CRITERIA III

Key Indicator 3.3 - Research Publication and Awards

3.3.1 Number of research papers published per teacher in the Journals notified on UGC CARE list during 2020

Research Publication 2020

PES Modern college of Pharmacy (For Ladies), Moshi, Pune 412105.

RESEARCH PUBLICATION 2020

Year	Sr. No.	Name of Faculty	Title of the Paper	Name of Journal	Year, Vol, Page No, Issue	ISSN No.
2020	1	Ms. M.C. Upadhye, Dr. Ms. R.R. Pujari	Antidiabetic activity of Ficusglomerata roots	Current bioactive compounds	2020, 16(1), 33-41	1875-6646
2020	2	Ms. M.C. Upadhye, Dr. Ms. R.R. Pujari	Pharmacognostic, phytochemical and antioxidant activity of Ficusglomerata	Current bioactive compounds	2020,16(1), 42-47	1875-6646
2020	3	Dr. Ms. V.S. Tambe	Direct chiral HPLC-MS/MS method for determination of R-Lacosamide in human plasma	Pharmaceutical Chemistry Journal	2020, 54(1), 96-103	1573-9031
2020	4	Dr. Ms. V.S. Tambe	Qualitative analysis of Carica papaya leaves tablet formulation and study of fragmentation pattern of Rutin	Indian drugs	2020, 57 (11), 83-86	0019-462X
2020	5	Dr. Ms. V.S. Tambe	HPTLC Method Development for the Simultaneous Estimation of Ketorolac Tromethamine and Tramadol Hydrochloride from a Formulation	Acta Scientific Pharmaceutical Sciences	2020, 4(1), 84-88	2581-5423
2020	6	Ms. P. P. Taru	A Review on post covid - 19 Redevelopment Plans	Pharmaceutical Resonance COVID-19 Special Issue	2020, 6-9	2581-6136
2020	7	Mr. R.R. Chanshetti,	Anti-Inflammatory Potential Effect of Flavonoid Rich Ethyl Acetate Fraction of Methanolic Extracts of StereospermumSuaveolens DC (Bignoniaceae) Leaves in Experimental Animals	Pharmacology eJournal	2020, 4(26)	-
2020	8	Ms. S.R. Chintamani	Extraction, identification, and screening of Brassica oleraceavat.italicaplenck (Broccoli) floret to be an alternative for nanoparticle formulation	Indian Journal of Pharmaceutical Education and Research	2020, 54 (3), 724-731	2581-5423
2020	9	Ms. P.B. Kothawade	Novel nitrogen-containing heterocyclic	Journal of Research in Pharmacy	2020, 24 (4), 1-12	2581-6136

			compounds in GPR109A as an anti-hyperlipidemic: Homology modeling, Docking, dynamic simulation studies			
2020	10	Prof. Dr. S. N. Dhole	Formulation and Evaluation of Sustained Release Colon Targeted Mesalamine Tablet.	Research Journal of Pharmacy and Technology	2020, 13(5), 22-41	0974-360X
2020	11	Dr. N. S. Kulkarni	A comprehensive Review on Analytical method development and validation for SGLT-2 inhibitors by HPLC in its API and Dosage form.	Research Journal of Pharmacy and Technology..	2020, 13 (7); 3472-3479	0974-360X
2020	12	Dr. N. S. Kulkarni, Mr.M.K.Munde, Dr. S. N. Dhole	Improvement of Water Solubility and In Vitro Dissolution Rate of Deflazacort ByComplexation With βCyclodextrin Through Freeze Drying Process.	Indian Drugs.	2020, 57 (07), 70-73.	N 1083-7450
2020	13	Dr. N. S. Kulkarni, Mr.M.K.Munde	A systematic review on development and evaluation of controlled release and fast dissolving formulations for Anti-diabetic drugs over past decade.	International Journal of Pharmaceutical Sciences and Research.	2020, 11 (10), 4874-4883.	0975-8232
2020	14	Dr. N. S. Kulkarni, Dr. S.N. Dhole	Formulation and evaluation of gastro retentive floating microspheres: a systematic review.	International Journal of Pharmaceutical Sciences and Research.	2020, 11 (11), 5404-5416	0975-8232
2020	15	Dr. Ms. S. D. More, Dr. R.L.Mhetre	A Review On 3D Printing Technologies In Pharmaceutical Science	Bull.Env.Pharmacol.Life sci	2020, 9(9), 126-134	2277-1808
2020	16	Dr. Ms. S. D. More, Dr. N. S. Kulkarni	A Review On Novel Approaches Of Mucoadhesive Oral Film Manufacturing Aspects	Bull.Env.Pharmacol.Life sci	2020, 9(9), 116-125	2277-1808
2020	17	Ms. M. C. Upadhye, Ms. P.P.Taru, Dr. S.N.Dhole	A review on *bryphyllumpinnatum* (lam) Oken.	Res. J. Pharmacognosy and phytochem	2020,12, 111-113	0975-2331
2020	18	Ms. V. S. Vichare	Simultaneous Estimation Of Dapsone And Adapalene In Gel Formulation By Uv-Spectroscopy	International Journal Of Pharmaceutical Sciences And Research	2020, 11(12), 6179-6183.	0975-8232

2020	19	Ms. V. S. Vichare, Dr. S.N.Dhole	Simultaneous Estimation Of Dapsone And Adapalene In Gel Formulation By Derivative Spectroscopy	Current Trends In Pharmacy And Pharmaceutical Chemistry	2020, 29(4), 1-7	2582-5062
2020	20	Mr. M. K. Munde, Dr. N. S. Kulkarni	A Novel Validated Stability Indicating Analytical Method for Simultaneous Quantification of Metformin Hydrochloride and Empagliflozin in Bulk and Marketed Formulation by HPTLC using Box-Wilson Experimental Design Approach	International Journal Of Pharmaceutical Education And Research	2020, 54(3),644-655	01-5464
2020	21	Mr. M. K. Munde, N. S. Kulkarni	Development and Validation of Novel Analytical Method for Empagliflozin and Metformin Hydrochloride in Bulk and Pharmaceutical Dosage Form by Four Different Simultaneous Estimation Approaches using UV Spectroscopy	Research J. Pharm. and Tech.	2020, 3(3)	0974-360X
2020	22	Mr. O. M. Bagade, Dr. S.N.Dhole	An Influence of Lyophilization on Praziquantel Loaded Nanosponge's by using food protein as a stabilizer with effect of Statistical Optimization.	Research J. Pharm. and Tech.	2020; 13(9):4491-4498.	0974-360X
2020	23	Mr. O. M. Bagade, Dr. S.N.Dhole	A Corollary of Nanoporous Carrier Drug Delivery System: An Updated Perspective	International Journal of Pharmaceutical Sciences and Nanotechnology	2020, 13 (5)	9074-3278
2020	24	Ms. S. R. Chintamani	Trends in Nanotechnology for the Treatment of Breast Cancer	Journal of Pharmaceutical Research International	2020, 32(36), 42-57	2456-9119
2020	25	Ms. S. R. Chintamani	Preparation Characterization And Evaluation Of Green Synthesis Nanoparticle Of Hydro Alcoholic Floret Extract Of Brassica Oleracea Var ItalicaPlenck (Broccoli)	International journal of scientific & technology research	2020, 9 (2), 1175-1187	2277-8616

			Using Qbd Approach For Breast Tumor Cells T-47D Treatment			
2020	26	Ms. S. R. Chintamani	A Review On The Solubility Enhancement Techniques With Their Pros And Cons	Pensee	2020,50(12),1508-1526	0031-4773
2020	27	Ms. S. R. Chintamani	Role Of Exotic Plants In Cancer	Pensee	2020, 11(12) 6067-6077	0031-4773
2020	28	Ms. S. S. Jadhav	Curcumin Potentiates Therapeutic Efficacy of Metformin: A Preclinical Study in STZ-NA Induced Hyperglycemia in Wistar Rats	Research journal of pharmacy and technology	2020, 13(6)	0974-360X
2020	29	Ms. P. B. Kothwade	GPR109A receptor (PM0083972)	PMDB data bank	-	-
2020	30	Mrs. B. N. Atre	Disease Modifying Potential Of Wedelolactone Rich Fraction Of Eclipta Alba In Adjuvant Induced Arthritis In Rats By Inhibition Of Proinflammatory Cytokines.	International Journal Of Pharmaceutical Sciences And Research	2020, 11(12), 6067-6077.	0975-8232
2020	31	Ms. Parande B	Convulsant Plasma as a potential therapy for trating COVID 19 patients	Pharmaceutical Resonance COVID 19 Special issue 2020	2020, Covid-19-Spcial Issue	2581-6136
2020	32	Kashikar Vrushali	A HERBAL CREAM FOR ACNE VULGARIS	Indian Drugs	2020 , 57 (2), 32-40	

Current Bioactive Compounds 2020, 16, 33-41

RESEARCH ARTICLE

Antidiabetic Effects of Ethanolic Extract of *Ficus glomerata* (L.) Roots

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Abstract: ***Background***: *Ficus glomerata* (*F. glomerata*) Linn. Family Moraceace is a large tree found all over India including outer Himalayan ranges, Punjab, Chota Nagpur, Bihar, Orissa, West Bengal, Rajasthan, Deccan and also as a common plant in South India. It is planted around the home and temples. It is cultivated throughout the year, distributed in evergreen forests and moist localities.

Objective: The Ethanolic Extract of roots of *F. Glomerata* (EEFG) belonging to the family Moraceace, was investigated for its antidiabetic activity using alloxan induced diabetic rats.

Methods: Thirty rats were divided into 5 groups having 6 rats in each group. The alloxan was administered to the rats of all groups except normal control group through intraperitoneal route at a concentration of 140mg/kg body weight. A dose of 100mg/kg and 200 mg/kg body weight of EEFG was administered to alloxan induced diabetic rats. The administration of the extract was lasted for 11 days. Effectiveness of the extract on glucose, cholesterol, triglycerides, and high density lipoprotein and protein concentrations was analyzed.

Results: Significant ($p<0.05$) reduction in the levels of glucose, cholesterol, triglyceride of the diabetic rats was observed after treatment with ethanolic extract. After subjecting to oral glucose tolerance test EEFG also showed significant improvement in glucose tolerance.

Conclusion: *F. glomerata* root ethanolic extract showed that it possesses antidiabetic effect and can be found useful for the management of diabetes mellitus.

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Keywords: Alloxan model, antidiabetic, diabetes, *Ficus glomerata*, herbal medicine, lipid profiles.

1. INTRODUCTION

Diabetes mellitus is characterized by chronic hyperglycemia, resulted due to absolute or relative deficiency or diminished effectiveness of circulating insulin. It is one of the most common serious metabolic diseases. Diabetes mellitus is the most important form of diabetes identified as a chronic progressive, systemic condition of impaired carbohydrate metabolism. The major manifestations include disorder metabolism and inappropriate hyperglycemia. In diabetes, oxidative stress is common and is mainly due to an increased production of oxygen free radicals and a reduction in the antioxidant defense mechanism. The prevalence of diabetes for all age-groups worldwide is estimated to be 2.8% calculated in 2000 and 4.4% in 2030. It is expected that there will be an increase from 171 million in 2000 to 366 million in 2030 in diabetic people [1, 2].

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F. glomerata has been used in Indian medicinal practice as astringent, carminative, stomachic, vermicide, etc from a long ago. It is also considered as a good remedy for visceral obstructions. The extract of its fruit is used in leprosy, diarrhoea, circulatory and respiratory disorders and menorrhagia.

Fruits are also useful in the treatment of miscarriage, spermatorrhoea, epididymitis, cancer, myalgia, scabies, haemoptysis, intrinsic haemorrhage and excessive thirst. Bark is found to be acrid, cooling, galactagogue and effective for gynaecological disorders. The stem bark is useful in the treatment of menorrhagia, leucorrhoea, gonorrhoea, urinary diseases, hemorrhage and skin diseases. As per the Unani system of medicine, leaves are considered as astringent to bowels and good in case of bronchitis. The leaves are also used to treat dysentery and bilious infection, as mouthwash. The tender leaf buds in the paste form are applied on the skin to improve complexion [3-7]. Externally, latex can be applied to chronic infected wounds to alleviate edema, and pain and to promote its healing. The latex is also reported to be used for treating piles. The root sap is an effective remedy for treating diabetes, mumps and other inflammatory en-

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RESEARCH ARTICLE

Pharmacognostical, Phytochemical and Antioxidant Studies of Indigenous Medicinal Plant

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ARTICLE HISTORY

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Abstract: ***Background:*** *Ficus glomerata* Roxb. is a moderate-sized avenue tree distributed throughout India both as wild or cultivated. It is traditionally used in various traditional systems of medicine including Ayurveda, Siddha and Homoeopathy. In these indigenous systems of medicine, different parts of the plant *Ficus glomerata* are commonly used for the treatment of dysentery, diarrhea, diabetes, bilious affections, stomachache, menorrhage, haemoptysis and also as a carminative and astringent.

Objectives: The current investigation deals with detail pharmacognostical studies on roots of *Ficus racemosa* mainly focusing the morphological, macroscopical analysis, preliminary examinations of root powder and florescence analysis.

Methods: Physicochemical constants of roots of *Ficus glomerata* were estimated as per official guidelines.

Results: Significant *in vitro* antioxidant activity was observed for alcoholic root extract of *Ficus glomerata*. The alcoholic extract and aqueous extract show the presence of tannins and saponins as major constituents. Remaining constituents were found to be carbohydrate, glycosides, phenolic compounds, gum and mucilage.

Conclusion: *Ficus glomerata* possess significant antioxidant activities.

Keywords: *Ficus glomerata*, macroscopical analysis, pharmacognosy, phytochemical investigation, traditional medicine, Scavenging.

1. INTRODUCTION

Ficus glomerata Roxb. syn. *Ficus rasemosa* Linn. (Family Moraceae) is a common tree. It can be grown throughout the year, grows in evergreen forest, bank of streams, deciduous forest, at an altitude of 1800 m.

This tree is approximately 18 m high with leaves which are ovate to lanceolate, or elliptic, subacute, entire and petiolate. It is an indigenous plant in traditional system of medicine of AYUSH. Various parts of *Ficus glomerata (F. glomerata)* are used in the treatment of dysentery, diarrhea, diabetes, bilious affections, stomachache, menorrhaga, himoptysis, and piles, carminative and astringent. The important constituents of the plant are carbohydrates, tannins, steroids, gums, mucilage, lupeol, lupeol acetate, alfa-amyrin acetae, leucoanthocyanidin and leucoanthocyanin [1-3].

The present investigation deals with detail pharmacognostical studies on roots *F. glomerata*, including macroscopical analysis, florescence analysis and microscopical analysis including *in vitro* antioxidant activity. This will help in the authentication and confirmation of drug prior using in formulations containing herbal drugs, also in the determination of various physicochemical constants.

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2. MATERIALS AND METHODS

2.1. Collection of the Plant Material

F. glomerata roots were obtained from Pune in October, and further was authenticated from Dr. Jayanthi, Botanical Survey of India, Pune.

2.2. Macroscopical Analysis of the Plant Material

The collected *F. glomerata* roots were shade dried and further evaluated for their morphological and sensory profile by studying organoleptic studies and special characteristics like texture and fracture (Fig. **1**) [4, 5].

2.3. Microscopical Characteristics

The powdered drug was cleared with chloral hydrate solution by boiling on the water bath for 5 to 10 min to remove the colouring matter. Clear sections were selected, stained with different reagents and mounted on a clean glass slide

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Current Bioactive Compounds

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Pharmaceutical Chemistry Journal, Vol. 54, No. 1, April, 2020 (Russian Original Vol. 54, No. 1, January, 2020)

DIRECT CHIRAL HPLC-MS/MS METHOD FOR DETERMINATION OF R-LACOSAMIDE IN HUMAN PLASMA

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Original article submitted November 15, 2017.

R-Lacosamide (RLC) is a new approved antiepileptic drug for adjunctive use and monotherapy for partial-onset seizures in some countries. RLC use in other epilepsies and diseases is under study. Research is also going on the activities exhibited by the S-enantiomer (SLC). Taking into consideration further perspectives, the development of direct chiral method that can selectively estimate R-isomer in the presence of S-isomer from human plasma is needed. Plasma samples were spiked with RLC, deuterated internal standard, and SLC. Deuterated RLC as the internal standard enabled us to precisely measure the concentration of RLC by minimizing variations associated with the extraction, ionization, and separation. Target compounds were recovered by liquid-liquid extraction from human plasma using methyl *tert*-butyl ether. The percentage recovery was found to be 68%.The isomers were resolved completely using DIACEL-IC3 column in the reverse phase mode. The retention times of R- and S-isomers were found to be 6.20 ± 0.5 and 8.00 ± 0.5 min, respectively. The proposed method was found to be linear in a concentration range from 1.00×10^2 to 1.50×10^4 ng/mL. Direct chiral HPLC tandem mass spectrometric method that can quantify R-lacosamide in the presence of S-isomer from human plasma without any carry-over and matrix effects was successfully developed. This method is very simple, fast, economic, sensitive, and validated as per EMA guidelines.

Keywords: lacosamide; HPLC-MS/MS; direct chiral bioanalysis; blood plasma, liquid-liquid extraction.

1. INTRODUCTION

R-Lacosamide (RLC), formerly harkoseride, is the latest antiepileptic drug (AED) approved by the FDA for adjunctive use and monotherapy for partial-onset seizures. The R-enantiomer of this 2-acetamido-N-benzyl-3-methoxypropionamide possesses anticonvulsant and antinociceptive properties. The mechanism of RLC action is not yet fully understood [1]. It has been suggested to cause slow inactivation of sodium channels, which is an endogenous mechanism thereby reducing the ectopic hyperactivityof neurons. RLC binds to the collapsin response mediator protein-2 (CRMP-2) and modulates its function *in vitro*. It has favourable pharmacokinetics and safety profiles in comparison to all other approved AEDs.

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RLC displays a favorable interaction profile with currently prescribed AEDs and other commonly used medications. The effect of carbamazepine-induced liver enzyme induction on RLC metabolism has not yet been studied [2]. Although some preclinical studies suggested that RLC could be potentially effective against generalized onset seizures, there was no human study yet to establish RLC as a broad spectrum AED. RLC may expand treatment options for patients with partial epilepsy and may provide significant benefit to patients with refractory seizures [3]. It is also undergoing clinical evaluation for the monotherapy treatment of diabetic neuropathic pain, fibromyalgia, and migraine prophylaxis [4]. Also, the S-enantiomers (SLC) showed promising effect to reduce postoperative and neuropathic pain by inhibiting CRMP-2 phosphorylation by targeting specific sensory neuron populations [5]. In order to evaluate the activity, toxicity, absorption, distribution, metabolism, and excretion properties of the individual enantiomers, and any potential for chiral inversion caused by the biotransformation process, chiral bioanalytical assays are necessary for individual enantiomers and/or their metabolites *in vivo*.

Some achiral methods were reported for the analysis of lacosamide in formulations and plasma [6 – 9]. Only two

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QUALITATIVE ANALYSIS OF *CARICA PAPAYA* LEAVES TABLET FORMULATION AND STUDY OF FRAGMENTATION PATTERN OF RUTIN

ABSTRACT

The chemical constitution of *Carica papaya* leaves tablets and the fragmentation pattern of rutin is poorly investigated. Rutin was found to a constituent of tablet formulation. This work reports a study on the fragmentation pattern of rutin by electrospray ionization with multistage mass spectrometry in positive mode. Potential dissociation pathway for rutin is proposed. The fragmentation pattern provides important information for its determination by liquid chromatography coupled to mass spectrometry.

Keywords: Carica papaya; Rutin; HR-MS

INTRODUCTION

Carica papaya Linn belonging to family Caricaceae has been used to treat ailments like malaria, dengue and jaundice. It has immunomodulatory and antiviral activity[1,2]. Its young leaves are rich in flavonoids (quercetin, rutin, kaempferol and myricetin), alkaloids (carpaine, pseudocarpaine, dehydrocarpaine I and II), phenolic compounds (ferulic acid, caffeic acid, chlorogenic acid), cynogenetic compounds (benzylglucosinolate) and carotenoids (β- carotene, lycopene)[3]. Leaf extracts from *C. papaya* are generally used for patients with dengue fever and in thrombocytopenia[4-9]. The extract is marketed in the form of capsules, tablets and syrup which does not claim any phytoconstituents. Although herbal medicines acceptance is increasing in the global market, concern is raised about inconsistent composition of herbal medicines. As per EMA guidelines, the herbal products should be standardised using markers. The quality of herbal medicine can be indicated in terms of the quantity of chemical marker[10]. Chemical fingerprinting is important to indicate the presence of chemical markers in the samples[11].

MATERIALS AND METHODS

Experimental

Materials

Rutin (RUT, 99.5% w/w) was purchased from Yucca Enterprises, Wadala, Mumbai. *C. papaya* leaves extract tablets (Caripill, Micro Labs limited, Bangalore, India) were purchased from the local market. This formulation contains 1100 mg of papaya leaves extract.

High resolution mass spectrometry

HR-MS study was essential to check the presence of various phytoconstituents in the tablet formulation. This data is useful to select the chemical marker for analysis of tablet formulation. Bruker Daltonik GmbH, Germany, Impact II UHR-TOF (ultra high resolution- time of flight) mass spectrometer was used. It was also used to study fragmentation of RUT standard and RUT present in

Table I: Fragments of RUT

Ions	Elemental composition	Measured exact mass	Theoretical exact mass	Error in mmu	Error in ppm	RDB*
RUT	$C_{27}H_{31}O_{16}^{+}$	610.1637	610.1534	10.3	16.8	13
RUT+ Na	$C_{27}H_{30}O_{16}Na^{+}$	633.1399	633.1432	3.3	5.05	13
Fragment I	$C_{21}H_{20}O_{12}Na^{+}$	487.0846	487.0847	0.1	0.20	12
Fragment II	$C_{24}H_{24}O_{12}Na^{+}$	543.0869	543.1115	24.6	45.3	13
Fragment II	$C_{24}H_{24}O_{12}Na^{+}$	543.0869	543.1115	24.6	45.3	13
Fragment III	$C_{22}H_{20}O_{10}Na^{+}$	467.1004	467.0954	5.5	11.7	13
Fragment IV	$C_{14}H_{12}O_{6}Na^{+}$	331.0990	331.0430	55.9	168.8	09
Fragment V	$C_{15}H_{10}O_{7}Na^{+}$	325.0312	325.0324	1.2	3.69	11

• *RDB: Ring and double bonds*

Publication20204

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ACTA SCIENTIFIC PHARMACEUTICAL SCIENCES (ISSN: 2581-5423)
Volume 4 Issue 1 January 2020
Research Article

HPTLC Method Development for the Simultaneous Estimation of Ketorolac Tromethamine and Tramadol Hydrochloride from a Formulation

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Abstract

Objective: The study was aimed to develop simple, specific, accurate HPTLC method for simultaneous determination of the Ketorolac Tromethamine and Tramadol HCl in pharmaceutical dosage form.

Material and Method: A rapid, selective and simple high performance thin layer chromatographic method was developed and validated for their simultaneous estimation in a mixture. Well resolved peaks were observed for both the drugs on aluminium sheet with silica gel 60 F_{254} as the stationary phase. The solvent system consisted of ethyl acetate: methanol: 25% ammonia solution [8.5: 1.5: 0.5 v/v/v]. The λmax were observed at 282nm and 271nm for Ketorolac Tromethamine and Tramadol HCl respectively. Spectrodensitometric scanning-integration was performed at a wavelength of 282 nm.

Results: This system was found to give compact spots for both Ketorolac [Rf value of 0.08 ± 0.01] and Tramadol [Rf value of 0.52 ± 0.02]. The polynomial regression data for the calibration plots showed good linear relationship in the concentration range of 200-700 ng/band for ketorolac [r^2 =0.999] and 500-1750 ng/band for Tramadol [r^2 = 0.995]. The LOD and LOQ were found to be 0.3912 ng/band and 1.7930 ng/band for Ketorolac and 4.6370 ng/band and 7.7551 ng/band for Tramadol, respectively. The peak purity of both drugs was found to be always more than 0.995 proving the specificity of the method.

Conclusion: The method was validated for linearity, LOD, LOQ, specificity, accuracy and precision as per ICH guidelines. The proposed method has demonstrated to have a potential use in simultaneous analysis of Ketorolac tromethamine and Tramadol hydrochloride from a tablet formulation.

Keywords: Ketorolac Tromethamine; Tramadol Hydrochloride; HPTLC Method; Simultaneous Estimation

Abbreviations

KETO: Ketorolac Tromethamine; TRAM: Tramadol Hydrochloride

Introduction

Two drugs are used in this study are Ketorolac Tromethamine [KETO, Figure 1a, NSAID] and Tramadol Hydrochloride [TRAM, Figure 1b, Opioid analgesic]. The combination of KETO/TRAM is a rational therapy for pain by different mechanisms of action. Ketorolac is a carboxylic acid derivative mainly used for its analgesic activity. Tramadol is a centrally acting analgesic used to produce pain relief. The combination of ketorolac and tramadol analgesic efficacy is higher than each of its component individually and has a faster onset of action. Literature revealed analytical methods viz. HPLC [1-8], UPLC [9], HPTLC [10-13] and Spectrophotometric techniques [14-19] for analysis of individual drugs as well as in combinations with other drugs. But no single HPTLC method has been reported for the simultaneous estimation of KETO and TRAM in a formulation.

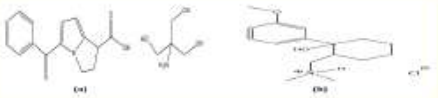

Figure 1: (a) Structure of Ketorolac Tromethamine. (b) Structure of Tramadol hydrochloride.

HPTLC is a reliable, fast and accurate for quantitative drug analysis. Moreover, many samples can be run simultaneously using a small quantity of mobile phase, thus minimizing analysis time and cost per analysis. So here an attempt has been made to develop simple, accurate, sensitive, rapid, economic and specific HPTLC method for simultaneous estimation of KETO and TRAM from a formulation.

Citation: Vrushali S Tambe., *et al.* "HPTLC Method Development for the Simultaneous Estimation of Ketorolac Tromethamine and Tramadol Hydrochloride from a Formulation". *Acta Scientific Pharmaceutical Sciences* 4.1 (2020): 84-88.

REVIEW ARTICLE

A REVIEW ON POST COVID - 19 REDEVELOPMENT PLANS

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Abstract : Humans are in grieved situation of fighting with pandemic COVID-19 which has spread all across the world. It is a major burden on our Government to cope with this situation as; it is not clear what will be the scenario coming ahead. We were struggling in some of the areas like sanitization, hygiene, education, economy, employment, health and healthcare personnel, public awareness, food security, climate even before this chaotic situation and now the plight is worsening more. Considering the COVID-19 as an opportunity to arise with a new resonance these areas should be intensively concerted.Here, in this review we have illustrated emerged challenges after the massive outbreak of corona virus. The possible rebound needed to restore the enormous transitions & the foreknowledge strategies needed for longer & healthier lives. It shows us track to be followed to reseal & re-emerge our nation with more effective tools to put footprint on the globe. We are hopeful that this outline will inform readers about the plans of redevelopment strategies for sustainable living. By making such provisions run through, we would be able to tackle such disastrous situations if any, in future.

Keyworkd : *COVID-19, Redevelopment, Sustainable, Strategies.*

1. INTRODUCTION:

A terrifying outbreak of mysterious corona virus masked an appearance in Wuhan (China) and inflated globally[1]. This disease was authenticated as COVID-19 (Corona Virus Disease 2019) by WHO on 12th Jan 2020 and SARS–COV-2 (Severe Acute Respiratory Syndrome Corona Virus-2) by International Committee on Taxonomy of Viruses on 11th Feb 2020. This uncontrollable spread of disease has no definite treatment. So it is better to prevent by following the guidelines led by the government.

Covid-19 has made us realize that everyone needs to be ready for the unimaginable scenario.[2] In India many sectors like sanitization, hygiene, education, economy, employment, health and health-care personnel, public awareness, food security, climate etc. were undervalued and this crisis has further retarded them. But, considering this testing time as an opportunity India should reset these sectors. With holistic planning and establishing new development models we can become more efficient and assembled for future eventualities and lead a sustainable journey ahead.

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2. SECTORS FOR REDEVELOPMENT POST COVID - 19 :

Fig. No. 1: Sectors to be concentrated for redevelopment post Covid -19

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Anti-inflammatory potential effect of flavonoid rich ethyl acetate fraction of methanolic extracts of *Stereospermum suaveolens DC* (Bignoniaceae) leaves in experimental animals.

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ABSTRACT

Objective: To assess anti-inflammatory potential effect of flavonoid rich ethyl acetate fraction of methanolic extract of Stereospermum suaveolens DC (Bignoniaceae) leaves.

Method: The phytochemical investigation and TLC analysis was studied as per standard phytochemical method. The inflammation was induced in wistar rats by sub-plantar injection of 0.1 ml of 1 % solution of carrageenan. The flavonoid rich ethyl acetate fraction of methanolic extract of *Stereospermum suaveolens DC* (Bignoniaceae) leaves was treated at different doses of 125mg/kg, 250mg/kg and 500mg/kg (p.o.). The rat paw volume was measured at 1h, 2h, 3h, 4h, 5h using Digital plethysmometer (VJ instruments - VJDP-01). The percentage inhibition of paw edema was calculated.

Result: The phytochemical investigation revealed presence of flavonoid, saponins, alkaloids, carbohydrates and phenolic components.The TLC study shown confirmation of presence of flavonoid. The significant paw edema inhibition and percentage of inhibition obtained in a dose of 250mg/kg is high as compared to 125mg/kg and 500mg/kg dose fraction in experimental model of inflammation. **Conclusion:** From the present obtained study it was concluded that flavonoid rich ethyl acetate fraction of methanolic extract of *Sterospermum suaveolens DC* leaves has potential anti-inflammatory activity.

Key words: Anti-inflammatory activity, Ethyl acetate fraction, Carageenan induced paw edema, *Sterospermum suaveolens* DC

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Original Article

Extraction, Identification and Screening of *Brassica oleracea* var. *italica* Plenck (Broccoli) Floret to be an Alternative for Nanoparticle Formulations

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ABSTRACT

Background: Plant or plant extract act as a source of several abundant natural compounds such as flavonoids, phenolics, alkaloids, steroids, tannins, saponins and other nutritional compounds. The extract not only acts as reducing and stabilizing agents due to presences of various secondary metabolites for the bio reduction reaction but, also shows added pharmacological potential. Among others, a cruciferous vegetable like Broccoli is assumed to affect the growth of numerous forms of cancers since it contains multiple chemical constituents such as, Selenium, Sulphoraphene, Glucosinolate and Diindolylmethane which shows anticancer activity. **Objectives:** The study involves extraction of florets of *Brassica oleraceae* var. *italica* which is done by cold maceration process by using different solvents like water, ethanol, methanol and methanol: water (6:4) followed by phytochemical screening. **Methods:** Broccoli plant was collected from local farmer and Extraction of aerial part (Florets) was done by cold maceration by using various solvents such as water, Et: OH, Water: EtOH (6:4 ratio). The optimization of the extract with solvent selection was done by the observation of color, nature and also by the calculation of percentage yield, solubility concentration and phytochemical screening tests. Further, the optimized extract was subjected to calculate the total phenolic and flavonoids concentration. **Results:** The study involves collection of Broccoli from Local farmer. The plant was identified and authenticated as *Brassica oleraceae* var. *italica*. (Family: Brassicaceae) from Botanical Survey of India, Western Regional Centre, Pune by Ms. Priyanka A. Ingale, Scientist B (Voucher specimen No. RBC-3, BSI/WRC/IDEN. CER./2016/667). Extraction of florets of *Brassica oleraceae* var. *italica* which was done by cold maceration process by using different solvents likes water, ethanol, methanol and methanol: water (6:4) followed by phytochemical screening. **Conclusion:** The present study reflects that the extract of *Brassica oleraceae var. italica* Plenck shows major presence of phenolic and flavonoids as per phytochemical screening to be an alternative for the nanoparticle formulation.

Key words: Broccoli, Extraction, Identification, Screening, Qualitative and Quantitative Analysis.

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INTRODUCTION

Herbal medicine that forms an integral part of CAM has been testified to play a vital role in the management of breast cancer. Different medicinal plants including *Taxus baccata* (Pacific Yew), *Podophyllum peltatum* (Mayapple), *Camptotheca acuminate* (happy tree) and *Vinca rosea* (Periwinkle) have been evaluated in clinical trials for breast cancer.[1,2] Medicinal plants are a source of a large number of bioactive that are excellent anticancer agents as they have the efficacy to control the molecular mechanisms and various signaling pathways implicated in carcinogenesis such as inflammation,

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Novel nitrogen-containing heterocyclic compounds in GPR109A as an anti-hyperlipidemic: Homology modeling, docking, dynamic simulation studies

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ABSTRACT: Niacin or nicotinic acid therapy leads to reduce the level of Low-density Lipoprotein cholesterol (20-40%) with significant elevation of High-Density Lipopreoin cholesterol level (20-35%). From research, it was said that Nicotinic acid might exert its positive action by activating the G-protein-coupled receptor (GPCR) which is found on adipocytes. GPR109A (family of GPCR) receptor was important for nicotinic acid (niacin) for its anti-lipolytic effects. As GPR109A is a targeted drug for the treatment of dyslipidemia, its structural analysis needs to be elucidated. But the Protein 3D structure of target was not available at Protein Data Bank (PDB), so we have generated its structure through homology modeling and validation was carried out. Screening of top lead molecules with the help of Various computational approaches like molecular-docking and Molecular-Dynamic (MD) simulations studies along with different online tools. The docking results showed that the lead compound 2B [(R)-methyl 2-(2-(1H-indol-3-yl) acetamido)-3-(1H-indol-3-yl) propionate] revealed significant binding energy value (-30.54 kcal/mol) as that with the nicotinic acid which is a standard drug (-17.68 kcal/mol). In addition to that, Molecular-Dynamic (MD) simulations analysis proved that compound 2B has lesser variations throughout the simulation period as represented by the root-mean-square deviation (RMSD) and root-mean-square fluctuation (RMSF) graphs. Current *in silico* study describes the modeling of novel heterocyclic compounds as antihyperlipidemic drugs for the treatment of dyslipidemia. This study also describes a deeper idea about the structural information of the lead compound 2B and its entire molecular interactions against GPCR109A and provides a hypothetical guideline to utilize this compound as an antihyperlipidemic for the treatment of dyslipidemia.

KEYWORDS: G-protein coupled receptor (GPCR); homology modeling; antihyperlipidemic drugs; nicotinic acid; molecular docking and molecular dynamic simulations.

1. INTRODUCTION

Nicotinic acid (Niacin), the water-soluble vitamin used to reduce plasma lipid levels of total cholesterol (TC), free fatty acids (FFA), triglycerides (TG) when administered to humans beings [1, 2]. Nicotinic acid robustly increases high-density lipoprotein levels compared to other anti-hyperlipidemic drugs [3]. How Nicotinic acid acts by lowering lipid levels in the body this metabolism is still not clear. Harmful side effects shown by Nicotinic acid such as flushing (facial reddening), reduced glucose tolerance or gastral intestinal effects decrease patient compliance [4]. Nicotinic acid plays an important role by inhibiting fat cell lipolysis by the activation of a G protein-coupled receptor (GPCR) and successive inhibition of cAMP configuration [5, 6] and [7]. In 2003, identified three G Protein-coupled receptors (GPR109A, GPR81, and GPR109B) that binds to nicotinic acid with projected similarity [8-10]. The GPR109A receptor, couples to G protein of Gi family, which is expressed mainly in adipocytes and immune cells. The receptors GPR109A and GPR81 both exist in humans as well as in rodent species [11]. The anti-hyperlipidemic effects of nicotinic acid cause a reduction in FFA and TG, but in mice lacking PUMA-G anti-

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REVIEW ARTICLE

A Comprehensive Review on Analytical Method Development and Validation for SGLT-2 Inhibitors by HPLC in Its API and Dosage Form

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ABSTRACT:
SGLT-2 is the newly developed class of antidiabetic medicine also called as gliflozins. Empagliflozin, dapagliflozin and canagliflozin are the SGLT-2 class inhibitors for the treatment of type II diabetes mellitus. SGLT-2 inhibitors shows the 82% of plasma protein binding, 36.8% of partitioning of red blood cells, 78% of bioavailability, 5.6 to 13.1 hrs half life in oral route of administration. In this review we complied analytical methods for the development and determination of the SGLT-2 inhibitors. Table no. 1, 2, 3 shows the analytical method development and validation of empagliflozin dapagliflozin and canagliflozin alone and with its combination by the HPLC method respectively also table no. 4 shows the various formulations available in SGLT-2 Inhibitors.

KEYWORDS: Empagliflozin, dapagliflozin, canagliflozin, pharmacokinetic parameters, pharmacodynamic parameters, HPLC method.

INTRODUCTION:

SGLT-2 inhibitors are also called as gliflozins. SGLT-2 is a class of medicine which inhibits reabsorption of glucose in kidney and lower blood sugar level. They are also used in the treatment of type II diabetes mellitus (DM-2). SGLT-2 inhibits the sodium-glucose transport protein-2. The gliflozins are used to treat type 2 diabetes mellitus but are most often used as second or third line agents instead of first-line because there are other medications on the market that have much longer safety record and are less expensive than gliflozins. Gliflozins may be a good option for patients who are failing with metformin monotherapy, especially if reducing weight is part of the underlying treatment.

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They are used in combination, for example metformin plus gliflozin and the triple therapy metformin, sulfonylurea and gliflozin.[1]

MECHANISM OF ACTION:

Sodium glucose co transporters (SGLTs) are newly available drug which are used in treatment of early and late type 2 diabetes. It blocks the glucose reabsorption in kidney and increase urinary glucose excretion. Glucose excreted and plasma levels drop down lead to development of all glycemic parameters. This mechanism of action is depend on blood glucose level as well as different actions of thiazolidinediones (mediated through GLUTs), is independent of the actions of insulin. Therefore, there is minimum potential for hypoglycemia, not risk of overstimulation or tiredness of beta cells. Because their mode of action relies upon normal renal glomerular-tubular function, SGLT-2 efficacy is reduced in persons with renal impairment. [2][3]

SHORT NOTES

IMPROVEMENT OF WATER SOLUBILITY AND *IN VITRO* DISSOLUTION RATE OF DEFLAZACORT BY COMPLEXATION WITH β-CYCLODEXTRIN THROUGH FREEZE DRYING PROCESS

ABSTRACT

Deflazacort is a poorly water-soluble drug and is practically insoluble in water. The objective of this study was to improve the solubility of deflazacort by using as solubility enhancer β-cyclodextrin and also to study the effect of the water-soluble polymer PEG 4000 on solubility of the deflazacort:β–cyclodextrin binary system. The inclusion complexes of deflazacort with β-cyclodextrin in 1:1 w/w, 1:2 w/w and 1:3 w/w proportions were prepared by kneading, microwave irradiation and freeze-drying techniques. The *in vitro* dissolution study showed improved dissolution rate for deflazacort for freeze-dried binary deflazacort: β-cyclodextrin 1:2 w/w complex, as compared to ternary deflazacort:β-cyclodextrin: PEG 6000 1:2 w/w complexes, plain deflazacort, physical mixtures and complexes prepared by kneading and microwave technique. This was confirmed by Fourier transform infrared spectroscopy, differential scanning calorimetry, powder x-ray diffraction study, scanning electron microscopy and ^{1}H nuclear magnetic resonance spectroscopy study. Thus, deflazacort:β-cyclodextrin complex with improved solubility was successfully developed using freeze drying technique.

Keywords: β-cyclodextrin, microwave, freeze drying.

INTRODUCTION

Therapeutic effectiveness of a drug depends on the solubility of the active pharmaceutical ingredient/ drug. To achieve desired concentration of the drug in systemic circulation, solubility is very important to show pharmacological response. Most of new chemical entities/ active pharmaceutical ingredients (APIs) discovered nowadays possess poor solubility by virtue of itheir lipophilicity. A large number of researchers have reported complex formation between cyclodextrin or its derivatives and poorly water-soluble drugs to improve the latter's water solubility, stability and bioavailability. Deflazacort (DFZ) is a poorly water-soluble drug used in the treatment of Duchenne muscular disease and is also categorized under anti-inflammatory and immunosuppressive agents. Hence, there is definite need for solubility enhancement of deflazacort[1,2].

MATERIAL AND METHODS

Deflazacort and β-cyclodextrin were obtained as gift samples from Swapnroop Drugs and Pharmaceuticals, Aurangabad, Maharashtra, India and Signet Chemical Corporation, Mumbai, India, respectively. All chemical and reagents usedwere of analytical grade.

Experimental

Phase solubility study of deflazacort drug was performed in distilled water as per the method described by Higuchi and Connors[3] to confirm solubility enhancement capability of β-cyclodextrin (β-CD). The dissolved amount of deflazacort was quantitated by UV visible spectroscopy at 243 nm.

Preparation of inclusion complexes of deflazacort with β–CD :

Freeze drying technique was employed to prepare inclusion complexes of deflazacort with β-CD in 1: 1 w/w (500 mg: 500 mg), 1: 2 w/w (500 mg: 1000 mg) and 1:3 w/w (500 mg: 1500 mg) in 30 mL, 60 mL and 90 mL distilled water were prepared respectively and lyophilized using Martin Christ LD plus 1-2 models operated at Vaccum mbar 0.10 and Ice condenser temperature is -50°C. Freeze dried inclusion complex of DFZ (500 mg): β-CD (1000 mg): PEG 6000 (225 mg) was also prepared. Inclusion complexes were also prepared by kneading and microwave irradiation techniques for comparison purpose[4,5].

CHARACTERIZATION OF INCLUSION COMPLEXES

Fourier Transform Infra-Red spectroscopy

Pure deflazacort, physical mixtures of deflazacort with β-CD as well as the inclusion complexes were characterized by FTIR spectrophotometer. IR spectral analysis was carried out by using Shimadzu FTIR Spectrometer.

Differential scanning calorimetry

Pure drug, physical mixtures of drug with β-CD as well as inclusion complexes prepared by kneading,

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A SYSTEMATIC REVIEW ON DEVELOPMENT AND EVALUATION OF CONTROLLED RELEASE AND FAST DISSOLVING FORMULATIONS FOR ANTI-DIABETIC DRUGS OVER PAST DECADE

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Keywords:

Diabetes mellitus, Formulations, Excipients, Evaluation

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ABSTRACT: Diabetes mellitus is the heterogeneous metabolic disorder caused by the high blood sugar level. Untreated high blood sugar can damage kidneys, eyes, nerves and other organs. Type 1 diabetes mellitus disorder is caused by the lack of insulin hormone while type 2 diabetes mellitus is a disorder of insulin resistance by β cells of the pancreas. For the management of type 2 diabetes mellitus different drugs are available as single or combination forms like Pioglitazone, Repaglinide, Metformin, Voglibose, Glipizide. Several research activities were carried out for its development, formulation and evaluation by the development of controlled-release and fast-dissolving formulations. The extensive literature review revealed information related to the formulation of sustain/fast release dosage form for the antidiabetic drugs. Newer techniques were used by the researcher for the formulation of dosage forms as solvent diffusion-evaporation technique, Reverse phase evaporation technique, emulsion solvent evaporation technique and Hot melt extrusion granulation technique. The review represents the types of formulation, methods used, excipients used and evaluation parameters of developed dosage forms and their correlation with therapeutic success.

INTRODUCTION: Diabetes mellitus is the heterogeneous metabolic disorder caused by the high blood sugar level. Insulin moves sugar from the blood into cells and used as energy. Untreated high blood sugar can damage kidneys, eyes, nerves, and other organs [1]. There are two important types of diabetes mellitus.

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a) Type 1 Diabetes Mellitus: Type 1 diabetes mellitus is caused by the lack of insulin hormone. In type 1 diabetes mellitus use of insulin is required and which is given to the patient in injection form.

b) Type 2 Diabetes Mellitus: Type 2 diabetes mellitus is the common type of diabetes, and it is a disorder of insulin resistance by β-cells of the pancreas. In this condition, treatment includes the use of oral drugs, which increases the amount of insulin secreted by β-cells of pancreas [2].

There are different ways for the classification of antidiabetic drugs, which depend on nature, age, and lifestyle of the person as well as other factors [3].

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FORMULATION AND EVALUATION OF GASTRO-RETENTIVE FLOATING MICRO-SPHERES: A SYSTEMATIC REVIEW

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Keywords:

GRDDS, Floating microspheres, Increased GRT, Bioavailability

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ABSTRACT: Gastro-retentive drug delivery system is the novel controlled release system that overcomes the problem like the first-pass metabolism, narrow index of absorption, unstable in intestinal pH, low bioavailability. Different approaches to GRDDS are floating, muco-adhesive, swelling, high density, magnetic drug delivery system. The floating drug delivery system is the most promising approach. The dosage forms remain buoyant for a longer duration of time in the gastric fluid due to the low density of dosage form. Gastric residence time is increased. In this system, there is site-specific drug delivery in the upper part of GIT. Drug release is a slow and controlled manner; drug absorption is increased. The bioavailability of drug is enhanced. Floating microspheres are gaining attention because it remains buoyant for longer time and uniform distribution of drug over the gastric fluid. Fluctuation in plasma drug concentration is reduced. Gastro-retentive dosage form prolong dosing interval reduce the frequency of drug administration so increase in patient compliance. GRDDS is useful for sustained/controlled drug delivery. This article gives an overview of different gastro-retentive systems, suitable drug candidates for GRDDS, advantages, and disadvantages, factors affecting GRDDS, floating microspheres, methods of preparation, evaluation, and application. Also, this review includes different studies on floating microspheres by various researchers.

INTRODUCTION: The oral drug delivery system is the most preferable and easy route of administration. This is a highly acceptable route [1, 2, 3]. The oral route is the most convenient, and patient compliance is more. This route plays a major role in the controlled and sustained drug delivery system. Gastro retentive drug delivery system is one of the novels and controlled drug delivery systems.

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Gastro-retentive drug delivery system increases the bio-availability of drug substance as the drug remains in the stomach for longer duration, and drug release is for extended time. It also prolongs the dosing interval, so increase patient compliance.

Various innovative approaches of gastric retention include bio-adhesion, expansion system, high-density system, magnetic systems, super porous hydrogels, low-density system, raft forming system, floating ion exchange resins. The controlled drug delivery system is going to be retained in the stomach and is called a gastro-retentive drug delivery system (GRDDS). Many drugs have an absorption window from the stomach and proximal part of the small intestine. GRDDs

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REVIEW ARTICLE **OPEN ACCESS**

A Review on 3D Printing Technologies in Pharmaceutical Science

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ABSTRACT

3D printing known formally as Additive Manufacturing began in the late 1980s. It is a digital manufacturing process that creates 3D objects by fusing or depositing material such as variety of polymers, metals, and ceramics in successive layers laid down under computer control. This objects can be of almost any shape or geometry & are produced from a 3D model as defined in a Computer- aided design(CAD). A variety of 3D printing technologies have been developed to fabricate novel solid dosage forms which are among the most renowned & distinct products today. The present review focused on briefing various techniques, applications in Pharmaceutical technology.

Keywords: *3D Printing Technology, Polypill concept, Thermal-Inkjet Printing, Binder Deposition, Stereo lithography, Democratization.*

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INTRODUCTION

The 3D Printing technology has caught the attention of medical devices industry and pharmaceutical industry due to its application on various platform in health care industry. 3D printing technology promises a future of drugs & medicine printed on demand, personalized with customized doses. The potential of 3D printing is about being able to deliver what you want, how much & when you want. This technology will definitely help Doctors & pharmacists to provide "Tailor made" medicine for each patient [1, 7].

3D printing in pharmaceutical drug delivery would excel greatly in the domain of personalized medicine, where the medication could be customized as per the need of treatment, & not "one fits all" approach. 3D printing can play a significant role in multiple active ingredients dosage forms, where the formulations can be as a single blend or multilayer printed tablets with sustained release properties. This reduces the frequency and no. of dosage forms units consumed by the patient on a daily routine. 3D printing technology has high potential in individualized dosage forms concept called the polypill concept. This brings about the possibility of all the drugs required for the therapy into a single dosage form unit [8].

Three dimensional printing technology is a novel rapid prototyping technique in which solid objects are constructed by depositing several layers in sequence. The rapid prototyping involves the construction of physical models using computer – aided design in three dimension. It is also known as additive manufacturing and solid free form fabrication [2].

3D printing relies on computer aided designs to achieve almost flexibility, time saving, & exceptional manufacturing capability of pharmaceutical medicines which can be utilized in personalized and programmable medicine.

ADVANTAGES OF 3D PRINTED DRUG DELIVERY [2-4, 15]

- High drug loading ability when compared to conventional dosage forms.
- Accurate and precise dosing of potent drugs which are administered at small doses.
- Reduce cost of production due to lesser material wastage.
- Suitable drug delivery for difficult to formulate active ingredients like poor water soluble drug.
- Narrow therapeutic window as well as increase complexibility.

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REVIEW ARTICLE **OPEN ACCESS**

A Review on Novel Approaches of Mucoadhesive Oral Film Manufacturing Aspects

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ABSTRACT

Oral route are most commonly preferred route for delivering drug. The aim of the present study was to gives an overview about the principles of creation of mucoadhesive bonds & about novel dosage form. Mucoadhesive film in terms of their composition, preparation & practical usage. It may be preferred over adhesive tablet in terms of flexibility and comfort. This study focused on development of a mucoadhesive buccal delivery system with a twofold objective of offering a rapid as well as a prolonged delivery with enhanced therapeutic efficacy.

Keywords: *Oral mucosa,Mucoadhesive polymer, Buccal film, Dosage form.*

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INTRODUCTION

In recent years, significant interest has been shown in the development of controlled drug delivery to, or via mucous membrane by the use of bio adhesive or mucoadhesive polymers [1-3]. These dosage form can be administer by different routes, including ocular, nasal, rectal and vaginal, for local and systemic delivery.

Among the various drug delivery system is found to be the most promising because, buccal mucosa, itself provides a protective covering for the underlying tissues, acting as a physical barriers against Toxin & microorganism [7].

The use of the oral cavity membranes as sites of drug interest for the past decade. It is well known that the absorption of therapeutic compounds from the oral mucosa provides a direct entry of the drug into the systemic circulation, thereby avoiding first-pass hepatic metabolism and GI drug degradation, both of which are associated with perioral administration [6].

Mucoadhesion is a state in which two materials, one of which is mucous or a mucous membrane is held together for an extended period of time. Various mucoadhesive polymer have been investigated &identified generally hydrophilic macromolecules that contain numerous hydrogen bond forming groups and will hydrate & swell when placed in contact with an aqueous solution [4].

Buccalfilms are the most recently developed dosage form for buccal administration. They have gained importance as efficacious and novel drug delivery systems and are cost effective with a good patient compliance. As buccal films are implied for attachment to the buccal mucosa, they can be formulated to exhibit local as well as systemic action. Buccal films may be preferred over buccal tablet, in terms of flexibility and comfort.

Buccal films have direct access to the systemic circulation through the internal jugular vein, which bypass the drug form the hepatic first pass metabolism leading to high bioavailability. Further, these dosage forms are self-administrable, pharmocoeconomic and have superior patient compliance.

The film can be defines as a dosage form that employs a water dissolving polymer, which allows the dosage form to quickly hydrate, adhere and dissolve when placed on the tongue, or in the oral cavity, which results in systemic drug delivery.

The main property of the buccal film is that due to the large surface area of the film, it allows quick wetting of the film which accelerates absorption of the drug quickly when compared to tablets.

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REVIEW ARTICLE

A Review on *Bryophyllum pinnatum* (Lam.) Oken

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ABSTRACT:
Bryophyllum pinnatum is widely used in Ayurvedic system of the medicine as astringent.the plant is widely use in traditional medicine for treatment of various ailments and well known for its haemostatic and wound healing properties.it is an indigenous and exotic plant. plant is found naturally throught the country. It is succulent,herb,leaves are variable size and leaflets are elliptic.the leaf extract of *Bryophyllum pinnatum* has been reported to possess antihypertensive,antiulcer properties.readialy available and easy to cultivate.secondary metabolites are obtained from different parts of plant alkaloids,flavenoids,tannin,phenolic compound etc.although there are few toxicological reports on extract these have not been sufficiently extensive.Bryophyllum pinnatum also known as air plant cathedral bells,life plant.it is native to Madagascar and popular houseplant has become naturalized in tropical and subtropical areas. The present review is an attempt to highlight the various toxic and pharmacological aspect of the *Bryophyllum pinnatum*.

KEYWORDS: Medicinal plant, Pharmacology, toxicitycardiac glycosides, *Bryophyllum pinnatum*.

1. INTRODUCTION:
Bryophyllum pinnatum also called as life plant widely distributed perennial medicinal herbs.native to Madagascar but has been natutalized in several other region of asia,Australia and newzealand.also called as panfuti[12] secondary metabolites obtained from the various part of the plants.many pharmacological activities of plant known antihelminthetic, anticancer, antihypertensive, antioxidant, anti-inflammatory. The species of these is thought to be poisonus to livestock as it contain cardiac glycosides[12]

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2. Origin:
Native to Madagascar and South Africa.

Morphology:
Bryophyllum pinnatum is a succulent herb 0.3-1.2m high. Stems obtusely four angled, older one pale coloured and younger ones are reddish with white. Leaves are usually simple/compound, upper ones are 3-5/7 foliolate with long petioled[12] The bell-shaped (i.e. tubular), drooping (i.e. pendulous), flowers (up to 7cm long) are arranged in branched clusters at the terminal of the stems (i.e. in terminal inflorescences). Each flower is present on a stalk (i.e. pedicel) 10-25mm long. that are partially connected to the tube (i.e. calyx) and streaked with pink or reddish colored blotches[13] The yellowish-green to dark red coloured petals (3-6cm long) are also partially fused into a tube (i.e. a corolla tube) that differentiate into four petal lobes (i.e. corolla lobes) near

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SIMULTANEOUS ESTIMATION OF DAPSONE AND ADAPALENE IN GEL FORMULATION BY UV- SPECTROSCOPY

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Keywords:

Dapsone, Adapalene, UV- Visible Spectrophotometric method, validation

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ABSTRACT: Objective: A new, simple, sensitive, and economical UV spectrophotometric method was developed for the simultaneous analysis of Adapalene and Dapsone in pharmaceutical formulation. **Method:** This UV method was developed with Tetrahydrofuran and Distilled water as solvents. The wavelengths selected for analysis in the present method were 237 nm and 293 nm. The method was validated as per ICH guidelines. **Results:** The method was validated for linearity, accuracy, precision, specificity and robustness. Linearity was found to be within the concentration range of 0.05-0.25 µg/ml for Adapalene and 2.5-12.5 µg/ml for Dapsone. Accuracy for the method was determined by recovery studies. The % drug recovered was found to be 99-102% w/w. The % RSD values of repeatability and intermediate precision were found to be less than 2, providing method was precise in nature. From all these studies it was observed that there was no interference of excipients from the formulation during the analysis. **Conclusion:** The advantages of this method for analytical purposes lie in the rapid determination, its cost-effectiveness, easy preparation of the sample and good reproducibility. In addition to this, the present method can be recommended for the simultaneous determination of Adapalene and Dapsone in routine quality control analysis in combined drug formulations.

INTRODUCTION: Dapsone is also known as 4, 4'- Diaminodiphenyl sulfone **Fig. 1**. Its molecular formula is $C_{12}H_{12}N_2O_2S$ and molecular weight is 248.30 g/mol [1]. Its logP value is 0.97 and pKais 2.41. Dapsone is a white to creamy-white crystalline, odourless powder with a slightly bitter taste. It is active against a wide range of bacteria but mainly used for its actions against Mycobacterium leprae [2] and prescribed in the treatment of leprosy in combination with rifampicin and clofazimine. Additionally, it is used in the treatment of skin related problems.

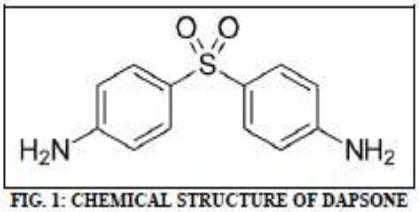

FIG. 1: CHEMICAL STRUCTURE OF DAPSONE

Its mechanism of action is similar to sulfonamides. Dapsone competes with the para-amino benzoate for the active site of dihydropteroate synthase and inhibits dihydrofolic acid synthesis [3]. It is official in IP, BP, and USP [1, 4, 5]. Adapalene is a 6-[3-(1-Adamantyl)-4-methoxyphenyl]-2-naphthoic acid. The molecular structure of Adapalene is as follows (fig 2). Its molecular formula is $C_{28}H_{28}O_3$ and the molecular weight is 412.5 g/mol [6]. It is a third-generation retinoid with a log P of 8.6 and pKa of 3.99.

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Research Article

Simultaneous Estimation of Dapsone and Adapalene in Gel Formulation by Derivative Spectroscopy.

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ABSTRACT

A simple, accurate, precise, and rapid UV-Visible spectroscopic method has been developed and validated for the simultaneous estimation of Dapsone and Adapalene is a marketed gel formulation. Analysis of marketed gel formulation was done by a first-order derivative spectroscopic method using tetrahydrofuran, methanol, and distilled water as solvents. From the first-order derivative overlay spectrum wavelengths, 307 nm (zero absorbance of Adapalene) and 365 (zero absorbance of Dapsone) were selected for analysis. The % drug content was found to be 99.753±1.520 and 99.38±1.853 for Dapsone and Adapalene respectively. The developed method was validated as per ICH guidelines Q2(R1) for linearity, range, accuracy and precision. The linearity of the method was found to be in the range of 25-125 µg/ml of Dapsone and 0.5-2.5 µg/ml of Adapalene respectively. The precision of the method was estimated by repeatability study. The % RSD values were found to be less than 2, proving the method is precise. The present method can be recommended for the simultaneous determination of Adapalene and Dapsone in routine quality control analysis in combined drug formulations.

KEYWORDS

Dapsone, Adapalene, derivative spectroscopy, method development, validation.

1. INTRODUCTION

Dapsone is an antibacterial agent used in the management of leprosy and various skin disorders. Chemically it is 4-[(4-aminobenzene)sulfonyl]aniline with molecular formula $C_{12}H_{12}N_2O_2S$ and molecular weight 248.30 g/mol (fig. 1).Its logP and $_pKa$ values are 0.97 and 2.41 respectively[1]. It shows a mechanism of action similar to sulfonamides which involve the inhibition of folic acid synthesis for the active site of dihydropteroate synthase [2,3]. It is official in IP, BP, and USP [1,4,5].

Adapalene is chemically 6-[3-(1-Adamantyl)-4-methoxyphenyl]-2-naphthoic acid (fig 2) with molecular formula $C_{28}H_{28}O_3$ and molecular weight 412.5 g/mol [6]. Its logP value is 8.6 and $_pKa$ is 3.99. It is topically used in the treatment of acne[7]. It shows a

Original Article

A Novel Validated Stability Indicating Analytical Method for Simultaneous Quantification of Metformin Hydrochloride and Empagliflozin in Bulk and Marketed Formulation by HPTLC using Box-Wilson Experimental Design Approach

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ABSTRACT

Background: A novel stability indicating analytical method was developed and validated by High Performance Thin Layer Chromatography (HPTLC) using Design of experiment approach. The proposed method is useful for quantification of Metformin hydrochloride and Empagliflozin in bulk and its dosage forms simultaneously. Design of experiment approach was applied for optimization of chromatographic conditions. **Materials and Methods:** For optimization process independent variables were used as Isopropyl alcohol proportion in mobile phase, saturation time of chamber and distance travelled by mobile phase. Experiments were carried out on silica gel pre-coated plate using mobile phase as 2 % Ammonium acetate: Isopropyl alcohol: Triethylamine (4:6:0.1 v/v/v). Direct evaluation of chromatograms were done by TLC scanner with reflectance/absorbance mode set at 242 nm. Method was validated as per ICH Q2 (R1) requirements. **Results:** Correlation coefficients for calibration curves were found to be 0.985 and 0.988, the calibration curve is in concentration range of 5000-30000 ng band^{-1} and 125–750 ng band^{-1} for Metformin hydrochloride and Empagliflozin respectively. The method showed % recovery between 99.05 to 102.54 % for Metformin hydrochloride and 99.20 to 101.50 % for Empagliflozin. The method has a prospective to determine Metformin hydrochloride and Empagliflozin simultaneously. The Metformin hydrochloride and Empagliflozin were subjected to forced degradation studies like hydrolysis, oxidation, thermolysis and photo-degradation. **Conclusion:** Proposed method has capacity to separate the Metformin hydrochloride and Empagliflozin in its degradation products. Hence one can apply this method effectively for routine analysis and during stability study as per regulatory requirements.

Key words: Method development, Validation, HPTLC, Stability studies, DoE.

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INTRODUCTION

Chemically Empagliflozin, 1-chloro-4-(glucopyranos-1-yl)-2-(4-(tetrahydrofuran-3-yloxybenzyl) benzene, [Figure 1 (a)] is an orally available competitive inhibitor of Sodium-glucose Co-transporter-2 (SGLT2) with anti-hyperglycemic activity. Empagliflozin function by inhibiting SGLT-2 present in proximal tubules in the kidneys. Empagliflozin reduces renal reabsorption of glucose leads to increase in urinary excretion of glucose and act as a antidiabetic agent for treatment of type-2 diabetes.[1] Metformin [Figure 1 (b)] is anti-hyperglycemic agent acts by inhibition of hepatic glucose output and therefore, the liver is most likely the principle site of Metformin function.[2] Chemically Metformin is 1-carbamimidamido-N,N-

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RESEARCH ARTICLE

Development and Validation of Novel Analytical Method for Empagliflozin and Metformin Hydrochloride in Bulk and Pharmaceutical Dosage Form by Four Different Simultaneous Estimation Approaches using UV Spectroscopy

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ABSTRACT:

Four new UV spectrophotometric methods namely simultaneous equation, absorbance ratio, area under curve and first derivative (zero crossing) spectroscopic methods were developed and validated for simultaneous estimation Empagliflozin and Metformin hydrochloride in bulk and tablet formulation. In simultaneous equation method, absorbance was measured at 224 and 232 nm for both the drugs. Empagliflozin and Metformin hydrochloride was estimated using 224 and 232 nm in absorbance ratio method. In Area under curve method both drugs were estimated at 224 and 232 nm respectively. First derivative (zero crossing) method was based on the transformation of UV spectra in to first derivative spectra followed by measurement of first derivative signal at 224 and 232 nm for Empagliflozin and Metformin hydrochloride, respectively using 2 nm as wavelength interval ($\Delta\lambda$) and 1 as scaling factor. Methods were found to be simple, fast, highly sensitive, cost effective and hence can be useful for simultaneous estimation of Empagliflozin and Metformin hydrochloride in commercial tablet formulation for routine quality control analysis.

KEYWORDS: Simultaneous equation, absorbance ratio, area under curve method, first derivative (zero crossing) spectroscopic methods, tablet formulation.

INTRODUCTION:

Empagliflozin (EN) chemically,(1-chloro-4-[b-D-glucopyranos-1-yl]-2-[4-([S]-tetrahydrofuran-3-yl-oxy) benzyl]-benzene is an orally administered selective sodium glucose cotransporter-2 (SGLT-2) inhibitor, which lowers blood glucose in people with type 2 diabetes by blocking the reabsorption of glucose in the kidneys and promoting excretion of excess glucose in the urine. Empagliflozine have the potential to reduce cardiovascular risk in patients with type 2 diabetes[1,2].

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In patients with type 2 diabetes and hyperglycaemia a higher amount of glucose is filtered and reabsorbed. Empagliflozin improves glycaemic control in patients with type 2 diabetes by reducing renal glucose reabsorption. The content of glucose moiety removed by renal excretion, through this glucuretic mechanism is dependent on blood glucose concentration and GFR. Inhibition of SGLT2 in patients with type 2 diabetes and hyperglycaemia leads to excess glucose excretion in the urine[3-5]. Metformin hydrochloride (MET) is given orally in the treatment of type 2 diabetes mellitus and is the drug of choice in overweight patients. They do not stimulate insulin release but require that some insulin be present in order to exert their antidiabetic effect. Possible mechanism of action includes the delay in the

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RESEARCH ARTICLE

An Influence of Lyophilization on Praziquantel Loaded Nanosponge's by using food protein as a stabilizer with effect of Statistical Optimization

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ABSTRACT:

Nanosponges are tiny sponges with a size of a small virus, which can be filled with a wide variety of drugs and can circulate around the body until they stumble upon the specific target site and attach on the surface and begin to release the drug in a controlled and expected manner. Praziquantel is anthelmintic drug which is belong to biopharmaceutical class II drug. There was no interaction found between drug and excipients as revealed by an IR spectra and standard curve of the pure drug and placebo formulation. Nanosponge of different ratios were prepared by emulsion solvent diffusion method by using ethyl cellulose (X1) and PVA / whey protein was used as polymers, dichloromethane (DCM) (X2) as a solvent and Stirring speed (X3) maintained for different batches. These factors were selected as independent variables, while Drug loading, Particle size and cumulative drug release were selected as dependent variables. The whey protein is used as stabilizers. Furthermore, an optimal batch was selected from eight formulations by using 2^3factorial design and evaluated for bulk density, tapped density, angle of repose, compressibility Index, Carr's index, dissolution studies, Entrapment efficiency, production yield, compatibility studies, powder x-ray diffraction (P-XRD), Differential scanning colorimetric (DSC), particle size analysis etc. Hence, nanosponge formulation using a variety of polymers was found to be a good alternative approach for increasing the dissolution rate of Praziquantel.

KEYWORDS: Particle size, Micromeritics, Nuclear Magnetic Resonance, cumulative drug release, factorial design, anthalmintic.

INTRODUCTION:

Targeted drug delivery to definite sites is the major problem which is being faced by the researchers. The development of new colloidal carrier nanosponges has the prospective to solve these problems. Nanosponge is innovative and emerging technology which offers controlled drug delivery for topical use. Nanosponges play an important role in targeting drug delivery in a controlled manner. A wide variety of drugs can be loaded into nanosponge for targeting drug delivery. Both water soluble and insoluble that is lipophilic as well as hydrophilic drugs can be loaded into nanosponges [1-3].

Nanosponge drug delivery system has emerged as one of the most promising fields in life science. The development of nanosponges has become an important step toward overcoming these problems. These tiny sponges can circulate around the body till they meet the target site, stick on the surface and begins to release the drug in a controlled and anticipated way which is more efficient for given dosage. Nanosponges are smaller in size due to their small size and spongy nature they can bind poorly-soluble drugs inside their matrix and develop their bioavailability. They can be formulated for targeting drugs to specific site and prevent drug and protein degradation and prolong the drug release in a controlled manner[3].These nano-sized colloidal carriers have been recently proposed for drug delivery, since their application can solubilize poorly water-soluble drugs and endow with prolonged release, as well as

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A Corollary of Nanoporous Carrier Drug Delivery System: An Updated Perspective

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ABSTRACT

Nanosponges have come into sight as one of the most promising fields of science because of their perceived applications in controlled drug delivery. It has been increasingly investigated to achieve targeted and sustained release of drugs. Nanosponges are one of the novel drug delivery system, which is gaining popularity now-a-days because of their perceived application in controlled and site-specific drug delivery. The fundamental appeal of the nanosponge technology arises from the difficulty experienced with conventional formulations in releasing active ingredients over an extended period of time, unpleasant odor, greasiness and skin irritation. They are tiny sponge-like spherical particles with a large porous surface and are believed to contribute towards reduced side effects, improved stability, increased elegance and enhanced formulation flexibility. The present investigation in the appraisal describes nanosponge technology embracing its method of preparation, characterization, *in-vitro* and *in-vivo* evaluation methods along with recent research and future potential.

KEYWORDS: Nanosponge; Controlled drug delivery; Polymers; Porosity; Cross linkers.

Introduction

Targeted drug delivery to explicit sites is the noteworthy setback that is being faced by the researchers. The development of new colloidal carrier nanosponges has the potential to solve these problems. Nanosponge is a novel and emerging technology, which offers controlled drug delivery for topical use. Nanosponges take part in a vital role in targeting drug delivery in a controlled mode. A wide variety of drugs can be loaded into nanosponge for targeting drug delivery. Both hydrophilic as well as lipophilic drugs can be encumbered into nanosponges (Patel et al., 2014; Mathew et al., 2014 and Subramanian et al., 2012). Nanosponges are integrated in specific dosage form, circulate around the body until they stumble upon the specific target site, unite to the surface, and start to discharge the drug in controllable and predictable manner (Tamkhane et al., 2014). Nanosponges are capable to encapsulate both hydrophilic and lipophilic drug substance (Ali et al., 2014). It is feasible to manage the size of nanosponges by varying the concentration of polymer to cross linkers. The particle size was examined 285nm using polymethylmethacrylate polymer, 370 nm by means of ethyl cellulose as polymer and 310nm using pluronic F-68 as polymer (Srinivas et al., 2013). Nanosponges are solid in character and can be prepared as oral, topical, parenteral dosage form (Patel et al., 2014). Complexing nanoparticles are nanoparticle that attracts the molecule by electrostatic charges and conjugating nanoparticles are the nanoparticles that link the drug through covalent bond (Bolmal et al., 2013; Subramanian et al., 2012). The innovation of nanosponges has turn out to be a significant pace toward overcoming these problems. Another important nature of these sponges is their aqueous solubility; this allows the use of these systems in point of fact for drugs with poor solubility. These petite sponges can circulate around the body until they stumble upon the target location and fuse on the surface and began to release the drug in a controlled and predictable manner, which is more

ABBREVIATIONS: β-CD: β Cyclodextrin; 3D: 3 Dimensional; DMF: Dimethyl Formamide; DMSO: Dimethyl Sulfoxide; PY: Production Yield; CDs: Cyclodextrins; CGT: Cyclodextrin-Glycosyltrans-Ferase; AGU: Anhydrous A-D-Glucopyranoside Units; α-CD: α-Cyclodextrin; γ-CD: γ-Cyclodextrin; HDI: Hexamethylene Diisocyanate; TDI: Toluene-2,4-Diisocyanate; DOC: Dissolved Organic Carbon; AAA: Aromatic Amino Acids; SDS: Sodium Dodecyl Sulphate; XRD: x-Ray Diffraction Pattern; UV: Ultra Violet; HPLC: High Performance Liquid Chromatography; SEM: Scanning Electron Microscopy; TEM: Transmission Electron Microscopy; AFM: Atomic Force Microscopy; DSC: Differential Scanning Calorimetry; TOC: Total Organic Carbon; CP: Cefpodoxime Proxetil; EVA: Ethylene Vinyl Acetate; si RNA: Small Interfering Ribo Nucleic Acid; FNS: Functionalized Nanosponges; PVA: Poly Vinyl Alcohol; IV: Intra Venous

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Trends in Nanotechnology for the Treatment of Breast Cancer

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Authors' contributions

This work was carried out in collaboration among all authors. Author SBD designed the study, managed the literature searches, performed the summarization of data and wrote the first draft of the manuscript. Authors ZA and KSB reviewed and corrected the manuscript. All authors read and approved the final manuscript.

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ABSTRACT

Breast cancer is the most common and progressively increased form of cancer mostly among women. Various therapies have been tried to cure this cancer but none of them is without side effect. These might be attributed to the indiscriminate destruction of normal cells along with cancer cells or other systemic effects of the chemotherapeutic agent. These difficulties initiate the urge to develop targeted drug delivery systems. Nanotechnology deals with formulation of nanostructures for innovative drug delivery. Nanodrug delivery systems are being used for targeting in the treatment of various diseases, hence this concept is also applicable to the treatment of breast cancer. Nanoparticles have an additional effect of improvement in the solubility of drugs such as paclitaxel, reduction in dose and toxicity, increased cellular uptake etc. Owing to smaller size these are easily taken by tumor cells and effectively encapsulate the hydrophobic drugs. This review is aimed to summarize the various management therapies majorly focusing on the recent nanodrug delivery systems to target chemotherapeutic agents in the breast cancer cells. Various nanodrug systems are in clinical trials and few of them are already in the market. These are promising tools for future cancer treatment and research.

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Preparation, Characterization And Evaluation Of Green Synthesis Nanoparticle Of Hydro Alcoholic Floret Extract Of Brassica Oleracea Var. Italica Plenck (Broccoli) Using Qbd Approach For Breast Tumor Cells T-47D Treatment

Ravindra B. Chintamani, Kishor S. Salunkhe, Amol R. Kharat, Sonali R. Chintamani, Rudra Pratap Singh, Machindra J. Chavan

Abstract :Background: Breast cancer is the second prime cause of death in women globally, and is expected to surpass heart diseases in the next few years. The resources available for diagnosis, prevention, and treatment of cancer are limited or non-existent. Unfortunately, presently available cancer chemotherapeutic agents surreptitiously affect the host cells of patients mainly bone marrow, epithelial tissues, reticule-endothelial systems and gonads. Metal nanoparticles have tremendous applications in the area of biomedical, agricultural, cancer, biotechnology and in other areas. Metallic NPs are commonly prepared by using various metals. In group of all metals, Silver has become the metal of researchers choice in treatment of cancer as a result of its solitary physiochemical properties. Objectives: The proposed study aimed to formulate the biologically synthesized green silver nanoparticles using floret extract of aerial part of Broccoli, wherein both silver as well as extract shows potential activity. Methods: Brassica oleracea var. Italica Plenck (Broccoli) hydro alcoholic floret extract mediated Silver Nanoparticles (Ag-Nps) were prepared by biological reduction method by implementing QbD approach. Resulted Ag-NPs were characterized for Morphology i.e. Particle Size and shape by FESEM, TEM and AFM. Other studies like Zeta Potential, % Yield, % Silver Loading and % Extract Loading were also undertaken, The studies also includes DSC, FTIR, UV-Spectroscopy, PXRD and EDS. Results: The studies showed promising results. In vitro and In vivo studies demonstrated that nanoparticles revealed higher anticancer efficacy than extract and proved stated hypothesis of significantly change in anticancer potential than individual. Conclusion: This study makes an attempt to overcome the limitations of conventional treatments of cancer and tumor with cost effective, eco-friendly, stable and safe targeted drug delivery as an alternative and / or complementary method of treatment.

Keywords: Breast Tumor Cell (T-47D), Green Synthesis Nanoparticle, Floret Extract of Broccoli, QbD Approach.

List of Abbreviations:
FE - Floret Extract; NPs – Nanoparticles; Ag-NP - Silver Nanoparticles; GSNPs Green Silver Nanoparticles; GSNP-F - Green Silver Nanoparticles of Florets; BNP -Blank Nanoparticles; CAM -Complementary and Alternative Medicine; CT - Chemotherapy; FTIR - Fourier Transform Infrared spectroscopy; NCCS - National Centre for Cell Science; MTT - (3-(4,5- Dimethylthiazol - 2- yl) - 2,5- Diphenyltetrazolium Bromide; MTT Assay - (3-(4,5-Dimethylthiazol - 2- yl) - 2,5- Diphenyltetrazolium Bromide Assay; PBS - Phosphate Buffered Saline; FE-SEM - Field Emission Scanning Electron Microscopy; HR-TEM - High Resolution Transmission Electron Microscopy; TGA - Thermo-Gravimetric Analysis; AFM - Atomic Forced Microscopy; XRD X-ray Diffraction; PXRD - Powder X-ray Diffraction; PSA - Particle Size Analysis; MP - Melting Point; BP - Boiling Point; UV-Vis - Ultra Violet Visible; DSC - Differential Scanning Colorimetry; SD - Standard Deviation; ICH - International Conference on Harmonization; IC_{50} - Inhibitory Concentration; QbD - Quality by Design; CQA - Critical Quality Attributes; TQPP / QTPP - Quality Target Product Profile; DoE - Design of Experimentation; ANOVA - Analysis of Variance, NDDS - Novel Drug Delivery System.

1. INTRODUCTION

Breast cancer is the second prime reason of cancer death in women globally, and is expected to surpass heart diseases in the next few years [1-2]. It reports for around seven % of worldwide burden of cancer and one-fifth of all the cancers in India [3]. As per American Cancer Society, a count of 29% incidences and 15% deaths due to breast cancer around the world has been anticipated [4]. In India, breast cancer was the leading cancer among females (24.85%) with the highest incidence and death rates being 10.53 and 16.18 %, respectively [5]. It has overtaken cervical cancer to become the leading cancer in Indian metro cities and is expected to double in 2016 [6]. It has been expected that by 2030, the universal occurrence of breast cancer would be grow to more than two million new cases per year; however, in India cases would reach up to two lakhs per year. Breast Cancer is a clinically diverse disease with multi-factorial etiology, triggered due to numerous risk factors comprising hormonal, genetic factors, environmental, dietary and lifestyle ; exposure to the ionizing radiation; as well as race, age, gender, ethnicity and history of family. Control of breast cancer is a foremost clinical challenge due to its complexity, heterogeneity and aggressiveness. The typical treatment available for breast cancer consists of chemotherapy, surgery, radiation therapy, targeted therapies and hormonal therapy. Even though these managements of cancer are highly efficacious, yet they are accompanying with grave side effects that have moved the global attention towards Complementary and Alternative Medicines (CAM). Use of CAM has become progressively common among the patients of breast cancer throughout the globe. It was investigated that the use of CAM in cancer patients differing from 7- 64% with increased use (47-83%) in breast cancer patients. Herbal medicine that forms an integral part of CAM has been testified to play a vital role in the management of breast cancer. Different medicinal plants including Taxus baccata (Pacific Yew), Podophyllum peltatum (Mayapple), Camptotheca acuminate (happy tree) and Vinca rosea (Periwinkle) have been evaluated in clinical trials for breast cancer [7]. Medicinal plants are a source of a large number of bioactive that are excellent anticancer agents as they have the efficacy to control the molecular mechanisms and various signaling pathways

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A review on the solubility enhancement techniques with their pros and cons

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Role of exotic plants in cancer

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Short Running title: EXOTIC PLANTS IN CANCER THERAPY

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RESEARCH ARTICLE

Curcumin Potentiates Therapeutic Efficacy of Metformin: A Preclinical Study in STZ-NA Induced Hyperglycemia in Wistar Rats

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ABSTRACT:
Type 2 diabetes mellitus is a metabolic disease characterized by persistent hyperglycemia. High blood sugar can produce long-term complications such as cardiovascular and renal disorders, retinopathy, and poor blood flow. The pharmacotherapy of diabetes includes use of oral hypoglycaemic agents like insulin and oral hypoglycaemic agents such as biguanides, sulphonylureas, insulin analogues, alpha glucosidase and amylse inhibitors, gliptins etc. Though these agents are therapeutically beneficial, they are associated with adverse effects such as hypoglycaemia, vitamin B_{12} deficiency, weight gain, etc. The alternatives as herbs and/or phytoconstituents, exercise, yoga, etc have been explored widely for treatment and management of diabetes mellitus. Number of plants and their isolated phytoconstituents are proven for antidiabetic activity in preclinical and clinical studies and one of widely explored of them is Curcumin. The Curcumin in its nanoparicles form had been already proven for potential antidiabetic activity. Though the phytoconstituents are said to be safe their interactions with modern medicines might be either beneficial or harmful and should be considered while co-administration of them. This research work focuses on evaluation of drug interaction between CuNPs and Metformin in STZ-Nicotinamide induced hyperglycemia in Wistar rats. The physical incompatibility between curcumin and metformin was not observed in the study. The coadministration of both produced significant reduction in glycemic and oxidative parameters than only metformin treated animals. The study suggest coadministration of curcumin and metformin can be used for better and safe management and treatment of diabetes mellitus.

KEYWORDS: Curcumin nanoparticles, Diabetes Mellitus, Metformin.

INTRODUCTION:

Diabetes is a chronic metabolic disorder mainly characterized by the loss of carbohydrate homeostasis with disturbances of fat and protein metabolism which results from defects in either insulin secretion or insulin action or both. Insulin is a protein (hormone) synthesized in beta cells of pancreas in response to various stimuli such as glucose, sulphonylureas, and arginine however glucose is the major determinant.

Impaired insulin secretion, resistance to tissue actions of insulin, or a combination of both are thought to be the commonest reasons contributing to the pathophysiology of T2DM, a spectrum of disease originally arising from tissue insulin resistance and gradually progressing to a state characterized by complete loss of secretory activity of the beta cells of the pancreas[1].

Medications currently available for treating hyperglycemia in type 2 diabetes include: biguanides (metformin), sulfonylureas (glibenclamide, known as glyburide in the U.S. and Canada, gliclazide, glimepride, and glipizide), thiazolidinediones or glitazones (pioglitazone), glucagon-like peptide-1 (GLP-1) agonists (exenatide and liraglutide), amylin agonists (pramlintide), dipeptidyl peptidase four (DPP-4) inhibitors (sitagliptin, vildagliptin, alogliptin, and

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DISEASE MODIFYING POTENTIAL OF WEDELOLACTONE RICH FRACTION OF *ECLIPTA ALBA* IN ADJUVANT INDUCED ARTHRITIS IN RATS BY INHIBITION OF PRO-INFLAMMATORY CYTOKINES

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Keywords:

Rheumatoid arthritis, Antiinflammatory, *Eclipta alba*, Wedelolactone, Cytokines

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ABSTRACT: *Eclipta alba* (Family-Asteraceae) is a herb commonly used in traditional Ayurvedic medicine for the treatment of inflammation, pain, and wounds. The present study is aimed to validate the ethnobotanical use of *Eclipta alba* in an animal model. The animals were induced with arthritis by injection of FCA on day 0 and treated with wedelolactone rich fractions of *Eclipta alba* (100, 200 and 400 mg/kg) from day 12 to day 28. WEA caused a significant effect in arthritis by inhibiting the joint inflammation and decreasing hyperalgesia and allodynia. WEA significantly decreased the biochemical markers and serum Tumor Necrosis factor-α, Interleukin 1β and Interleukin-6 levels and significantly increased the antioxidant profile. WEA (400 mg/kg) exhibited anti-rheumatic activity as evidenced by altered hematological milieu (ESR, CRP, WBC, RBC and Hb), histopathology of ankle joints, reduced cytokine levels, paw volume and related parameters associated with arthritis. Taken together, these results demonstrated the antiarthritic activity of WEA against experimental arthritis, and the underlying mechanism behind this efficacy might be mediated by inhibition of proinflammatory cytokines by wedelolactone in combination with other phytoconstituents.

INTRODUCTION: Rheumatoid arthritis (RA) is one of the prime health predicaments worldwide, which is the foremost cause of disability and the most common autoimmune disease in the world, leading to premature death if not treated properly [1]. In RA, inflammation of synovial tissue lining the joint capsule results in an invasion of the cartilage and bone, leading to progressive joint dysfunction manifested as synovitis, synovial hyperplasia, stiffness, and pain [2].

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The extent of inflammation is determined by the balance between proinflammatory and anti-inflammatory cytokines [3]. Reactive oxygen species, addition to cytokines, play a crucial role in the development and progression of RA [4]. Both sexes are affected while females are more susceptible to the ratio of 3:1. Conventional treatment with NSAIDs, DMARDs gives symptomatic relief, and newer biologicals like tumor necrosis factor-α (TNF-α) antagonist brought a therapeutic revolution by improving clinical, functional, and radiographic outcomes. However, the adverse effects, toxicity, and cost of the existing drugs appeal for a new alternative cost-effective therapy, which addresses the multiple targets in the treatment of RA [5].

Herbs have been in use from the time immemorable as a preventive and therapeutic medicine. Extensive

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REVIEW ARTICLE

CONVALESCENT PLASMA AS A POENTIAL THERAPY FOR TREATING COVID-19 PATIENTS

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Abstract : Currently the Covid-19 or corona virus pandemic has threatened the whole world as there is no any confirmed medicine or vaccine available to treat this. In this situation, on the basis of historical data, covalescent Plasma therapy is the ray of hope towards treatment of covid-19 patients to reduce the mortality rate. The usefulness of this therapy is based on the presence of neutralizing antibodies in the blood of recently survived patient of severe covid-19. And the transfusion of this neutralizing antibodies into the infected person. Patient's hummoral immunity is the key factor for the treatment of convalescent plasma therapy. The presented article is based on the study of potential use of convalescent plasma therapy in the treatment of covid-19 patients

Keyworkd **:** *Convalescent Plasma, Hummoral Immunity, Neutralizing Antibodies, Apheresis, HLA Antibodies.*

1. Introduction :

Basically our immune system has been divided into innate and acquired immunity. In this , acquired immunity has its two types Active and Passive acquired immunity. In the passive aquired immunity, when the antibodies are transferred by the natural way, i.e. e.g. from mother to foetus is the type of Natural Passive immunity. And when the antibodies are transferred from other sources or resistance passively transferred to the recipient by the administration of antibodies is the Artificial Passive immunity. And the agents used for this purpose are the convalescent sera of human or animal origin, pooled human gammaglobulin1 etc. This article is based on use of such convalescent sera or plasma in the treatment of COVID-19. Nowadays we all are going through the difficult situation of covid-19 pandemic , which has become a big threat for the world. And currently no specific vaccines or antiviral agents are available for the treatment of covid-19 patients. This article is based on the use of passive acquired immunity or we can say convalescent plasma in the treatment of covid-19 patientsto reduce the mortality rate in emergency situations[1] [2]

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2. History :

The convalescent plasma therapy was firstly used in the treatment of diphtheria in late 1800's. After that many of the bacterial infections such as pertussis, scarlet fever, influenza etc. have been treated using convalescent plasma therapy. Its therapeutic effectiveness was also studied during the period of Spanish influenza pandemic in 1918-1920. And later on it is widely used as a effective remedy in Measles, Influenza, Chickenpox, Cytomegalovirus, Ebola virus, Middle East Respiratory Syndrome coronavirus (MERS-coV) etc. During H1N1 Influenza pandemic in 2009, studies showed that there was reduction in the mortality rate and decrease in the viral load within short period of time i.e. of five days without showing any adverse effects[2][3]

3. Procedure of Convalescent Plasma Therapy:

Convalescent plasma obtained from a patient who has been currently survived with previous infection and has created memory cells or has been developedhumoral immunity against the pathogen containing huge amount of neutralizing antibodies which can be helpful to remove the virus from the another patient's body.

3.1 Collection of the convalescent plasma :

Apheresis is the process used to collect the convalescent plasma from the donor. Apheresis is the process in which blood is removed from the donor's body, and passed through a machine in which blood is separated by centrifugation in various components such as plasma, red blood cells, leukocytes, platelets,

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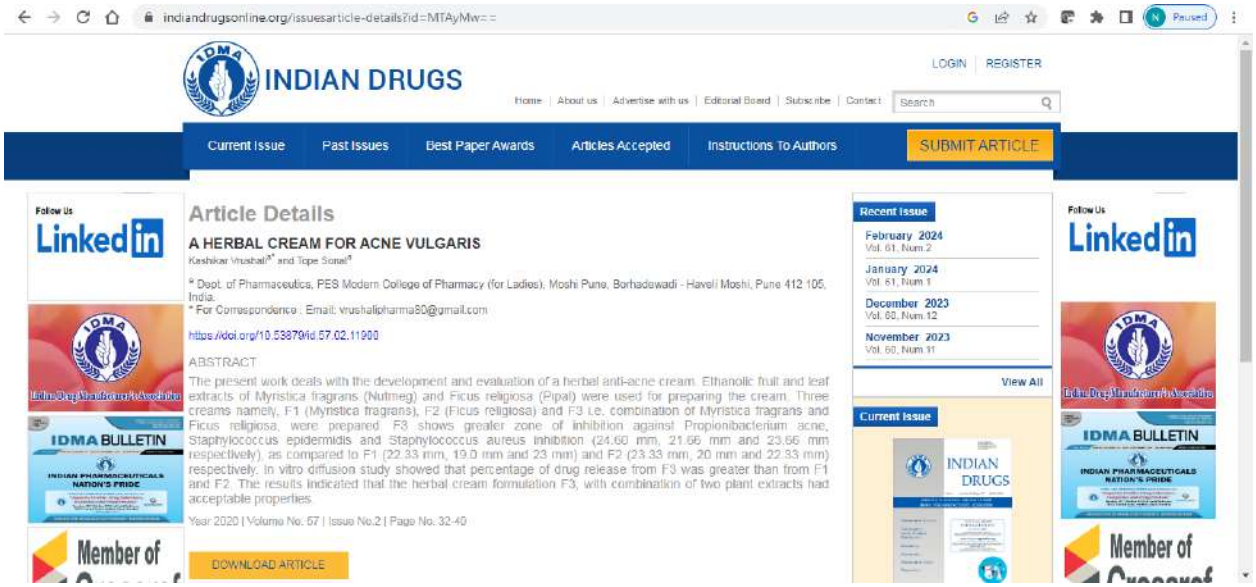

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