**Department of Pharmaceutical Sciences**

**List of Abstracts**

**2020**

**Role of heterocyclic compounds in SARS and SARS CoV-2 pandemic, Bioorganic Chemistry, 104 (2020) 104315 (Published by Elsevier Inc.) (Impact factor: 4.83)**

## Abstract: Coronaviruses have led to severe emergencies in the world since the outbreak of SARS CoV in 2002, followed by MERS CoV in 2012. SARS CoV-2, the novel pandemic caused by coronaviruses that began in December 2019 in China has led to a total of 24,066,076 confirmed cases and a death toll of 823,572 as reported by World Health Organisation on 26 August 2020, spreading to 213 countries and territories. However, there are still no vaccines or medications available till date against SARS coronaviruses which is an urgent requirement to control the current pandemic like situations. Since many decades, heterocyclic scaffolds have been explored exhaustively for their anticancer, antimalarial, anti-inflammatory, antitubercular, antimicrobial, antidiabetic, antiviral and many more treatment capabilities. Therefore, through this review, we have tried to emphasize on the anticipated role of heterocyclic scaffolds in the design and discovery of the much-awaited anti-SARS CoV-2 therapy, by exploring the research articles depicting different heterocyclic moieties as targeting SARS, MERS and SARS CoV-2 coronaviruses. The heterocyclic motifs mentioned in the review can serve as crucial resources for the development of SARS corona viruses treatment strategies.

# Morphological transition of *M. tuberculosis* and modulation of intestinal permeation by food grade cationic nanoemulsion: *In vitro*-*ex vivo*-*in silico* GastroPlus™ studies, [Journal of Drug Delivery Science and Technology](https://www.sciencedirect.com/science/journal/17732247), [Volume 60](https://www.sciencedirect.com/science/journal/17732247/60/supp/C), December 2020, 101971 (Published by Elsevier Inc.) (Impact factor: 2.73)

## Abstract: The study aimed to investigate rifampicin (RIF) loaded cationic nanoemulsion (NE) for increased efficacy, facilitated intestinal permeability and GastroPlus™ based prediction. Formulations were prepared and characterized for robustness to dilution, cloud point and stability to varied pH. Morphological transition of M. tuberculosis H37 Rv was studied by a transmission electron microscopy (TEM), % inhibition study and cytoplasmic content analysis. The ex vivo permeation and confocal laser scanning microscopy (CLSM) studies were conducted using duodenum, jejunum and ileum. Results of robustness ensured stability to dilution, pH and temperature (˃ 37 °C). The Smix (surfactant to co-surfactant) ratio (2:1 and 3:1) possessed maximized % inhibition due to LAB and AC8. The Peff values of cationic NE were 2.25, 1.96 and 2.0 fold higher than DS (drug solution) for duodenum, jejunum and ileum, respectively, whereas enhancement ratios were 2.25-, 1.94- and 2.0 fold higher than DS. A CLSM showed 3.22-, 2.89-, and 1.1 fold higher % fluorescence intensity from duodenum, jejunum and ileum, respectively. GastroPlus™ predicted 100% regional absorption of RIF-cationic NE and considerable effect of globular size, permeability and nanonization on pharmacokinetics (PK) parameters. Conclusively, the cationic NE can be a promising approach for increased efficacy of RIF and augmented oral absorption to control tuberculosis.

**Adhikari L, Kumar N, Saha a, Semalty a, Semalty A. Naringenin loaded cyclodextrin nanoparticles for improved drug delivery, Indian Drugs, 2020, Accepted. ISSN: 0019-462X.**

**Abstract:** Herbal drug like naringenin is well known for its anti-cancer, anti-oxidant, anti-inflammatory activities, carbohydrate metabolism promoter, immunity system modulator, BCRP/ABCG2 Inhibitors, hormone substitutes, and hormone antagonists since decades. However, use of naringenin as pharmaceutical aid is hindered due to its low aqueous solubility. In the present study β-cyclodextrin, and hydroxy propyl -β- cyclodextrin based biocompatible nanoforms were developed by the exploitation of self-assembly properties of cyclodextrins in aqueous media using sodium dodecyl sulphate and Pluronic F108 as co-surfactants. Prepared formulations were evaluated for various parameters such as particle size, zeta potential, polydispersity index, percent encapsulation efficiency, drug solubility, and in-vitro permeation studies. Particles present in all the formulations were not greater than the 161.2 nm with surface charge up to -24.8 mV and highest polydispersity index of 0.739. Aqueous solubility of drugs in prepared formulations was increased by 4 folds. Drug permeability was increased twice of free drug naringenin. It was concluded that the cyclodextrin based biocompatible nanosystems can be developed in the improvement of aqueous solubility and hence the bioavailability of herbal drugs.

**Mishra H, Adhikari L, Semalty M, Semalty A. Cellulose acetate floating microspheres of metformin hydrochloride: formulation and characterization, Indian Drugs, 2020 Accepted. ISSN: 0019-462X.**

**Abstract:** In this study, floating microspheres of Metformin hydrochloride were prepared by using cellulose acetate polymer. The method employed was solvent evaporation. Various formulations were prepared by varying the ratio of drug and polymer. The prepared microspheres were then subjected to various evaluation parameters such as drug content, micrometric evaluations, FTIR, SEM, floatability and in- vitro dissolution study. Formulation F1 (1:1 ratio of polymer and drug) showed the highest drug release and drug content with the good flow properties. The cumulative percentage of drug release significantly decreased with decreasing drug concentration with a constant polymer ratio. Scanning Electron Microscopy images of all formulations showed that the prepared floating microspheres were irregular in shape, and the surface was found to be non- uniform and rough. In-vitro release studies indicated the mechanism of the drug release to follow the Korsmeyer-Peppas model, and “n” value was found to be between 0.5-1.9, indicating anomalous transport mechanism.

**Adhikari L, Kotiyal R, Pandey M, Bharkatiya M, Sematy A, Semalty M. Effect of geographical location and type of extract on Total phenol/flavon contents and antioxidant activity of different fruits extracts of Withania somnifera. Curr. Drug Discov. Technol. 2020; 17(1): 92-99. [https://doi.org/10.2174/1570163815666180807100456]**

**Abstract: Background:**Withania somnifera (family solanaceae) is a well-investigated medicinal plant which is also called Indian ginseng due to its wide spectrum of medicinal properties. The contents and activity of the plant may vary depending on the habitat and part of the plant and the solvent used for extraction. The present study deals with the comparative chemical analysis and in vitro antioxidant activity of methanolic fruits extracts and its subfractions (in ethyl acetate, butanol and water) of W. somnifera collected from two different geographical locations. **Methods:**In the present study, Withania somnifera fruits were collected from two different geographical locations (Uttarakhand and Rajasthan). The different fruit extracts were prepared and studied for total phenolic contents and total flavone contents. The in vitro antioxidant activity was assessed by DPPH free radical scavenging assay and peroxide scavenging assay. **Results:**Methanol extract of W. somnifera Uttarakhand and ethyl acetate subfraction of W. somnifera Rajasthan showed the highest amount of Total Phenolic Contents (TPC). In W. somnifera Uttarakhand, ethyl acetate extract showed the highest amount of Total flavonoids while in W. somnifera Rajasthan, methanol extract was found to be the richest in flavonoids. Methanolic extract of W. somnifera Uttarakhand showed the highest free radical scavenging activity while in W. somnifera Rajasthan, the highest antioxidant activity was shown by the methanolic extract followed by butanolic extract, water extract and then ethyl acetate. In the peroxide scavenging assay of antioxidant activity, water extract of W. somnifera Uttarakhand showed the highest activity, while in W. somnifera Rajasthan, ethyl acetate extract showed highest scavenging activity. **Conclusion:**It was concluded that the geographical location exerts a vital effect on the presence of active constituents and also on the antioxidant potential of W. somnifera.

**Jagdeep Kumar, Naresh Kumar, Nitin Sati, Prasanta Kumar Hota; Antioxidant properties of ethenyl indole: DPPH assay and TDDFT studies, New Journal of Chemistry 2020, 44, 8960-8970.**

**Abstract:** A series of ethenyl indoles (eg. 3-(4-substituted phenylethenyl-E)-N-H-indole) with various donor or acceptor substituents have been synthesized and their antioxidant properties have been studied. Ethenyl indoles exhibit antioxidant activity in a substituent depended manner. Ethenyls bearing strong electron withdrawing substituents show weak or no antioxidant activity, whereas with electron donating substituents exhibit antioxidant properties comparable to vitamin E. It can be seen from a plot of the percentage of inhibition versus antioxidant concentration that the hydroxyl substituted ethenyl indole exhibits good antioxidant properties (IC50% 24microM) as compared to other ethenyls (IC50 30-63microM) and that is comparable to vitamin E (IC50 26microM). The results are also supported by the computational data obtained through time dependent density functional theory (TDDFT) calculations. From the TDDFT and antioxidant study, it was shown that there is a correlation between the highest occupied molecular orbital (HOMO)-lowest unoccupied molecular orbital (LUMO) energy, the ground state dipole moment, optical band gap, bond dissociation energy and ionization potential of the ethenyls with the antioxidant properties. A possible hydrogen and/or electron and proton transfer mechanism is suggested for the quenching of the free radical.

**2019**

**Afzal Hussain, Faiyaz Shakeel, Sandeep Kumar Singh, Ibrahim A. Alsarra, Abdul Faruk, Fars K. Alanazi, G.V. Peter Christoper, Solidified SNEDDS for the oral delivery of rifampicin: Evaluation, proof of concept, *in vivo* kinetics, and in silico GastroPlusTM simulation, *International Journal of Pharmaceutics 566 (2019) 203–217.* (DOI:**[**10.1016/ j.ijpharm.2019.05.061**](https://doi.org/10.1016/j.ijpharm.2019.05.061)**) *(Elsevier) Impact factor 3.862.***

**ABSTRACT**

The present investigation was performed to develop a rifampicin (RIF)-loaded solidified self-nanoemulsifying drug delivery system (SNEDDS) (solidified RIF-OF1) for in vitro and in vivo evaluations. Optimized formulations were tested for their powder flow characteristics, loading efficiency, and in vitro dissolution (at pH-1.2, 6.8 and 7.4). Compatibility studies were also performed. The formulations were also tested for hemocompatibility, intestinal permeation, histopathological effects, and in vivo pharmacokinetics. Additionally, an in silico simulation study using GastroPlus was performed. At different varied pH values, we observed immediate release (T85% within 15 min) based on the dissolution profile. This could be due to labrasol-assisted RIF solubilization. In vitro hemolysis study of the reconstituted RIF-OF1 revealed normal architecture of erythrocytes compared to the positive control (lysed and fragmented). Through in vivo permeation and biopsy studies, a rationale for facilitated intestinal permeation of RIF with components deemed physiological safe (normal anatomy of mucosal membrane evidenced from biopsy study) could be established. The in vitro-in vivo correlation (IVIVC) plus module of GastroPlusTM simulation showed a good IVIVC between in vitro release and in vivo absorption with a predicted systemic absorption of ∼96.5%. Solidified SNEDDS showed improved pharmacokinetic profiles compared to RIF suspension. Solid RIF-SNEDDS was demonstrated to be a suitable carrier for enhanced intestinal permeation and oral bioavailability. Hence, it may serve as a suitable alternative to conventional delivery systems for tuberculosis treatment.

**Sabya Sachi Das, Neelam, Kashif Hussain, Sima Singh, Afzal Hussain, Abdul Faruk and Tebyetekerwa Mike, Laponite-based Nanomaterials for Biomedical Applications: A Review, *Current Pharmaceutical Design, 2019, 25, 1-20.* (DOI**:[**10.2174/13816128 25666190402165845**](https://doi.org/10.2174/1381612825666190402165845)**) *(Bentham Science Publishers) Impact factor 3.052***

**Abstract:** Laponite based nanomaterials (LBNMs) are highly diverse regarding their mechanical, chemical, and structural properties, coupled with shape, size, mass, biodegradability and biocompatibility. These ubiquitous properties of LBNMs make them appropriate materials for extensive applications. These have enormous potential for effective and targeted drug delivery comprised of numerous biodegradable materials which results in enhanced bioavailability. Moreover, the clay material has been explored in tissue engineering and bioimaging for the diagnosis and treatment of various diseases. The material has been profoundly explored for minimized toxicity of nanomedicines. The present review compiled relevant and informative data to focus on the interactions of laponite nanoparticles and application in drug delivery, tissue engineering, imaging, cell adhesion and proliferation, and in biosensors. Eventually, concise conclusions are drawn concerning biomedical applications and identification of new promising research directions.

**Pandey M, Adhikari L, Semalty A, Semalty M. Preparation and evaluation of hair growth formulations of indian ginseng (Withania somnifera) for alopecia. Asian J Bio Sci. 2019; 12: 524-532. [https://dx.doi.org/10.3923/ajbs.2019.524.532]**

**Abstract: Background and Objective**: Hair loss or alopecia or baldness, a dermatological disorder, affects the personality of an individual, psychologically and sociologically. There is a flood of drugs claiming to be useful in the treatment of alopecia but none seems to be developed with a proper rational strategy. The study aims to investigate the hair growth promoting activity of herbal formulations prepared from fruits extract of Withania somnifera (family- Solanaceae) collected from two different locations (from Rajasthan, WSR andfrom Uttarakhand WSU) on healthy male Wistar rats. **Materials and Methods:** The methanolic fruit extracts were sub fractionated intoethyl acetate, butanol and water fractions. All extracts were evaluated for their total phenolic content (TPC), total flavonoid content (TFC) and in vitro anti-oxidant activity (by two different methods). Aloe vera based herbal formulations were prepared from ethyl acetate fraction of the plant extracts. The prepared herbal formulations were subjected to primary skin irritation test and in vivo hair growth activity in healthy male Wistar rats. All the formulations were observed for hair growth initiation (HGIT) and hair growth completion time (HCIT). The histological study of skin samples was also performed at the end of study to study hair growth at follicular level. **Results:** Ethyl acetate fraction showed high TPC as well as TFC in both WSR and WSU in general. The extracts (particularly ethyl acetate extract) showed significant anti-oxidant activity in DPPH free radical scavenging activity and hydrogen peroxide scavenging assay. Primary skin irritation test showed that the prepared herbal formulations were non-irritating and non-toxic to the skin without any erythema oroedema at the end of 48 h of formulation application on denuded skin of rats. In vivo study showed early hair growth initiation and completion time in test group of animals as compared to the control group and the effect was comparable to that of standard group. The histology showed good growth of hair follicle in WSU as compared to WSR, control and standard with visible maximum anagenicpopulation of hair. **Conclusion:** It was concluded that WSU formulation showed good in vivo hair growth activity and was well supported by follicular/histological study.

**Adhikari L, Semalty M, Naruka PS, Aswal VK, Semalty A. Binary complexes of glimepiride with β-cyclodextrin for improved solubility and drug delivery, Indian Drugs, 2019, 56, 3, 54-60. ISSN: 0019-462X.**

**Abstract:** Cyclodextrin complexation is a one of the most investigated techniques of solubility and dissolution enhancement of drugs. In the present study, a poorly water-soluble drug glimepiride, was complexed with β-cyclodextrin (βCD) with the aim of improving water solubility and drug dissolution. The complexes were prepared using two different methods (solvent evaporation and kneading) and then characterized by Fourier-transform infrared spectroscopy (FT-IR), powder x-ray diffractometry (X-RD), thermal analysis (DSC), scanning electron microscopy and in-vitro dissolution study. The phase solubility study revealed the most suitable ratio of drug to β CD (1:4 molar ratio). Analysis of various physical and pharmacokinetic parameters for the complex prepared by solvent evaporation method showed better drug content, solubility and drug release profile in comparison to the complex prepared by the kneading method. The complex prepared with solvent evaporation method showed better drug release as compared with that of kneading method and the pure drug. The FT-IR, DSC and X-RD data also confirmed the results. It was concluded that complex prepared with (1:4 drug: βCD molar ratio) using solvent evaporation method showed the better improvement in solubility and drug dissolution.

2018

**Afroze A, Sabya SD, Afzal H, Abdul F., Formulation and Evaluation of Solid Dispersion and Inclusion Complex of Poorly Aqueous Soluble Diacerein, *JOJ Material Sci. 2018; 5(1): 555651. (DOI: 0.19080/JOJMS.2018.04.555651)*** (Juniper Publisher USA)

**Abstract:** The present study was focused on a poorly aqueous soluble drug (diacerein); basic structured anthracene molecule possesses defensive activity against osteoarthritis. The problem with the diacerein is its poor bioavailability (35%) which is due to its poor dissolution profile. The present study efforts to improve the dissolution profile using solubility enhancement techniques. The objective of the study was to improve the solubility of poorly soluble drug diacerein by solid dispersion technique and inclusion complex using the most compatible carriers and technique for the formulation. The prepared solid dispersion and inclusion complex were evaluated for physiochemical characteristics and dissolution efficacy. The solid dispersion and inclusion complex were formulated using kneading method with PVP K30 (screened to be the best among different carriers) and β-cyclodextrin respectively. The prepared formulations were characterized by FTIR, SEM, DSC and XRPD. The prepared solid dispersion and inclusion complex were then compressed into conventional tablets which were then coated with acid resistant polymer. The in-vitro dissolution release of drug from solid dispersion and inclusion complex was carried out using USP II dissolution apparatus. Solid dispersion of diacerein prepared with PVP K30 was found to be the most effective in improving the dissolution profile of the drug. The enteric coated tablets showed no drug release in acidic medium resulting in higher bioavailability of the drug. The dissolution profile of diacerein was improved significantly. Dissolution enhancement and acid protection resulted into enhanced oral bioavailability of diacerein.

**Gurpreet Singh, Preet Mohinder Singh Bedi, Abdul Faruk, Liposomes and Nanoemulsions: A Brief Review on Approved Products, *Journal of Applied Science and Computations Volume 5, Issue 10, October/2018, 1159-1163.***

**Abstract:** This review gives a brief overview of the advantages and disadvantages of liposomes and nanoemulsions used in drug delivery systems. Due to unique features liposomes and nanoemulsions attained much attention of companies for their utilization in pharmaceutical, cosmetics, and food science and agriculture sector. Currently, the number of formulations are approved by Food and Drug Administration (FDA) and are already available in the market where some are under review are. This paper summarizes the list of approved products of liposomes and nanoemulsions.

**2017**

**Afzal Hussain, Sima Singh, Dinesh Sharma, Thomas J Webster, Kausar Shafaat, Abdul Faruk, Elastic liposomes as novel carriers: recent advances in drug delivery*, International Journal of Nanomedicine, 2017:12 5087–5108. (Dove Press USA) Impact factor 4.471***

**Abstract:** Elastic liposomes (EL) are some of the most versatile deformable vesicular carriers that comprise physiologically biocompatible lipids and surfactants for the delivery of numerous challenging molecules and have marked advantages over other colloidal systems. They have been investigated for a wide range of applications in pharmaceutical technology through topical, transdermal, nasal, and oral routes for efficient and effective drug delivery. Increased drug encapsulation efficiency, enhanced drug permeation and penetration into or across the skin, and ultradeformability have led to widespread interest in ELs to modulate drug release, permeation, and drug action more efficiently than conventional drug-release vehicles. This review provides insights into the versatile role that ELs play in the delivery of numerous drugs and biomolecules by improving drug release, permeation, and penetration across the skin as well as stability. Furthermore, it provides future directions that should ensure the widespread use of ELs across all medical fields.

**Semalty M, Adhikari L, Semwal D, Chauhan A, Mishra A, Kotiyal R, Semalty A. A Comprehensive Review on Phytochemistry and Pharmacological Effects of Stinging Nettle (Urtica dioica). Curr. Trad. Med. 2017;3(3):156-167. [https://doi.org/10.2174/22150838036661 70502120028]**

**Abstract: Background and Objective:** Urtica dioica (stinging nettle), a member of the Urticaceae family, has been used in various traditional systems of medicines since ancient times especially for joint pain, arthritis and prostate problems. Its roots and leaves contain a wide variety of bioactive constituents like sterols, fatty acids, lectins terpenes, phenylpropanes, lignans and coumarins. The leaves and root extract shows various activities like hypoglycemic, anti-inflammatory, antiproliferative, antioxidant, hypolipemic, antirheumatic, anticarcinogenic and antiviral activity. It shows its effects through the inhibition of aromatase, 5 α-reductase, cell proliferation and Na+, K+-ATPase inhibition. **Conclusion:** The article reviews the phytochemistry and phytopharmacology of the plant.

**Semalty M, Adhikari L, Chauhan A, Mishra A, Semwal D, Kotiyal R, Semalty A. Obesity and Herbal Drug Research: Exploring the Safer Alternative and Lead Molecule. Curr.Trad. Medi. 2017;3(2):74-92. [https://doi.org/10.2174/2215083803666170309124540]**

**Abstract: Background:** Obesity has developed as an epidemic and as a psychosocial problem globally at an alarming rate. The lack of physical exercise, sedentary lifestyles and the consumption of junk foods are the major contributing factors to the etiology of obesity. Overweight and obesity rank fifth as the leading risk factors for deaths globally. **Method:** There are a number of claimed treatment options including drug therapy, yoga, surgery, lifestyle changes and natural herbal and homeopathic remedies. Most of the synthetic drugs used for anti-obesity have one or more side effects. Moreover, the treatment is also costly. A herbal drug may be a safer as well as cost effective alternative for anti-obesity and antihyperlipidemic activity. **Discussion:** The article discussed the current epidemiological status and prevalence of diabetes. After introducing the conventional treatment of obesity the herbal drug research was reviewed exhaustively. **Results & Conclusion:** The meta analysis and SWOT analysis of herbal drug research were done, major lacunae in the current research was identified and the solutions to boost the research field were suggested. The rational and judicious use of more and more in vitro and in vivo assays, chemical fingerprinting of herbal extracts and development of validated protocols for evaluation parameters may be helpful in taking the herbal drug research for developing a bioactive lead molecule.

**Ankita Sati, Sushil Chandra Sati, Nitin Sati, OP Sati; Chemical composition and antimicrobial activity of fatty acid methyl ester of *Quercus leucotrichophora* fruits, Natural Product Research 2017**

**Abstract:** Natural fats and dietary oils are chief sources of fatty acids and are well known to have antimicrobial activities against various microbes. The chemical composition and antimicrobial activities of fatty acids from fruits of white Oak (Quercus leucotrichophora) are yet unexplored and therefore the present study for the first time determines the fatty acid composition and antibacterial and antifungal activity of the fatty acid methyl esters (FAME) of the white oak plant found along the Himalayan region of Uttarakhand. The GCMS analysis revealed presence of higher amount of saturated fatty acid than unsaturated fatty acids. FAME extract of fruits of Q.leucotrichophora demonstrated better antibacterial activity against Gram positive bacteria than Gram negative bacterial. The present studies clearly establish the potential of the fruits of Q. leucotrichophora for use in soap, cosmetics, and pharmaceutical industries.

**2016**

**Afzal Hussain, Abdus Samad, S. K Singh, M. W Haque, A. Faruk, and F. J. Ahmed, Nanoemulsion gel-based Topical delivery of an antifungal drug: in vitro activity and in vivo evaluation, *Drug Deliv, 2016; 23(2): 642–657. (Taylor & Francis) Impact factor 4.843***

**Abstract: Objective:**In this study, attempt has been focused to prepare a nanoemulsion (NE) gel for topical delivery of amphotericin B (AmB) for enhanced as well as sustained skin permeation, in vitro antifungal activity and in vivo toxicity assessment. **Materials and methods:**A series of NE were prepared using sefsol-218 oil, Tween 80 and Transcutol-P by slow spontaneous titration method. Carbopol gel (0.5% w/w) was prepared containing 0.1% w/w AmB. Furthermore, NE gel (AmB-NE gel) was characterized for size, charge, pH, rheological behavior, drug release profile, skin permeability, hemolytic studies and ex vivo rat skin interaction with rat skin using differential scanning calorimeter. The drug permeability and skin irritation ability were examined with confocal laser scanning microscopy and Draize test, respectively. The in vitro antifungal activity was investigated against three fungal strains using the well agar diffusion method. Histopathological assessment was performed in rats to investigate their toxicological potential. **Results and discussion:**The AmB-NE gel (18.09 ± 0.6 µg/cm(2)/h) and NE (15.74 ± 0.4 µg/cm(2)/h) demonstrated the highest skin percutaneous permeation flux rate as compared to drug solution (4.59 ± 0.01 µg/cm(2)/h) suggesting better alternative to painful and nephrotoxic intravenous administration. Hemolytic and histopathological results revealed safe delivery of the drug. Based on combined results, NE and AmB-NE gel could be considered as an efficient, stable and safe carrier for enhanced and sustained topical delivery for AmB in local skin fungal infection. **Conclusion:**Topical delivery of AmB is suitable delivery system in NE gel carrier for skin fungal infection.

Mishra A, Kotiyal R, Adhikari L, Semalty A, Polymeric implants of diclofenac for site specific and prolonged drug delivery for use in orthopedic or arthritic patients. Adv. Biomed. Pharm.2016; 3(6): 380-386. [http://dx.doi.org/10.19046/abp.v03i06.04]

**Abstract:** In the present study, diclofenac loaded implants were prepared for prolonged and site specific drug delivery in orthopedics and other related areas. The polymeric biodegradable implants of diclofenac were prepared using sodium alginate and gelatin by solvent evaporation method. The prepared implants were characterized for various physico-chemical parameters (like visual appearance, thickness, weight variation, drug content, formaldehyde test) and in-vitro drug release (in franz diffusion cell). The surfaces of prepared implants were smooth and shiny with yellow colour. Drug content was found to be 98.56 ± 1.98 and 97.99 ± 1.60 % for formulation F1 and F2, respectively. Both formulations of implant were free from free formaldehyde. In the in vitro drug release study the drug release across the membrane was 95.11 ± 2.26 and 91.66 ± 2.08 % at the end of 24 h. The implants prepared with gelatin and sodium alginate in 3:1 ratio was concluded to be the better formulation. The study concluded that the biodegradable implants of diclofenac might be effective in orthopedics for getting prolonged drug release.

**Maher M, Pandey M, Adhikari L, Semalty A, Semalty M. Effect of Hydrophilic Excipients on Cyclodextrin Complexes of Acyclovir in Improving Solubility, Dissolution and Permeability. Lett. Drug Desig. Discov. 2016; 13(8):771-780.**

**Abstract:** Acyclovir, a popular antiviral drug, is associated with the problems of poor water solubility, low bioavailability (15-30%), low permeability (across the gastro intestinal membrane) and short half-life (3 hours) leading to high dosage frequency which in turn may cause adverse effects. Therefore, with the objective of the improvement in solubility (and dissolution also) and gastro intestinal permeability (which in turn is expected to improve the bioavailability) of acyclovir, the acyclovir- β-cyclodextrin (β-CD) complexes were prepared and characterized. The inclusion complexes of acyclovir were prepared with β-CD (with or without the presence of hydrophilic excipients namely polyvinyl pyrollidone K-30 and nicotinamide) using the kneading method. The prepared complexes were characterized for various physicochemical properties, FTIR, DSC, XRPD, in vitro release and ex vivo permeation study. The effect of water soluble excipients (PVP K- 30 and nicotinamide) on the performance of acyclovir- β-CD inclusion complexes was also studied. FTIR, DSC and XRPD data confirmed the formation of inclusion complexes. The DSC explained and correlated the change in the endothermic peaks with the complexation and the solubility improvement. This study revealed that FK6 (Drug+β-CD+PVP K- 30 1.5%+ nicotinamide-14mM) and FK4 (Drug+β-CD+nicotinamide-14mM) ratio showed highest increase in solubility as compared to that of PVP K-30. The effect of two excipients (PVP K-30 and nicotinamide) was investigated on the solubility, dissolution and permeability of acyclovir. Nicotinamide was found to be more effective and promising water soluble excipients for the preparation of β-CD complexes as compared to PVP K-30.

**Pandey M, Maher M, Semalty M, Semalty A. Natural Macromolecules in the Development of Safe and Effective Gastroretentive Floating Microparticles of Metformin Hydrochloride. The Natural Products Journal. 2016; 6(1):62-72.**

**Abstract: Background:** Metformin hydrochloride, an oral hypoglycaemic, shows better absorption from upper part of the gastric region. Natural/herbal substances have been investigated for the development of natural polymer-based drug delivery systems owing to the desirable properties like biodegradability, biocompatibility, aqueous solubility, swelling ability, easy availability and cost effectiveness. **Method:** Therefore, three natural macromolecules: Glycine max (soya chunks), Metroxylon sagu (sago starch) and Plantago ovata (psyllium husk) were used for developing its gastroretentive floating microparticles for expected improvement in bioavailability. The macromolecules and the prepared microparticles were evaluated for physicochemical properties, FTIR, XRPD, DSC and dug release. **Result:** The percent drug content was in the range of 60.353 ± 1.25 to 92.682 ± 2.47 % for all the microparticles. All the formulations showed good swelling and floating properties (the formulation prepared with P. ovata showed the best swelling and in vitro floatability). The FTIR studies showed that the herbal carriers were compatible with the drug. XRD and DSC studies showed a transition in the physical state of the drug in the formulations from crystalline state to amorphous state. In vitro drug release studies showed good percent cumulative drug release from all the formulations (72.13 to 87.06 % at the end of 6 hour) with non-fickian diffusion process. **Conclusion:** Therefore, it was concluded that the herbal macromolecules may be the potential, safe and effective carriers for improving the drug delivery of the metformin like drugs by developing, effective gastroretentive floating drug delivery systems.

**Mona Semalty, Rahul Kumar, Ajay Semalty, Formulation and characterization of herbal formulation for antihyperlipidemic activity in diet induced obese mice, Indian Drugs, 2016;53(7):30-34. ISSN: 0019-462X**

**Abstract:** In the present study, an Aloe vera based herbal formulation of the ethanolic extract of Trigonella foenum graecum (seed) was prepared and characterized for antihyperlipidemic and antiobesity activity. Ethanolic extract of the seeds of T. foenum graecum was obtained by the cold extraction method and then its Aloe vera based formulation was prepared. The prepared formulation was given orally (400 mg/kg) to the obese (high fat diet induced) mice for one month and at the end of one month the body weight, total cholesterol, triglyceride, HDL- cholesterol, serum creatinine and serum potassium were determined and compared with the control and standard group (received atorvastatin, 40.0 mg/kg). Standard group showed a total of 43.05 % body weight gain while the test formulation showed 39.54 % body weight gain only. In the in vivo study, the group which received the herbal formulation showed significantly lower serum total cholesterol, triglyceride and LDL-Cholesterol and higher values of serum HDL cholesterol. The test formulation showed better HDL/LDL ratio (0.86±0.02) as compared to the standard (0.66±0.09). The serum creatinine and serum potassium concentrations were also found to be lowered in the test group. The study suggested that the herbal formulation prepared from the ethanolic Trigonella extract possessed anti hyperlipidaemic and anti-obesity activity with efficacy even better than that of standard lipid lowering agent (atorvastatin). Hence, it was concluded that the herbal formulation may be a natural and safe remedy for the prevention and control of hyperlipidemia and obesity.

**2015**

**Afzal Hussain, Abdus Samad, Sandeep Kumar Singh, Mohd Neyaz Ahsan, Abdul Faruk, and Farhan Jalees Ahamed, Enhanced Stability and Permeation Potential of nanoemulsion containing sefsol-2018 oil for topical delivery of amphoteracin B*, Drug Dev Ind Pharm, 2015; 41(5): 780–790. (*DOI:**[**10.3109/03639 045.2014.902957**](https://doi.org/10.3109/03639045.2014.902957)**) *(Taylor & Francis) Impact factor 3.295***

**Abstract: Aim:**To characterize the enhanced stability and permeation potential of amphotericin B nanoemulsion comprising sefsol-218 oil at varying pH and temperature of aqueous continuous phase. **Methodology:**Several batches of amphotericin B loaded nanoemulsion were prepared and evaluated for their physical and chemical stability at different pH and temperature. Also, a comparative study of ex vivo drug permeation across the albino rat skin was investigated with commercial Fungisome® and drug solution at 37 °C for 24 h. The extent of drug penetrated through the rat skin was thereby evaluated using the confocal laser scanning microscopy (CLSM). **Results and conclusions:**The optimized nanoemulsion demonstrated the highest flux rate 17.85 ± 0.5 µg/cm(2)/h than drug solution (5.37 ± 0.01 µg/cm(2)/h) and Fungisome® (7.97 ± 0.01 µg/cm(2)/h). Ex vivo drug penetration mechanism from the developed formulations at pH 6.8 and pH 7.4 of aqueous phase pH using the CLSM revealed enhanced penetration. Ex vivo drug penetration studies of developed formulation comprising of CLSM revealed enhanced penetration in aqueous phase at pH 6.8 and 7.4. The aggregation behavior of nanoemulsion at both the pH was found to be minimum and non-nephrotoxic. The stability of amphotericin B was obtained in terms of pH, optical density, globular size, polydispersity index and zeta potential value at different temperature for 90 days. The slowest drug degradation was observed in aqueous phase at pH 7.4 with shelf life 20.03-folds higher when stored at 4 °C (3.8 years) and 5-fold higher at 25 °C (0.951 years) than at 40 °C. The combined results suggested that nanoemulsion may hold an alternative for enhanced and sustained topical delivery system for amphotericin B.

Semwal D, Kotiyal R, Chauhan A, Mishra A, Adhikari L, Semalty A, Mona Semalty, Alopecia and the herbal drugs, An overview of the current status, Advances in Biomedicine and Pharmacy. 2015; 2(6): 246-254. [[DOI: 10.19046 /abp.v02i06. 01](http://dx.doi.org/10.19046/abp.v02i06.01)]

Abstract: Alopecia is a dermatological disorder commonly known as hair loss. Psycho -social importance of hair is the main cause and focus of cosmaceutical industries on hair growth formulations. Numerous medicinal systems contain therapeutic agents for alopecia but very few of them are promising. Use of herbs and medicinal plants for the treatment of alopecia is a well-known folklore practice. The conventional synthetic drugs are associated with one or more significant side effects when used in the long term for alopecia treatment. The herbal drugs can provide a safer and more effective alternative to the treatment. Understanding of physiological factors affecting hair growth and mechanism of herbs in promoting hair growth can be helpful in the hair growth research. In present study, we have tried to review the alopecia as a disorder, the present status of the nonsurgical treatment options for alopecia and the discussion on the ongoing systematic research using herbal drugs to treat alopecia.

**Semalty A, Kumar R, Semalty M. Anti-hyperlipidemic and anti-obesity activities of ethanolic extract of Trigonella foenum graecum (seeds) of Himalayan region in diet induced obese mice. Adv. Biomed. Pharm. 2015;2(5):229-34. [https://www.researchgate.net/deref/http%3A%2F% 2Fdx.doi.org%2F10.19046%2Fabp.v02i05.05]**

**Abstract:** Trigonella is a well-established constituent of our daily food with a variety of beneficial properties. In present study the ethanolic extract of Trigonella foenum graecum (seed) obtained from Himalayan region was prepared and evaluated for antihyperlipidemic and antiobesity activities. The extract was given orally (400 mg/kg) to the obese (high fat diet induced) mice for one month and then body weight, total lipid profile, serum creatnine and serum potassium were determined and compared with the control and standard group(atorvastatin, 400 mg/kg). At the end of treatment the standard group showed a total of 40.55 % body weight gain while the extract showed 43.64 % body weight gain against the obese control group (51.97 %). The extract group showed significantly lower serum, total cholesterol, triglyceride and LDL-Cholesterol and higher values of serum HDL cholesterol. The serum creatinine and serum potassium concentration were found to be in normal range at the end of the study in the standard and test group. The study suggests that the Trigonella extract might be used for anti-hyperlipidemic and anti-obesity activity with efficacy comparable to modern lipid lowering agent (atorvastatin). Hence, it can be used as natural and safe remedy for the prevention or delay of hyperlipidemic and cardiovascular complications of diet induced obesity.

**Rajendra Singh, Vivek Ahluwalia, Pratap Singh, Naresh Kumar, Om Prakash Sati & Nitin Sati; Antifungal and phytotoxic activity of essential oil from root of Senecio amplexicaulis Kunth. (Astraceae) growing wild in high altitude Himalayan region, Natural Product Research 2015**

**Abstract:** This work was aimed to evaluate the essential oil from root of medicinally important plant Senecio amplexicaulis for chemical composition, antifungal and phytotoxic activity. The chemical composition was analysed by GC/GC-MS showed the presence of monoterpene hydrocarbons in high percentage with marker compounds as alpha phellandrene (48.57%), o-cymene (16.80%) and beta-ocimene(7.61%). The essential oil exhibited significant antifungal activity against five phytopathogenic fungi, S.rolfsii, Macrophomina phaseolina, R. solani, Pythium debaryanum and Fusarium oxysporum. The oil demonstrated remarkable phytotoxic activity in tested concentration and significant reduction in seed germination percentage of Phalaris minor and Triticum aestivum at higher concentrations. The root’s essential oil showed high yield for one of its marker compound (alpha phellandrene) which makes it important natural source of this compound.

**2014**

**Semalty A. Cyclodextrin and phospholipid complexation in solubility and dissolution enhancement: a critical and meta-analysis. Expert Opin Drug Deliv. 2014; 11(8):1255-72. [doi: 10.1517/17425247.2014.916271] [PMID: 24909802]**

**Abstract: Introduction:**Poor solubility and dissolution of drugs are the major challenges in drug formulation and delivery. In order to improve the solubility and dissolution profile of drugs, various methods have been investigated so far. The cyclodextrin (CD) complexation and phospholipid (PL) complexation are among the exhaustively investigated methods employed for more precise improvement of the solubility and dissolution of poorly water-soluble drugs. **Areas covered:**The article discusses the CD and PL complexation techniques of solubility and dissolution enhancement. Various studies reporting the CD and PL complexation as the potential approaches to improve the dissolution, absorption and the bioavailability of the drugs have been discussed. The article critically reviews the physicochemical properties of CDs and PLs, eligibility of drugs for both the complexation, thermodynamics of complexation, methods of preparation, characterization, advantages, limitation and the meta-analysis of some studies for both the techniques. **Expert opinion:**The CD and PL complexation techniques are very useful in improving solubility and dissolution (and hence the bioavailability) of biopharmaceutical classification system Class II and Class IV drugs. The selection of a particular kind of complexation can be made on the basis of eligibility criteria (of drugs) for the individual techniques, cost, stability and effectiveness of the complexes.

**Semalty A, Tanwar YS, Singh D, Rawat MS. Phosphatidylcholine complex in improving oral drug delivery of epicatechin: Preparation and characterization. BDDD. 2014; 1:46-55.**

**Abstract:** Epicatechin, a polyphenolic flavonoid, shows antioxidant, anti-bacterial, anticarcinogenic and antitumour activity. Like other flavonoids, epicatechin is poorly absorbed across the gastrointestinal tract because it has multiple ring molecules that are too large to be absorbed by simple diffusion. It shows poor miscibility with oils and other lipids which limit its ability to pass across the lipid rich biomembranes of small intestine. Therefore, in an attempt to improve the problem of poor absorption, solubility and dissolution of epicatechin its phospholipid complexes were prepared. The prepared epicatechin-phospholipid complex was characterized for various physico-chemical parameters like drug loading, infrared absorption (FTIR), differential scanning calorimetry (DSC), scanning electron microscopy (SEM), aqueous/n-octanol solubility and dissolution study. In the SEM, the complex was observed as nonporous irregular particles with rough surface morphology. FTIR and DSC data confirmed the formation of phospholipid complex. The water and n-octanol solubility of epicatechin was improved from 326.32 to 427.12 μg/ml and 378.53 to 502.67 μg/ml, respectively in the complex. The dissolution was also improved significantly in the phospholipid complex. It was concluded that the phospholipid complex may be used for improving solubility, dissolution and hence the bioavailability of epicatechin molecule.

**Semalty A, Tanwar YS, Semalty M. Preparation and characterization of cyclodextrin inclusion complex of naringenin and critical comparison with phospholipid complexation for improving solubility and dissolution. J Therm. Anal. Calorim. 2014; 115(3):2471-2478. [https://doi.org/10.1007/s10973-013-3463-y]**

**Abstract:** Naringenin, a flavonoid specific to citrus fruits shows a variety of therapeutic effects like anti-inflammatory, anticarcinogenic, and antitumour effects. But it is associated with some limitations like poor water solubility, poor dissolution, lower half-life, and rapid clearance from the body. With the aim of improving amorphous nature, water solubility, and dissolution profile of naringenin and its complexes were prepared with β-cyclodextrin in three different molar ratios (1:1, 1:2, and 1:3) by solvent evaporation method. These complexes were characterized for solubility, drug content, chemical interaction (using FTIR), phase transition behavior (using DSC), crystallinity (using XRPD), surface morphology (using SEM), and in vitro dissolution study. The results were also critically compared with the results obtained from naringenin-phospholipid complexes (from author’s previous study). The prepared complexes showed high drug content (ranging from 69.53 to 84.38 %) and about two fold improvement in water solubility (from 41.81 to 76.31 μg mL−1 in the complex with 1:3 ratio). SEM of the complexes showed irregular and rough surface morphology. FTIR, DSC, and XRPD data confirmed the formation of the complex. Unlike the free naringenin which showed a total of only 48.78 % drug release at the end of 60 min, the complex showed 98.0–100 % in dissolution study. Thus it was concluded that the β-cyclodextrin of naringenin may be of potential use for improving bioavailability of poorly soluble phytoconstituents/herbal drugs. On critical comparison with the phospholipid complex of naringenin both the techniques were found almost equally effective in improving the solubility and the dissolution performance of naringenin in the complex form.

**Semalty A, Tanwar YS. Preparation and characterization of cyclodextrin inclusion complexes for improving solubility and dissolution of nimesulide. World J Pharm. Sci. 2014; 2(1):72-78.**

**Abstract:** Nimesulide (4'-nitro-2'-phenoxy methane sulfonanilide) is a selective cyclooxygenase-2 inhibitor and one of the potent non steroidal anti-inflammatory drugs (NSAIDs). It is practically insoluble in water and hence has a low bioavailability. To improve solubility and dissolution of nimesulide, its β-cyclodextrin complex were prepared. Nimesulide was complexed with β-cyclodextrin in 1:1, 1:2 and 1:3 molar ratios using solvent evaporation method with the addition of freeze drying. The prepared inclusion complexes were evaluated for solubility, scanning electron microscopy (SEM), differential scanning calorimetry (DSC), X ray powder diffraction (XRPD) and in vitro dissolution study. All the complexes showed about up to 12 fold increase in solubility. The complex prepared in 1:3 ratios showed the greatest improvement in solubility (from 9.67 to 108.60 μg/ml). In SEM, the complexes showed irregular disc shaped non-porous surface. XRPD data indicated that maximum amorphization was induced in the complex prepared with 1:2 ratio. The DSC data confirmed the formation of inclusion complex. The dissolution of the drug in the complexes was also found to be improved. Complex prepared by solvent evaporation method in 1:2 molar ratio showed a marked improvement in dissolution profile (complete release in just 30 minutes) than that of pure drug which showed just 60.02 % drug release at the end of 3 hour. It was concluded that the β-cyclodextrin complex made in 1:2 molar ratio showed good solubility and the dissolution profile as compared to the complex made in 1:1 and 1:3 molar ratio. It was concluded that the complex prepared by solvent evaporation method with 1:2 molar ratio showed the best performance with respect to great improvement in solubility, the best amorphization and the best in vitro dissolution profile as compared to other complexes.

**Semalty A, Tanwar YS. Nimesulide-phosphatidylcholine complex for improvement of solubility and dissolution. Am. J. Drug Disc. Devel. 2014; 3(1):225-234. [doi 10.3923/ajdd.2013]**

**Abstract:** Nimesulide, a potent non-steroidal anti-inflammatory drug, is a highly selective cyclooxygenase-2 (COX-2) inhibitor. Being a class II drug (according to biopharmaceutical classification system or BCS) its poor aqueous solubility results in low bioavailability. Moreover its absorption is dissolution rate limited. It also shows hepatic and gastrointestinal toxicity in long term use. Therefore, to improve solubility, dissolution (hence the bioavailability) and to reduce toxic effects of nimesulide, its phospholipid complex was prepared. The prepared phospholipid complex was evaluated for drug loading, solubility, scanning electron microscopy (SEM), infrared absorption (FT-IR), differential scanning calorimetry (DSC), X-ray powder diffractometry (X-RPD), and in vitro dissolution study. The aqueous solubility of nimesulide was improved significantly in the complex. In the SEM phospholipid complex was found to be fluffy and porous with rough surface morphology. FT-IR, DSC and X-RPD data confirmed the formation of the complex. The prepared phospholipid complex showed significantly improved dissolution profile. It was concluded that the phospholipid complexation of nimesulide like BCS class II drugs may be a very effective, reliable and safe approach to improve the solubility and dissolution of drugs.

## Semalty M, Panchpuri M, Singh D, Semalty A. Cyclodextrin inclusion complex of racecadotril: effect of drug-β-cyclodextrin ratio and the method of complexation. Curr. Drug Discov. Technol. 2014; 11(2): 154-161. [https://doi.org/10.2174/1570163811310666 0043]

**Abstract:** Racecadotril is an antisecretory and antidiarrheal agent against watery diarrhoea in children. Racecadotril is a class II drug (as per Biopharmaceutical Classification System) with poor aqueous solubility and dissolution rate limited absorption. β-cyclodextrin complexation of solubility or dissolution rate limited drugs provides an amphiphilic complex with improved solubility and dissolution profile. Thus Racecadotril - β-cyclodextrin complex were prepared to improve its solubility and dissolution by imparting an environment of improved hydrophilicity. Racecadotril was complexed with β-cyclodextrin (in 1:1 and 1:2 molar ratios) by two different methods (solvent evaporation and kneading method). These inclusion complexes were evaluated for solubility, drug content, scanning electron microscopy (SEM), differential scanning calorimetry (DSC), X ray powder diffraction (XRPD) and in vitro dissolution study. The highest drug content (30.83%) was found in complex made by kneading method (RK1:1) in 1:1 molar ratio. Complex prepared by solvent evaporation method (RSE1:1, RSE1:2) were found to be showing irregular disc shaped non-porous surface, while the complexes prepared by kneading method (RK1:1, RK1:2) showed rough, fluffy, non-porous and irregular surface in SEM. Solubility of the drug improved up to 2 to 3 folds in the complexes. The complex RK1:1 showed the greatest improvement in solubility (from 28.98 to76.56 µg/ml). The dissolution of the complexes was also found to be improved. Complex prepared by solvent evaporation method in 1:1 molar ratio (RSE1:1) showed a marked improvement in percent drug release (100.33%) than that of pure drug (52.58%) at the end of 1 hour in dissolution study. FTIR, DSC and XRPD data confirmed the formation of inclusion complex. It was concluded that water solubility of all the complexes were increased when the drug was complexed with β-CD in 1:1 molar ratio. The complex made in 1:1 molar ratio (irrespective of the method) showed better solubility and the dissolution profile as compared to the complex made in 1:2 molar ratio. It was concluded that the complex prepared by the solvent evaporation method showed better solubility and the dissolution due to better amorphization of the drug.

**Somesh Thapliyal, Vijay Juyal, Anil Bhandari, Hepatoprotective and Antioxidant activity of methanol extract of *Hedychium spicatum* against CCl4- induced liver injury in rats. Research Journal of Pharmaceutical, Biological and Chemical Sciences, 2014; 5(2):1428-1437.**

**Abstract:** The present study investigated the antioxidant and hepatoprotective activity of methanolic rhizome extract of *Hedychium Spicatum* (MEHS) in CCl4-induced hepatotoxicity model in rats. The hepatoprotective and *in vivo* antioxidant activity of methanolic rhizome extract of *Hedychium Spicatum* were evaluated against CCl4-induced hepatic damage in rats. The MEHS at dose of 100, 200 and 400 mg/kg were administered orally once daily for seven days. Serum enzymatic levels of serum glutamate oxaloacetate transaminase (AST), serum glutamate pyruvate transaminase (ALT), serum alkaline phosphatase (ALP) and total bilirubin were estimated along with estimation of superoxide dismutase (SOD) and malondialdehyde (MDA) levels in liver tissues. Further histopathological examination of the liver sections was carried out to support the induction of hepatotoxicity and hepatoprotective efficacy. The extract revealed significant activities and substantially elevated serum enzymatic levels of AST, ALT, ALP and total bilirubin were found to be restored towards normalization significantly by the MEHS in a dose dependent manner with maximum hepatoprotection at 400 mg/kg dose level. The histopathological results also supported the biochemical evidences of hepatoprotection. Elevated level of superoxide dismutase (SOD) and decreased level of malondialdehyde (MDA) further strengthen the hepatoprotective observations. The results of the present study strongly revealed that MEHS have potent antioxidant activity and hepatoprotective activity against CCl4-induced hepatic damage in experimental animals.

**Somesh Thapliyal, Vijay Juyal, Anil Bhandari, Pharmaognostic screening of *Hedychium spicatum* rhizomes.,International Journal of Pharmaceutical and Chemical Sciences, 2014; 3(2): 483-488.**

**Abstract:** The rhizomes of *Hedychium spicatum* belonging to family zingiberaceae are reported to have great medicinal value such as carminative, spasmolytic, hepatoprotective, anti-inflammatory, antiemetic, antidiarrhoeal, analgesic, expectorant, antiasthmatic, emmenagogue, hypoglycaemic, hypotensive, antimicrobial, anthelmintic, insectrepellent etc. By looking the high traditional use of *Hedychium spicatum* the present investigation was undertaken for research with the purpose of drawing the pharmacopoeial standards for this species. The present study deals with pharmacognostical parameters for the rhizomes of *Hedychium spicatum* which mainly consists of macroscopic and microscopic characters, physio-chemical constants and phytochemical screening. This information will be possibly used to differentiate the drug from its other species and will assist in standardization for quality, purity and sample identification.

**Somesh Thapliyal, Vijay Juyal, Anil Bhandari,Evaluation of Hepatoprotective activity of Methanol extract of *Curculigo orchioides* in CCl4- induced liver injury in rats., Amarican journal of Pharmtech Research, 2014; 4(2):365-374.**

**Abstract:** The present study investigated the hepatoprotective activity of methanolic rhizome extract of *Curculigo orchioides* (MECO) in CCl4-induced hepatotoxicity model in rats. The hepatoprotective activity of methanolic rhizome extract of *Curculigo orchioides* were evaluated against CCl4-induced hepatic damage in rats. The three doses of MECO (100, 200 and 400 mg/kg) were administered orally once daily for seven days. Serum glutamate oxaloacetate transaminase (AST), serum glutamate pyruvate transaminase (ALT), serum alkaline phosphatise (ALP) and total bilirubin were estimated along with the estimation of superoxide dismutase (SOD) and malondialdehyde (MDA) levels in liver tissues. Further histopathological examination of the liver sections was carried out to support the induction of hepatotoxicity and hepatoprotective efficacy. The extract revealed significant activities and substantially elevated erum enzymatic levels of AST, ALT, ALP and total bilirubin were found to be normalized significantly by the MECO in a dose dependent manner with maximum hepatoprotection observed at 400 mg/kg dose level. The histopathological observations also indicated the biochemical evidences of hepatoprotection. Elevated level of superoxide dismutase (SOD) and decreased level of malondialdehyde (MDA) further affirmed the hepatoprotective observations. The results of the present study demonstrated that MECO have potent hepatoprotective activity against CCl4-induced hepatic damage in experimental animals.

**Somesh Thapliyal, Vijay Juyal, Anil Bhandari, Effect of rhizomes of *Curculigo orchioides* on Thioacetamide induced hepatotoxicity. Environment Conservation Journal, 2014; Vol. 1 & 2, 55-60.**

**Abstract:** The hepatoprotective activity of methanolic rhizome extract of Curculigo orchioides (MECO) were evaluated against Thioacetamide – induced hepatic damage in rats. The MECO at dose 100, 200 and 400 mg/kg were administered orally once daily for 21 days and simultaneously administered TAA 100 mg/ kg b.w. s.c. 1h after the respective assigned treatments every 72 h. Serum enzymatic levels of serum glutamate oxaloacetate transaminase (AST), serum glutamate pyruvate transaminase (ALT), serum alkaline phosphate (ALP) and total bilirubin were estimated along with estimation of superoxide dismutase (SOD) and malondialdehyde (MDA) levels in liver tissues.

**Mona Semalty, Prateeksha Badoni, Devendra Singh, Ajay Semalty, Modulation of solubility and dissolution of furosemide by preparation of phospholipid complex, Drug Development and Therapeutics (ERSTWHILE Chronicles of Young Scientists), 2014; 5(2): 172-76; ISSN: 2394-6555.**

**Abstract:** Aim: The aim of this study is to improve the solubility and dissolution of furosemide (a potent high ceiling diuretic used for the treatment of hypertension and a Class IV drug that is low solubility and low permeability drug as per the Biopharmaceutical Classification System) by preparing its phospholipid complexes or pharmacosomes. Materials and Methods: Furosemide was complexed with phosphatidylcholine in four different molar ratios (1:1, 1:2, 1:3 and 1:4) by conventional solvent-evaporation technique. The pharmacosomes prepared were evaluated for drug content, solubility, X-ray powder diffraction (XRPD) and in-vitro dissolution study. Results: Pharmacosomes of furosemide showed high drug content ranging from 88.30% to 100%. XRPD studies confirmed the formation of phospholipid complex and the amorphization of drug in the complex. The water solubility was found to be increased up to six-fold in the complexes. The octanol solubility also increased in the complexes indicating the probable increase in permeability. The in-vitro dissolution profile of the prepared complexes was found to be much better than furosemide. Conclusion: It was concluded that the phospholipid complexes can be effectively used for improving the solubility, dissolution, permeability and hence the bioavailability of furosemide like Class IV drugs.

**Ajay Semalty, Ashtami Semwal, Gastroretentive floating microspheres of nateglinide: formulation, evaluation and effect of drug-polymer ratio, Indian Drugs 2014, 51(6):37-43. ISSN: 0019-462X**

**Abstract:** The study aims to develop gastroretentive floating drug delivery system of nateglinide which is used in the treatment of type – II diabetes. Due to the short biological half-life of drug (about 1.5 hours), frequent dosing is required to maintain its therapeutic effect. Therefore, to prolong the gastric retention of nateglinide, its oil entrapped floating microspheres (different formulations with different drug to polymer ratio) were prepared using sodium alginate by emulsion gelation method. The prepared floating microspheres were subjected to evaluation for surface characteristic, entrapment efficiency, swelling index, in vitro buoyancy and in vitro drug release. The scanning electron microscope photograph indicated that the prepared microspheres were discrete and almost spherical in shape with a hollow inner core. The entrapment efficiency was found to be in the range of 80.47 % to 91.33% for all the formulations. Drug entrapment efficiency decreased with increasing polymer concentration in floating microspheres. Average buoyancy was found to be 93 % to 98% for all the formulations. The in vitro floating test clearly showed that most of the microspheres floated for around 12 hrs. The increase in polymer concentration slightly decreased the percent yield and the drug entrapment. On the other hand the increased polymer concentration resulted into increased degree of swelling and percent buoyancy. All the formulations showed good in vitro drug release with first order release by matrix diffusion process. Overall, among the different polymer-drug ratios investigated, 1:6 drug to polymer ratio showed the best buoyancy, highest swelling index, good drug release with good entrapment efficiency. It was concluded that drug-loaded floating alginate microspheres appeared to be a suitable delivery system for nateglinide for potential therapeutic use as a hypoglycemic agent.

**Semalty A, Preparation and evaluation of chitosan microspheres of metformin hydrochloride and to study the effect of drug to polymer ratio, International Journal of Pharmaceutical and Chemical Sciences, 2014, 3(2): 316-20. (ISSN: 2277-5005).**

**Abstract:** Metformin hydrochloride is biguanide used as oral hypoglycemic agent. But its shows short biological half-life (t1/2 3-4) which leads to high dosage frequency. Therefore, the present study aims to prepare the controlled release formulation of metformin hydrochloride loaded in the chitosan microspheres. It also involves the study of the effect drug to polymer ratio on the performance of chitosan microspheres. Chitosan microspheres were prepared by Solvent Extrusion Method using citric acid as a crosslinking agent. Two formulations with different drug polymer ratios (M1 high drug-polymer ratio and M2 low drug to polymer ratio) were prepared for their effect on performance. Formulated microspheres were characterized for its drug content, compressibility index, swelling index, surface morphology and particle size (SEM) and in- vitro drug release study. The characterization of fabricated microsphere showed smooth cracked to smooth porous surface with narrow particle range (600-800µm) and high drug content (75.83 and 73 % for M1 and M2, respectively). Compressibility index was founded between 10.6 and 5.53 % for M1 and M2, respectively. Both the formulations showed good percent swelling index. SEM showed nonporous, smooth and cracky surface for both the formulations. The microspheres prepared with high drug to polymer ratio showed higher in vitro drug release at the end of 12 h of the study. It was concluded that the chitosan microspheres could be considered for controlled drug delivery of metformin hydrochloride. The microspheres prepared with high drug to polymer ratio showed good drug content, compressibility index, swelling index, surface morphology and greater in- vitro drug release.

**Ajay Semalty, Ravindra Aswal, Chitosan microspheres of metformin hydrochloride and the effect of using different concentrations of crosslinking agent, International Research Journal for Inventions in Pharmaceutical Sciences (IRJIPS), 2014, 2(1):22-27. (ISSN: 2321-7855).**

**Abstract:** Metformin hydrochloride is an oral hypoglycemic agent with short biological half-life and high dosage frequency. The present study aims at the formulation of chitosan microspheres loaded with metformin hydrochloride and to evaluate the effect of different concentration of crosslinking agents. Chitosan microspheres were prepared by Solvent Extrusion Method using citric acid as a crosslinking agent. Two microsphere formulations with same drug to polymer ratio (1:1) were prepared with two different concentration of crosslinking agent (M1 with 2% citric acid as crosslinking agents and M2 with 4 % citric acid as crosslinking agents). Formulated microspheres were characterized for its drug content, compressibility index, swelling index, surface morphology, surface morphology (SEM) and in- vitro drug release study. The characterization of fabricated microsphere showed smooth cracked to smooth porous surface with narrow particle range (600-700µm) and high drug content (75.83 and 77.6 % for M1 and M2, respectively). Compressibility index was founded between 10.6 and 5.24 % for M1 and M2, respectively. Both the formulations showed good percent swelling index. SEM showed nonporous and smooth surface for both the formulations. The microspheres prepared with high concentration of crosslinking agent showed higher in vitro drug release at the end of 12 h of the study. It was concluded that the chitosan microspheres with suitable concentration of crosslinking agent could be considered for controlled drug delivery of metformin hydrochloride. The microspheres prepared with high concentration of crosslinking agent showed good drug content, compressibility index, swelling index, surface morphology and greater in- vitro drug release.

**Ajay Semalty, Interplay of solubility and dissolution in dosage form development, International Journal of Pharmaceutics and Drug Analysis (IJPDA), 2014, 2(1), 13-24. ISSN: 2348 – 8948.**

**Abstract:** For the drug formulation and drug delivery, poor solubility and the dissolution of drugs are the major challenges. The drugs which have a water solubility less than 10 mg/ml (over the pH range of 1 to 7 at 37 ºC) show potential bioavailability problems. The bioavailability of the drugs (which show the solubility or dissolution rate-limited absorption) may be improved by improving their aqueous solubility. Moreover, the various formulations need water solubility of the drug as a prerequisite. The article discussed the basic concept related to solubility and dissolution, their importance in biopharmaceutical classification of drugs along their significance in pharmaceutical drug delivery.

**Ajay Semalty, Mukesh Pandey, Lokesh Adhikari, Preparation and characterization of alginate microspheres and the effect of different types and concentration of crosslinking agents, International Research Journal for Inventions in Pharmaceutical Sciences (IRJIPS), 2014, 2(1):33-37. (ISSN: 2321-7855).**

**Abstract:** In development of controlled release formulations, microspheres play a vital role. Alginate microspheres are easy to prepare in lab scale. Present study is focused on the study of effect of different types and concentration of cross-linking agents in the alginate microspheres prepared using ionic gelation technique. Paracetamol was used as a model drug for the study. Prepared microspheres were subjected to various evaluation parameters including drug content, bulk density and tap density, angle of repose, Carr’s index, Hausner’s ratio and in vitro dissolution study. Results concluded that the microspheres prepared with Bacl2 showed good per cent drug content, good flow properties as well as good per cent drug release as compared to the formulations prepared with CaCl2. All formulations had Hausner’s Ratio <1.00 which shows a good flow property and compressibility index about≤10%. Angle of repose for all the formulation had <20which states the low cohesion forces and frictional coefficient between particles. An average range for drug release from all formulations at the end of 21st hour was found to be in range of 60 to 80%. In particular lower per cent (5%) of crosslinking agent (in formulation B1) was favourable for ensuring good drug content, good flow properties and good per cent drug release.

**Ajay Semalty, Lokesh Adhikari, Mukesh Pandey, Development and evaluation of alginate microspheres of paracetamol: effect of different concentrations of crosslinking agent and coating, International Research Journal for Inventions in Pharmaceutical Sciences (IRJIPS), 2014, 2(1):28-32. (ISSN: 2321-7855).**

**Abstract:** The objective of the present study was to design the alginate microspheres of paracetamol (model drug) using calcium chloride as a crosslinking agent by inotropic gelation method. The study focused on the effect of different concentrations of crosslinking agent and coating on the dissolution profile of microspheres using sodium carboxymethylcellulose (SCMC) as coating agent. Microspheres were prepared by using 2% sodium alginate aqueous solution with three different concentrations (5%, 10%, 15% w/v) of crosslinking agent (CaCl2), followed by coating with 2% sodium carboxymethylcellulose (low viscosity grade). Uncoated microspheres were evaluated for micromeritic properties like angle of repose, bulk density, tapped density, Carr’s index, Hausner’s ratio and for drug content. The in vitro drug release study was done for both uncoated and coated microspheres. The bulk density values were found in between 0.78 to 1.45 and tapped density values were found in between 0.82 to 1.48. Angle of repose was found to be less than 200, which shows excellent flow properties. The values of Carr’s index were in between 5.05 to 6.22 and Hausner’s ratio was in between 1.01 to 1.05 for uncoated microspheres. It was concluded that microspheres formulated with lower concentration of crosslinking agent showed the higher drug release while the coated microspheres showed prolonged or extended-release drug release.

2013

P. Kumar, Mir S. R., A. Semalty, Isolation and Characterization of Novel Flavonoid from Methanolic Extract of *Pongamia pinnata* Pods, Research J Phytochemistry, 2013, 7(2), 1-4.; [DOI: 10.3923/rjphyto.2013]

Abstract: Pongamia pinnata (Linn) Pierre (family Papiolanaceae) is an important medicinal plant found in tidal forests of India and has been largely used in the traditional Indian system of medicine for bronchitis, whooping cough, rheumatic arthritis and diabetes. Significant hypoglycemic activity has already been reported in flowers of the plant. But due to the short flowering period of the plant, the pods of the plants were studied as a potential alternative of flowers for getting some novel compounds with potential of the similar activity. In the present study, methanolic extract of P. pinnata pods were fractionated with column chromatography from its methanolic extract. Elution of the column with petroleum ether: chloroform (1:3) in fractions 51-79 yielded a novel flavonoid as yellow crystalline powder that was recrystallized from methanol. It showed Rf value: 0.90 (Petroleum ether: chloroform:: 1:3) and mp as 131°C The isolated novel compound was characterized with UV-Vis., Infrared (IR), Mass, lH and 13C-NMR (Nuclear Magnetic Resonance) spectroscopy. The isolated novel compound was found to be 13'-(3'-hydroxy-4'-methoxychalconyl-13-3, 4-dimethoxychalcone and hence named as Pongamiachalcone). Being a novel flavonoid isolated from the plant there are very good chances that this can also be another novel hypoglycemic agent from P. pinnata. Therefore, in vivo hypoglycemic activity of the novel compound may be carried out for its probable hypoglycemic activity like that of other flavonoids obtained from P. pinnata pods.

**Mona Semalty, Mitali Panchpuri, Devendra Singh, Ajay Semalty, Effect of drug β-CD ratio and method of complexation in the development of cyclodextrin inclusion complex of ofloxacin, Indian Drugs, 2013, 50(12), 34-40.ISSN: 0019-462X.**

**Abstract:** Ofloxacin, a second-generation fluoroquinolone, shows poor aqueous solubility and dissolution profile. Thus, ofloxacin-B-cyclodextrin complexes were prepared to improve its dissolution by imparting an environment of improved hydrophilicity. Ofloxacin was complexed with B-cyclodextrin (in 1:1 and 1:2molar ratio) by two different methods namely, solvent evaporation and kneading method. These inclusion complexes were evaluated for solubility, drug content, scanning electron microscopy (SEM), differential scanning calorimetry (DSC), X ray powder diffraction (XRPD) and in vitro dissolution study. The highest drug content (35.45"/") was found in complex made by kneading method (OK1:1) in 1:1 molar ratio. All the complexes OSE1:1, OSE1:2, OK1:1, OK1:2were found to be showing rough and porous surface morphology in SEM. Solubility as well as the dissolution of the complexes was found to be improved. Complex prepared by kneading method in 1:1 molar ratio (OK 1:1) showed a marked improvement in percent drug release (88.94%) than that of pure drug (54.22o/o) at the end of t hour in dissolution study. FTIR' DSC and XRPD data confirmed the formation of inclusion complex. lt was concluded that the complex made in 1:1 molar ratio (irrespective of the method) showed better solubility and dissolution profile as compared to complex made in 1:2 molar ratio.

**Somesh Thapliyal, Vijay Juyal , R.M.Painuli Anil Bhandari(2013), Pharmacognostic and Phytochemical Study of rhizomes of *Curculigo orchioides,* 2013;The herbs, Vol. 1, Issue 1,42-47**

**Abstract:** *Curculigo orchioides* belonging to family *Amaryllidaceae or Hypoxidaceae;* is an ayurvedic traditional medicinal plant known as Taalmuuli, Taalpatri, Krishna Mushali, Bhuumitaala in ayurveda. The root plant is as nervine, adaptogenic, sedative, anticonvulsive, androgenic, anti-inflammatory and diuretic. Used in Jaundice, urinary disorders, skin diseases and asthma. By looking the high traditional use of *Curculigo orchioides* the present investigation was undertaken for research with the purpose of drawing the pharmacopoeial standards for this species. The present study deals with pharmacognostical parameters for the rhizomes of *Curculigo orchioides* which mainly consists of macromorphology and microscopical characters, physio-chemical constants and phytochemical screening. This information will be of used for further pharmacological and therapeutically evaluation of the species and will assist in standardization for quality, purity and sample identification.

**S P Anand and N Sati; Artificial preservatives and their harmful effects: Looking toward nature for safer alternatives, International Journal of Pharmaceutical Sciences and Research 2013, 4(7), 2496-2501**

**Abstract:** Preservatives prolong the shelf life of food, cosmetics and pharmaceuticals by preventing their spoilage. Antimicrobials such as nitrites, nitrates, benzoates and sulfur dioxide destroy or delay the growth of bacteria, yeast and molds. Antioxidants such as BTH, BHA and propylgallate slow or stop the breakdown of fats and oils. Antienzymatic preservatives such as citric and erythorbic acid block the enzymatic processes such as ripening occurring in foodstuff after harvest. Natural substances like salt, sugar, vinegar and spices have been used as preservatives since time immemorial. The majority of preservatives used today are artificial rather than natural. Researchers have reported that artificial preservative as nitrates, benzoates, sulfites, sorbates, parabens, formaldehyde, BHA, BHT and several can cause serious health hazard such as hypersensitivity, allergy, asthma, hyperactivity, neurological damage and cancer. Research has proven that several natural preservative obtained from plants, animals, microbes and minerals contain antioxidant, antimicrobial and antienzymatic properties. Extracts of basil, clove, neem and rosemary are promising alternatives to their artificial counterparts. This article aims at increasing awareness about the harmful effects of artificial preservative and recommends the usage of natural preservatives for better therapeutic efficacy, safety and preservation of substances along with improved general health.

**Rawat DS, Thakur BK, Semalty M, Semalty A, Badoni P, Rawat MS. Baicalein-phospholipid complex: a novel drug delivery technology for phytotherapeutics. Curr. Drug Discov. Technol. 2013; 10(3):224-232. [https://doi.org/10.2174/1570163811310030005]**

**Abstract:** Flavonoids are a group of low-molecular-weight polyphenolic compounds of plant origin. They exhibit a variety of biological activities such as anti-inflammatory, antioxidant, antiviral, and antitumor etc. Baicalein, is a bioactive flavone constituent of Scutellariae radix with a wide range of beneficial activities. But the poor solubility and dissolution rate limit its oral intestinal absorption and bioavailability. The aim of this study was to develop an amphiphilic phytophospholipid complex in order to enhance the delivery of poorly soluble drug (baicalein). The baicalein-phospholipid complex (Ba-PLc) was prepared and evaluated for various physico-chemical parameters like drug loading, infrared absorption (FT-IR), differential scanning calorimetry (DSC), X-ray powder diffractometry (X-RPD), scanning electron microscopy (SEM), aqueous/ n-octanol solubility and dissolution study. In the SEM, phospholipid complex (Ba-PLc) was found fluffy and porous with rough surface morphology. FT-IR, DSC and X-RPD data confirmed the formation of phospholipid complex. The water/ n-octanol solubility of baicalein was improved significantly in the complex. Improved dissolution was shown by the phospholipid complex. The results of the study concluded that the phospholipid complex may be considered as a promising drug delivery system for improving the absorption and overall bioavailability of the baicalein molecule.

**Singh D, Rawat MS, Semalty A, Semalty M. Chrysophanol–phospholipid complex. J Therm. Anal Calorim. 2013;111(3):2069-2077.[http://dx.doi.org/10.1007%2Fs10973-012-2448-6]**

**Abstract:** Delivery of poorly soluble drugs results in poor absorption and low bioavailability to the systemic circulation. Chrysophanol (1,8-dihydroxy 3-methyl anthraquinone) a plant derived herbal drug is well known for its strong anti-inflammatory, anti-mutagenic, and anti-carcinogenic activities but poor aqueous solubility (hence the lower dissolution rate), is a major barrier in its intestinal absorption. To improve the bioavailability and prolong its duration in the body system, its phospholipid complex was prepared and evaluated for various physicochemical parameters like encapsulation efficiency, scanning electron microscopy, differential scanning calorimetry (DSC), X-ray powder diffractometry (X-RPD), IR spectroscopy, aqueous/*n*-octanol solubility, and dissolution study. The phospholipid complex of chrysophanol was found, fluffy and porous with rough surface morphology. FTIR, DSC, and X-RPD data confirmed the complex formation. The 89.1 % of chrysophanol was encapsulated in the phospholipid complex. The aqueous solubility of chrysophanol was improved from 0.60 to 30.09 μg ml−1 in the prepared complex. The improved dissolution was shown by the complex (which showed continuous release up to 83.67 % of chrysophanol) at the end of 12 h, in comparison to free drug (which showed a total of only 45.12 % drug release at the end of 12 h of dissolution study).

**2012**

**Semalty A, Semalty M, Kumar P, Mir SR, Ali M, Amin S. Isolation and hypoglycemic activity of a novel pongamiaflavonylflavonol from Pongamia pinnata pods. International Journal of Pharmacology. 2012; 8(4):265-270. [https://dx.doi.org/10.3923/ijp.2012.265.270]**

**Abstract:** Pongamia pinnata (family Papilionaceae) has been used for bronchitis, whooping cough, rheumatic joints and quench dipsia in diabetes. This study deals with the isolation of a new hypoglycemic phytoconstituent from P. pinnata pods. The hypoglycemic activity of the isolated phytoconstituent was evaluated in comparison of the methanolic extract of the pods.. Methanolic extract of P. pinnata pods was fractionated by column chromatography and the isolated compounds were identified by spectral analysis. A new compound named Pongamiaflavonylflavonol was isolated from chloroform: methanol (97:3) eluant. This new isolated compound was studied for hypoglycemic activity in streptozotocin induced diabetic rats. Methanolic extract of P. pinnata pods and pongamiaflavonylflavonol showed significant hypoglycemic activity in streptozotocin-induced hyperglycemic rats after oral administration. At the end of 6 h the new compound showed 12.15% reduction in blood glucose level in comparison of extract (11.36%) against the standard (16.93%). It can be concluded that the novel Pongamiaflavonylflavonol isolated from P. pinnata pods may be useful as oral hypoglycemic therapeutic agent. This may serve as a lead compound for development of more potent drugs for clinical use in diabetes.

**Semalty A, Semalty M, Singh D, Rawat MS. Phyto-phospholipid complex of catechin in value added herbal drug delivery. J Incl Phenom Macrocycl Chem. 2012; 73 (1-4): 377-386. [http://dx.doi.org/10.1007%2Fs10847-011-0074-8]**

**Abstract:** Catechin (an anti-inflammatory, antioxidant, antitumour, and hepatoprotective bioflavonoid) is poorly absorbed across the GIT because it has multiple ring molecules that are too large to be absorbed by simple diffusion. It typically has poor miscibility with oils and other lipids which limit their ability to pass across the lipid rich outer membranes of enterocytes of small intestine. Thus catechin–phospholipid complex were prepared to improve its absorption by imparting an environment of improved lipophilicity. The phospholipid complexes of catechin were prepared with phosphatidylcholine in presence of dichloromethane by conventional solvent evaporation technique. Pharmacosomes thus prepared were evaluated for solubility, drug content, scanning electron microscopy (SEM), differential scanning calorimetry (DSC), X ray powder diffraction (XRPD), in vitro dissolution study and in vitro antioxidant activity. Prepared phospholipid complex showed high drug content (99.40%. w/w) and improved lipid solubility (0.79–1.97 mg/mL). FTIR, NMR, DSC and XRPD data confirmed the formation of phospholipid complex. Unlike the free catechin, catechin complex showed a sustained release over the 24 h of study. Catechin-phospholipid complex showed slightly better antioxidant activity than that of catechin at all dose levels. Thus it can be concluded that the phospholipid complex of catechin may be of potential use for improving absorption of catechin across the lipidic biological barriers in gastrointestinal tract. It was concluded that the complexation with phospholipids did not interfere with the biological activities. This herbal drug delivery system can pave the way for large molecules to pass through the lipophilic biological membrane (by the virtue of their amphiphilic nature) and get absorbed into the systemic circulation.

**Singh D, Rawat MS, Semalty A, Semalty M. Quercetin-phospholipid complex: an amorphous pharmaceutical system in herbal drug delivery. Curr. Drug Discov.Technol. 2012; 9(1):17-24. [https://doi.org/10.2174/157016312799304507]**

**Abstract:** Development of amphiphilic drug-lipid complexes is a potential approach for improving therapeutic efficacy of the drugs by increasing solubility, release profile and oral bioavailability. Quercetin (3, 3', 4', 5, 7-pentahydroxyflavone), a polyphenolic flavonoid, shows several biological effects like anti-inflammatory, anti-cancer, antiproliferative, antimutagenic and apoptosis induction but its use is limited due to its low aqueous solubility. To overcome this limitation, a value added phospholipid complex of quercetin was developed to improve its aqueous solubility for better absorption through the gastrointestinal tract and this might result in improved bioavailability. The quercetin-phospholipid complex thus prepared was evaluated for various physico-chemical parameters like infra red spectroscopy (FT-IR), differential scanning calorimetry (DSC), X-ray powder diffractometry (XRPD), scanning electron microscopy (SEM) and solubility study. The In vitro antioxidant activity was also studied. The phospholipid complex of quercetin was found to be fluffy and porous with rough surface in SEM. FTIR, DSC and XRPD data confirmed the formation of phospholipid complex. The water solubility of quercetin was improved by 12 folds (from 3.44 μg/ ml to 36.81 μg/ ml) in the prepared complex. There was no statistical difference between the quercetin complex and quercetin in the In vitro anti-oxidant activity, indicating that the process of complexation did not adversely affect the bioactivity of the active ingredient.

**Singh D, Rawat MS, Semalty A, Semalty M. Rutin-phospholipid complex: an innovative technique in novel drug delivery system-NDDS. Current Drug Delivery. 2012 May; 9 (3): 305.**

**Abstract:** Biopharmaceutical properties together with potency contribute critically towards clinical efficacy of the drugs by influencing the dissolution and bioavailability. The aim of this study was to develop an amphiphilic phyto-phospholipid complex in order to enhance the delivery of poorly soluble rutin. The rutin-phospholipid complex (Ru-PLc) was prepared and investigated for various physico-chemical parameters like drug loading, infrared absorption (FTIR), differential scanning calorimetry (DSC), X-ray powder diffractometry (XRPD), scanning electron microscopy (SEM), aqueous/ n-octanol solubility and dissolution study. The in vitro anti-oxidant activity was also studied. In the SEM, Ru-PLc was found fluffy and porous with rough surface morphology. FTIR, DSC and XRPD data confirmed the formation of phospholipid complex. The water/ noctanol solubility of rutin was improved from 2.88 to 45.71 μg/ ml and 68.17 to 245.18 μg/ ml, respectively in the complex. The improved dissolution was shown by the phospholipid complex at different pH buffers. The antioxidant activity indicated that, the bioactivity of rutin was maintained even after being complexed with the phospholipid. Based on the results, it can be concluded that the phospholipid complex may be considered as a promising drug delivery system for improving the overall absorption and bioavailability of the rutin molecule.

**Semalty A, Semalty M, Panda VS, Ashar KH. Herbal Drugs in Chronic Fatigue Syndrome: An Overview. Schweiz Z Ganzheitsmed. 2012; 24:155-68. [https://doi.org/10.1159/000339011]**

**Abstract:** Chronic fatigue syndrome (CFS) is a debilitating and complex disorder characterized by profound fatigue of 6 months or longer duration that is not improved by bed rest and that may be worsened by physical or mental activity. It is often age-related and may coexist with other diseases such as multiple sclerosis, Parkinson’s disease, depression, cancer, HIV infection etc. Persons with CFS most often function at a substantially lower level of activity than they were capable of before the onset of illness. Modern medicine has limited therapies and those offered by it have strong side-effects. On the other hand, various traditional systems of medicine such as the Chinese herbal system and Ayurveda offer several botanicals, especially the adaptogens, which have been used to combat chronic fatigue effectively. Literature reports a plethora of animal and clinical studies on the safety and efficacy of these plant drugs. The present article extensively reviews CFS, its pathophysiology, and its pharmacological treatment, with a special emphasis on herbal drugs such as Cat’s claw, Ginseng, caterpillar fungus, ashwagandha, Tulsi, jiaogulan etc. The botanical therapies discussed here are very commonly used drugs with profound data available on them.

**Singh D, Rawat MS, Semalty A, Semalty M. Emodin–phospholipid complex. J Therm. Anal. Calorim. 2012; 108:289-298. [https://doi.org/10.1007/s10973-011-1759-3]**

**Abstract:** Developing the drugs as amphiphilic lipid complexes is a potential approach for improving therapeutic efficacy of the drugs by increasing solubility, reducing drug crystallinity, modifying dissolution behavior (sustained or controlled release), and improving bioavailability. Emodin (1,3,8-trihydroxy-6-methylanthraquinone), an anthranoid derivative, shows several biological effects like antimicrobial, antidiuretic, anti-cancerous, and potent antioxidant but due to poor solubility, the dissolution restrains its valuable importance. To overcome this limitation, the emodin– phospholipid complex was developed and investigated by thermal analysis (differential scanning calorimetry), crystallographic (X-ray diffractography), surface morphology (scanning electron microscopy), spectroscopic methods (FT-IR, 1 H-NMR), solubility, and the dissolution (in vitro drug release) study. The phospholipid complex of emodin was found, fluffy and porous with rough surface morphology in the SEM. FT-IR, 1 H-NMR, DSC, and X-RPD data confirmed the formation of the complex. The water and noctanol solubility of emodin was improved from 2.25 to 9.97 and 53.45 to 77.62 lg/ml, respectively, in the prepared complex. The improved dissolution was shown by the phospholipid complex. Based on the results of the study, it can be concluded that the phospholipid complex may be considered as promising drug delivery system for improving the overall absorption and bioavailability of the emodin molecule.

**Semalty M, Semalty A, Bisht T. Triple layered Aceclofenac tablets of Xanthan gum and guargum: A comparative study. International J Pharm Sci Nanotechnol 2012; 5(1): 1621-1626. [DOI:**[**10.37285/ijpsn.2012.5.1.5**](https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.37285%2Fijpsn.2012.5.1.5?_sg%5B0%5D=9Pw-W2wpio4Lrw9tXUXLcxGUu_NfhEIrSZ6ZY8-MuK6bUyLYeSL18_zrYFbgw5fjU1QW70b9_mFjsISZH37FtgStMA.lCdfjrzXpWDaVrgHta_MbTZRsBiEpNCiqkk4GUEYE-HorR0l8X4nfvz6v7xWkY7IV4wJdNx0K9Svlv_MbuY-jA)**]**

**Abstract:** The aim of the present study was to develop sustained release, multilayered-matrix tablet of aceclofenac using natural polymers-guar gum (GG) and xanthan gum (XG) as carrier for core matrix and hydroxyl propylmethyl cellulose (HPMC K-15M), sodium carboxymethylcellulose (NaCMC) and ethyl cellulose (EC) and polyvinylpyrrolidone (PVP-K30) for preparing bottom and top layers. The formulated tablets were evaluated for uniformity of weight, drug content, friability, hardness, thickness, swelling index and in vitro drug release. The physicochemical properties of tablets were found within the limits. The physiochemical investigation showed that aceclofenac matrix tablet prepared with xanthan gum showed better dissolution profile as compared to that of guar gum. Matrix tablets of xanthan gum with 6% W / V xanthan gum (MTX1) showed the highest percent drug release (88.98%), while matrix tablets of guar gum with 6% W / V guar gum (MTG1) showed the highest percent drug release (73.89%) at the end of 8 hours in pH 6.8 phosphate buffer. Among the matrix tablet of xanthan gum MTX4 (with 24% W / V of xanthan) showed the lowest percent drug release (49.6%) and while among the guar gum tablets MTG4 (with 24% W / V of guar gum) showed the lowest percent drug release (48.65%) at the end of 8 hours. It was concluded that increasing the concentration of gum from 6% W / V to 24% W / V in the formulation decreased the amount of drug release from the tablet. The xanthan gum based matrix tablets of aceclofenac were found to be superior to that of guar gum matrix tablets for potential therapeutic uses.

**D. S. Rawat, B K Thakur, M Semalty, A Semalty, MSM Rawat,** **Silymarin-phospholipid complexes: A drug delivery system in NDDS, *Universities Journal of Phytochemistry and Ayurvedic Hights*. (UJPAH), 2012, 1 (12), 4-13. ISSN: 0973-3507**

**Abstract:** The fruit of the milk thistle plant (S. marianum) contain flavonoid known for hepatoprotective effect. Silymarin is strong hepatoprotective bioactive and has been shown to have positive effects in treating liver diseases of various kinds hepatitis, cirrhosis, fatty infiltration of the liver (chemical and alcohol induced) and inflammation of the bile duct. The poor water solubility of the silymarin led to the formation of more soluble complex with the phospholipid which might improve solubility, dissolution, and bioavailability of the active constituents. Silymarin (as a drug) phospholipid solid system was prepared by chemical refluxing method. The solid-state study of the complex was done. The formation of the complex with phospholipid in the solid state was confirmed by infrared spectroscopy, differential scanning calorimetry, X-ray diffractometry, and scanning electron microscopy (SEM).

**Semalty Mona, Semalty Ajay, Badola Ashutosh, Joshi Geeta Pant, Rawat M.S.M., A comprehensive review on phytochemistry and pharmacological effects of Stinging Nettle *(Urtica dioica)*, Pharmacognosy Reviews, 2012, 7. Impact Factor: 2.882**

**Abstract:** Urtica dioica (stinging nettle), a member of the Urticaceae family, has been used in various traditional systems of medicines since ancient times especially for joint pain, arthritis and prostate problems. Its leaves and roots contain a variety of biologically active compounds such as fatty acids, terpenes, phenylpropanes, lignans, coumarins, triterpenes, ceramides, sterols and lectins. The leaves and root extract shows various activities like hypoglycemic, anti-inflammatory, antiproliferative, antioxidant, hypolipemic, antirheumatic, anticarcinogenic and antiviral activity. It shows its effects through the inhibition of aromatase, 5 α-reductase, Cell proliferation and Na+, K+-ATPase inhibition. The article reviews the phytochemistry and phytopharmacology of the plant.

**N. Sati, S. Kumar, MSM Rawat; Rational design, synthesis, SAR study of N-napthalen-1-yl-2-[4- (substituted phenyl)-piperazin-1-yl]acetamides as atypical antipsychotic agents, Indian Journal of Chemistry 2012, 51B, 318-322.**

**Abstract:** Design and synthesis of various N-napthalen-1-yl-2-[4-(substituted phenyl)-piperazin-1-yl] acetamides have been carried out on the basis of the structural information available for dopamine D3 and serotonin receptor and screened for antagonist activity at the target receptors and atypical antipsychotic profile. The series synthesized afford compounds having varying degree of affinity for target receptors. N–napthalene-1-yl-2[4-(2-methoxyphenyl)-piperazin-1-yl]-acetamide 1e is found to be most potent atypical antipsychotic compound synthesized.

**Sushil Chandra Sati, Nitin Sati, Vivek Ahluwalia, Suresh Walia and O. P. Sati; Chemical composition and antifungal activity of essential oil extracted from Artemisia nilagirica growing in hilly areas of India, Natural Product Research 21 Feb. 2012.**

**Abstract:** Essential oil extracted from aerial parts of Artemisia nilagirica was analyzed by gas chromatography mass spectroscopy. Forty three constituents amounting to 98.16% of the total essential oil content were identified. The essential oil contained approximately 79.91% monoterpenoids and 18.25% sesquiterpenoids. Alpha thujone (36.5%) and beta thujone (9.37%), germacrene D (6.32%), 4- terpineol (6.31%), beta caryophyllene (5.43%), camphene (5.47%) and borneol (4.12) were identified as the major constituents. The essential oil exhibited significant antifungal activity against Rhizoctonia solani (ED50, 85.75mg/L), Sclerotium rolfsii (ED50, 87.63 mg/L) and Macrophomina phaseolina (ED50 93.23mg/L). This study indicated that A. nilagrica essential oil can be used to control phytopathogenic fungi infesting agricultural crops and commodities.

DEVELOPMENT AND EVALUATION OF MICROCAPSULES OF VERAPAMIL

HYDROCHLORIDE

Semalty M. \*, Verma D. and Semalty A

DEVELOPMENT AND EVALUATION OF MICROCAPSULES OF VERAPAMIL

HYDROCHLORIDE

Semalty M. \*, Verma D. and Semalty A

**Mona Semalty, Deepika Verma, Ajay Semalty, Development and evaluation of microcapsules of Verapamil hydrochloride, Indian Drugs, 2011, 48(8), 33-38. ISSN: 0019-462X.**

**Abstract:** The objective of this study was to design sustained release microcapsules of verapamil hydrochloride using three different polymers, ethyl cellulose (EC), cellulose acetate phthalate (CAP) and eudragit L 100-55 by solvent evaporation method. The polymer was used alone and in combination with different ratios. Microcapsules of different polymers were evaluated for physical properties like drug content, particle size, bulk density and angle of repose. The size range of various microcapsules was 228 to 608 mcm. The drug content of microcapsules was between 74.49 to 91.50 % depending on the polymer and it's ratio. Average bulk density values were found to be less than 1.2 g/mL which indicates good flow properties. Angle of repose was found to be less than 40o , which shows free flowing properties. From the SEM studies it was observed that the microcapsule of all three polymer combinations was having very smooth surface, round shape and was nonporous, however EC and CAP containing microcapsules showed rough and porous surface. From the drug release studies it was observed that microcapsules prepared by the Eudragit L 100-55 combination with other polymer gave better sustained release as compared to the other. It was concluded that formulation F3 (prepared with drug, EC and CAP in 1:2:1 ratio) showed the highest percent drug content, good flow properties, good surface morphology and promising drug release.

**Somesh Thapliyal, N.Mahadevan, and Nanjan MJ, Analysis of Picroside I and Kutkoside in Picrorhiza Kurroa and its Formulation by HPTLC, International Journal of Research in Pharmaceutical and Biomedical Sciences (2012); Vol 3(1), 25-30.**

**Abstract:** A HPTLCmethod to determine picroside and kutkoside in Picrorhiza kurroa and its herbal formulation was developed. The chromatographic separation was performed on silica gel GF 254 precoated HPTLC plates. Ethyl acetate: methanol: glacial acetic acid (8:1:0.2) was used as mobile phase. RF value of picroside and kutkoside were 0.17 and 0.40 respectively. Calibration plots of peaks area against concentration were linear in the range of 60ng to 600ng. The limit of quantification was 100ng and limit of detection was 30ng. The amount of picroside content in Picrorhiza kurroa and its formulations were found to contain 7.27%, 6.83% and 7.03% respectively. The amount of kutkoside in plant extract and its formulation were found to be 3.22%, 3.17%, and 2.9% respectively. The developed HPTLC method is accurate, precise, simple, rapid and selective.

**2011**

**Semalty A, Semalty M, Joshi GP, Rawat MS. Techniques for the discovery and evaluation of drugs against alopecia. Expert Opin. Drug Discov. 2011; 6(3):309-321. [https://doi.org/ 10.1517/17460441.2011.553831]**

**Abstract: Introduction:**Hair care, color and style play an important role in physical appearance and self-perception. Hair loss or alopecia is a common dermatological and affective disorder. Factors contributing to alopecia include genetic predisposition, hormonal factors, disease status, side effects of chemotherapeutic agents and stress. To keep pace with the demand for drugs for alopecia, attempts are being made to explore drugs with hair-growth-promotion activity. To explore and evaluate these, it is necessary to be familiar with the basics and the availability and suitability of techniques and experimental models of hair growth activity assessment. **Areas covered:**Basic and advanced techniques and models for assessing hair growth activity. A variety of pharmacological models of hair growth are reviewed. This review will help in selecting a suitable, relevant, inexpensive, easy and reliable model for hair growth assessment. **Expert opinion:**There is a need to identify the genes involved in hair follicle growth for the production of more effective animal models of the disorder. Standardization of pharmacological models will also be essential for better comparison and validation of results. Recently developed hair follicle organ culture models are a suitable, relevant and inexpensive alternative to traditional whole-animal pharmacological models and will, largely, replace whole-animal systems in the future.

**Semalty M, Semalty A, Joshi GP, Rawat MS. Hair growth and rejuvenation: an overview. JDermatolog. Treat. 2011;22(3):123-132. [https://doi.org/10.3109/09546630903578574]**

**Abstract:** Hair has psychological and sociological importance throughout the ages in framing the personality and general appearance of an individual. Significant progress is being made on discovering an effective and safe drug for hair growth. Angiogenesis, androgen antagonism, vasodilation, potassium channel opening and 5-alpha reductase inhibition are the major non-surgical therapeutic strategies of hair growth promotion. In spite of a flood of drugs claiming to be useful as hair growth promoters, more rational strategies, which can target the problem areas or stages of the hair growth cycle effectively, are still awaited. This article highlights the developments in hair rejuvenation strategies and reviews the potential of herbal drugs as safer and effective alternatives.

**Somesh Thapliyal, N.Mahadevan , M.J.Nanjan,Analysis of Wedelolactone in Eclipta alba and its herbal formulation by HPTLC, Journal of Global Trends in Pharmaceutical Sciences, (2011); Vol 2, Issue 4, 450-457.**

**Abstract:** A HPTLC method to determine wedelolactone in Eclipta alba and its herbal formulation was developed. The chromatographic separation was performed on silica gel GF 254 precoated HPTLC plates. Ethyl acetate: methanol: water: glacial acetic acid (9: 0.5: 0.5: 0.2) was used as mobile phase. RF value of wedelolactone was 0.72. Calibration plots of peaks area against concentration were linear in the range of 1 µg to 5 µg. The limit of quantification was 0.9µg and limit of detection was 0.3µg. The amount of wedelolactone content in Eclipta alba and its formulation was found to contain 0.173%. And 0.131% respectively. The developed HPTLC method is accurate, precise, simple, rapid and selective.

**Bhawana Sati1, Somesh Thapliyal , Hemlata Sati , Sarla Saklani, Pramod Kumar, Prakash Chandra Bhatt, Preliminary Phytochemical, Physicochemical and Antimicrobial Studies of *Inula cuspidata* leaves, Journal of Global Trends in Pharmaceutical Sciences, (2011); Vol 2, Issue 3, 290-295.**

**Abstract:** *Inula cuspidata* (Asteraceae) is used for the treatment of respiratory, gastrointestinal and urinary disorder. Methanolic extract of leaves was prepared by soxhlet extraction. Preliminary phytochemical screening was performed for qualitative identification of phytoconstituents. Physicochemical parameters such as ash value, extractive value and fluorescence analysis were performed to standardize the plant material. The extract was evaluated for antibacterial activity against S. aureus, B.subtilis, E. coli, P.aeruginosa and antifungal activity against C. albicans by cup plate method. The extract showed significant antimicrobial activity against all test strains when compared with standard drugs amoxycillin and fluconazole.

**Somesh Thapliyal, Kapil Kumar Goel, Nidhi Goel, Antiinflammatory activity of *Inula cuspidata* leaf extract, Asian Journal of Chemistry (2011); Vol 23, No. 2, 943-944.**

**Abstract:** *Inula cuspidata*  leaf powder was extracted with petroleum ether, chloroform, acetone, methanol and water using soxhlet apparatus. All the extracts were screened for the anti-inflammatory activity by measuring the reduction in carrageenan induced hind paw edema. The potency of each extract was compared with each other and standard drug diclofenac sodium (5mg/kg) for anti-inflammatory activity. The maximum anti-inflammatory activity was observed in water extract followed by ether, acetone extract, methanolic extract and chloroform extract.

**Vinod Nautiyal, Ashwani Kumar Somesh Thapliyal, and Kapil Kumar Goel, Antiinflammatory activity of aqueous bark extract of *Butea monosperma* (Lam.) Taub, Asian Journal of Chemistry (2011);Vol.23,No.9, 4219-4220.**

**Abstract:** *Butea monosperma* is used in the traditional system of medicine for treating inflammation, tumors, diabetes, anticonvulsant, antidiarhoeal,etc. Present study emphasizes its efficacy against inflammation. The bark was collected from its natural habitat care was taken to select healthy plant for normal bark. Aqueous bark extract of *Butea monosperma* was tested to study the effect on the inflammation using the technique of carrageenan induced paw edema in the albino rats. It is concluded that the aqueous extract showed significant anti-inflammatory activity compare to the reference standard indomethacin. It was found that the aqueous bark extract (200 mg/kg) showed significant activity as compared to dose of 100 mg/kg aqueous bark extract.

**Nitin Sati, Sushil Kumar and Sushil Sati; Synthesis and Pharmacological Evaluation of 7-{2-[4-(Substitutedphenyl)-piperazin-1-yl]-2-Oxo-Ethoxy}-4-Methyl-Chromen-2-Ones as Seroto-nin 5-HT2 Receptors Antagonist, International Journal of Drug Design and Discovery, 2011, 2(1), 419-24.**

**Abstract:** Substituted phenyl piperazines were treated with chloroacetyl chloride to give respective 2-chloro-1-[4(substituted phenyl)-piperazine-1-yl]ethanones, which were subsequently coupled to 7-hydroxy-4-methyl-chromen-2-one to afford target compounds. The novel compounds were evaluated for antagonism at serotonin 5HT2 receptor. Some of the synthesized compounds showed high antagonistic activity at the target receptor. The binding affinity to these receptors depended greatly on the nature and position of substitution in phenyl ring.

**Sushil Chandra Sati, Nitin Sati, and O. P. Sati.; Analysis and Antimicrobial Activity of Volatile Constituents of Quercus leucotrichophora (Fagaceae) Bark, Natural Product Research, 2011.**

**Abstract:** The chemical composition of the volatile extract (yield 0.13%) from the bark of Quercus leucotrichophora (Fagaceae) was analyzed for the first time by GC-MS. Twenty three constituents, amounting to 93.0% of the total detected contents of the volatile extract were identified. The volatile extract contained approximately 86.36% monoterpenoids, 6.53% sesquiterpenoids and 0.11% aliphatic aldehydes. 1,8-cineole (40.359%) followed by gamma terpine (16.369%) were the major monoterpene constituents of the volatile extract. The residue of volatile extract exhibited a potent antimicrobial activity against Streptococcus pyogenes ATCC 19615. This study concludes that residues of the volatile extract of Q. leucotrichophora could serve as an important bioresource for the extraction and isolation of monoterpenoids exhibiting antimicrobial activity, and thus has good potential for use in pharmaceutical industry.

**Sushil Chandra Sati, Nitin Sati; Bio-active constituents and medicinal importance of genus Alnus, Pharmacognosy Reviews, 2011, 5, 10, 174.**

**Abstract:** The genus Alnus has been reviewed for its chemical constituents and biological activities including traditional importance of some common species. The plants of this genus contain terpenoids, flavonoids, diarylheptanoids, phenols, steroids and tannins. Diarylheptanoids are the dominant constituents within the genus Alnus, few of them exhibited antioxidant effects and inhibitory activity against nuclear factor kappa B activation, nitric oxide and tumour necrosis factor alpha production, human umbilical vein endothelial cells, farnesyl protein transferase, cell mediated low density lipoprotein oxidation and the HIV 1 induced cytopathic effects in MT-4 cells. Some ellagitannines showed hepatoprotective activity even in a dose of 1 mg/kg which is ten-fold smaller compared with the dose of traditional flavonoid based drugs. The members of genus Alnus were well known for their traditional uses in the treatment of various diseases like cancer, hepatitis, inflammation of uterus, uterine cancer, rheumatism, dysentery, stomach ache, diarrhea, fever, etc. The aim of the present review is to summarize the various researches related to chemistry and pharmacology of the genus Alnus.

**Sushil Kumar, Punit Kumar and Nitin Sati; Synthesis and biological evaluation of Schiff bases and azetidinones of 1-napthol, Journal of pharmacy and Bioallied sciences, 2011, 4(2), 121-124.**

**Abstract:** Schiff bases and azetidinones form an important structural class possessing wide spectrum of biological activities that include antibacterial and antifungal activity. A series of Schiff bases N’-(Substituted benylidene)-2-(napthalen-1-yloxy) acetohydrazides (3a-3f) and azetidinones N-3[3-chloro-2-oxo-4-(substitutedphenyl)-azetidin-1-yl]-2-(napthalen-1-yloxy) acetamides (4a-4b) were synthesized and tested for antimicrobial activity. Material and Methods: The chemical structures of synthesized compounds were elucidated on the basis of IR and H NMR spectroscopy. The synthesized compounds were screened for antibacterial activity against E. coli (ESS 2231) and B. subtilis (MTCC 441). The compounds were also tested for antifungal activity against A. niger (NCIM 618) and C.albicans (NCIM 3557) by the cup diffusion method. Results and Discussion: The in vitro antimicrobial activity results showed that the acetamides (4a-b) exhibited better antibacterial activity than the synthesized (3a-3f). Compound 4b displayed potent antibacterial activity against B. subtilis and E.coli (MIC values of 16-54 microgram/ml). The antifungal activity of the synthesized compounds was moderate to low and antifungal activity was relatively weak. Therefore, a further study with this class of compounds is necessary to elucidate the mechanism and structure activity relationship.

**2010**

**Kumar P, Semalty A, Mir SR, Ali M, Amin S. Hypoglycemic and hypolipidemic activity of Pongamia pinnata (Linn.) Pierre in streptozotocin-induced diabetic rats. Int. J Pharmacol. 2010;6(5):738-743. [http://dx.doi.org/10.3923/ijp.2010.738.743]**

**Abstract:** The plant *Pongamia pinnata* (Linn.) Pierre of family Leguminosae sub-family Papilioanaceae was evaluated for its hypoglycemic and hypolipidemic activity in streptozotocin induced diabetic rats. A new difuranoflavonone Compound PP (named Pongamiaflavonol), isolated from methanlolic extract of *P. pinnata* pods by column chromatography, was also studied for the activity. It was observed that after 14 days of treatment blood glucose level was reduced by 66.34, 54.82, 63.62 and 67.48% with Std. Glibenclamiade 3 mg kg-1, *P. pinnata* pods (300 mg kg-1), *P. pinnata* flowers (300 mg kg-1) and PP (100 mg kg-1), respectively. The lipid profile was also studied and was found to be normalized significantly by both the flowers and pods extracts of *P. pinnata* and compound PP.

**A. Semalty, Mona Semalty, B. S. Rawat, D. Singh, M. S. M. Rawat, Development and evaluation of pharmacosomes of aceclofenac, Indian J. Pharm. Sci., 2010, 72, 5, 576-81. ISSN: 0250-474X *DOI:10.4103/0250-474X.78522*. Impact factor 0.626.**

**Abstract:** Pharmacosomes are amphiphilic lipid vesicular systems containing phospholipid complexes with a potential to improve bioavailability of poorly water soluble as well as poorly lipophilic drugs. To improve the water solubility, bioavailability and minimize the gastrointestinal toxicity of aceclofenac, its pharmacosomes were prepared. Aceclofenac was complexed with phosphatidylcholine (80%) in two different ratios (1:1 and 2:1) using conventional solvent evaporation technique. Pharmacosomes thus prepared were subjected to solubility and drug content evaluation, scanning electron microscopy, differential scanning calorimetry, X ray powder diffraction and in vitro dissolution study. Pharmacosomes of aceclofenac were found to be disc shaped with rough surface in scanning electron microscopy. Drug content was found to be 91.88% (w/w) for aceclofenac phospholipid complex (1:1) and 89.03% (w/w) aceclofenac-phospholipid complex (2:1). Differential scanning calorimetric thermograms and X ray powder diffraction datas confirmed the formation of phospholipid complex. Solubility and dissolution profile of the prepared complex was found to be much better than aceclofenac.

**A. Semalty, Mona Semalty, Ujjwal Nautiyal, Formulation and evaluation of mucoadhesive buccal films of enalapril maleate, Indian J. Pharm. Sci., 2010, 72, 571-575. ISSN: 0250-474X: *DOI:10.4103/0250-474X.78523. Impact factor* 0.626.**

**Abstract:** Enalapril maleate is used in the treatment of hypertension and angina pectoris. It shows low bioavailability due to high hepatic first pass metabolism. Hence the present work was undertaken to formulate mucoadhesive buccal films of enalapril maleate with an objective to improve therapeutic efficacy, patient compliance and the bioavailability. In the present study ten formulations of mucoadhesive drug delivery system of enalapril maleate were prepared as buccal films, by solvent casting technique. Sodium carboxymethylcellulose, hydroxylpropyl-methylcellulose, hydroxyethylcellulose and polyvinyl pyrrolidone K-90 were used as mucoadhesive polymers. Prepared films were evaluated for their weight, thickness, surface pH, swelling index, drug content uniformity, in vitro residence time, folding endurance in vitro release and permeation studies. Films exhibited controlled release over more than 10 h in permeation studies. It was concluded that the films containing 20 mg of enalapril maleate in sodium carboxymethylcellulose 2% w/v and hydroxyethyl cellulose 2% w/v (formulation F5), showed good swelling, a convenient residence time and promising controlled drug release, thus can be selected for the development of buccal film for effective therapeutic uses.

**Mona Semalty, A. Semalty, Geeta P. Joshi, M.S.M. Rawat, Development and *in vivo* studies of herbal hair oil forhair growth promotion, Indian Drugs, 2010, 47(7),28-32. ISSN: 0019-462x.**

**Abstract:** Alopecia or baldness is a very common dermatological disorder. In the present study a herbal hair oil for hair growth promotion was formulated and evaluated for its hair growth potential. The olive oil based herbal hair oil was prepared from the seeds of Trigonella foenum-graecum treated with Aloe vera gel (prepared with fresh Aloe vera leaves). The prepared oil was subjected to characterization for various physicochemical parameters like acid value, iodine value, saponification value, peroxide value, refractive index, specific gravity, odour and taste. All these values conformed to compendia requirements. Hair growth activity of the developed oil was studied in comparison of 2 % minoxidil solution (standard) in albino rats for 30 days. The hair growth initiation time of prepared herbal oil (5 days) was even less than that of standard or minoxidil-treated groups (8 days). The herbal oil also showed the least hair growth completion time (18 days) in comparison of standard (21 days) and control (25 days). With the treatment of herbal oil, the hair length as well as diameter was also considerably increased as compared to control and standard. It was concluded that the prepared olive oil based herbal hair oil of Trigonella has potential components to stimulate hair growth even in short term treatment.

**Semalty Mona, Semalty Ajay, Badola Ashutosh, Joshi Geeta Pant, Rawat M.S.M., *Semecarpus anacardium* Linn.: A Review, Pharmacognosy Reviews, 2010, 4(7), 88-94. ISSN: *0973-7847;* DOI: 10.4103/0973-7847.65328; IF: 2.882.**

**Abstract:** Semecarpus anacardium Linn. (Family: Anacardiaceae), commonly known ‘Ballataka’ or ‘Bhilwa’, has been used in various traditional system of medicines for various ailments since ancient times. Its nuts contain a variety of biologically active compounds such as bifl avonoids, phenolic compounds, bhilawanols, minerals, vitamins, and amino acids, which show various medicinal properties. The fruit and nut extract shows various activities like antiatherogenic, anti-inflammatory, antioxidant, antimicrobial, anti-reproductive, CNS stimulant, hypoglycaemic, anticarcinogenic and hair growth promoter. The article reviews the various activities of the plant.

**Semalty A, Semalty M, Rawat MS, Franceschi F. Supramolecular phospholipids-polyphenolics interactions: the PHYTOSOME strategy to improve the bioavailability of phytochemicals. Fitoterapia. 2010;81(5):306-314. [https://doi.org/10.1016/j.fitote.2009.11.001]**

**Abstract:** The poor and/or erratic oral bioavailability of polyphenolics can be improved using the PHYTOSOME delivery system, a strategy that enhances the rate and the extent of solubilization into aqueous intestinal fluids and the capacity to cross biomembranes. Phospholipids show affinity for polyphenolics, and form supramolecular adducts having a definite stoichiometry. This article reviews the preparation and characterization of PHYTOSOME complexes and their activity in various medicinal (cardiovascular, anti-inflammatory, hepatoprotective, anticancer) and cosmetic (skin aging) realms of application.

**Semalty A, Semalty M, Singh D, Rawat MS. Preparation and characterization of phospholipid complexes of naringenin for effective drug delivery. JIncl. Phenom Macrocycl Chem. 2010; 67(3-4):253-260. [http://dx.doi.org/10.1007%2Fs10847-009-9705-8]**

**Abstract:** Naringenin is a flavonoid specific to citrus fruits and possesses anti-inflammatory, anticarcinogenic, and antitumour effects. But due to a lower half-life and rapid clearance from the body, frequent administration of the molecule is required. To improve the bioavailability and prolong its duration in body system, its phospholipid complexes were prepared by a simple and reproducible method. Naringenin was complexed with phosphatidylcholine in equimolar ratio, in presence of dichloromethane. The prepared Phytosomes (naringenin–phospholipid complex) were evaluated for various physical parameters like FT-IR spectroscopy, Differential Scanning Calorimetry (DSC), X-ray powder diffractometry (XRPD), Solubility, Scanning Electron Microscopy (SEM) and the in vitro drug release study. These phospholipid complexes of naringenin were found to be irregular and disc shaped with rough surface in SEM. Drug content was found to be 91.7% (w/w). FTIR, 1H NMR, DSC and XRPD data confirmed the formation of phospholipid complex. Water solubility of naringenin improved from 43.83 to 79.31 μg/mL in the prepared complex. Unlike the free naringenin (which showed a total of only 27% drug release at the end of 10 h), naringenin complex showed 99.80% release at the end of 10 h of dissolution study. Thus it can be concluded that the phospholipid complex of naringenin may be of potential use for improving bioavailability.

**Semalty M, Yadav S, Semalty A. Preparation and characterization of gastroretentive floating microspheres of ofloxacin hydrochloride. Int. J Pharmaceutical Sci. Nanotechnol. 2010; 3(1): 819-823. [DOI:**[**10.37285/ijpsn.2010.3.1.4**](https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.37285%2Fijpsn.2010.3.1.4?_sg%5B0%5D=B0Wxr7ZNpw3jzC5DkuEA6xY-fcr_p9m81VU8NE1-m6DE224tvr6AtBXdjm1Xc3rD53xj6vFjNw2toL4f333x-vsMmQ.Vgmal0gotdbnrHNEFcqeDSjPvYo7LltSarGjli4e5y8_FJxP0j205v9liekE2XG_XuRtA99nK5kE3_5suS4wsg)**]**

**Abstract:** As Ofloxacin is preferably absorbed from the upper part of the gastrointestinal tract and is readily soluble in the acidic environment of the stomach, the floating microspheres of ofloxacin were formulated to develop gastroretentive formulation. These floating microspheres release the drug in the stomach and upper gastrointestinal tract and thereby improve the bioavailability. In the present study, six formulations of ofloxacin hydrochloride were prepared as floating microspheres by solvent diffusion technique using polymers such as ethyl cellulose, polyvinyl pyrrolidone K-90 and poly vinyl alcohol in different ratios. The prepared microspheres were evaluated for different physicochemical tests such as particle size, percent drug entrapment, drug content uniformity, SEM, buoyancy test, and in vitro drug release studies. The results of all the physicochemical tests of all formulations were found to be satisfactory. In vitro floatability studies revealed that most of the microspheres (52.5% to 95.5%) were floatable. The in vitro drug release was found to be in the range of 39.64 to 93.64 % at the end of 6 hours. It is concluded that these floating microspheres can be selected for the development of gastroretentive drug delivery system of ofloxacin hydrochloride for potential therapeutic uses.

**Semalty A, Semalty M, Singh D, Rawat MS. Development and characterization of aspirin-phospholipid complex for improved drug delivery. Int. J Pharm. Sci. Nanotechnol. 2010; 3(2): 940-947.[DOI:**[**10.37285/ijpsn.2010.3.2.7**](https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.37285%2Fijpsn.2010.3.2.7?_sg%5B0%5D=dh2MWP41s0ZXdG9EdRNKxIy302YgdZEWUtfg3AFbTfiCHFmCuQ-aW8n7NZma_3x-ScTEgGJGXDLGkZtZRosk4C0-NA.2q1eHl6rEw2ckrDxowPrnQWqdyprRxq35F2RP7jA6f7c9Pjdm6Yotbi5zag4B9oEK8fdTVlAJSh7V_Fta_HWqw)**]**

**Abstract:** Aspirin (acetylsalicylic acid) is one of the most widely used analgesic. Aspirin is poorly soluble in water and causes gastrointestinal (GI) irritation. To improve the solubility (and hence the bioavailability) and minimize the GI irritation, its complexes with soya-phospholipid-80 % (in 1: 1 molar ratio) were prepared in an organic solvent and evaluated for solubility, drug content, scanning electron microscopy (SEM), FT-IR spectra, X ray diffraction, differential scanning calorimetry (DSC) and in vitro dissolution study. Aspirin-phospholipid complex were found to be disc shaped with rough surface in SEM. Drug content in the complex was found to be 95.6 %. DSC thermograms, XRD and FTIR confirmed the formation of phospholipid complex. Solubility of the prepared complex was found to be improved. Aspirin complex and aspirin showed 90.93 % and 69.42 % of drug release at the end of 10 h in dissolution study in pH 1.2 acid buffer. It was concluded that the phospholipid complex of aspirin may be of potential use for improving the solubility of aspirin and hence its bioavailability. The complexes may also reduce GI toxicity of the drug.

**Semalty Mona, Semalty Ajay, Rawat Balwant Singh, Singh Devendra, Joshi Geeta Pant, Rawat M.S.M., *In-vitro* antioxidant activity of roots of *Urtica dioica* (Nettle), Indian Drugs, 2010, 47(5), 55-58. ISSN 0019-462X**

**Abstract:** Successive methanolic and direct ethanolic extracts of Urtica dioica (Urticaceae) roots were prepared and investigated for their potential of antioxidant activity against DPPH (2, 2-diphenyl-1-picrylhydrazyl) free radicals and compared with butylated hydroxyanisol and silymarin. At the concentration of 500 mcg/mL, the root extract of Urtica showed free radical scavenging activity of 46.71% and 45.03 % for successive methanolic and direct ethanolic extract respectively. As there was no significant difference in the free radical scavenging activity of successive methanolic and direct ethanolic extract, it was concluded that only methanolic fraction or the polar chemical constituents were responsible for the antioxidant activity of Urtica. The antioxidant activity of the extracts increased with the increasing concentration.

**Kumar P., Mir S. R., Semalty A., Semalty Mona, Antibacterial and antifungal activity of *Pongamia pinnata,* Indian Drugs, 2010, 47(3), 48-50. ISSN 0019-462X**

**Abstract:** *Pongamia pinnata* (Papilionaceae) is used for bronchitis, whooping cough, scabies, leprosy, piles, ulcers, rheumatic joints and to quench Dipsea in diabetes in Indian traditional system of medicine. Methanolic extracts of pods and flowers of *P.pinnata* were prepared by Soxhlet extraction. The extracts were evaluated for their antibacterial (*S.aureus, E.coli, K. pneumoniae)* and antifungal *(C. albicans)* activity by cup plate method. The flower extract of *P. pinnata* showed higher antibacterial as well as antifungal activity as compared to pod extract. The phytochemical screening was performed for qualitative identification of phytoconstituents.

**A. Semalty, Mona Semalty, R.K. Jain, R.K. Rishi, Hepatitis-B vaccination: Current status of a hilly area of Uttarakhand and strategies for improvement, The Pharma Review, 2010, March, 160-65. ISSN *0973-399X***

**Abstract:** Hepatitis B is endemic throughout the world, especially in tropical and developing countries. The World Health Organization has recommended universal immunization of hepatitis B (HB) vaccine way back in 1980s. But in India still the debate is going on, to include the Hepatitis B vaccination in Expanded Program of Immunization. In the present study a survey of local population was done to know the awareness and immunization status of Hepatitis B in the local population of Srinagar Garhwal. The number of population (n=650 with age range 18-64 years) selected randomly from the persons coming to two big hospital of the area. It was observed that about 60 % population is not vaccinated against the disease. Moreover, in spite of a good awareness status (56.46 %) only 39.38 % of the local population was found to be vaccinated while 20.77 % (135) persons were not vaccinated (among the aware population only). The article further provides the model strategies to improve the awareness and vaccination status.

**Sati N; Oregonin: An important diarylhepatanoid from the bark of *Alnus nepalensis,* Universities Journal of Phytochemistry and Ayurvedic Heights, 2010, 1(7), Pages: 16-18**

**Abstract:** Presently, there has been an amplified interest worldwide to identity antioxidant compounds which are pharmacologically effective and have low or no side effects for use in preventive medicine and food industry. Plants produce significant amount of antioxidant compounds such as flavonoids, phenolics and polyphenolics to prevent the oxidative stress caused by reactive oxygen species. Ayurveda, Unani, Chinese and other traditional medicinal systems, provide substantial lead to find active and therapeutically useful antioxidant compounds from plants. Considering the growing interest in assessing the antioxidant capacity of natural products the phytochemistry of plants having antioxidant activity has been reported.

**H.Sati, H.Joshi, B.Sati, P.C.Bhatt, S.Saklani, S.Thapliyal, P.Kumar, Evaluation of Analgesic and Anti-Inflammatory activity of *Ervatamia Heyneana* roots, THE INDIAN PHARMACIST (2010); November, 77 -80.**

**Abstract:** The analgesic activity was assessed by using acetic acid induced writhing in mice and tail-flick method using rats. A dose dependent analgesic activity was observed with diethyl ether extract of the roots of *Ervatamia Heyneana.* A significant analgesic activity was observed at a dose of 100, 200 and 400 mg/kg body weight. On the other hand, the anti inflammatory activity was assessed by carrageenan induced paw oedema in rats. A dose dependent anti-inflammatory activity was observed with diethyl ether extract of the roots of *E.heyneana.* A significant anti-inflammatory activity was observed at a dose of 100, 200 and 400 mg/kg body weight.

**Semalty M, Semalty A, Joshi GP, Rawat MS. In vivo hair growth activity of herbal formulations. Int. J Pharmacol. 2010;6(1):53-57. [DOI:**[**10.3923/ijp.2010.53.57**](https://www.researchgate.net/deref/http%3A%2F%2Fdx.doi.org%2F10.3923%2Fijp.2010.53.57?_sg%5B0%5D=G_0B62Lscpteh14RXFUsdpEOiJ_aY16JMCzlZIqt_umVXk2ykAfbpc8kFEI7HTWEJMv4Tw9Eytdb75MkXcInJR9wLw.27adCM_Nvkh1Jhxk_bMO8oDGyqhM61o5IUAO4WQyLOPZgbRnzq7z8j9hWDIsDQaI0KqJokgof-DHYqDKjonQPw)**]**

**Abstract:** The present study deals with the assessment of hair growth potential of three plants, *Semecarpus anacardium*, *Trigonella foenumgraecum* and *Trigonella corniculata*. Petroleum ether and ethanolic extracts of all the plants were prepared. Aloe vera gel (prepared with fresh Aloe vera leaves) based herbal formulations were prepared with both types of extracts of each plant. The formulations were subjected to characterization of pH, texture, odour and toxicity studies. Hair growth activity of the formulations was studied in comparison of 2% minoxidil solution (standard) in albino rats for 30 days. It was concluded that *T. foenumgraecum* showed the best hair growth activity. Formulation containing *T. foenumgraecum* petroleum ether extract showed the minimum time to initiate (5 days) as well as to complete the hair growth (18 days) at denuded surfaces. Formulation with *T. foenumgraecum* ethanolic extract showed the best hair lengthening properties as compared to others. The study concluded that even the short-term treatment with these herbal formulations is effective in significant hair growth promotion.

**2009**

**Semalty A, Semalty M, Rawat BS, Singh D, Rawat MS. Pharmacosomes: the lipid-based new drug delivery system. Expert Opin Drug Deliv. 2009;6(6):599-612. [https://doi.org/10.1517 /17425240902967607]**

**Abstract:** Lipid-based drug delivery systems have been investigated in various studies and shown their potential in controlled and targeted drug delivery. Pharmacosomes are amphiphilic phospholipid complexes of drugs bearing active hydrogen that bind to phospholipids. Pharmacosomes impart better biopharmaceutical properties to the drug, resulting in improved bioavailability. Pharmacosomes have been prepared for various non-steroidal anti-inflammatory drugs, proteins, cardiovascular and antineoplastic drugs. Developing the pharmacosomes of the drugs has been found to improve the absorption and minimize the gastrointestinal toxicity. This article reviews the potential of pharmacosomes as a controlled and targeted drug delivery system and highlights the methods of preparation and characterization.

**Semalty Mona, Semalty A, Joshi Geeta P, Rawat M.S.M., Hair loss: Causes and current strategies for hair growth promotion, Pharma Buzz, 2009, 4, 11, 38-45.**

**Abstract:** Hair is considered to be a major component of an individual’s general appearance. Hair loss creates the psychological impact and results in a measurably detrimental change in self-esteem. Extensive researches are going on explore the effective and safe drug for hair growth. Angiogenesis (through endogeneous substances), Androgen antagonism, potassium channel opening, and 5 alpha reductase inhibition are the major non-surgical therapeutic strategies for hair growth promotion. So far only two drugs minoxidil and finasteride have been approved by USFDA for alopecia. The article focuses on causes and factors affecting hair loss. The developments in hair rejuvenation strategies are discussed along with the potential of herbal drugs for hair growth activity.

**Ajay Semalty, Mona Semalty, Sterile processing: quality assurance and validation, Pharma Buzz, 2009, 4, 6, 54-59. *ISSN 0361-0709***

**Abstract:** To enhance the effectiveness and safety of the drug product after approval, many regulatory agencies such as the United States Food and Drug Administration (FDA) also require that the drug product be tested for its identity, strength, quality, purity, and stability before it can be released for use. For this reason, pharmaceutical validation and process controls are important in spite of the problems that may be encountered. Process controls include raw materials inspection, in-process controls, and targets for final product. The present article deals with all the aspects of validation of sterile production area and the process. The validation is a vital tool for monitoring the quality, safety, and effectiveness of the sterile products.

**Semalty M, Semalty A, Joshi GP, Rawat MS. Comparison of in vitro antioxidant activity of Trigonella foenum-graecum and T. corniculata seeds. Res. J Phytochem. 2009;3(3):63-67. [http://dx.doi.org/10.3923/rjphyto.2009.63.67]**

**Abstract:** Successive methanolic and direct ethanolic extracts of *Trigonella foenum-graecum* and *T. corniculata* seeds were prepared and were investigated for their potential antioxidant activity against DPPH (2,2-diphenyl-1-picrylhydrazyl) free radicals. Seed extracts of *T. corniculata* showed better antioxidant activity than that of *T. foenum-graecum*. Ethanolic extract of *T. corniculata* was the most effective antioxidant among the extracts with 90.24% DPPH radical scavenging activity at 500 µg mL-1. The antioxidant activity of the extracts increased with the increasing amount of the concentration. It was concluded that the seeds of *T. corniculata* had better antioxidant than *T. foenum-graecum*. Moreover the ethanolic extracts showed significantly better activity than the successive methanolic extracts.

**Semalty A, Semalty M, Singh D, Rawat M. Development and physicochemical evaluation of pharmacosomes of diclofenac. Acta Pharmaceutica. 2009; 59(3):335-344. [https://doi.org/ 10.2478/v10007-009-0023-x]**

**Abstract:** Pharmacosomes are amphiphilic lipid vesicular systems that have shown their potential in improving the bioavailability of poorly water soluble as well as poorly lipophilic drugs. Diclofenac is a poorly water soluble drug and also causes gastrointestinal toxicity. To improve the water solublity of diclofenac, its pharmacosomes (phospholipid complex) have been prepared and evaluated for physicochemical analysis. Diclofenac was complexed with phosphatidylcholine (80%) in equimolar ratio, in the presence of dichloromethane, by the conventional solvent evaporation technique. Pharmacosomes thus prepared were evaluated for drug solubility, drug content, surface morphology (by scanning electron microscopy), phase transition behaviour (by differential scanning calorimetry), crystallinity (by X-ray powder diffraction) and in vitro dissolution. Pharmacosomes of diclofenac were found to be irregular or disc shaped with rough surfaces in SEM. Drug content was found to be 96.2 ± 1.1%. DSC thermograms and XRPD data confirmed the formation of the phospholipid complex. Water solubility of the prepared complex was found to be 22.1 μg mL-1 as compared to 10.5 μg mL-1 of diclofenac. This improvement in water solubility in prepared pharmacosomes may result in improved dissolution and lower gastrointestinal toxicity. Pharmacosomes showed 87.8% while the free diclofenac acid showed a total of only 60.4% drug release at the end of 10 h of dissolution study.

**N Sati, S Kumar and MSM Rawat; Synthesis, Structure Activity Relationship Studies and Pharmacological Evaluation of 2-Phenyl-3-(Substituted Phenyl)-3H-Quinazolin-4-Ones as Serotonin 5-HT2 Antagonists, Indian Journal of Pharmaceutical Sciences, 2009, 71(5), Pages: 572-575.**

**Abstract:** Benzoyl chloride was added to the solution of anthranilic acid in pyridine to afford crude 2- phenyl-benzo[d][1,3]oxain-4-one(1). To the solution of compound 1 in dry toluene, various substituted anilines were added and the mixture refluxed for 8h to afford 2-phenyl-3-(substituted phenyl)-3H-quinazolin-4-ones(2a-2f). All the compounds were obtained in solid state in yields varying between 40-70%. Spectral characterization included FTIR, H NMR and ESMS. The synthesized compounds were screened for 5-HT2 antagonist activity. Some of the title compounds have been found to show significant 5HT2 antagonist activity. The compound 2b, 3-(2-chlorophenyl)-2-phenyl-3H-quinazolin-4-one was the most potent derivative in the series of compound synthesized**.**