ਮਹਾਰਾਜਾ ਰਣਜੀਤ ਸਿੰਘ ਪੰਜਾਬ ਟੈਕਨੀਕਲ ਯੂਨੀਵਰਸਿਟੀ, ਬਠਿੰਡਾ
MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
(A State Univ. Estd. by Govt. of Punjab vide Punjab Act No. 5 of 2015 and Approved u/s 2(f) & 12 (B) of UGC; Member AIU)
Bathinda-151001 (Punjab), India

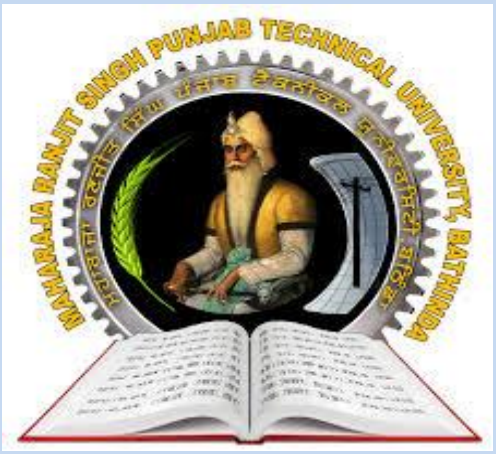
ANNUAL REPORT

2019

RESEARCH PUBLICATIONS

MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
Bathinda-151001 (Punjab), India

ANNUAL REPORT- RESEARCH PUBLICATIONS



2019

INTERNAL QUALITY ASSURANCE CELL
MAHARAJA RANJIT SINGH PUNJAB TECHNICAL UNIVERSITY
BATHINDA 151001

ANNUAL REPORT- RESEARCH PUBLICATIONS [2019]

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Year 2021

INTERNAL QUALITY ASSURANCE CELL

ANNUAL REPORT- RESEARCH PUBLICATIONS

2019

Sr. No.	Research Publications (2019)	Impact factor
Department of Pharmaceutical Sciences & Technology		
1.	Palakdeep K, Mandal UK (2019) Development and validation of a UV spectrophotometric method of mycophenolate mofetil useful at preformulation stage of microemulsion formulation *Research Journal of Pharmacy and Technology*, 10, 4777-4781.	UGC Care
2.	Hiral S, Mandal UK, Nivsarkar M, Shrivastava N (2019) Fabrication and evaluation of a medicated hydrogel film with embelin from Embeliaribes for wound healing activity, *Future Journal of Pharmaceutical Sciences*,5, 1-10.	UGC listed
3.	Sh, AA Taher M, Mandal UK, Jaffri, JM, Susanti, D, Mahmood, S, Zakaria. ZA (2019) Pharmacological properties of Centella asiatica hydrogel in accelerating wound healing in rabbits. *BMC complementary and alternative medicine* 19, 1-7.	3.659
4.	Kai BL, Gaurav A, Mandal UK, (2019) A review on co- processed excipients: current and future trend of excipient technology *International Journal of Pharmacy and Pharmaceutical Sciences* ,11, 1-9.	UGC listed
5.	Ashish D, Sharma A, Mandal UK, Kotwal P, Bhatt S, Nandi. U, (2019) Liquid chromatography-based methods for analysis of disease-modifying Antirheumatic drugs (DMARDs) in biological matrices. *Critical Reviews in Analytical Chemistry* 49, 224-242.	6.535
6.	Bappaditya C, Gorain B, Mohananaidu K, Sengupta P, Mandal UK, Choudhury H (2019) Targeted drug delivery to the brain via intranasal nanoemulsion: Available proof of concept and existing challenges. *International Journal of Pharmaceutics* 565, 258-268.	5.875
7.	Kyaw OM, Mahmood S, Wui, WT, Mandal UK, Chatterjee. B (2019) Effects of different formulation methods on drug crystallinity, drug-carrier interaction, and *ex vivo* permeation of a ternary solid dispersion containing nisoldipine *Journal of Pharmaceutical Innovation* 16, 26-37.	2.75
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	Department of Computer Science and Engineering	
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Department of Civil engineering		
80	Rani S, Bansal M, Kaur K, Sharma S (2019) Biosorption of copper(ii) ions using timber Industry waste-based biomass *Rasayan Journal of Chemistry*, 12, 1247-1261.	UGC Care
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Department of Textile		
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RESEARCH ARTICLE

Development and Validation of a UV Spectrophotometric Method of Mycophenolate Mofetil Useful at Preformulation Stage of Microemulsion Formulation

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ABSTRACT:
The main objective of this work was to develop and validate a simple UV spectrophotometric method to estimate mycophenolate mofetil required at preformulation stage for its microemulsion formulation. Absorption spectrum of the drug was recorded against methanol as a blank. Various analytical parameters such as linearity, limit of detection and quantification, accuracy, precision, stability and robustness were studied. The validated method was applied for solubility studies of the drug in various excipients to explore its microemulsion formulation. The developed method was found to be linear within the range of 5-35µg/ml. The limit of detection and quantification were found to be 0.796µg/ml and 2.412µg/ml, respectively. Other analytical parameters were within the range of ICH Q2 (R1) guidelines of analytical method validation. The developed UV method was successfully used to screen the solubility of few selected oils, surfactants and co-surfactants. The developed UV method of mycophenolate mofeteil can be used successfully for solubility studies required for microemulsion formulation.

KEYWORDS: Mycophenolate mofetil, UV-Spectrophotometeric method, validation, solubility study, microemulsion.

INTRODUCTION:

Psoriasis is a chronic inflammatory and disabling auto-immune disease that affects millions of individual world-wide. In general, psoriasis may occur at any age but it is most common in the age group of 50 to 69 years[1]. The basic parts of the body involved in psoriasis are skin and nails along with a number of comorbidities. It is clinically characterized by erythematous, sharply demarcated papules and rounded plaques covered by silvery micaceous scale. Epidermal hyper proliferation and immune-mediated dermal inflammation in psoriasis lead to profound adverse effects on patient's physical, social and mental well-being[2].

Drugs such as silymarin, calcipotriol, betamethasone dipropionate, sirolimus, cyclosporine, dithranol, acitretin, capsaicin, mycophenolate mofeteil etc are used orally and topically to treat the disease. Mycophenolate mofetil (MMF) is very effective among them. It is 2-(morpholin-4- yl) ethyl (4E)-6-(4hydroxy- 6-methoxy-7-methyl-3-oxo 1, 3 dihydroisobenzofuran- 5-yl)-4-methylhex-4-enoate (Fig. 1). It belongs to BCS Class II of drugs characterized by a strongly pH-dependent solubility profile[3]. It is an immune-suppressant and prodrug of mycophenolic acid (MPA), extensively used to prevent rejection in organ transplantation[4]. MPA, a product of a Penicillium fungus, was originally isolated in 1896. MPA has anti-neoplastic, anti-viral, antifungal and immunosuppressive activity[5]. MMF has recently been added to therapeutic regimens for psoriatic skin disorder[6]. It is commercially available as capsules (250 mg), immediate-release tablets (500mg), delayed-release tablets (180 and 360mg) and oral suspension (200mg/ml). Its oral use is associated with side effects such as nausea, leucopenia, sepsis and diarrhoea[7]. That's why chronic use of the drug for psoriasis is not advisable for the patients.

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Future Journal of Pharmaceutical Sciences

RESEARCH Open Access

Fabrication and evaluation of a medicated hydrogel film with embelin from *Embelia ribes* for wound healing activity

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Abstract

Background: There has been huge interest among the researchers to incorporate a medicinally active compounds in hydrogel sheets for effective treatment of wound healing. This research work involves development and evaluation of medicated hydrogel sheet incorporated with embelin which has both antimicrobial and wound healing activity. Embelin was isolated from the fruits of *Embelia ribes* and characterized by various physical and analytical methods like melting point, UV/VIS spectroscopy, and HPTLC. The hydrogel sheets containing polyvinyl alcohol and polyethylene glycol was prepared by freeze-thaw technique, where isolated embelin was successfully incorporated within the sheet. The prepared hydrogel sheets were further characterized by *in vitro* drug release study, swelling capacities, gel fraction, water vapor transmission rate (WVTR), mechanical strength, and scanning electron microscopy (SEM) study. Finally, the optimized hydrogel with embelin was evaluated for its wound healing efficacy *in vivo* using excision wound model on Sprague–Dawley rats.

Results: The optimized hydrogel sheet had a composition of 5% PEG 400 and 10% PVA. It had acceptable in physico-chemical properties with respect to swelling capacities, gel fraction, water vapor transmission rate (WVTR), and mechanical strength The release of the drug from hydrogel followed zero order kinetics with more than 80% drug release within 12 h. The in vivo studies on the Sprague–Dawley showed faster healing process with embelin loaded hydrogels as compared to the control and market formulation.

Conclusions: Sheet hydrogel with 0.2% embelin was found to have huge potential for moist wound healing activity.

Keywords: Wound healing, Hydrogel sheet, Polyvinyl alcohol, Polyethylene glycol, Embelin

Background

Apart from financial burden, wounds and particularly chronic wounds (that do not heal within 3 months) causes a lot of sufferings to patients in their social life. In the USA, chronic wound related complications affect 5.7 million patients, which costs an estimated 20 billion dollars annually [1]. Increased number of geriatric patients together with a huge volume of surgeries and increased awareness about wound care products among the presents have resulted such a steep growth of this market. According to the Global Wound Care Market report, the Wound Care Market accounted a value of $18.22 billion in 2016 and is projected to reach a value $26.24 billion at the end of 2023. According to another recent past market survey with forecast for world market of wound management products until the year 2022, demand for wound management products is expected to grow at a compound annual growth rate (CAGR) of 6.7% (https://www.psmarketresearch.com/press-release/wound-care-market). As per that survey, China will form the fastest expanding wound management; however, the significant market growth will be experienced by North America (CAGR 7.1%), Asia pacific (CAGR 7.2%), Europe, and other regions. This has obviously drawn huge attention to the pharmaceutical manufacturers to develop patient-friendly wound care products.

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Novel approaches for ocular drug delivery: A review

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Abstract: Nanocaarier have been recently studied for their relevance in ophthalmic drug delivery. These systems are capable to evade the ocular barriers that presently edge the efficacy of conventional treatments, as well as offer additional sustained release of drug, decreasing the administration frequency and increasing patient compliance. This review summarizes the ophthalmic drug delivery from conventional treatment to the utilization of nanocarriers as novel drug delivery system.

Key words: Drug delivery, Nanocaarier, Novel drug delivery system, Ocular, Emulsions, Implants

Introduction

Eye is special and profoundly organ on account of its perplexing capacity. Its life structures, physiology and natural chemistry make this organ carefully impervious to external substances. The test ahead of formulator is to detailing of particular sorts of dose structure which can't create any tissue harm of eye. For infection of the eye, topical organization is normally best more than the systemic organization. Anatomical contrast of each layer of the visual tissues can bring about a noteworthy obstruction for medication conveyed by any course, i. e., topical, intraocular and systemic. For any medication organization, firstly the medication atoms cross the precorneal obstruction, and then cross the corneal hindrance. Precorneal obstruction comprise of the tear (film) and the conjunctiva that moderate the conveyance of medication into the visual tissues furthermore in charge of decreased bioavailability of customary visual details. The centralization of imparted dosage begins diminishing inside of 2 minutes at precorneal territory in people. Cornea is the major organic barrier to infiltration of the solution (1,2). Ocular bioavailability of medication particle is additionally relying on couple of physiological properties of medication including, protein tying, drug digestion system, lacrimal seepage and so on and physiological components which can influence the medication's visual bioavailability (3). Figure 1 reveals the destiny of visual medication retention. In any case, for the most part of the visual details are rapidly lost amid nasolacrimal seepage right away. Different types of dosage forms are used for different ocular diseases. Like the Conventional ocular dosage forms (eye solutions, suspentions, ointments etc), these are mostly used for ocular disease management. More than 90% of the promoted visual measurement structures are as eye drops, suspension, treatments, gels and so forth (4). These dosage forms are mainly target the ocular anterior segme. But due to the less contact time, these dosage forms have not more therapeutic effects on eye. To defeat these problems, novel ocular dosage formsare used for various ocular diseases. Like controlled ocular dosage form that are implants, ocular inserts, contact lenses, iontophoresisetc, have sustained release properties by slow degradation of polymer (5). They also enhance the retention time of drug in cul-de-sac of eye. The colloidal systems including lioposomes, niosomes, nanoparticles etc, penetrate into the deeper tissues of eye and increase the ocular drug absorption. They additionally keep the metabolic system of medications from the catalysts that present at eye tissues (6). These can keep up medication movement at its site of activity and are suitable for inadequately water-solvent medications. The advanced ocular dosage forms like cyclodextrins, they increase the solubility of poorly aqueous soluble drug. Another is quality conveyance that conveys the nucleic acids to a particular site of eye. In this way, progressing research on Novel ocular dose

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RESEARCH ARTICLE Open Access

Pharmacological properties of *Centella asiatica* hydrogel in accelerating wound healing in rabbits

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Abstract

Background: Various extracts of *Centella asiatica* (Apiaceae) and its active constituent, asiaticoside, have been reported to possess wound healing property when assessed using various in vivo and in vitro models. In an attempt to develop a formulation with accelerated wound healing effect, the present study was performed to examine in vivo efficacy of asiaticoside-rich hydrogel formulation in rabbits.

Methods: Asiaticoside-rich fraction was prepared from *C. asiatica* aerial part and then incorporated into polyvinyl alcohol/polyethylene glycol (PVA/PEG) hydrogel. The hydrogel was subjected to wound healing investigation using the in vivo incision model.

Results: The results obtained demonstrated that: i) the hydrogel formulation did not cause any signs of irritation on the rabbits' skin and; ii) enhanced wound healing 15% faster than the commercial cream and > 40% faster than the untreated wounds. The skin healing process was seen in all wounds marked by formation of a thick epithelial layer, keratin, and moderate formation of granulation tissues, fibroblasts and collagen with no fibrinoid necrosis detected.

Conclusion: The asiaticoside-rich hydrogel developed using the freeze-thaw method was effective in accelerating wound healing in rabbits.

Keywords: Asiaticoside, *Centella asiatica*, Apiaceae, Hydrogel film, Wound dressing, Wound healing, PVA/PEG

Introduction

It is currently estimated that approximately six million people globally suffer from chronic wounds. Wound healing process is a defined biological procedure that regenerate tissues, it involves complex cascade of events that are divided into three main unique, yet overlapping, phases include inflammation, proliferation and maturation [1–5]. Furthermore, the wound healing mechanism encompasses complex interactions between the various cell types, the components of the extracellular matrix and the cytokine mediators [2, 4, 5]. Even though the natural wound healing mechanism to recover damaged tissues is initiated when a wound is introduced, yet a suitable dressing for the wounds should be used. To enhance the healing process, the dressing is ought to be able to intervene at the precise phase of wound healing or providing the right environment for the wound to heal [1, 6]. In general, a good and effective wound dressing ought to have the ability to maintain a moist wound environment, protect the wound from secondary infection, heal the wound faster, reduce wound bed necrosis and will not introduce a secondary trauma to the regenerated tissues once the dressing is removed from the healed wounds. Additionally the wound dressing should be biocompatible with the tissues as well as blood, not antigenic, not toxic and with suitable elasticity [1, 4, 6, 7]. In light with these requirements, biocompatible

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Review Article

A REVIEW ON CO-PROCESSED EXCIPIENTS: CURRENT AND FUTURE TREND OF EXCIPIENT TECHNOLOGY

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ABSTRACT

There is no single-component excipient fulfills all the requisite performance to allow an active pharmaceutical ingredient to be formulated into a specific dosage form. Co-processed excipient has received much more attention in the formulation development of various dosage forms, specially for tablet preparation by direct compression method. The objective of this review is to discuss the emergence of co-processed excipients as a current and future trend of excipient technology in pharmaceutical manufacturing. Co-processing is a novel concept of combining two or more excipients that possess specific advantages that cannot be achieved using a physical admixture of the same combination of excipients. This review article discusses the advantages of co-processing, the need of co-processed excipient, general steps in developing co-processed excipient, limitation of co-processed excipient, technologies used in developing co-processing excipients, co-processed excipients in the literature, marketed products and future trends. With advantages offered by the upcoming newer combination of excipients and newer methods of co-processing, co-processed excipients are for sure going to gain attraction both from academia and pharmaceutical industry. Furthermore, it opens the opportunity for development and use of single multifunctional excipient rather than multiple excipients in the formulation.

Keywords: Orally disintegrating tablet, Oral drug delivery, Co-processed excipient, Direct compression

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INTRODUCTION

In the past 10 y, the focus of both academia and pharmaceutical industry has been shifted from developing new active pharmaceutical ingredient (API) to formulation technology [1]. Pharmaceutical excipients have played a major role in that shift. Pharmaceutical excipients are defined as the substances other than the API which has been appropriately evaluated for safety and are intentionally included in a drug delivery system [2]. The International Pharmaceutical Excipients Council (2009) defines excipients as the substances which present in a finished pharmaceutical dosage form other than the active drug substance [3]. Excipient can be classified into four categories generally: single entity excipient, a physical blend of multiple excipients, new chemical entity excipient and co-processed excipient [4].

It is generally agreed by the formulation scientist that there is no single-component excipient fulfills all the requisite performance to allow an active pharmaceutical ingredient to be formulated into a specific dosage form [5]. On the other hand, developing a new chemical entity excipient requires a huge sum of investment [6]. To counter this issue, formulation scientist has introduced a novel concept of co-processing which is combining of two or more excipients that possess significant advantages that cannot be achieved using a physical admixture of the same combination of excipients [7]. A co-processed excipient is a combination of two or more compendial or non-compendial excipients designed to modify their physical properties in a manner not achievable by simple physical mixing, and without significant chemical change [2]. By formulating few excipients into a single composite material with specialized manufacturing method leads to an improvement in functionality of the end product [8]. This has become a newer trend in formulation development [9].

Co-processed excipient has received much more attention in the formulation development of various dosage forms such as a tablet, capsule, powder, cream, ointment, and others [10]. It is different from the physical mixture. Physical mixture is just a simple admixture combining few excipients by short duration shear processing. However, in the case of co-processed excipients, they possess performance advantages that cannot be achieved using a physical admixture of the same combination of excipients [11]. Combination of economical excipient with others of optimal quantity of a functional material will produce an integrated product with superior functionality than the simple mixture of components [12]. Co-processing generally does not involve chemical change. The changes in functionality are often contributed by the change in physical properties of the excipient particles [13].

Oral delivery remains the most popular route of drug delivery [14]. It is because the oral drug delivery system has the key advantage of convenient drug administration. Tablets and hard gelatin capsules constitute a major portion of drug delivery systems that are currently available due to its convenience of self-administration, compactness and simple manufacturing process [15, 16]. Moreover, the drug is found to be more stable in solid dosage form than liquid dosage form [17].

The most common methods to manufacture tablets are wet granulation, dry granulation and direct compression [18]. If the major components of a formulation have already possessed good fluidity and compressibility, granulation would be redundant. Direct compression was reported as one of the most preferred methods due to some advantages such as time-saving, ease of production due to few steps involved, the absence of heat and moisture in the process [19]. In the survey by Shangraw and Damarest (1993), it was shown that direct compression was the most preferred tablet manufacturing method compared to wet granulation and roller compaction. About 41% of the companies indicated that direct compression was the method of choice, and 41.1% indicated that they used both direct compression and wet granulation. Only 1.7% of the respondents indicated that they never used direct compression and 15.5% indicated that the process was not recommended [19].

A further advantage of direct compression is that tablets disintegrate into the primary particles bypassing granular aggregation stage. As a result, the effective surface area increases and dissolution of the drug

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Liquid Chromatography Based Methods for Analysis of Disease-Modifying Antirheumatic Drugs (DMARDs) in Biological Matrices

Ashish Dogra, Anjna Sharma, Uttam Kumar Mandal, Pankul Kotwal, Shipra Bhatt & Utpal Nandi

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Review

Targeted drug delivery to the brain via intranasal nanoemulsion: Available proof of concept and existing challenges

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ABSTRACT

Intranasal delivery has shown to circumvent blood-brain-barrier (BBB) and deliver the drugs into the CNS at a higher rate and extent than other conventional routes. The mechanism of drug transport from nose-to-brain is not fully understood yet, but several neuronal pathways are considered to be involved. Intranasal nanoemulsion for brain targeting is investigated extensively. Higher brain distribution of drug after administering intranasal nanoemulsion was established by many researchers. Issues with nasomucosal clearance are solved by formulating modified nanoemulsion; for instance, mucoadhesive nanoemulsion or *in situ* nanoemulgel. However, no intranasal nanoemulsion for brain targeted drug delivery has been able to cross the way from 'benches to bedside' of patients. Possibilities of toxicity by repeated administration, irregular nasal absorption during the diseased condition, use of a high amount of surfactants are few of the persisting challenges that need to overcome in coming days. Understanding the ways how current developments has solved some challenges is necessary. At the same time, the future direction of the research on intranasal nanoemulsion should be figured out based on existing challenges. This review is focused on the current developments of intranasal nanoemulsion with special emphasis on the existing challenges that would help to set future research direction.

1. Introduction

Nature created biological barriers in the human body system helps to prevent external interferences to invade. The barriers for the central nervous system (CNS) are therefore very much essential between peripheral and CNS interface. The blood-brain-barrier (BBB) and cerebrospinal fluid (CSF) at different layers of the human brain (Engelhardt and Liebner, 2014) function to protect the brain from various external threats, including toxins or pathogens and preserve its unique physiological nature. These BBB forms the interface between blood capillaries and CNS tissues, which selectively allows access of necessary nutrients and hormones, while restricts the entry of other external materials including therapeutic agents (Patel and Prey, 2015). As a result of this permanent barrier, almost all large drug molecules and most of the small molecules could not enter into the CNS following oral or systemic administration (Gorain et al., 2018; Pardridge, 2016). Specific transportation systems are desirable to deliver the therapeutics into the brain. Active transport and passive diffusion through endothelial cells are the two principal mechanisms by which therapeutic agents can enter into the brain. But the endothelial cells of capillaries present in the BBB are effectively precluded by very stringent and tight junctions, which restricts the diffusional transport mechanism of the drugs (Rankovic, 2015). Therefore, modified drug deliveries specially designed to target CNS are necessary to make high molecular weight or highly water soluble drugs available at the site of action, where the conventional oral or parenteral route of drug administration fails to achieve the desired goal. Nanotechnology based systems either by targeted nanoparticles delivered by injection or lipid carrier meditated nanoformulation is among the promising approaches of brain targeting (Choudhury et al., 2018; Micheli et al., 2012).

Now-a-days, a great focus has been given towards intranasal route as a promising and novel alternative to the invasive methods for

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Effects of Different Formulation Methods on Drug Crystallinity, Drug-Carrier Interaction, and Ex Vivo Permeation of a Ternary Solid Dispersion Containing Nisoldipine

May Kyaw Oo, Syed Mahmood, Wong Tin Wui, Uttam Kumar Mandal & Bappaditya Chatterjee

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Inflammopharmacology

REVIEW ARTICLE

Activation of microglia and astrocytes: a roadway to neuroinflammation and Alzheimer's disease

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Abstract

Alzheimer's disease (AD) is a neurodegenerative disease that is of high importance to the neuroscience world, yet the complex pathogenicity is not fully understood. Inflammation is usually observed in AD and could implicate both beneficial or detrimental effects depending on the severity of the disease. During initial AD pathology, microglia and astrocyte activation is beneficial since they are involved in amyloid-beta clearance. However, with the progression of the disease, activated microglia elicit detrimental effects by the overexpression of pro-inflammatory cytokines such as interleukin (IL)-1β, IL-6, and tumor necrosis factor-α (TNF-α) bringing forth neurodegeneration in the surrounding brain regions. This results in decline in Aβ clearance by microglia; Aβ accumulation thus increases in the brain resulting in neuroinflammation. Thus, Aβ accumulation is the effect of increased release of pro-inflammatory molecules. Reactive astrocytes acquire gain of toxic function and exhibits neurotoxic effects with loss of neurotrophic functions. Astrocyte dysfunctioning results in increased release of cytokines and inflammatory mediators, neurodegeneration, decreased glutamate uptake, loss of neuronal synapses, and ultimately cognitive deficits in AD. We discuss the role of intracellular signaling pathways in the inflammatory responses produced by astrocytes and microglial activation, including the glycogen synthase kinase-3β, nuclear factor kappa B cascade, mitogen-activated protein kinase pathways and c-Jun N-terminal kinase. In this review, we describe the role of neuroinflammation in the chronicity of AD pathogenesis and an overview of the recent research towards the development of new therapies to treat this disorder.

Keywords Alzheimer's disease · Microglia · Astrocytes · Pro-inflammatory cytokines · Neuronal synapses · Neuroinflammation

Introduction

Alzheimer's disease (AD) is a progressive neurodegenerative brain disorder and is a major cause of dementia making up to 80% of all dementia cases (Wilson et al. 2012). AD is characterized by the presence of extracellular amyloid-beta (Aβ) deposits and intracellular neurofibrillary tangles (NFTs) that are responsible for neuronal dysfunction and cell death primarily by persistent inflammation and oxidative stress (Zhao and Zhao 2013). AD is the most common form of dementia that affects nearly 24 million population in the world in 2011 and the prevalence rate is estimated to be doubled by the year 2030 (Reitz et al. 2011; Duthey 2013). AD is a multifactorial disease driven from genetic and environmental factors and is classified as familial AD (FAD) and sporadic AD (SAD). FAD comprises of 5% AD cases, caused by mutations in the APP, presenilin1 or presenilin2 genes which cause the production of Aβ peptides. SAD constituting more than 95% AD dementia cases has no specific family link, although expression of apolipoprotein E4 (APOE4) with a role in the transportation of lipids, cholesterol and other hydrophobic molecules into the brain region contributes to the development of SAD. SAD can also be caused by environmental factors such as mental and emotional stress, and genetic risk factors such as mutations and polymorphisms in the microglial and astrocytic genes, signifying the role of myeloid cells in the development of SAD (Bisht et al. 2018).

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Simultaneous Estimation by RP-HPLC Method for the Immunosuppressant Drug Combination: Mycophenolate Mofetil, Tacrolimus with Prednisolone

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ABSTRACT

In current scenario, treatment of any disease depends upon two major factors i.e. patient compliance and effective dosage regimen. The effective dose delivered by a dosage form to a patient depends on various parameters, which can be assessed by an effective and economic analytical method. In the present study a precise analytical method for estimating the combination of immunosuppressant drugs mycophenolate mofetil (MMF), tacrolimus (TAC) and prednisolone through RP-HPLC was developed. The mobile phase contained a mixture of acetonitrile and 0.35% triethylamine (pH 4.2) with orthophosphoric acid (70:30). As per ICH guidelines the optimized RP-HPLC method was validated with respect to linearity, limit of detection (LOD), limit of quantitation (LOQ), accuracy, precision, repeatability, robustness, ruggedness. The accuracy of the method was determined in terms of % recovery of the standard. The obtained test results were compared with that of the standard drug. The results of the recovery study were found to be within the acceptance criteria (96.93- 103.99%), which indicated a good degree of sensitivity of the developed method in detection of analytes in a sample.

Keywords: Dosage regimen, mycophenolate mofetil, prednisolone, RP-HPLC, ICH, tacrolimus

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INTRODUCTION

Immunosuppression causes decrease in the immunity of the body and its ability to fight with various infections. Immunosuppressant drugs generally weaken the immune system so that it cannot differentiate the transplanted organ from the rest of the body, resulting

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AN SURVEY ON OBESITY STIGMA AND ITS ASSESSMENT WITH UPDATE : A REVIEW

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Abstract

Obesity word comes from Latin language "Obesitas" indicates stout, fat or plump nature. The fatness in person more than their usually body requirement or having BMI more than 30 is known as obese person. An obese person is in severe condition that it can lead to further more diseases like hypertension, diabetes, myocardial infarction, peripheral vascular disease, stroke, heart attack, etc. The number of obese persons is increasing day by day in the world. In most of time obesity is caused due to consumption of excessive amount of food and moving deficient. It is due to intake of high energy diet, particularly fat and sugars, however we do not burn off the energy through determine and physical action, abundant of the surplus energy will be accumulated by the human body as fat. It has been detailed that in the event that we adjust the good nourishment and diminishing terrible nourishment such as fast food or junk food and adjusting good life style like waking up and running, gym workout makes a difference to decrease in the obesity. Other strategies are moreover accessible for treating obesity like Acupuncture, Hot spa, Medication but the lifestyle and diet are find to be key role player in treating obesity. In present study a survey questionnaire was planned and reaction was reported online in google form. The study was conducted with 212 people's responses gotten through web against 17 questions/query asked. The questions are related to their life style, diet and medication which is particularly related with their diet propensities.

Keywords: Obesity, BMI, Life style, WHO, Diet

Introduction

The word obesity comes from Latin language "obesitas" which having several meanings like stout, fat or plump. According to WHO Obesity and overweight is abnormal or excessive fat accumulated in body which further leads to risk to health. Obesity is a state of body in which accumulated fat over the limit will cause to the adverse effect on health. It may lead to the reduced life expectancy and or increased health problems. Obesity can be determined by the dividing weight of a person by the square of the height of the person in meters. If that value is 25 or above then it will know as overweight as and more than 30 it will term as obese. This value or method is known as Body Mass Index (BMI) (PL Rajagopal *et al.*, 2016; Knai C *et al.*, 2007; George P *et al.*, 2011). Triglycerides [TGs] are biochemical basis of obesity which forms due to deposition of fatty acids into the cells. Generally, there are two reasons of obesity, High fat diet food and a diet which having low amount of vitamins, minerals and other nutrient. The daily intake of high-fat diet food can cause obesity. Decreased amount of physical works which can be due to daily routine, technology, change in modes of transformation etc. There are some more reasons like junk food, not enough sleep, medicine reaction, genetics, etc which also can cause obese (Kelly *et al.*, 2008; McAlpine *et al.*, 2007; Sampsel *et al.*, 2007).

Obesity can cause hypertension, diabetes, myocardial infraction, peripheral vascular disease, stroke, heart attack, etc. The extra mass or weight of body put stress on every part of body. There is a high risk of joint pain in obesity. This pain is because of extra mass which can cause osteoarthritis. Also, the extra mass accumulated at the sight of heart can cause heart attack, congestive heart failure and stroke. Hypertension, High blood glucose, sleep apnea also caused by obesity. Obesity taker as a most effective factor for type-II diabetes. Because obesity which is in particular area of intra-abdomen can increase FFC (Free Fatty Acid) concentration in blood plasma which gives a major negative effect on insulin. Sensitivity in both muscle and liver. Besides the insulin resistance it secretes defective insulin which can cause type-II diabetes. Diabetes is a late phenomenon in obesity. Several diseases of heart, blood pressure, fatigue, etc. are also connected with obesity. So, we can take obesity as a major threat for our health. For cure this threatened disease, there are some drugs from ancient time like *Mellisa officinalis* [Labitae], *Bambusa textilis* [bambusoideae], *Crinum asiaticum* [amaryllidaceae], *Vitis thunbergii* [vitaceae], *Nielumbo nucifera* [nelumbonaceae] etc. which having the anti-obesity properties (Zachary Bloomgarden, 2003; WHO, 2015; Kaur *et al*, 2018).

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Imiquimod-oleic acid prodrug loaded cream reduced drug crystallinity and induced indistinguishable cytotoxicity and apoptosis in mice melanoma tumour

Akanksha Sharma, Dharampal Sharma, Ashish Baldi, Kiran Jyoti, Ramesh Chandra & Jitender Madan

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Review Article

Theme: Lipid-Based Drug Delivery Strategies for Oral Drug Delivery
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Recent Advances in Formulation Strategies for Efficient Delivery of Vitamin D

Rahul Gupta,[1] Chittaranjan Behera,[1] Gourav Paudwal,[1] Neha Rawat,[2] Ashish Baldi,[2] and Prem N. Gupta[1,3]

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Abstract Deficiency of vitamin D is a global concern affecting a huge number of human populations. This deficiency has a serious impact on human health not only affecting bone mineral density but also becoming the reason for cardiovascular disorders, infectious diseases, autoimmune diseases and cancers. Exposure to sunlight is the major source of vitamin D, but due to the present day-to-day lifestyle of working in a shade arouses the need for exogenous sources of vitamin D. Ergocalciferol (vitamin D2) and cholecalciferol (vitamin D3) are the two major forms of vitamin D, which are hydrophobic in nature and highly susceptible to environmental conditions, like temperature and light. Therefore, novel drug delivery systems could be explored for efficient delivery of vitamin D. In this review, a brief account of vitamin D is provided followed by a detailed description of recent advances in various delivery systems, including solid lipid nanoparticles, nanoemulsion, self-emulsifying drug delivery systems, polymeric nanoparticles and solid dispersion, for the efficient delivery of vitamin D.

KEY WORDS: nanoformulations; vitamin D; ergocalciferol; cholecalciferol; solid lipid nanoparticles.

INTRODUCTION

Nutritional deficiencies and inadequacies have become a major health issue all across the globe. Deficiency in vitamin D, folate and iron is noted among adolescents, children, pregnant women and elderly (1). Deficiency of vitamin D is one which always remains underdiagnosed due to false perceptions that a few minutes in sunlight and regular diet provide sufficient amount of vitamin D (2). High-altitude areas, socio-religious cultural practices, seasonal changes, sun avoidance and excessive use of sunscreen are some of the limitations responsible for vitamin D deficiency. The scarcity of vitamin D in natural products has led fortification of staple foods as the most prominent and viable strategy to overcome deficiency; unfortunately, this strategy has failed till date, as only a few fortified products are available in the market. Fortification is the only option, which if utilized at a large scale can become successful for providing 2000 IU daily dose requirement and help in reducing the menace of associated diseases (3).

Guest Editor: Sanyog Jain

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Biological Functions

Vitamin D is an essential micronutrient that enables small intestine to absorb calcium and phosphorus from food sources. Absorbed minerals are required for normal cellular functions in all cells, nerve conduction, muscle contraction and mineralization of the bone; so, deficiency of vitamin D is a major menace causing rickets, osteomalacia, hyperparathyroidism and osteoporosis (4,5). New analogues of vitamin D have been developed and under clinical trial for its efficiency in the treatment of psoriasis. Such activity actually relies on its immuno-modulatory action of inhibiting cellular proliferation and differentiation (6). Type 1 and type 2 diabetes mellitus patients are reported being in jeopardy if they are vitamin D deficient, as chances of cardiovascular mortality, insulinemia and glucose intolerance increase (7–9; Fig. 1). The efficiency of vitamin D analogues as an anticancer agent has also been reported due to its ability in inhibition of proliferation, differentiation and angiogenesis (10–11).

Recommended Dietary Intake

The concentration of 25-hydroxyvitamin D [25(OH)D] in serum indicates vitamin D status, and minimum required concentration is 20 ng/ml (12; Table I). As per the Institute of Medicine (US), a study on Germans (aged 20–70 yrs) showed no sign of vitamin D deficiency in those having blood concentration of 25(OH)D more than 20 ng/ml. However, there is also some literature which observed the evidence of

Sr.no 14

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4-Bromo 4'-chloro pyrazoline analog of curcumin augmented anticancer activity against Human cervical cancer, HeLa cells: *In-silico* guided analysis, synthesis and *in-vitro* cytotoxicity

Monika Chaudhary, Neeraj Kumar, Ashish Baldi, Ramesh Chandra, M. Arockia Babu & Jitender Madan

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Open Access to Pharmaceutical and Medical Research

Open Access Research Article

and Validation of Hptlc Method for the Simultaneous Estimation of Ascorbic Acid and Gallic Acid in Amla Juice Preparation

Mela Singh[1], Dharmender Kumar[2], Subh Naman[1], Nupur Madhavi[1], Preet Amol Singh[1], Neha Bajwa[1], Ashish Baldi[1]*

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ABSTRACT

The aim of this study was to asses a simple, selective, precise, and reproducible high performance thin-layer chromatography (HPTLC) method for the simultaneous estimation analysis of ascorbic acid (AA) and gallic acid (GA) in amla juice preparation. The aluminium-based pre-coated TLC plates (Silica gel G 60F 254) were used for the HPTLC fingerprinting analysis. The chromatograms of samples were developed in twin trough glass chamber pre-saturated with mobile phase (toluene: ethyl acetate: methanol: formic acid; 3:3:2:1, v/v/v/v) at room temperature (25 ±2°C). The densitometric analysis was carried out in absorbance mode at 254 nm. The optimized mobile phase showed compact spots of AA and GA at 0.59 and 0.86 *Rf* respectively. The linear regression analysis data for the calibration plots of AA and GA showed good linearity (r^2= 0.992 and 0.996 respectively) with respect to peak area in the range of 200-1400 ng/spot. The method was validated as per International Conference on Harmonization (ICH) guidelines. The limits of detection and quantification (40 and 140 ng/spot, respectively) were also established. The proposed method has shown the excellent recovery (98.97–99.89%), which supports the suitability of the method for the analysis of AA and GA in the amla juice and other preparations containing these ingredients.

Keywords: Amla juice, Ascorbic acid, Gallic acid, HPTLC, ICH guidelines, Validation.

Article Info: Received 19 May 2019; Review Completed 21 June 2019; Accepted 28 June 2019; Available online 15 July 2019

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1. INTRODUCTION

Herbal drugs are complex in nature and inherent variability of the chemical constituents in plant based drugs so it is difficult to establish quality control parameters by using analytical techniques. Antioxidants are the substances which play a vital role and help to defend the body against cell damage caused by free radicals which are produced by various degenerative changes in our body leading to ailments such as heart disease, hardening of the arteries, inflammatory conditions, cataracts and other visual problems, arthritis and rheumatism, diabetes and cancer[1,2]. *Emblica officinalis* (Euphorbiaceae) is commonly known as Indian gooseberry or amla is found throughout the different regions of India. It is most important medicinal plant in the Indian traditional system of medicine as in the Ayurveda as various parts of the plant are used to treat wide range of diseases[3,4]. The fruit of *E. officinalis* are acidic in nature, bitter in taste and rich in vitamin C[3,4]. The amla fruit is used either alone or in combination with other plants to possess pharmacological activity like laxative, livertonic, stomachic, restorative, alterative, cardioprotective, gastroprotective, antianemia, antihypercholesterolemia, cytoprotective, hepatoprotective, antimutagenic, anticarcinogenic, nephroprotective, neuroprotective and radiomodulatory, chemomodulatory, chemopreventive effects, antioxidant, anti-inflammatory, and immunomodulatory activities[7-9]. Ascorbic acid (AA) and gallic acid (GA) are the major antioxidants found in the amla fruits. Therefore, they can be used as bioactive markers for standardization of herbal preparation[10,11]. According to the literature surveyed there are no reports on (HPTLC) method for simultaneous estimation of AA and GA in herbal amla juice. The

Sr.no 16

Current Pharmaceutical Design

Title: Recent Advances in Solid Dispersion Technology for Efficient Delivery of Poorly Water-Soluble Drugs

VOLUME: 25 **ISSUE:** 13

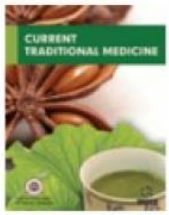
Author(s): Gourav Paudwal, Neha Rawat, Rahul Gupta, Ashish Baldi*, Gurdarshan Singh and Prem N. Gupta*

Affiliation:PK-PD Toxicology & Formulation Division, CSIR-Indian Institute of Integrative Medicine, Jammu, Department of Pharmacy, Maharaja Ranjit Singh Punjab Technical University, Bathinda, PK-PD Toxicology & Formulation Division, CSIR-Indian Institute of Integrative Medicine, Jammu, Department of Pharmacy, Maharaja Ranjit Singh Punjab Technical University, Bathinda, PK-PD Toxicology & Formulation Division, CSIR-Indian Institute of Integrative Medicine, Jammu, PK-PD Toxicology & Formulation Division, CSIR-Indian Institute of Integrative Medicine, Jammu

Keywords: Solid dispersion (https://www.eurekaselect.com/search/aws_search.php?searchvalue=Solid dispersion), polymers (https://www.eurekaselect.com/search/aws_search.php?searchvalue= polymers), poorly soluble drug (https://www.eurekaselect.com/search/aws_search.php?searchvalue= poorly soluble drug), oral delivery (https://www.eurekaselect.com/search/aws_search.php?searchvalue= oral delivery), bioavailability (https://www.eurekaselect.com/search/aws_search.php?searchvalue= bioavailability), hydrophilic polymers. (https://www.eurekaselect.com/search/aws_search.php?searchvalue= hydrophilic polymers.)

Abstract: Drug discovery is generally considered as a costly affair and it takes approximately 15 years to reach a new chemical entity into the market. Among the recent potent drug molecules with most effective pharmacological properties, very few reached for Phase I clinical trial in humans. Unfortunately, the historical average reveals an almost 90% overall attrition rate in clinical trials. The solubility and permeability of a drug are the critical factors influencing the success of a drug. Oral drug delivery systems still continue to exist as the most favored, simplest and easiest administration route. A huge number of potential clinical candidates won't make it to the market or accomplish their maximum capacity except if their solubility and oral bioavailability are enhanced by formulation. The solubility of drugs will continue to exist as important aspects of formulation development. With the emergence of synthetic methods for new molecule synthesis in chemistry and better screening methods, the number of poorly water soluble compounds has dramatically expanded in the last few years. Solid dispersion is one of the most important techniques as it can be prepared by several methods. It is mostly prepared with a drug having poor water solubility and it explores hydrophilic polymers either individually or in combination for the enhancement of solubility. In comparison to the conventional formulations such as tablets or capsules, there are different methods with which solid dispersions can be prepared and also have many benefits over conventional drug delivery approaches. Solid dispersion systems are potential for increasing the solubility, oral absorption and bioavailability of drugs and the significance of the solid dispersion technology is constantly increasing. The main focus of this review is to present recent advancements in the area of solid dispersion. This review also includes an account of recent patents on solid dispersion and clinical status of solid dispersion based formulations.

Sr.no 17



A Comprehensive Review on *Pistacia integerrima*

Authors: Jeet, Kamal; Baldi, Ashish
Source: Current Traditional Medicine, Volume 5, Number 2, 2019, pp. 98-113(16)
Publisher: Bentham Science Publishers
DOI: https://doi.org/10.2174/2215083805666181213154344

Abstract | References | Citations | Supplementary Data | Article Media | Metrics

Pistacia integerrima J.L. Stew. Ex Brandis belonging to the family Anacardiaceae and subfamily Anacardioideae is one of the widely accepted plants used to cure a vast array of diseases. Various ethnomedicinal and traditional database of different medicinal systems revealed a diverse array of curative and protective therapeutic potential of this plant. Since ancient times different parts of the plants are still in prevalence in the formulation of herbal medicines. This plant is being used in treating various ailments like Gastrointestinal tract (GIT) and respiratory tract disorders. The aim of the present review is to explore the traditional and modern knowledge including the botanical description, ethnomedicinal claims, pharmacognostic parameters, phytochemicals and pharmacological potential of P. integgerima. The comprehensive literature and relevant information regarding the plant were gathered through electronic databases including Google Scholar, Pub Med, Science direct, online open access databases and books from the college library. The review represents consolidated summary in all aspects of plant with a special emphasis on reported phytochemicals isolated from plant and their therapeutic potential. The rearranged data in the form of a single review will be essential in providing updated knowledge to the readers regarding the plant and it will act as a baseline for future exploration of P.integerrima in terms of its phytochemistry and pharmacology.

Keywords: Alzheimer; cytotoxic; galls; gold nano particles; kakad singi; kakar; phytotoxic; safety
Document Type: Review Article
Publication date: June 1, 2019

More about this publication?

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Available online on 15.07.2019 at http://jddtonline.info

Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Research Article

Formulation and Evaluation of Novel Herbal Formulations Incorporated with Amla Extract for Improved Stability

Nupur Madhavi[1], Dharmender Kumar[2], Subh Naman[1], Mela Singh[1], Preet Amol Singh[1], Neha Bajwa[1], Ashish Baldi[1*]

[1] *Department of Pharmaceutical Sciences and Technology, Maharja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India*

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ABSTRACT

The objective of the present study was to formulate effervescent and fast dispersible granules by incorporating the fruit extract of *Emblica officinalis* as an alternate of liquid herbal juices available in market. Amla juice was extracted manually and then subjected to preliminary phytochemical screening which indicates the presence of alkaloids, glycosides, flavonoids, carbohydrates, phenolic compounds, proteins and phytosterols. Lyophilized amla powder was used to formulate effervescent and fast dispersible granules which were further optimized on the basis of concentration of superdisintegrants and effervescent producing agents like croscarmellose sodium, sodium starch glycolate, sodium bicarbonate and citric acid. Powdered formulations were then evaluated on basis of their flow properties like angle of repose, bulk density, tapped density, carr's index, hausner's ratio, effervescent cessation time and disintegration time. Among all the effervescent formulations F_2 was found to be optimum as it was having least disintegration time of 22 seconds and showed excellent flow properties. In case of the fast dispersible formulations the optimum strength were shown by formulations F_5 having croscarmellose with least disintegration time of 52 seconds. Total phenolic content of fresh amla juice were found to be 8.94 mg GAE/100 gm and estimation of ascorbic acid and gallic acid in lyophilized amla powder and developed formulations was carried out by HPTLC. *In vitro* antioxidant activity of lyophilized amla powder was evaluated by DPPH radical scavenging assay. IC_{50} value of lyophilized amla powder was found to be 32 ± 0.25 ug/ml calculated in comparison to standard ascorbic acid possessing IC_{50} value of 25.80 ± 0.2 ug/ml. Results of present study reveals that developed formulations may serve as alternate product with better quality, consistency and stability in comparison to available herbal liquid formulations.

Keywords: Anti-oxidant, Dispersible granules, Effervescent granules, *Emblica officinalis*.

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Cite this article as:

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1. INTRODUCTION

Herbal juice has been used since the dawn of civilization to maintain health and to treat diseases. Use of herbal extracts in conventional medicinal system since antiquity and well established safety profile has resulted in wider acceptance by people. Inspite of wider acceptability there are some drawbacks related to herbal juices like stability, non-uniformity in dose and portability etc so there is a need to design and develop a cost effective novel formulations, which give consistent product quality. The objective of the present study was to develop novel solid formulations by incorporating the fruit extract of amla as alternate of liquid herbal juices available in market. Fresh amla is so sour that most people find eating it almost intolerable so the portability and convenience of effervescent granules will dramatically increases patient compliance. *Emblica officinalis* commonly known as amla is considered as natural wonder drug. It is the richest source of vitamin C[1]. The drug also contains secondary metabolites *viz.* gallic acid, ellagic acid, 1-*O*-galloyl-beta-D-glucose, 6-di-*O*-galloyl-D-glucose, quercetin, chebulinic acid, chebulagic acid, corilagin together with isostrictinnin[2].

The seeds of the Indian amla contain fixed oil, essential oil and phosphatides. The drug also contains secondary metabolites *viz.* gallic acid, ellagic acid, 1-*O*-galloyl-beta-D-glucose, 6-di-*O*-galloyl-D-glucose, quercetin, chebulinic acid,

Sr.no 19

Accepted Manuscript

Optimization of sulfation of okra fruit gum for improved rheological and pharmacological properties

Meenu Nagpal, Manjot Kaur, Deepika Sharma, Ashish Baldi, Ramesh Chandra, Jitender Madan

PII: S0141-8130(18)32475-9
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Sr.no 20

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Effect of Geographical and Seasonal Variations on Phenolic Contents and Antioxidant Activity of Aerial Parts of *Urtica diocia* L.

Authors: Gautam, Vinod K.; Datta, Mannu; Baldi, Ashish
Source: Current Traditional Medicine, Volume 5, Number 2, 2019, pp. 159-167(9)
Publisher: Bentham Science Publishers
DOI: https://doi.org/10.2174/2215083804666181012123333

Abstract | References | Citations | Supplementary Data | Article Media | Metrics

Background: Environmental conditions affect the biosynthesis of secondary metabolites as a result of biotic and abiotic factors. In the present study, the effect of different geographical locations and season was studied on total phenolic and flavonoid contents extracted from Urtica dioica Linn.

Methodology: The aerial parts of U. dioica collected from Palampur, Shimla and Dharamshala in different seasons were subjected to hydro-alcoholic extraction. Quantitative estimation of total phenolic and flavonoid contents in various extracts was carried out spectrophotometrically.

Results: The highest amount of total phenolic (3.987± 0.130) and flavonoid contents (2.847± 0.341) was found in Palampur sample collected in summer season whereas sample collected from Dharamshala in spring season showed the least phenolic contents. In vitro antioxidant activity of all the samples was evaluated by DPPH, NO scavenging and FRPA method. The antioxidant potential was found maximum in the sample collected from Palampur in the summer season, however, the sample collected from Dharamshala in spring season showed the least antioxidant potential.

Conclusion: The present study confirms that altitude and seasonal variations significantly affect the levels of secondary metabolites in plant parts.

Keywords: Antioxidant; Urtica dioica Linn; flavonoids; polyphenols; seasonal variation; secondary metabolites
Document Type: Research Article
Publication date: June 1, 2019

Sr.no 21

THIS PAGE IS SECURE

Impact of Probiotics and Prebiotics on Colon Cancer: Mechanistic Insights and Future Approaches

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Authors: Arora, Malika; Baldi, Ashish; Kapila, Nitesh; Bhandari, Saurav; Jeet, Kamal
Source: Current Cancer Therapy Reviews, Volume 15, Number 1, 2019, pp. 27-36(10)
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Abstract | References | Citations | Supplementary Data | Article Media | Metrics

Colon cancer is one of the most common and most diagnosed types of cancer. It is a major cause of increased rate of morbidity and mortality across the globe. Currently, the focus has been shifted towards natural remedies for the treatment of colon cancer. These new methods of treatment include prebiotics and probiotics, as they offer great potential for alleviating symptoms of cancer. These are more promising and have lesser side effects than existing medications. Probiotics are living organisms which confer health benefits when ingested into adequate amounts. Prebiotics are non-digestible ingredients which promote the growth of beneficial bacteria, which produce metabolites for stimulation of apoptosis of colonic cancer cell lines. Apart from it, prebiotics are helpful to modify the activity of enzymes to be produced by beneficial bacteria as well as for inhibition of several bacteria able to produce carcinogenic enzymes. This review has been collated to present tremendous benefits and future potential of pro- and prebiotics in the treatment of colon cancer and to overview the mechanisms of probiotic actions along with their impact on humans.

Keywords: Commensal bacteria; colon cancer; metastatic disease; microbiota; prebiotics; probiotics
Document Type: Review Article
Publication date: April 1, 2019

More about this publication?

Sr.no 22

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Journal of Drug Delivery and Therapeutics

Open Access to Pharmaceutical and Medical Research

Open Access Review Article

Formulation Design and Pharmaceutical Considerations for Paediatric Patients: Current Status and Future Dimensions

Subh Naman[1], Nupur Madhavi[1], Mela Singh[1], Preet Amol Singh[1], Neha Bajwa[1], Ashish Baldi[1*]

[1]*Department of Pharmaceutical Sciences and Technology, Maharja Ranjit Singh Punjab Technical University, Bathinda, Punjab, India*

ABSTRACT

Present day's conventional pediatrics doses forms are not very attractive towards the children. Due to various reasons such as larger size, bitter taste etc. pediatrics patients rejects the present conventional doses form in many cases. So, there is need for development of some attractive and effective dosage form for children. Present day's conventional pediatrics doses forms are not very attractive towards the children. Due to various reasons such as larger size, bitter taste etc. pediatrics patients rejects the present conventional doses form in many cases. So there is need for the development of some unconventional dosage forms that proves to be attractive towards the paediatrics populations. This review provides possible advantages and disadvantages of the present conventional dosage forms available for children. Hence present review introduces to various alternatives and unconventional dosage forms viz. effervescent granules / tablets, oral disintegrating tablets and medicated candies and their advantages and disadvantages.

Keywords: Effervescent granules, effervescent tab, medicated candy, Oral disintegrating tablet and pediatrics.

Article Info: Received 21 May 2019; Review Completed 24 June 2019; Accepted 30 June 2019; Available online 15 July 2019

Cite this article as:

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INTRODUCTION:

Pediatrics patients differ from adult in various aspects of pharmacotherapy, including the abilities of drug admistration, medicine related toxicity and taste partialities. It is very much important that pediatrics drugs should best fit the child's size, age and various physiologic conditions of the children. To confirm suitable treatment for all pediatrics patients, various routes of administration, dosage forms, and strengths may be required. Selecting and designing a suitable dosage form for the pediatric patients is challenging. In addition to those problems usually faced while developing adult dosage forms; developing a dosage form for children poses other challenges such as the diversity of the patient population both in terms of size and physiological conditions[1]. Many present formulations such as tablets, capsules, suspensions, syrups for pediatrics are not suitable, they often leads to various types of problems in pediatrics such as chocking due to larger size of dosage form, vomit out due to of bitter taste of various oral dosage forms, difference in dosing in liquid dosage forms, unbearable pain in case of injection, ethical issue arises due to rectal forms. This review highlights current knowledge on various dosage forms for infants and preschool children. The pros and cons of the various types of pediatric dosage forms are summarized in this review[2].

Table 1: Various childhood stages according to age of children[3]

Stages of childhood	Age
Preterm infants	New born
Term new born infants	0-27 days
Infants and toddlers	1-23 months
Children	2-11 years
Adolescent	12-18 years

Various dosage forms available for pediatrics populations are

i) Oral route:-

***a)* Tablets**

Tablets are solid dosage forms usually prepared with the help of appropriate excipients in Fig. 1(a). A tablet varies in many features such as shape, size, hardness, thickness,

Sr.no 23

Intricacies in the Approval of Radiopharmaceuticals – Regulatory Perspectives and the Way Forward

Article in Current Science · January 2019

DOI: 10.18520/cs/v116/i1/97-106

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Sr.no 24

Emergence of Traditionally Used Foods as Today's Probioticslong Journey

Authors: Arora, Malika; Kaur, Navdeep; Bansal, Parveen; Baldi, Ashish
Source: Current Traditional Medicine, Volume 5, Number 2, 2019, pp. 114-125(12)
Publisher: Bentham Science Publishers
DOI: https://doi.org/10.2174/2215083804666181012125122

Abstract | References | Citations | Supplementary Data | Article Media | Metrics

Introduction: Probiotic based food products have become very popular nowadays throughout the world. Due to the steep rise in scientific evidences pointing towards the positive health benefits to humans and animals; probiotic microorganisms are being manufactured by the food manufactures in a range of market products. As per today's era, traditional foods are being anticipated as a delivery vehicle for probiotics and nutraceuticals. These traditional food products are supposed to alter the gut microbial composition, thus leading to improved gut health. Worldwide market of probiotics based food products is increasing exponentially due to the increased interest of consumers towards traditional home remedies.

Materials: The traditional products with therapeutic value and having probiotic characteristics have been searched from various research and reviews article from Ayurveda texts (like Charak Samhita, Sushuruta Samhita, Bhavparkasha Nighantu etc.) and Internet sources such as Pubmed, Google Scholar, Scopus etc.

Results: Though key research developments are going on in the field of probiotic microbes, the use of these in food and pharmaceuticals is a major challenge for both the industry and science sectors. This article summarizes traditionally used probiotics product along with market value, current status, associated health/nutritional claims and potential applications of probiotics for health care professionals and common man. Moreover, this manuscript has highlighted the use of traditional probiotics strain as today's medicines.

Conclusion: In light of ongoing market trends strengthened with presence of the strong scientific evidences for associating health benefits of these probiotic products, there is a need to conduct studies to designate their quality, safety and efficacy. Furthermore, scientific substantiation with supportive evidences of clinical trials is required to be carried out to use probiotics based traditional medical therapy in a safe and judicious manner.

Sr.no 25

Drug utilization study and prevalence of cognitive dysfunction in diabetes mellitus

Autores: Amit Kumar Sharma, Simran Arora, Taranpreet Kaur Gil, Alex Mengi, Amritpal Sodhi, Ashish Baldi, Kumar Sharma Dinesh
Localización: European journal of clinical pharmacy: atención farmacéutica, ISSN 2385-409X, Vol. 21, Nº. 1, 2019, págs. 19-24
Idioma: inglés

Resumen

Introduction. Drug utilization study acts as a powerful explanatory tool and is an ongoing, authorized and systemic quality improvement process for the health care decision. The process is used to ascertain the role of drugs in the society. The aim of the study is to evaluate the drug utilization pattern and prevalence of cognitive dysfunction in diabetes mellitus (type 1 and type 2) patients. Method. Prospective observational study including 205 patients was conducted for six months. Results. Diabetes mellitus was found to be most prevalent (27.8%) in the age group of 51-60 years, more than half (56.1%) of the patients were males as compared to females (43.9%). It was analyzed that cognitive impairment most prevalently occurs in the geriatric patients who were having a score between 10-15 in the majority. Conclusion. The diabetes was found to be more prevalent in males and there was moderate cognitive dysfunction in geriatric patients suffering from diabetes. Hence in future, improving the patient knowledge regarding the drug therapy, dose and frequency will perhaps improve the quality of life in diabetic patients

Sr.no 26

JOURNAL OF HETEROCYCLIC CHEMISTRY

Review

Diversified Synthetic Strategies for Pyrroloindoles: An Overview

Sundeep Kaur Manjal, Shelly Pathania, Rohit Bhatia, Ramandeep Kaur, Kapil Kumar, Ravindra K. Rawal

First published: 16 August 2019 | https://doi.org/10.1002/jhet.3661 | Citations: 5

Abstract

In current scenario, heterocyclic compounds' role in medicinal chemistry has been tremendously increased as they possess wide number of pharmacological activities. One of the common heterocycles include indole skeleton with well-established biological significance in field of medicinal chemistry. Fusion of indole nucleus with pyrrole heterocycle constitutes pyrroloindole scaffold, which further modifies the existing properties of indole alone. Pyrroloindole is a privileged scaffold found in various types of bioactive entities including natural compounds and exhibits wide variety of pharmacological activities like muscle relaxant, antifungal, antitumor, and antibiotic. Therefore, it is considered as attractive template for drug discovery. From several years, numbers of synthetic strategies have been reported for the synthesis of pyrroloindole and its derivatives, including also natural compounds such as amauromine, yuremamine, and chimonanthines. Here, in this review, we have tried to compile various synthetic strategies of pyrroloindole and its derivatives.

Sr.no 27

European Journal of Medicinal Chemistry
Volume 180, 15 October 2019, Pages 486-508

Review article

Role of sulphur-heterocycles in medicinal chemistry: An update

Shelly Pathania [a, b], Raj Kumar Narang [a], Ravindra K. Rawal [c]

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https://doi.org/10.1016/j.ejmech.2019.07.043

Highlights

- This review compiles various *S*-heterocycles such as thiazole, thiazolidine, thiophene, thiopyran *etc.*
- This review focused on various synthetic strategies of sulphur containing heterocycles.
- Various pharmacological activities of *S*-containing heterocycles have been compiled together.
- SAR and *in-vitro* studies of *S*-heterocycles have been discussed in details.

Abstract

From many decades, *S*-heterocycles have maintained their status as an important part and core of FDA approved drugs and medicinally active compounds. With exhaustive exploration of nitrogen heterocycles in medicinal chemistry, researchers have shifted their interest towards other heterocycles, especially, *S*-heterocycles. Thus several attempts have been made to synthesize a variety of new sulphur

Sr.no 28

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The regulatory dilemma for import of radiopharmaceuticals in India

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Abstract

The inclusion of monographs of several radiopharmaceuticals in the Indian Pharmacopoeia has drawn the attention of drug control authorities in the country and other stakeholders. Therefore, in a move towards better regulation of radiopharmaceuticals, the Office of the Drug Controller General of India has issued some important notices concerning their import. However, these notices have resulted in several misgivings among the nuclear medicine community as appointment of patients for nuclear medicine scans had to be cancelled/rescheduled and clinical decisions delayed. An analysis of the sequence of events is presented in this study, highlighting the effects of decisions taken regarding import of radiopharmaceuticals, and suggestions to implement regulations with minimal repercussions. © 2019.

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Journal List > Asian Pac J Cancer Prev > v.20(11); 2019 > PMC7062994

Asian Pacific Journal of Cancer Prevention
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Mdm2-P53 Interaction Inhibitor with Cisplatin Enhances Apoptosis in Colon and Prostate Cancer Cells *In-Vitro*

Amit Gupta,[1] Tapan Behl,[2,*] Hem Raj Heer,[3] Rahul Deshmukh,[4] and Pyare Lal Sharma[5]

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Abstract

Go to:

Objective:

To study the effect of RITA (*MDM2-p53* interaction inhibitor) and its action along with genotoxic drug cisplatin was evaluated on COLO-205 colon cancer and PC-3 prostate cancer cells.

Method:

Various *in-vitro* parameters to determine cytotoxic and apoptotic potential of RITA with genotoxic drug cisplatin were evaluated. The potentiation of cytotoxic effect was evaluated using MTT assay and colony forming assay, mechanism of cell death by Etbr/AcO assay and the mechanism of apoptosis was determined by caspase-3 release assay.

Results:

The findings from MTT confirmed the best possible potent combination of 5+5μM and 10+10μM concentration of Cisplatin and RITA respectively. These combinations were further evaluated for its chemo sensitizing effect which confirmed the significant reduction in number of colonies in combination as compared to monotherapy. Also, the results of Etbr/AcO assay were in line with the colony forming assay. For apoptotic activity, it was noted that increasing the concentration of cisplatin and RITA (10μM), did not affect much to apoptotic activity and was found to be equally effective to that of low dose (5μM) concentration. The same results were seen in Caspase-3 release effect on both the cell lines.

Conclusion:

Our present study provides compelling evidence that pharmacological activation of the p53 by blocking the MDM2–p53 interaction is a promising cancer therapeutic strategy and using RITA in combination with

Sr.no 30

Current Neuropharmacology . *Open Access* . Volume 17, Issue 2, Pages 165 - 175 . 2019

Insight into the emerging role of striatal neurotransmitters in the pathophysiology of parkinson's disease and huntington's disease : A review

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Abstract

Alteration in neurotransmitters signaling in basal ganglia has been consistently shown to significantly contribute to the pathophysiological basis of Parkinson's disease and Huntington's disease. Dopamine is an important neurotransmitter which plays a critical role in coordinated body movements. Alteration in the level of brain dopamine and receptor radically contributes to irregular movements, glutamate mediated excitotoxic neuronal death and further leads to imbalance in the levels of other neurotransmitters viz. GABA, adenosine, acetylcholine and endocannabinoids. This review is based upon the data from clinical and preclinical studies to characterize the role of various striatal neurotransmitters in the pathogenesis of Parkinson's disease and Huntington's disease. Further, we have collected data of altered level of various neurotransmitters and their metabolites and receptor density in basal ganglia region. Although the exact mechanisms underlying neuropathology of movement disorders are not fully understood, but several mechanisms related to neurotransmitters alteration, excitotoxic neuronal death, oxidative stress, mitochondrial dysfunction, neuroinflammation are being put forward. Restoring neurotransmitters level and downstream signaling has been considered to be beneficial in the treatment of Parkinson's disease and Huntington's disease. Therefore, there is an urgent need to identify more specific drugs and drug targets that can restore the altered neurotransmitters level in brain and prevent/delay neurodegeneration.

Author keywords

Acetylcholine; Adenosine; Dopamine; Gaba; Glutamate; Movement disorders; Neurotransmitters; Striatum

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ORIGINAL ARTICLE

Biocomposite edible coatings based on cross linked-sesame protein and mango puree for the shelf life stability of fresh-cut mango fruit

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Abstract

Effect of bi-layer coatings based on native/crosslinked sesame protein guar gum and mango puree with the addition of guar gum and calcium chloride on storage of fresh cut mango for 15 days was evaluated. Fruits were coated by layer by layer dipping method by crosslinked sesame protein/guar gum (coating- A) as a first layer and mango puree/calcium chloride (coating-B) as a second layer and stored in polystyrene trays. Drip loss %, firmness, °Brix, titrable acidity, ascorbic acid content, total phenolic content, carotenoids, total sugars, and reducing sugars for both coated and noncoated samples were determined during 1, 3, 7, 12, and 15 days of storage. Results exhibited that all coating formulations have potential to improve the shelf life and maintain the quality of fresh cut mango for 15 days. Coatings from cross-linked proteins were found to be more effective as compared with native sesame protein based coatings.

Practical applications

Significant amount of mango (*Mangifera indica* L.) fruit is wasted due to its climacteric nature and short life. Coatings have been applied to prolong shelf life and reduce wastage. The samples were coated with bi-layer coatings based on native/crosslinked sesame protein, guar gum, mango puree, and calcium chloride. Based on the results obtained from drip loss percentage, chemical, and organoleptic characteristics, it was concluded that the effect of coating as well as storage temperature on the quality and shelf life of the fruit was significantly different when compare to noncoated samples. Sesame protein isolate crosslinked with organic acids can be act as a better and cost effective substitute of coatings obtained from other sources.

1 | INTRODUCTION

Major growing segments in food retail market are minimally processed fruits. Mango (*Mangifera indica* L.) is a major tropical fruit grown in India. Demand of fresh-cut increased in market for convenience of serving and consumption. However, the major hurdle to the commercial marketing of fresh-cut mango is the limited shelf life which is due to dehydration, excessive tissue softening and cut surface browning in case of mango (Soliva-Fortuny & Martin-Belloso, 2003). Due to lack of protective pericarp, fresh-cut mango fruit are very perishable (Robles-Sánchez, Rojas-Graü, Odriozola-Serrano, González-Aguilar, & Martin-Belloso, 2013). Edible coatings can be described as a thin layer of edible material applied directly on the surface of fresh cut fruit (Pavlath & Orts, 2009). Nature of the material strongly influences the efficiency of the coating, thus biopolymer component should be selected according to physical and chemical properties, taking permeable and mechanical features in consideration. Proteins are preferred for films and coatings especially for food applications because of their biodegradability, nontoxicity, and excellent gas barrier properties (Thaker, Hanjabam, Gudipati, & Kannuchamy, 2017).

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Full length article

Difference in protein content of wheat (*Triticum aestivum* L.): Effect on functional, pasting, color and antioxidant properties

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ABSTRACT

Wheat cultivars from *Triticum aestivum* L. grown at same location were chosen and classified on the basis of their protein contents into low protein cultivars (LPC's), medium protein cultivars (MPC's) and high protein cultivars (HPC's). Protein content had a significant effect on the functional, pasting, color and antioxidant properties. HPC's showed significantly ($p < .05$) higher water absorption capacity (WAC), oil absorption capacity (OAC), foaming capacity, emulsion activity and emulsion stability as compared to LPC's. Clear difference among LPC's, MPC's and HPC's was not observed for pasting parameters and hunter color characteristics. Wheat cultivars were also studied for their bioactive properties. Total phenolic content (TPC), antioxidant activity (AOA) and total flavonoids content (TFC) among cultivars ranged between 1650–2095 μg GAE/g, 16.7–20.9% and 75–106 μg CE/g, respectively. HPC's had higher values for TPC and AOA as compared to LPC's. Significant correlations were observed among different measured properties as revealed by both pearson's correlation and principal component analysis (PCA). The first and second principal components together represent 65.6% of the total variability. LPC's and HPC's found place at different locations on the score plot.

1. Introduction

Wheat occupies about 25% of the global area under cereal production. According to FAO (2014), the world wide production of wheat was 729,012,175 tonnes whereas in India, it was 95,850,000 tonnes. It is cultivated mainly in temperate and sub temperate regions of the world and widely grown in many parts of India. Wheat kernel is composed of endosperm, bran, and germ with endosperm mostly containing starch and protein, whereas bran and germ are rich in dietary fiber, minerals and phytochemicals (Van-Hung et al., 2009). The dietary fiber and phytochemicals play important role in nutrition and health benefits for humans.

Due to nutritional and antioxidant properties, wheat consumption has been associated with reduced risk of developing chronic and cardiovascular diseases (Anderson, 2004). The antioxidants in wheat include carotenoids, tocopherols, flavonoids and phenolic acids. Phenolic acids and flavonoids are present in cereals in free, soluble conjugated and insoluble bound forms. Wheat phenolic acids include ferulic, vanillic, syringic, sinapic, caffeic and p-coumaric acids have been considered to be a source of nutritional antioxidants (Hatcher and Kruger, 1997; Liyana-Pathirana and Shahidi, 2007). Tocopherols, tocotrienols, β-carotene, zeaxanthin, β-cryptoxanthin, and lutein of wheat grain are reported as lipophilic antioxidants (Okarter et al., 2010). In our previous studies on wheat (Sandhu et al., 2016), barley (Sandhu and Punia, 2017), and pearl millet (Siroha et al., 2016) cultivars, attempts were made to enhance antioxidant potentials by solid state fermentation. In another study, toasting was used to increase antioxidant potential of oat cultivars (Sandhu et al., 2017). Wheat quality has traditionally been judged on functionality, mostly on gluten content and strength, and to a lesser extent, on nutritional value (Marconi and Carcea, 2001). Hard wheat flour, characterized by high levels of protein (gluten) is used for bread and fine cakes, while durum wheat flour is used for macaroni, spaghetti, and other pasta products. Soft wheat flour is lower in protein and is primarily used for cookies, crackers and breakfast foods. The differences in hardness of the kernel and the type of product produced from them, is due to their gluten content (Marconi and Carcea, 2001).

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REVIEW PAPER

Millets: a cereal grain with potent antioxidants and health benefits

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Received: 16 June 2018 / Accepted: 22 November 2018 / Published online: 26 November 2018

Abstract

Millet grains are small seeded Kharif crop used as food and feed. Due to presence of bioactive compounds and important minerals, millets have their own importance among cereal grains. Finger millet is a mixture of gallic acid; *p*-hydroxybenzoic acid; gentisic acid; caffeic acid; syringic acid; *p*-coumaric acid; sinapic acid; salicylic acid; *trans*-cinnamic acid. Foxtail millet contains gallic acid; *p*-hydroxybenzoic acid; vanillic; caffeic acid; chlorogenic acid; ferulic acid; sinapic acid and *p*-coumaric acid. Pearl millet possesses gallic acid; syringic acid; *p*-coumaric acid, ascorbic acid and ferulic acid. Little millet is rich in gallic acid; *p*-hydroxybenzoic acid; vanillic; caffeic acid; chlorogenic acid; ferulic acid; sinapic acid and *p*-coumaric acid. Thermal processing leads to oxidative degradation and depolymerization of bioactive constituents present in millets. Bioactive compounds like ascorbic acid and carotenoids are heat sensitive and could lose their activity upon processing especially thermal processing. Higher temperature resulted in decrease in *p*-coumaric acid (14.3–3.8 mg 100 g^{-1}), ellagic acid (8.5–4.9 mg 100 g^{-1}), caffeic acid (6.3–2.3 mg 100 g^{-}), gallic acid (224–170 mg 100 g^{-1}), hydroxybenzoic acid (2.3–0.6 mg 100 g^{-1}), catechin (87.2–45.6 mg 100 g^{-1}), ferulic acid (45.4–17.5 mg 100 g^{-1}) and epicatechin (23.9–4.8 mg 100 g^{-1}). Millet extracts contain specific compounds with bioactive properties, including antioxidant activity, the ability to protect DNA, anti-diabetic, anti-inflammatory and other health-promoting properties. Processing imparts specific flavor, improve texture, taste and shelf life of millets based food products. Millet grains are of great interest because of their agro-industrial importance, high nutritional value and bioactive constituents.

Keywords Millet · Processed food · Bioactive phytochemicals · Antioxidants

Introduction

Malnutrition is one of the major problems which need to be explored in detail as poor diets are the leading cause of deaths worldwide. Majority of the population are either not getting enough food or eating the junk foods/unbalanced diet, resulting in illnesses and health crises [1]. Most of the patients suffering from malnutrition are infants, children and women of reproductive age. Different types of millets (Pearl millet, proso millet, kodo millet, finger millet, foxtail millet and little millet) are currently being used for various purposes (bread, cookies, muffins, chapatti and biscuit) in developing as well as developed countries (Fig. 1). The availability of millet grains (13%) is somewhat lesser as compared to maize (62%) and sorghum (45%) [2]. Due to this reason, millet flours are less studied in this aspect [3]. To sustain healthy life style, it is necessary to choose food and functional food products on the basis of biological and physiological properties they possess. Major portion of world's population (38%) is residing in drylands where climate change and human activities affects the agricultural output [4, 5]. Knowledge of climatic conditions and soil profile could help farmers to select crops accordingly. Millet is an important cereal grain that could grow under these conditions. Different scientific studies on millets indicate the promising results in their utilization for various healthy foods [6, 7]. Being gluten free, millets are gaining interest from researchers/food processing industries for the preparation of recipes based on their flour [8, 9]. Along with major

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Sr.no 34

Kaur et al. Bioresour. Bioprocess. (2019) 6:2
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Bioresources and Bioprocessing

REVIEW Open Access

DNA damage protection: an excellent application of bioactive compounds

Pinderpal Kaur[1], Sukhvinder Singh Purewal[2,3*], Kawaljit Singh Sandhu[3] and Maninder Kaur[4]

Abstract

Discovery of deoxyribonucleic acid (DNA) solved out the mystery of cellular functioning and abnormality in cellular metabolism. Understanding the coding of DNA resulted in enormous medical growth and helps the researchers in finding the genes which trigger major chronic diseases in humans. Further, the structural and sequential analysis brought humans into a new era of medical industry. The advancement in understanding of DNA could be a boon for agricultural sector as it allowed the farmers/breeders to choose better varieties with disease resistant features. In developing nations where the staple foods suffers with micronutrient deficiencies and stress conditions, DNA modifications and repair mechanism could solve out their problems. The role of DNA damaging factors and repair mechanism plays a crucial role in occurrence of certain disorders. Extracts prepared from various natural resources could either stop or slow down the process of DNA damage. This will help to eradicate major disorders related to DNA from human race. Further on the basis of type and dose of natural extracts, it would ease the planning of diets for patients suffering from chronic disorders.

Keywords: DNA, Agriculture, Chronic disorders, Natural extracts, Breeders

Introduction

Being a complex macromolecule, deoxyribonucleic acid (DNA) controls the important genetic characteristics of living organism. Genes are important segment/sections of DNA that are indirectly involved in coding of proteins which acts as a basic building for cellular system (Singh and Sharma 2018). The majority of genetic information, defects and diseases rely on types of DNA, their structure and functions performed by them within the human body. The effect of several factors (environmental, synthetic chemicals, UV rays, genetic defects) on DNA modulates its functionality within cells and ultimately results in notable changes in the living organisms (Farag and Alagawany 2018). Damage to DNA and its important segments could occur at endogenous level as well as external factors, thereby posing a threat at cellular level (John 1987; Lu et al. 2015). Continuous exposure of DNA and genome of living organisms to damaging factors could result in variety of genetic defects which might be inherited from one generation to the other (Perez-Coyotl et al. 2017; Han et al. 2017). Understanding the molecular structure and functionality of DNA could help scientists to discover new drugs for the treatment of various chronic diseases. In fact, discovery of important genes that are required to sustain normal metabolism in the cells and their subsequent analysis for therapeutic purposes influenced scientific community (Gagna and Lambert 2006). Artificial methods are being employed to change sequences of DNA to achieve desired results in diseased patients and genetic improvement in agricultural sector. DNA is an important molecule to be studied for the welfare of human race (Liu 2017; Sawitzke et al. 2017). Modifications at genetic level could result in drought as well as salt-tolerant crops with maximal yield. DNA modifications are not restricted up to plants system even it could be used for the improvement of animal breeds also. Researchers all over the world are working on the aspect of relating the changes in DNA with evolutionary development (Hefferon 2018; Ma et al. 2017; Hall 2012; Deichmann 2011). Being a complex molecule, DNA has its presence in every cells of body and will help to

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Rheological and pasting behavior of OSA modified mungbean starches and its utilization in cake formulation as fat replacer

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ABSTRACT

This research investigated the effectiveness of heat treated (120 °C for 1, 2, 3 h) OSA modified mungbean starches, as fat replacers in cake. Physicochemical, pasting, rheological properties of the modified starch and textural and sensorial attributes of cakes incorporated with OSA modified mungbean starch at 10, 20, 30 and 40% were evaluated. The pasting viscosity of the OSA modified mungbean starches was found to be higher when compared with native starch. Magnitude of G' and G'' was slightly increased with the increase of frequency. Modified starches showed lesser values for Peak G' as compared to native counterpart starch while reverse was observed for G'' value during heating. The cakes containing OSA modified mungbean starch a higher specific volume. The study concluded that cakes prepared from 30% OSA-MS possessed the best texture, desirable color and mouthfeel and thus, found to be highly acceptable as indicated by their overall quality score.

1. Introduction

Modern lifestyle and busy schedule of consumers demand for ready to serve foods without altering their nutritional requirements and personal health. The health issue associated with high fat consumptions have moved consumers towards the low fat products. Fat plays an important role in food products as it contributes in taste, appearance, palatability and consistency of foods [1]. However, incorporation of fat in bakery product is expensive and provides high calories and also associated with cardiovascular diseases, obesity, cancer etc. To reduce the consumption of fat intake in diet, fat consumption should be reduced or replaced with low fat alternatives. As fat replacers, starches are used generally used as they are digested and absorbed to some extent. Native starches show low shear resistance, thermal resistance, thermal decomposition and a high tendency towards retrogradation, which limit its use in some industrial food applications [2]. So, native starches are modified to produce desirable functional properties. Chemical modifications bring the structural changes and incorporate new functional groups, these affect the physicochemical properties of the starches and making them fit for various industrial applications. Starch succinate offer a number of desirable properties such as high viscosity, better thickening power, low gelatinization and retrogradation [3]. At present time modification of starch with octenyl succinic anhydride (OSA) is permitted at 3% level on the dry weight basis for use in food products in many countries [4]. OSA starches stabilize the oil–water interface of an emulsion. The glucose part of starch binds the water and lipophilic, octenyl part binds oil and separation of the oil and water phases is prevented [5]. As reported by Balic et al. [6], OSA starches have hydrophobic and hydrophilic nature so applicated as fat replacement component in bakery goods. To the authors' knowledge, there is limited published research on replacement of fat content of cake with OSA modified mungbean starch. Cakes are baked products relished by consumers and are available worldwide. The main problem of such baked goods is their high fat and sugar content, which turns them into high-calorie products [7]. OSA modified starches have improved texture, freeze thaw stability, water retention properties [8], increased swelling volume [9] and have potential to prevent retrogradation [10]. Many researches were conducted to reduce fat content of bakery product [6,11–13]. So the present study focussed on investigating rheological and pasting properties of OSA modified mungbean starches and their utilization in cake making.

2. Material and methods

2.1. Materials

Mungbean seeds were procured from local market, Sirsa, Haryana (India). All chemicals and reagents used were of analytical grade.

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ORIGINAL PAPER

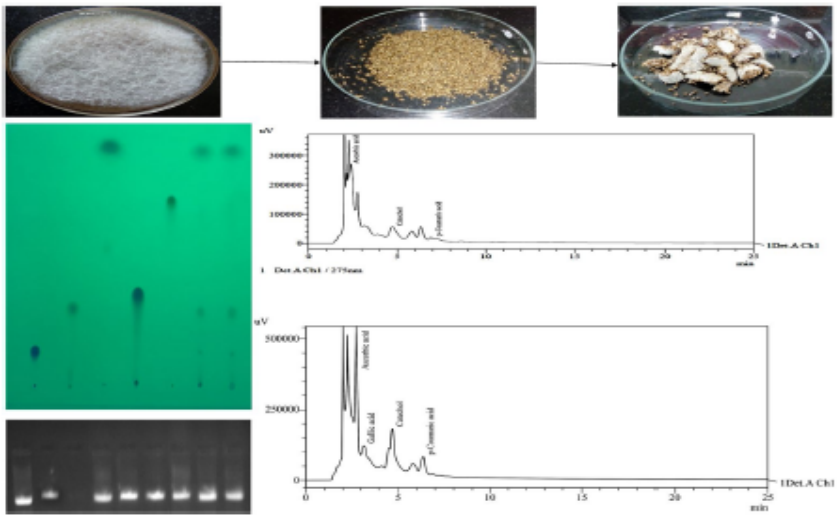
Fermented pearl millet: a product with enhanced bioactive compounds and DNA damage protection activity

Sukhvinder Singh Purewal[1,2] · Kawaljit Singh Sandhu[2] · Raj Kumar Salar[1] · Pinderpal Kaur[3]

Received: 12 January 2018 / Accepted: 2 February 2019

Abstract
Pearl millet cultivar PUSA-415 was fermented for a period of 10 days using *Rhizopus azygosporus* as a starter culture. Aqueous ethanol (50%) was used as extraction phase to extract bioactive constituents from *Rhizopus azygosporus* fermented millet (RFPM) and unfermented millet (UFPM) flours at 44.5 °C for 23 min. Extracts were evaluated for the presence of bioactive compounds, antioxidant potential, enzymatic activities and DNA damage protection activity (DDPA). Solid state fermentation significantly ($p < 0.05$) enhanced the bioactive constituents with the highest values being observed on 10th day of fermentation. The ranges for different bioactive properties [Total phenolic content (TPC), Condensed tannin content (CTC)] were, TPC [6.6–21.8 mg gallic acid equivalent/g dry weight basis (mg GAE/g dwb), CTC (101.3–176.7 mg catechin equivalent/100 g dwb)] and enzymatic activities [α-amylase (61–201 IU /gds), β-Glucosidase (4–86 IU /gds) and xylanase (7–77 IU /gds)]. Maximum DDPA was observed in RFPM extract (10th day). Thin layer chromatography confirmed the presence of catechin, catechol and ascorbic acid in both UFPM and RFPM. HPLC also confirmed the presence of specific bioactive compounds *viz.* *p*-Coumaric acid, catechol, ascorbic acid and gallic acid in extracts studied.

Graphical Abstract



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Rheological behavior of wheat starch and barley resistant starch (type IV) blends and their starch noodles making potential

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Sensorial properties

ABSTRACT

Barley starch citrate (BSC), a type IV resistant starch (RS) is associated with numerous health benefits when incorporated in bakery products. Physicochemical, pasting and rheological properties of the wheat starch (WS) and wheat starch-barley starch citrate (WS-BSC) blends and textural and sensorial attributes of wheat starch noodles incorporated with BSC at 10, 20, 30 and 40% were evaluated. As the level of BSC increases, physico-chemical properties were reduced. Except pasting temperature all pasting parameters were decreased as the proportion of BSC increased in WS. All WS–BSC blends possessed decreased viscosity with increasing resistant starch type IV (RS4), which was well described by the Herschel-Bulkley model. As compared to WS, Firmness, springiness, cohesiveness and chewiness of BSC blends gels were decreased by addition of BSC. Study revealed a remarkable decrease in resistance of wheat starch gel by increasing the BCS substitution level. The results concluded the possibility of blending of BSC with WS up to 20% to produce noodles of acceptable quality.

1. Introduction

Resistant starch (RS) may be considered as a source of dietary fiber and believed to be a key component of a healthy diet. In the small intestine of healthy individuals, RS and its derivatives are not absorbed or digested. It directly reaches the colon and fermented by colonic microflora [1] and produces short chain fatty acids which are associated with numerous health benefits [2]. As reported by Birt et al. [3], RS are classified into five distinct types i.e. RS type I (Enzyme inaccessible starch), RS type II (uncooked granular starch), RS type III (retrograded starch), RS type IV (resistant to enzymatic hydrolysis) and RS type V (amylose-lipid complex). Epidemiologic evidence suggested that intake of dietary fiber is associated with a reduced risk of a range of chronic diseases, including cardiovascular diseases, type 2 diabetes, and pancreatic cancer [4]. Along with human health benefits, RS possess desirable physicochemical properties i.e. swelling capacity, viscosity, gel formation and water-binding capacity, which make it useful in a variety of bakery products [5]. A research published by Arp et al. [6] studied the impact of maize RS on properties of bread and reported that substitution of RS up to 20% has great consumer acceptance and giving a chance to become a healthy substitute of white bread. Hedayati and Niakousari [7] studied the influence of partial replacement of WS by corn starch citrate (RS) and demonstrated that RS may be added to food products to prevent the texture hardening and improve their textural attributes. Bayrakçı and Bilgiçli [8] added different levels of RS to tarhana and found that the increase of RS level improved foaming capacity, foam stability, water and oil absorption capacity of the tarhana samples. A study conducted by Hong and Yoo [9] studied the influence of incorporation of resistant starch type III (RS3) in wheat flour and results showed that the addition of RS3 to WF modified its steady and dynamic rheological properties.

Nevertheless, little work has been published about the influence of RS type IV on properties of noodles. Polyfunctional carboxylic acids such as malic, tartaric, citric, and glutaric acid have been used in the synthesis and rheological characterization of hydrogels [10]. Xie and Liu [11] used citric acid and high temperature to increase the RS content of corn starch. Compared to inorganic acids, citric acid is nutritionally harmless, and increasing the degree of substitution (DS) of starch by ester bond [12], therefore, production of RS type IV by citric acid is healthy and safe compared as compared to other chemical reagents. Keeping this point in view, the purpose of this work was to study the influence of 0, 10, 20, 30 and 40% RS type IV on rheological properties of wheat starch and WS-BSC blends and their utilization in noodles making quality.

2. Materials and methods

Wheat cultivar (cv.WH-1080) and barley cultivar (cv.BH-393) were procured from Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana (India). All chemicals and reagents used were of analytical grade.

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Physicochemical, rheological, morphological and *in vitro* digestibility properties of pearl millet starch modified at varying levels of acetylation

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ABSTRACT

Pearl millet (PM) starch was reacted with acetic anhydride at different concentrations (1.25, 2.5, 3.75 & 5.0%) and its physicochemical, rheological, morphological and *in vitro* digestibility properties were compared with native starch. The acetyl (%) and degree of substitution (DS) of acetylated starches ranged between 1.07 and 2.15% and 0.040–0.081, respectively. Swelling power and solubility of acetylated PM starch increased progressively upto 3.75% level of acetylation, however, further increase in acetylation levels resulted in a decrease. Peak, set-back and final viscosities of acetylated PM starches were higher than their native counterpart starch. Both native and acetylated PM starches showed similar A-type X-ray diffraction patterns. During heating, storage modulus (G′) and loss modulus (G″) of acetylated starches ranged between 753 and 1177 Pa and 96–129 Pa, respectively. G′ was much higher than G″ at all the values of angular frequency studied. Both native and acetylated PM starch pastes showed flow behaviour index value of <1. For acetylated starches, both, yield stress and consistency index values were higher than native starch. Readily digestible and slowly digestible starch contents of acetylated PM starches varied between 44.3 and 45.5% and 27.3–32.5%, respectively, the highest values observed for starch acetylated at 3.75% and 1.25% acetic anhydride concentrations.

1. Introduction

The industrial food applications of native starches are limited due to their low shear resistance, thermal decomposition and high tendency towards retrogradation [1]. These can be improved by modifications using physical, chemical and enzymatic methods. The free hydroxyl groups present at 2, 3 and 6 carbons of the glucose molecule enable native starch to be modified by different chemical treatments [2]. The chemical modification of starch can be done by employing acid hydrolysis, oxidation, esterification, etherification and cross-linking methods [3]. The physico-chemical and functional properties of starch can be improved by acetylation [4]. The number of acetyl groups incorporated into the starch molecule during acetylation depends on many factors, such as reactant concentration, starch source [5], reaction time, and the presence of a catalyst [6]. Starch acetylation results in an increased solubility and a decrease in bond strength, which improves clarity and freeze-thaw stability [7]. Food and Drug Administration recommends not >2.5% acetyl groups in starch acetate [8,9].

Pearl millet (*Pennisetum glaucum*) belongs to family *Poaceae* and is widely grown around the world for feed and fodder. Being drought tolerant cereal crop, it is grown primarily in India and Africa. India ranks first in annual production of millets (11,420,000 t in 2014), followed by Niger which produced 3,321,753 t [10]. Pearl millet (PM) has a starch content of 60–70% which is comparable with corn and this starch can be isolated easily from it. In our earlier study on Indian PM cultivars, we characterized starches isolated from these cultivars for their physicochemical, morphological, thermal, rheological and *in vitro* digestion properties [11]. Further, these PM starches were cross-linked by epichlorohydrin (0.5%) and studied for their various functional properties [12]. To the best of our knowledge no work has been reported on the acetylation of PM starch. In order to explore utilization of PM starch, the present investigation was aimed at acetylation of PM starch at varying levels of acetylation and analyzed for their physicochemical, rheological, morphological and *in vitro* digestibility properties.

2. Material and methods

2.1. Materials and starch isolation

Pearl millet cultivar (HC-10) was procured from Chaudhary Charan Singh Haryana Agriculture University, Hissar, India. All chemicals used were of analytical grade. Starch was isolated from pearl millet grains

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Experimental and modeling studies of the flow, dynamic and creep recovery properties of pearl millet starch as affected by concentration and cultivar type

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ABSTRACT

Starch from pearl millet varieties viz. ProAgro 9444 and HHB 67, selected on the basis of amylose content was studied for steady, dynamic and creep recovery characteristics as affected by concentration (3–15%). ProAgro 9444 and HHB 67 possess amylose content of 20.21% and 15.05%, respectively. Starch gel exhibited shear thinning behavior with flow behavior index <1, well described by Herschel Bulkley model ($R^2 > 0.969$) at all the concentrations. The starch pastes were thixotropic and the extent increased with increasing concentration and amylose content. Dynamic shear properties obtained within the linear viscoelastic region suggested weak gel like behavior at all concentrations, except 3% starch from HHB 67 which was categorized as dilute solution. Weak gel like behavior at other concentrations was supported by tan $\delta < 1$, and the gel from ProAgro 9444 was more elastic. Power law analysis of data from mechanical spectra also reflected weak gel behavior except for 3% HHB 67. High amylose and increasing concentration favored gel formation as magnitude of temperature at peak G′ and G* were lower. Creep compliance followed Burger model at higher concentrations whereas 3% HHB 67 exhibited Newtonian behavior. The strain recovery increased with increase in starch concentration and amylose content.

1. Introduction

Globally, pearl millet is the most widely grown type of millet followed by other cereals such as maize or wheat because it is a drought tolerant crop and requires minimal growing conditions and can flourish well even under low soil fertility [1]. India is the largest producer of Pearl millet area wise (7.12 million ha) as well as production wise (9.05 million tons) across the world [2]. Moreover, pearl millet accounts for 50% of the global production of all the millets. Pearl millet is available in different varieties and its starch content varies from 58 to 70% with variable range of amylose content depending upon the variety [3]. So, in order to explore non-conventional sources of starch, pearl millet is an excellent choice.

Starch finds immense applications in food and other industries such as paper, textile and pharmaceutical industry owing to its contribution to the textural attributes, proficiency to impart viscosity, and consistency to various foods as well as due to its thickening, gelling, stabilizing and film forming properties [4,5]. Rheological functionality of native starches varies as a consequence of differences in their origin, morphology, amylose to amylopectin ratio, degree of crystallinity and branch chain length distribution [6–8]. Due to wide applications, interest is increasing to explore novel and underutilized sources of starch. [9]. Gelatinization of starch is a phase transition process involving the breakdown of intermolecular bonds of starch molecules. Thus, a proper knowledge and understanding about the rheological changes taking place during this starch phase transitions is extremely important in food processing and other industrial processes [10,11]. Dynamic rheological measurements are useful for investigating the viscoelastic behavior of gels and pastes allowing the continuous measurement of dynamic moduli for temperature and frequency sweep tests. Small amplitude oscillatory shear analysis is of prime significance because, it is much established method to rule out the rheological properties because it performs within the linear viscoelastic range (LVE) [12].

Starches from different sources and varieties differ with respect to their composition and granules' morphology which in turn affects the rheological properties of starch. Also, starches are used at variable concentrations in industrial purposes. In order to acquire information about the structural alterations connected with food systems such as pudding, vermicelli, noodles and others, having starch as one of the major constituent creep recovery studies are vital. The knowledge of creep behavior of constituents of any food system could help in selection of ingredients depending upon their corresponding properties to induce or suppress the resistance to deformation of the product under shear [13]. For instance, cooking leads to gelatinization of starch and the characteristics of retrograded starch are intended to affect the quality of gel like

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Impact of high pressure processing on the rheological, thermal and morphological characteristics of mango kernel starch

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ABSTRACT

The effect of high pressure (HP) processing at selected pressures (300, 450 & 600 MPa) for 10 min on physico-chemical and morphological properties of mango kernel starch (MKS) were studied. Peak viscosity of MKS increased with the increase in pressure up to 400 MPa, and then decreased at 600 MPa. During frequency sweep, native and pressurized pastes exhibited predominantly solid-like behaviour in frequency range (0.1–100 rad/s), with $G' > G''$. Temperature sweep test showed G' and G'' values of native MKS of 1568 and 224 Pa, respectively; pressurization decreased values for both the moduli. tan δ of starches was <1, indicating their elastic behaviour. Shear stress versus shear rate plots for all starch pastes showed shear-thinning behaviour. Thermal properties showed elevation in onset and peak temperatures after pressurization. HP treatment also resulted in narrowing the range (T_c–T_o) for pressurized MKS. Native MKS had ΔH_{gel} of 5.23 J/g, which upon pressurization reduced significantly ($p < 0.05$). The endothermic peak, even at 600 MPa did not completely disappear, indicating incomplete gelatinization of starch. The granular structure was not affected by pressure treatment even after 600 MPa. The surface of native MKS appeared smooth whereas HP treatment resulted in rough surface of the starch granules.

1. Introduction

Mango (*Mangifera indica*) is one of the most favoured and commercially valuable fruit growing throughout the tropics and is used in variety of food products [1]. The global production of mangoes was 50.6 million tonnes, with India being the largest producer in the world (19.5 million tonnes) contributing to about 39% of the total production [2]. Considerable amounts of mango kernels are discarded as waste after industrial processing of mangoes [3]. Out of the total waste generated, the peel and kernel constitute 12–15% and 15–20%, respectively [4]. Depending on the variety, mango kernels contain ash, protein, fat, carbohydrate, and crude fiber contents of 2%, 6%, 11%, 77%, and 2%, respectively [5]. Mango kernel, on a dry weight basis, contains, on average, 58% starch, 2.9% reducing sugars and 1.1% tannins [6].

Starch, the main constituent of cereals, tubers and legumes has unique functional properties, and is widely used in industrial and food applications. Starches from different sources vary particularly in their quantitative and qualitative make-up as well as in some of the physico-chemical properties [7]. The characteristics of MKS are comparable to other commercial sources of starches obtained from wheat, corn, rice and potato [4,8]. Native starches produce undesirable gels, therefore, the food manufacturers generally prefer starches with better behavioural characteristic than those provided by native starches [9,10]. Starch modification is generally achieved through derivatization, e.g., by etherification, esterification, cross-linking and grafting, decomposition (acid or enzymatic hydrolysis and oxidization of starch) or physical treatment using heat and moisture [11]. Although chemically modified starches are available for industrial uses, most industries (especially food and pharmaceutical industries) prefer starches that have been physically altered (heat, moisture, shear, radiation, high pressure processing) due to their relative safety [12]. Extreme treatments (temperature, pressure) can evoke gelatinization of starch granules in starch–water suspensions [13,14]. However, pressure-induced gelatinisation is considered significantly different from heat-induced gelatinization [15].

High pressure (HP) processing is a non-thermal emerging technology that subjects a product to high pressures (up to 1000 MPa) for a controlled time and temperature [16]. It has advantages over heat treatment such as better retention of nutritional and functional ingredients in the processed product. To achieve the desired product functionality and texture, the understanding of pressure-induced gelatinization of starch is vital for applications of high pressure treatment in starch-containing products [17]. Previous studies have reported the effect of

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Dynamic, shear and pasting behaviour of native and octenyl succinic anhydride (OSA) modified wheat starch and their utilization in preparation of edible films

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ABSTRACT

Starch-based edible films could offer non-chemical means for preserving perishable commodities. The present research investigated the effectiveness of native and heat treated Octenyl succinic anhydride (OSA) modified wheat starch in edible film making. Pasting and rheological properties of the native and OSA modified starch as well as antioxidants and sensorial attributes of coated and non-coated grapes were evaluated. The peak and final viscosity of the OSA modified wheat starch (1270 Pa and 1589 Pa) was found to be higher than native starch (1120 Pa and 1490 Pa). Magnitude of G' and G'' was slightly increased with the increase of frequency. Modified starches showed lesser values for Peak G' as compared to native starch. G' and G'' values of native starch were 2145 and 250 Pa whereas for OSA modified starch, these values were 1780 and 190 Pa. Results exhibited that starch based coating have potential to maintain total phenolic content, total carotenoids and scavenging activities as well as the shelf life and quality of grapes for 13 days. The coated grapes were also found microbiologically safe for human consumption. OSA modified starch based coating was found to be more effective as compared to native wheat starch. Therefore, this study suggested that the edible coating with good water barrier properties will be beneficial for fruit processors to enhance the shelf-life of fresh produce.

1. Introduction

Grapes (*Vitis vinifera*) belongs to Vitaceae family and is one of the major fruit crops in the world with a global production of 75 million tonnes [1]. Approximately 42% of the grapes produced in the world are for table purpose. India ranks 7th in grape production with a total production of 2.9 million tonnes [1]. However, 95% of the Indian grapes are used for table purpose. This indicates a significant consumption of grapes as a fresh fruit both in India and worldwide. Demand of grapes has shown increasing trend. This could be due to a wide variety of health-promoting effects of grape components which include the reduced risk of cardiovascular diseases, type-2 diabetes, certain types of cancers, and other chronic complications [2,3]. These health benefits of grapes are associated with a number of antioxidants and bioactive components including anthocyanins, catechins, resveratrol, phenolic acids, and procyanidins [4].

Being a fresh fruit, table grape is a perishable commodity. Being a rich source of vitamins, minerals, fibres and bioactive compounds, grapes show severe problems during postharvest storage and retailing. Loss of weight and firmness, change in color and decay of berry are the postharvest problems associated with grapes [5]. Chemical fungicides may solve these problems but increasing demand for natural foods has stimulated new perspectives such as using modified atmosphere [6]. As reported by Park [7], edible coating may be substitute for modified atmospheres as it reduces quality and quantity loss by altering internal atmosphere of the fruits. Also, edible coatings offer environment friendly way to extend shelf life [8] of fresh fruits. Use of starch and starch derivatives for producing edible coatings has a long history [9]. Generally, such coatings are less costly than alternative high tensile strength materials.

Native starches produce weak-bodied, cohesive, rubbery pastes when heated and undesirable gels when the pastes are cooled [10]. That is why, the food manufacturers generally prefer starches with better behavioural characteristic than those provided by native starches. The properties of starches can be improved by various modifications and these modified starches could have practical applicability in the food industry. For example Octenylsuccinic (OS) starches are used as emulsion stabilizers in the molecular form, surface active hydrocolloids, texturizing agents in many food-systems, for flavor compound encapsulation, as well as in pharmaceutical and biodegradable plastic industries [11,12]. The maximum level of OSA allowed is 3% dry wt. basis of the

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MINI-REVIEW

WILEY Legume Science

Faba bean (*Vicia faba*) starch: Structure, properties, and in vitro digestibility—A review

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Abstract

The dietary consumption of legumes is associated with the prevention and management of cardiovascular disease, diabetes, and metabolic syndrome. There is a growing interest in faba bean (*Vicia faba*) to formulate functional products. Starch is the main component of faba bean (up to 45%), and its properties and reaction with other food components are mainly important for human nutrition, and the food industry as starch properties may greatly determine the product quality. This minireview summarizes the structural, morphological, and thermal characteristics and in vitro digestibility of faba bean starch to provide direction for new research.

KEYWORDS
digestibility, faba bean starch, scanning electron microscope, X-ray pattern

1 | INTRODUCTION

Legumes are the plants belonging to the family *Leguminosae*/*Fabaceae* and the third largest family of angiosperms with over 16,000–19,000 species in 750 genera (Allen & Allen, 1981). The worldwide production of legumes was 96 MT. India is the world's largest producer of legume contributing to about 24% of the total world production (FAOSTAT, 2017). *Vicia faba* L. (faba bean, broad beans, or horse bean) is a species of flowering plant in *Fabaceae* family and the fourth most widely grown winter season legume after pea, chickpea, and lentil (FAOSTAT, 2018). Faba bean seeds are the rich source of carbohydrates (51–68%), and the major carbohydrate is starch (22–45%; Hoover & Sosulski, 1991). Ross and Davies (1992) reported 35% starch and 36% protein in faba beans. Because of higher amylose content than cereal starches, legume starches provide distinctive properties, that is, high gelation temperature, fast retro-gradation, high resistant starch (RS), and gel elasticity to food systems (Ratnayake, Hoover, & Warkentin, 2002). To the best of our knowledge, a review on faba bean has not been previously reported. Therefore, this minireview will provide an update on physicochemical, morphological, and thermal properties and in vitro digestibility of faba bean starch, which will facilitate the utilization of faba bean starch in food and nonfood industries.

2 | ISOLATION OF FABA BEAN STARCH

During isolation of starch fraction from legumes, insoluble proteins and fine fibres diminish sedimentation and

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ORIGINAL RESEARCH ARTICLE

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Effect of debittered fenugreek (*Trigonella foenum-graecum* L.) flour addition on physical, nutritional, antioxidant, and sensory properties of wheat flour rusk

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Abstract

Fenugreek (*Trigonella foenum-graecum*) is a unique legume crop having many pharmacological properties and health benefits attributed to its high soluble dietary fiber and phytochemicals. The main objective of this study was to evaluate selected functional and physical (color and pasting) properties of debittered fenugreek flour (DFF) and its addition on the nutritional value and acceptance of wheat flour rusk, prepared with 5%, 10%, 15%, and 20% DFF. The antioxidant potential and sensory attributes of DFF-added rusks were also analyzed. The results revealed that with successive increase of DFF level, the nutritional, mineral, dietary fiber, and bioactive contents of the rusks were significantly ($p \leq .05$) enhanced. The progressive replacement at 0% to 20% level significantly ($p \leq .05$) improved the total phenolic content (157.5 to 455.8 mg GAE per 100 g), total flavonoid content (5.5 to 8.2 mg CE per 100 g), and antioxidant activity (20.4% to 45.5%). DFF incorporation significantly ($p \leq .05$) increased the water and oil absorption capacity, whereas peak viscosity, breakdown viscosity, final viscosity, setback viscosity, and peak temperature were decreased. The color of rusks became darker, the loaf weight and hardness increased, whereas loaf volume and specific loaf volume values were decreased with DFF addition. Sensory attributes of rusks were slightly affected with DFF incorporation, and rusks with 15% DFF were found most desirable with significantly ($p \leq .05$) enhanced nutritional, antioxidant, and sensory characteristics. The results of the present study demonstrated that incorporation of DFF at acceptable level could be achieved successfully for preparation of bakery product with enhanced nutritional and sensory quality.

KEYWORDS
antioxidant, debittered fenugreek flour, dietary fiber, pasting properties, rusks

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MINI-REVIEW

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Kidney bean (*Phaseolus vulgaris*) starch: A review

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Abstract

The mini review focuses on the morphology, pasting, rheological and in vitro digestibility of kidney bean starch. In legumes seeds, *starch* is the *most abundant carbohydrate* reserve in plants and have been ascribed medicinal and cultural as well as nutritional roles. The major carbohydrate of kidney bean seeds is starch, which accounts for 25–45% of the dry matter. Lower swelling and high solubility of kidney bean starches indicate their higher functional properties than cereal starches. High amount of resistant starch (RS) and slow digestible starch (SDS) and low amount of rapidly digestible starch (RDS) present in kidney bean starches provide their potentiality as a good source of RS. Starch is a macro-constituent of many foods and its properties and interactions with other constituents, particularly water and lipids, are of interest to the food industry and for human nutrition as starch properties may greatly determine the product quality.

KEYWORDS

digestibility, DSC, kidney bean starch, morphology

1 | INTRODUCTION

Beans are members of the Fabaceae family, which include legumes, and are important food crops both economically and nutritionally and are cultivated and consumed worldwide. In 2017, the global production of bean was 31,405,912 t under the area of 36,458,894 ha and in India, about 15,425,864 ha of land is under beans cultivation with total production of 6,390,000 t (Food and Agriculture Organization [FAO], 2017). Kidney beans (*Phaseolus vulgaris*) is one of the most globally important legume crops and an important component of human nutrition because of high protein content (20%–25%), complex carbohydrates (50%–60%) and a good source of vitamins, minerals, poly-unsaturated fatty acids (Rehman, Salariya, & Zafar, 2001; Reyes-Moreno & Paredes-Lopez, 1993), and appreciable amount of folate and fiber (Shi, Xue, Kakuda, Ilic, & Kim, 2007). The major kidney bean seed storage polysaccharide is starch accounting 25%–45% (Su, Lu, & Chang, 1997; Yoshida et al., 2003). Starch is the main storage carbohydrate of plants and contributes 50%–70% of the energy in the human diet, providing a direct source of glucose. It is often used as an additive ingredient in food products such as sauces, soups, confectionery, sugar syrups, ice cream, snack foods, meat products, baby foods, and fat replacers (Copeland, Blazek, Salman, & Tang, 2009). As the *demand* for convenience foods *increases*, the use of *starch* and its by-products *increases rapidly*. Among different types of starches, we maize, wheat, and potato are widely used in a diverse range of applications. Finding alternative to these commercial starch sources may offer additional substitutes for meeting the rising demand in the starch industry (Ngobese et al., 2018). Legume starch exhibits better gel characteristics and resistant starch (RS) contents when compared with cereal and tuber starches. This mini-review will provide an update on chemical composition, morphology, thermal properties, and in vitro digestibility of kidney bean starch with a view to providing suggestions for needed research to improve the implementation of kidney bean starch in the food and nonfood industries.

Sr.no 45

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Impact of octenyl succinic anhydride on rheological properties of sorghum starch

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Save all to author list

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Abstract

The impact of pH conditions (4, 6, and 8) during modification by dry heated octenyl succinic anhydride on physicochemical, pasting and rheological properties of sorghum starch was studied. Degree of substitution and reaction efficiency values of modified starches varied from 0.013 to 0.021 and 54.6 to 88.2%, respectively, the highest values were observed for starch modified at pH 8. Amylose content of modified starches decreased as compared to native starch. Swelling power and solubility of starches were observed the highest for starch modified at pH 8 and pH 4, respectively. Peak viscosity of starches varied from 239 to 3,138 mPa s, the highest and the lowest values were observed for starches modified at pH 8 and pH 4, respectively. Modified starches showed lower pasting temperature as compared to native counterpart starch. G' and G" values of starches during heating ranged from 811 to 1,982 Pa and 108 to 191 Pa, respectively. tan δ values of native and modified starches were less than 1, indicating their elastic nature. G' values of modified starches during frequency sweep measurements were less than native starch. Starch pastes from native and modified starches showed shear thinning behaviour during steady shear measurements. © 2019 Wageningen Academic Publishers.

Author keywords

Dynamic shear rheology; OSA; Sorghum; Steady shear rheology

Reaxys Chemistry database information

Computational Sciences

Sr.no 46

Character and numeral recognition for non-Indic and Indic scripts: a survey

Munish Kumar[1] · M. K. Jindal[2] · R. K. Sharma[3] · Simpel Rani Jindal[4]

Abstract A collection of different scripts is employed in writing languages throughout the world. Character and numeral recognition of a particular script is a key area in the field of pattern recognition. In this paper, we have presented a comprehensive survey on character and numeral recognition of non-Indic and Indic scripts. Many researchers have done work on character and numeral recognition from the most recent couple of years. In perspective of this, few strategies for character/numeral have been developed so far. There are an immense number of frameworks available for printed and handwritten character recognition for non-Indic scripts. But, only a limited number of systems are offered for character/numeral recognition of Indic scripts. However, few endeavors have been made on the recognition of Bangla, Devanagari, Gurmukhi, Kannada, Oriya and Tamil scripts. In this paper, we have additionally examined major challenges/issues for character/numeral recognition. The efforts in two directions (non-Indic and Indic scripts) are reflected in this paper. When compared with non-Indic scripts, the research on character recognition of Indic scripts has not achieved that perfection yet. The techniques used for recognition of non-Indic scripts may be used for

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Sr.no 47

Multimedia Tools and Applications
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Fusion of RGB and HSV colour space for foggy image quality enhancement

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Published online: 29 August 2018

Abstract
The physical properties of water cause light-prompted degradation of foggy images. The light quickly loses intensity as it goes in the water, depending upon the shading range wavelength. Visible light is consumed at the longest wavelength first. Red and blue are the most and least absorbed, respectively. Foggy images with low contrast, are captured due to the degradation effects of the light spectrum. Therefore, valuable information from these images cannot be fully extracted for further processing. In this paper, the authors have proposed a new method to increase contrast and reduce the noise of foggy images using CLAHE (Contrast Limited Adaptive Histogram Equalization) algorithm. The proposed method fuses the modification of image histogram into two main colour models, namely, Red–Green–Blue (RGB) and Hue-Saturation-Value (HSV). In the primary stage, the CLAHE is connected just on the red part as in water, red shading is more influenced than the blue or green shading. Furthermore, in the second stage, without influencing the hue, the CLAHE is connected to saturation and value components of the HSV colour model. Finally, enhanced image has been produced using a fusion of output of primary phase and output produced in the second phase. Two parameters, namely, RMSE (Root Mean Squared Error) and the PSNR (Peak Signal to Noise Ratio) have been considered in comparing the experimental results of the proposed system with state-of-the-art work.

Keywords Image enhancement · CLAHE · RGB · HSV · PSNR

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Sr.no 48

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Face detection techniques: a review

Ashu Kumar, Amandeep Kaur & Munish Kumar

Artificial Intelligence Review **52**, 927–948 (2019) | Cite this article

4066 Accesses | **47** Citations | Metrics

Abstract

With the marvelous increase in video and image database there is an incredible need of automatic understanding and examination of information by the intelligent systems as manually it is getting to be plainly distant. Face plays a major role in social intercourse for conveying identity and feelings of a person. Human beings have not tremendous ability to identify different faces than machines. So, automatic face detection system plays an important role in face recognition, facial expression recognition, head-pose estimation, human–computer interaction etc. Face detection is a computer technology that determines the location and size of a human face in a digital image. Face detection has been a standout amongst topics

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terature. This paper presents a comprehensive survey of various techniques explored for face detection in digital images. Different challenges and applications

Sr.no 49

Neural Processing Letters
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Improved Recognition Results of Medieval Handwritten Gurmukhi Manuscripts Using Boosting and Bagging Methodologies

Munish Kumar[1] · Simpel Rani Jindal[2] · M. K. Jindal[3] · Gurpreet Singh Lehal[4]

Abstract
Recognition of medieval handwritten Gurmukhi manuscripts is an essential process for resourceful contents exploitation of the priceless information contained in them. There are numerous Gurmukhi script ancient manuscripts from fifteenth to twentieth century's. In this paper, we have considered, work written by various persons from 18th to 20th centuries. For recognition, we have used various feature extraction techniques like zoning, discrete cosine transformations, and gradient features and different combinations of these features. For classification, four classifiers, namely, *k*-NN, SVM, Decision Tree, Random Forest individual and combinations of these four classifiers with voting scheme have been considered. Adaptive boosting and bagging have been explored for improving the recognition results and achieves the new state of the art for recognition of medieval handwritten Gurmukhi manuscripts recognition. Using this proposed framework, maximum recognition accuracy of 95.91% has been achieved using adaptive boosting technique and a combination of four different classifiers considered in this paper. To the best of our knowledge, this work is the successful attempt towards recognition of medieval handwritten Gurmukhi manuscripts and it can lead towards the development of optical character recognition systems for recognizing medieval handwritten documents in other Indic and non-Indic scripts as well.

Keywords Medieval handwriting recognition · Feature extraction · Classification · Adaptive boosting · Bootstrap aggregating

1 Introduction

Optical Character Recognition (OCR) is used for converting hard copy image containing machine-printed or handwritten text into a format which can be edited or processed by a computer. OCR frameworks have just accomplished impressive accuracy in fine printed text recognition. Historical books and medieval handwritten text documents containing bleed through text are yet to be recognized with acceptable accuracy. Gurmukhi is one of the

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ORIGINAL PAPER

Writer Identification System for Indic and Non-Indic Scripts: State-of-the-Art Survey

Shaveta Dargan[1] · Munish Kumar[1]

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Abstract

Writer identification is a challenging move in the field of pattern recognition and reflects advanced perceptions into the handwriting research. It is the process of determining the author or writer of the text by matching it with the training database. It is an exigent task because the writing style of an individual is distinct from other because of unique intrinsic characteristics and is different even if the same writer writes that text with the same pen next time. It is concerned with the writing styles, feelings, perception, behavior and the brain of an individual and it is one of the neoteric applications of biometric identification. Biometric identification is the branch of computer science that deals with identification of an individual from a group using unique identifiers such as fingerprints, retina, handwriting and signatures. It is a term used for the body measurements and calculations. This paper presents a comprehensive and transparent panorama on the work done for the writer identification system on different Indic and non-Indic scripts and a widespread view towards this peculiar research area. The structure of the paper comprises introduction, motivation for the work, background, sources of information, schemes, process, reported works, synthesis analysis, study of features and classifiers for writer identification, and finally the conclusion and future directions. The main focus of this paper is to present in a systematic way, the reported works on writer identification systems on Indic scripts such as Bengali, Gujarati, Gurumukhi, Kannada, Malayalam, Oriya, Tamil and Telugu and Non-Indic scripts such as Arabic, Chinese, French, Persian, Roman and finally exposes the synthesis analysis based on the findings. This study gives the cognizance and beneficial assistance to the novice researchers in this field by providing in a nut shell the studies of various feature extraction methods and classification techniques required for writer identification on both Indic and non-Indic scripts. It is observed that work done on the writer identification systems with good accuracy rates in Indic scripts is limited as compared to non-Indic scripts and truly presents a future direction.

1 Introduction

Pattern recognition is a mature, evolving, exciting and useful field which actually acts as a foundation stone for the developments such as computer vision, image processing, text and document analysis, speech recognition, medical diagnosis, weather forecasting, fingerprint recognition, multimedia data analysis and so on. Pattern recognition has its roots in artificial intelligence and it is a concept of machine learning that focuses on the recognition of entities called patterns and based on the identified patterns it is able to do the classification of data. The evolution of artificial intelligence and pattern recognition stipulates one of the novel research problems of writer identification through handwriting. Due to ample advancements of the technology, identification of an individual is essential in many fields such as forensic document analysis, criminal justice system personal identification, old handwritten music scores etc. In view of biometric features such as physiological and behavioral, recognizing an individual based on the handwriting is a form of behavioral biometric identification. Writer identification systems are also useful for the validation and authentication purpose, such as signature identification and verification, in banks and in the court of law. The scientific base here is the human brain, as the brain sends the commands and signals for the writing. Writer identification system works on the basic principle of performing one-to-many search in a database with samples of known authorship and

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Sr.no 51

Multimedia Tools and Applications
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A healthcare monitoring system using random forest and internet of things (IoT)

Pavleen Kaur[1] · Ravinder Kumar[1] · Munish Kumar[2]

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Published online: 22 February 2019

Abstract

The Internet of Things (IoT) enabled various types of applications in the field of information technology, smart and connected health care is notably a crucial one is one of them. Our physical and mental health information can be used to bring about a positive transformation change in the health care landscape using networked sensors. It makes it possible for monitoring to come to the people who don't have ready access to effective health monitoring system. The captured data can then be analyzed using various machine learning algorithms and then shared through wireless connectivity with medical professionals who can make appropriate recommendations. These scenarios already exist, but we intend to enhance it by analyzing the past data for predicting future problems using prescriptive analytics. It will allow us to move from reactive to visionary approach by rapidly spotting trends and making recommendations on behalf of the actual medical service provider. In this paper, the authors have applied different machine learning techniques and considered public datasets of health care stored in the cloud to build a system, which allows for real time and remote health monitoring built on IoT infrastructure and associated with cloud computing. The system will be allowed to drive recommendations based on the historic and empirical data lying on the cloud. The authors have proposed a framework to uncover knowledge in a database, bringing light to disguise patterns which can help in credible decision making. This paper has evaluated prediction systems for diseases such as heart diseases, breast cancer, diabetes, spect_heart, thyroid, dermatology, liver disorders and surgical data using a number of input attributes related to that particular disease. Experimental results are conducted using a few machine learning algorithms considered in this paper like K-NN, Support Vector Machine, Decision Trees, Random Forest, and MLP.

Keywords Internet of things · Data mining · Machine learning · Healthcare

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Sr.no 52

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An efficient page ranking approach based on vector norms using *s*Norm(*p*) algorithm

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ABSTRACT

In the whole world, the internet is exercised by millions of people every day for information retrieval. Even for a small to smaller task like fixing a fan, to cook food or even to iron clothes persons opt to search the web. To fulfill the information needs of people, there are billions of web pages, each having a different degree of relevance to the topic of interest (TOI), scattered throughout the web but this huge size makes manual information retrieval impossible. The page ranking algorithm is an integral part of search engines as it arranges web pages associated with a queried TOI in order of their relevance level. It, therefore, plays an important role in regulating the search quality and user experience for information retrieval. PageRank, HITS, and SALSA are well-known page ranking algorithm based on link structure analysis of a seed set, but ranking given by them has not yet been efficient. In this paper, we propose a variant of SALSA to give sNorm(p) for the efficient ranking of web pages. Our approach relies on a p-Norm from Vector Norm family in a novel way for the ranking of web pages as Vector Norms can reduce the impact of low authority weight in hub weight calculation in an efficient way. Our study, then compares the rankings given by PageRank, HITS, SALSA, and sNorm(p) to the same pages in the same query. The effectiveness of the proposed approach over state of the art methods has been shown using performance measurement technique, Mean Reciprocal Rank (MRR), Precision, Mean Average Precision (MAP), Discounted Cumulative Gain (DCG) and Normalized DCG (NDCG). The experimentation is performed on a dataset acquired after pre-processing of the results collected from initial few pages retrieved for a query by the Google search engine. Based on the type and amount of in-hand domain expertise 30 queries are designed. The extensive evaluation and result analysis are performed using MRR, Precision@k, MAP, DCG, and NDCG as the performance measuring statistical metrics. Furthermore, results are statistically verified using a significance test. Findings show that our approach outperforms state of the art methods by attaining 0.8666 as MRR value, 0.7957 as MAP value. Thus contributing to the improvement in the ranking of web pages more efficiently as compared to its counterparts.

1. Introduction

The enormous volume and unstructured nature of information over the web are causing a big threat to the information retrieval efficiency of search engines. Thousands of results are returned by search engines for a search query out of which only some are

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Soft Computing
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METHODOLOGIES AND APPLICATION

Devanagari ancient character recognition using DCT features with adaptive boosting and bootstrap aggregating

Sonika Rani Narang[1] · M. K. Jindal[2] · Munish Kumar[3]

Abstract

Devanagari ancient manuscript recognition framework is drawing a lot of considerations from researchers nowadays. Devanagari ancient manuscripts are rare and delicate documents. To exploit the priceless information included in these documents, these documents are being digitized. Optical character recognition process is being used for the recognition of these documents. This paper presents a system for improvement in recognition of Devanagari ancient manuscripts using AdaBoost and Bagging methodologies. Discrete cosine transform (DCT) zigzag is used for feature extraction. Decision tree, Na¨ıve Bayes and support vector machine classifiers are used for the recognition of basic characters segmented from Devanagari ancient manuscripts. A dataset of 5484 pre-segmented characters of Devanagari ancient documents is considered for experimental work. Maximum recognition accuracy of 90.70% has been achieved using DCT zigzag features and RBF-SVM classifier. AdaBoost and Bagging ensemble methods are used with the base classifiers to improve the accuracy. Maximum accuracy of 91.70% is achieved for adaptive boosting (AdaBoost) with RBF-SVM. Various parameters for performance measures such as precision, recall, *F*-measure, false acceptance rate, false rejection rate and RMSE are used for assessing the quality of the ensemble methods.

Keywords Ancient manuscripts · Devanagari historical documents · Off-line character recognition · Feature extraction · Classification

1 Introduction

Optical character recognition (OCR) is used for the identification of characters from scanned printed or handwritten documents. India is a land of timeless and rich heritage, to which our ancient monuments and documents are the testimony. Great knowledge of Indian sages and other great persons is preserved in ancient documents. Ancient documents are mostly degraded documents. Degradation of ancient documents may be due to age or writing style, ink stains, lightening of ink, uneven space between text lines, overlapping of text lines or characters, different layouts, broken characters or torn pages. In order to preserve our cultural heritage and for automated document processing, libraries and national archives have started digitizing historical documents (Kleber et al. 2008). So, this work has motivated us to propose a system for recognition of Devanagari ancient documents. Other systems exist for the recognition of printed and handwritten Devanagari text, but the present work is done for the recognition of handwritten Devanagari ancient documents. As per the best of our knowledge, no such work is reported in the literature. To evaluate the performance of this system, the authors have considered 5484 samples of basic characters categorized in 33 classes. Though basic characters in Devanagari script are 44, but total classes identified are 33 as some characters are converted to the same classes, for example, after

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Sr.no 54

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Devanagari ancient documents recognition using statistical feature extraction techniques

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Abstract. Devanagari ancient document recognition process is drawing a lot of consideration from researchers nowadays. These ancient documents contain a wealth of knowledge. However, these documents are not available to all because of their fragile condition. A Devanagari ancient manuscript recognition system is designed for digital archiving. This system includes image binarization, character segmentation and recognition phases. It incorporates automatic recognition of scanned and segmented characters. Segmented characters may include basic characters (vowels and consonants), modifiers (*matras*) and various compound characters (characters formed by joining more than one basic characters). In this paper, handwritten Devanagari ancient manuscripts recognition system has been presented using statistical features extraction techniques. In feature extraction phase, intersection points, open endpoints, centroid, horizontal peak extent and vertical peak extent features are extracted. For classification, Convolutional Neural Network, Neural Network, Multilayer Perceptron, RBF-SVM and random forest techniques are considered in this work. Various feature extraction and classification techniques are considered and compared to the recognition of basic characters segmented from Devanagari ancient manuscripts. A data set, of 6152 pre-segmented samples of Devanagari ancient documents, is considered for experimental work. Authors have achieved 88.95% recognition accuracy using a combination of all features and a combination of all classifiers considered in this work by a simple majority voting scheme.

Keywords. Ancient manuscripts; Devanagari historical documents; feature extraction; classification.

1. Introduction

work on digitizing historical documents [1]. Hence, this work has motivated us to offer a system for recognition of

Sr.no 55

Multimedia Tools and Applications
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Drop flow method: an iterative algorithm for complete segmentation of Devanagari ancient manuscripts

Sonika Rani Narang[1] · Manish Kumar Jindal[2] · Munish Kumar[3]

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Abstract
One of the major challenges of ancient manuscripts recognition is character segmentation. Because of many distinct features of ancient documents (thick characters, overlapping and touching characters), character segmentation is a very difficult task. Devanagari ancient manuscripts consist of vowels, consonants, modifiers, conjuncts and compound characters. Using existing techniques, segmentation of overlapping and touching characters is problematic. In this paper, an iterative character segmentation algorithm is presented for ancient documents in Devanagari script. At the beginning, the lines are extracted from the ancient documents by dividing the document image into vertical stripes and then using piecewise horizontal projection profiles. After that, these lines are segmented into words using vertical projection profiles and finally, words are segmented in characters using an iterative algorithm. In each iteration, character segmentation is refined. In the present work, we have proposed a new algorithm with the name 'Drop Flow Method' to find the segmentation path between touching components. The proposed algorithm can segment touching characters and 96.0% accuracy has been achieved for complete segmentation of Devanagari ancient manuscripts.

Keywords Pattern recognition · Optical character recognition · Drop flow · Ancient manuscripts · Ancient documents

1 Introduction

Text line, word and character segmentation are important steps in an optical character recognition system. Segmentation plays a major role in increasing the recognition accuracy of the text. It is very important to keep errors as minimum as possible in the segmentation

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Archives of Computational Methods in Engineering
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ORIGINAL PAPER

A Survey of Deep Learning and Its Applications: A New Paradigm to Machine Learning

Shaveta Dargan[1] · Munish Kumar[1] · Maruthi Rohit Ayyagari[2] · Gulshan Kumar[3]

Received: 11 November 2018 / Accepted: 26 May 2019

Abstract

Nowadays, deep learning is a current and a stimulating field of machine learning. Deep learning is the most effective, supervised, time and cost efficient machine learning approach. Deep learning is not a restricted learning approach, but it abides various procedures and topographies which can be applied to an immense speculum of complicated problems. The technique learns the illustrative and differential features in a very stratified way. Deep learning methods have made a significant breakthrough with appreciable performance in a wide variety of applications with useful security tools. It is considered to be the best choice for discovering complex architecture in high-dimensional data by employing back propagation algorithm. As deep learning has made significant advancements and tremendous performance in numerous applications, the widely used domains of deep learning are business, science and government which further includes adaptive testing, biological image classification, computer vision, cancer detection, natural language processing, object detection, face recognition, handwriting recognition, speech recognition, stock market analysis, smart city and many more. This paper focuses on the concepts of deep learning, its basic and advanced architectures, techniques, motivational aspects, characteristics and the limitations. The paper also presents the major differences between the deep learning, classical machine learning and conventional learning approaches and the major challenges ahead. The main intention of this paper is to explore and present chronologically, a comprehensive survey of the major applications of deep learning covering variety of areas, study of the techniques and architectures used and further the contribution of that respective application in the real world. Finally, the paper ends with the conclusion and future aspects.

1 Introduction

Machine learning is a subsection of Artificial Intelligence (AI) that imparts the system, the benefits to automatically learn from the concepts and knowledge without being explicitly programmed. It starts with observations such as the direct experiences to prepare for the features and patterns in data and producing better results and decisions in the future. Deep learning relies on the collection of machine learning algorithms which models high-level abstractions in the data with multiple nonlinear transformations. A deep learning technology works on the artificial neural network system (ANNs). These ANNs constantly take learning algorithms and by continuously increasing the amounts of data, the efficiency of training processes can be improved. The efficiency is dependent on the larger data volumes. The training process is called deep because the number of levels of neural network increases with the time. The working of the deep learning process is purely dependent on two phases which are called the training phase and inferring phase. The training phase includes labeling of large amounts of data and determining their matching characteristics and the inferring phase deals with making conclusions and label new unexposed data using their previous knowledge. Deep-learning is such an approach that helps the system to understand the complex perception tasks with the maximum accuracy. Deep learning is also known as deep structured learning and hierarchical learning that consists of multiple layers which includes nonlinear processing units for the purpose of conversion and feature extraction. Every subsequent

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Springer

Recognition of newspaper printed in Gurumukhi script

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Abstract: In this work, a system for recognition of newspaper printed in Gurumukhi script is presented. Four feature extraction techniques, namely, zoning features, diagonal features, parabola curve fitting based features, and power curve fitting based features are considered for extracting the statistical properties of the characters printed in the newspaper. Different combinations of these features are also applied to improve the recognition accuracy. For recognition, four classification techniques, namely, k-NN, linear-SVM, decision tree, and random forest are used. A database for the experiments is collected from three major Gurumukhi script newspapers which are Ajit, Jagbani and Punjabi Tribune. Using 5-fold cross validation and random forest classifier, a recognition accuracy of 96.19% with a combination of zoning features, diagonal features and parabola curve fitting based features has been reported. A recognition accuracy of 95.21% with a partitioning strategy of data set (70% data as training data and remaining 30% data as testing data) has been achieved.

Key words: newspaper recognition; feature extraction; classification; Gurumukhi script; random forest

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1 Introduction

Optical character recognition (OCR) is a process which is used to convert the scanned text document either printed or handwritten into the machine processable format. Many of the OCRs are being developed to work on recognition of text printed/handwritten in different scripts across the nation and also worldwide. Database to feed to OCRs training may be varied according to the requirement of users, database can be of books, general pages, post office letters, handwritten manuscripts, ancient text documents, etc. A lot of work has been done on all these fields and still in progress. Many of the researchers are also working on the development of OCR for newspapers so that people could be enabled to store a lot of information in digital and most important in searchable form. Large research project is established in the United States to digitize historic newspapers from 1836 to 1922 and working on providing more searchable data. Many more projects are running to digitize newspapers. If we discuss about digitization of newspapers printed in Indian scripts, a few research works are reported on the Bangla script as best to our knowledge. Text graphic segmentation of an article in few Indian

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RESEARCH ARTICLE

Line Segmentation of Devanagari Ancient Manuscripts

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Abstract In this paper, we have proposed a line segmentation algorithm for Devanagari ancient documents by dividing the document image into vertical stripes and followed by piecewise horizontal projection profiles. Average line height is computed, and based on this height, under-segmentation or over-segmentation of lines is detected for ancient manuscripts recognition. For experimental work of line segmentation algorithm, Devanagari ancient manuscripts are collected from various libraries and museums. To digitize these images, scanner and digital camera are used. The proposed line segmentation algorithm is tested on 1500 text lines. To the best of our knowledge, this is the first work of its kind for line segmentation on Devanagari ancient manuscripts. The proposed algorithm can be used for other Indian scripts also.

Keywords OCR · Segmentation · Line segmentation · Ancient manuscripts · Ancient documents · Historical document

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1 Introduction

In this digital day and age, it has turned out to be mandatory to have all the accessible data in a digital form recognized by machines. In the digitization phase, optical character recognition (OCR) intends to recognize characters from these digitized documents. In India, there are a large number of historical ancient documents in handwritten Devanagari script containing ancient manuscripts written by spiritual persons of fifteenth to twentieth centuries. These manuscripts have great information. But, due to their delicate condition, these ancient documents of thousand pages are not easily accessible. It has to be digitized and converted to a textual form in order to be recognized by machines doing searches of millions of pages/second. OCR plays an important role in recognizing text from images of documents. Many commercial OCRs are available for a number of non-Indian scripts like Arabic, Italian, Roman, Spanish, etc. OCR for Indian scripts is at the advanced research level. OCR for Devanagari printed text has been developed up to acceptable accuracy, but OCR for handwritten Devanagari documents especially ancient documents is still at a very early stage. Not much work has been done in this field. In this paper, authors have presented a line segmentation algorithm for Devanagari ancient documents.

2 Related Work

Many techniques have been proposed in the literature for line segmentation of a document image. Survey papers are available for segmentation of lines from handwritten text [1, 2]. Wong et al. [3] used Run Length Smearing Algorithm (RLSA) for line segmentation in printed documents.

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Improved object recognition results using SIFT and ORB feature detector

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Abstract

Object recognition has a wide domain of applications such as content-based image classification, video data mining, video surveillance and more. Object recognition accuracy has been a significant concern. Although deep learning had automated the feature extraction but hand crafted features continue to deliver consistent performance. This paper aims at efficient object recognition using hand crafted features based on Oriented Fast & Rotated BRIEF (Binary Robust Independent Elementary Features) and Scale Invariant Feature Transform features. Scale Invariant Feature Transform (SIFT) are particularly useful for analysis of images in light of different orientation and scale. Locality Preserving Projection (LPP) dimensionality reduction algorithm is explored to reduce the dimensions of obtained image feature vector. The execution of the proposed work is tested by using k-NN, decision tree and random forest classifiers. A dataset of 8000 samples of 100-class objects has been considered for experimental work. A precision rate of 69.8% and 76.9% has been achieved using ORB and SIFT feature descriptors, respectively. A combination of ORB and SIFT feature descriptors is also considered for experimental work. The integrated technique achieved an improved precision rate of 85.6% for the same.

Keywords Object Recognition · ORB · SIFT · K-Means · LPP · k-NN · Decision Tree · Random Forest

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Plant Species Recognition using Morphological Features and Adaptive Boosting Methodology

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ABSTRACT Plant species detection aims at the automatic identification of plants. Although a lot of aspects like leaf, flowers, fruits, seeds could contribute to the decision, but leaf features are the most significant. As a plant leaf is always more accessible as compared to other parts of the plants, it is obvious to study it for plant identification. The present paper introduced a novel plant species classifier based on the extraction of morphological features using a Multilayer Perceptron with Adaboosting. The proposed framework comprises pre-processing, feature extraction, feature selection, and classification. Initially, some pre-processing techniques are used to set up a leaf image for the feature extraction process. Various morphological features, i.e., centroid, major axis length, minor axis length, solidity, perimeter, and orientation are extracted from the digital images of various categories of leaves. Different classifiers, i.e., k-NN, Decision Tree and Multilayer perceptron are employed to test the accuracy of the algorithm. AdaBoost methodology is explored for improving the precision rate of the proposed system. Experimental results are obtained on a public dataset (FLAVIA) downloaded from http://flavia.sourceforge.net/. A precision rate of 95.42% has been achieved using the proposed machine learning classifier, which outperformed the state-of-the-art algorithms.

INDEX TERMS Leaf recognition, Feature extraction, k-NN, Decision tree, Multilayer perceptron, Plant Leaf Classification, Plant Species Identification, AdaBoost.

I. INTRODUCTION

As the future is moving to an artificially intelligent world, machines are replacing human experts in every domain. One such significant domain is agriculture, where the human experts are looking for intelligent machines, which may make their task easier and perform even better than human experts. Such intelligent systems are very crucial, as they are likely to eliminate any chances of ambiguity. Leaf recognition for plant species detection is a significant research zone in the field of image processing and computer vision. Although a lot of methods have been developed so far, the existing computational models for leaf recognition must address a couple of challenging issues. One of these challenges is the extraction of features of plant leaf and their representation so that accurate classification of plant species could be made. Out of many features, leaf shape is a conspicuous element that most algorithms rely on to perceive and describe a plant [1]. In addition, leaf shading, surface, and vein can also be considered for more accurate classification [2]. Each of these components is significant for the recognition and classification of a leaf image. Because of the availability of effortless cameras and remarkable computer vision frameworks, plant/leaf recognition has become an active area of research. The popular frameworks mainly comprise pre-processing, feature extraction & selection and classification. This paper aims to propose a novel classifier for plant species recognition using morphological features enhanced with the adaptive boosting methodology. The major contributions of our paper are:

- Fast and accurate leaf classification for plant species identification
- Utilization of morphological leaf features with low dimensionality
- Evaluation of different classifiers
- Optimize the classification results using AdaBoost

This paper is subdivided into seven sections. An introduction to plant leaf recognition has been presented in Section 1. Section 2 presents a review of existing techniques. The diagram of the proposed system is depicted in Section 3.

The exploratory outcomes are portrayed in Section 4. Furthermore, a performance comparison with state-of-the-artwork is made in Section 5. Finally, Section 6 provides the

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METHODOLOGIES AND APPLICATION

Writer identification system for pre-segmented offline handwritten Devanagari characters using *k*-NN and SVM

Shaveta Dargan[1] · Munish Kumar[1] · Anupam Garg[2] · Kutub Thakur[3]

Abstract

A biometric identification system based on single and multiple modalities has been an evolving concept for solving criminal issues, security and privacy maintenance and for checking the authentication of an individual. The writer identification system is a type of biometric identification in which handwriting of an individual is taken as a biometric identifier. It is a system in which the writer can be identified based on his handwritten text. These systems employ machine learning and pattern recognition algorithms for the generation of a framework. In this paper, the authors have presented a novel system for the writer identification based upon the pre-segmented characters of Devanagari script and also presenting comprehensive state-of-the-art work. The experiment is performed on the corpus consisting of five copies of each character of Devanagari script written by 100 different writers, selected randomly at the public places and consisting of total 24,500 samples of Devanagari characters. Four feature extraction methodologies such as zoning, diagonal, transition and peak extent-based features and classification methods such as *k*-NN and linear SVM are used with identification accuracy of 91.53% when using zoning, transition and peak extent-based features with a linear SVM classifier.

Keywords Forensic record examination · Writer identification · Devanagari character recognition · Feature extraction · *k*-NN · SVM

1 Introduction

Writer identification system is one of the important applications of document analysis and recognition. Writer identification is the process of identifying the author or the writer based on the handwritten text, and the nature of the script may be Indic or non-Indic. Each script has its own specific characteristics and uniqueness that can be explored to devise a unique approach for the target such as the extraction of specific features from of the text samples written by a person, implementation of classification algorithms and so on. Automatic identification of the writer for the online or offline digitized handwriting sample images has been widely used and important for many applications such as crime investigation, forensic analysis, theft cases and personal identification for wills. It is the part of document analysis and identification which comes under the field of pattern recognition and the machine learning research community. The proposed experiment was implemented on the Devanagari script for the development of the writer identification system for achieving high accuracy rates as compared to the state-of-the-art work. Devanagari is the national language of India and is the third popular language of the world. It has been believed that the Devanagari script was originally developed from the Brahmi script by applying numerous transformations. As there is a close linkage between handwriting recognition and writer identification, it is therefore believed that writing by hand can also be an important source for solving many important issues such as the name of the writer, age, handedness (left or right) and

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Switching related activation field for polarization-reversal and for polarization-saturation in PVA based $NaNO_2$–$CsNO_3$ mixed system composite films fabricated at moderate elevated temperature

Lakhbir Singh, Baljinder Kaur, Tarun Garg, Arvind Nautiyal, Navneet Dabra & Jasbir S. Hundal

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A comparative investigation of structural and optical properties of annealing modified mullite bismuth ferrite

Baljinder Kaur, Lakhbir Singh, Tarun Garg, Dae-Yong Jeong, Navneet Dabra & Jasbir S. Hundal

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BIOSORPTION OF COPPER(II) IONS USING TIMBER INDUSTRY WASTE BASED BIOMASS

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ABSTRACT

The processing and characterization of timber industry waste based saw dust and its biosorption studies towards Cu (II) ions is the focus of the present study. The processing of saw dust involved (i) boiling with water (ii) treatment with formaldehyde and (iii) treatment with sulphuric acid to get three new adsorbents abbreviated as SDB (boiled saw dust), SDF (formaldehyde treated saw dust) and SDS (sulphuric acid treated saw dust), respectively. CHNSO, SEM-EDS, FTIR and BET surface area techniques were used for the characterization of SDB, SDF and SDS. These adsorbents were used for the comparative investigation of Cu (II) ions remediation in a batch process. Effects of procedural variables like pH, contact period, starting concentration of Cu (II) ions, the quantity of adsorbent, temperature and agitation speed were investigated for the removal of metal ions under study on SDB, SDF and SDS adsorbents. Isothermal studies were carried out using Langmuir, Freundlich, Dubinin-Radushkevich and Temkin isotherm models. From Langmuir isotherm, the maximum adsorption capacity was calculated as 98.81, 178.57 and 142.85 mg/g for SDB, SDF and SDS adsorbents, respectively. Kinetic studies indicate that the rate of Cu (II) ions adsorption follows pseudo-second-order kinetics. Studies of free energy changes suggest the process of biosorption as spontaneous and feasible. Enthalpy change values indicate the process of adsorption to be exothermic for SDB, SDF and endothermic for SDS. The results of desorption studies revealed that biosorbents used in present work are promising biosorbents for remediating copper from aqueous solution.

Keywords: Cu (II) Biosorption, Low-cost Adsorbents, Kinetic, Isotherm Studies, Desorption.

INTRODUCTION

Contamination of water bodies, due to the discharge of metal ions containing untreated effluent by industries, poses a profound danger to the global environment. The major percentage of metal ions in water comprises of Cd, Ni, Hg, Cu, Zn, Pb, Cr and As. These metals are obnoxiously affecting the ecological community owing to their toxic behavior [1]. The presence of metal ions in water bodies often exceeds the permissible limit. Metals are non-biodegradable and get accumulated in the biotic community resulting in physiological and metabolic disorders [2]. They are generally persistent and are not degraded readily [3]. The driving force for the eviction of metal ion contaminants from the aquatic system is the health problems caused by their occurrence above permissible limit [4]. Several methodologies have been reported in the literature for addressing the contamination problem due to metal ions. These include membrane filtration, ion-exchange, reverse osmosis, photo-catalysis, electrocoagulation, precipitation, solvent extraction etc. Although, these physical and chemical treatment procedures are manageable, quick

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ADSORPTION ISOTHERM, KINETICS AND THERMODYNAMICS OF BIVALENT NICKEL SCAVENGING UTILISING SAWDUST CARBON

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ABSTRACT

Batch mode studies were carried out for investigating the removal efficiency of sawdust carbon prepared by sulphuric acid treatment of Indian Rosewood sawdust for aqueous bivalent nickel ions. Experiments involved the study of influence of varying the parameters like pH, contact period, the initial strength of adsorbate, temperature, agitation speed and dosage of adsorbent on scavenging of adsorbate ions. Characterization of adsorbent has been done using FTIR, SEM-EDX, BET surface area and CHNSO elemental analysis. Adsorption isothermal studies are in good agreement with the Langmuir isotherm model. The highest calculated value of the correlation coefficient suggested Pseudo-second order reaction kinetics for adsorption of nickel bivalent ions on sawdust carbon. Exothermic nature and spontaneity of removal of nickel ions were shown by thermodynamic parameters. Desorption experiments were accomplished using HCl solutions of varying concentrations. High percentage adsorption of sawdust carbon adsorbent observed for Ni (II) ions indicated that it could be efficiently employed for scavenging of aqueous Ni (II) metal ions.

Keywords: Adsorption, Batch mode, Bivalent Nickel, Isotherm, Kinetics.

INTRODUCTION

Heavy metals present in effluents emanating from industries[1] discharged into water bodies are the most ubiquitous pollutants of utmost concern for the whole world[2]. Commonly employed metals in industries include Cu, Ni, Zn, Hg, Cd, Cr, As, Pb etc. Toxicity and persistency associated with these heavy metals demand their removal from effluent water[3]. Surprisingly, some of these metal ions could be highly hazardous at low concentration towards animals, plants and human beings. Serious health disorders are caused by ingestion of heavy metal ions beyond permissible limits[4]. Therefore, research in past decades is focused on the discovery of various alternative treatment processes for efficient eviction of these metallic pollutants from industrial emissions before their discharge into aquatic system[5].

Nickel in comparison to other metals is a more recalcitrant pollutant[6]. It is widely used in many industries such as electroplating, mining, smelting, aircraft, pigments and metal finishing etc.[7]. The high strength of metallic nickel in industrial effluents may result in various diseases and disorders in human beings like renal disorder, pulmonary fibrosis (excessive formation of connective tissue in lungs) and skin dermatitis[8]. In the metal-plating industry, continuous exposure to Ni has been known to cause

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REVIEW

Recent developments in biological aspects of chalcones: the odyssey continues

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ABSTRACT

Introduction: Chalcones are attractive to synthetic chemists because they are easy to prepare, have a large number of replaceable hydrogens, thereby having significant biological potential. Chalcones and their derivatives (carbocyclic as well as heterocyclic) exhibit a range of biological properties including anticancer, antimalarial, antioxidant, anti-inflammatory and anti-tubercular activities. Their promising biological profile, along with their ease of synthetic manipulations, have triggered the design and development of new chalcone derivatives as well as their conjugates with active pharmacophores affording therapeutic templates targeting various diseases.

Areas covered: This review focuses on synthesized substituted chalcones as well as chalcone-based molecular conjugates that have been developed between 2015 and 2018. Furthermore, their structure–activity relationships with an emphasis on their mechanism of action and docking studies along with their future therapeutic applications.

Expert opinion: A recent upsurge in scientific literature encompassing the synthesis of new chalcone-derivatives as well as its role in ameliorating the activity profiles *via* amalgamation with other pharmacophores has clearly established the importance of chalcones in present-day drug discovery. As a point, we, the authors, believe that new effective scaffolds can be developed from chalcones with an added advantage of being available at a low cost.

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Claisen-schmidt condensation; chalcones; Structure Activity Relationship (SAR); anti-proliferatives; anti-oxidant; anti-malarial

1. Introduction

1,3-diaryl-prop-2-en-1-ones, popularly known as chalcones are important core-structures belonging to the flavonoid family and act as synthetic precursors to various flavonoids and isoflavonoids [1]. Of the various forms they exist in nature, the molecular framework of chalcone includes the presence of aryl rings connected through a three carbon *viz.* α, β-unsaturated carbonyl chain (Figure 1) [2]. Chalcones, thus can exist in two isomeric forms *viz.* *Z* and *E* of which the *E*-isomer is considered as thermodynamically favorable [3]. The occurrence of chalcones in nature can be as they acknowledged are considered to be responsible for floral coloration, imparting yellow/red pigmentation because of their highly conjugated structures, thus attracting insects like bees and butterflies for pollination. Plants like *Angelica keiskei*, *Glycyrrhiza inflate* and *Piper aduncum* are rich source of chalcones and have been used extensively by the natives for their medicinal potential [2,4]. Besides, chalcones, because of their ease of synthesis, large number of replaceable hydrogens as well as ease of synthetic manipulations, have attracted the attention of organic medicinal chemists worldwide.

A large number of research publications dedicated to the synthesis and bio-activities of chalcones appear every year specifically exploring their antioxidant [5], anticancer [6,7], anti-tubercular [8], anti-inflammatory [6,9], antimalarial [10], antifungal and antiviral activities [11,12]. The aim of the present review article is to take the readers on an odyssey of scientific reports appeared lately (**2015–18**) on the synthesis and biological potential of variedly functionalized chalcones. Emphasis would be given towards the Structure–Activity Relationship (SAR) of the synthesized scaffolds as well as the enzymatic studies of the promising molecules.

2. Biological activities

2.1. *Chalcones as anti-cancer agents: synthesis and biological evaluation*

Cancer is a life-threatening disease characterized by uncontrolled progression and metastasis of unusual or inconsistent cells [13–16]. The American Cancer Society estimated over 1,735,350 new cancer cases and over 609,640 deaths in the US alone in 2018 [17,18]. In spite of preferred method, chemotherapy is still considered inadequate providing a strong impetus for new molecular frameworks with a low incidence of resistance [19–21]. Due to the relative ease of preparation, structural diversity and facile chemical manipulation, many chalcones of natural and synthetic origin have been recognized for modulating important therapeutic pathways or molecular targets in cancer [22–24]. In addition, the literary rationale revealed strategies *viz.* structural manipulation of aryl rings, replacement of aryl rings with heteroaryl/ferrocenyl core as well as conjugation with other pharmacologically active scaffolds for enhancement of anticancer properties of chalcones [25–33]. These strategies have enabled the development of new

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IMPACT OF *IN SITU* RICE CROP RESIDUE BURNING ON AGRICULTURAL SOIL OF DISTRICT BATHINDA, PUNJAB, INDIA

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ABSTRACT

The study was carried out to explore the effect of *in situ* rice crop residue burning on physicochemical and biological properties of soil. Physico-chemical properties under investigation included soil pH, electrical conductivity, organic matter, total phosphorus, nitrogen and potassium. Result analysis showed an increase in mean pH and electrical conductivity values of soil samples from 7.94 and 245-699 µS/cm (pre-burning period) to 8.46 and 403-800 µS/cm (post-burning period). Similarly, a significant increase in soil organic matter for the post-burning period (27100 mg/kg) was observed as compared to the pre-burning period (25200 mg/kg). However, the nitrogen and phosphorus content decreased significantly in post burning period. The analysis also revealed a significant decrease in enzyme activities of amylase, cellulase, invertase and dehydrogenase in post burning samples. The causes and effects of the changes in physicochemical and biological properties of agriculture soils due to *in situ* rice crop residue burning have been discussed.

Keywords: Rice straw burning, Soil enzyme, Soil property, Macronutrients

INTRODUCTION

In situ crop residue burning is the burning of residues left in the field after crop harvesting. The residue is mainly stem of the rice plant still anchored with its roots in the soil. Crop residue burning is commonly practiced by farmers in several parts of India to get rid of the crop residue of the previous harvest. Agricultural residues mainly include straw, husks and hulls. Main contributors to biomass burning are wheat residue, maize stalks & leaves, rice straw & hulls, barley residue, millet and sorghum stalks. These residues do not have much usage and economic value. The practice is more common in agriculture intensive states like Punjab, Haryana, Rajasthan and Uttar Pradesh.

Crop residue burning is a cheap, convenient, easy and economical method for managing *in situ* crop residues. Another major reason for the wide acceptance of this practice is the time-saving in clearing the agricultural fields. Often, the farmers have very less time between harvest of one crop and sowing of the next one. However, this management measure has serious environmental and human health implications. The major environmental issues associated with crop residue burning are air pollution, climatic changes and soil pollution. The burning of crop residues also leads to human health problems due to the release of soot particles & smoke. Air pollution and climate change are due to the emission of greenhouse gases (GHGs) like carbon dioxide, nitrous oxide etc. The *in situ* crop residue burning adversely affects the soil fertility & soil properties.

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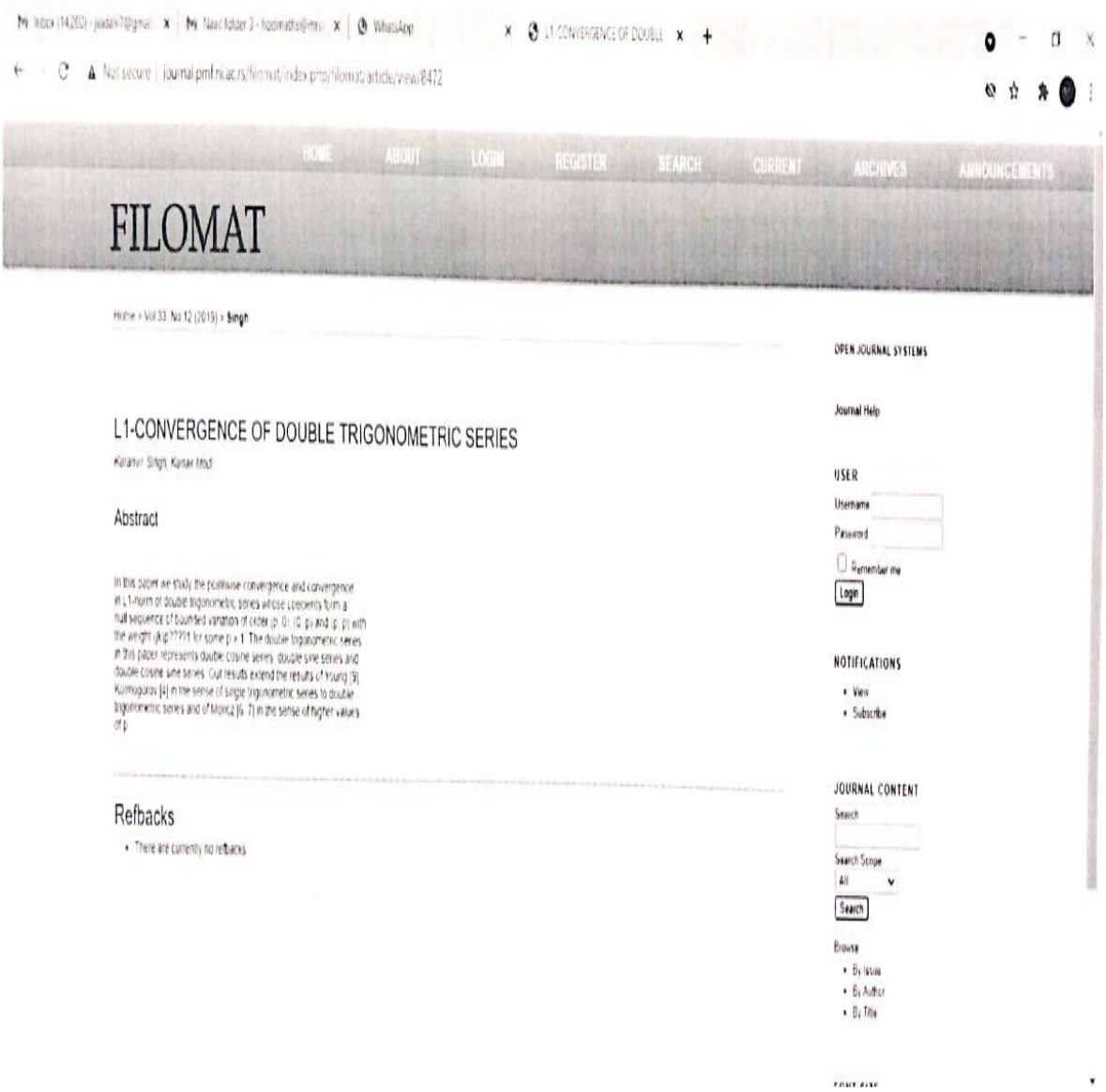
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L1-CONVERGENCE OF DOUBLE TRIGONOMETRIC SERIES
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University business School

Sr.no69

International Journal of Business and Globalisation • 2019 Vol.23 No.3

Title: Impact of operating efficiency on firm value - a case of Indian banking sector and information technology sector

Authors: Pritpal Singh Bhullar; Deepak Tandon

Addresses: University Business School, Maharaja Ranjit Singh Punjab Technical University, Bathinda, India ' PGDM Banking and Financial Services, International Management Institute, B-10, Qutab Institutional Area, New Delhi – 110016, India

Abstract: Indian banking sector and IT sector have undergone metamorphic changes amidst reforms. The efficiency, effectiveness and productivity in the banking and IT sector depict the transformation vis-a-vis the reforms. The present study examines the effect of operating efficiency on valuation of firm in context of Indian banking sector and IT sector. The authors have done a pilot study comprising of 15 banks and 15 IT companies over a time span of 2005 to 2015. Panel data analysis has been employed to examine the main objective of research. The independent variable, operating efficiency, is proxied by six financial ratios (FATO, ROCE, EV, NPM, QOI and EV/sales) and enterprise value acts as dependent variable. The study concludes that the fixed asset turnover (FATO) ratio and return on capital employed (ROCE) gives negative relation with enterprise value (EV) in banking sector whereas in IT sector similar trend is indicated by fixed asset turnover ratio.

Keywords: operating efficiency; panel data; enterprise value; banking; IT sector.

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Sr.no70

Stock Market Integration among Asian Economies in a Case of India, China and Japan

*Pritpal Singh Bhullar**

Abstract

Globalization has opened the door for global investors to avoid the saturation of investment opportunities in the domestic market. Latest technological advancement, accessibility to financial and global information, liberalization and globalization put the global market into a new investment framework. The present paper aims to examine the level of cointegration between three big Asian economic powers India, China and Japan. Twenty-years data has been analyzed by applying Johansen Cointegration, Vector Error Correction Model, and other econometric statistical tests in E-Views. The findings suggest a long-run relationship between India (BSE) and Japan Stock indices (Nikkie), but no such integration find of these two stock indices with China Stock Exchange (Shanghai).

***Keywords*:**
Asian Economies, Stock Indices, VECM, Johansen Cointegration Test, E-Views

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Department of Computer Science and Engineering

Sr.no71

Springer Link

Published: 03 October 2019

Energy Efficient Fuzzy Routing Protocol for Wireless Sensor Networks

Abhilasha Jain & Ashok Kumar Goel

Wireless Personal Communications **110**, 1459–1474 (2020) | Cite this article

222 Accesses | **17** Citations | Metrics

Abstract

Energy efficiency to route data in wireless sensor networks is key concern to enhance network lifetime. In this paper, an energy efficient routing protocol has been proposed using fuzzy logic tools. Fuzzy sets and fuzzy decision rules have been introduced for intelligent selection of CHs and to establish multi-hop routes to base station. The performance of the proposed protocol is compared with FD-LEACH, OCM-FCM and MH-EEBCDA. Simulation results confirm that the proposed protocol is far better than these protocols in terms network lifetime and throughput. The performance of proposed protocol improves further for networks with higher node density.

Sr.no72

International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878, Volume-7, Issue-6S5, April 2019

Enhanced Versions of PEGASIS Routing Technique for Wsns: a Survey

Abhilasha Jain , Ashok Kumar Goel

Abstract: *An efficient routing in Wireless Sensor Networks (WSNs) helps to utilize the network energy economically to escalate the lifetime of the network. PEGASIS is a forerunner for chain-based routing algorithm designed with aim to enhance network lifetime. But the algorithm suffers from problems like data redundancy, long link formations, large latency period and so on. Many researchers propounded the enhanced versions of PEGASIS to overcome one or more problems associated with it. This paper presents the literature survey of 45 such protuberant research papers spanning over last eighteen years to provide insight into the problems of chain-based routing algorithms. In this paper, an effort has been made to classify these chain-based routing algorithms for WSN based upon their features. The article dowries the strong and weak points of these enhanced versions proposed by each of fellow researchers. Such an exhaustive survey would surely be fruitful to provide more healthy and efficient solutions. Finally, some open issues concerning the future design of chain-based routing algorithms have also been presented.*

Index Terms: *WSN, PEGASIS, Chain-based, Routing, Protocols, algorithms.*

I. INTRODUCTION

WSN contains numerous small low-cost devices, called sensor nodes which are used to monitor different environmental conditions or track any event in cooperative manner. The sensor nodes communicate the gathered data to the sink or Base Station (BS) [1]. These networks can be employed in industry, home, wildlife, military applications in order to monitor or track any event [2][3][4]. Sensor nodes are capable to sense, process and communicate [5]. These nodes are laced with non-rechargeable power source (battery) which cannot be replaced. Therefore, some advanced methods are required to efficiently utilize these resources while achieving the overall goal of the network for longer period [6].

Sensor nodes devour their energy in each network operation i.e. sensing, processing, transmission and reception. Foremost amount of energy is primarily devoured in data transmissions[7]. As each sensor node is required to transmit its data to the sink, therefore, an efficient routing scheme can utilise the energy resource more effectively and enhance the network lifespan. Many investigators have proposed routing algorithms to optimize the energy utilization and network lifetime. Hierarchical routing algorithms have proved to more energy efficient and promising [8][9]. Hierarchical routing can be cluster based, chain based or hybrid of both methods. In cluster-based routing, all sensor nodes of the network arepartitioned into clusters. One node from a cluster act as Cluster Head (CH) which performs a duty to collect cluster data, aggregate the collected data and forward the data to sink. Other node act as member nodes which generates the data and forward it to CH [10]. In Chain-based routing algorithms, one node act as leader node who is responsible to forward chain data to the sink and other nodes except the end nodes of the chain transmits data to the subsequent node in the chain in direction of leader node [11]. LEACH (Low Energy Adaptive Clustering Hierarchy) and PEGASIS are two popular routing techniques which are considered as models for cluster-based and chain-based routing techniques respectively [12]. There are several surveys that are conducted on LEACH variants. But, very few number of surveys are available on chain-based routing techniques. Arora et al. have examined only twelve chain-based algorithms, the authors have not classified these algorithms into any category [13]. Marhoon et al. provided insight in nine chain-based algorithms and discussed merits and demerits of each algorithm [14]. Singh et al. discussed only nine algorithms which are limited in number [15]. These surveys are very limited in scope and are outdated. This paper presents a survey on the chain-based routing algorithms and classifies them into area division based, branching topology based and hybrid techniques-based chaining methods. The taxonomy for the PEGASIS modified algorithms surveyed in the paper is presented in figure1.

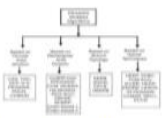

Figure 1: Taxonomy for PEGASIS modified algorithms

The main contributions of the paper are briefed as under:

1) An effort has been made to classify the chain-based routing algorithms depending upon their features. It will certainly provide a new perception for readers to

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Ashok Kumar Goel , ECE Department, GZS Campus College of

Sr.no73

Integrating Morphological Edge Detection and Mutual Information for Nonrigid Registration of Medical Images

Authors: Aggarwal, Vivek; Gupta, Anupama
Source: Current Medical Imaging, Volume 15, Number 3, 2019, pp. 292-300(9)
Publisher: Bentham Science Publishers
DOI: https://doi.org/10.2174/1573405614666180103163430

Background: Medical images are widely used within healthcare and medical research. There is an increased interest in precisely correlating information in these images through registration techniques for investigative and therapeutic purposes. This work proposes and evaluates an improved measure function for registration of carotid ultrasound and magnetic resonance images (MRI) taken at different times.

Methods: To achieve this, a morphological edge detection operator has been designed to extract the vital edge information from images which is integrated with the Mutual Information (MI) to carry out the registration process. The improved performance of proposed registration measure function is demonstrated using four quality metrics: Correlation Coefficient (CC), Structural Similarity Index (SSIM), Visual Information Fidelity (VIF) and Gradient Magnitude Similarity Deviation (GMSD). The qualitative validation has also been done through visual inspection of the registered image pairs by clinical radiologists.

Results: The experimental results showed that the proposed method outperformed the existing method (based on integrated MI and standard edge detection) for both ultrasound and MR images in terms of CC by about 4.67%, SSIM by 3.21%, VIF by 18.5%, and decreased GMSD by 37.01%. Whereas, in comparison to the standard MI based method, the proposed method has increased CC by 16.29%, SSIM by 16.13%, VIF by 52.56% and decreased GMSD by 66.06%, approximately.

Conclusion: Thus, the proposed method improves the registration accuracy when the original images are corrupted by noise, have low intensity values or missing data.

Electronics and Communication Engineering

Sr.no74

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ECG And Medical Diagnosis Based Recognition & Prediction Of Cardiac Disease Using Deep Learning

Manoj Sharma

Abstract : In the present age, the most common reason of death is heart disease. Any ailment in heart and blood vessels is known as Cardiovascular Diseases (CVD). There are numerous factors responsible to CVD. The premature revealing and prediction of existence of CVD is required for medical treatments. There are numerous ways to identify and predict CVD. With the advancement in machine learning, Deep learning can be as tool to predict CVD. The paper presents several methodologies for recognition and prediction of CVD using deep learning. A broad spectrum of research on prediction of CVD using artificial neural network is presented in this paper. Medical diagnosis and ECG investigation using deep learning for CVD recognition and prediction is presented in this paper. The result shows that better sensitivity, accuracy and specificity can be obtained using deep learning.

Index Terms: Cardiovascular Diseases, Deep Learning, Neural Networks, Classifiers, Artificial Neural Network, ECG, Machine Learning.

1. INTRODUCTION

A report published by World Health Organization (W.H.O) shows those now days CVD is the main reason of death around the globe. Perhaps, this is the number one reason of death. According to W.H.O reports, in 2015, estimated 17.7 million individuals were died because of CVD [1]. It denotes 31% of the total estimated death around the world. From the early death of these 17.7 million people in 2015, approximately 82% deaths were reported in under developed or developing countries. There are ample factors that were responsible for CVD. According to WHO reports, these risk factors can be classified as: - Major Changeable Risk Factors, Other Changeable Risk Factors, Non-Changeable Risk Factors and Novel Risk Factors [1]. Changeable risk factors encompass high blood pressure, abnormal blood lipids, use of tobacco, lack of physical exercise and activity, Obesity, junk foods and shortage of fruits and vegetable intake, high saturated fat intake etc. Other changeable risk factors consist of use of certain drugs and hormone replacement treatment, mental stress, lipoprotein, degradation in socio-economic status, Left Ventricular Hypertrophy (LVH), alcohol use, depression etc. Non changeable factors include gender, heredity, age, society background and race etc. Novel risk factors include surplus homocysteine in blood, Anomalous blood thickening etc. CVD can be classified on effect, cause and risk factors [1]. Table 1 shows different types of CVD.To recognize and predict heart disease many methods were suggested. These can be predicted by critical examination of medical reports, conventional methods or by some learning methods. CVDs can be predicted with the analysis of ECG and certain parameters such as age, sex, smoking, drinking, blood pressure, cholesterol, etc. These factors can be analyzed by numerous ways. In the last few years the researchers focused on deep learning algorithms to predict CVD. The deep learning algorithms show a better performance as compare to traditional learning algorithms. The basic reason behind its better performance is that the deep learning algorithms are encouraged by working and organisation of neurons in brains. Broadly deep learning algorithms can be classified into reinforcement learning algorithms, supervised learning algorithms and unsupervised learning algorithms [2]. The paper presents proposed methodologies on the prediction methods of CVDs using deep learning i.e. by neural network method. The structure of the remaining paper is as follows: Section II presents methodologies on deep learning based CVD medical diagnosis system; Section III presents methodologies on deep learning based CVD prediction using ECG analysis.

TABLE 1. CLASSIFICATION OF CVD

Name	Description	Possible Risk Factors
Coronary heart disease	Disease of the blood vessels.	High BP, physical laziness, diabetes, age, blood coagulation disorder, smoking/tobacco use, unhealthy diet etc.
Rheumatic heart disease	Injuries to heart valves and muscles.	Rheumatic fever--disease instigated by streptococcal bacteria
Congenital heart disease	Any Deformities in the heart structure from birth.	Use of alcohol by expectant mother, use of certain drugs/medicines by the expectant mother etc.
Aortic aneurysm and dissection	Dilatation and rupture of the aorta	Progressing age, congenital heart disorders, long standing high blood pressure, syphilis, infectious and inflammatory disorders and Marfan syndrome.
Peripheral arterial disease	Disease of the blood vessel providing the arms and legs	Same factors that are responsible for Coronary heart disease
Deep venous thrombosis (DVT) and pulmonary embolism	Blood accumulations in the leg veins, which can displace to the heart and lungs	Obesity, cancer, previous episode of DVT, recent childbirth, use of certain drugs and hormone replacement treatment etc.
Arrhythmia	Atypical heart rhythm	Irregular heartbeats due to strong physical exercise.

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Original Research | Published: 05 August 2019

Improved autistic spectrum disorder estimation using Cfs subset with greedy stepwise feature selection technique

Manoj Sharma

International Journal of Information Technology (2019) | Cite this article

80 Accesses | 3 Citations | Metrics

Abstract

The aspiration of this study is to predict autistic spectrum disorder (ASD) using machine learning algorithms. ASD is a weakness in the progress of central nervous system. The reason of ASD can be genetic and/or neurological. The early prediction and detection of ASD can help medical practitioner and family members in better treatment. With the recent development in machine learning, the machine learning algorithms can be used for estimation of ASD. The machine learning algorithms improves the prediction accuracy and also makes the process less time consuming. Machine learning algorithm with feature reduction technique is used for prediction and detection of ASD. The paper presents estimation of ASD using Cfs subset

Sr.no76

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Original Paper | Published: 30 August 2019

Cervical cancer prognosis using genetic algorithm and adaptive boosting approach

Manoj Sharma

Health and Technology **9**, 877–886 (2019) | Cite this article

127 Accesses | **6** Citations | Metrics

Abstract

Cervical cancer is fourth main causes of death in women. Cervix is the main origin of cervical cancer. The idea of this research is to explore and propose an efficient and improved prediction method of cervical cancer. Earlier detection and prediction methods/test were very complex, tedious and requires medical and pathological expertise. In this paper, Machine learning approach is used for prediction and detection of cervical cancer. Integrated approach of Genetic Algorithm and Adaptive Boosting is used for performance evaluation for prediction of disease. Genetic algorithm is used as attribute selector to decrease the number of attributes. This not only declines the computational cost but also reduces the number of parameters for

sed to improve the performance of classifiers. C 4.5 Decision

Sr.no77

Research paper | Published: 24 July 2018

Design of Metamaterial-Loaded Rectangular Patch Antenna for Satellite Communication Applications

Nancy Gupta, Jyoti Saxena, Kamaljit Singh Bhatia & Naveen Dadwal

Iranian Journal of Science and Technology, Transactions of Electrical Engineering **43**, 39–49 (2019) | Cite this article

Abstract

In the modern era, metamaterials are gaining enormous interest of researchers due to their peculiar electromagnetic properties. In this proposed work, a novel square Minkowski fractal-shaped metamaterial (MTM) array is designed as a superstrate of rectangular patch antenna with defected ground structure. This proposed MTM superstrate, placed at optimum height of 15 mm from the designed rectangular patch antenna, enhances the gain of antenna in wireless transmission for satellite communications. The simulation results indicate that the gain of

ing it with 6 x 2 x 1 MTM array as a

Sr.no78

Turkish Journal of Electrical Engineering & Computer Sciences
http://journals.tubitak.gov.tr/elektrik/
Research Article
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HGAB3C: A new hybrid global optimization algorithm

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Abstract: This paper proposes a new optimization algorithm, namely HGAB3C, and presents its performance on the CEC-2014 test suite. In HGAB3C, simple genetic algorithms (GAs) and big bang-big crunch (BB-BC) are hybridized. The algorithm carries out global searches using a simple GA. In every generation the BB-BC algorithm is used to carry out local searches. The addition of local search has improved the capability of simple GAs significantly. The performance of the proposed algorithm is compared with 17 other optimization algorithms on all 30 functions of the CEC-2014 benchmark suite. It is observed that HGAB3C outperforms all other algorithms on 4 benchmark functions. For the 3 other functions, its performance equaled the best of the competing algorithms, which makes HGAB3C's performance best in a total of 7 benchmark functions. Out of the 18 competing algorithms, the proposed algorithm ranked second for the unmatched best mean error measure. For the best performance measure (number of functions giving unmatched best and equaled best mean error), the proposed algorithm was the third best. As far as the speed of convergence is concerned, the algorithm gave an unmatched best performance for the shifted Schwefel function (function 10 of CEC-2014 test bench). It obtained a mean error value of 0.00E+00, outperforming the previous best of 1.23E-03, converging to the target result in an average of 346.44 generations, which no other algorithm could achieve.

Key words: Optimization algorithm, HGAB3C, CEC-2014

Sr.no79

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Published: 14 May 2019

Design of Wideband Flower-Shaped Microstrip Patch Antenna for Portable Applications

Nancy Gupta, Jyoti Saxena & Kamaljit Singh Bhatia

Wireless Personal Communications **109**, 17–30 (2019) | Cite this article

182 Accesses | **4** Citations | Metrics

Abstract

The paper discusses design of wideband diagonally symmetrical flower-shaped patch antenna with reduced ground plane. The anticipated antenna is provided microstrip line feed for signal excitation. The antenna is designed and analyzed using finite-element-based simulator HFSS (version 15.0) and provides wide impedance bandwidth between 1.49 and 2.46 GHz. Parametric analysis of significant design parameters is conducted to attain 49% 10-dB impedance bandwidth relative to center frequency of 1.975 GHz. The prototype antenna is fabricated and tested to measure different experimental results including return loss, VSWR, radiation pattern and gain. Reasonable agreement is attained between simulated and measured results. The designed antenna retains an advantage of being low profile and

DEPARTMENT OF CIVIL ENGINEERING

Sr.no80

BIOSORPTION OF COPPER(II) IONS USING TIMBER INDUSTRY WASTE BASED BIOMASS

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ABSTRACT

The processing and characterization of timber industry waste based saw dust and its biosorption studies towards Cu (II) ions is the focus of the present study. The processing of saw dust involved (i) boiling with water (ii) treatment with formaldehyde and (iii) treatment with sulphuric acid to get three new adsorbents abbreviated as SDB (boiled saw dust), SDF (formaldehyde treated saw dust) and SDS (sulphuric acid treated saw dust), respectively. CHNSO, SEM-EDS, FTIR and BET surface area techniques were used for the characterization of SDB, SDF and SDS. These adsorbents were used for the comparative investigation of Cu (II) ions remediation in a batch process. Effects of procedural variables like pH, contact period, starting concentration of Cu (II) ions, the quantity of adsorbent, temperature and agitation speed were investigated for the removal of metal ions under study on SDB, SDF and SDS adsorbents. Isothermal studies were carried out using Langmuir, Freundlich, Dubinin-Radushkevich and Temkin isotherm models. From Langmuir isotherm, the maximum adsorption capacity was calculated as 98.81, 178.57 and 142.85 mg/g for SDB, SDF and SDS adsorbents, respectively. Kinetic studies indicate that the rate of Cu (II) ions adsorption follows pseudo-second-order kinetics. Studies of free energy changes suggest the process of biosorption as spontaneous and feasible. Enthalpy change values indicate the process of adsorption to be exothermic for SDB, SDF and endothermic for SDS. The results of desorption studies revealed that biosorbents used in present work are promising biosorbents for remediating copper from aqueous solution.

Keywords: Cu (II) Biosorption, Low-cost Adsorbents, Kinetic, Isotherm Studies, Desorption.

Sr.no81

INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 8, ISSUE 09, SEPTEMBER 2019 ISSN 2277-8616

Risk Rating Index For Prioritizing Of Road Accident Prone Segments On Highways

Nirpinder Jain, Dr. Sanjiv Kumar Aggarwal

Abstract: India has emerged as a fast developing economy in the world. This development has been possible with great improvements in road infrastructure. Improved road infrastructure has led to a tremendous increase in vehicular traffic on Indian roads. This increase in vehicular traffic has further led to a negative effect of road accidents. In India, an accident occurs at every 1 minute and a person is killed in every four minutes. Accident leads to social and economical suffering for a nation. Generally, accidents tend to cluster along particular points along the road segment known as blackspot. The main concern in road safety is the elimination of such accident locations. So, the study identifies and prioritizes the accident blackspots within the study stretch of SH-13, in the state of Punjab. An attempt has been made to develop risk rating index using road safety audit. The RRI was further used to develop RR (Risk ratio) to get an insight of safety standards of each section with respect to total study stretch. The ratio is hence used for prioritization of sections with more risk and suggests remedial measures.

Key Words: Risk, Blackspot, Audit, Accident, State Highway, Matrix

1. INTRODUCTION

India has seen spectacular growth in the sector of road transportation. This expansion has led to degradation of environment, increased road congestion, noise pollution and road accidents. Around 85% of road accidents in the world occur in developing countries and India constitutes for about 10% of total road accidents occurring in the world. The total loss from road accident is about 2 to 3 percent of the Gross Domestic Product (GDP) of India. WHO Global Status report on Road Safety (2016)[1], states that road injuries killed 1.4 million people in 2016, about three-quarters (74%) of whom were men and boys. Further, road statistics indicate a steep increase in deaths, casualities and number of accidents in last decade. The occurrence of accidents can be summed up as interaction among three major factors viz. road, road user and the vehicle (PIARC 2013)[2]. Road accidents are one of the leading contributors of disease and injury to humans globally. The increase in number of road casualities in India can be attributed to the tremendous growth of transport vehicles, heterogeneity of vehicles on Indian highways and absence of grade separators to eliminate conflicts. The situation gets worse due to poor road maintenance, bad driving habits and poor enforcement of laws. Thus identification of such high hazard location is an important aspect in road safety. It is necessary that road accident blackspots are identified and prioritized for treatment. The researchers in the past have worked on the identification of blackspots but the studies exploring the prioritization of the blackspots have been limited. Hence, in the present study an attempt has been made to identify the accident prone sections and prioritize the sections based upon Risk Rating Index by conducting RSA.

2. LITERATURE REVIEW

In past, researchers have developed methods for identification and prioritization of accident black spots. Srinivasan et.al [3] developed three models based on severity. In the development of models they have considered API (Accident prone index) method, WSI (Weighted Severity Index method) and Quantum of accident method. The API method considered three components for defining blackspot viz. a) Consistency- frequency of accidents b) Level-magnitude of accidents c) Tendency-occurrence of accidents with time. In WSI method weights were assigned according to severity level of the accident and the locations were ranked according to the numeric value of severity for the location. Quantum of accident method described about the improper interrelation among various factors concerned with vehicle, road, road user and weather conditions. Radin and Baguley [4] in their pilot project in Malaysia studied about accident diagnosis and prioritizing of blackspots. The authors utilized accident maps, link-node-cell system and coordinates for linking the hazardous locations to the system of kilometer post on rural highways in Malaysia. Moreover, they suggested use of stick and collision diagram for in-depth analysis of accident blackspot locations. Field investigations should be done to ascertain about the reasons for occurrence of accidents, concluded the study. A.Thube and D. Thube [5] in their work accident blackspot on rural highways in India have described the method of identification of blackspot on rural highway in Maharashtra, India. The method used by the accident prevention committee was by physically verifying the accident data available with the police stations. APC noted down the locations where accidents were occurring repetitively. The APC categorized the accident locations as priority-I, where immediate attention was sought for. The committee also suggested remedial measures for identified locations. K. Ratkeviciute et.al [6] developed accident prediction model using empirical Bayes method for the roads of national significance in Lithuania. The developed model based on empirical Bayes method was utilized to locate the hazardous road sections considering homogeneity of road sections. They summed up that road sections in built-up areas were more hazardous. G.Zovak et.al [7] in their research used the Croatian criteria of identifying blackspot for state roads. The criteria stated that blackspot could be an intersection or a segment of road of length 300m and further falls in category of having 12 or more road accidents in last three years. Karlaftis and Golias [8] deployed hierarchical tree to study interrelation between traffic, geometric features of road and accident rates for rural two lane highways. They concluded that average daily traffic (ADT) along with lane width was the prominent attributes for accidents on rural roads. N.Mor et.al [9] used linear regression technique to develop accident model. The developed model gave accuracy of 84%. The study observed that road length, motor vehicle density and population were the contributing factors for road accidents.

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ADSORPTION ISOTHERM, KINETICS AND THERMODYNAMICS OF BIVALENT NICKEL SCAVENGING UTILISING SAWDUST CARBON

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ABSTRACT

Batch mode studies were carried out for investigating the removal efficiency of sawdust carbon prepared by sulphuric acid treatment of Indian Rosewood sawdust for aqueous bivalent nickel ions. Experiments involved the study of influence of varying the parameters like pH, contact period, the initial strength of adsorbate, temperature, agitation speed and dosage of adsorbent on scavenging of adsorbate ions. Characterization of adsorbent has been done using FTIR, SEM-EDX, BET surface area and CHNSO elemental analysis. Adsorption isothermal studies are in good agreement with the Langmuir isotherm model. The highest calculated value of the correlation coefficient suggested Pseudo-second order reaction kinetics for adsorption of nickel bivalent ions on sawdust carbon. Exothermic nature and spontaneity of removal of nickel ions were shown by thermodynamic parameters. Desorption experiments were accomplished using HCl solutions of varying concentrations. High percentage adsorption of sawdust carbon adsorbent observed for Ni (II) ions indicated that it could be efficiently employed for scavenging of aqueous Ni (II) metal ions.

Keywords: Adsorption, Batch mode, Bivalent Nickel, Isotherm, Kinetics.

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IMPACT OF *IN SITU* RICE CROP RESIDUE BURNING ON AGRICULTURAL SOIL OF DISTRICT BATHINDA, PUNJAB, INDIA

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ABSTRACT

The study was carried out to explore the effect of *in situ* rice crop residue burning on physicochemical and biological properties of soil. Physico-chemical properties under investigation included soil pH, electrical conductivity, organic matter, total phosphorus, nitrogen and potassium. Result analysis showed an increase in mean pH and electrical conductivity values of soil samples from 7.94 and 245-699 µS/cm (pre-burning period) to 8.46 and 403-800 µS/cm (post-burning period). Similarly, a significant increase in soil organic matter for the post-burning period (27100 mg/kg) was observed as compared to the pre-burning period (25200 mg/kg). However, the nitrogen and phosphorus content decreased significantly in post burning period. The analysis also revealed a significant decrease in enzyme activities of amylase, cellulase, invertase and dehydrogenase in post burning samples. The causes and effects of the changes in physicochemical and biological properties of agriculture soils due to *in situ* rice crop residue burning have been discussed.

Keywords: Rice straw burning, Soil enzyme, Soil property, Macronutrients

INTRODUCTION

In situ crop residue burning is the burning of residues left in the field after crop harvesting. The residue is

Sr.no84

PROCESSED FLYASH GEOPOLYMER CONCRETE AND EFFECTS OF MIRHA (MICROWAVE INCINERATED RICE HUSK ASH) ON PROCESSED FLYASH GEOPOLYMER CONCRETE AND ITS COMPARISON WITH DIFFERENT GEOPOLYMER CONCRETE & CEMENT CONCRETE

***Mohammad Mujeeb Ur Rehman Bhat**
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ABSTRACT

The objective of this study is to study the effects of partial replacement of MIRHA on processed fly ash as a geopolymer concrete & is compared with the unprocessed fly ash and Plain Cement Concrete. The strength of plain cement concrete, increases gradually from 3 to 28 days of water curing. The strength of processed and rice husk ash processed flyash geopolymer concrete mixes gain early strength within 3 days of curing and later increases only by 20 to 25% at the end of 28 days of curing. The strength of rice husk ash processed flyash geopolymer concrete mixes increases the strength from 2% to 3% replacement and beyond 5% replacement the strength starts decreasing. 3% rice husk ash processed flyash geopolymer concrete gives the maximum value of compressive strength as compared to other mixes. As the percentage of rice husk ash is replaced from 2% to 10% the flyash to alkaline activator ratio goes on decreasing from 0.66 to 0.43. The more the rice husk is replaced less will be flyash to alkali activator ratio, but there will be decrease in strength.

Keywords: MIRHA, geopolymer, fly ash, concrete, rice husk ash, curing, alkaline activator.

Department of Electrical Engineering

Sr.no85

Renewable energy-based hybrid model for rural electrification

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Abstract

The distributed power generation is playing an important role for the rural electrification in developing countries like India. In this work, a hybrid model based on renewable energy sources has been developed on the basis of availability of the resources at the proposed site. This paper present the hybrid model based on biomass-biogas-solar PV to supply the electric power in rural areas of Sonipat, Haryana, India where grid supply is not available or rarely available. The hybrid system is modelled by considering various parameters associated with each system component. Different models are developed on the basis of available resources and optimised for total annualised cost (TAC) using particle swarm optimisation (PSO) approach. Obtained results shows that the TAC of the optimal configuration at 0% unmet load is $ 64,109 and the cost of energy is $ 0.065 per kWh. The results at various unmet loads are also presented and found satisfactory. The results of the proposed approach are compared with harmony search (HS) algorithm and found in the desired limits.

Suggested Citation

Department of Mechanical Engineering

Sr.no86

3D printed functional prototypes for electrochemica energy storage

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Abstract: This study outlines the three dimensional (3D) printing of functional prototypes as electrochemical energy storage devices (EESD). The EESD has been prepared with acrylonitrile butadiene styrene (ABS)-graphene (Gr) blended feedstock filament on commercial fused deposition modelling (FDM) setup. The rheological suitability of ABS-graphene composite material for FDM applications has been examined by melt flow index (MFI) test. Finally the feedstock filament for FDM has been prepared on twin screw extrusion. The in-house prepared feedstock filament can be used for the 3D printing of EESD. The effect on glass transition temperature with the inclusion of Gr

Sr.no87

High-temperature corrosion behavior of some post-plasma-spraying-gas-nitrided metallic coatings on a Fe-based superalloy

Vikas Chawla, Buta S. Sidhu, Amita Rani, Amit Handa

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Abstract

The objective of the present study is to propose a cost-effective process for modifying commercially available coatings by gas nitriding using commonly available equipment and starting materials. Al–Cr and Ti–Al metallic coatings were deposited on Superfer 800H (Fe-based superalloy) using a plasma spray process. Then the gas nitriding of the coatings was done in the lab and the parameters were optimized after conducting several trials on plasma-sprayed-coated specimens. Characterization and high-temperature corrosion behavior of coatings after exposure to air and molten salt at 900°C were studied under cyclic conditions. Techniques like XRD, SEM/EDX, and X-ray mapping analysis were used for the characterization of the coatings and analysis of the oxide scale. Both the coatings successfully protected the substrate and were effective in decreasing the corrosion rate when subjected to cyclic oxidation (Type-I hot corrosion) at 900°C for 50 cycles in air and molten salt (a salt mixture of Na_2SO_4–60%V_2O_5 dissolved in distilled water). Based on the findings of the present study, the coatings under study are recommended for tapplications to super-heater and reheater tubes of boilers and all those surfaces that face fireside corrosion, such as fluidized beds, industrial waste incinerators, internal combustion engines, gas turbines or steam turbines, to provide protection against degradation in these environments. The cost of the product/process is

Department Of Textile

Sr.no88

Elastic characteristics of hand-tufted carpets under compressive load

March 2019 · Indian Journal of Fibre and Textile Research 44(1):51-55

Authors:

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R. Varshney

Abstract

This paper reports the study on dynamic-mechanical properties of nine hand-tufted cut pile carpet samples (80/20 wool/nylon blended pile yarn) with different structural parameters. The influence of two structural parameters, viz. carpet pile density and pile height on the carpet pile deformation properties has been studied. Carpet samples are tested for compression and thickness recovery, considering pressure ranging from 2 kPa to 200 kPa. The findings are statistically analyzed using general linear model through regression analysis. It is observed that both these structural parameters have a significant influence on compression and recovery properties of selected carpet samples. © 2019, National Institute of Science

Sr.no89

Research Article

Tensile and Frictional Properties of Wool-Cotton Union Khadi Fabrics

H. C. Meena, D. B. Shakyawar & R. K. Varshney

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ABSTRACT

This paper describes the tensile and frictional behavior of wool-cotton union fabrics developed using different wool-cotton blended warp yarns, and mixed wool weft yarns spun on khadi spinning system. The tenacity and elongation at break of fabric increase with the blending of cotton with JK crossbred wool in the warp direction and high content of Australian merino wool in the weft direction, however, initial modulus decreases. The static and dynamic coefficient of friction positively correlates to the wool content in warp yarn and negatively correlates with linear density and the proportion of Australian merino wool in weft yarn.

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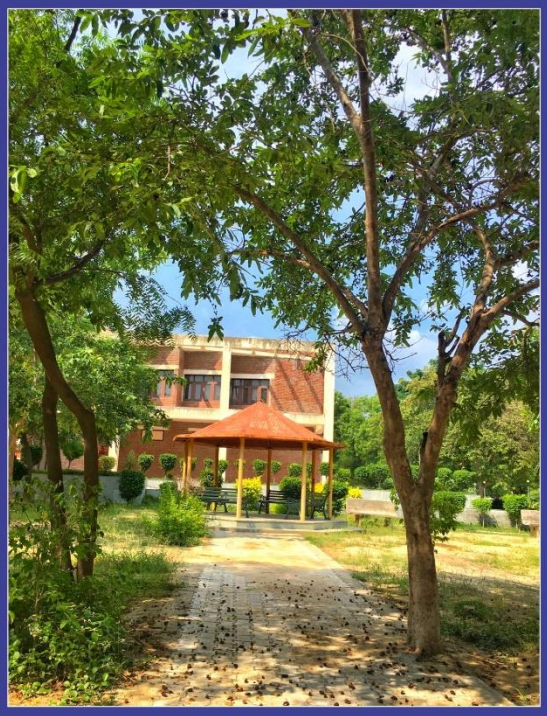

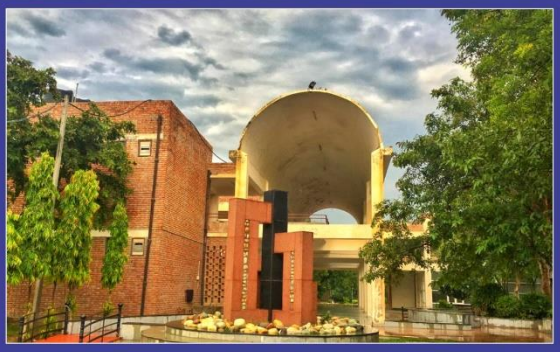

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