# Principal K. M. Kundnani College of Pharmacy

**Title**: Practice School Report

**Domain**: Pharmacognosy

| Roll Number | Name |
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**Class:** Final year B Pharm (R 2019)

**Semester:** VII

**Academic Year:** 2023-2024

**PRINCIPAL K. M. KUNDNANI COLLEGE OF PHARMACY**

**CUFFE PARADE, MUMBAI – 400 005.**

## CERTIFICATE

**THIS IS TO CERTIFY THAT THE FOLLOWING STUDENTS OF FINAL YEAR B. PHARM SEM VII HAVE ATTENDED AND SUCCESSFULLY COMPLETED PRACTICE SCHOOL IN THE ACADEMIC YEAR 2023-24**

**REPORT SUBMITTED BY**

| Sr. No. | Name of student | Roll number | Signature |
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**UNDER GUIDANCE OF**

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# INDEX

## INTRODUCTION:

Herbal Drug Technology is used for converting botanical materials into medicines where standardization and quality control with proper integration of modern scientific techniques and traditional knowledge is important. Moving forward with the same goal, all the basic points of research and formulation of herbal products were covered in our entire Practice School of "Pharmacognosy". [1]

Research in the herbal drug is important because of it helps to determine the safety and effectiveness of herbal remedies. Scientific research can provide evidence for their traditional uses and identify potential risks. Research establishes standards for the quality, purity and potency of herbal products. It also helps in the identify the active compounds within the herbs, which can lead to new drugs or new treatment. [1]

Herbal formulation shall mean a dosage form consisting of one or more herbs or processed herb(s) in specified quantities to provide specific nutritional, cosmetic benefits, and/or other benefits meant for use to diagnose treat, mitigate diseases of human beings or animals and/or to alter the structure or physiology of human beings or animals.

### Herbal formulation:

- Herbal preparations are obtained by subjecting herbal treatments such as extraction, Substances to distillation, expression, fractionation, purification, concentration or fermentation.
- These include comminuted or powdered herbal substances, tinctures, extracts, essential expressed juices and processed exudates.

Theory covered right from out sourcing drugs then its standardization, its formulation and evaluation.

### Practical performed was;

1. **General Methods of Extraction:**
   In this the various methods of extraction were discussed and shown during the Practical. The general methods are as follow Sonication, Decoction, Soxhlet Extraction.

2. **Isolation and Characterization of phytomarkers:**

   In this experiment we isolated Piperin from black pepper, Embelin from Embelin ribes fruit, and Sesamin from Sesame oil. In this experiment we learnt to assemble the Soxhlet apparatus and by using it we can yield the desired constituent.

3. **Preliminary phytochemical testing:**

   Phytochemical screening not only helps to reveal the constituents of the plant extracts and the one that predominates over the others but also is helpful in searching for bioactive agents those can be used in the synthesis of useful drug. We evaluated Arjuna (tannis), nux vomica(alkaloid), orange peel(flavonoids) and senna (glycoside anthraquanine) by using various reagents to check whether the desired constituents are present or not.

4. **Preparation of the herbal formulation:**

   Herbal syrup was prepared and various test such as, viscosity, density, Test of ph, and evaluation of the Herbal Syrup was done.

5. **Presentation on the Adulteration of herbal drugs:**

   Presentation was also done and our topic was Adulteration of herbal drugs.Our primary objective was to comprehensively investigate the extent and implications of adulteration within the herbal drug market, and further, to illuminate the multifaceted factors contributing to this predicament. Throughout our research, we have diligently examined the reasons behind adulteration, the consequences it inflicts upon consumers, and the potential strategies for mitigating this growing concern.

## PLAN FOR A RESEARCH PROJECT:

Planning a research project involves several key steps to ensure its success. Successful research requires a careful planning.

### Find the gap in market:

This includes understanding the current state of research, analyzing trends, and recognizing areas where there is a need for further investigation. Start by reviewing existing research in your field of interest. Pay attention to recent publications and identify areas where there is limited or outdated information. You can engage with experts, professionals, and scholars in your field. Attend conferences, webinars, and networking events to gain knowledge into what areas are currently of interest and think about unmet needs or problems in society, technology, or industries. Like for example discover the global health challenges, cost effectiveness of products and etc. [2]

### Select the plant for research:

Selecting a plant for research is a systematic process. You should start by specific goals and your objectives. Consider the availability and accessibility of the plant species you're interested in. Either We need to decide the disease we will be focusing on then find the perfect plant species for that particular disease or select a plant and then evaluate its active constituents which can cure or prevent a particular disease. [2]

### Literature review:

Conduct a comprehensive review of existing literature in your topic of research. This will help you understand the current state of knowledge, identify research gaps, and refine your research questions. Minimum 100 articles should be considered of literature review. Read about phytochemical analysis, pharmacological studies on the plant's active constituents. Use online databases like PubMed, academic journals, books, and other reputable sources for research. For examples search for medicinal plants used in cancer or some other specific disease. Research for its toxicity, adverse interactions in body and gain all the possible knowledge about the research project. [2]

**Collaboration and expertise:**

Seek out potential collaborators who share common interests and research goals in the field of drug research. It can be academic researchers, pharmaceutical companies, government agencies, or non-profit organizations. The concepts of novelty and impact are crucial for producing meaningful and influential outcomes. Novelty is the uniqueness of a research idea, approach or finding. It based on new concepts, and experimental approaches. Impact means meaningful outcomes and influence that a research project has on its target audience, field, or society at large. For example, how the research benefits the society which includes the improvement in public health, the environment or the economy. If we collaborate with experts from diverse fields to bring together different perspectives and methodologies this can lead to novel insights and approaches. The regulatory considerations for a plant species which we wish to research on is also very essential. It should be noted and reviewed on every step of our research. Also, we need to identify potential risks and challenges associated with our research and develop strategies to mitigate them. [2]

## WHAT IS QUALITY DRUG DESIGN (QbD)?

Quality by Design (QbD) is a strategic approach employed in various industries, including pharmaceuticals, manufacturing, and product development, to ensure the consistent delivery of high-quality products. It involves a systematic and proactive process of integrating quality considerations throughout the entire product lifecycle, from conception to production.

In the context of pharmaceuticals, Quality by Design focuses on optimizing the development, manufacturing, and control processes of drugs to enhance their safety, efficacy, and overall quality. It requires a deep understanding of the product's critical quality attributes (CQAs), which are the measurable characteristics that determine its performance, and the critical process parameters (CPPs), which are the variables affecting the manufacturing process.

The core principle of Quality by Design is to identify and understand the relationships between the product's CQAs and the CPPs that influence them. This knowledge is gained through a combination of scientific experimentation, risk assessment, and statistical analysis. By thoroughly studying these relationships, manufacturers can establish a design space within which the product can consistently meet the desired quality standards

The main objectives of QBD is to ensure the quality products, for that product and process characteristics important to desired performance must be resulting from a combination of prior knowledge and new estimation during development. [3]

## QBD Approach:

- **Quality Target Product Profile (QTPP) for polyherbal tablets:**

The Quality Target Product profile (QTPP) is pretended in International Council for Harmonisation (ICH) Q8 is a vital element of QBD approach. All product features required for comparable safety and efficacy are included in QTPP. QTPP for herbal tablet has been developed by considering the dominant drug product quality contributes specification. [3]

- **Critical Quality Attributes (CQA)**

"A physical, chemical, biological or microbiological features or characteristics that should be within an appropriate limit, range or distribution to ensure the designated product destined product quality." Potential drug product CQAs derived from the QTPP and/or prior knowledge are used to guide the product and process development and they should be within an appropriate limit, range, or distribution to ensure the desired product quality. [3]

**Advantages:**

- Right first time" – reduced costs and less process downtime.
- Science-based understanding of the process results in minimized batch failure or rework.
- Better consistency in drug quality and efficacy.
- Ensures therapeutic efficacy of generics.
- Reduced time to market for new drugs.
- Less intensive regulatory oversight.
- Process changes within approved design space are permitted without regulatory resubmission.
- In-depth process understanding results in process improvement over time – improved yields, lower cost. [3]

**Quality Management System (QMS):**

QMS is a collection of business processes and procedures which aims to ensure that the quality of products or services meets - or exceeds - customer expectations. [3]

**Quality Target Product Profile (QTPP):**

A prospective summary of the quality characteristics of a drug product that ideally will be achieved to ensure the desired quality, taking into account safety and efficacy of the drug product. [3]

## TOXICITY AND SAFETY STUDIES OF HERBAL DRUG:

With the rising utilization of herbal products, safety and efficacy of herbal medicine have become a public health concern. Adverse health effects associated with herbal products could be attributed to both inherent toxic effects of herbal medicine and toxicities induced by adulterants/contaminants. Increasing evidence, regarding side effects of herbal medicine, has highlighted the demand and necessity of toxicological studies for herbal products. [4]

### Types of Toxicity

1. **Intrinsic Toxicity:**
   The toxicity caused by the drugs which has narrow therapeutic index & interacts with the body in an unpredictable manner
   Eg: Overdose of Ephedra, Aristolochia & Aconitum as they have narrow therapeutic index. [4]
2. **External Toxicity:**
   Contamination of product with toxic metal, adulteration, by misidentification or substitution of herbal ingredients.
   Eg: Caulis Akebiae replaced by Caulis Aristolochiae Manshurensis causes aristolochic acid nephropathy. [4]

### Ways to Reduce Toxicity of Herbal Drugs:

1. **Heating Process:** In bitter almond heating causes loss in enzyme activity & decreases toxicity ofalmond containing cyanophoric glycoside. [4]
2. **Shodhana Process:**
   Involves purification as well as reduction in the toxin's principle. After Shodhana process the total alkaloid content increases but the content of less toxic substance such as aconine from aconitine possibly due to conversion. [4]

## STANDARDIZATION AND BIO EVALUATION OF HERBAL DRUGS:

**Standardization of Herbal Medicines:** According to WHO (1996a ab, 1992), standardization and quality control of herbs is a process involving physicochemical evaluation of a raw drug, which includes aspects such as raw material selection and handling, safety assessment, efficacy and stability of the finished product, safety and risk documentation based on experience, providing information about the product to the consumer and its promotion. During the manufacture, formulation, storage, packaging, transport and distribution of a medicinal product, it may change the efficacy, safety, stability, and therefore the standardization of herbal medicinal products is a necessity of an era for the actual process. Phytochemicals standardization consists of all possible information generated in relation to the chemical fractions present in the herbal medicinal product. Hence, purpose of standardization of herbal medicine includes the following:

1. Preliminary testing for the presence of different chemical Groups.
2. Quantification of chemical groups of interest (e.g., total alkaloids, total phenolics, total triterpene acids, total tannins). Establishment of fingerprint profiles.
3. Multiple marker-based fingerprint profiles.
4. Quantification of important chemical constituents [5]

**The Need for Standardization and Bio evaluation of Herbal/Traditional Medicine:**

Main reason for standardizing herbal extracts is to achieve the greatest possible control in double-blind clinical studies. According to herbalist Bob Bruce, standardization has advantages. It produces a constantly strong product with guaranteed components. When you consider the quality of most commercial herbs, standardization will at least ensure that they contain something and that the right herb is used. Many herbalists look to the brighter side of standardized herbal products than to the quantum intake of more people, including doctors and pharmacists, who are accustomed to the consistency and percentage of active ingredients.[5]

**Techniques involved in standardization of crude drugs:**

1. **Preliminary Evaluation:** Sampling, Foreign determination, determination of total fibre.
2. **Morphological Evaluation:** Colour, odour, taste, size, shape, extra features.
3. **Microscopical evaluation:** Qualitative histological evaluation of types of tissues, quantitative assessment of palisade ratio, vein-islet, vein termination, stomatal

index, stomatal number and Lycopodium spore method.

4. **Physical qualitative evaluation:** Solubility refractive index, optical rotation, melting point, boiling point, density, viscosity, chromatographic and spectroscopic evaluation
5. **Physical quantitative evaluation:** Ash values, Extractive values, Moisture content and volatile oil determination.
6. **Chemical Evaluation:** To detect different classes of phytochemicals, quantitative determination of phytochemicals, assay
7. **Biological Evaluation:** Swelling Index, Haemolytic index, Bitterness value, Foaming index, Total tannins value
8. **Toxicological Evaluation:** Determination of pesticides, Determination of arsenic and heavy metals, Determination radioactive contamination, Determination of aflatoxins
9. **Pharmacological Evaluation:** Animal activity, Animal organ or tissue activity
10. **Analytical Evaluation:** Chromatographic-TLC, Paper, HPTLC, HPLC AND GC and spectroscopic evaluation [5]

**Standardization and Bio evaluation:**

- **Microscopic Evaluation:** Full and Accurate characterization of plant material requires a combination of physical and chemical tests. Microscopic analyses of plant are invaluable for assuring the identity of the material and as an initial screening test for impurities. Most manufacturers of herbal products lack the quality control personnel to accurately as identity and purity microscopically
- **Chemical Evaluation:** Chemical analysis of the drug is done to assess the potency of vegetable material in terms of its active principles. It covers screening, isolation, identification, and purification of the chemical components. It helps to determine the identity of the drug substance
- **Biological Evaluation:** Pharmacological activity of certain drugs has been applied to evaluate and standardize them. The assays on living animals and on their intact or isolated parts are carried out.
- **Chromatography Separation**: of individual components from the herbal mixture is the key step to enable identification and bioactivity evaluation. TLC is used extensively in the phytochemical evaluation of herbal drugs because it enables rapid analysis of herbal extracts with minimum sample clean-up requirement.
- **Genetic Markers in Standardization:** RAPD based mole molecular markers have been found to be useful in differentiating different accessions of neem collected from

different geographical regions. Germless analysis to study genetic diversity is another important area in which a lot of efforts have been put in. Fingerprinting of crops like rice wheat, chickpea, pigeon pea, pearl millet etc is being carried out extensively.

- **DNA Fingerprinting Technique:** DNA analysis has been proved as an important tool in herbal drug standardization. This technique is useful for identification of phytochemically indistinguishable genuine drug from substituted or adulterated drug. [5]

**IDENTIFICATION OF DIFFERENT CONSTITUENTS IN EXTRACT:**

1) Crude Drugs: Raw plant materials collection, drying.
2) Natural Substance:
   - Plant origin: Flowers, leaves, seeds.
   - Animal origin: Whole animal, Organs.
   - Mineral Sources: Calamine, Talc, Bentonite, Sheela Jit.

Drug evaluation mat be defined as the determination of Identify, Purity & Quality of drug.

- Identify: Identification of biological sources of the drug.
- Quality: The quality of active constituents present.
- Purity: Foreign organic material presumes in a crude.

Importance of Evaluation of crude drug: Determination of biochemical variation in the drug.

Methods of Drug Evaluation:

1) Organoleptic – Colour, Odour, Taste.
2) Microscopic – T.S, L.S.
3) Physical Evaluation – LDD, Solubility, Viscosity,
4) Chemical Evaluation – Tanis, Alkaloids.
5) Biological Evaluation – Cell line, Stomatal Index. [6]

## GENERAL EXTRACTION METHODS:

There are several general methods of extraction used for obtaining active compounds from herbal drugs. Here are some of the common techniques:

1. Maceration: This involves soaking the plant material in a solvent (usually alcohol or water) for an extended period. It's a simple method but can be time-consuming.
2. Percolation: This is similar to maceration but involves a continuous flow of solvent through the plant material. It's often used for extracting active constituents from hard or woody materials.
3. Decoction: In this method, the plant material is boiled in water. It's particularly useful for extracting water-soluble compounds.
4. Infusion: Similar to decoction, but the plant material is steeped in hot water rather than boiled. This method is suitable for delicate plant parts.
5. Steam Distillation: This is used to extract essential oils from aromatic plants. Steam is passed through the plant material, causing the volatile compounds to vaporize and then condense.
6. Expression or Cold Pressing: This method is used for extracting essential oils from citrus fruits. It involves mechanical pressure to release the oils.
7. Soxhlet Extraction: This is a continuous extraction method where a solvent is repeatedly cycled through the plant material. It's particularly efficient for extracting lipophilic compounds.
8. Supercritical Fluid Extraction (SFE): This method uses supercritical fluids (usually CO2) as a solvent to extract compounds. It's efficient and leaves no solvent residue.
9. Ultrasound-assisted Extraction (UAE): Ultrasonic waves are used to disrupt cell walls, aiding in the release of active compounds into the solvent.
10. Microwave-assisted Extraction (MAE): Microwaves are used to generate heat within the plant material, accelerating the extraction process.
11. Percussion (Bashing): This involves physically breaking down the plant material to facilitate extraction, often followed by another extraction method like maceration.
12. Enzyme-assisted Extraction: Certain enzymes can be used to break down cell walls and aid in the release of active compounds.

The choice of extraction method depends on various factors, including the type of plant material, the target compounds, the intended use of the extract, and available equipment.

## ISOLATION AND CHARACTERIZATION OF PHYTOMOLECULES

**Aim:** To isolate piperine from black pepper.

**Ingredients:** Powdered fruits (100 g), petroleum ether (60-80 °C), alcohol.

**Apparatus:** Soxhlet apparatus, distillation assembly, beaker, burner, etc.

**Theory:**

Pipeline is a piperidine alkaloid present in the fruits of Piper nigrum Linn., Piper longum Linn., Piper retroacted Vahl., Piper Guineans Schumacher & Thonn., Piper cubeba L.f. (Fam. Piperaceae), etc.

Piper nigrum is a perennial climber found in Kerala, Western Ghats, Assam in India and other tropical cont Fruit is indehiscent one seeded berry. Dried fruits are dark brown or grayish black in colour, globular, hard having coarsely reticulated surface. Fruit contains piperine (3-5%), beta-caryophyllene, limonene, etc. Fruits are used as a spice. [7]

**Physical properties:**

Molecular Formula: C17H19NO3

Molecular Weight: 285

Melting Point: 130

Solubility: Soluble in alcohol, chloroform, benzene and acetic acid; almost insoluble in water.

Uses: To impart pungent taste. [7]

**Isolation and characterization of Piperine from Piper nigrum fruit**

**Procedure:** We extracted powdered black pepper fruit (100 g) with 400 ml of petroleum ether in Soxhlet apparatus for 2 hours. We concentrated the extract up to 1/5 of its original volume using distillation assembly whereupon the oily residue settled down. We then decanted the supernatant and concentrated it to about 20-30 ml and allowed it to cool so that the piperine precipitates. After that, we filtered and treated the residue with 20-40 ml petroleum ether to remove oil. Then recrystallized piperine with alcohol (yield was about 0.8g). [8]

**Identification of Piperine by Thin-Layer Chromatography:**

**Preparation of sample:** Transferred 1 g of P.nigrum powder in test tube, and added 5 ml methanol and shake. Then we heated it gently on water hath for 2-3 min and allowed the contents to cool and settle. We separated the methanol solution from undissolved solids using pipette or by decantation. And then we used this solution for development of TLC. [8]

**Preparation of piperine solution:** We Prepared 0.01% solution of piperine in methanol and used this solution for development of TLC.

**Solvent system:** Toluene-Ethyl acetate (7:3). Detection: A. UV 254 nm B. Dragendorff reagent. Observation:

1)Distance travelled by solvent: 5.4 2) Distance travelled by solute 1:- 3.1

3)Distance travelled by solute 2: 3

4)Distance travelled by solute 3: 4.7

**Calculation:**

Rf1= 3.1/5.4= 0.574

Rf2= 4.3/5.4= 0.796

Rf3= 4.7/5.4= 0.870

**Result:**

Retention factor of solute 1,2,3 was found to be 0.574, 0.796, 0.870

**Aim:** To isolate Embelin from Embelia ribes fruits.

**Requirements:** Powdered fruits (100 g). petroleum ether (60-80 °C), methanol, Soxhlet apparatus, distillation assembly

**Time required**: 3 hrs.

**Theory:** Embelin is an orange coloured alkylated hydroxybenzoquinone present in the fruits of Embelia ribes Burm. Embelia tsjeriam-coffam (Roem. & Schult) A.DC., seeds of Myrsine laetevirens (Mex) Arechav, Inaves of Embelia angustifolia (ADC) ADC, fruits of Ardisia sanguinolenta Blume, (Fam Primulaceae), etc. Embolia ribes is a climbing perennial shrub found throughout India. Fruits are varying in colour from dull red to nearly black, globular, wrinkled or warty with a short pedicel, pericarp is brittle and easily separable from single or occasionally two seeded fruits. Fruit contains embelin (2-3%), embellic acid, quercitol, fatty ingredients, an alkaloid christembine, a resinoid, tannin, etc. Fruits are traditionally used for its anthelmintic action. [8]

**Physical properties:**

Molecular Weight: 294

Melting Point: 142-143°C

Solubility : Soluble in hot organic solvents and in alkali hydroxide solutions, very slightly soluble in petroleum ether, practically Insoluble in water. [8]

**Uses:** Ammonium embelate is used as an Anthelmintic (Cestodes).

**Procedure:** Extract powdered E. ribes fruit (100 g) with 300 ml of petroleum ether using Soxhlet apparatus for 1 h. Concentrate the petroleum ether layer to half of its original volume Using distillation assembly. On cooling embelin precipitates out, filter and treat with cold petroleum ether to remove fatty material (10-15 ml approx) Recrystallise embelin with methanol (yield: about 1 g). [8]

**Identification of Embelin by Thin-Layer Chromatography Preparation of sample:** Transfer 1 g of E ribes powder in a test tube, add 5 ml methanol and shake. Heat gently on water bath for 2-3 min and then allow the contents to cool and settle. Separate the methanol solution from undissolved solids using pipette or by decantation this solution for development of TLC.

**Preparation of embelin solution:** Prepare 0.01% solution of embelin in methanol and use this solution for development of TLC.

**Solvent system:** -Butanol-n-Propanol-Ammonia (7:1:2);

Detection: A. Visible and B. UV-254 nm.

**HPLC analysis of Embelin**

**Preparation of sample:** Dissolve about 10 mg of embelin in methanol in a 10-ml volumetric flask and make up the volume. Prepare test solution of 100 ug/ml suitable dilution from stock solution.

**Chromatographic conditions:**

Column: Purospher, RP-18e

Detection: UV-286nm

Mobile Phase: Acetonitrile-Water (70:30)

Flow Rate: 1ml/min

Injection volume: 20 ul

Run time: 10 min [8]

**Aim:** To Isolate Sesamin from Sesame oil

**Synonyms:** Asarinin, Fagarol, Pseudocubebin

**Requirements:** Sesame oil (500 ml), sodium hydroxide, ethyl acetate, petroleum ether, methanol, distillatory assembly: time required: 14 h.

**Theory:**

Sesamin is a lignan present in the seed of Sesamum indicum Linn. (Fam. Pedaliaceae) bark of Fagara spp. (Fam. Rutaceae), etc. Sesamum indicum is an erect annual herb grown throughout India. Sesame from seeds. Oil is clear, light yellow, with slight odour and bland taste.

**Procedure:**

Dissolve 80g of Sodium hydroxide in 200 ml of water and pour this solution in 500 ml of seasame oil with stirring and keep it overnight to form soap. Powder the soap and extract with ethyl acetate (3 L) by shaking vigorously for about 10-15 mins and allow it to settle. Seperate ethyl acetate fraction from soap by filtration and concentrate the extract to about 50 ml using distillation assembly. Transfer the extract to evaporating dish and completely remove ethyl acetate. Treat the residue with 15 ml of Petrolium ether to remove residual oil, discard the petroleum layer and repeat the procedure 3 times where upon seasamin seperates out (about 5 g). Seasamin is then treated with small amount of cold methanol (10 ml) to remove impurities. Recrystallise seasamin by dissolving it in minimum quantity of Methanol and keep it overnight where upon Needle - shaped crystals seperates out. [9]

(Yield - about 39 g)

**Result:** Seasamin was found to be Needle. shaped.

## IDENTIFICATION OF DIFFERENT EXTRACTS OF PHYTOCONSTITUENTS

Phytoconstituents of medicinal plants have been playing a key role in treating various diseases all over the world since ancient times. Preliminary analysis of extracts was carried out to identify the presence of various Phytoconstituents.

**Tests for alkaloids**

(a) Dragendroff 's test**:** By adding 1 mL of Dragendroff"s reagent to 2 mL of extract, an orange red precipitate was formed, indicating the presence of alkaloids.

(b) Mayer's test**:** Few drops of Mayer's reagent were added to 1 mL of extract. A yellowish or white precipitate was formed, indicating the presence of alkaloids.

(c) Hager's test Two milliliters of extract were treated with few drops of Hager's reagent. A yellow precipitate was formed, indicating the presence of alkaloids. [10]

**Test for phenolic compounds and tannins:**

(a) Ferric chloride test **:** Two milliliters of 5% neutral ferric chloride solution was added to 1 mL of extract, the dark blue colour indicating the presence of phenolic compounds and tannins. [10]

(b) Lead tetra acetic acid test**:** One milliliter of lead tetra acetate solution was treated with 0.5 mL of extract, precipitate formation indicating the presence of phenolic compounds and tannins.

**Tests for flavonoids:**

(a) Alkaline reagent test Two to three drops of sodium hydroxide were added to 2 mL of extract. Initially, a deep yellow colour appeared but it gradually became colourless by adding few drops of dilute HCL, indicating that flavonoids was present.

(b) Shinoda's test**:** Ten drops of dilute HCL and a piece of magnesium was added to 1 mL of extract, the resulting deep pink colour indicating the presence of flavonoids. [10]

**Tests for cardiac glycosides:**

Keller Killiani test: A solution of 0.5 mL, containing glacial acetic acid and 2-3 drops of ferric chloride, was mixed with 2 mL of extract. Later, 1 mL of concentrated $H_2SO_4$, was added along the walls of the test tube. The appearance of deep blue colour at the junction of two liquids indicated the presence of cardiac glycosides.[10]

**Test for steroids:**

Salkowski test: The test extract was shaken with chloroform and concentrated $H_2SO_4$ was added along the walls of a test tube; a red colour appeared, indicating the presence of steroids. [10]

**Test for Saponin glycosides:**

Foam test**:** Take1 ml of sample extract in this add some amount of water well shaked and generation of froths takes place this indicate the presence of saponins. [10]

**Test for Anthraquinone glycoside:**

Borntrager's test: To 1 gm of drug add 5–10 ml of dilute HCl boil on water bath for 10 min and filter. Filtrate was extracted with $CCl_4$/ benzene and add equal amount of ammonia solution to filtrate and shake. Formation of pink or red colour in ammonical layer due to presence of anthraquinone moiety. [10]

## FORMULATION AND EVALUATION OF HERBAL SYRUP

**Aim:** To Formulate and Evaluate the Herbal Syrup.

**Requirements:** Ingredients and Equipment:

Karela (bitter gourd) extract, Neem extract, Amla extract, Beetroot extract, Sweetening agent Water, mixing equipment (e.g., a large pot), Bottles or containers for storing the syrup, Labels [11]

**Apparatus:** Beaker, Glass rod, Motter and pestle. Etc

**Chemicals:** Water as a solvent, Sugar, Extracts plant parts of Karela, Neem, Amla, Beet root, etc. [11]

**Formulation:**

| Sr. No | Ingredients | Biological Name | Quantity taken | Role |
|---|---|---|---|---|
| 1 | Karela | Momordica charantia | 1.5 | Anti-Diabetic |
| 2 | Neem | Azadirachta indica | 1.5 | Anti-Diabetic |
| 3 | Amla | Phyllanthus emblica | 1.5 | Anti-Diabetic |
| 4 | Beet root | Beta vulgaris | 1.5 | Anti-Diabetic |

**Theory:**

Herbal syrup is prepared by adding concentrated decoction of herbs with either honey or sugar and we also use alcohol. The herbal syrup is made by decoction process. Mixing a decoction of herbs with sugar it helps to the formulation for thicken and preserve the formulation. This was responsible to increase the shelf life of formulation. The added sweetener can also help to increase the palatability of some herbs. The finally obtained syrup to be delicious. It is defined as a thick sticky liquid consisting of a concentrated solution of sugar and water with or without addition of flavoring agent or medicinal substance. [11]

**Procedure:**

1. Preparation of Plant Extracts:
   a. Obtain fresh Karela, Neem, Amla, and Beetroot.
   b. Wash and chop them into small pieces.
   c. Extract the juice from each plant separately using a juicer or by blending and straining.
   d. Filter the extracts to remove any solid particles.
2. Mixing the Extracts:

a. In a large pot, combine the extracted juices of Karela, Neem, Amla, and Beetroot & mix them thoroughly.

3. Sweetening:

a. Add a sweetening agent like honey or sugar to the mixture. The amount will depend on your taste preferences. Start with a small amount.

5. Taste and Adjust:

a. Taste the mixture and make adjustments to the sweetness or consistency as needed.

b. You can also add more of any specific extract to enhance the flavour or properties of the syrup.

6. Heat (optional):

a. If you want to pasteurize the syrup for longer shelf life, you can heat it gently. Heat the mixture over low heat, but do not bring it to a boil. Stir continuously.

7. Storage:

a. Once the syrup is ready, let it cool to room temperature.

b. Pour the syrup into clean, airtight bottles or containers.

c. Label the containers with the syrup's name, ingredients, and date of preparation.

8. Usage:

a. Store the syrup in a cool, dark place or in the refrigerator.

b. Shake well before each use. [11]

**Observations**:

Evaluation of Herbal Syrup:

1) Colo: Coffee Brown.
2) pH: 6.5
3) Odour: Aromatic.
4) Viscosity:1.20.
5) Taste: Sweet, Density: 1:16 [11]

# OUTCOMES

1. **Pharmacy Knowledge:**

   We have acquired a comprehensive understanding of the fundamental aspects of the pharmacy profession, encompassing biomedical sciences, pharmaceutical sciences, behavioural, social, and administrative pharmacy sciences, as well as manufacturing practices.

2. **Problem Analysis:**

   We have developed the ability to employ scientific inquiry principles, think analytically, critically, and clearly when addressing issues and making decisions in our daily practice. We are proficient in locating, analyzing, evaluating, and systematically applying information, ensuring our decisions are well-founded.

3. **Modern Tool Usage:**

   We have gained expertise in selecting and applying appropriate methods, equipment, procedures, resources, and contemporary pharmacy-related computing tools.

4. **Professional Identity:**

   We have cultivated an awareness of the importance of our professional roles in society, whether as healthcare professionals, health promoters, educators, managers, employers, or employees. We can analyse and effectively communicate the value we bring to society.

5. **Pharmaceutical Ethics:**

   We have learned to uphold personal values and integrate ethical principles in both professional and social settings. We demonstrate behavior that respects cultural and individual differences in values, communication, and lifestyles. We utilize ethical frameworks and principles to guide decision-making, and we take accountability for the consequences of our choices.

6. **Communication:**

   We have developed strong communication skills within the pharmacy community and in broader society. This includes the ability to comprehend and compose effective reports, deliver impactful presentations and documentation, and give and receive clear instructions.

## CO-CURRICULAR ACTIVITIES

**Hospital visit:**

The practice school department planned an hospital visit in L.H. Hiranandani Hospital which is located in Powai. The visit was for one day between 9:30Am to 3:30 PM

This hospital pharmacy visit provided an insightful opportunity for students to gain practical knowledge about hospital pharmacy, its services and its operations within a healthcare facility. The visit aimed to familiarize students with the functioning of a hospital pharmacy, the role it plays in patient care, and the importance of medication management.

There were three main Pharmacy departments in the hospital are Ground floor pharmacy (outpatient pharmacy), sixth floor pharmacy (Inpatient pharmacy), Basement pharmacy (stores).

This visit gives us the various information like medication management, Quality control, Patient Interaction, Technology Integration

**Presentation:**

During our tenure in the practice school in the department of pharmacognosy, individual groups were assigned the certain topics by their respective guides, all of us prepared a presentation on topic adulteration of herbal drugs. This presentation was evaluated by Ms..Bharti Gawade and Ms. Aliefia Lehri. This topic includes the types, methods of adulteration, and methods for overcome the adulteration.

Our presentation concluded with getting insights and valuable key notes by the entire teaching staff of the pharmacognosy department.

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