



National Seminar
on

**Recent Advancement In Pharmaceutical Research
and Biomedicines**

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About the Institute

Dr. Ambedkar Institute of Pharmaceutical Science (DAIPS) is one of the leading institutes of Odisha established in 2019 by Dr. Ambedkar Memorial Social Welfare and Educational Trust (DEMSWET). This institute is approved by Pharmacy Council of India (PCI) New Delhi, affiliated by Biju Patnaik University of Technology (BPUP) and recognized by Govt. Of Odisha (DMET). DAIPS offers D. Pharm, B. Pharm courses having intake of 60 seats each. The institute is regularly conduct co-curricular and extra-curricular activities to create an environment of enthusiasm and zeal among the students and staff members for educational excellence.

About the Seminar

This seminar will provide a common platform for academicians, medical professionals, pharmacists, Allied healthcare providers, Pharmaceutical Industry personnel to highlight recent discoveries and trends in diverse fields of Pharmaceutical Sciences and Biomedicine. This aims to provide a platform to bring together young and experienced national academicians, medical personnel, research scholars, industry experts and students to exchange ideas and experiences. It will comprehensively cover areas ranging from basic to applied research in biological sciences. Renowned academicians would share their expertise knowledge in various fields of biological research. This seminar will be a brilliant opportunity for the participants to showcase their knowledge in the form of oral and poster presentations.

TISSUE ENGINEERING RESEARCH CAN CHANGE THE FUTURE DRUG SCREENING

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Abstract

Drug screening is vital for selecting prospective drug from among several drug formulations in pharmaceutical industries. The discovery of new drugs is limited due to the complexity and expensive process of drug screening along with poor productivity and challenges in using animal model. Though numerous drugs are developed for several diseases, the drugs that successfully gone through clinical trials are very limited. The elimination of ineffective or highly toxic profile compounds before the pre-clinical animal study is of immense importance. The use of these animal models in pharmacological research are still the subject of ethical discussion. Besides several constraints including the highly expensive clinical trials, increased regulatory requirements and complexity, there is a big gap between the currently used pre-clinical screening tools and clinical investigations in humans. The current translational pharmaceutical research aims to identify alternative approaches that rely on complicated human characteristics and micro-environments. Tissue engineering is an alternative approach that implies the principles of biology, engineering and medicine for developing tissue constructs *in vitro* and altering cellular growth and function *in vivo* by implanting appropriate cells on a tissue compatible and biodegradable engineered matrix. This technique reduces the number of animal studies, thereby accelerating the drug development process and improving drug screening efficiency with reduced cost. The tissue constructs usually produced by two-dimensional (2D) cell cultures have been used since the early 1900s and are currently widely employed in various biological experiments. However, 2D cell culture lacks cell-cell and cell-matrix signalling which are existed in animal model. In this context, a three-dimensional (3D) tissue construct is potential as it closely mimic the *in vivo* microenvironment. The development of 3D tissue constructs through tissue engineering techniques and their prospects in future drug testing will be addressed in this keynote lecture.

Keywords: Tissue engineering, drug screening, cell-scaffold construct, *in vivo* animal study

Fabrication of Metronidazole and Amoxicillin Loaded Biodegradable Chitosan Films for Periodontitis Treatment

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ABSTRACT

Metronidazole (MET) and Amoxicillin (MOX) are widely employed for treatment of periodontitis, but high oral dose and resistance development after long-term oral administration limit their use. Here we developed the films by solvent casting technique using glycerol as plasticizer. They were characterized using XRD, FTIR and SEM. Their physical characteristics, such as tensile strength, surface pH, swelling index, exhibited satisfactory results. SEM images of films showed the presence of free drug particles on the surface which resulted in burst effect. *In vitro* release in PBS buffer pH 6.6 was of sustained nature assisted by initial burst effect. The drug loaded films demonstrated sustained release up to 24h. The antibacterial efficacy of the prepared films was tested on *Bacillus subtilis* and *Escherichia coli*, which showed good antibacterial activity. The biofilm inhibition property of the drug loaded films for *B. subtilis* and *E. coli* were found to be highly efficient as demonstrated by crystal violet staining assay. Conclusively, MET-loaded films demonstrated superior physical and biological properties than MOX-loaded films for use in effective treatment of periodontitis.

Keywords: Periodontitis, drug, chitosan, antibacterial, antibiofilm

Silver and strontium incorporated TiO₂ nanotubes to enhance osteogenic and antibacterial bone regeneration

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Biomaterial-associated infection can occur during any surgical operation, especially when biomaterials are implanted. Infection of these biomaterials is a major source of morbidity and mortality in the healthcare system. Bacteria that cling to implant surfaces form biofilms, which aid colonization, inhibit phagocytosis and immune evasion, and make bacteria more resistant to systemic drugs. Titanium and its alloys are frequently utilized for orthopedic and dental implants due to its desired characteristics, including low modulus, excellent fatigue strength, formability, machinability, corrosion resistance, and biocompatibility. Changes in the surface topography of titanium implants, as well as the stabilization of bioactive molecules on their surfaces, have all been attempted to improve osteointegration. However, for long-term function in the body, it is necessary to improve the antibacterial properties of the implant surface.

The current research aimed to learn more about the antibacterial and osteoblastic effects of a titanium surface covered with an array of titanium dioxide (TiO₂) nanotubes. An anodic oxidation is a cost-effective and successful approach for the deposition of TiO₂ nanotubes on ti-alloys [1]. Strontium-incorporated TiO₂ nanotubes were created on the Ti6Al4V surface by hydrothermal treatment, and then silver nanoparticles were incorporated into the nanotubes by electrochemical method and subsequently reduced with ultraviolet irradiation (UV). Even though the strontium inclusion can make the TiO₂ nanotubes even more water-friendly (hydrophilicity), the silver nanoparticles (AgNPs) may somehow raise the water contact angle of the modified surface [2]. In addition to boosting alkaline phosphatase and osteocalcin expression, Sr²⁺ release may also stimulate osteoblast adhesion, proliferation, and mineralization. However, AgNPs on Sr-incorporated nanotubes may effectively block the adhesion and proliferation of E.coli., however, having no discernible impact on osteoblast cell activities [3]. Thus, the approach used in the current work is likely to be applicable to the surface modification of titanium with the aim of concurrently improving the osseointegration capability and antibacterial capacity for bone healing.

Utilization of food waste derived biomaterials in drug delivery

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Abstract:

Drug delivery research aims to devise a mechanism that produce prolonged active drug levels in the body, resulting in better drug efficacy. Pharmaceuticals could be effectively delivered to targeted sites via biomaterials. Controlled release can be achieved by conjugating a drug to a biomaterial. Conventionally used synthetic biomaterials have a number of drawbacks, such as toxicity, poor biocompatibility, and high production costs. In order to get over these restrictions, natural biomaterials may be used as secure substitutes when creating medication delivery systems. As a practical, sustainable and cost-effective option, food waste as a potential natural bioresource for the synthesis of biomaterials has grown in popularity and by this approach harmful impacts of wastes to the environment can also be minimized to a great extent. Such biomaterials were found to increase the transport and effectiveness of a variety of pharmacological substances like vaccines, medicines, antibodies, enzymes, and peptides. For example, hydroxyapatite nano-powder synthesized from egg shells exhibited efficient ibuprofen drug loading (>85%) and controlled drug release activity. Similarly, a topical gel was developed using pineapple crown waste derived cellulose nanofibers incorporated with carbopol 934P (containing ampicillin drug) and this gel showed sustained drug release and enhanced permeation when tested. This paper highlights the usage of biomaterials like biopolymers and bioceramics extracted from prospective food wastes in oral and injectable drug delivery and will undoubtedly provide an in-depth understanding and guidance to the researchers who are working with waste derived biomaterials in the field of biomedicine.

Keywords: Food wastes, biomaterial, biopolymers, bioceramics, drug delivery

Prevalence of Sickel Cell Disease: Current Scenario in India

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Abstract:

Sickle cell anemia is one of the common forms of Sickel cell disease (SCD). Anemia is a condition in which the body does not have enough red blood cells. The disease is caused by gene changes that involve in producing haemoglobin in RBCs. It is caused due to genetic mutation in the beta-globin gene that affects the production of hemoglobin. As per the US Centers for Disease Control and Prevention, Sickel cell anaemia is the most severe form of SCD.

Most of the screening programmes in India use high performance liquid chromatography (HPLC) analysis although the solubility test is also sensitive and convenient.

SCD can lead to many complications, including stroke, high blood pressure, blindness, skin-ulcers, gallstones, and a life-threatening condition and cause severe pain and permanent damage to brain, heart, lungs, kidneys, liver, bones and spleen. The clinical complications are variable with many cases severe complications observed. As per the epidemiological studies, at least 14 lakh people in India are likely to have Sickel cell anemia. As compared to general population Tribals have on average much higher incidence of SCD. This has partially been due to the high frequency of α -thalassaemia among these tribes as well as higher foetal haemoglobin levels. Sickel cell anemia is most prevalant in Gujarat, Maharashtra, Chhattishgarh, Odisha and parts of Bengal. However, in India, according to an Indian Council of Medical research (ICMR) study about 20% of children with Sickel cell disease died by the age of two, and 30% children with SCD die before they reach adulthood. Newborn screening programmes for SCD have been initiated in India. ICMR and the National Rural Health Mission (NHRM) are organizing outreach programmes for awareness, management and control of the SCD.

The aim of this paper is to summarise the prevalence of SCD in India.

Keywords: Sickel cell anemia, Sickel cell disease (SCD), genetic mutation, beta-globin gene.

Bone protecting activity of Quercetin under osteoporotic condition

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Abstract

Bone is a self-rejuvenating hard tissue for minor defects or fractures. The growing cases of bone defects due to bone diseases like osteoporosis, osteonecrosis, osteogenesis imperfecta, etc., are serious concerns in medical field. These diseases cause osteoporotic conditions in normal mature bone. The available conventional therapies for these diseases related to the antiresorptive and/or anabolic agents are associated with many limitations. Numerous ongoing scientific investigations aim to create natural bone-protecting agents with minimal limitations. Among many plant derived agents Quercetin, a dietary bioflavonoid, is known for its antimicrobial, anti-inflammatory, antioxidative, and bone-conserving properties. The protecting nature of quercetin for bone is done by the inhibition of osteoclastogenesis and upregulation of osteoblastogenesis. The possible mechanisms behind these acts are regulations of RANKL, MAPK, BMP, TGF- β 1, and apoptotic pathways. Due to its potential effect, quercetin was loaded in many ideal scaffolds for bone tissue upregulation. Therefore, there is a need to review all the osteogenic effects of quercetin for an effective substitute in osteoporotic conditions. So, this paper showcases the mechanism of osteogenic activities of quercetin under osteoporotic conditions, including its limitations in oral administration, which are necessary for the regeneration of naive bone at the location of a bone defect.

Keywords: Bone, Quercetin, Osteoclastogenesis, Osteoblastogenesis

Development of lignin based biomaterials for biomedical applications: a review

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Abstract

Growing sustainability and environmental concerns in recent years have prompted researchers to investigate alternate, clean, and renewable sources as raw materials to partially or wholly replace materials derived from non-renewable resources. In Tissue Engineering, the biomaterial scaffolds that mimic the extracellular matrix and serve as a template for the growth and regeneration of tissue, which is the most important aspect of tissue regeneration, are constructed from synthetic materials. To restore damaged tissues or organs for medicinal purposes, it is essential to synthesize natural biomaterials for scaffolds. Among various biopolymers, Lignin is a naturally available, renewable, biocompatible, and biodegradable alternative that has not been thoroughly researched for its source, isolation method, functionalization, and modification. Lignin is the principal constituent of lignocellulosic biomass and the second most abundant component of plant cell walls. Unfortunately, due to its unreactive and structural complexity, Lignin has been considered a waste for decades prior to the discovery of its optimal extraction methods and medical applications. Lignin has functional moieties that endow it with attractive properties, such as excellent stiffness, antioxidant, antimicrobial, and anti-inflammatory activity depending upon its source and isolation procedures. Presently, attempts are being made to employ and valorize lignin in the development of polymeric scaffolding materials, lignin-derived drug encapsulation, and nanomaterials. In addition, numerous publications demonstrate its potential for wound healing, bone tissue engineering, regenerative medicines, and drug delivery alone or in conjugation with other materials, making it an ideal choice for a wide range of biomedical applications. This paper explores the potentiality of lignin for developing various biomedical applications such as Tissue Engineering & Drug delivery.

Keywords: Lignin, biomaterial, scaffolds, Tissue engineering, drug delivery

Pharmacogenomics: present status and future prospects

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Abstract:

Pharmacogenomics (PGx) is a new area of research where genetic information is studied to optimize the drugs according to the individual responses. Gene variant is assessed by identifying the genetic loci associated with the diseases and with individual drug response. PGx information decreases the risk of adverse drug reactions and optimizes therapeutic efficacy.

With the significant advancement of modern technologies including next generation sequencing, whole-genome single nucleotide polymorphism (SNP) profiles or the multigene analysis genetic information of the individual can be achieved. Based on the genetics of the patients the potential clinical decisions can be taken like choosing selective drugs or the optimization of the doses etc. PGx approaches have significant role also in the large scale drug discovery and development. Pharmacokinetics and pharmacodynamics both are essential considerations in the PGx study. Considering challenges in modern medicine, knowledge on the determinant of genetic variation on drug response has great importance in precise treatment. Therapy adjustment according to the patient's genotype for certain drugs have already been recommended by the Clinical Pharmacogenetics Implementation Consortium Guidelines. National Institute of Health (NIH) sponsored resource known as the 'Pharmacogenomics Knowledgebase' (Pharm GKB) is established for the collection and the dissemination of PGx information. Drug labels containing PGx information are accepted by global regulatory agencies, including: the US Food and Drug Administration (FDA), the European Medical Agency and the Pharmaceuticals and Medical Devices Agency of Japan etc.

Although, extensive research is required to implement PGx in current clinical regime on a massive scale, but the importance of PGx in the future treatment application is undoubted. It will bring down the treatment expenses, duration of treatment procedure, elevate the quality of care and worthy for all healthcare system.

Keywords: Adverse drug reactions, gene variant, multigene analysis, next generation sequencing Pharmacogenomics, Pharmacogenomics Knowledgebase whole-genome single nucleotide polymorphism.

USE OF ALOE-VERA IN WOUND HEALING AND SKIN TISSUE ENGINEERING

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Abstract

Aloe vera (*Aloe barbadensis*) is a cactus that is extensively applied in pharmaceutical, biomedical, and cosmetic purposes. This herb belongs to Asphodelaceae (Liliaceae) family which is used as a traditional medicine since decades. The leaves of aloe vera plant is basically divided into two primary products: latex, a bitter yellow fluid existing beneath the leaf's epidermis, and gel, a tasteless and colourless material present in the interior part of the leaf. Both include several physiologically active components, namely polysaccharides (the most significant of which is acemannan) and anthraquinones, which might function alone or in combination of both. The anti-inflammatory, antimicrobial, antiseptic, anti-skin protection, antitumor, anti-bacterial, anti-diabetic, and anti-viral properties of aloe vera helps in curing wounds, inflammation in skin, burns, and insect stings. Recently, aloe vera is being incorporated in tissue engineered scaffolds as aloe vera play an important role in skin wound healing thereby helping in regeneration of skin tissues. The effective utilization of aloe vera as a biomaterial is being explored by several researchers. This paper describes the different classes of compounds present in aloe vera along with their mechanism of action towards wound healing and its use in developing scaffolds for skin tissue regeneration.

Keywords: Aloe vera, biomedicine, wound healing, scaffold, skin tissue engineering

Fabrication of biomimetic three-dimensional printed sodium alginate/silk fibroin/polyvinyl alcohol tripolymer scaffold for bone tissue engineering

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Abstract

Tissue engineering is a technique that involves the fabrication of biopolymer scaffold that can match the defect site of degenerated or accidental injured tissue for initial cell attachment, proliferation and development. Scaffolds with the proper form, and dimension, along with natural physical and chemical features, are continually in need of improving performance and repairing damaged tissue. As per our previous work sodium alginate (SA), silk fibroin (SF) is a potential scaffold for tissue engineering application. So in this work, a fibrous 3D scaffold composed of sodium alginate (SA), silk fibroin (SF) and polyvinyl alcohol (2-5 w/v) is reported with enhanced physicochemical properties. Morphological analysis revealed fibrous structure with pore diameter ranging from 192±24 micrometer. SA₇₀/SF₃₀/PVA₃ exhibited regulated water uptake and degradation responses and measured tensile strength of 0.69MPa. SA₇₀/SF₃₀/PVA₃ scaffold had protein adsorption over 400 microgram and contact angle of 56.3° exhibiting their potential as a suitable substrate for cell attachment. The result suggests that SA₇₀/SF₃₀/PVA₃ scaffold might be used as a potential platform for tissue regeneration.

Keywords: Scaffold; sodium alginate; silk fibroin; polyvinyl alcohol; 3D printing; tissue engineering.

Design Of Engineered Skin Substitute Using Electrospinning And 3D Printing For Burn Patients

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Abstract:

Skin is the outermost layer of the body and performs several important functions such as insulation, temperature regulation, prevention of moisture loss etc. As it covers the exterior of the body and has a large surface area it is also the most prone to injury. Burns are one of the most commonly occurring wounds with about seven million individuals suffering from them annually in India alone. Conventionally, grafts are used to treat such wounds however there is a severe shortage of donors thus creating the need for an alternative solution. Tissue engineering approach enables us to solve this problem by providing an artificial ECM (scaffold) platform for skin tissue repair and regeneration. Skin consists of a complex three-layered structure, the uppermost layer being two-dimensional while the lower layers are three-dimensional. In deep burn wounds multiple layers of skin are usually damaged requiring a scaffold that can mimic the hierarchical two-dimensional and three-dimensional structure of the skin, which is a great challenge. In this poster a concept of innovative design of a bilayer scaffold that can act as an excellent platform mimicking the different layers of skin and can perform a multifunctional role in regeneration of desired two-dimensional epidermal and three-dimensional dermal skin tissue by using electrospinning and 3D printing techniques in combination is presented. This design concept may pave the way of fabricating engineered skin substitute by combining scaffold and cells for skin tissue regeneration in future.

Keywords: Skin, Bilayer, Burn wound, Electrospinning, 3D printing.

Advancement of Biotechnology in Agriculture

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Biotechnology is the study to modify or manipulate any biological system for the development of products for various purposes. It is broadly employed in diverse fields including in agriculture. Genetic Modification is a technology that involves incorporating DNA into the genome of an organism. Genetically modified crops (GM crops) are plants used in agriculture, the DNA of which has been modified using genetic engineering methods and new DNA is inserted into the cells of a plant. Plants genomes can be engineered by physical methods or by use of *Agrobacterium* for the delivery of sequences hosted in T-DNA binary vectors. Genetically engineered crops have genes added or removed using genetic engineering techniques, originally including gene guns, electro poration, microinjection, *agro bacterium*. Most recently, CRISPR & TALEN genome editing system offered extra precise & convenient editing techniques.

These traits include improved shelf life, disease resistance, herbicide resistance, pest resistance, & for use in bioremediation of pollution. Farmers have widely adopted GM technology for the higher yields, enhanced nutritional value and improved self life of the products.

Although, numerous challenges to be overcome, especially in the maintenance and testing of safety, regulation inter-national policies and food labeling. However, utmost precision and vigilance must be followed to avoid harmful effects on human health and the environment.

Key words: Biotechnology, genetic modification technology, genetically modified crops, CRISPR system, TALEN genome editing system.

Development and evaluation of polyherbal capsules containing combination of *Swartia chirata* and *Ficus glomerata*

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The current work focuses on the development and ethanolic extract of *Swartia chiratia* leaves and *Ficus glomerata* fruits. The capsule was created using an ethanolic extract of *Swartia chiratia* and *Ficus glomerata*. For quality assurance, the material was weighed, sampled, authenticated, and analysed. The capsules were evaluated using various parameters. The flow property of the blend to be filled in the capsules should be in the good range, according to the standards, as confirmed by the above parameters. formulation 2 demonstrated excellent flow characteristics and was used for capsule filling. In this study, polyherbal were used with moisture content ranging from 0.96 to 1.13%, weight variation ranging from -2.11 to 6.73%, and disintegration time ranging from 10 to 12 minutes. Polyherbal were used in this study to create a unit solid dosage form (capsule) to improve consumer compliance, acceptability, and adaptation. As it is also critical to estimate the pharmaceutical quality of herbal products regardless of their medicinal content and therapeutic states, the current study includes pre-formulation and formulation studies of the formulated capsules. The availability of drug from solid dosage into the GI fluid regulates drug absorption in the blood. As a result, improving drug disintegration and dissolution rates may improve absorption and availability. The capsule has been successfully developed.

Keyword: *Swartia chiratia*, *Ficus glomerata*, polyherbal formulation, capsule.

Advances in COVID-19 Vaccines: A Comprehensive Status

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Abstract:

Recently we have experienced COVID-19 pandemic across the world and is probably the deadliest in the last 100 years. The current covid-19 pandemic has exhorted the scientific community internationally to find therapeutic interventions and vaccines to control SARS-CoV-2 virus (corona virus) and save the human lives. Indisputably, Covid-19 vaccines are one of the greatest public health interventions. These vaccines are highly effective against infection, mild illness, serious illness, hospitalization and death. Vaccinated people are less likely to spread the infection to others.

There are several COVID-19 vaccines validated for use by World Health Organization (WHO). The Pfizer/BioNTech, Moderna, Janssen /Ad26.COV2.S, COVISHIELD, Sinopharm, Sinovac-CoronaVac COVAXIN, Covovax (NVX-CoV2373), Nuvaxovid (NVX-CoV2373) vaccines are the WHO validated leading vaccines helped to control the pandemic. Various types for ingredients are used to make vaccines such as mRNA vaccine, virus vectored vaccines, protein sub unit vaccine, genetic vaccines and monoclonal antibodies for non-resistant immunization etc. Different types of vaccines exert different mode of actions to offer protection against COVID-19 disease. These provide instructions to cells in the body to generate immune response.

Recently, the non-invasive intranasal inhalable vaccines, nanovaccines have been invented and received a lot of attention. Second generation vaccines like patch vaccines is developed by using high density microarray patch (HD-MAP) technology. This type of vaccines can be administered simply attaching in the arm.

In this paper we provide a comprehensive status of the recent advancement of Covid-19 vaccines and their efficacy. Research is still in progress by numerous researchers worldwide to search how new virus mutations and variants influence the efficiency of the different COVID-19 vaccines.

Key words: COVID-19 disease, COVID-19 vaccines, high density microarray patch technology, intranasal vaccines, patch vaccines, SARS -COV-2 viruses.

PHYSIOCHEMICAL PARAMETER AND ANTI-MICROBIAL STUDY OF LEAVES OF *Citrus limon*(L)

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ABSTRACT:

Examination has affirmed hundreds of years of down to earth utilization of vital oils, and we now realize that the 'fragrant drug store' contain mixes with an amazingly expansive scope of biochemical effects. Fundamental oils are accepted to speak to the very substance of odour and flavour. Essential Oil was extracted utilizing Steam Distillation technique. In this venture Steam Distillation was utilized to concentrate oil from plant materials *Citrus limon*(L) and commonly called as sour orange. The leaves of *C.limon* , there is no comparison and cheapest natural and easily available plant. It is traditionally known to be useful for the treatment of wide panel of diseases like stomach ache, vomiting, carminative, excellent refrigerant drink and culinary uses etc. Therefore research on development of herbal products from this plant is required to be initiated immediately for exploring the unique potential of this crop which would also minimize the harmful wastage of this plant especially the leaves. Detailed microscopical characters of the leaves showed the presence of secretory cells, crystals specifically under the upper epidermis, three layers of well defined palisade cells, spongy mesophyll, vascular bundles in the midrib region and calcium oxalate druses in the petiole. Quantitative microscopic parameters were studied which will help in the identity and purity of a plant. The physical parameters were studied and presented. Pharmacological activity of the plant has showed that the volatile oil of *Citrus limon* possessed good antioxidant properties. The antibacterial activity has shown that the volatile oil has a broad spectrum of activity against the tested gram positive and gram negative organisms (human pathogens) like *E.coli*, *Streptococci*, *Chromobacterium violaceum*, *Klebsiella pneumonia*, *Proteus Mirabilis*, *Shigella Flexneri* etc. The in vitro antibacterial activity on the volatile oil was carried and the volatile oil was found to be active all the organisms tested at a very low concentration. It was effective against both gram positive and gram negative bacteria. The volatile oil was also possessed a very potent antioxidant property and the combination of the antioxidant and antibacterial activity throws light the use of the volatile as an antibacterial agent.

Kew words: *Essential oil, steam distillation, antioxidant, quantitative microscopic parameter.*

Gene Therapy in Type-1 Diabetes Mellitus

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Type-1 diabetes mellitus (T1DM) is a chronic auto-immune disease which results from the destruction of insulin secreting β -cells in pancreatic islets that leads to deficiency of insulin and subsequent hyperglycemia. Patients required daily insulin injection for pathogenesis, management and treatment in their life. Despite advancement of modern medicine and treatment, there is no any satisfactory result found. In this context, a number of researchers are focussing on the gene as a potential solution to prevent and cure T1DM.

Insulin gene therapy refers to the use of viral vector (lentivirus or adenovirus) and non-viral transduction or gene expression are used for the treatment of Type 1 diabetes that can be applied in various ways to prevent β -cells destruction/preservation or by regenerating pancreatic β -cells, thereby maintain insulin secretion levels. A different approach is through the development of the β -cells in pancreatic islets which occurs by introducing an insulin producing gene into endogenous cell population that do not produce insulin normally. It works through gene transfer with a combination of antiTCR β mAb with Ngn3-Btc to produce insulin-producing cells in the liver.

Hence, the objective of this paper is to discuss the recent advancements of gene therapy in T1DM to hold or stop the disease. Further research is necessary to ensure the large-scale benefit of the human population.

Keywords: Type-1 diabetes mellitus, insulin, lentivirus, gene therapy, autoimmunity.

New Medical Breakthroughs for Chronic Obstructive Pulmonary Disease

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Chronic obstructive pulmonary disease (COPD) is a chronic lung disease that gradually damages the lung. It is a common and rising problem worldwide COPD is the major reason of morbidity and will rank 7th of global burden of diseases in 2030. The disease is characterized by airflow inadequacy associated with a chronic inflammatory response in airway of lung.

Different diagnostic tests such as lung tests, biological specimens, imaging, and genetic test are used for the early diagnosis and the risk factors of COPD.

The general therapeutic approaches are lifestyle changes, medication, and oxygen therapy. Advanced treatments for COPD have developed significantly in the past 2 decades with the new oral and inhaled medications. There are several new treatments for COPD that can improve patient's lives drastically. Recently, the following medical breakthroughs have been revolutionized the management of COPD. Valve surgery in COPD, robotic lung volume reduction surgery, targeted lung denervation, Bronchial Rheoplasty, Stem cell therapy etc. are the new breakthrough of the COPD treatment. Researchers are also focusing on the development of genetic therapies that treat alpha-1 antitrypsin deficiency (AAT). AAT is a genetic condition that increases the risk of COPD.

This paper aims to summarize the recent medical advances of the COPD treatment paradigms.

Key Words: Chronic obstructive pulmonary disease, chronic inflammatory response, Valve surgery in COPD, robotic lung volume reduction surgery, targeted lung denervation, Bronchial Rheoplasty, Stem cell therapy, alpha-1 antitrypsin deficiency (AAT)

MICRO-ROBOTICS: A MICROTECHNOLOGY BASED APPROACH AND IT'S APPLICATIONS

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Technology has become ubiquitous and is nowadays essentially linked to the development of modern human societies. Robotic technology has been hastily developing in the past few eras and has already benefited humans in several heavy and repetitive tasks. Despite the predominant focus on large-scale robots, recent years have also viewed an increased interest in intelligent micro-robots. Due to their small size, various advantageous release pattern, error free, precisely nature, micro-robots can simulate the shape and movements of real organisms, allowing for operations that would be otherwise difficult to complete by traditional robots. As the scope and benefits of biotechnology immensely growing the application of micro-robotics increasing simultaneously. For decades, roboticists have focused their efforts on rigid systems that enable programmable, automated action, and sophisticated control with maximal movement precision and speed. Not only in human but also in the animal society, microrobots are effective where normal treatment can't fulfil the common desire. This review is totally based on the benefits, applications, advancement & future prospective of micro-robotics.

Keywords: Microrobotics, Advancement, Applications

ADVANCEMENTS ON DRUG DELIVERY SYSTEM: NANOEMULSIONS & SNEDDS

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ABSTRACT:

Self-Nano emulsifying systems or SNEDDS is one of the best researches acquired till date. Considering the positive approaches of SNEDDS in the field of oral delivery, cosmetics, ocular, parenteral and topical delivery Nanoemulsions have shown very prominent and effective aspects in the field of drug delivery systems. In general, Nanoemulsions prevent coalescence and possess good penetrating power through the skin which makes SNEDDS a great choice in case of drug delivery system. While comparing the formulations of SNEDDS with other Pharmaceutical products, it requires less amount of surfactant. Properties like quick onset of action, reduction in drug dose, ease of manufacture and scale-up, can be observed during the application of Self- Nano emulsifying drug delivery system.

KEYWORDS: Nanoemulsions, SNEDDS, coalescence

AN INSIGHT INTO FORMULATION OF HYDROGELS AS DRUG DELIVERY IN THE PHARMACEUTICAL FIELD

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Abstract:

Hydrogel is a network of polymer chains that are water-insoluble, sometimes found as a colloidal gel in which water is the dispersion medium. Hydrogel products constitute a group of polymeric materials, the hydrophilic structure of which renders them capable of holding large amounts of water in their three-dimensional networks. Due to their high water content, these gels resemble natural living tissue more than any other type of synthetic biomaterial. Several techniques have been reported for the synthesis of hydrogels like co polymerization/cross linking of co- monomers using multifunctional co-monomer, which acts as cross linking agent. Chemical initiator initiates the polymerization reaction. Some applications are used of hydrogels in human body. Hydrogels that are responsive to specific molecules, such as glucose or antigens, can be used as biosensors as well as drug delivery systems. New synthetic methods have been used to prepare homo- and co-polymeric hydrogels for a wide range of drugs, peptides, and protein delivery applications. The aim of this article is to present a concise review on the applications of hydrogels in the pharmaceutical field, hydrogel properties, and method of preparation of hydrogel, advantages and disadvantages of hydrogel.

Keywords: Hydrogel, drug delivery, polymer.

MENINGITIS: A COMPREHENSIVE REVIEW

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ABSTRACT:

Meningitis is now immensely increasing fatal & untreated inflammation disease generally occurs in meninges (a membrane of brain), as per WHO 34% populations are continuously facing death out of 1 lakh population. India is now reaches to 55 rank meningitis affected country in world wide. In 1996 the first case was found in India. Africa (Saharan) is the origin of meningitis. In 1661, Sir Thomas Wills was discovered meningitis. Viral and bacterial infections are the two types of meningitis generally transmitted by coughing, sneezing. Loss of appetite, lethargy, nausea, vomiting, fever and fatigue are the most common symptoms of meningitis. Lumbar puncture and complete blood count are the two most approved test to analysis meningitis. Treatment includes antibiotics, corticosteroid, oxygen therapy is commonly used. Meningococcal conjugate vaccine (mcv-4) was discovered by Sanofi which is the frontrunner treatment for meningitis. In this review we have discussed about types, stages, treatment of meningitis.

Keywords: Meningitis, Treatment, Stages of Inflammation

Development of lignin based biomaterials for biomedical applications: a review

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Abstract:

Growing sustainability and environmental concerns in recent years have prompted researchers to investigate alternate, clean, and renewable sources as raw materials to partially or wholly replace materials derived from non-renewable resources. In Tissue Engineering, the biomaterial scaffolds that mimic the extracellular matrix and serve as a template for the growth and regeneration of tissue, which is the most important aspect of tissue regeneration, are constructed from synthetic materials. To restore damaged tissues or organs for medicinal purposes, it is essential to synthesize natural biomaterials for scaffolds. Among various biopolymers, Lignin is a naturally available, renewable, biocompatible, and biodegradable alternative that has not been thoroughly researched for its source, isolation method, functionalization, and modification. Lignin is the principal constituent of lignocellulosic biomass and the second most abundant component of plant cell walls. Unfortunately, due to its unreactive and structural complexity, Lignin has been considered a waste for decades prior to the discovery of its optimal extraction methods and medical applications. Lignin has functional moieties that endow it with attractive properties, such as excellent stiffness, antioxidant, antimicrobial, and anti-inflammatory activity depending upon its source and isolation procedures. Presently, attempts are being made to employ and valorize lignin in the development of polymeric scaffolding materials, lignin-derived drug encapsulation, and nanomaterials. In addition, numerous publications demonstrate its potential for wound healing, bone tissue engineering, regenerative medicines, and drug delivery alone or in conjugation with other materials, making it an ideal choice for a wide range of biomedical applications. This paper explores the potentiality of lignin for developing various biomedical applications such as Tissue Engineering & Drug delivery.

Keywords: Lignin, biomaterial, scaffolds, Tissue engineering, drug delivery.

A review on incorporated Nanoparticles with In-situ gel, delivering through intranasal route for the treatment of Alzheimer's disease

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Abstract:

Current review explores the potential of nano drug technology for nose-to-brain delivery and is further developed by incorporating this technology into an in situ gelling system to the field of action where it accumulates. The intranasal route appears to be a preferable route than the oral route as it has been shown to overcome the associated obstacles as low bioavailability, limited brain exposure and undesired pharmacokinetics or side effects. The objective of this study is to prepare in situ gel incorporating nanotechnology-based drug delivery systems for the treatment of Alzheimer's disease as it is proven to be effective in managing the common symptoms of Alzheimer's disease when administered via the nose-to-brain delivery route. For delivering drug to the brain, blood brain barrier (BBB) is a major rate limiting factor for the drugs. The desired drug concentration could not be achieved through the conventional drug delivery system so nanoparticle based drug delivery systems are promising for delivering drug to brain while incorporating with in situ gelling system it increase the retention time. Present article highlights on the nano drug technology with in situ gel based intranasal drug delivery system for the treatment of Alzheimer's disease.

Key words: - Alzheimer's disease, Nanoparticles, In-situ gel

Evaluation of Antimicrobial activity of *Urochloa distachya* (L.) By using *Escherichia coli*

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ABSTRACT:

Introduction: Microbes are crucial to sustaining the environment in which we can survive. Infection and disease-causing microorganisms make up a very minor portion of the global population. Human bodies contain over 100 trillion germs, which are crucial to both health and sickness. Microbial infection is the main factor in morbidity and mortality all over the world. Worldwide, bacterial infections are responsible for about 53 million deaths. *Urochloa distachya* is an annual or short-lived perennial plant, Clums slender and straggling, 10 to 45 cm long. Roots from the lower nodes. Leaf blades 1-2.9 × 0.2-0.7 cm, lanceolate, apex acuminate, margin hairy and wavy, long hairs at the leaf base, surface hairy; Leaf sheath loose, pilose with ciliate margin; Ligule ciliate, cilia ca 1.5 mm.

Material and Method: The agar disc diffusion method was used to screen the extracts for antibacterial activity. The minimum inhibitory concentration (MIC) of the selected active plant extracts against the bacterial strains. Antimicrobial activity was determined against standard bacterial strains.

Results: The ethanolic extract of *U. distachya* showed the weak anti-microbial activity against *E. coli* bacteria. Conclusion: From pharmacological evaluation it was concluded that ethanolic extracts of *Urochloa distachya* have weak antibacterial activity.

Keywords: *Urochloa distachya*, Antimicrobial, *E. coli* bacteria.

ARTIFICIAL INTELLIGENCE: A FRONTRUNNER IN PHARMACEUTICAL FIELD

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Abstract:

Artificial intelligence (AI) is a science related to machine which relatable to human behaviour in the field of data analysis and has immensely used in various sectors like drug discovering, clinical trials & enhancing productivity in pharmaceutical sector as a frontrunner. Generally, it minimizes the human workload, work time and work effort with better, accurate and precise result. In a growing digital world, a huge number of medical data can be generated every day and it needs to be accurate and faster. Apart from above applications AI has numerous applications like disease identification, personalized treatment, radiotherapy, surgical robotics, smart electronic health records, evaluation of biomarkers and diseases. AI could also give treatment for complex and rare diseases such as Alzheimer's and Parkinson. Finding more reliable patients faster for clinical trials; Introducing automated robot pharmacies to fill prescriptions and dispensing; and marketing. Artificial Intelligence can cut costs down, create new, effective treatments and above all else, help save lives. Use of AI is immensely increasing in biotech companies. Using the power of modern supercomputers and machine learning would make it possible for us to produce medicines faster and at reduced costs. This article reviews exhaustively the present status and future prospects of Artificial Intelligence in pharmaceutical sciences with specific attention to pharmaceutical industry and also explain various models and general processes of machine learning and their role in pharmacological science.

Keywords: Artificial Intelligence (AI), Drug discovering, Clinical trails

MAGNETIC NANOPARTICLES FOR GENE THERAPY AND DRUG DELIVERY SYSTEM

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ABSTRACT:

Magnetic nanoparticles (MNPs) that are used for drug delivery purposes have crystals between 5-20nm in diameter. These crystals are typically iron-based, most commonly magnetite or maghemite. The most common method of preparation of MNPs is precipitation and Co-precipitation of Fe (III) and Fe (II). Synthesis of MNPs involves simple, basic inorganic chemistry, particularly iron chemistry. Delivery technologies that have been used with MNPs include Polymeric, viral, as well as non-viral platforms. For in vivo targeting, treatment-nanoparticle complexes are injected intravenously, intraarterially, or intraperitoneally, and an external magnet is attached near the target region to create a localized magnetic field. For gene delivery, MNPs are typically combined with a delivery platform to encapsulate the gene and promote cell uptake. In different fields like Bio separation, Biosensors, molecular imaging, and

Catalysis field MNPs have a unique role. Rapid developments in particle synthesis have enabled the use of new materials for more efficient capture and targeting and novel strategies are being developed for applying magnetic fields which could lead to treatments for diseases such as cystic fibrosis and localized cancerous tumors.

KEYWORDS: - Magnetic nanoparticles (MNPs), Precipitation and Co-precipitation method

REGENERATIVE MEDICINE AND TISSUE ENGINEERING IN DRUG DEVELOPMENT SECTORS

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ABSTRACT:

Current review explores about Regenerative medicines and tissue engineering, which have been a very promising field keeping very positive approach towards development in the field of medical treatment and drug development. It is based on the concept of self-healing. Regenerative medicines use biological foreign materials for its application. It meant to work upon the resurrection of the damaged tissue or organ in a fully functional state. The introduction of regenerative medicines offers broad aspects mostly in the issue of cell regeneration, by the help of bioactive materials. Considering the fact that tissue engineering has been proven very beneficial in the research sectors especially in the field of drug development. Majorly it'll provide key tools to inaugurate the prospective of personalized medicines by reducing the costs of the research and reducing the number of animal used. Introduction of supplemental bladders or small arteries into the body are some of the instances of tissue engineering. Regenerative medicines and tissue engineering should be considered as a very important evolution in the field of Medical treatment and drug development and design.

Keywords: Regenerative medicines, Tissue engineering, bioactive materials.

Formulation and Evaluation of Poly herbal hair oil

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ABSTRACT:

Now a days herbal cosmetics are in high demand because they are more effective with nil or less side effects and easily available ingredients. A few of these herbs are Amla, Henna, Methi, Lemon, Tulsi, Brahmi, Shikakai, Retha, Liquorice root, Musk root, Mahabringaraj, Jatamansi, Marigold, Hibiscus Nut meg etc. The poly herbal concept is found in Ayurvedic and other traditional medical system where multiple herbs in a particular ratio may be used in the treatment of illness, it will give a better therapeutic effect and reduce toxicity. Previous study reveals that poly herbal oil promote the hair growth, supplement the hair with vital nutrients such as vitamins and minerals prevent hair damage dandruff and dull hair. The poly herbal drugs were weighted and grinded and mixed with sesame oil and boiled for 30 to 60 minutes and filtered. The filtrate was mixed with 25 percent coconut oil to make up the final volume up to 100 ml then flavoring agent was added. Different evaluation test was carried out like

sensitivity, pH, acid value, saponification, viscosity and specific gravity etc which results are within the limits.

Key words: sensitivity, PH, acid value, saponification, viscosity and specific gravity.

AYURVEDIC MEDICINE: A STEP TOWARDS SUCCESS FOR URINARY TRACT INFECTION

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Abstract:

Urinary tract infection (UTI) is an infection occurs in urinary system (kidney, bladder and uterus) mainly affected in women as compare to men. Among all serious diseases UTI is one of most common and easily treated disease in human beings. In this busy world about 60% of women and 12% of men are continuously facing UTI problem in their healthy life period and about 150 million peoples are affected by UTI annually. Since the beginning of civilization, ayurveda has been a vital element of human society which have the capability to reduce the cost and increase the effectiveness by reducing the toxicity. Medicinal plants (Herbal) have been an essential and crucial part of human life since ancient times. The knowledge of herbal medicines was first coined by 'Papyrus Ebers' in 1550 BCE. Due to the availability and budget friendly nature of ayurveda, about 80% of the world populations are using ayurvedic treatment. Uropathogenic Escherichia Coli (UPEC) and Staphylococcus saprophyticus are the two causing agents in case of UTI. In this article we have briefly illustrates about the ayurvedic medicines which have the potential to treat/cure the UTI.

Keywords: UTI, Herbal medicines, Uropathogenic Escherichia Coli

Role of insulin in health care : An update

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ABSTRACT:

Insulin is a polypeptide hormone mainly secreted by β cells in the islets of Langerhans of the pancreas. The hormone potentially coordinates with glucagon to modulate blood glucose levels; insulin acts via an anabolic pathway, while glucagon performs catabolic functions. Insulin regulates glucose levels in the bloodstream and induces glucose storage in the liver, muscles, and adipose tissue, resulting in overall weight gain. The modulation of a wide range of physiological processes by insulin makes its synthesis and levels critical in the onset and progression of several chronic diseases. Although clinical and basic research has made significant progress in understanding the role of insulin in several pathophysiological processes, many aspects of these functions have yet to be elucidated. This review provides an update on insulin secretion and regulation, and its physiological roles and functions in different organs and cells, and implications to overall health. We cast light on recent advances in insulin-signaling targeted therapies, the protective effects of insulin signaling activators against disease, and recommendations and directions for future research.

KEYWORDS: Insulin, health, disease, homeostasis, regulation, glucose

ENGINEERED ALGAE-BASED MICROROBOTS FOR TARGETED CANCER THERAPIES

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ABSTRACT:

Due to the untargeted nature and severe side effects of systemic chemotherapy, various types of nanomedicine approaches have been developed to overcome these issues. Living microrobots made from algae were weaponized to help fight tumors by improving the effectiveness of cancer therapies because they can be targeted to a specific site, they are not toxic and they don't affect the nearby cells rather than the targeted one. During cancer progression solid tumors typically develop regions with limited access to nutrients and oxygen, tumor hypoxia makes cancer treatments such as Radiotherapy, Photodynamic therapy and Chemotherapy less effective. So algae based microrobots were prepared by coating Spirulina Algae with biocompatible magnetic particles for site specific delivery and to reduce toxicity and it was engineered and used as microrobots that attacks targeted cancer cells.

immunotoxins are the drugs that combine a toxin with an antibody, the antibody targets the toxin to specific cells, such as cancer cells. The algae based microrobots were able to penetrate tissues and reach targeted cancer cells more efficiently without damaging any nearby cells.

keywords:- Targeted, Chemotherapy, Nanomedicine, Hypoxia, Radiotherapy, Photodynamic therapy, immunotoxins.

FORMULATION AND INVIVO EVALUATION OF CONTROLLED RELEASE MATRIX TABLETS OF CARVEDILOL PHOSPHATE

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ABSTRACT:

In the present investigation ,efforts were made to developed controlled release tablets of carvedilol phosphate for treatment of hypertension and congestive heart failure which will provide similar in vitro release profile to that of theoretical drug release profile which can be confirm by f_1 (difference factor) and f_2 (similarity factor) values . Matrix tablet of carvedilol phosphate (F-XII) were successfully prepared by using PEO WSR303 & carbopol 971_p by direct compression method . Based on the results, F-XII was identified as better formulation amongst all formulations developed for matrix tablets. Tablets for the formulation F-XII passed all official and unofficial quality control tests. The f_1 and f_2 values for the comparison of release of drugs from the from the formulation F-XII with the theoretical drug release profile were found to be 9,60.92 in 0.1N HCL, 10,53.45 in 4.5 acetate buffer and 13,49 in 6.8 Phosphate buffer respectively, for matrix tablets. Carvedilol phosphate release from the matrix tablets was dependent of pH of the dissolution medium ,assuring the release to be fairly dependent of pH of GIT. Carvedilol phosphate release from the tablets of F-XII formulation follows first-order kinetics.

Key words : Controlled release, Carbopol, direct compression, first order kinetics, optimized formulation.

ANALGESIC ACTIVITY OF CISSUS QUADRANGULARIS EXTRACT IN MICE: OPIOID RECEPTOR INVOLVEMENT

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ABSTRACT

Cissus quadrangularis is an indigenous plant to Odisha (family Vitaceae) that has never been studied. The purpose of this study was to investigate the analgesic effect of a dried ethanolic extract of *Cissus quadrangularis* (CQE) in mice utilising tail flick, hot plate, and acetic acid induced writhing paradigms. Naloxone antagonism was used to examine the role of opioid receptors in the analgesic process. The results showed that CQE had substantial dose-dependent analgesic efficacy in all analgesic models examined. The analgesic effect was caused by the activation of opioid receptors in the central nervous system, which might include both spinal and supraspinal components. The analgesic time course demonstrated maximal activity after three hours in both the tail flick and hot plate techniques, which was extended to 24 hours. CQE metabolites may be responsible for opioid receptor activation. In the tail flick and hot plate tests, the EC₅₀ of CQE was 83 and 50 mg/kg, respectively. In both assays, CQE provided double the analgesic coverage of morphine. Finally, CQE demonstrated opioid agonistic action with a new slow and protracted impact. The current study might add a new weapon to the arsenal of opioid medicines as a natural powerful analgesic and for the treatment of opioid withdrawal syndrome.

Keywords : *Cissus quadrangularis*, Opioid receptors, Analgesic activity

Evaluation of traditional ayurvedic Kadha for prevention and management of the novel Coronavirus

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Abstract:

Since the emergence of novel Coronavirus (SARS-CoV-2) infection in Wuhan, China in December 2019, it has now spread to over 205 countries. The ever-growing list of globally spread corona virus-19 disease (COVID-19) patients has demonstrated the high transmission rate among the human population. Currently, there are no FDA approved drugs or vaccines to prevent and treat the infection of the SARS-CoV-2. Considering the current state of affairs, there is an urgent unmet medical need to identify novel and effective approaches for the prevention and treatment of COVID-19 by re-evaluating the knowledge of traditional medicines and repurposing of drugs. The phytochemicals present in these herbs possess significant anti-inflammatory property. Apart from this, based on their pharmaceutical characteristics, we have also performed in-silico drug-likeness and predicted pharmacokinetics of the selected phytochemicals found in the Kadha. Overall our study provides scientific justification in terms of binding of active ingredients present in different plants used in Kadha preparation with viral proteins and target proteins for prevention and treatment of the COVID-19.

Keywords: Ayurvedic Kadha, Coronavirus, COVID-19, molecular docking, phytochemicals

VACCINES

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We have vaccines for nearly thirty of the more than seventy infectious diseases which are pathogenic for humans. Most of the vaccines, especially those to prevent childhood diseases, are highly effective with a high safety profile. Vaccines are being developed against many of the other bacteria and viruses, and some parasites. Occasionally, a new vaccine has to be withdrawn because of unexpected side effects. Smallpox remains the only infectious disease to have been eradicated. The Global Program to eradicate poliomyelitis initiated in 1988, has unfortunately run into difficulties. A few children immunised with the Sabin oral vaccine fail to clear the virus which can mutate over some years into a pathogenic form and spread rapidly unless large vaccination programs are re-introduced. Of major concern are emerging and re-emerging infectious diseases, especially HIV, for which there is currently no vaccine. Fortunately, new techniques are becoming available making it possible to consider developing vaccines based on inducing strong cell-mediated immune responses to control the agent's replication when antigenic variation in surface antigens (e.g. HIV, influenza) makes classical techniques based on induction of antibody responses less attractive.



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