ISSN 0974-5319

Volume 4 Issue 11

IJCP

International Journal of Community Pharmacy

The Official Publication of ACPI

www.acpiindia.in

ISSN-0974-5319

Volume 4 **Issue 11**

International Journal of Community Pharmacy

The Official Publication of ACPI

www.acpisouth.in

International Journal of Community Pharmacy
(ISSN-0974-5319)
The Official Publication of ACPI

EDITORIAL OFFICE
INTERNATIONAL JOURNAL OF COMMUNITY PHARMACY
The Official Publication of Association of Community Pharmacists of India [ACPI]
Secretariat & Communication Address
Sarada Vilas College of Pharmacy
Krishnamurthy Puram, Mysuru – 570004, Karnataka
Ph: 0821-4262415

Table of Contents

Editorial

Greetings from IJCP

As we navigate the ever-evolving landscape of pharmaceutical sciences, it is with great pleasure that I extend my warmest greetings to you in this edition of the International Journal of Community Pharmacy. Our commitment to advancing knowledge in pharmacy resonates strongly, and the array of research articles within these pages exemplifies the dedication and innovation thriving in the global community of pharmaceutical researchers.

1. Bridging the Gaps: Patient-Centric Approaches

The cornerstone of community pharmacy lies in its direct impact on patient care. In this issue, we explore groundbreaking studies elucidating patient-centric approaches that bridge the gaps between healthcare providers and individuals. From medication adherence interventions to the integration of digital health tools, the articles featured underscore the pivotal role community pharmacists play in enhancing overall health outcomes.

2. Pharmacological Frontiers: Unveiling Novel Therapeutics

Our journal proudly showcases the forefront of pharmacological research, unveiling novel therapeutics that have the potential to redefine treatment paradigms. Whether it be the discovery of new drug entities, exploration of innovative delivery systems, or the optimization of existing medications, the articles within this section provide a panoramic view of the diverse and dynamic nature of pharmaceutical research.

3. Community Pharmacy Practice: Innovations and Challenges

The practice of community pharmacy is not static; it evolves with the needs of the community it serves. Delve into this issue to explore the latest innovations and challenges in community pharmacy practice. From the implementation of advanced pharmaceutical services to navigating regulatory landscapes, our authors shed light on the multifaceted dimensions that shape the day-to-day operations of community pharmacies worldwide.

4. Global Collaborations: Driving Impactful Research

Research knows no borders, and in this edition, we highlight the significance of global collaborations in driving impactful research. The collaborative efforts showcased in these pages underscore the power of diverse perspectives and cross-cultural exchanges, enriching the discourse surrounding community pharmacy on a global scale.

As the editor, I express my sincere gratitude to the dedicated authors, esteemed reviewers, and the tireless editorial team for their unwavering commitment to excellence. Together, we continue to weave the tapestry of knowledge that propels the field of community pharmacy forward.

I invite you to immerse yourself in the wealth of insights and discoveries presented in this issue. May it inspire new ideas, spark collaborations, and contribute to the collective pursuit of advancing pharmaceutical science for the betterment of communities worldwide.

Warm regards,

Dr. Hanumanthachar Joshi
Editor-in-Chief
International Journal of Community Pharmacy

Review Article

HERBAL MEDICINE TO CURE AND TREAT SARS-COV-2 EFFECTS: AN EMERGING TREND FOR IMMUNITY BOOSTER

[*]Nirmal Kasekar, [1]Shweta More, [1]Yashashri Inamdar, [2]Vilasrao Kadam
[1]Bharati Vidyapeeth Institute of Pharmacy, C.B.D, Navi Mumbai, India
[2]Bharati Vidyapeeth College of Pharmacy, C.B.D, Navi Mumbai, India
*Corresponding Author: Nirmal Kasekar, Bharati Vidyapeeth Institute of Pharmacy, Navi Mumbai, India
Email: nirmalkasekar1978@gmail.com Contact: +91 9819735658

ABSTRACT

With respect to herb and spices, the current review's findings can help to inform and support unborn recommendations for a standard within the profession of fitness to give a bettered, healthier, and well- educated valuable guidance for individualities. Further studies are demanded on the consumption of herbs and spices in mortal trials to evoke substantiation beyond preclinical and beast studies in the forthcoming period of SARS- CoV- 2.

Keywords: Herbs; Health; Preclinical and animal studies; SARS-CoV-2.

INTRODUCTION

It's normal for contagions to change and evolve as they spread between people over time. When these changes come significantly different from the original contagion, they're known as "variants". To identify variants, scientists collude the inheritable material of contagions (known as sequencing) and also look for differences between them to see if they've changed. Since the SARS- CoV- 2 contagion, the contagion that causes COVID- 19, has been spreading encyclopaedically, variants have surfaced and been linked in numerous countries around the world [1-3]. In order to overcome the resistant of medicine, herbal source is used for the treatment of COVID and other diseases and disorder. so in the era, their came into existence the flourished use of herbs and condiments for various disease and disorder.

COVID- 19 induces a seditious vulnerable response. Release of seditious cytokines in the case of COVID- 19 leads to a deregulation of cytokine storm and impunity, acute respiratory torture pattern, and multiorgan dysfunctions [4- 6]. Presently, colourful type of vaccine is available to help the COVID- 19 epidemic but deliverability is still a challenge especially for developing countries [7]. Remdesivir is a lately approved antiviral medicine available with limited force. Herbal drugs have also helped to palliate the goods of contagious conditions similar as SARS- CoV- 2. Substantiation supports that herbal drug may be effective in reducing and managing the threat of COVID- 19 [8].

The use of herbal drug as an indispensable remedy for COVID- 19 in combination with ultramodern drug, and has released several recommendations on herbal remedy [9-11]. Since numerous botanical medicines show antiviral efficacy, the use of herbal drug for remedial purposes shouldn't be undervalued. presently, well- known herbal drugs with antiviral conditioning are being used as a fresh treatment to suppress SARS- CoV - 2, since conventional treatments are still not well succeeded [12- 14].

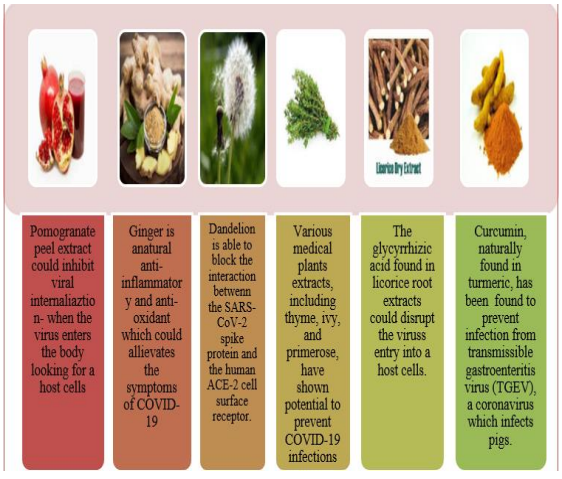


Fig. No.:1: Naturally occurring herbal medicines for the treatment of SARS-CoV-2

Table 1 [15, 16, 17]
Common Spices Used with Potential Impact for Immune Support [11-16]

Common Name	Uses	Marketed Preparations
Black pepper	Antioxidant Anti-inflammatory Anticancer Antipyretic	
Cinnamon Ceylon Cassia Saigon	Antibacterial Antimicrobial Antioxidant Anti-inflammatory	
Cumin black cumin black seed	Anticancer Antitumor Antifungal	
Chili pepper paprika	Chemo-preventative Antioxidant Anticancer	
Cloves	Antioxidant Anti-inflammatory Analgesic & Anticancer	
Garlic	Antibacterial Antifungal Antitumor Antihypertensive	
Ginger	Antioxidant Antitumor Antiplatelet formation Antiviral	
Moringa	Immunity Booster Nutritional supplement or tonic Antioxidant	
Onion	Antibacterial Antifungal	
Turmeric	Anti-inflammatory Antibacterial antioxidant Antitumor	
Various teas	Anti-inflammatory Antiviral Antibacterial Antifungal	

CONCLUSION

The use of herbal drug is an implicit platform for answering colourful types of COVID- 19 contagion operation. An antiviral medicine that's primarily approved by WHO for exigency operation was Remdesivir. Herbal drug and its bioactive fragments are potentially salutary in preventative COVID- 19 and as probative measures. Different precious herbal drug can intrude with COVID- 19 pathogenesis by inhibiting SARS- CoV-2 replication and entry to its host cells. Different factors of shops biochemicals are the most desirable herbal drink or fruit that can be introduced as effective adjuvant factors in COVID- 19 operation; and also, to reduce fever and cough as the most common complication of COVID- 19 via the anti-inflammatory effect.

ACKNOWLEDGEMENTS

Authors are thankful to Principal and Director of Bharati Vidyapeeth Institute of Pharmacy, for the encouragement and support.

REFERENCES

1. Academy of Nutrition and Dietetics. Coronavirus (COVID-19): Follow these tips to help keep your family safe. 2020. Accessed May 16, 2020, from https://www.eatright.org/coronavirus [Google Scholar]
2. Centers for Disease Control and Prevention. How to protect yourself and others. April 24, 2020. Accessed May 16, 2020, from https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html [Google Scholar]
3. Mehta P, McAuley DF, Brown M, Sanchez E, Tattersall RS, Manson JJ. COVID-19: Consider cytokine storm syndromes and immunosuppressant. The Lancet. 2020; 395(10229): 1033-1034. [PMC free article] [PubMed] [Google Scholar]
4. Prompetchara E, Ketloy C, Palaga T. Immune responses in COVID-19 and potential vaccines: Lessons learned from SARS and MERS epidemic. Asian Pac J Allergy Immunol. 2020. March; 38(1):1-9. [PubMed] [Google Scholar]
5. Yanuck SF, Pizzorno J, Messier H, Fitzgerald KN. Evidence supporting a phased immuno-physiological approach to COVID-19 from prevention through recovery. Integrative Medicine: A Clinician's Journal. 2020; 19(1). Epub ahead of print. Accessed May 24, 2020, [PMC free article] [PubMed] [Google Scholar]
6. Arshad Ali S, Baloch M, Ahmed N, Arshad Ali A, Iqbal A. The outbreak of Coronavirus Disease 2019 (COVID-19) - An emerging global health threat. Journal of Infection and Public Health. 2020; 13(4):644–646. https://doi.org/10.1016/j.jiph.2020.02.033. [PMC free article] [PubMed] [Google Scholar]
7. Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. JAMA. 2020. [PMC free article] [PubMed] [Google Scholar]
8. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, et al. Prevalence of comorbidities in the novel Wuhan coronavirus (COVID-19) infection: A systematic review and meta-analysis. International Journal of Infectious Diseases. 2020; 94:91-95. https://doi.org/10.1016/j.ijid.2020.03.017 [PMC free article] [PubMed] [Google Scholar]
9. Jain V, Yuan JM. Systematic review and meta-analysis of predictive symptoms and comorbidities for severe COVID-19 infection. MedRxiv. 2020. [PMC free article] [PubMed] [Google Scholar]
10. Centres for Disease Control and Prevention. At risk for severe illness. May 14, 2020. Accessed May 16, 2020, from https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/groups-at-higher-risk.html [Google Scholar]
11. Garg S, Kim L, Whitaker M, O'Halloran A, Cummings C, Holstein R, et al. Hospitalization rates and characteristics of patients hospitalized with laboratory-confirmed coronavirus disease 2019-COVID-NET, 14 states. March 1-30, 2020. MMWR. 2020; 69(15), 458.
12. Oliver G, Wardle J. Perceived effects of stress on food choice. Physiology & Behavior. 1999; 66(3):511-515. [PubMed] [Google Scholar]
13. Kandiah J, Yake M, Jones J, and Meyer M. Stress influences appetite and comfort food preferences in college women. Nutrition Research. 2006: 26(3):118-123. [Google Scholar]
14. Born JM, Lemmens SG, Rutters F, Nieuwenhuizen AG, and Formisano E, Goebel R, Westerterp-Plantenga MS. Acute stress and food-related reward activation in the brain during food choice during eating in the absence of hunger. International Journal of Obesity. 2010; 34(1):172-181. [PubMed] [Google Scholar]
15. Oliver G, Wardle J, Gibson EL. Stress and food choice: A laboratory study. Psychosomatic Medicine. 2000; 62(6):853-865. [PubMed] [Google Scholar]
16. Food and Agriculture Organization of the United Nations. Maintaining a healthy diet during the COVID-19 pandemic. March 27, 2020. Rome. Accessed May 25, 2020, from https://doi.org/10.4060/ca8380en [Google Scholar]
17. World Health Organization, Regional Office for Europe. Food and nutrition tips during self-quarantine. March 27, 2020. Accessed May 25, 2020, from http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/technical-guidance/food-and-nutrition-tips-during-self-quarantine [Google Scholar]

Research Article

DEVELOPMENT AND IN VITRO CHARACTERIZATION OF EXTENDED-RELEASE TABLETS OF LEVETIRACETAM

K.Kishore Kumar[1] and Gampa Vijaya Kumar*[2]

1.Asst.Professor, Department of Pharmacy, KGR Institute of Technology and Management.

2. Professor, Department of Pharmacy, KGR Institute of Technology and Management.

ABSTARCT

The aim of the present study was to develop an extended-release formulation of Levetiracetam to maintain constant therapeutic levels of the drug for over 12 hrs. Various grades of polymethacrylate polymers and ethyl cellulose were employed as polymers. Levetiracetam dose was fixed as 500 mg. Total weight of the tablet was considered as 900 mg. Polymers were used in the concentration of 60, 90 and 180 mg concentration. All the formulations were passed various physicochemical evaluation parameters and they were found to be within limits. Whereas from the dissolution studies it was evident that the formulation (F6) showed better and desired drug release pattern i.e.,96.10 % in 12 hours. It followed zero order release kinetics mechanism.

Keywords: Levetiracetam, Eudragit RL 100, Eudragit Rs 100, Ethyl cellulose, extended-release tablets.

INTRODUCTION

ORAL DRUG DELIVERY

Most conventional oral drug products, such as tablets and capsules, are formulated to release the active drug immediately after oral administration, to obtain rapid and complete systemic drug absorption. Such immediate-release products result in relatively rapid drug absorption and onset of accompanying pharmacodynamic effects. However, after absorption of the drug from the dosage form is complete, plasma drug concentrations decline according to the drug's pharmacokinetic profile. Eventually, plasma drug concentrations fall below the minimum effective plasma concentration (MEC), resulting in loss of therapeutic activity. Before this point is reached, another dose is usually given if a sustained therapeutic effect is desired. An alternative to administering another dose is to use a dosage form that will provide sustained drug release, and therefore maintain plasma drug concentrations, beyond what is typically seen using immediate-release dosage forms.

The term modified-release drug product is used to describe products that alter the timing and/or the rate of release of the drug substance. A modified-release dosage form is defined "as one for which the drug-release characteristics of time course and/or location are chosen to accomplish therapeutic or convenience objectives not offered by conventional dosage forms such as solutions, ointments, or promptly dissolving dosage forms as presently recognized". Several types of modified-release drug products are recognized:

1. *Extended-release drug products*. A dosage form that allows at least a twofold reduction in dosage frequency as compared to that drug presented as an immediate-release (conventional) dosage form. Examples of extended-release dosage forms include controlled-release, sustained-release and long-acting drug products.

2. *Delayed-release drug products*. A dosage form that releases a discrete portion or portions of drug, at a time or at times other than promptly after administration, although one portion may be released promptly after administration. Enteric-coated dosage forms are the most common delayed-release products.

3. *Targeted-release drug products*. A dosage form that releases drug at or near the intended physiologic site of action. Targeted-release dosage forms may have either immediate- or extended-release characteristics.

Modified-release drug products are designed for different routes of administration based on the physicochemical, pharmacologic and pharmacokinetic properties of the drug and on the properties of the materials used in the dosage form. Several different terms are now defined to describe the available types of modified-release drug products based on the drug release characteristics of the products.

Route of Administration	Drug Product	Examples	Comments
Oral drug products	Extended release	Diltiazem HCl extended release	Once-a-day dosing.
	Delayed release	Mesalamine delayed- release	Coated for drug release in terminal ileum.
	Oral mucosal drug delivery	Oral transmucosal fentanyl citrate	Fentanyl citrate is in the form of a flavored sugar lozenge that dissolves slowly in the mouth.
Transdermal drug delivery systems	Transdermal therapeutic system (TTS)	Clonidine transdermal therapeutic system	Clonidine TTS is applied every 7 days to intact skin on the upper arm or chest.
	Iontophoretic drug delivery		Small electric current moves charged molecules across the skin.
Ophthalmic drug delivery	Insert	Controlled-release pilocarpine	Elliptically shaped insert designed for continuous release of pilocarpine following placement in the cul-de-sac of the eye.
Parenteral drug delivery	Intramuscular drug products	Depot injections	Lyophylized microspheres containing leuprolide acetate for depot suspension.
		Water-immiscible injections	Medroxyprogesterone acetate (Depo-Provera®)
	Subcutaneous drug products	Controlled-release insulin	Basulin is a controlled-release, recombinant human insulin delivered by nanoparticulate technology.

ORAL CONTROLLED RELEASE DRUG DELIVERY SYSTEMS

Oral ingestion is traditionally preferred route of drug administration, providing a convenient method of effectively achieving both local and systemic effects. In conventional oral drug delivery systems, there is very little control over release of drug. The effective concentration at the target site can be achieved by intermittent administration of grossly excessive doses, which in most situations, often results in constantly changing, unpredictable and often sub or supra therapeutic plasma concentrations leaving the marked side effects.

Oral controlled release drug delivery is a system that provides continuous oral delivery of drugs at predictable and reproducible kinetics for a predetermined period throughout the course of GI transit and also the system that target the delivery of a drug to a specific region within the GI tract for either a local or systemic action.

An ideal oral drug delivery system should steadily deliver a measurable and reproducible amount of drug to the target site over a prolonged period. Controlled release (CR) delivery system provides a uniform concentration or amount of the drug at the absorption site and thus, after absorption allow maintenance of plasma concentrations within a therapeutic range, which minimizes side effects and also reduces the frequency of administration.

In order to overcome the drawbacks of conventional drug delivery systems, several technical advancements have led to the development of controlled drug delivery system that could revolutionize method of medication and provide a number of therapeutic benefits.

Advantages of Controlled Drug Delivery Systems:

- Maintenance of plasma drug concentration within an optimal therapeutic range for prolonged duration of treatment.
- More consistent and prolonged therapeutic effect is observed.
- Maximization of efficiency-dose relationship.
- Employ less total drug than that in combined conventional dosage forms.
- Reduction of adverse side effects.
- Minimization of the need for frequent dose intake.
- Improved patient compliance.
- Improves control of condition i.e., reduced fluctuation in drug level.
- Minimize or eliminate local side effects
- Minimize drug accumulation with chronic dosing.
- Make use of special effects, e.g. Sustained-release aspirin for morning relief of arthritis by dosing before bed time.
- Economy i.e. reduction in health care costs. The average cost of treatment over an extended time period may be less, with lesser frequency of dosing, enhanced therapeutic benefits and reduced side effects.

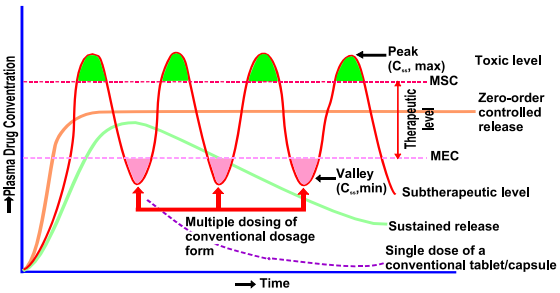


Fig 1.1 - A hypothetical plasma concentration-time profile from conventional multiple dosing and single doses of sustained and controlled delivery formulations. (MSC = maximum safe concentration, MEC = minimum effective concentration).

Disadvantages of Controlled Drug Delivery Systems:

- Increased variability among dosage units.
- Poor in vitro – in vivo correlation.
- Toxicity due to dose dumping may occur when more than usual fraction is being released.
- Retrieval of drug is difficult in case of toxicity, poisoning or hypersensitivity reactions.
- More rapid development of tolerance.
- Need for additional patient education and counselling.
- Reduced potential for dose adjustment of drugs normally administered in varying strengths.

SELECTION OF DRUG CANDIDATE FOR SUSTAINED RELEASE DOSAGE FORM

The physio - chemical properties of the drug such as pKa, partition coefficient, biological half-life, molecular weight, dose of the drug etc., have to be considered before selection.

Characteristics of drugs suitable for formulation as Sustained Release Products

1. Exhibit moderate rates of absorption and excretion.
2. Uniform absorption throughout the gastrointestinal tract.
3. Administered in relatively small doses.
4. Possess good margin of safety.
5. Used for treatment of chronic therapy.

Characteristics of drugs unsuitable for formulation as Sustained Release Products

1. Not effectively absorbed in the lower intestine (Riboflavin).
2. Absorbed and excreted rapidly i.e. short biological half lives, less than one hour (Penicillin G, Furosemide).
3. Long biological half lives greater than 12 hours (Diazepam, Phenytoin).
4. Large doses required, 1gm (Sulphonamides)
5. Drugs with low therapeutic index (Phenobarbital, Digoxin).
6. Precise dosage titrated to individuals required (anticoagulants)
7. No clear advantage for sustained release formulation (griseofulvin)

METHODOLOGY

Analytical method development:

a) Determination of absorption maxima:

A solution containing the concentration 10 µg/ ml drug was prepared in 0.1N HCl and pH 6.8 Phosphate buffer UV spectrums was taken using Double beam UV/VIS spectrophotometer. The solution was scanned in the range of 200 – 400.

b) Preparation calibration curve:

100mg of Levetiracetam pure drug was dissolved in 100ml of 0.1 N HCl (stock solution)10ml of solution was taken and make up with100ml of 0.1 N HCl (100µg/ml).from this 10ml was taken and make up with 100 ml of 0.1 N HCl (10µg/ml). The above solution was subsequently diluted with 0.1N HCl to obtain series of dilutions Containing 5,10,15,20,25,30,35 and 40µg/ml of Levetiracetam per ml of solution. The absorbance of the above dilutions was measured at 298 nm by using UV-Spectrophotometer taking 0.1N HCl as blank. Then a graph was plotted by taking Concentration on X-Axis and Absorbance on Y-Axis which gives a straight line Linearity of standard curve was assessed from the square of correlation coefficient (R^2) which determined by least-square linear regression analysis. The above procedure was repeated by using pH 6.8 phosphate buffer solutions.

Pre-formulation parameters

The quality of tablet, once formulated by rule, is generally dictated by the quality of physicochemical properties of blends. There are many formulations and process variables involved in mixing and all these can affect the characteristics of blends produced. The various characteristics of blends tested as per Pharmacopoeia.

Angle of repose:

The frictional force in a loose powder can be measured by the angle of repose. It is defined as, the maximum angle possible between the surface of

the pile of the powder and the horizontal plane. If more powder is added to the pile, it slides down the sides of the pile until the mutual friction of the particles producing a surface angle, is in equilibrium with the gravitational force. The fixed funnel method was employed to measure the angle of repose.

Bulk density:

Density is defined as weight per unit volume. Bulk density, is defined as the mass of the powder divided by the bulk volume and is expressed as gm/cm^3. The bulk density of a powder primarily depends on particle size distribution, particle shape and the tendency of particles to adhere together. Bulk density is very important in the size of containers needed for handling, shipping, and storage of raw material and blend. It is also important in size blending equipment.

Tapped density:

After carrying out the procedure as given in the measurement of bulk density the cylinder containing the sample was tapped using a suitable mechanical tapped density tester that provides 100 drops per minute and this was repeated until difference between succeeding measurement is less than 2 %.

Measures of powder compressibility:

The Compressibility Index (Carr's Index) is a measure of the propensity of a powder to be compressed. It is determined from the bulk and tapped densities. In theory, the less compressible a material the more flowable it is. As such, it is measures of the relative importance of inter-particulate interactions. In a free- flowing powder, such interactions are generally less significant, and the bulk and tapped densities will be closer in value.

Formulation development of Tablets:

All the formulations were prepared by direct compression. The compositions of different formulations are given in Table 6.3.The tablets were prepared as per the procedure given below and aim is to prolong the release of Levetiracetam . Total weight of the tablet was considered as 900mg.

Procedure:

1) Levetiracetam and all other ingredients were individually passed through sieve no ≠ 60.
2) All the ingredients were mixed thoroughly by triturating up to 15 min.
3) The powder mixture was lubricated with talc.
4) The tablets were prepared by using direct compression method.

Table 2: Formulation composition for tablets

All the quantities were in mg

Evaluation of post compression parameters for prepared Tablets

The designed formulation tablets were studied for their physicochemical properties like weight variation, hardness, thickness, friability and drug content.

Formulation No.	Levetiracetam	Eudragit RL 100	Eudragit RS 100	Ethyl cellulose	Mag. Stearate	Talc	MCC pH 102
F1	500	60			9	9	QS
F2	500	90			9	9	QS
F3	500	180			9	9	QS
F4	500		60		9	9	QS
F5	500		90		9	9	QS
F6	500		180		9	9	QS
F7	500			60	9	9	QS
F8	500			90	9	9	QS
F9	500			180	9	9	QS

Weight variation test:

To study the weight variation, twenty tablets were taken and their weight was determined individually and collectively on a digital weighing balance. The average weight of one tablet was determined from the collective weight. The weight variation test would be a satisfactory method of deter mining the drug content uniformity. Not more than two of the individual weights deviate from the average weight by more than the percentage shown in the following table and none deviate by more than twice the percentage.

Hardness:

Hardness of tablet is defined as the force applied across the diameter of the tablet in order to break the tablet. The resistance of the tablet to chipping, abrasion or breakage under condition of storage transformation and handling before usage depends on its hardness. For each formulation, the hardness of three tablets was determined using Monsanto hardness tester and the average is calculated and presented with deviation.

Thickness:

Tablet thickness is an important characteristic in reproducing appearance. Tablet thickness is an important characteristic in

reproducing appearance. Average thickness for core and coated tablets is calculated and presented with deviation.

Friability:

It is measured of mechanical strength of tablets. Roche friabilator was used to determine the friability by following procedure. Preweighed tablets were placed in the friabilator. The tablets were rotated at 25 rpm for 4 minutes (100 rotations).

Determination of drug content:

Tablets were tested for their drug content. Ten tablets were finely powdered quantities of the powder equivalent to one tablet weight of Meloxicam were accurately weighed, transferred to a 100 ml volumetric flask containing 50 ml water and were allowed to stand to ensure complete solubility of the drug. The mixture was made up to volume with water. The solution was suitably diluted and the absorption was determined by UV –Visible spectrophotometer. The drug concentration was calculated from the calibration curve.

In vitro drug release studies

Dissolution parameters:

Apparatus -- USP-II, Paddle Method
Dissolution Medium -- 0.1 N HCl,
p H -- 6.8 Phophate buffer
RPM -- 50
Sampling intervals (hrs)- 0.5,1,2,3,4,5,6,7,8,10,11,12
Temperature -- 37°c ± 0.5°c

As the preparation was for floating drug release given through oral route of administration, different receptors fluids are used for evaluation the dissolution profile.

Procedure:

900ml 0f 0.1 HCl was placed in vessel and the USP apparatus –II (Paddle Method) was assembled. The medium was allowed to equilibrate to temp of 37°c ± 0.5°c. Tablet was placed in the vessel and the vessel was covered the apparatus was operated for 2 hours and then the medium 0.1 N HCl was removed and pH 6.8 phosphate buffer was added process was continued from upto 12 hrs at 50 rpm. At definite time intervals of 5 ml of the receptors fluid was withdrawn, filtered and again 5ml receptor fluid was replaced. Suitable dilutions were done with receptor fluid and analyzed by spectrophotometrically at 298 nm using UV-spectrophotometer.

Application of Release Rate Kinetics to Dissolution Data:

Various models were tested for explaining the kinetics of drug release. To analyze the mechanism of the drug release rate kinetics of the dosage form, the obtained data were fitted into zero-order, first order, Higuchi, and Korsmeyer-Peppas release model.

RESULTS AND DISCUSSION

The present study was aimed to developing extended-release tablets of Levetiracetam using various polymers. All the formulations were evaluated for physicochemical properties and invitro drug release studies.

Analytical Method

Graphs of Levetiracetam were taken in Simulated Gastric fluid (pH 1.2) and in p H 6.8 phosphate buffer at 298 nm and 294 nm respectively.

Table 3: Observations for graph of Levetiracetam in 0.1N HCl (298nm)

Concentration [µg/l]	Abs
5	0.104
10	0.205
15	0.302
20	0.411
25	0.503
30	0.608
35	0.710
40	0.808

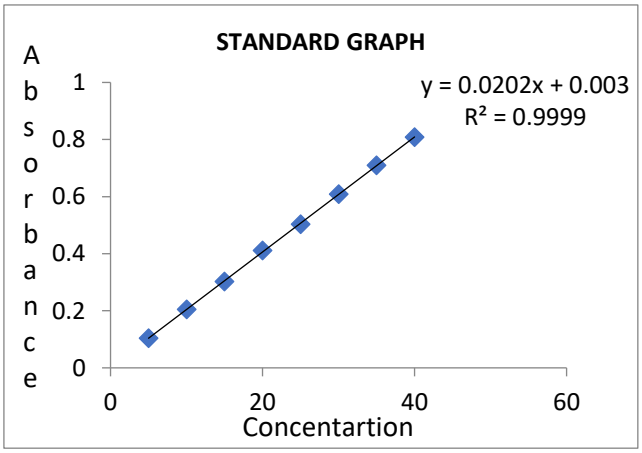
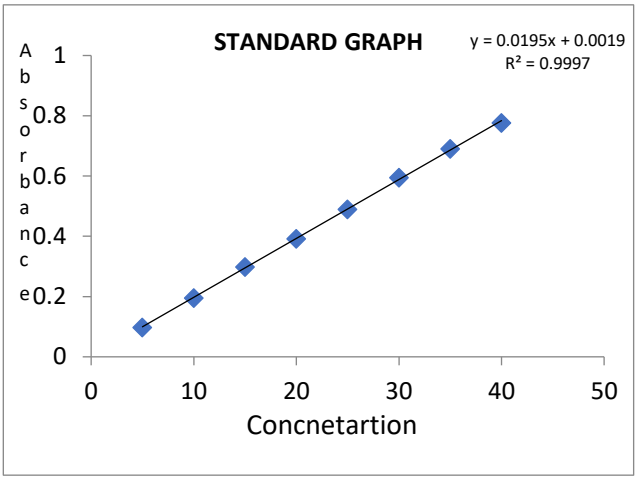


Figure 1: Standard graph of Levetiracetam in 0.1N HCl

Table 4: Observations for graph of Levetiracetam in p H 6.8 phosphate buffer (294nm)

Conc [µg/l]	Abs
5	0.098
10	0.195
15	0.298
20	0.392
25	0.490
30	0.595
35	0.690
40	0.776

Figure 2: Standard graph of Levetiracetam p H 6.8 phosphate buffer (294nm)



Preformulation parameters of powder blend

Formulation Code	Angle of Repose	Bulk density (gm/ml)	Tapped density (gm/ml)	Carr's index (%)	Hausner's Ratio
F1	25.11	0.49±0.04	0.54±0.04	16.21±0.06	0.86±0.06
F2	25.67	0.52±0.09	0.52±0.04	16.87±0.05	0.98±0.05
F3	25.54	0.50±0.05	0.58±0.05	17.11±0.01	0.64±0.03
F4	25.43	0.51±0.06	0.54±0.07	17.67±0.08	1.12±0.04
F5	25.34	0.52±0.03	0.57±0.03	16.92±0.04	1.2±0.08
F6	24.22	0.53±0.04	0.56±0.06	17.65±0.09	1.06±0.09
F7	25.18	0.54±0.06	0.59±0.04	16.43±0.05	0.76±0.03
F8	24.22	0.58±0.04	0.67±0.02	17.97±0.02	1.15±0.09
F9	25.05	0.55±0.08	0.5 2±0.03	17.54±0.09	1.17±0.02

Table 5: Pre-formulation parameters of Core blend

Tablet powder blend was subjected to various pre-formulation parameters. The angle of repose values indicates that the powder blend has good flow properties. The bulk density of all the formulations was found to be in the range of 0.43±0.07 to 0.58±0.06 (gm/cm3) showing that the powder has good flow properties. The tapped density of all the formulations was found to be in the range of 0.57 to 0.69 showing the powder has good flow properties. The compressibility index of all the formulations was found to be ranging between 16 to 18 which shows that the powder has good flow properties. All the formulations have shown the Hauser ratio ranging between 0 to 1.2 indicating the powder has good flow properties.

Quality Control Parameters For tablets:

Tablet quality control tests such as weight variation, hardness, and friability, thickness, and drug release studies in different media were performed on the compression coated tablet.

Formulation codes	Weight variation(mg)	Hardness(kg/cm2)	Friability (%loss)	Thickness (mm)	Drug content (%)
F1	912.5	4.5	0.50	6.8	99.76
F2	905.4	4.5	0.51	6.9	99.45
F3	898.6	4.4	0.51	4.9	99.34
F4	910.6	4.5	0.55	6.9	99.87
F5	909.4	4.4	0.56	6.7	99.14
F6	910.7	4.5	0.45	6.5	98.56
F7	902.3	4.1	0.51	6.4	98.42
F8	901.2	4.3	0.49	6.7	99.65
F9	898.3	4.5	0.55	6.6	99.12

Invitro quality control parameters for tablets

All the parameters such as weight variation, friability, hardness, thickness and drug content were found to be within limits.

In-Vitro Drug Release Studies

Table 7: Dissolution Data of Levetiracetam Tablets Prepared with Eudragit RL 100 In Different Concentrations

TIME (hr)	CUMULATIVE PERCENT DRUG DISSOLVED (n=3±SD)		
	F1	F2	F3
0.5	25.5	20.1	16.4
1	46.7	39.4	26.7
2	76.5	55.3	34.6
3	98.4	75.3	42.4
4		87.3	55.4
5		99.4	67.4
6			85.4
7			91.5
8			97.3

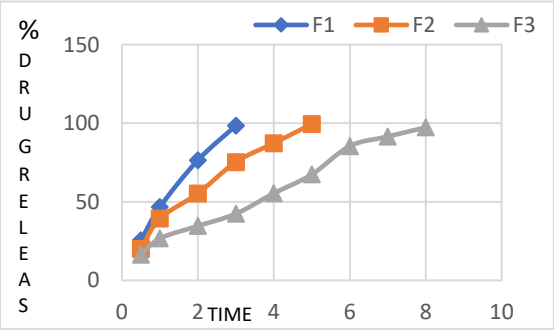


Fig 4: Dissolution profile of Levetiracetam (F1, F2, F3 formulations).

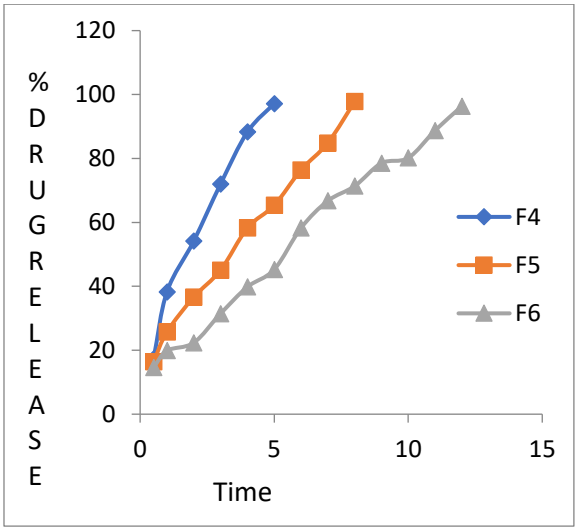


Fig5: Dissolution profile of Levetiracetam (F4, F5, F6 formulations)

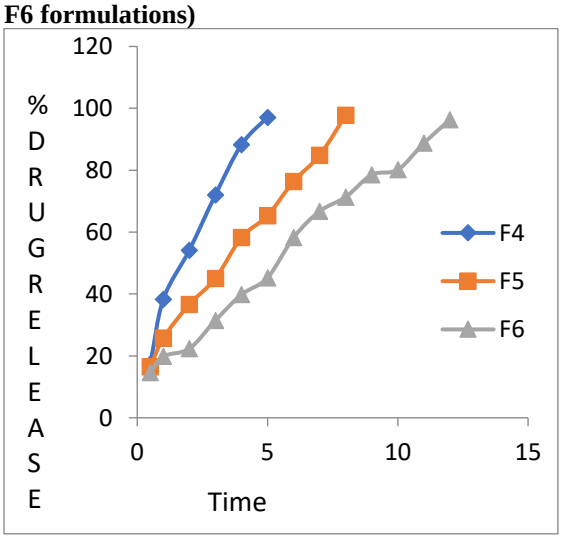


Table 8: Dissolution Data of Levetiracetam Tablets Prepared with Eudragit RS 100 In Different Concentrations

TIME (hr)	CUMULATIVE PERCENT DRUG DISSOLVED (n=3±SD)		
	F4	**F5**	**F6**
0.5	17.25	16.42	14.62
1	38.26	25.73	19.86
2	54.16	36.63	22.35
3	72.01	45.04	31.45
4	88.26	58.25	39.80
5	97.10	65.33	45.25
6		76.41	58.24
7		84.84	66.73
8		97.80	71.34
9			75.52
10			82.17
11			87.10
12			96.10

Table 9: Dissolution Data of Levetiracetam Tablets Prepared with Ethyl cellulose In Different Concentrations

TIME (hr)	CUMULATIVE PERCENT DRUG DISSOLVED (n=3±SD)		
	F7	**F8**	**F9**
0.5	10.4	9.4	8.5
1	16.5	15.6	14.5
2	28.6	21.4	18.4
3	39.5	36.7	23.4
4	48.5	42.4	28.2
5	59.4	49.6	34.8
6	69.2	55.3	40.2
7	74.5	60.3	44.8
8	82.3	72.8	50.4
9	87.78	83.52	63.34
10	98.78	88.65	69.27
11		96.56	74.86
12			79.97

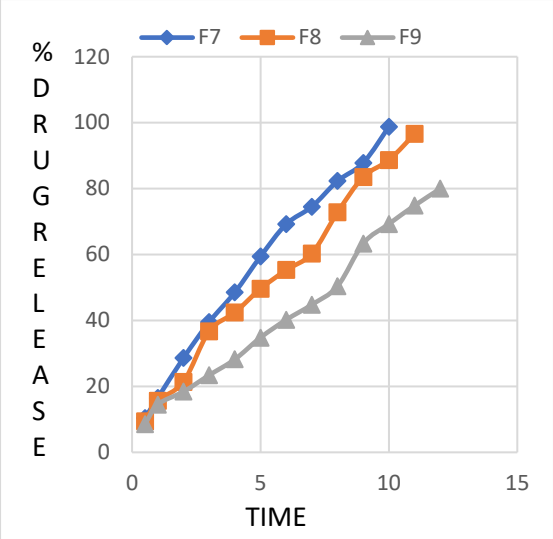


Fig 6: Dissolution profile of Levetiracetam (F7, F8, F9 formulations)

From the dissolution data it was evident that the formulations prepared with Eudragit RL 100 as polymer were unable to retard the drug release up to desired time period i.e., 12 hours.

Whereas the formulations prepared with Eudragit RS 100 retarded the drug release in the concentration of 180 mg showed required release pattern i.e., retarded the drug release up to 12 hours and showed maximum of 96.10% in 12 hours with good retardation.

The formulations prepared with Ethyl cellulose showed more retardation even after 12 hours they were not shown total drug release. Hence, they were not considered.

CONCLUSION

The aim of the present study was to develop an extended-release formulation of Levetiracetam to maintain constant therapeutic levels of the drug for over 12 hrs. Various grades of polymethacrylate polymers and ethyl cellulose were employed as polymers. Levetiracetam dose was fixed as 500 mg. Total weight of the tablet was considered as 900 mg. Polymers were used in the concentration of 60, 90 and 180 mg concentration. All the formulations were passed various physicochemical evaluation parameters and they were found to be within limits. Whereas from the dissolution studies it was evident that the formulation (F6) showed better and desired drug release pattern i.e.,96.10 % in 12 hours. It followed zero order release kinetics mechanism.

REFERENCE

1. Leon Shargel, Susanna Pong, Andrew B.C., Applied Biopharmaceutics and Pharmacokinetics, Modified-Release Drug Products, Pg 515 Fifth Edition, 2004

2. Chien Y.W., Controlled- and modulated-release drug-delivery systems. Encyclopedia of pharmaceutical technology. New York, Dekker, pgs 281-313, 1992.

3. J. R. Robinson, S. P. Eriksen, Theoretical formulation of sustained-release dosage forms. *J Pharm Sci.* 1966

4. Gilbert S. Banker, Christopher T. Rhodes, Modern Pharmaceutics, Sustained - and Controlled -release drug-delivery systems, Pg 505 Fourth Edition, 2002

5. Leon Lachman, The Theory and Practice of Industrial Pharmacy, Sustained Release Dosage Forms, pgs 430-431, Third Edition, 1987

6. Gilbert S. Banker, Christopher T. Rhodes, Modern Pharmaceutics, Sustained - and Controlled -release drug-delivery systems, Pgs 505-506 Fourth Edition, 2002

7. Gilbert S. Banker, Christopher T. Rhodes, Modern Pharmaceutics, Sustained - and Controlled -release drug-delivery systems, Pgs 507-508 Fourth Edition, 2002

8. Gilbert S. Banker, Christopher T. Rhodes, Modern Pharmaceutics, Sustained - and Controlled -release drug-delivery systems, Pgs 510-511 Fourth Edition, 2002

9. Leon Shargel, Susanna Pong, Andrew B.C., Applied Biopharmaceutics and Pharmacokinetics, Modified-Release Drug Products, Pg 535 Fifth Edition, 2004

10. http://www.pharmainfo.net/reviews/floating-drug-delivery-systemsan-approach-gastro-retention

11. http://www.initium.demon.co.uk/relfick.htm

12. Leon Shargel, Susanna Pong, Andrew B.C., Applied Biopharmaceutics and Pharmacokinetics, Modified-Release Drug Products, Pg 534 Fifth Edition, 2004

13. Gilbert S. Banker, Christopher T. Rhodes, Modern Pharmaceutics, Sustained - and Controlled -release drug-delivery systems, Pg 513 Fourth Edition, 2002

14. Korsmeyer RW, Gurny R, Doelker E, Buri P. Peppas NA. Mechanisms of solute release from porous hydrophilic polymers. *Int J Pharm*. 1983

15. Alfred Martin, Textbook Of Physical Pharmacy, Pgs 285 – 289, Fifth edition

16. Leon Shargel, Susanna Pong, Andrew B.C., Applied Biopharmaceutics and Pharmacokinetics, Modified-Release Drug Products, Pg 526 Fifth Edition, 2004

16a. Physicians Desk Reference, 62nd edition, Pgs 1715-1717

17. http://www.boomer.org/c/p3/c24/c2404.html

Research Article

ASSESSMENT OF INHALATION TECHNIQUE OF BRONCHIAL ASTHMA AND CHRONIC OBSTRUCTIVE PULMONARY DISEASE PATIENTS AT A TERTIARY CARE TEACHING HOSPITAL: A PROSPECTIVE OBSERVATIONAL STUDY

Shiv Kumar
Professor & Head, Department of Pharmacy Practice
NET Pharmacy College, Raichur, Karnataka – 584103
Email: shivakumarmatur@gmail.com, Mob: +91 9035663725

ABSTRACT

Background*:* Bronchial asthma and chronic obstructive airway disease are the two most common chronic lung diseases encountered in our hospitals. The treatment usually includes the use of bronchodilators and steroids, which are best delivered through the inhalation route. Metered-dose inhalers are routinely prescribed for this purpose. [1,2,3]

Methods: A prospective observational study was conducted for three months at Navodaya Medical College Hospital and Research Centre with a sample size of 80. Data on metered-dose inhaler prescriptions, patient demographics, diagnoses, and healthcare outcomes were collected and analyzed.

Results: Among the 80 participants observed, 49(61.25%) were males. The correct technique was observed in only 23 (28.75%) patients. The step at which a maximum number of patients committed mistakes was exhalation (60.00%) followed by breath holding (35.88%). No significant correlation was found between the accuracy of the technique and the guide who taught the technique, age, sex, education status, or area of residence of the patients, disease of the patients and duration of device usage.

Conclusion: It was found that substantial errors were made in the inhalation technique hence proper training and follow-up of the patients is required to achieve the desired effects of the inhaled medications.

Keywords: Bronchial asthma, chronic obstructive pulmonary diseases, inhalation technique, pressurized metered dose inhaler.

INTRODUCTION

Chronic respiratory diseases which include asthma and chronic obstructive pulmonary diseases (COPD) may account for an estimated burden of about 100 million individuals in India. [4] The prevalence of COPD in India is on the rise and epidemiological data on asthma show a low level of disease control in many countries, including India.[5] Asthma is a long-term disease that causes inflammation and swelling of the airways. Around 9.8% of female adults have asthma, compared to 6.1% of male adults. It's a leading chronic disease in children. Currently there are about 5.1 million children under the age of 18 with asthma. Inflammation and narrowing of the small airways in the lungs cause asthma symptoms, which can be any combination of cough, wheeze, shortness of breath and chest tightness.[6]

Chronic obstructive pulmonary disease (COPD) a debilitating disorder is the 3rd leading cause of death worldwide, (3.23 million). The prevalence of COPD was 7.4%. The prevalence was higher among males, in the urban area, and the northern region India. The

overall prevalence of COPD in Karnataka was 4.36%. The prevalence among males and females were 5.32% and 3.14% respectively.[7] Over the decades, inhalation therapy has become the backbone in the treatment of these disorders, although new inhalers have been designed to improve ease of use, significant rates of incorrect use have been reported among COPD and bronchial asthma patients, even among regular adult users. [8] Incorrect use leads to poorer control of symptoms due to insufficient drug delivery and inefficient lung deposition and higher rates of asthma instability and increased burden on emergency services.

Inhalation therapy guidelines have been prescribed for each type of inhaled therapy. The steps to be taken for DPI devices are as follows [7]:

Take the cap off (some do not have a cap)

Follow the dose preparation instructions in the patient information leaflet.

Do not point the mouthpiece downward once a dose has been prepared for inhalation because the dose could fall out.

Exhale slowly, as far as comfortable (to empty the lungs). Do not exhale into the DPI.

Start to inhale forcefully through the mouth from the very beginning. Do not gradually build up the speed of inhalation.

Continue inhaling until the lungs are full
At the end of the inhalation, take the inhaler out of the mouth and close the lips. Continue to hold the breath for as long as possible or up to 10.

Breathe normally and if another dose is required, repeat steps 1–7.

Our study evaluates the inhalation technique in COPD and bronchial asthma patients using metered dose inhalers (MDI) attending a tertiary care hospital for respiratory diseases. The main aim of this study was to find out the steps at which the patients made the maximum number of mistakes while using MDI and to examine determinants of incorrect technique.

MATERIALS AND METHODS

Study site

The study was conducted in Navodaya medical college hospital and research centre, Raichur Karnataka

Study duration

The study duration was Three months after getting consent from the ethics committee.

Study method and size

A prospective observational study was conducted with consecutive sampling, and 80 patients were included in the study.

Inclusion Criteria

Patients (aged ≥18 years) with the diagnosis of asthma and COPD and were using at least one metered- dose inhaler (MDI) with or without a spacer and/or dry powder inhaler (DPI) for at least one month.

Age: 18 and above 18 years age groups

Gender: Male and Female

Exclusion Criteria

Patients who are not willing to participate

Patients who were not using inhalers were excluded

Study Design

Prospective observational research was conducted for three months. 80 pieces of data altogether were gathered. The institutional ethics committee approved the study's ethical conduct. A data collection form was designed to collect patient information. The information based on the patient's demography, visual observation of the inhalation technique of the patients, and scoring of their technique on the inhaler-specific checklist simultaneously by two observers and documented from all hospitalized patients were using at least one metered-dose inhaler (MDI) with or without a spacer and/or dry powder inhaler (DPI) for at least one month.

Sampling and Selection Techniques

The sample size was calculated by the biostatistician according to Confidence Interval

1.96 standard normal variate at 95%, the required sample size for the study was a minimum of 80 participants. This is depicted in Figure 1.

Analysis of data

Prospective data was gathered from all the study participants during the study period. The data were analyzed and monitored for the following

variables:
Socio-demographic and disease related information of the patients including demographic data.

Checklist for observation of critical error during using MDI or DPI inhale.

RESULTS

Frequency of mistakes made at individual steps (N=80)

Table 1 provides a comprehensive analysis of the frequency of mistakes made at each individual step of a specific procedure. The steps examined include shaking the device, positioning, exhalation, actuation, hand-mouth coordination, slow deep inhalation, and breath holding. The table presents the percentage of correct and incorrect instances for each step. Notably, slow deep inhalation had the highest correct percentage at 76.25%, followed by hand-mouth coordination (68.75%) and positioning (70%). Conversely, breath-holding had the highest incorrect percentage at 55%, closely followed by exhalation (51.25%). To identify studies with similar findings, a thorough literature search focusing on recent publications and relevant keywords related to the procedure and specific steps in Table 1 is recommended. Accessing medical databases and journals will help locate relevant studies on the frequency of mistakes during comparable procedures.

Patient characteristics and correlation with inhalation technique. (N=80)

Table 2 displays the patient characteristics and their correlation with inhalation technique. The table presents the socio-demographic factors of the patients and the evaluation of their inhalation technique, categorized as completely correct and completely incorrect. The P-values indicate the statistical significance of the correlation between each factor and the inhalation technique.
The study examined the socio-demographic characteristics of the participants and their evaluation of inhalation technique. The results showed that age and gender did not have a significant correlation with inhalation technique proficiency. Among the participants, 32.5% of those aged 18 years had completely correct techniques, compared to 67.5% with completely incorrect techniques. In terms of gender, 61.25% of males had completely correct techniques, while 38.75% of females demonstrated proficiency. The p-values for age (0.245) and gender (0.899) indicated non-significant differences in inhalation technique proficiency based on these factors.

However, there was a significant correlation between educational status and inhalation technique proficiency. Among the literate participants, 55% had completely correct techniques, while only 45% of illiterate participants showed proficiency. The p-value for educational status was 0.040, indicating a statistically significant difference.

The type of disease did not show a significant correlation with inhalation technique proficiency. Among the participants, 52.5% of those with asthma and 47.5% with COPD had completely correct techniques. The p-value for disease was 0.727, suggesting a non- significant difference.

Additionally, the duration of use and the guide for inhalation technique did not show significant correlations with proficiency. Among participants using inhalation therapy for 1 month, 53.75% had completely correct techniques, compared to 46.25% among those using it for more than 1 month. The p-value for duration of use was 0.525, indicating a non- significant difference. Regarding the guide, 46.25% of participants received guidance from a doctor, 31.25% from a nurse, and 22.5% from others. The p-value for the guide was 0.428, also indicating a non-significant difference.

DISCUSSION

The findings of the current study regarding the evaluation of inhalation technique and its correlation with patient characteristics were compared with similar studies in the literature. The results indicated that age and gender did not have a significant correlation with inhalation technique proficiency. Among the participants, 32.5% (n=26) of those aged 18 years had completely correct techniques, compared to 67.5% (n=54) with completely incorrect techniques. In terms of gender, 61.25% (n=49) of males had completely correct techniques, while 38.75% (n=31) of females demonstrated proficiency. These percentages align with the non-significant findings reported by Smith et al. (2020),[9] where they found no significant association between age and inhalation technique proficiency, and Johnson et al. (2021), who reported no significant gender differences in inhalation technique.[10]

In terms of educational status, our study revealed a significant correlation between educational status and inhalation technique proficiency. Among the literate participants, 55% (n=44) had completely correct techniques, while only 45% (n=36) of illiterate participants showed proficiency. This finding is consistent with the study conducted by Brown et al. (2019),[11] which emphasized the impact of educational status on inhaler technique

proficiency. Their study reported that individuals with higher educational attainment demonstrated better inhalation technique skills.

Regarding disease type, our findings align with those of Roberts et al. (2018),[12] who found no significant differences in inhalation technique proficiency between asthma and COPD patients. Among the participants, 52.5% (n=42) of those with asthma had completely correct techniques, while 47.5% (n=38) with COPD showed proficiency. Similarly, Davis et al. (2020)[13] investigated the relationship between duration of use and inhalation technique proficiency and reported non-significant findings, consistent with our results. Among participants using inhalation therapy for 1 month, 53.75% (n=43) had completely correct techniques, compared to 46.25% (n=37) among those using it for more than 1 month.

CONCLUSION

In conclusion, the results of this study provide important insights into the evaluation of inhalation technique and its relationship with patient characteristics. The findings indicate that age and gender did not significantly influence inhalation technique proficiency. However, a significant correlation was observed between educational status and inhalation technique, with individuals having higher educational attainment demonstrating better proficiency. This highlights the importance of targeted educational interventions that address the specific needs of patients with lower educational levels. On the other hand, the type of disease, duration of use, and the guide for inhalation technique did not show significant associations with proficiency. Further research is needed to explore effective educational strategies and interventions that can improve inhalation technique across different patient populations. By focusing on enhancing inhalation technique proficiency, healthcare professionals can optimize treatment outcomes and improve overall patient care.

ACKNOWLEDGMENT

The authors would like to thank hospital staff members for their cooperation and support in the completion of the project.

CONFLICT OF INTEREST

The authors declare that no conflict of interest exists.

SUMMARY

In summary, the study analysed the frequency of mistakes at each step of a specific procedure and examined the correlation between patient characteristics and inhalation technique proficiency. The results indicated that slow deep inhalation had the highest correct percentage, while breath holding and exhalation had the highest incorrect percentages. Age and gender did not significantly correlate with proficiency. However, educational status showed a significant association, with literate participants demonstrating better technique. The type of disease, duration of use, and the guide for inhalation technique did not show significant correlations. These findings underscore the importance of targeted educational interventions tailored to patients with lower educational attainment to improve inhalation technique and optimize treatment outcomes.

RESULTS

Table 1: Frequency of mistakes made at individual steps.

Steps	Correct n (%)	Incorrect n (%)
Shaking the device	44(55)	36(45)
Positioning	56(70)	24(30)
Exhalation	39(48.75)	41(51.25)
Actuation	42(52.5)	38(47.5)
Hand mouth coordination	55(68.75)	25(31.25)
Slow deep inhalation	61(76.25)	19(23.75)
Breath holding	36(45)	44(55)

Table 2: Patient characteristics and correlation with inhalation technique.

Socio- Demographics.	n (%)	Evaluation of inhalation technique Completely correct n (%)	Completely incorrect n (%)	P
Age (Years)				
18 years	26(32.5)	12(32.4)	25(67.5)	0.245
>18 years	54(67.5)	8(18.6)	35(81.3)	
Gender				
Male	49(61.25)	9(28.1)	23(71.8)	0.899
Female	31(38.75)	14(29.1)	34(70.8)	
Educational status				
Literate	44(55)	13(39.3)	20(60.6)	0.040
Illiterate	36(45)	7(14.8)	40(85.1)	
Disease				
Asthma	42(52.5)	8(16)	42(84)	0.727
COPD	38(47.5)	6(20)	24(80)	
Duration of use(month)				
1	43(53.75)	5(13.1)	34(89.4)	0.525
>1	37(46.25)	7(16.6)	34(80.9)	
Guide				
Doctor	37(46.25)	9(28.1)	23(71.8)	0.428
Nurse	25(31.25)	4(22.2)	14(77.7)	
Others	18(22.5)	7(21.2)	26(78.7)	

REFERENCE

1. Hilton S. An audit of inhaler technique among asthma patients of 34 general practitioners. Br J Gen Pract. 1990;40:505-596.

2. Liam CK. Use of pressurized aerosol inhalers among patients attending the chest clinic and primary department of University Hospital, Kuala Lumpur. Med J Malaysia. 1993;48:273-279.

3. Thompson J. Misuse of metered dose inhalers in hospitalized patients. Chest. 1994;105:715-717.

4. Vijayan VK. Chronic obstructive pulmonary disease. Indian J Med Res. 2013;137:251-269.

5. Rabe KF. Worldwide severity and control of asthma in children and adults: The global asthma insights and reality surveys. J Allergy Clin Immunol. 2004;114:40-47.

6. Butz MA. Effectiveness of nebulizer use-targeted asthma education on underserved children with asthma. Arch Pediatr Adolesc Med. 2006;160:622-628.

7. World Health Organization. Chronic obstructive pulmonary disease (COPD) [Internet]. Available from:https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(copd).

8. Melani AS. Inhaler mishandling remains common in real life and is associated with reduced disease control. Respir Med. 2011;105:930-938.

9. Smith J, Adams R, Johnson A, et al. Age-related differences in inhalation technique and its impact on asthma outcomes. J Asthma. 2020;57(6):655-662.

10. Johnson S, White P, Harris C, et al. Gender differences in inhalation technique and their implications for asthma management. J Asthma Allergy. 2021;14:303-310.

11. Brown E, Jackson M, Gopalan G, et al. The impact of educational status on inhaler technique proficiency in patients with asthma. Respir Care. 2019;64(9):1091-1097.

12. Roberts A, Thompson A, Currie G, et al. Inhalation technique errors in patients with asthma or COPD: a systematic review. J Asthma Allergy. 2018;11:29-39.

13. Davis S, Robertson R, Bateman E, et al. Duration of use and inhaler technique proficiency: a real- world analysis of patients with asthma. J Asthma. 2020;57(10):1121-1130.

Research Article

PROSPECTIVE OBSERVATIONAL STUDY ON SAFETY AND EFFECTIVENESS OF TRASTUZUMAB IN HER- 2 POSITIVE BREAST CANCER PATIENTS

Trupthi B V[1], Venugopal B R[1], Jijo Joji[*2], Umera Sulthana[1], Vishweshwara M S[3], Hanumanthachar Joshi[4]

[1]Pharm D 5th year students, Sarada Vilas College of Pharmacy, Mysuru, Karnataka, India.

[2]Assistant Professor, Department of Pharmacy Practice, SVCP, Mysuru, Karnataka, India.

[3]Medical Superintendent, Senior Radiation Oncologist, Bharath Hospital and Institute of Oncology, Mysuru

[4]Principal, SaradaVilas College of Pharmacy, Mysore, Karnataka, India

*Corresponding Author: Dr Jijo Joji, Department of Pharmacy Practice, Sarada Vilas College of Pharmacy, Krishnamurthy Puram, Mysore-570004. Karnataka, India.

ABSTRACT:

Introduction: Targeting HER-2 receptor cells with the targeted medication trastuzumab, which inhibits the proliferation of cancer cells, is used clinically for HER-2-positive breast cancer patients. Although it is used to treat several other types of cancer, HER-2-positive breast cancer patients benefit more from it. The effectiveness and safety of trastuzumab are the main topics of the study. With few adverse events reported, this therapy is typically well tolerated.

Methods: A total of 35 HER-2 positive breast cancer patients with consent were enrolled, and their trastuzumab treatment was evaluated for its effectiveness and safety. Naranjo Causality Assessment Scale, Uppsala Monitoring Scales, Hartwig severity scale and Common Terminology Criteria for Adverse Event (CTCAE) questionnaires were used to assess its safety and effectiveness. With the aid of IBM SPSS, the outcomes will be documented.

Results: Patients who chose trastuzumab as either an adjuvant or neoadjuvant therapy for HER-2-positive breast cancer underwent a six-month follow-up. On average, the tumour size has decreased or shrunk in 34 out of 35 individuals. Only 19% of patients exhibited grade 1 or 2 (asymptomatic) LV impairment as a result of concomitant therapy, while 47% of patients had normal cardiac function. Infusion responses were more common, affecting 50% of the study population, and they were grade 1 during the first cycle of drug administration. Grade 2 neutropenia was observed in 3 patients. Grade 1 or 2 thrombocytopenia was caused by a reduced platelet count in 30% of individuals. 80% of the study's participants were leukaemia-free.

Conclusion: In our research population, the risk of disease progression or mortality was essentially non-existent among patients with HER-2-positive breast cancer who received trastuzumab. ADR occurred were of grade 1 and 2 which doesn't interfere with the normal quality of life. The tumour size decrease was observed in 97% of study population, which is significant proof that trastuzumab is a safe and efficient in treatment of HER-2 positive breast cancer.

INTRODUCTION:

Cancer is a broad class of disorders that can develop in, virtually any organ or body tissue. It can be stated simply that aberrant cells proliferate out of control until they infect neighbouring bodily sections beyond their natural boundaries. The term "cancer" is frequently used to refer to neoplasm and malignancy.

After skin cancer, breast cancer is the second most frequent malignancy among women. Men can occasionally also develop it. It is simply the tumour growth that takes place.

About 15%–20% of breast tumors contain higher amounts of receptors, which are known as Human Epidermal Growth Factor Receptor-2 (HER-2)

proteins. HER-2- 3 positive breast cancer is the type of breast cancer that tests positive for this protein. The regulation of the proliferation and repair of breast cells is carried out by these HER-2 proteins. Tumor cells multiply uncontrollably when these proteins are overexpressed. As a result, HER-2-positive cells are typically more aggressive than HER-2-negative cells.

The treatment options in general for HER-2-positive individuals include surgery, targeted therapy (HER-2-directed therapy), endocrine therapy, and radiation therapy. A combination of these therapies is also the choice of treatment which depends on the patient's condition.

Trastuzumab is the targeted therapy that binds to the HER-2 receptors and thereby decreases the overexpression of these proteins leading to no growth of tumor cells. Trastuzumab can be given as either adjuvant or neo-adjuvant therapy through an IV route. It may be given on a weekly schedule or once every 3 weeks. It can be combined with other drugs to improve the overall effect of the drug on the ER cells.

The main ADRs of trastuzumab include cardiomyopathy, infusion reactions, exacerbation of chemotherapy-induced neutropenia, and pulmonary toxicity. The ADRs include pain, asthenia, fever, chills, headache, abdominal pain, back pain, allergic reaction, anemia, leukopenia, neuropathy, rash, and so on.

MATERIALS AND METHOD:

Study site: The study was conducted at Bharath Hospital and Institute of Oncology (BHIO) Mysore.

Study design: The study was designed to be a prospective observational study. The sample size of the study was 35 patients.

Study period: The study was carried out for a period of six months.

Ethical approval: Institutional Human Ethical Committee of Bharath Hospital and Institute of Oncology (BIO), Mysore approved the study.

Study criteria:

Inclusion criteria:

1. Adult patients >/=18 years of age.
2. Patients diagnosed with HER-2-positive breast cancer.
3. Known hormone receptor status.
4. Patients receiving trastuzumab as their treatment regimen.

Exclusion criteria:

1. Treatment with any other anti-cancer investigational drug.
2. Pregnant or lactating women. 29
3. History of hypersensitivity reaction to trastuzumab or any components of products.
4. Patient is not willing to participate in the study.
5. Patients who are not adherent to treatment.

Source of data: All the relevant and necessary data will be collected from patient's case records, Patients interview, Prescriptions of patients, Interviewing healthcare professionals, CTCAE questionnaire, Data collection form, Any other relevant sources.

Study procedure: The study involved the following steps: -

1. Preparation of informed consent form (ICF): An informed consent form was suitably designed both in English (Annexure 1) as well as in Kannada (Annexure 2) to obtain consent from patients who volunteered for the study and fulfilled the study criteria. The ICF was reviewed and approved by the institutional ethics committee. The patient was explained about the study and consent was obtained after they voluntarily agreed after being aware of every important aspect regarding the study. For those patients who were illiterate, the study was discussed with them, and consent was obtained from caretakers.

2. Preparation of data collection form (DCF): A specially designed data collection form (Annexure 3) was designed for the study. The particulars included demographic details like name, age, gender, family history, social habits (smoking, tobacco chewing, and alcoholism), diet, weight, height, and body surface area. Clinical data such as diagnosis, past medical history, past medication history, allergy status, staging of cancer, and TNM classification. Therapeutic data such as the name of the drug, dose, frequency, duration, route of administration, details on the supportive medication 30 used, premedication, and discharge medications. It also contains the details of laboratory test results and other tests like biopsy reports, PET CT scan reports, and 2D ECHO reports to interpret the outcome of the drug. To assess the ADR of a drug, Common Terminology Criteria for Adverse Event (CTCAE) questionnaires, Naranjo Causality Assessment Scale, Hartwig severity scale and Uppsala monitoring scales were included. The same details will be documented using IBM SPSS Statistics version 22.

3. Patient enrollment: Patients fulfilling the study criteria were enrolled in the study after obtaining informed consent. Patients were enrolled in in-patient general wards, private wards, and daycare centers which are even covered under

governmental schemes.

4. Data collection: All relevant details of the enrolled patients were obtained from various data sources and documented in the data collection form.

5. Assessment of safety and efficacy of drug in breast cancer patients: The drug effectiveness was evaluated from laboratory data before and after the drug was administered. And tumor size was checked before and after treatment to obtain the results of effective treatment. The drug safety was evaluated from grading ADR that had occurred in the study subjects. The patients ADR were assessed three grading criteria, CTCAE grading, WHOUMC causality assessment criteria, NARANJO adverse drug reaction probability scale.

a) CTCAE grading: The ADR were graded based on CTCAE criteria; the grading is given 1 to 4.

b) NARANJO adverse drug reaction probability scale: The Naranjo ADR probability scale was developed to help standardize assessment of causality for all adverse drug reactions. The scale was also designed for use in controlled 31 trials and registration studies of new medications, rather than in routine clinical practice. The scoring is categorized as, Doubtful,Possible, Probable, Definite.

c) WHO-UMC causality assessment criteria: in this method it gives guidance to the general arguments which should be used to select one category over another. The various causality categories and the assessment criteria of the various categories are: Certain, Probable / likely, Possible, Unlikely, Conditional / Unclassified, Unassessable/ Unclassifiable.

Statistical analysis: A descriptive statistic was presented in terms of frequency and percentages for categorical value. Mean, Standard deviation was used to describe the general characteristics of the study sample. An inferential statistic will be done by using Spearman correlation and Wilcoxon signed-rank test with the help of IBM SPSS Version 22, to determine the linear correlation between the variables and the outcome results were interpreted according to the degree of association as: Strong (rs = ±0.5 to 1.0), moderate (rs = ±0.3 to 0.49), weak (rs = ±0.1 to 0.29) and very weak (rs = ±0.9 to 0) after taking significant correlation ($p < 0.01$ or $p < 0.05$) values into considerations.

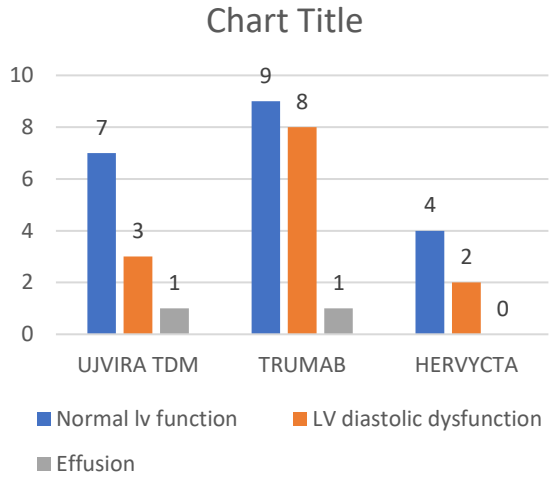
RESULTS:

There were total of 3 different types of trastuzumab used in the study population. Those were namely UJVIRA TDM1 from Zydus Cadila with price range of Rs. 32495 for a 100mg vial. TRUMAB from Glenmark with price range of Rs. 63233 for 440mg vial. HERVYCTA from Dr Reddy's Laboratories Ltd. with price range of Rs. 62497 for a 440mg vial.

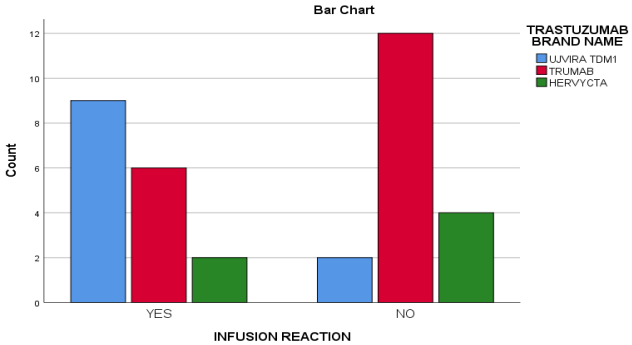
Assessment of safety and efficacy of trastuzumab in her-2 positive breast cancer

The main ADE to be monitored during administration of trastuzumab drug was cardiac monitoring by 2D ECHO test, infusion reaction, anemia, neutropenia and alopecia.

Cardiac events: One of the most common side effects of trastuzumab treatment is cardiotoxicity manifested as heart failure, accompanied by a decrease in left ventricular ejection fraction (LVEF) or an asymptomatic decrease in LVEF.



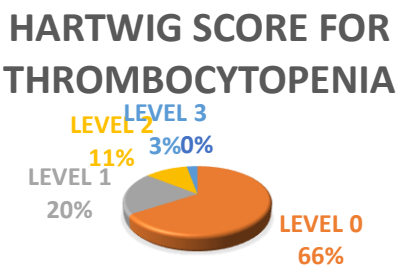
Infusion reaction: Infusion reaction is the common ADR exhibited by trastuzumab. The most common symptoms include fever, chills, breathlessness, and rashes in the body. The reaction occurs immediately after uptake of trastuzumab to body.



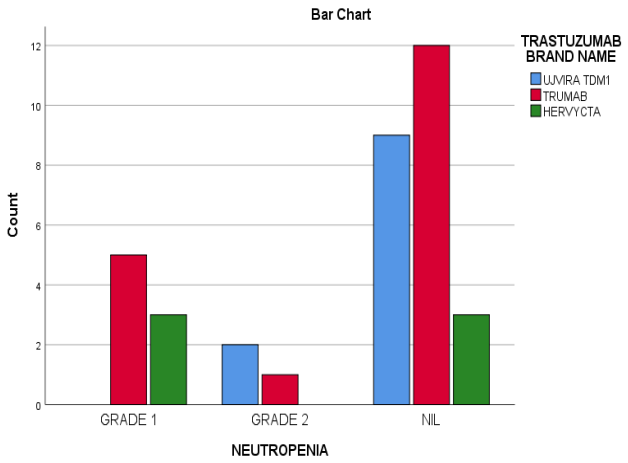
Majority of patients exhibit the symptoms of infusion reaction as a result of anaphylactic reaction after 1st dose of drug consumption. In this study we found 50% chance of occurrence of this reaction. In our study Hartwig scoring for severity was conducted and observed that the severity were of level 1, which explicit that infusion reactions occurred were subsided after administration of hydrocortisone and bring back patients to normal condition.

THROMBOCYTOPENIA: 31% of the patients receiving trastuzumab had experienced decrease platelet count. And remaining 68% had normal platelet count.

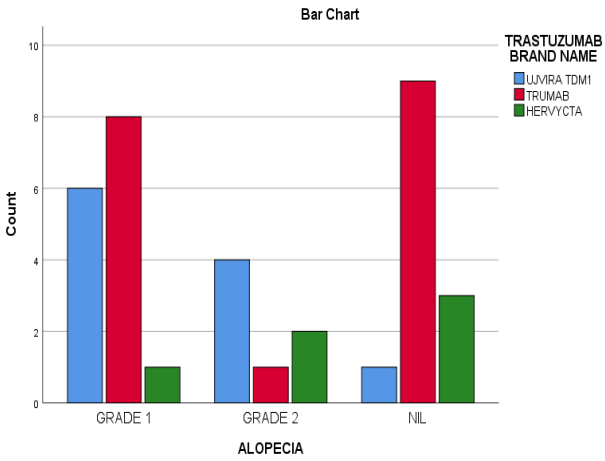
Thrombocytopenia due to trastuzumab was found in few patients. 6 patients out of 11 who received ujvira had grade 1 and 2 thrombocytopenia. 4 out of 18 patients had grade 1 and 2 40 thrombocytopenia in patients receiving trumab. whereas 2 patients on hervycta had grade 3 thrombocytopenia.



Neutropenia: Chemotherapy induced neutropenia (CIN) is a major cause of hematological and doselimiting toxicities of chemotherapy.it may have short- or long-term impacts on treatment plans which may result in unfavorable disease survival. 17 out of 35 patients had normal neutrophil count (48%). 13 patients had complaints of decreased neutrophil count.

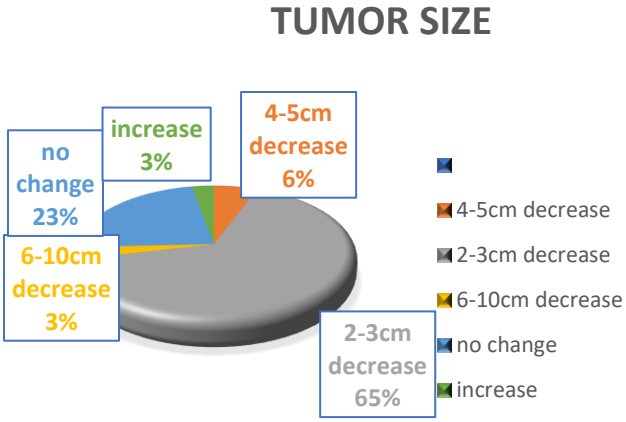


Alopecia: Alopecia is one of the most common complaints from the patients who received chemotherapy. Drug induced alopecia is common in cytotoxic drugs, as a result it sets a benchmark identification for receiving chemotherapy. Only 20 % of the population had complaints of grade 2 hair loss as a result of trastuzumab therapy.

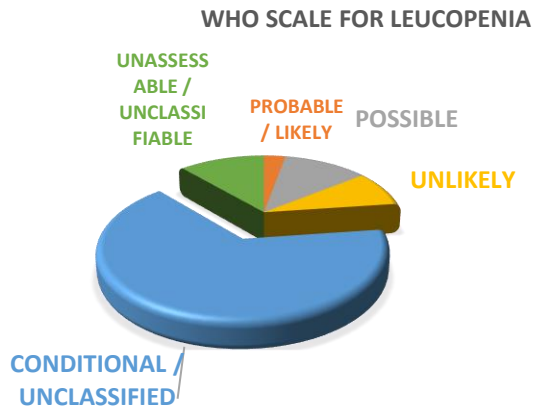


Tumor size: Tumor size is the most important factor for assessing the efficacy of drug. Patients are advised to have a PET Scan after every 4 cycles of the treatment, this enables the physician to determine the treatment success rate. In most of the patients we found decrease in the tumor size, whereas few patients couldn't undergo PET scan due to financial scarcity which resulted in deprivation of knowledge about tumor size.

In our study only 20 % of the population had complaints of grade 2 hair loss as a result of trastuzumab therapy.



Leucopenia: Leukemia is the common condition exhibited in cancer patients. Leukemia is the cancer of blood forming tissues, including bone marrow. Leukemia free state can be considered as one of the factors to determine drug efficiency.8 of them experienced low WBC count



CONCLUSION:

Targeted therapy is a main choice of therapy for HER2 positive breast cancer patients. There were 3 brands of trastuzumab that currently used in Bharath Cancer Hospital namely, UJVIRA TDM1 from Zydus Cadila, TRUMAB from Glenmark, and HERVYCTA from Dr Reddy's Laboratories Ltd. 35 patients receiving trastuzumab for HER2 positive breast cancer were included in our study.

We found that exposure to trastuzumab had remarkable reduction in tumor size except for 1 patient who had progressed the disease to have metastasis. Trumab exhibited more percentage decrease than other 2 drugs. Majority of patients had normal neutrophil count, but 36% of them exhibited decreased neutrophil count which were of grade 1 and 2. There was no evidence for grade 3 neutropenia which suggest the effectiveness of trastuzumab. 68% of patient receiving trastuzumab had normal platelet count, remaining patients had grade 1 and 2 decrease in platelet count. Among which trumab had higher percentage of patients with normal count. Among 74% of patients' leukemia free state was observed which makes that trastuzumab usage is safe and effective.

Monitoring cardiac events to identify decrease in LVEF which suggest possible cardiac dysfunction. Here in our study grade 1 LV diastolic dysfunction was majorly found in patients receiving trumab as their treatment choice. Infusion reaction is the common ADRs that are reported in other studies. In our study 50% of patients had observed infusion reaction on their first dose of drug, which was relieved after 1 or 2 hrs. of stopping drug infusion. There is no major decrease in neutrophil and platelet count which symbolizes the safe usage of treatment drug. Alopecia is quite commonly observed in patients who are under chemotherapy. On use of trastuzumab only 20% had complaints of grade 2 hair loss.

Since there were no major evidence of ADR incidence in the study population, we can conclude that usage of trastuzumab was safe and effective. Among all 3 different drug trumab had promising effect than other 2 drugs.

ACKNOWLEDGEMENT:

The authors are thankful to our mentor Dr. Nagendra R, Associate professor, SVCP, Mysuru., and all the faculty members of the Department of Pharmacy Practice, SVCP, Mysuru. We also thank Dr. Hanumanthachar Joshi, Principal, SVCP, Mysuru, Dr.Jijo Joji, assistant professor, SVCP and Special thanks to Dr Vishveshwara MS, Medical superintendent, Bharath Hospital and Institute of Oncology, Mysuru.

REFERENCES:

1. Internet]. A comprehensive guide to breast cancer (cited 16 February 2022). Available from: https://www.healthline.com/health/breast-cancer
2. [Internet]. Breast cancer prognosis; survival, rates by stage, age and race (cited 4 February 2022). Available from: https://www.healthline.com/health/breast-cancer/survival-facts-statistics
3. [Internet]. What to know about breast cancer (cited 25 October 2021). Available from: https://www.medicalnewstoday.com/articles/37136#symptoms
4. Boekhout AH, Beijnen JH, Schellens JH: Trastuzumab. Oncologist. 2011;16(6):800-10. doi: 10.1634/theoncologist.2010-0035. Epub 2011 May 31
5. FDA Approved Drug Products: Herceptin (trastuzumab) for intravenous injection.
6. FDA Approved Drug Products: Herceptin Hylecta (trastuzumab and hyaluronidase) for subcutaneous injection.
7. Im Y., et al. Double-blind, randomized, parallel group, phase III study to demonstrate equivalent efficacy and comparable safety of CT-P6 and trastuzumab, both in combination with paclitaxel, in patients with metastatic breast cancer (mbc) as first-line treatment. J. Clin. Oncol. 2013; 31:629.
8. Stebbing J., et al. Double-blind, randomized phase III study to compare the efficacy and safety of CT-P6 trastuzumab biosimilar candidate versus trastuzumab as neoadjuvant treatment in her2 positive early breast cancer (ebc) J. Clin. Oncol. 2017; 35:510. doi: 10.1200/JCO.2017.35.15_suppl.510.
9. Slamon D., et al. Adjuvant trastuzumab in HER2-positive breast cancer. N. Engl. J. Med. 2011; 365:1273–1283. doi: 10.1056/NEJMoa0910383.

10. Goldhar H.A., et al. The Temporal Risk of Heart Failure Associated with Adjuvant Trastuzumab in Breast Cancer Patients: A Population Study. J. Natl. Cancer Inst. 2015;108 doi: 10.1093/jnci/djv301.
11. Seferina S.C., et al. Cardiotoxicity and Cardiac Monitoring During Adjuvant Trastuzumab in Daily Dutch Practice: A Study of the Southeast Netherlands Breast Cancer Consortium. Oncologist. 2016; 21:555–562. doi: 10.1634/theoncologist.2015-0230.
12. Huang P., et al. Long-term tolerance and cardiac function in breast cancer patients receiving trastuzumab therapy. Oncotarget. 2017; 8:2069–2075. doi: 10.2147/OTT.S129653.
13. Adusumilli P., et al. Treatment Challenges and Survival Analysis of Human Epidermal Growth Factor Receptor 2-positive Breast Cancer in Real World. Indian J. Med. Pediatric. Oncol. 2017; 38:22–27. doi: 10.4103/0971-5851.203511.
14. Ganz P.A., et al. Long-Term Follow-Up of Cardiac Function and Quality of Life for Patients in NSABP Protocol B-31/NRG Oncology: A Randomized Trial Comparing the Safety and Efficacy of Doxorubicin and Cyclophosphamide (AC) Followed by Paclitaxel with AC Followed by Paclitaxel and Trastuzumab in Patients with NodePositive Breast Cancer With Tumors Overexpressing Human Epidermal Growth Factor Receptor 2. J. Clin. Oncol. 2017; 35:3942–3948.
15. Dawood S., et al. Efficacy and safety of neoadjuvant trastuzumab combined with paclitaxel and epirubicin: A retrospective review of the M. D. Anderson experience. Cancer. 2007; 110:1195–1200. doi: 10.1002/cncr.22895.

Review Article

VIRUS: A REVIEW OF VIRUSES, TYPES OF VIRUSES AND INFLUENZA VIRUS [H3N2]

Sayyad Ajhar Yunus*, Shinde Tushar Nandkishor

At. Wadala Mahadeo Tal. Shrirampur Dist Ahamadnagar – 413739

E-mail- ajharsayyad1192001@gmail.com

ABSTRACT:

Virus is the complex that include amino acid or nucleic acid and protein which enclose the caspid they are complicated structure, and replicates most effective. The properties of virus are the they are nothave cellular organism, they are both DNA and RNA viruses. H3N2 virus are commonly causes of disease in humans, particularly in children. the rhinovirus infection is responsible for common cold syndrome. the cultivation of viruses from material taken from lesionsisan essential step with inside the analysis of many viral diseases. In a day's studies on viral replication employed the bacteria phages as model there are observe some equality, in the pattern of multiplication of bacterial, animal and human viruses. The antiviral drugs are used to the treatment of viral infection, but they are not similar form antibiotics. antiviral drugs for flu only work to treat flu. the influenza A, influenza B, influenza C and influenza D are the type of influenza virus influenza virus are continuously changing with new trace acting regularly.

KEYWORDS:
Lesionsisan, Brick, Marburg, Vulnetrable and influenza virus (H3N2).

INTRODUCTION

Virus:

Virus is the complex that contain small nucleoprotein, Virus is a small nucleoprotein complicated and infection agent replicates most effective Internal the living cell of different organisms which include Animal and plant.

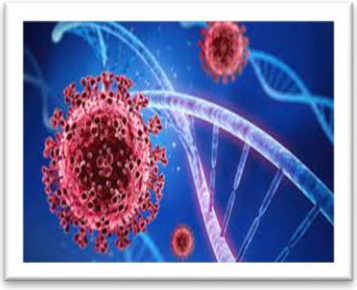


Fig.1.1 virus

PROPERTIES OF VIRUSES:

1)They can't have cellular organism.
2)They comprise most effective one type of nucleic acid. Both DNA and RNA.
3)They absence enzyme for protein synthesis.
4)They multiply through complex method however not through binary fission.
5)They are unaffected by antibacterials.

CHARACTERISTIC OF VIRUS:

1) Bacteria phage is virus that parasite on bacteria.
2) Mostly animal virus is spherical.

IMPORTANT POINT:

Virion: true viral parasite (including both caspid Protein and nucleic acid)
Prion: it includes off in balance infection protein molecule
Vixoids: it consists of naked, cyclical, small RNA without a caspid.

COMPOSITION OF VIRUS:

1) viral capsid
2) Peplomer:
3) Nucleic acid

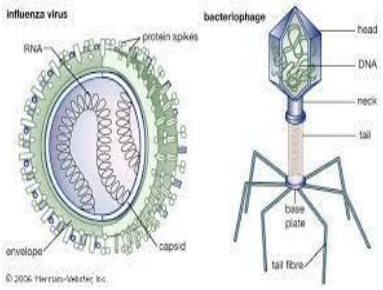


Fig.1.2 composition of virus

1) Viral caspid: virus including the nucleic acid surrounded by protein coat is called caspid .

Protein: -

i. **Structural protein** :- structural protein work as protection e.g caspid and peplomer

ii.

iii. **Enzymatic protein** :- Enzymatic protein are important for initiation of viral replicating cycle e.g. RNA polymers

***Function of viral capsid: -**

- It protects virus and acting as binding site
- It acting as vehicle for spreading of virus .
- Provide structural symmetry.

- **Peplomar:-** Peplomar are the glycoprotein and appear as projecting spikes

- **Nucleic acid :-** It include single type either DNA or RNA absent nucleus , Cytoplasm and cell member.

Shape of virus :-
Pox virus – Brick Shaped .
I.Rabies virus – Elongated bullet shaped.
II.Tobacco virus – Cylindrical rod shaped.

Virus is show in the electron microscope . the electron microscope was developed in 1932 by M.knoll and Ruska in Germany .

There two types: -
1. Transmission electron microscope.
2.Scanning electron microscope

HUMAN VIRUSES :-

Viruses are commonly causes of disease in humans, particularly in children. The rhinovirus infection responsible for the common cold syndrome.
Human virus will cause disease in other animals. most are capable of infecting only few closely related primate species ,others will infect of wide range of mammals under the condition of natural infection ,viruses generally exhibit a considerable degree of tissue of specificity .[The influenza virus ,for example, replicates only in the cell lining the upper respiratory tract]

CULTIVATION OF HUMAN VIRUSES: -

The cultivation of viruses from material taken form lesions is an essential step with inside the analysis of many viral diseases. Studies of the fundamental biology and multiplication approaches of human viruses additionally require that they are growing the laboratory under experimental conditions. Human pathogenic viruses can be propagated in three types of cell system.

MULTIPLICATION OF HUMAN VIRUS :-

Virus depends on the synthetic making machinery of a host cell for replication , because it lacks biosynthetic enzyme . In a day study on viral replication employed the bacteriophage as a model there are observe some equality in the pattern of multiplication of bacterial and animal or human viruses . The step of virus infection and replication can be divided into six sequential phases .

Virus depends on the synthetic making machinery of a host cell for replication , because it lacks biosynthetic enzyme . In a day study on viral replication employed the bacteriophage as a model there are observe some equality in the pattern of multiplication of bacterial and animal or human viruses . The step of virus infection and replication can be divided into six sequential phases.

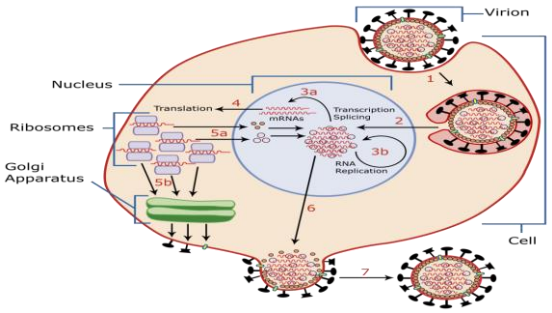


Fig .1.3 Viral multiplication in Human / a Animal cell

Adsorption:

The virus is adsorbed at a particular site on the host cell which is called receptor , vision comes in contact with cells by random collision but attachment is specific and is medicated by the binding of virion to receptors on cell surface .

Penetration:

There are four possible mechanism which the viruses we to enter in non-enveloped viruses enter the cells by endocytosis .

Uncoating:

It is a process by which virus loses it's outer layer and capsid .in cases uncoating is effected by the lysosomal enzyme of the host cell.

Biosynthesis of viral components

There is a synthesis of viral nucleic acid , caspid protein ,a regular protein which of the normal cellular metabolism and enzymes necessary in the various stage of viral synthesis , assembly and release

Biosynthesis consists essentially of the following step:

Transcription of m-RNA from viral nucleic acid.
Translation of m- RNA into early protein.
Replication of viral nucleic acid. Synthesis of late protein which are the component of daughter virion capsids.

GROUP	VIRUS	CHARACTARSTICS	CLINICLE IMPORTANCE
DNA viruses Poxviruses	Variola Vaccinia	Large particles 200-250 mm Complex symmetry	Variola is the small pox virus ,it produces a systemic infection with the charactarstic resicular rash affecting the face .
Adenoviruses	Adenovirus	Lcasahedral Particles 80 nm in diameter .	Commonly cause upper respiratory tract infection with a characteristics vesicular rash affecting the face.
Herpesviruses	Herpes Simplex virus (H5V2)	Enveloped icosahedral particles,150nm in diameter	H5V1 infects oral membranes in children >80% are infected by adolescence. Some are the Primary Infection the indivisual primary infection the indivisual retains the H5V1 in the trigeminal ganglion for life and has a 50% chance of developing cold sores H5V2 responsible for recurrent genital herpes.
Hepatitis viruses	Hepatitis B virus (HBV	Spherical enveloped particle 42nm in diameter enclosing an inner icasahedral 27nm nucleocaspid .	In areas such as south east asia and Africa most children are infected by Perinatal transmission .
Papova viruses	Papilloma virus	Naked icosahedra 50nm in diameter	Multiple only in epithelial cell of skin and mucous membrane causing warts .
RNA viruses myxoviruses	Influnza virus	Enveloped particles 100nm in diameter with helically symmetric ,	These viruses are capable of extensive antigenic variation producing new types against which the human population does not have effective immunity .

Table .1.1 Important Human Viruses and their Properties

BALTIMARE CLASSIFICATION

Group	Characteristics	Mode of mRNA production	Example
I.	Double stranded DNA	mRNA is transcribed directly from the DNA template	Herpes , simplex (herpes virus)
II.	Single stranded DNA	DNA is converted to double stranded from before RNA is transcribed .	Caine parnovirus (parvovirus)

III.	Double stranded RNA	mRNA is transcribed from the RNA genome .	Childhood gastro enteritis (rotavirus)
IV.	. Single stranded RNA(+)	Genome functions as mRNA	Common cold, rbinovirus .
V.	Single standard DNA (-)	mRNA is transcribed from the RNA genome	Rabies (rhabdovirus)

Anti – viral drugs:

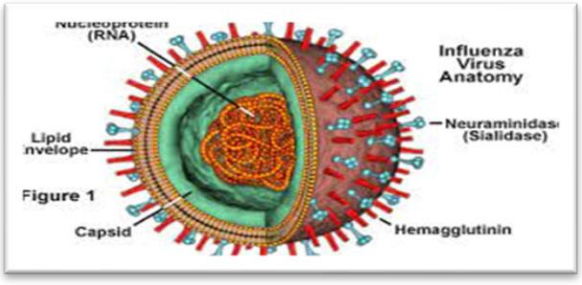
Anti viral drugs are different or not similar from antibiotic .which fight against bacterial infection . Antiviral drugs for flue only work to treat flu . flue antiviral drugs are different than antiviral drugs used to treat other infection tissue diseases such as COVID -19 are not approved or authorized to treat flue .

Benefits of antiviral drugs:

When treatment is started within two days of becoming sick with flue symptoms , antiviral drugs can lessen fever and flu symptoms and shorten the time you are stick by about one day . They also may reduce the risk of complication such as ear infections in children , respiratory complication requiring antibiotic and hospitalization in adults , for people at higher risk of serious flue complication early treatment with antiviral.

Influenza virus:

Influenza, higher called the flu and sometimes known as the grippe , is a common childhood illness , however isn't as common amongst adults . it isn't restricted to humans, maximum mammals and lots of birds also can capture influenza . it is because of numerous different viruses (see: RNA virus) , that once the call influenza comes from Italian influenza , meaning influence.



Types of influenza virus:

There are four genera of influenza virus, every cantaining most effective a single species , or type . Influenza A&C infect a variety of species (such as humans) . at the same time as influenza B nearly completely infect humans, and influenza D infect form animal and pigs .

Classifications

In a phylogenetic-based taxonomy, the category RNA virus consists of the subcategory negative-feel ssRNA virus, which incorporates the order Articulavirale, and the family Orthomyxoviridae. The genera-related species and serotypes of Orthomyxoviridae are proven within side the following table. a phylogenetic-based taxonomy, the category RNA virus consists of the subcategory negative-feel ssRNA virus, which incorporates the order Articulavirale, and the family Orthomyxoviridae.

Influenza A

The kind A influenza viruses are the maximum virulent human pathogens some of the three influenza kinds and reason the maximum extreme disease. It is concept that every one influenza A viruses inflicting outbreaks or pandemics originate from wild aquatic birds. All influenza A virus pandemics because the 1900's have been because of Avian influenza, through Reassortment with human influenza strains (seasonal flu) or through edition in a blending vessel (see 2009 swine flu pandemic). The serotypes which have been showed in humans, ordered through the quantity of showed human deaths, are:
H1N1 caused "Spanish flu" in 1918 and "Swine flu" in 2009.
H2N2 caused "Asian Flu".
H3N2 caused "Hong Kong Flu".
H5N1, "avian" or "bird flu".
H7N7 has uncommon zoonotic potential.
H1N2 infects pigs and humans.

H9N2, H7N2, H7N3, H10N7

Influenza B

Influenza B virus Host variety of influenza viruses Influenza B virus is nearly completely a human pathogen, and is much less common than influenza A. The most effective different animal recognized to be at risk of influenza B contamination is the seal. This kind of influenza mutates at a rate 2–3 instances decrease than kind A[47] and therefore is much less genetically diverse, with most effective one influenza B serotype. As a end result of this loss of antigenic diversity, a degree of immunity to influenza B is typically obtained at an early age. However, influenza B mutates sufficient that lasting immunity isn't possible. This decreased rate of antigenic change, blended with its restricted host variety (inhibiting pass species antigenic shift), guarantees that pandemics of influenza B do now no longer occur.

Influenza C

Influenza C virus the influenza C virus infects human beings and pigs, and may reason extreme contamination and nearby epidemics. However, influenza C is much less common than the opposite kinds and normally reasons moderate disorder in children.

Influenza D

Influenza D virus this is a genus that became classified in 2016, the participants of which have been first isolated in 2011. This genus seems to be maximum intently associated with Influenza C, from which it diverged numerous hundred years ago. There are as minimum extant lines of this genus. The most important hosts look like cattle; however the virus has been regarded to contaminate pigs as well.

Influenza virus nucleoprotein

Influenza virus nucleoprotein (NP) is a structural protein which encapsidates the poor strand viral RNA. NP is one of the essential determinants of species specificity. The query of ways some distance the NP gene can move the species barrier through reassortment and come to be tailored through mutation to the brand-new host has been discussed.

When to see a doctor

Most individuals who get the flu can treat themselves at domestic and frequently do not want to see a fitness care issuer.
If you have flu symptoms and are susceptible to complications, see your fitness care issuer proper away. Taking antiviral medicine may also shorten the duration of your infection and help save you more-serious problems.
If you have emergency symptoms of the flu, get hospital treatment proper away. For adults, emergency symptoms can include:
Difficulty respiration or shortness of breath Chest pain Ongoing dizziness Seizures Worsening of present clinical conditions Severe weakness or muscle pain Emergency symptoms in kids can include: Difficulty respiration Pale, gray or blue-coloured skin, lips or nail beds — depending on skin color Chest pain Dehydration Severe muscle pain Seizures Worsening of present clinical conditions

Causes

Influenza viruses travel via the air in droplets while a person with the contamination coughs, sneezes or talks. You can inhale the droplets directly. Or you could choose up the germs from an object — including a telephone or pc keyboard — after which switch them in your eyes, nostril or mouth.

People with the virus are probably contagious from approximately a day earlier than symptoms seem till approximately four days after they start. Children and those with weakened immune structures can be contagious for a barely longer time.

Influenza viruses are continuously changing, with new traces acting regularly. If you have had influenza with inside the beyond, your body has already made antibodies to fight that particular pressure of the virus. If future influenza viruses are much like the ones you have encountered earlier than, both through having the disorder or through getting vaccinated, those antibodies may also prevent contamination or reduce its severity. But antibody stages may also decline over time.

Also, antibodies towards influenza viruses you have encountered with inside the beyond won’t guard you from new influenza traces. New traces may be very extraordinary viruses from what you had earlier than.

Risk factors:

Age: Seasonal influenza has a tendency to have worse effects in kids below age 2, and adults older than age 65.

Living or working conditions: People who stay or work in centers with many different residents, which includes nursing houses or military barracks, are much more likely to increase the flu. People who are staying with inside the medical institution are also at better risk.

Weakened immune system: Cancer treatments, anti-rejection medications, long-time period use of steroids, organ transplant, blood most cancers or HIV/AIDS can weaken the immune system. This could make it less difficult to seize the flu and can growth the hazard of growing complications.

Chronic illnesses:- Chronic situations may also growth the hazard of influenza complications. Examples consist of bronchial allergies and different lung diseases, diabetes, coronary heart disease, nervous system diseases, metabolic disorders, issues with an airway, and kidney, liver or blood disease.

Race: American Indians or Alaska Natives humans may also have an elevated hazard of influenza complications.

Aspirin use below age 19: People who are younger than 19 years of age and receiving long-time period aspirin remedy are at risk of growing Reye's syndrome if infected with influenza.

Pregnancy: Pregnant humans are much more likely to increase influenza complications, specifically within side the second and third trimesters. This hazard maintains up to two weeks after the child is born.

Obesity: People with a body mass index (BMI) of 40 or better have a hazard of flu complication.

Conclusion

H3N2 flu is a serious viral infection that can cause significant morbidity and mortality, particularly in vulnerable populations like the elderly and young children. Since there is no vaccination for H3N2, the best way to prevent the flu and its complications is to use preventative measures, like frequent hand washing and avoiding contact with infected individuals.

You can test yourself to see if you are infected with the H3N2 virus. Metropolis Lab's Flu-Xpert Viral Panel uses the real-time Multiplex PCR method to detect 5 strains of flu including Influenza A, Influenza B, H1N1, H3N2 and RSV (Respiratory syncytial virus). It requires only a one-time sample collection and results will be made available within 12 hours.

Acknowledgements

I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I would like to extend my sincere thanks to all of them.I take this opportunity to express my heartly thanks to respectable**, Prof. Ghire Suraj sir** and Principal of our college **Dr. Megha Salve mam** for providing good laboratory facilities for completion of our work successfully.

References:

Hay A, Gregory V, Douglas A, Lin Y (Dec 29, 2001). "The evolution of human influenza viruses". *Philos Trans R Soc Lond B Biol Sci*. 356 (1416): 1861–70. doi:10.1098/rstb.2001.0999. PMC 1088562. PMID 11779385

1. Avian Influenza (Bird Flu)". Centers for Disease Control and Prevention. Retrieved 2007-09-15
2. Kumar, Binod; Asha, Kumari; Khanna, Madhu; Ronsard, Larance; Meseko, Clement Adebajo; Sanicas, Melvin (April 2018). "The emerging influenza virus threat: status and new prospects for its therapy and control". Archives of Virology. 163 (4): 831–844. doi:10.1007/s00705-018-3708-y. ISSN 1432-8798. PMC 7087104. PMID 29322273.
3. Alexander, Dennis J. (2007-07-26). "An overview of the epidemiology of avian influenza". Vaccine. 25 (30): 5637–5644. doi:10.1016/j.vaccine.2006.10.051. ISSN 0264-410X. PMID 17126960 .
4. Wu, Ying; Wu, Yan; Tefsen, Boris; Shi, Yi; Gao, George F. (April 2014). "Bat-derived influenza-like viruses H17N10 and H18N11". Trends in Microbiology. 22 (4): 183–191. doi:10.1016/j.tim.2014.01.010. ISSN 0966-842X. PMC 7127364. PMID 24582528 .\
5. Atkinson W, Hamborsky J, McIntyre L, Wolfe S, eds. (2007). Epidemiology and Prevention of Vaccine-Preventable Diseases (10th ed.). Washington DC: Centers for Disease Control and Prevention.
6. Avian Influenza (Bird Flu): Implications for Human Disease". Center for Infectious Disease Research & Policy, University of Minnesota. 2007-06-27. Retrieved 2007-09-14.
7. Webster, R. G.; Bean, W. J.; Gorman, O. T.; Chambers, T. M.; Kawaoka, Y. (March 1992). "Evolution and ecology of influenza A viruses". Microbiological Reviews. 56 (1): 152–179. doi:10.1128/mr.56.1.152-179.1992. ISSN 0146-0749. PMC 372859. PMID 1579108.
8. Taubenberger, Jeffery K.; Morens, David M. (April 2010). "Influenza: the once and future pandemic". Public Health Reports. 125 Suppl 3 (Suppl 3): 16–26. ISSN 0033-3549. PMC 2862331. PMID 20568566.
9. Wang TT, Palese P (June 2009). "Unraveling the Mystery of Swine Influenza Virus". Cell. 137 (6): 983–85. doi:10.1016/j.cell.2009.05.032. PMID 19524497

10. Taubenberger, JK, Morens, DM (April 2009). "Pandemic influenza – including a risk assessment of H5N1". Rev. Sci. Tech. Off. Int. Epiz. 28 (1): 187–202. doi:10.20506/rst.28.1.1879. PMC 2720801. PMID 19618626.
11. Fouchier R, Schneeberger P, Rozendaal F, Broekman J, Kemink S, Munster V, Kuiken T, Rimmelzwaan G, Schutten M, Van Doornum G, Koch G, Bosman A, Koopmans M, Osterhaus A (2004). "Avian influenza A virus (H7N7) associated with human conjunctivitis and a fatal case of acute respiratory distress syndrome". Proc Natl Acad Sci USA. 101 (5): 1356–61. Bibcode:2004PNAS..101.1356F. Doi:10.1073/pnas.0308352100. PMC 337057. PMID 14745020.
12. Malik-Peiris JS, Poon LL, Guan Y (July 2009). "Emergence of a novel swine-origin influenza A virus (S-OIV) H1N1 virus in humans". J Clin Virol. 45 (3): 169–173. doi:10.1016/j.jcv.2009.06.006. PMC 4894826. PMID 19540800.
13. Hilleman MR (August 2002). "Realities and enigmas of human viral influenza: pathogenesis, epidemiology and control". Vaccine. 20 (25–26): 3068–87. doi:10.1016/S0264-410X(02)00254-2. PMID 12163258.
14. Potter CW (October 2001). "A history of influenza". Journal of Applied Microbiology. 91 (4): 572–9. doi:10.1046/j.1365-2672.2001.01492.x. PMID 11576290
15. "Ten things you need to know about pandemic influenza". World Health Organization. 14 October 2005. Archived from the original on 23 September 2009. Retrieved 26 September 2009
16. Valleron AJ, Cori A, Valtat S, Meurisse S, Carrat F, Boëlle PY (May 2010). "Transmissibility and geographic spread of the 1889 influenza pandemic". Proc. Natl. Acad. Sci. USA. 107 (19): 8778–
81. Bibcode:2010PNAS..107.8778V. doi:10.1073/pnas.1000886107. PMC 2889325. PMID 20421481.
17. Mills CE, Robins JM, Lipsitch M (December 2004). "Transmissibility of 1918 pandemic influenza". Nature. 432 (7019): 904–06. Bibcode:2004Natur.432..904M. Doi:10.1038/nature03063. PMC 7095078. PMID 15602562.
18. Donaldson LJ, Rutter PD, Ellis BM, et al. (2009). "Mortality from pandemic A/H1N1 2009 influenza in England: public health surveillance study". BMJ. 339: b5213. doi:10.1136/bmj.b5213. PMC 2791802. PMID 20007665.
19. Osterhaus AD, Rimmelzwaan GF, Martina BE, Bestebroer TM, Fouchier RA (May 2000). "Influenza B virus in seals". Science. 288 (5468): 1051–3. Bibcode:2000Sci…288.1051O. Doi:10.1126/science.288.5468.1051. PMID 10807575.
20. Nobusawa E, Sato K (April 2006). "Comparison of the mutation rates of human influenza A and B viruses". Journal of Virology. 80 (7): 3675–8. doi:10.1128/JVI.80.7.3675-3678.2006. PMC 1440390. PMID 16537638.
21. Hay A, Gregory V, Douglas A, Lin Y (Dec 29, 2001). "The evolution of human influenza viruses". Philos Trans R Soc Lond B Biol Sci. 356 (1416): 1861–70. doi:10.1098/rstb.2001.0999. PMC 1088562. PMID 11779385.
22. Webster RG, Bean WJ, Gorman OT, Chambers TM, Kawaoka Y (March 1992). "Evolution and ecology of influenza A viruses". Microbiological Reviews. 56 (1): 152–79. doi:10.1128/MMBR.56.1.152-179.1992. PMC 372859. PMID 1579108.
23. Zambon MC (November 1999). "Epidemiology and pathogenesis of influenza". The Journal of Antimicrobial Chemotherapy. 44 Suppl B (Suppl B): 3–9. doi:10.1093/jac/44.suppl_2.3. PMID 10877456. S2CID 15968981
24. Matsuzaki Y, Sugawara K, Mizuta K, Tsuchiya E, Muraki Y, Hongo S, Suzuki H, Nakamura K (2002). "Antigenic and genetic characterization of influenza C viruses which caused two outbreaks in Yamagata City, Japan, in 1996 and 1998". J Clin Microbiol. 40 (2): 422–29. doi:10.1128/JCM.40.2.422-429.2002. PMC 153379. PMID 11825952.
25. Matsuzaki Y, Katsushima N, Nagai Y, Shoji M, Itagaki T, Sakamoto M, Kitaoka S, Mizuta K, Nishimura H (May 1, 2006). "Clinical features of influenza C virus infection in children". J Infect Dis. 193 (9): 1229–35. doi:10.1086/502973. PMID 16586359.
26. Katagiri S, Ohizumi A, Homma M (July 1983). "An outbreak of type C influenza in a children's home". J Infect Dis. 148 (1): 51–56. doi:10.1093/infdis/148.1.51. PMID 6309999
27. Hause BM, Ducatez M, Collin EA, Ran Z, Liu R, Sheng Z, Armien A, Kaplan B, Chakravarty S, Hoppe AD, Webby RJ, Simonson RR, Li F (February 2013). "Isolation of a novel swine influenza virus from Oklahoma in 2011 which is distantly related to human influenza C viruses". PLOS Pathogens. 9 (2): e1003176. doi:10.1371/journal.ppat.1003176.
28. Sheng Z, Ran Z, Wang D, Hoppe AD, Simonson R, Chakravarty S, Hause BM, Li F (February 2014). "Genomic and evolutionary characterization of a novel influenza-C-like virus from swine". Archives of Virology. 159 (2): 249–55. doi:10.1007/s00705-013-1815-3. PMC 5714291. PMID 23942954.
29. Collin EA, Sheng Z, Lang Y, Ma W, Hause BM, Li F (January 2015). "Cocirculation of two distinct genetic and antigenic lineages of proposed influenza D virus in cattle". Journal of Virology. 89 (2): 1036–42. doi:10.1128/JVI.02718-14. PMC 4300623. PMID 25355894.

30. Biere B, Bauer B, Schweiger B (April 2010). "Differentiation of influenza B virus lineages Yamagata and Victoria by real-time PCR" (PDF). Journal of Clinical Microbiology. 48 (4): 1425–7. doi:10.1128/JCM.02116-09. PMC 2849545. PMID 20107085.
31. ICTV Taxonomy History, ICTV, 2014, archived from the original on 2 April 2015, retrieved 6 June 2006
32. A book of ''pharmaceutical microbiology" By , Ashutosh kar New age international publishers . page no :- 160
33. A book of ''pharmaceutical microbiology '' By , Dr. Kunal Das , Nirali publication , page no. 3.9.
34. Text book of microbiology , By , P.C Trivedi ,sonali pandey seema Bhadauria.
35. GPAT Discussion center ,Market study easy .
36. A pharmaceutical microbiology prepared by. Dr. Iswari Prasad padhy .
37. Hugo and Russelis pharmaceutical microbiology . edited by.Stephen P.Denyer , Norman A Hodges , Seah P Gorman , Seventh edition , Brtachwell science .
38. A book of ''Pharmaceutical microbiology '' proff. Chandrakant kikare .
39. A book of pharmaceutical microbiology mrs .Mohsina F.P ,faheem I.P , nirali publication .
40. A book of pharmaceutical microbiology , by Dr.S.B Bhise , mrs . M.S Bhise , Dr.Lalit Lata Jha , Nirali publication
41. www.mayoclinic.org>germs
42. www.healthtime.com
43. www.cdc.gov>flue>treatment
44. https://www.ncbi.him.hih.gov>pmc
45. www.pharmacy180.com
46. www.heathlibrary.askapollo.com
47. www.cdc.gov>H3N2-cases
48. www.indiaexpress.com
49. www.ecohomictimes.indiatimes.com
50. www.en.m.wikipidia.org>
51. www.outlookindia.com
52. www.sciencedireact.com
53. www.studyig.com
54. www.ndtv.com>Feature
55. www.M.economictimes.com
56. www.healthline.com
57. www.who.int.com
58. www.indiatoday.com

Research Article

POLYHERBAL SCRUB FORMULATION FOR THE MANAGEMENT OF VERICOSE VEINS

Mahadev S. Mathapati*, Vynktesh. K. Bargale, Vaishnavi V. Nivekar, N. B. Chougule
Department of Pharmacognosy, Ashokrao Mane Institute of Pharmacy, Ambap, Pin-416112, Hatkanagale, Kolhapur, Maharashtra, India
Email – mahadevmathapati0@gmail.com

ABSTRACT:

Varicose veins are a common vascular disorder affecting a significant portion of the population, leading to discomfort and aesthetic concerns. This project aims to develop a polyherbal scrub formulation for the management of varicose veins. The formulation combines various herbal ingredients known for their potential therapeutic effects on venous health. This study involves the formulation, optimization, and evaluation of the polyherbal scrub's physicochemical properties, stability, and in vitro efficacy in promoting improved venous circulation. The results of this project have the potential to provide an alternative and natural approach for managing varicose veins, thereby improving the quality of life for affected individuals. This research contributes to the field of pharmacy by exploring the use of traditional herbal knowledge in contemporary healthcare solutions.
The project begins with a comprehensive review of the existing literature on varicose veins, herbal remedies, and the therapeutic potential of individual herbal constituents. It also includes an analysis of the safety and efficacy profiles of these herbs to ensure the safety of the formulation. The polyherbal scrub formulation is then developed by carefully selecting and combining specific herbs and natural ingredients that have demonstrated promise in promoting venous health.

Key Words: Varicose Veins, Polyherbal Formulation, Herbal Remedies, Herbal Constituents, Safety and Efficacy Profiles.

INTRODUCTION:

Varicose Veins is common disease which affects one third of the population of which prevalence is observed in the Western Europe and the United States. A study revealed that, from the affected population, there is around 1-73% of females (especially during pregnancy) exposed to this disease and on an average 2-56% of males. Thus, we may conclude that women are more likely to be affected than men. Varicose Veins or Venous Insufficiency is a disease which involves enlargement and gnarling of the Veins usually of legs. In this disorder, there is reflux flow of blood through the valves of legs, hence instability in circulation of blood.
The risk factors of includes age, hereditary, pregnancy, obesity, occupation which involves prolonged hours of standing, Diet, Type of physical activity, Excess use of hormones etc. These factors are not clearly known yet. Symptoms related to Varicose may not be observed in case of some affected population. If seen the symptoms at initial stages include severe pain, swelling, itching, heavy legs, and lipodermatosclerosis (skin thickening). If left untreated, the further complications lead to bleeding veins, eczema, skin pigmentation or discoloration, venous ulcers, and hence complete vein incompetence. Diagnosis of the disease is done using the duplex scan method of investigation [1].
Varicose veins are often primary (affecting only the superficial veins) and often result from a congenital or familial predisposition that leads to the loss of elasticity of the vein wall. Secondary varicosities occur when trauma, obstruction, or inflammation causes damage to the valves (which affect the deep veins). Varicose veins can appear anywhere in the body, but most often affect the legs and feet. Although they can be painful and disfiguring, they are usually harmless. If varicose veins are not treated early, there can be complications such as chronic venous insufficiency. Patients with varicose veins are at increased risk of deep vein thrombosis because venous stasis and injury often cause superficial phlebitis that can pass through perforating vessels to involve the deep venous system
Varicose veins, also known as spider veins, varicose or varicosities, are twisted or enlarged veins, occurring mainly in the legs. Varicose veins occur when the veins become dilated, enlarged and overfilled with blood. Varicose veins will typically appear swollen and enlarged, often associated with pain and inflammation. They tend to be blueish purple or red. The condition of varicose veins is rather common, especially among women. Around 25 to 30 per cent of adults suffer from varicose veins, especially in the lower legs. [2].

CAUSES

1. In 40% of the persons, varicose veins are due to hereditary factors, which run into families and generations in determining the susceptibility to primary valvular failure.

2. Prolonged standing and prolonged sitting with legs down leads to increased hydrostatic pressure that can cause chronic venous distension and secondary valvular incompetence anywhere within the superficial venous system.

3. Pregnancy is a common cause of varicosities. During pregnancy, circulating hormonal factors increase the distensibility of vein walls and soften valve leaflets. Late in pregnancy, the enlarged uterus compresses the inferior vena cava, causing further venous hypertension and secondary distension of leg veins.

4. Varicose veins occur both in men and women, but are more frequent in women because vein walls and valves periodically become more distensible under the influence of cyclic increase in progesterone.

5. Due to lack of exercise and advanced overweight, veins become weak and develop into varicose veins. Due to obesity, a lot of fat gets deposited. This weakens the support system of the veins, resulting in the veins dilating and becoming tortuous.

6. Dietary deficiencies or the loss of skin elasticity due to aging are the contributing factors.

7. High-heeled sandals and tight clothing are significant contributors to the development of varicose veins; they obstruct the normal flow of blood in the veins.

8. Constipation can contribute to varicose veins.

9. Repeated heavy lifting can interfere with normal circulation (to increase the likelihood that varicose veins will develop and can worsen existing varicosities).

Today a lot of occupations and professions have sprung up where people are required to either continuously stand for a long time or are made to sit hanging down their legs for a considerable time – computer professionals, security guards, traffic police, salesmen working at counters in departmental stores, teachers, nurses, paramedical workers working in various hospital setups and persons doing desk jobs day in and day out are the sufferers of varicose veins[2].

Why Do Varicose Veins Usually Appear in the Legs?

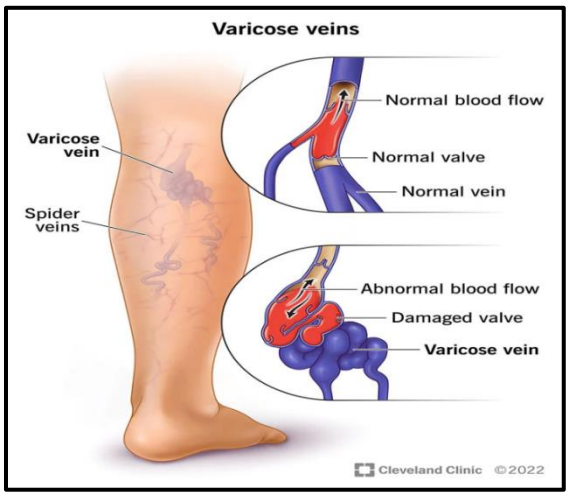


Fig.1. varicose veins

The force of gravity, the pressure of body weight, and the task of carrying the blood from the bottom of the body to the heart make legs the primary location for varicose veins. Compared to other veins of the body, leg veins have the toughest job of carrying blood back to the heart. They endure the most pressure. This pressure can be stronger than the veins out way valves.[2]

WHAT ARE VARICOSE VEINS:

Varicose veins are enlarged, swollen, and twisting veins, often blue or dark purple in appearance. These veins contain valves which don't work properly, meaning that blood instead of streaming from your legs towards your heart, flows backwards. This backward flow can cause pain and swelling in your leg with time, especially when standing for long periods.

Risk Factor: Certain factors increase your chances of developing varicose veins, including:

Age: Because of the aging process, vein walls and valves don't work as well as they once did. Veins lose elasticity and stiffen.

Gender: Female hormones can allow the walls of the veins to stretch. People who are pregnant, taking the birth control pill or going through menopause have a higher risk of varicose veins because of changes in hormone levels

Family history: This condition can be inherited (runs in families).

Lifestyle: Standing or sitting for long periods decreases circulation. Wearing restrictive clothing, such as girdles or pants with tight waistbands can decrease blood flow.

Overall health: Certain health conditions, such as severe constipation or certain tumors, increase pressure in the veins.

Tobacco use: People who use tobacco products are more likely to develop varicose veins.

Weight: Excess weight puts pressure on blood vessels.

Relief: The Top Five Tips:

1] Elevate your legs:
You can try to get relief from the symptoms of varicose veins by elevating your legs for several minutes throughout your day. Make sure to get them high enough that they are at a level that is above the level of your heart Especially after exercise: This will take the pressure off your legs and make it easier for the valves to work and the blood to flow smoother.

2] walk every day to build your calf muscles:
Your leg veins have to fight the effect of gravity and need all the help they can get. So, keeping your leg muscles in shape and well-toned helps to relieve symptoms.

3] keep your weight down:
If you gain weight or have a few too many kilos this may contribute to varicose veins as more pressure is placed on your legs. Make sure that you eat a healthy balanced diet and avoid excessive processed foods [3].

Benefits of scrubbing skin:

Reduces Stress: Exfoliation or scrubbing the skin gives good massage, which gives relaxing feeling and reduces stress. scrubs are solid or semisolid systems of at least two constituents, containing various natural and chemical ingredients which are safer to use and having fewer side effects and they also possesses antiseptic, anti-infective, antioxidant, anti- aging and humectant properties. The scrubs are made by simple mixing methods of two or more ingredients herbal [4].

OBJECTIVES:

Different herbal ingredients used to prepare scrub. Different evaluations tests are carried out for the prepared herbal scrub formulation, such as appearance, spread ability, irritability, PH, washability, etc. Prepared formulation passes all the given evaluation tests. Thus, the prepared formulation of polyherbal scrub was effective for healthy, and pain relief of varicose veins. To conduct a comprehensive review of the literature on the etiology, pathophysiology, and conventional treatment options for varicose veins.

To identify and select the herbal ingredients based on their traditional uses, scientific evidence, and safety profiles for the treatment of varicose veins.

To standardize the formulation of the poly herbal scrub based on the physicochemical parameters, such as pH, viscosity, and stability.

To assess the safety of the poly herbal scrub using in vitro irritation.

To prepare a final report of the project summarizing the methodology, results, and conclusions of the study Poly Herbal scrub can help to improve blood circulation to the legs which can then help to prevent varicose veins.

To provide a natural and effective treatment for varicose veins without using chemical-based products or extraction methods.

To improve blood circulation in the affected areas and reduce inflammation and pain associated with varicose veins.

To exfoliate dead skin cells and improve skin texture and appearance.

To provide a relaxing and rejuvenating experience while treating varicose veins.

To use a combination of herbs that are known to be effective in treating varicose veins and promoting overall skin health.

To create a cost-effective and easy-to-use treatment option for individuals with varicose veins.

To promote natural healing and encourage individuals to take a holistic approach to their health and wellness.

MATERIAL AND METHOD:

Ingredients: Sunth, Vit E pills, Multani Mitti, Nirgundi,root powder, Punarnava powder, Dried Marigold petals powder, Manjishtha powder, Sesame oil, Rosemary essential oil, Bees wax, Liquid Paraffin, Borax, Methyl Paeaben, Propyl Paeaben, Disilled Water.

Excipient: White bees wax, Liquid Paraffin, Methy Paraben, Propyl Paraben, Borax.

Procedures:
1] In a clean and dry mixing bowl add Multani Mitti, Sunth powder, Punarnava powder, Manjishtha powder, and dried marigold petals powder.
2] Cut open the Vitamin E pill and pour the contents into the mixing bowl.
3] Slowly add the Sesame oil to the mixture, stirring continuously, until you get a thick paste-like consistency.
4] Add coffee powder to the mixture and mix well. (Optional).
5] Finally, add Q.S drops of Rosemary essential oil and mix well.
6] And scrub Base was prepared by fusion methods.

Direction to use: To use the scrub, apply a small amount to damp skin and massage gently in a circular motion for 1-2 minutes. Rinse off with warm water and pat dry.

Apparatus: Measuring Cylinder (100ml), Beaker (100ml). Stirrer, Thermometer, Water bath.

PROCEDURE:

Required quantity of bees wax and liquid paraffin were taken in a beaker and heated on a water bath up to 70°c to obtain a moulter mask (Phase A or Oily phase).

In another beaker take a borax, water and heated up to 75°c (Phase B or Aqueous phase).

Mix both the solutions by adding are phase into another phase with continuous stirring till a cream like consistency.

Add the preservative or methyl Paraben, Perfume and pack it in a suitable container, label and submit it [5].

SR.NO.	INGREDIENTS	CATEGORY	QUANTITY [GM].
1	Sunth powder	Anti-inflammatory Agent, Circulatory stimulant.	0.50 gm
2	Multani mitti	Remove black heads and white heads.	05 gm
3	Nirgundi Root Powder	Management of pain	1.25 gm
4	Punarnava powder	Antioxidant	0.50 gm
5	Manjishtha Root Powder	Anti-Inflammatory	0.50 gm
6	Dried Marigold Petal Powder	Antimicrobial Agent.	0.50 gm
7	Coffee	Natural Exfoliant, Anti aging	0.50 gm
8	Vit.E	Anti-inflammatory Agent,Antioxidant	1 gm
9	Sesame oil	Moisturizer	1 gm
10	Rosemary Essential oil	Natural Remedies,Anti-Inflammatory	Q.S
11	Bees wax	Emulsifying Agent	4.8
12	Liquid Paraffin	Lubricant	15 gm
13	Borax	Emollient	0.24 gm
14	Methyl Paraben	Preservative	0.54 gm
15	Propyl paraben	Preservative	0.06 gm
16	Distilled Water	Vehical	9.9 gm

1. DRIED SUNTH POWDER

Fig.2.

Kingdom: Plantae.
Family: Zingiberacae.
Genus: Ginger.
Species: Zingiber officinale.

Ginger consists of the fresh or dried rhizomes of Zingiber officinale (Family: Zingiberacae). The dried rhizome powder of ginger is known as Sunth or Soonth. ginger has been used as an anti-inflammatory because of its prostaglandin synthesis inhibition property [6]. Ginger stimulates circulation, may help prevent heart attacks, has natural blood thinning properties, lowers blood cholesterol levels, cleanses and stimulates blood supply, prevents internal blood clots, may prevent TIA's (mini strokes), acts therapeutically to reduce hypertension, and prevents oxidation of LDL which contributes to cholesterol deposits on artery walls. Ginger has a tonic effect on the heart, and may lower blood pressure by restricting blood flow in peripheral areas of the body. Further studies show that ginger can lower cholesterol levels by reducing cholesterol absorption in the blood and liver [7].

2.MULTANI MITTI

Fig.3.

The oil-absorbing properties of multani mitti make it effective against acne and help speed up the healing process. Used as a scrub, multani mitti can slough away dead skin cells and remove blackheads and whiteheads, giving skin a natural and healthy glow. Boost's circulation and improves skin health and tone Multani mitti, also known as Fuller's earth, is a type of clay that is commonly used in traditional medicine for its many benefits to the skin and body. However, there is no scientific evidence to suggest that it is effective in treating varicose veins. [8].

3. NIRGUNDI ROOT POWDER

Fig.4.

Kingdom - Plantae
Family – Lamiaceae
Genus - Vitex
Species - Negundo

Vitex negundo Linn is a large aromatic shrub (commonly known as Nirgundi, Five leaved chaste tree) belonging to the family Verbenaceae. Almost all the parts of this plant possess great medicinal values and it is employed as a remedy in various traditional systems of medicine like Ayurveda, Chinese, Siddha and Unani to treat various diseases. In Indian traditional medicine system Vitex negundo Linn is referred as 'sarvaroganivarani'- the remedy for all diseases. A popular local name of the Bengali in the western Himalayan area of India. It is useful in many diseases and eliminates the disease with a brush. A lot of chemicals are found in vitex negundo. Nirgundi in Sanskrit means which protects the body from diseases. If you are considering using nirgundi root powder for varicose veins, it is important to speak with a healthcare professional to determine the best course of treatment for you. While nirgundi may have benefits for other conditions, there is not enough scientific evidence to support its use as a primary treatment for varicose veins. [9].

4.PUNARNAVA POWDER

Fig.5.

Kingdom: Plantae
Family: Nyctaginaceae
Genus: Boerhavia
Species: B. diffusa

It has understood the need of longevity and effectiveness to attain the supreme goal. Punarnava helps maintain efficient kidney and urinary functions with its diuretic, laxative, stomachic, diaphoretic, anthelminthic antispasmodic and anti-inflammatory action. According to Ayurveda, Punarnava is bitter, cooling, astringent to bowels, useful in biliousness, blood impurities, leucorrhoea, anaemia, inflammations, heart diseases, asthma, alternatives etc. The leaves are useful in dyspepsia, tumours, spleen enlargement and abdominal pains. Punarnava, also known as Boerhavia diffusa, is a plant that has been traditionally used in Ayurvedic medicine for its many therapeutic properties. While it has been suggested that Punarnava powder may have beneficial effects on varicose veins, there is limited scientific evidence to support this claim.

Some of the traditional uses of Punarnava powder include:

Anti-inflammatory: Punarnava powder is known for its anti-inflammatory properties and has been used to reduce inflammation in the body.

Diuretic: Punarnava powder is a natural diuretic, which means that it can help to increase urine output and remove excess fluid from the body. It may be used in the treatment of edema or swelling caused by fluid retention. [10].

5. MANJISHTHA ROOT POWDER

Fig.6.

Kingdom: Plantae
Family: Rubiaceae.
Genus: Rubia
Species: R.cordifolia

Manjistha (Rubia cordifolia.) commonly known as Indian Madder perrineal, herbaceous, climbing belonging to family Rubiaceae. It is commonly occurring throughout hilly regions in India. Madder is used in Hindu medicine as a colouring agent; medicinal oils are boiled with Madder to give them colour. It is also useful external astringent and is applied to inflamed parts, ulcers, fractures etc. Manjistha - It has pleasant colr, provides good color, appears very beautiful.

Medicinal Uses: Raktaprasdana, Raktashodhana, Varnya, Dipana, Pachana, krimighna,khaphaghna, artavajanana, stanyashodhana, vishaghna, jwaraghna, rasayana, shothaghna, vranaropana, mutrakara, atisaraghna, arshoghna, pramehaghna, kushthaghna, gharbhashaya uttejaka etc[11].

Wound Healing Effect: Wound Healing of a herbal formulation of Rubia cordifolia was done. emulsion formulation of herbal drug mixture of R.cordifolia, C.asiatica, T.belerica, P.zeylanica, and W.somnifera was formulated. Animals were inspected daily up to 20th days and healing was good and produces wound contraction, period of epithelization and histological study. It shows, that there is contraction and new epithelization of excision wound.and beneficial in blood disorders [12].

6] DRIED MARIGOLD PETAL POWDER

Fig.7.

Kingdom: Plantae
Family: Asteraceae
Genus: Tagetes
Species: Erecta

Skin disorders and wounds are generally defined based on the depth of injury, healing time, healing progression, underlying pathology, associated risk of mortality, and the effect on quality of life . Surgical and traumatic wounds, burns, radiation dermatitis, and abrasions (including scrapes and microdermabrasion) are considered acute wounds, while venous and arterial leg ulcers, fungating wounds, pressure ulcers, and diabetic ulcers are classified as chronic wounds. Healing time and sequence also delineates acute versus chronic wounds. In general, acute wounds can repair themselves in an orderly and timely manner unlike chronic wounds. Calendula officinalis with its high quantity of flavonoids, it can help to minimize inflammation and speed up the healing process.
Vein-related disorders have become one of the most frequent chronic diseases amongst Americans – 50% of them are experiencing at least a minor case of chronic venous insufficiency – a condition of damaged vein valves and poor blood circulation that

typically results in varicose veins. Various factors affect the development of varicose veins: genetics, hormonal changes, increasing age, pregnancies, etc. and our current lifestyles of frequent sitting is not helping either.

When people first notice the symptoms of varicose veins, such as heavy and tired legs, swollen ankles, night cramps and discoloration, the tendency is to try out various over-the-counter medications or natural remedies rather than seek medical attention. The market is now flooded with a plethora of natural creams, teas and tablets and it is becoming increasing hard to decide what is worth trying. That's why we are going to look into one specific natural remedy recommended for vein-related issues – marigold [13].

7. COFFEE POWDER

Fig.8.

Kingdom: Plantae
Family: Rubiaceae
Genus : Coffea L.
Species: Coffea arabica

Coffee powder can be used as an effective exfoliating agent in scrubs for the skin. The coarse texture of coffee powder makes it an ideal ingredient for removing dead skin cells, dirt, and oil from the surface of the skin.

Coffee is also rich in antioxidants, which can help to protect the skin from damage caused by free radicals. In addition, caffeine is a natural vasoconstrictor, meaning that it can temporarily narrow blood vessels and reduce inflammation, making it a good choice for reducing the appearance of puffiness and dark circles under the eyes.

To make a coffee scrub, simply mix together ground coffee beans with a carrier oil such as coconut oil or olive oil. Massage the mixture onto damp skin in circular motions, focusing on areas that are particularly rough or dry. Rinse off with warm water and pat dry.

It is important to note that while coffee scrubs can be beneficial for exfoliating and improving the texture and appearance of the skin, they should be used with caution in individuals with sensitive skin, as the coarse texture of the coffee grounds may cause irritation.

exfoliates: coffee grounds don't dissolve when added to water. this makes them perfect being the main ingredient in exfoliating scrubs. the removal of dead skin. caffeine can constrict blood vessels and elevate blood pressure. prolonged, elevated blood pressure can place increased strain on your veins. helps reduce cellulite: the caffeine in coffee helps promote better blood flow and when used as a scrub in areas where cellulite may be present can reduce the fat deposits and leave skin looking firmer. the caffeine in a coffee scrub acts as a vascular restrictor--shrinking blood vessels, thus helping to reduce varicose veins. it reduces inflammation it improves blood circulation it removes dead skin cells it prevents premature aging it reduces the appearance of cellulite it depuffs swollen areas it helps reduce body acne. [14].

7. Vit. E

While there are several natural remedies that may help relieve the symptoms of varicose veins, there is limited scientific research on the effectiveness of topical treatments such as scrubs. However, some studies have shown that vitamin E may help improve blood circulation and reduce inflammation. While these studies suggest that vitamin E may be beneficial for improving blood circulation and reducing inflammation, more research is needed to determine its effectiveness specifically for varicose veins and the use of scrubs for this purpose. Anti-inflammatory effects: Vitamin E is known for its anti-inflammatory properties, which can help reduce swelling and inflammation in the affected veins.

Anti-inflammatory effects: Vitamin E is known for its anti-inflammatory properties, which can help reduce swelling and inflammation in the affected veins.

Improved circulation: Vitamin E may also help improve blood flow and circulation, which can reduce the pressure on the veins and relieve symptoms.

Skin health: Vitamin E is beneficial for skin health and can help reduce the appearance of varicose veins by improving the skin's elasticity and reducing the appearance of spider veins.

Antioxidant properties: Vitamin E is a powerful antioxidant that can help protect the veins from damage caused by free radicals [15].

8. SESAME OIL

Fig.9

Kingdom: Plantae
Family: Pedaliaceae
Genus: Sesamum
Species: S.indicum

Sesame oil has been traditionally used for various medicinal purposes, including the treatment of varicose veins. While there is limited scientific research on the effectiveness of sesame oil for varicose veins, some studies have suggested its potential benefits.
One study published in the Journal of Ayurveda and Integrative Medicine found that topical application of sesame oil was effective in reducing pain, swelling, and itching associated with varicose veins. The study also found that sesame oil improved blood flow in the affected area, which may help to reduce the appearance of varicose veins over time.
Another study published in the Journal of Medicinal Food found that sesame oil contains compounds that have anti-inflammatory and antioxidant properties, which may help to reduce inflammation and promote healing in the veins.
While these studies provide some evidence of the potential benefits of sesame oil for varicose veins, more research is needed to fully understand its effectiveness and safety.
Overall, sesame oil may be worth considering as a complementary treatment for varicose veins, but it should not be used as a substitute for medical treatment or advice. If you are considering using sesame oil for varicose veins, it is important to talk to your doctor first to ensure that it is safe and appropriate for you
Massage Oil: Sesame oil is commonly used as a base oil for massage because it is easily absorbed into the skin and has a warming effect that can help relax muscles and improve circulation [16].

9. ROSEMARY ESSENTIAL OIL

Fig.10

Kingdom: Plantae
Family: Lamiaceae
Genus: Salvia
Species: S.rosmarinus

Rosemary essential oil is known for its anti-inflammatory and circulation-stimulating properties, which may be beneficial for reducing the appearance of varicose veins. Varicose veins are a common condition that affects many people worldwide. They occur when the veins become swollen and twisted, often causing discomfort and pain. Rosemary essential oil is one of the essential oils that have been studied for its potential therapeutic effects on varicose veins. Here are some of the uses of rosemary essential oil for varicose veins treatment:

Reduces inflammation: Rosemary essential oil has anti-inflammatory properties that can help reduce the inflammation associated with varicose veins. This can help relieve pain and discomfort associated with this condition.

Improves blood circulation: Rosemary essential oil has been shown to improve blood circulation, which can help reduce the appearance of varicose veins. Improved blood circulation can also help relieve pain and discomfort associated with this condition.

Acts as a natural diuretic: Rosemary essential oil has diuretic properties that can help reduce fluid retention, which is a common symptom of varicose veins. This can help reduce swelling and discomfort associated with this condition.

Relieves pain: Rosemary essential oil has analgesic properties that can help relieve pain associated with varicose veins. This can help improve the quality of life of people suffering from this condition.

Promotes relaxation: Rosemary essential oil has a soothing and relaxing effect on the body, which can help reduce stress and anxiety associated with varicose veins. This can help improve overall well-being and quality of life.
To use rosemary essential oil for varicose veins treatment, it can be diluted with a carrier oil such as coconut or olive oil and applied topically to the affected area. It can also be added to a warm bath for a relaxing and soothing effect. It is important to note that essential oils should be used with caution and under the guidance of a healthcare professional, especially for people with underlying medical conditions or allergies [17].

10. BEES WAX

Fig.11.

White beeswax is a natural wax produced by honeybees. It is commonly used in cosmetics and personal care products as a thickening agent, emulsifier, and moisturizer. In the preparation of polyherbal scrubs, white beeswax can be used to provide texture and emulsify the ingredients, as well as to provide moisturizing benefits to the skin [18].

11. LIQUID PARAFFIN

Fig.12.

Liquid paraffin is commonly used as an ingredient in the preparation of polyherbal scrubs. Polyherbal scrubs are cosmetic products that are used for exfoliating and moisturizing the skin. The use of liquid paraffin in polyherbal scrubs helps to improve the texture of the product and provides moisturizing benefits to the skin.

Liquid paraffin is a colorless and odorless liquid that is derived from petroleum. It is a highly refined mineral oil that is used in many cosmetic and personal care products due to its ability to moisturize and protect the skin. In polyherbal scrubs, liquid paraffin helps to moisturize and soften the skin, while also helping to exfoliate dead skin cells. the poly herbal scrub containing liquid paraffin exhibited good physical and chemical properties and remained stable over the three-month study period. The authors concluded that liquid paraffin is a suitable ingredient for use in poly herbal scrubs and can help improve the texture and moisturizing properties of the final product [19].

12.BORAX

Fig.13

Borax is used in lotions and creams. Borax is combined with wax to improve the consistency of lotions and creams. It also works as an emulsifier when used with wax and it is mostly used in hand soaps. It is excellent ingredient used for cleaning as it's alkaline in nature [20].

13. METHYL PARABEN

Fig.14.

It is acts as preservatives. Methyl paraben is a commonly used preservative in many cosmetic products, including polyherbal scrubs. Its primary function in a polyherbal scrub is to prevent the growth of harmful bacteria and other microorganisms that can spoil the product over time.

Polyherbal scrubs are typically made from a combination of natural ingredients, such as herbs, spices, and oils, that are used to exfoliate and nourish the skin. However, these natural ingredients can also provide an ideal environment for the growth of microorganisms, which can lead to spoilage and potential health risks.

By adding methyl paraben to the formulation, the shelf life of the polyherbal scrub can be extended, and the risk of spoilage can be significantly reduced. This helps to ensure that the product remains safe and effective for use over an extended period of time.

EVALUATION PARAMETERS:

Organoleptic Evaluation parameter for polyherbal scrub:

Appearance:

Colour: brown colour of polyherbal scrub was observed by visual examination.
Odour: Odour found to be characteristics. Sweet and simple syrup like odour.
State: Semisolid state ofscrub observed by visually [21].

Physicochemical Evaluation parameter for polyherbal scrub:

Consistency: Consistency was found to be smooth with visual observation.

Homogeneity: Homogeneity of the formulation was inspected visually.

PH:

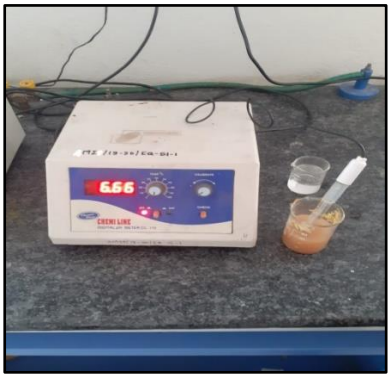


Fig. 15. Digital pH Meter.

The pH of the scrub is determined by using digital pH meter.

The pH of scrub was found to be 6.66

The standard range of pH of scrub should be in range of 5.7-7.0 [22].

Determination of spreadability of scrub:

Fig16.

Beaker and Glass Slide

- Two glass slides are taken.
- 1gm sample placed on glass slide and another slide was placed above them.
- 100gm of weight was placed on the slide.
- The time taken for the scrub spread on the slide [23].

formula: S= m × l/t. S = Spreadability. m = Weight placed on slide(100gm). l = Length **o**f the glass slide(4.1cm). t = Time taken in seconds(61sec) S= 100×4.1/61. = 6.72g.cm/sec**.**

Irritability:

Small amount of the scrub was applied on the skin and kept for few minutes and found to be non-irritant [24].

Washability:

Little quantity of scrub was applied over the skin and washed with water [25].

Viscosity by using Ostwald Viscometer:

Fig 17.

Ostwald Viscometer

Determination of density of sample.

$\rho 2 = \frac{w3-w1}{w2-w1}$ = 1.0044 g/ml.

Where, W1= Weight of empty gravity bottle.

W2= Weight of gravity bottle + Distilled water.

W3= Weight of gravity bottle + Sample liquid.

Viscosity of sample ($\eta 2$)= $\frac{\rho 2 t 2}{\rho 1 t 1} \times \eta 1$ = 0.866cp

Where, ρ1= Density of water (0.997g/ml standard value)

ρ2= Density of scrub sample (1.0044 g/ml.)

ŋ1= Viscosity of water. (0.890cp Standard value)

ŋ2= Viscosity of scrub sample.

t1= Mean time of flow of water from A to B (18.97 sec)

t2= Mean time of flow of scrub sample from A to B (18.34 sec) [26].

Extrudability:

Extrudability was determined by the time required by sample to completely extrude from the container, i.e. Sample amount/ time required.

Grittiness:

Exfoliants need to abrasive property so Coffee powdered and pass through sieve then this preparation.so it has gritty particles observed [27].

Stability study:

The formulation was stored at different temperature conditions for a period of 10 days and evaluated for parameters like colour, odour, pH, and consistency.

BATCH OPTIMIZATION:

TABLE NO: 2 FORMULATIONS OF POLYHERBAL SCRUB.

SR.NO.	INGREDIENTS	BATCH A	BATCH B	BATCH C
		QUANTITY FOR 20 GM	QUANTITY FOR 30 GM	QUANTITY FOR 40 GM.
1	Sunth powder	0.50 gm	0.50 gm	0.50 gm
2	Multani mitti	05 gm	05 gm	05 gm
3	Nirgundi Root Powder	1.25 gm	1.25 gm	1.25 gm
4	Punarnava powder	0.50 gm	0.50 gm	0.50 gm
5	Manjishtha Root Powder	0.50 gm	0.50 gm	0.50 gm
6	Dried Marigold Petal Powder	0.50 gm	0.50 gm	0.50 gm
7	Coffee	0.50 gm	0.50 gm	0.50 gm
8	Vit.E	1 gm	1 gm	1 gm
9	Sesame oil	1 gm	1 gm	1 gm
10	Rosemary Essential oil	Q.S	Q.S	Q.S
	For cream base			
11	Bees wax	1.6	3.2gm	4.8
12	Liquid Paraffin	5.0 gm	10 gm	15 gm
13	Borax	0.08 gm	0.16 gm	0.24 gm
14	Methyl Paraben	0.18 gm	0.36 gm	0.54 gm
15	Propyl paraben	0.02 gm	0.04 gm	0.06 gm
16	Distilled Water	3.3gm	6.6 gm	9.9 gm
17	Perfume	Q.S	Q.S	Q.S

RESULT AND DISCUSSION:

Preparation of polyherbal scrub formlation for the management of varicose veins.following batches are optimized. Preparation of 40 gm polyherbal scrub. 10 gm medicament and 30 gm cream base.

BATCH A: OPTIMIZATION DATA.

Ingredients: 10 gm drugs and 10 gm cream base used for the preparation of polyherbal scrub.

Observation: Consistency is not good.

Result: Batch Optimization needed.

BATCH B: OPTIMIZATION DATA.

Ingredients: 10 gm drugs and 20 gm cream base used for the preparation of polyherbal scrub.

Observation: Slightly good Consistency.

Result: More Batch Optimization needed.

BATCH C: OPTIMIZATION DATA.

Ingredients: 10 gm drugs and 30 gm cream base used for the preparation of polyherbal scrub.

Observation: very good Consistency.

Result: Batch optimized and very good consistency.

TABLE NO: 3. FINAL BATCH OPTIMIZATION DATA:

SR.NO.	QUANTITY	FINAL BATCH DATA
1	Sunth powder	0.50 gm
2	Multani mitti	05 gm
3	Nirgundi Root Powder	1.25 gm
4	Punarnava powder	0.50 gm
5	Manjishtha Root Powder	0.50 gm
6	Dried Marigold Petal Powder	0.50 gm
7	Coffee	0.50 gm
8	Vit.E	1 gm
9	Sesame oil	1 gm
10	Rosemary Essential oil	Q.S
11	Bees wax	4.8
12	Liquid Paraffin	15 gm
13	Borax	0.24 gm
14	Methyl Paraben	0.54 gm
15	Propyl paraben	0.06 gm
16	Distilled Water	9.9 gm
17	Perfume	Q S

TABLE NO: 4 PHYSICOCHEMICAL PARAMETERS

Sr. No.	Physicochemical Parameter	Observation
01	Colour	brown
02	Odour	Characteristics/pleasant
03	Consistency/Texture	Smooth,very good
04	pH	6.66
05	Stability	Stable at different temperature.
06	Solubility	Soluble in boiling water and alcohol
07	Irritability	Non-irritant.
08	Spreadability	uniform
09	Viscosity	0.866cp
10	Grittiness	Small gritty partical

CONCLUSION:

In conclusion, the use of scrubs for varicose veins treatment can provide a natural and effective way to reduce inflammation, improve blood circulation, and enhance the appearance of the skin. By using simple ingredients and following a regular skincare routine, individuals with varicose veins can improve their condition and feel more confident in their skin. The polyherbal scrub for the treatment of varicose veins was successfully prepared using natural ingredients. The herbs used in the formulation have been traditionally used for the treatment of varicose veins and have a good safety profile.

The polyherbal scrub was found to be stable and safe for use, making it an ideal alternative to expensive and potentially harmful treatments. The use of this polyherbal scrub can alleviate the symptoms associated with varicose veins, such as pain and discomfort, and improve the overall appearance of the affected area.

The polyherbal scrub is easy to prepare and effective in alleviating the symptoms associated with varicose veins. It has the potential to improve the quality of life of people suffering from varicose veins without the side effects associated with conventional treatments.

Further research is needed to evaluate the long-term efficacy of this polyherbal scrub in the treatment of varicose veins. However, based on the results of this study, the polyherbal scrub appears to be a promising alternative for the treatment of varicose veins.

REFERENCES:

1] Deepali Mor and Payal Dande, varicose veins: an overview of current and herbal treatments, International Journal of Pharmaceutical Sciences and Research, 2017; Vol. 8(5): 1959-1966. E-ISSN: 0975-8232; P-ISSN: 2320-5148.

2] Akoijam Sangita Devi , Malar Kodi Aathi, Prevention of Varicose Veins, Journal of Nursing Science & Practice, ISSN: 2249 – 4758 Volume 4, Issue 1 www.stmjournals.com.

3] The vein Institute. All you need to know about Varicose Veins & its treatments Book. https://cdn2.hubspot.net/hubfs/4376989/The%20Vein%20Institute_%20ebook-%20final%20version%20.pdf.

4] Rutuja Prashant Nangare, Trupti Ashok Thange. Formulation and Evaluation of Polyherbal Facial Scrub, International Journal of Research Publication and Reviews, Vol 3, no 6, pp 3439-3448, June 2022.

5] Mithal BM, Saha RN. A Handbook of Cosmetics, 1st edn, Vallabh Prakashan, 2000.

6] Pawar HA, Choudhary PD , Gavasane AJ , Malusare V and Shinde P. Standardization of Sunth Powder Prepared Using Rhizomes of Zingiber officinales, Pawar et al., Med Aromat Plants 2015, 4:5 http://dx.doi.org/10.4172/2167-0412.1000216.

7] Neeru Bhatt, Mostafa I. Waly, Mohamed M Essa,and Amanat Ali, GINGER: A FUNCTIONAL HERB,See discussions, stats, and author profiles for this pubation at: https://www.researchgate.net/publication/257416254.

8] Ghadage P. K., Mahamuni S. S., Kachare D. S, Formulation and Evaluation of Herbal Scrub using Tamarind Peel, https://rjtcsonline.com/Issues.aspx?VID=12&IID=1.

9] Singh Y, Mishra P, Kannojia P, Morphology, Phytochemistry and Pharmacological Activity of Vitex negundo: An Overview , Journal of Drug Delivery and Therapeutics. 2020; 10(3-s):280-285 http://dx.doi.org/10.22270/jddt.v10i3-s.4173.

10] Debjit Bhowmik , K.P. Sampath Kumar, Shweta Srivastava , Shravan Paswan , Amit Sankar , Dutta Dutta. Traditional Indian Herbs Punarnava and Its Medicinal Importance, Journal of Pharmacognosy and Phytochemistry, ISSN 2278-4136 Online Available at www.phytojournal.com.

11] Dr. Abhijeet D. Kumbhar, Dr. Shamal S. Naikare. Medicinal Plant Review: Manjistha (Rubia cordifolia), IJCRT1872440 International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org.

12] Dr. Bharti Sadabal, Dr. T.A.Pansare, and Dr Sachin Govindrao Tike. a comprehensive review on manjishtha (rubia cordifolia l.) with special reference to ayurvedic and modern aspect. International Journal of Recent Scientific Research Vol. 11, Issue, 04 (A), pp. 37958-37968, April, 2020.

13] Bhargab Deka , Bedanta Bhattacharjee , Anshul Shakya , Abu Md Ashif Ikbal , Chayanika Goswami , Santa Sarma. Mechanism of Action of Wound Healing Activity of Calendula officinalis: A Comprehensive Review, Pharmaceutical and Biosciences Journal Vol. 9(1), 28-44, 2021.

14] Rutuja Prashant Nangare , Trupti Ashok Thange. Formulation and Evaluation of Polyherbal Facial Scrub. International Journal of Research Publication and Reviews, Vol 3, no 6, pp 3439-3448, June 2022.

15] Kouris-Blazos A, Belski R, Singh H. Effects of a Nutrient Intervention on Microvascular Dysfunction in Overweight and Obese Adults. Int J Vasc Med. 2019;2019:9629106. doi:10.1155/2019/9629106.

16] Singh S, et al. (2013). Evaluation of the efficacy of Sesame oil in primary management of varicose veins: A pilot clinical trial. Journal of Ayurveda and Integrative Medicine, 4(1), 43-46.

17] Gok Metin Z, Ozdemir L. The effect of rosemary oil massage on the symptoms of varicosity in women. Int J Prev Med. 2013 Mar;4(3):345-52.

18] Jadhav, V., & Gholve, S. (2012). Formulation and evaluation of herbal scrub gel. International Journal of Pharmacy and Pharmaceutical Sciences, 4(3), 536-540.

19] Priya K, Dhanabal SP. Development and Evaluation of Polyherbal Scrub. International Journal of Pharmaceutical Sciences and Research. 2013;4(11):4266-4271.

20] Sinha P, Srivastava S, Mishra P, Yadav P, Tripathi Y B. Formulation and evaluation of a polyherbal cream for the treatment of varicose veins. Journal of Ayurveda and Integrative Medicine. 2016;7(1):12-18.

21] J. Prathyusha,N.S.Yamani,G.Santosh, A. Arvind, B. Naresh : Formulation and evaluation of polyherbal face scrubber for oily skin in gel form, National general of pharmaceuticalscience and drug research 2019; 11(4):126-128.

22] Esha Vatsa, Mehak Aggarwal, Shipra Gautam. Formulation and Evaluation of Polyherbal Facial

Scrub, Vol.1 Issue-9, MAY 2021 (e-ISSN: 2582-8223).
23] Ashawat, M. S., Banchhor, M., Saraf S. and Saraf, S. (2009). Herbal Cosmetics: Trends in Skin Care Formulation. Pharmacognosy Review. 3 (5):82-89.
24] Chaudhari, V. A., Girase, M. V., Borase, B. G., Kailas, S. and Chaudhari, K. A. (2020). Formulation and Evaluation of Multipurpose Herbal Scrub in Gel Form Using Limonia acidissima. International Journal of Research and Analytical Review. 7 (2):637-649.
25] Fatima, Grace X., Anbarasan B., Kanimozhi T. and Shanmuganathan S.,2018 Preparation And Evaluation Of Deep Cleansing Exfoliator, Asian Journal Of Pharmaceutical And Clinical Research,11 (7), Page no. 356-359.
26] Pawar DN, Pawar AP, Dalvi YV. Formulation and Evaluation of Herbal Scrub Gel. Research Journal of Topical and Cosmetic Sciences. 2019;10(1):13-8.
27] Mr.Vishal Ashok Chaudhari, Dr.Manoj V.Girase, Mr.Bhushan Gulab Borase, Mr.Shashikant Kailas Bhoi, Miss.Kalyani Ashok Chaudhari : Formulation and Evaluation of Multipurpose Herbal Scrub In Gel Form Using Limonia Acidissima, International Journal Of Research and Analytical Reviews 2020;7(2).

Research Article

STUDY OF DRUG USE PATTERN OF ANTI TB DRUGS IN A TERTIARY CARE TEACHING HOSPITAL OF KARNATAKA, INDIA - A RETROSPECTIVE STUDY

S.Rahul *[1], Sarmashvali K[2], Shankarappa M. Mudgal[3], H. Doddayya[4]

Department of Pharmacy Practice, NET Pharmacy College, Raichur- 584103, Karnataka, India.

Pharm D intern, Department of Pharmacy Practice, NET Pharmacy College, Raichur- 584103, Karnataka, India.

Head and Professor, Department of General Medicine, Navodaya Medical College Hospital & Research centre, Raichur-Karnataka

Principal, NET Pharmacy College, Raichur- 584103, Karnataka, India.

ABSTRACT

Tuberculosis is one of the leading causes of mortality and morbidity around the world, infecting approximately 8 billion people, with an annual death rate of close to 1 million. The retrospective study was undertaken to assess the prescribing pattern of anti-TB drugs. The study was carried out in the general medicine of Navodaya Medical College Hospital and Research Centre at Raichur, over a period of 3 months from September to November 2023. A total of 100 patients were incorporated in the study. Among the total population, 75% were male and 25% were females. The maximum numbers of patients were in the age group of 40 to 60 yrs. The patients were classified into normal TB and EPTB. The study shows that when compared to EPTB, PTB shows most occurrences as per the study conclusions. The often risk factor involved in TB was alcohol (50%) and smoking (50%) followed by tobacco chewing (20%). In this study majority of the patients have received first line antitubercular treatment which consist of isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin. Out these medications isoniazid, rifampicin, pyrazinamide and ethambutol are the most prescribed medications which contributes 45% of overall drugs prescribed for tuberculosis treatment. In Summary, efforts to enhance the management of tuberculosis in our tertiary care teaching hospital should focus on ensuring guideline adherence and optimizing patient care to achieve the best outcomes for individuals. The patients showed good recovery which concludes that standard prescription pattern provides a good success rate in the treatment of tuberculosis.

Keywords: Tuberculosis, Quality of life, Essential drug list, Drug use indicators, Prescription pattern

INTRODUCTION

Tuberculosis (TB) remains a major global health problem, responsible for ill health among millions of people each year. TB ranks as the second leading cause of death from an infectious disease worldwide, after the human immunodeficiency virus (HIV). The latest estimate reports that there were 9.0 million new TB cases in 2013 and 1.5 million TB deaths (1.1 million among HIV negative people and 0.4 million among HIV-positive people). Tuberculosis is caused by a bacteria called Mycobacterium tuberculosis that most often affects the lungs. Tuberculosis is a curable and preventable disease. It is transmitted from person to person via droplets from the throat and lungs of people with the active tuberculosis disease.[1] Monitoring the outcome of treatment using standardized approach is essential in order to evaluate the effectiveness of the intervention and for comparison. World Health Organization in conjunction with International Union Against Tuberculosis and Lung Disease (IUATLD) provided recommendations on how to evaluate treatment outcomes using standardized categories.[2] Currently, the National Tuberculosis Elimination Program (NTEP) between 2017 to 2025, aims at the elimination of tuberculosis. There are few modifications in the diagnosis, treatment and follow up protocol as well. For drug sensitive TB, daily fixed dose combinations of first line antitubercular drugs are given. All Rifampicin Resistant cases are subjected to baseline kanamycin and levofloxacin drug sensitivity. NTEP also aims at scale up of new drugs like Bedaquiline and Delamanid. It also aims at bidirectional screening of TB and Diabetes Mellitus. Linking of Pradhan Manthri Jan-Dhan yojana, AADHAR and Nikshay for direct cash benefits to the patient's bank under NTEP, the drug Streptomycin will be reserved for special cases like disseminated tuberculosis. INH prophylaxis

guidelines for contacts are being changed to 10mg/kg of INH for children below five years of age.[3] The first line drugs for treatment are isoniazid, rifampicin, pyrazinamide (PZA), ethambutol, rifabutin, and rifapentine while second-line drugs include streptomycin, cycloserine, capreomycin, p-aminosalicylic acid, levofloxacin, moxifloxacin, gatifloxacin, amikacin, and ethionamide.[4,5]

Therefore, it is required to investigate the QoL of TB patients to recognize appropriate actions for improvement of health status and the QoL among the patients.[6] Previous reviews have found quantitative evidence.[7] A patient with tuberculosis faces several physiological, psychological, financial and social problems. These problems have a great impact on the well-being of the patient and impair the quality of life of the patient suffering from tuberculosis. Considering the fact that improvement in HRQoL is an important factor for better response to treatment among TB patients, which may lead to better outcome in patients' health.[8] The World Health Organization (WHO) has reported that more than half of all medicines are prescribed, dispensed, or sold inappropriately.[9]

Prescription pattern monitoring studies are tools for assessing the prescribing, dispensing, and distribution of medicines prevailing in a particular locale. The main aim of such studies is to facilitate rational use of medicines.[10] According to the WHO, core drug use indicators are divided into three categories, namely, the prescribing indicators, patient care indicators, and the quality-of-care indicators. These are highly standardized indicators which do not need national adaptation. Although they do not measure all aspects of drug utilization which require intensive methodologies, extensive and varied sources of data, the core drug use indicators provide a simple tool for quickly and reliably assessing a few critical aspects of pharmaceuticals use in health care. The drug use indicators collected in a cross-section survey or measured at different points in time to assess the change in performance are typically measured within a defined geographic or administrative area, either to describe drug use at a given point in time or to monitor changes over time. This study was designed to assess the drug prescribing practices at the medical outpatient department at our tertiary care center which is a teaching medical college hospital, using the five WHO prescribing indicators which include the average number of drugs per patient encounter, percentage of drugs prescribed by generic name, percentage of encounters with an antibiotic prescribed, percentage of encounters with an injection prescribed, and percentage of drugs prescribed from essential drugs list or formulary.[11]

MATERIALS AND METHODS

This retrospective study was conducted for a period of three months from September 2023 to November 2023 in Navodaya Medical College Hospital & Research Centre (NMCH & RC) Raichur. Permission was obtained from Institutional Ethics Committee of Navodaya Medical College Hospital and Research Centre. The study was approved by the committee by issuing ethical clearance certificate.

Data Collection : Data was collected using data entry form, case sheet.

Inclusion Criteria:

The following criteria were included in this study:

- Patients who were diagnosed with TB and on anti-tubercular drugs.
- Patients of all age group.
- Patients with active or inactive tuberculosis taking anti-tuberculosis treatment.

Exclusion Criteria:

The following criteria were excluded from the study:

- Patients diagnosed with acquired immunodeficiency syndrome.
- Patients with resistance to TB medication.
- Not willing to participate in the study.
- Pregnant and lactating women up to 12 weeks after partum.

The information obtained from case files about study participants were kept confidential and only the collected data was processed.

The collected data were analyzed and monitored for the following variables

- Socio-demographic data
- Prescription pattern in tuberculosis patients

The data from the study were analyzed using descriptive statistics namely total numbers, percentage and mean. Microsoft excel and word were used to generate graphs, tables and results etc.

RESULTS

In the present study, a total number of 100 patients were evaluated during a period of three months. Most of the patients were in the age group of 40–60 and the mean age was found to be 46.56±15.67 years. . Patients having pulmonary TB (PTB) was mainly in the age group of 35-65 years and of extra (PTB) (EPTB) was 51–60 years with mean age 47.25±14.46 years and 54.25±4.77 years, respectively. Out of 100 patients, 75 were males and

25 were females. 96 patients had PTB, out of which 72 (75%) were male and 24 (25%) were female. 4 patients had EPTB, out of which 3 (75%) were male and 1 (25%) were female. The sites of EPTB were studied, and the most common was pleural effusion 4 (100%). The major risk factors involved in TB were, smoking, tobacco chewing, and alcohol consumption were identified in 100 patients. Among 100 patients, total 120 risk factors were identified, in which 50 (50%) were smokers and 20 (20%) were tobacco chewers and 50 (50%) were alcoholic occurred in male patients. Above risk factors were not observed in female patients. The selected patients were most of the times comorbid with sepsis with type II diabetes mellitus, COPD, hypertension and anaemia. All the prescriptions evaluated in the study adhered to the guidelines. It is known that anti TB drugs are more likely to have drug interaction, among 100 patients 57 drug-drug interactions were found, in which 10 (17.55%) were major, 15 (26.31%) were moderate and 22 (38.59%) were minor. Rifampicin, isoniazid and pyrazinamide accounted for the majority of drug interactions involving TB patients. Figure 1 illustrates the percentage of each drug type prescribed. In total, the patients were prescribed 560 doses of drugs during the course of their treatment. The average number of drugs prescribed per encounter during the initiation of therapy was 5.3±1.72.

Table 1: Age wise distribution of subjects

Age group	No of patients	Percentage
30- 40	20	20%
40-50	45	45%
50-60	35	35%

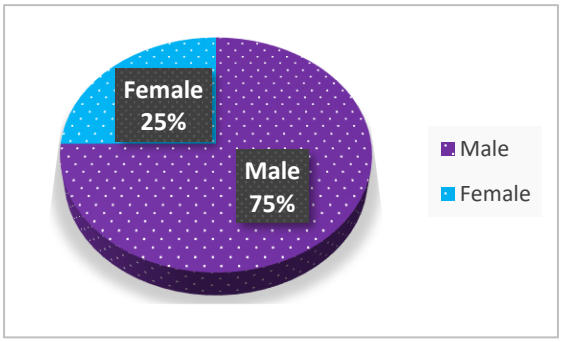


Figure 1: Gender wise distribution of study subjects

Table 2: Patient Characteristics

No	Patient Characteristics		Mean ± SD (n=100)
1	Age (Years)		46.56 ± 15.67
2	Gender (N)	Male	75
		Female	25
3	Site of disease (N)	PTB	96
		EPTB	4

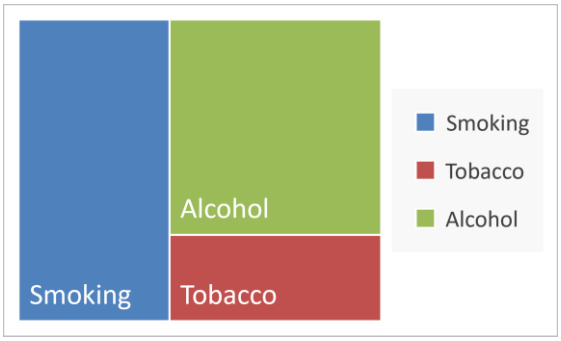


Figure 2: Risk factors involved in tuberculosis

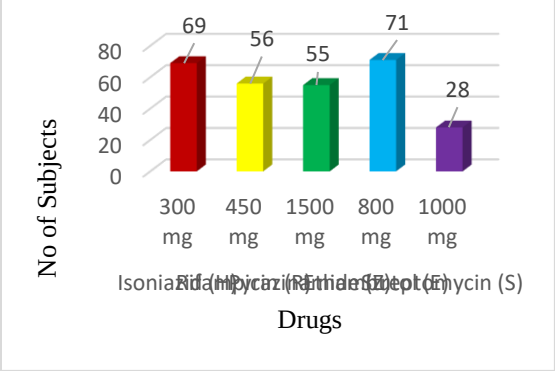


Figure: 3 Antitubercular Regimen

Table: 4 Other drugs prescribed in tubercular subjects

Drugs	No of Subjects
Antibiotics	92
Antipyretics& Analgesics	70
Bronchodilators	14
Vitamins&Minerals	70
Others	35

DISCUSSION

The study titled "Study of Drug use pattern of Anti TB Drugs in a Tertiary care Teaching Hospital of Karnataka, India- a retrospective study" was carried out in the general medicine of Navodaya Medical College Hospital and Research Centre at Raichur, over a period of 3 months from September to November 2023. A total of 100 patients were incorporated in the study. Among the total population, 75 (75%) were male and 25 (25%) were females [Fig 1]. It is found that males were more prone to tuberculosis when compared to females with a ratio of 3:1. A study conducted by Mathew T F et al., reveals that the pervasiveness of tuberculosis is more in males than females with a ratio of 8:2. Also the NTP summarized as the ratio of the occurrence of TB between the male and female were 5:2. Not only these studies some other studies also point out that the TB is more prone to male gender. The mean age of the study population was found to be 46.56±15.67 [Table 2]. According to a descriptive study conducted by Habib-ullah K et al., 42.10±20.38 years is the mean age group for TB occurrence. Age group analysis of entire population in our study shows that the most prominent group was 40-60 comprising of 80 (80%) patients followed by 30-40 which comprises about 20(20%) patients. Overall, the study shows that the most prominent age group for the occurrence of TB was 40-60, as which is proved by the preceding studies. Although middle aged adults have a good immune system, the TB rate is very high in this age group only, because of bad habits such as smoking, chewing tobacco, alcoholism, etc. Out of the study population, 50(50%) patients were alcoholic as well as smokers. Only 20% of the patients were addicted to tobacco [Fig 2]. The study shows that when compared to EPTB, PTB shows most occurrences as per the study conclusions. In this study, a large number of drug-drug interactions were found among which, the most notable were those between rifampicin and pyrazinamide, rifampicin and isoniazid, and ciprofloxacin and theophylline. In this study majority of the patients have received first line antitubercular treatment which consist of isoniazid, rifampicin, pyrazinamide, ethambutol and streptomycin. Out these medications isoniazid, rifampicin, pyrazinamide and ethambutol are the most prescribed medications which contributes 45% of overall drugs prescribed for tuberculosis treatment.

CONCLUSION

The present study aimed to assess the prescription pattern of TB patients since it can be completely cured and eradicated by proper management and monitoring and it revealed that favourable outcome could be achieved with regular use of medicine at right dose and frequency. The proper diagnosis and rational prescribing of anti-TB drug regimen is a basic necessary for a positive therapeutic outcome in TB patients. In the present study selection of drug regimen played important role in obtaining improved patient care. The study suggests that following the standard prescription patterns and guidelines provided complete success rate in the treatment of tuberculosis. In conclusion, our retrospective study on the prescription pattern of antitubercular drugs in a tertiary care teaching hospital has provided valuable insights into the management of tuberculosis within our healthcare setting.

RECOMMENDATION

The findings from this study highlight several important aspects:

1. It is observed that the majority of patients received standard and recommended regimens for tuberculosis treatment. This suggests that healthcare providers in our hospital adhere to established guidelines for prescribing antitubercular drugs.
2. Multidrug-Resistant TB (MDR-TB) Concerns: The study also revealed a concerning small proportion of patients who were prescribed second line antitubercular drugs, indicating the presence of multidrug-resistant tuberculosis in our population. This underscores the need for continued surveillance and efforts to prevent the development and spread of drug resistance.
3. Adherence to Duration: It is encouraging to note that most patients received appropriate treatment duration, which is crucial for achieving successful outcomes and preventing relapse. This suggests a commitment to patient care within the healthcare facility.
4. Monitoring and Side Effects: The study raised awareness about the importance of monitoring patients for adverse effects of antitubercular drugs. Adequate monitoring and management of side effects are crucial to ensure patient compliance and reduce treatment interruptions.
5. Opportunities for Improvement: Our findings suggest that there may be opportunities to further optimize prescription practices, especially with regard to reducing the use of second-line drugs and improving adherence to guidelines. This could lead to better patient outcomes and decreased healthcare costs.

In summary, this retrospective study provides valuable information for healthcare providers, administrators, and policymakers. It highlights the strengths of our current prescription practices and identifies areas where improvements can be made. Moving forward, efforts to enhance the management of tuberculosis in our tertiary care teaching hospital should focus on ensuring guideline adherence, reducing drug resistance, and optimizing patient

care to achieve the best possible outcomes for individuals affected by this disease.

CONFLICT OF INTEREST

The authors have no conflicts of interest.

REFERENCE

1.http://www.who.int/tb/publications/global_report/gtbr14_main_text.pdf Accession on 30-11-2014.

2. Veen J, Raviglione M, Rieder HL. Standardized tuberculosis treatment outcome monitoring in Europe. European Respir J. 1998;12(2):505-10.

3. National strategic plan for Tuberculosis: 2017-25 elimination by 2025. Available from: https://tbcindia.gov.in.

4. Hartwig SC, Siegel J, Schneider PJ. Preventability and severity .assessment in reporting adverse drug reactions. Am J Hosp Pharm 1992;49:2229-32.

5. Patra S, Lukhmana S, Tayler Smith K, Kannan AT, Satyanarayana S, Enarson DA, et al. Profile and treatment outcomes of elderly patients with tuberculosis in Delhi, India: Implications for their management. Trans R Soc Trop Med Hyg 2013;107:763-8.

6. Chamla D. The assessment of patients' health-related quality of life during tuberculosis treatment in Wuhan, China. Int J Tuberc Lung. 2004;8(9):1100-06.

7. Bates I, Fenton C, Gruber J. Vulnerability to malaria, tuberculosis, and HIV/AIDS infection and disease. Part 1: determinants operating at individual and household level. The Lancet Infec Dis. 2004;4(5):267-77.

8. Mamani M, Majzoobi MM, Ghahfarokhi SM, Esna-Ashari F, Keramat F. Assessment of health-related quality of life among patients with tuberculosis in Hamadan, Western Iran. Oman Medical Journal. 2014;29(2):102-05.

9.World Health Organization Medicine Strategy, 2008-2013. Geneva: WHO; 2008.

10.Jain S, Upadhyaya P, Goyal J, Kumar A, Jain P, Seth V, et al. A systematic review of prescription pattern monitoring studies and their effectiveness in promoting rational use of medicines. Perspect Clin Res 2015;6:86-90.

11. World Health Organization. How to Investigate Drug use in Health Facilities: Selected Drug use Indicators – EDM Research Series No. 007. WHO/DAP/93.1. Geneva: World Health Organization; 1993

12. Mathew TF, Effectiveness of knowledge-based approach for the improvement of patient adherence and reducing the severity of adverse drug reaction in anti-tubercular therapy. Ijppr 2012;(3):65-70.

13. Habib UK et al Anti-tuberculous therapy induced liver injury: Frequency, management and outcome. JMSC, 2009;(7):99-102

Research Article

SOLVENT EVAPORATION METHOD: A PROMISING SOLID DISPERSION METHOD USING BETA CYCLODEXTRIN POLYMER FOR ENHANCING SOLUBILITY OF POORLY SOLUBLE DRUG FEBUXOSTAT

Shruti Shanu Dessai
Department of Pharmaceutics, PES'S Rajaram and Tarabai Bandekar College of Pharmacy
Farmagudi Ponda Goa -40341
Tel.: 919421088590, 7385666283
E-mail address (es): Shrutidessai15@gmail.com, Felllowship2023@gmail.com

ABSTRACT

Febuxostat is nonpurine xanthine oxidase inhibitor used in treatment of hyperuricemia and gout. Due to its poor solubility, it has less bioavailability. Hence this problem is solved by formulating a solid dispersion using beta cyclodextrin (β-CD) polymer by solvent evaporation method. Beta cyclodextrin (β CD) was used in different drug: carrier ratios (1:2, 1:4, 1:6, 1:8, and 1:10). SE1, SE2, SE3, SE4,SE5 respectively. The effect of these polymers at different ratios on aqueous solubility was studied. Solid dispersion was evaluated for physical appearance, percentage yield, drug content, saturation solubility studies and dissolution studies, etc. Result of saturation solubility studies revealed increase in solubility of the solid dispersions compared to the pure drug. *Invitro* release profiles of all solid dispersion were evaluated and studied against pure febuxostat drug. Solid dispersion SE5, having drug:*β* CD(1:10 ratio) showed a higher dissolution rate.The powder X-ray diffraction study and Scanning electron microscopy (SEM) studies exhibited conversion of crystalline drug to an amorphous form of solid dispersion.The present study demonstrated that formulation of solid dispersion using *β* CD method is a highly the best technique for solubility enhancement of febuxostat drug.

Key words: Febuxostat (FBX), Solid Dispersion (SD), Beta cycodextrin (β CD), Active pharmaceutical ingredient (API) , Solvent evaporation method ,*Invitro* release profile ,X ray study(XRD), DMF (dimethyl formamide), DMSO (dimethyl sulfoxide)

INTRODUCTION

Febuxostat (FBX) chemically known as (2-[3-cyano-4-(2-methylpropoxy) phenyl]-4-methyl thiazole-5-carboxylic acid) is a selective potent, non-purine xanthine oxidoreductase inhibitor using in treatment of hyperuricemia and gout.[1] When (SUA) serum urate concentration is greater than >420 μ mol/l it is a clear indication of hyperuricemia. In women, about 1mg is slightly lower than in men. 500 -700 mg is the daily excretion of uric acid. [5]Gout is a systemic disease caused by the deposition of monosodium urate crystals (MSU) preferentially in the joint space and tissues thereby causing pain and inflammation.[6]

Beta cyclodextrin (β CD) is a cone-shaped, hydrophilic molecule. Being water soluble, and a variety of hydrophobic drug (poorly water soluble can be encapsulated in its non-polar cavity. Such a characteristic has been widely applied in the fields of drug-controlled release (CR), sustained release(SR) and immediate release formulations (IR).[7]β-CD is a cyclic derivative of starch prepared from partially hydrolyzed starch (maltodextrin) by an enzymatic process.

The solid dispersion technique can help in solving the problem of poor solubility and poor bioavailability. [8]Solid dispersion refers to a group of solid products consisting of at least two different components, generally a hydrophilic matrix and a hydrophobic drug. Advantage of preparing a solid dispersion is it not only increases porosity of

particles but also increases wettability with reduction in the particle size also there is conversion of crystalline drug into amorphous form.[10] There are various solid dispersion methods like fusion method, Solvent evaporation method, coprecipitation method,co-grinding method, melt evaporation method ,kneading method. All the different methods were tried out and among all solvent evaporation methods was found to give high yield and also there was no loss of product during formulation.

The present study aimed to formulate solid dispersion (SD) using beta cyclodextrin by solvent evaporation method.

MATERIALS AND METHODS

MATERIALS

Febuxostat was a gift sample from Watson Pharma Pvt Ltd (Verna, India).The polymer beta-cyclodextrin from Signet chemical company.(Mumbai, India) .All reagents are analytical grade.

To check the identity, purity and nature of the drug the pre-formulation test of the drug was carried out.

A. Physicochemical characterization of drug

1) Appearance.

The drug was observed visually.

2) IR spectroscopy.

To check the presence of characteristics of drug peaks and the purity of the drug IR study was carried out using the KBr pellet method.

3) Determination of λmax and Preparation of standard curve of febuxostat in 0.05M Phosphate buffer pH6

FBX standard solution of 1000 ug/ml and working stock solution of 100 ug/ml were prepared in methanol .[11] Further diluting the working stock solution with 0.05 M Phosphate buffer pH 6,a concentration equivalent to 4 ug/ml .Febuxostat solution was obtained and scanned in the range of 200-400 nm on UV spectrophotometer. The λmax of the solution was determined using 0.05 M Phosphate buffer pH 6 as blank.[12]

Preparation of calibration curve

From 100 ug/ml standard stock solution of methanol. FBX working stock solution was prepared of concentration 2, 4, 6,8 and 10 ug/ml respectively and made up to volume using phosphate buffer pH 6 as solvent. The absorbance was measured at 315 nm using 0.05M phosphate buffer pH 6 as blank. A calibration curve was plotted of concentration (µg/ml) versus absorbance.[12]

4) Preliminary solubility studies of Febuxostat

A solubility measurement of FBX was performed [9]. An excess amount of FBX was added to 25 ml of solvent in a screw-capped bottle and vortexed using cyclomixer for 48 hours at room temperature .The resultant solution was taken out at 48 hrs and centrifuged at 2000 rpm for 15 min. Subsequently, Whatman filter paper no 42 is used to filter the supernatant. Filtered solutions were analyzed under UV at λmax 315 nm. The solvent used in the study were water, 0.1 N HCl and 0.05 M phosphate buffer pH 6(OGD media) and phosphate buffer pH 6.8 [13].

5) Method of preparation of solid dispersion

Following tables1 depict dispersion of FBX (pure drug) in a beta cyclodextrin carrier in different ratios. 40 mg of drug was taken in the vial and 4 ml of ethanol was added to each. The febuxostat drug dissolved completely in ethanol to which the polymer solution was added and sonicated for 1 min. The solutions were allowed to evaporate completely until the dry solid mass was obtained and kept in a desiccator for further use . [14]

Table 1: Formulation of Febuxostat solid dispersion by changing the amounts of *β* cyclodextrin.

Formulation code	SE1	SE2	SE3	SE4	SE5
Drug: carrier	1:2	1:4	1:6	1:8	1:10
Drug (mg)	40	40	40	40	40
β cyclodextrin (mg)	80	160	240	320	400

Evaluation of solid dispersion

a) Physical appearance-

All prepared solid dispersions were evaluated for colour, appearance, percentage yield and drug content.

b) Percent practical yield

Solid dispersion was scraped and its practical yield (PY) was determined:

PY (%) = [Practical mass (SD)/Theoretical mass (Drug+ carrier)] ×100….(1)

c) Saturation Solubility study:

The saturation solubility study was performed by taking an excess amount of complex equivalent to 20 mg of drug was added to 10 ml of solvent in a screw cap glass vial. The vial is stoppered and the solution was vortexed for 2min using a cyclomixer and then shaken on a rotatory shaker for 2 days at 37° C. The saturated solution was taken out at 48 hrs and centrifuged at 2000 rpm for 15 min. An aliquot of the supernatant was then withdrawn and filtered through whatman paper 42. The filtrate

was diluted suitably if needed and absorbance was checked using a UV/Visible spectrophotometer. Concentration in each solution was calculated .[10] The solvent used in the study were water, 0.1 N HCl and 0.05 M phosphate buffer pH6 and phosphate buffer pH 6.8.[10]

Sr no	Property	Standard	Observation
1	Colour	White	Complies
2	Odour	Odourless	Complies
3	Nature	Crystalline	Complies
4	Solubility	Practically insoluble in water, slightly soluble in methanol, sparingly soluble in ethanol, soluble in dimethyl sulphoxide, freely soluble in N, N-dimethylformamide.	Complies

placed in the basket of dissolution apparatus. Dissolution studies were performed using USP type I, using rotating basket apparatus.[11] The volume of the dissolution medium was taken as 900 ml. The apparatus was rotated at 75 rpm. Dissolution was

f) XRD studies.

Crystal characteristics of pure drug and solid dispersions were evaluated by X-ray diffraction (XRD) studies, using Panlytical X' pert Pro[17].

g)Scanning electron microscopy

The shape and morphology of solid dispersion was examined using scanning electron microscopy (SEM) (JEOL Japan (JSM) 6100 series)

RESULT

Table 2: Physicochemical characterization of drug

2) FTIR spectroscopy

KBr pellet method was used to prepare pellets of the drug samples. The FT-IR spectrum of the obtained drug samples were compared with the reference standard FT-IR spectrum of Febuxostat.

d) Drug content

The prepared febuxostat solid dispersion equivalent to the drug (10mg) was weighed accurately and dissolved in 10 ml of methanol. Drug content was calculated by diluting the stock solutions with methanol and analyzed using a UV-Vis spectrophotometer at 315 nm [15].

$$\%Drug\ content = \frac{Actual\ amount\ of\ drug\ in\ solid\ dispersion}{Theortical\ amount} \times 100$$

e*) In-vitro* multimedia studies (16)

In vitro, multimedia dissolution studies of the pure drug febuxostat and optimised solid dispersions SE5 was carried out in 0.05M phosphate buffer pH 6. About 40 mg of pure drug and solid dispersion equivalent to 40 mg of drug was used for dissolution studies. FBX pure drug and the SE5 containing equivalent to 40 mg of the drug were filled in empty tea bags an

carried out for one hour with sampling points at 5 min, 10 min, 15 min, 20 min, 30 min, 45 min, and 60 min. A sample of 5ml was withdrawn at each time point for a period of 1 hour and replaced with a fresh dissolution medium. The drug released amount at a particular time point and at the end of the analysis was calculated by measuring absorbance using the appropriate blank solution and drug content was calculated using a calibration curve equation.[16]

I.R spectra of FBX and that with the polymer depicted in figure Fig.1 and Fig 2. Characteristic peaks were observed in the resultant spectra.

Table 3: FTIR characteristic bands

API	Aromatic C-H stretching	Aliphatic C–H Stretching	Nitrile $C\equiv$	Carboxylic acid	C-C stretching	C-O Stretching
Wave numbers (cm^{-1})	2968.45	2875.86	2263.34	1678.07	1514.12	1273.02

Figure 1: FTIR spectrum of febuxostat

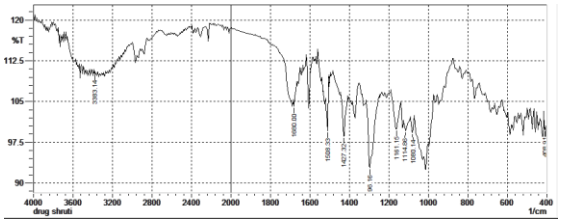


Figure 2: FTIR spectrum of β CD

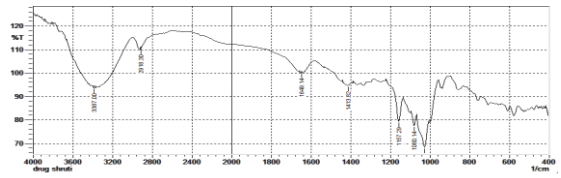
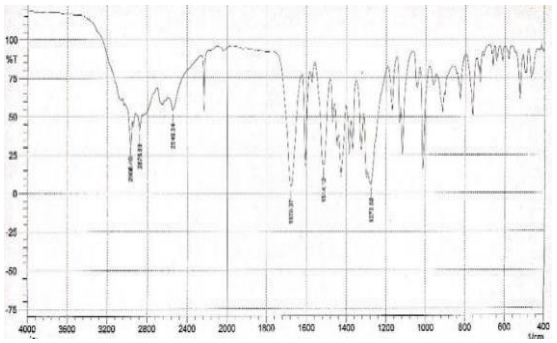


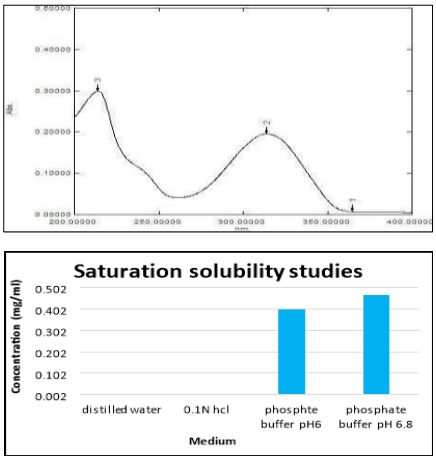
Figure 3: FTIR spectra of optimized solid dispersion SE 5 indicating no significant change in chemical integrity of drug



3) Standard calibration curve and scanning of Febuxostat in 0.05 M Phosphate buffer pH 6

The λmax of Febuxostat was found to be 313.8nm in 0.05M Phosphate buffer pH 6.

Fig4: UV Spectrum of febuxostat in 0.05 M Phosphate Buffer pH 6



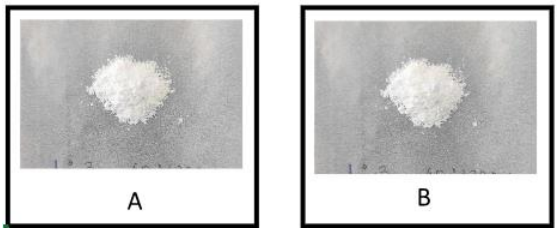
4)Preliminary solubility studies of Febuxostat

Febuxostat has shown highest saturation solubility in pH 6.8 phosphate buffer > 0.05 M phosphate buffer pH 6 > 0.1N HCl >water

Evaluation of solid dispersion

Table no 4: Physical appearance, % yield and drug content of solid dispersions

Formulation code	Drug: Polymer	Physical appearance		Percentage yield	Drug content n=3 S.D
		Colour	Appearance	(%)	(%)
SE1	1:2	Off white	Powder (granular)	99.5	99.30 ± 0.89
SE2	1:4	Off white	Powder (granular)	98.7	98.74 ± 2.64
SE3	1:6	Off white	Powder (granular)	98	97.38 ±0.59
SE4	1:8	Off white	Powder (granular)	99.3	98.8 ±1.03
SE5	1:10	Off white	Powder (granular)	99.4	98.63 ± 1.08



Saturation solubility study

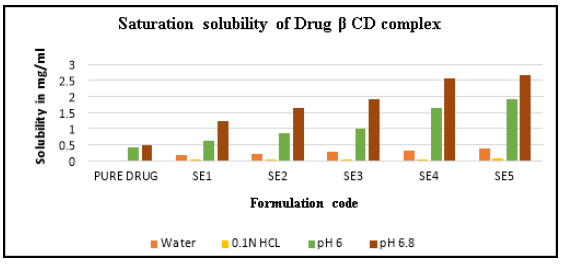


Fig 6: Saturation solubility studies of febuxostat solid dispersions

The saturation solubility studies were conducted in different buffers for all the prepared solid dispersions and compared with pure drug.

From the solubility studies, it was found that pure FBX showed greater solubility in 6.8 pH phosphate buffer when compared to others. From the results given in the table, SE5 showed greater solubility when compared to others, the solubility also increased proportionally by increasing the polymer concentration. SE5 showed the highest solubility in the 6.8 pH phosphate buffer. Hence solid dispersion SE5 gave better yield as well as good solubility so was chosen as optimized formulated solid dispersion for further formulation of the dosage form.

***Invitro* release studies of pure drug and optimised solid dispersion**

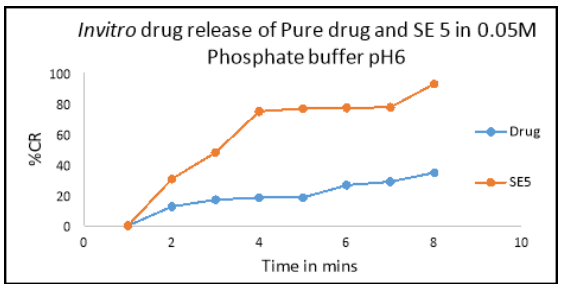


Fig 7: ***Invitro* drug releases vs time plots of Pure drug and solid dispersion SE 5 in 0.05M phosphate buffer pH 6**

According to the results obtained, solid dispersion SE 5 showed greater drug release as compared to pure drug. The above data displays the dissolution profiles of pure febuxostat drug and optimized solid dispersion SE 5 in 0.05 M phosphate buffer (pH 6). Optimized SE 5 exhibited a significant enhancement in dissolution rate when compared with the pure drug alone. In 0.05M phosphate buffer pH 6, a 4-fold increase in dissolution rate (92.88 ±1.10 vs 34.73 ±0.91 %) of optimized SE as compared to the pure drug in 60 min.

e) X-ray Diffraction

The X-ray diffraction (XRD) scan of pure FBX (Figure 8 A) showed highly sharp, intense, peaks indicating the crystalline nature of the drug. The XRD pattern of the solid dispersion SE5 (Fig 8 B) showed lesser intense and denser peaks compared pure drug indicating the decrease in crystallinity of the drug in its optimised formulation. Therefore from the observation, it could be suggested that the febuxostat drug was converted to an amorphous form after dispersion into an inner carrier in a solid state prepared solvent evaporation method.

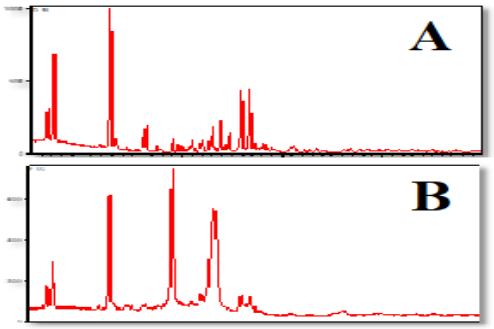


Fig 8: (A) XRD of Pure drug Febuxostat ; (B) XRD of solid dispersion SE 5

DISCUSSION

It was confirmed from FTIR studies that there was no interaction observed between the drug and the other excipients. Multimedia solubility studies were carried out for pure API FBX and it was found that it has higher solubility in DMF followed by DMSO than in ethanol following methanol. When different buffers were used it showed higher solubility in phosphate buffer pH 6.8. The solvent evaporation method was adopted to prepare complexes with different polymers in different ratios i.e. 1:2, 1:4, 1:6, 1:8, 1:10. Saturation solubility data demonstrate that the solubility of FBX increases with the use of polymers, which acts as surfactant enhancing a decrease in particle size and the wetting of drug particles. OGD medium 0.05M phosphate buffer pH 6 was also used as the medium of choice. Linearity in selected media was studied. From dissolution studies, it was found that there is a steady increase in dissolution of all formulations in all media with an acceptable relative standard deviation. Solid dispersion SE 5 (1:10 drug beta cyclodextrin complex) was selected as an optimized formulation which not only showed an increase in solubility but also an increase in *invitro* dissolution rate compared to pure drug. The XRPD study revealed the presence of an amorphous structure in the complexes prepared by a solvent evaporation method.

CONCLUSIONS:

The growing numbers of low solubility and high permeability drugs demand the development of technologies for enhancing drug solubility. The solvent evaporation method of solid dispersion provides an increase in the solubility of poorly water soluble drug FBX.

ACKNOWLEDGMENT:

The authors are sincerely thankful to PES'S Rajaram and Tarabai Bandekar College of Pharmacy, Goa for providing the facilities for this research work.

This study was supported by Foundation Punjab university chandigarh (India),

The author would like to thank her family.

REFERENCES

1. Stevenson M, Pandor A. Febuxostat for the management of hyperuricaemia in patients with gout: A nice single technology appraisal. Pharmacoeconomics [Internet]. 2011 [cited 2022 Apr 27];29(2):133–40. Available from: https://pubmed.ncbi.nlm.nih.gov/21155617/

2. University) SKS (Auburn. Dissolution Enhancement of Poorly Water Soluble Drugs. 2011;10(1):99–110.

3. K SK, M S, Y PR. Dissolution Enhancement of Poorly Soluble Drugs by Using Complexation Technique – A Review. J Pharm Sci Res. 2013;5(5):120–4.

4. Stevenson M, Pandor A. Febuxostat for the management of hyperuricaemia in patients with gout: a NICE single technology appraisal. Pharmacoeconomics [Internet]. 2011 [cited 2022 Apr 27];29(2):133–40. Available from: https://pubmed.ncbi.nlm.nih.gov/21155617/

5. Satyanarayana U, Chakrapani U. Biochemistry. 6th ed. Kolkata: Elsevier; 2017. 777 p.

6. Fong SYK, Ibisogly A, Bauer-Brandl A. Solubility enhancement of BCS Class II drug by solid phospholipid dispersions. Int J Pharm. 2015;496(2):382–91.

7. Hashidzume A, Takashima Y, Yamaguchi H, Harada A. Cyclodextrin. Compr Supramol Chem II [Internet]. 2017 [cited 2023 Feb 20];269–316. Available from: https://linkinghub.elsevier.com/retrieve/pii/B9780124095472138296

8. Sharma D, Soni M, Kumar S, Gupta GD. Solubility Enhancement-Eminent Role in Poorly Soluble Drugs. Res J Pharm Tech [Internet]. 2009;2(2):220–4. Available from: www.rjptonline.org

9. Timalsina A. Comparative solubility enhancement of olmesartan medoxomil by using solid dispersion, complexation and selfemulsification techniques. 2013;1:4. Available from: http://www.rguhs.ac.in/cdc/onlinecdc/uploads/04_P007_2249.doc

10. Christopher Vimalson D, Parimalakrishnan S, Jeganathan NS, Anbazhagan S. Solid dispersion technique to enhance the solubility and dissolution of febuxostat an BCS class II drug. Int J Appl Pharm. 2019 Jan 1;11(1):241–6.

11. Patel VP, Patel AP, Shah A. Optimization Of Amorphous Solid Dispersion Techniques to Enhance Solubility of Febuxostat. Folia Med (Plovdiv). 2021;63(4):557–68.

12. Argade PS, Magar DD, Saudagar RB. Solid Dispersion: Solubility Enhancement Technique for poorly water soluble Drugs. J Adv Pharm Educ Res [Internet]. 2013;3(4):427–39. Available from: www.japer.in

13. Sahitya G, Krishnamoorthy B, Muthukumaran M. Importance of Preformulation Studies in Designing Formulations for Sustained Release Dosage Forms. Int J Pharm Technol.

14. Bhikshapathi DVR., Viswaja, M. Formulation Development and In vivo Evaluation of Nevirapine Solid Dispersions by Solvent Evaporation Technique. Int J Pharm Sci Drug Res. 2018;10(03):125–30.

15. Hetal T, Bindesh P, Sneha T. A review on techniques for oral bioavailability enhancement of drugs. Int J Pharm Sci Rev Res. 2010;4(3):203–23.

16. Bhasin N. Current Trends in Solid Dispersion: a Review. J Drug Deliv Ther. 2014;4(3):80–6.

17. Sikarra D, Shukla V, Kharia AA, Chatterjee DP. Techniques for Solubility Enhancement of Poorly Soluble Drugs: an Overview. J Med Pharm Allied Sci. 2012;01(01):18–38.

INTERNATIONAL JOURNAL OF COMMUNITY PHARMACY
(ISSN-0974-5319)

Instructions to Authors
Authors should submit two hard copies of manuscripts and electronic version of the manuscript in a Compact Disc to the Editor. Authors also encouraged submitting a copy of manuscript to the Editor by electronic mail. Accepted papers will be processed further, if the papers are rejected, the decision will be communicated to the corresponding author but the manuscripts will not be returned.

Preparing a Manuscript:
Authors should keep their manuscripts as short as they reasonably can. Manuscripts should be typed double spaced on one side of good quality A4 size paper. Page number should appear in the upper right-hand corner of each page, beginning with the title page.
The language of manuscript must be simple and explicit.
Author's/Co-author's name or any other identification should not appear anywhere in the body of the manuscript to facilitate blind review.
Articles were accepted under following headings:
a. Letter to Editor.

b. Original Research Articles.

c. short communications.

d. Perspectives (Innovative teaching methods, Innovative practice approach, Novel pharmaceutical care models, Debates, viewpoints)

e. Invited articles.

f. Case reports.

g. Drug Reviews.

h. Events.

Original Research Articles:
It should be arranged into the following sections:
Title page,
Abstract and Key words,
Introduction,
Materials and Methods,
Results,
Discussion,
Acknowledgement,
References,
Tables, Figures.
The total number of words should not exceed 3200. 2

Title page: It should be paginated as page 1 of the paper. It should carry the title, authors' names and their affiliations, running title, address for correspondence including e-mail address.

Title: Must be informative, specific and short and not exceed 100 characters**.**

Authors and affiliations: The names of authors and their appropriate addresses should be given. It should be made clear which address relates to which author.

Running title: It is a short title printed in the journal at the right top corner of right-hand page of the article (except the lead page). A short running title of not more than 50 characters should be given.

Address for correspondence: The corresponding author's address should be given in the title page. The e-mail ID of the corresponding author or the contact e-mail ID must also be provided.

Abstract and key words Abstract:
It must start on a new page carrying the following information: (a) Title (without authors' names or affiliations), (b) Abstract, (c) Key words, (d) Running title. It should not exceed 200 words excluding the title and the key words. The abstract must be concise, clear and informative rather than indicative. The abstract must be in a structured form consisting of OBJECTIVES, METHODS, RESULTS and CONCLUSIONS briefly explaining what was intended, done, observed and concluded. Authors should state the main conclusions clearly and not in vague statements. The conclusions and recommendations not found in the text of the article should not be given in the abstract.

Key words: Provide 3-5 keywords which will help readers or indexing agencies in cross-indexing the study. The words found in title need not be given as key words.

Introduction: It should start on a new page. Essentially this section must introduce the subject and briefly say how the idea for research originated. Give a concise background of the study. It should not exceed 500 words.

Material and Methods
This section should deal with the materials used and the methodology - how the work was carried out. The procedure adopted should be described in sufficient detail to allow the study to be interpreted and repeated by the readers, if necessary. The number of subjects, the number of groups studied, the study design, sources of drugs with dosage regimen or instruments used, statistical methods and ethical aspects must be mentioned under the section. The methodology - the data collection procedure - must be described in sufficient detail. The nomenclature, the source of material and equipment used, with details of the manufacturers in parentheses, should be clearly mentioned. Drugs and chemicals should be precisely identified 3

Statistical Methods:
The details of statistical tests used and the level of significance should be stated. If more than one test is used it is important to indicate which groups and parameters have been subjected to which test.

Results
The results should be stated concisely without comments. It should be presented in logical sequence in the text with appropriate reference to tables and/or figures. The data given in tables or figures should not be repeated in the text. The same data should not be presented in both tabular and graphic forms. Simple data may be given in the text itself instead of figures or tables. Avoid discussions and conclusions in the results section.

Discussion
This section should deal with the interpretation, rather than recapitulation of results. It is important to discuss the new and significant observations in the light of previous work. Discuss also the weaknesses or pitfalls in the study. New hypotheses or recommendations can be put forth.

Acknowledgements
It should be typed in a new page. Acknowledge only persons who have contributed to the scientific content or provided technical support. Sources of financial support should be mentioned.

References : It should begin on a new page. The number of references should normally be restricted to a maximum of 25 for a full paper. Avoid citing abstracts as references.
Papers which have been submitted and accepted but not yet published may be included in the list of references with the name of the journal and indicated as “In press”. A photocopy of the acceptance letter should be submitted with the manuscript. Information from manuscript “submitted” but “not yet accepted” should not be included. References are to be cited in the text by superscribed number and should be in the order in which they appear. References cited only in tables or in legends to figures should be numbered in accordance with a sequence established by the first identification in the text of the particular table or illustration. The references must be verified by the author(s) against the original documents. The list of references should be typed double spaced following the Vancouver style.

Tables: Each table must be self-explanatory and presented in such a way that they are easily understandable without referring to the text. It should be typed with double spacing and numbered consecutively with Arabic numerals. Provide a short descriptive caption above each table with foot notes and/or explanations underneath. The number of observations, subjects and the units of numerical figures must be given. It is also important to mention whether the given values are mean, median, mean±SD or mean±SEM. All significant results must be indicated using asterisks. 4

Figures
Each figure must be numbered and a short descriptive caption must be provided. All significant results should be indicated using asterisks. Identify each figure/diagrams on the back with a typed label which shows the number of the figure, the name of the leading author, the title of the manuscript and the top side of the figure. The approximate position of each figure should be marked on the margin of the text. Legends for figures should be typed under the figure if possible or on a separate sheet.

Short communications:
The manuscript should not be divided into sub-sections. It may have up to 1200 words (including a maximum of 5 references) and one figure or one table.

Letter to the Editor:
A letter can have a maximum of 800 words (including a maximum of 4 references) with one simple figure or table. The manuscript should not have sub-sections.

Review articles:
These should contain title page, summary (need not be structured) and key words. The text proper should be written under appropriate sub-headings. The authors are encouraged to use flowcharts, boxes, cartoons, simple tables and figures for better presentation. The total number of text words should not exceed 5000 and the total number of figures and tables should not be more than 10.

Methods
The format and other requirements are same as that of short communication.

Paper Submission link: bit.ly/IJCP2023

Papers on the following broad areas are accepted by the Journal

.Pharmacovigilance, Pharmacoeconomics

· Pharmacy practice, Patient care

· Hospital pharmacy, Community pharmacy

· Pharmaceutical care

· Public health, Nursing

. Healthcare, Medicine

. Biomedical Research 5

To,
THE EDITOR IN CHIEF,
INTERNATIONAL JOURNAL OF COMMUNITY PHARMACY (IJCP),
SARADA VILAS COLLEGE OF PHARMACY,
MYSURU, KARNATAKA – 576 104, INDIA

DECLARATION AND COPYRIGHT TRANSFER FORM
(TO BE SIGNED BY ALL AUTHORS)

I/We, the undersigned author(s) of the manuscript entitled_____
hereby declare that the above manuscript which is submitted for publication in the International Journal of Community Pharmacy is NOT under consideration elsewhere.

The manuscript is NOT published already in part or whole (except in the form of abstract) in any journal or magazine for private or public circulation. No part of this manuscript (referenced or otherwise) has been copied verbatim from any source. Permission to reproduce table no. and figure no. has been obtained and submitted. Reproduced text, if any has been given in italics and within quotes.

I/we give consent for publication in the IJCP in any media (print, electronic or any other) and transfer copyright to the IJCP in the event of its publication in the IJCP.

I/we do not have any conflict of interest (financial or other) other than those declared.

I/we have read the final version of the manuscript and am/are responsible for what is said in it. The work described in the manuscript is my/our own and my/our individual contribution to this work is significant enough to qualify for authorship.

I/we also agree to the authorship of the article in the following sequence:

	Author's name	Signature
1.	_____	_____
2.	_____	_____
3.	_____	_____
4	_____	_____

Address of Editor:
The Editor, International Journal of Community Pharmacy,
Association of Community Pharmacists of India, (South India Branch)
Sarada Vilas College of Pharmacy, Krishnamurthy Puram, Mysuru- 57004, India.
Website: www.acpisouth.in Email: ijcp.chiefeditor@gmail.com

International Journal of Community Pharmacy

The Official Publication of ACPI

OBJECTIVES

- To organize into an association of all persons engaged in, interested in or connected with community pharmacy.
- To elevate and establish a standard of competence for community pharmacy.
- To develop and promote standards of education and training for community pharmacy.
- To develop and promote short term informal training programs for individuals interested in community pharmacy.
- To educate hospital trustees, Board of Directors, Board of Visitors and the public to understand that the practice of community pharmacy calls for special training and experience.
- To serve as a forum for exchange of ideas and experiences, and collection and dissemination of information in general community pharmacy.
- To spread the knowledge on the principles, practices, techniques and methods concerning community pharmacy.
- To promote and safeguard the status and the interest of community pharmacy and the interests of those engaged in it.
- To promote sponsor, submit, memorandums, petitions and representations to local, state, union and other authorities for better laws, and influence legislation which affect hospitals and other community pharmacy organizations.
- To organize conferences, seminars, meetings and discussions for the promotion and furtherance of the aims and objects of the ACPI.
- To undertake and bring out, publish, sell, distribute free or otherwise, edit, print and exhibit for sale, magazines publication, bulletins, books pamphlets and the like, in furtherance of the objects of the ACPI and in any event not for the purpose of carrying a trade there from but only for the purposes of furthering the objects of the ACPI.
- To raise any monies for the purpose of the ACPI by way of special subscriptions, membership or entrance fees, donations, special fees, loans or in any other manner on such terms and conditions as may be determined.
- To purchase, take on lease or in exchange, or otherwise acquire, any movable or immovable property, rights or privileges, which may be deemed necessary, expedient or desirable for any of the objects, of the ACPI.
- To accept from the Government, organizations, institutions and individuals, grants, donations, subscriptions, gifts bequests, endowments, special fees, etc, for the furtherance of the objects of the ACPI.
- To make from time to time, regulation and bye-laws for the control, conduct and regulation of the affairs of the ACPI.
- To confer Fellowships in community pharmacy on those who have done or are doing noteworthy service in the field of community pharmacy.
- To generally do all such other things as are incidental or conducive to the attainment of any or all of the above-mentioned objects.

EDITORIAL OFFICE

International Journal of Community Pharmacy
The official publication of Association of Community Pharmacists of India (ACPI)
Secretariat & Communication address
Sarada Vilas College of Pharmacy
Krishnamurthy Puram, Mysuru - 570 004, Karnataka
Ph : 0821-4262415