WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 11, Issue 5, 334-341. Review Article ISSN 2277– 7105

PLANT EXTRACTS AND CONVENTIONAL METHOD OF EXTRACTION

[1]*Dr. Kajal Sharma, [2]Dr. D.C. Singh, [3]Dr. Suresh Chaubey and [4]Dr. Shailendra Pradhan

[1]P.G Scholar of Dravyaguna Department, Government P.G Ayurvedic Rishikul College.

[2]M.D (Ay.), PhD, Prof. and H.O.D Department of Dravyaguna, Government P.G Ayurvedic Rishikul College, Haridwar.

[4]Professor, P.G. Department of Dravyaguna, Government P.G Ayurvedic Rishikul College, Haridwar.

[4]Assistant Professor, Department of Dravyaguna, Government P.G Ayurvedic Rishikul College, Haridwar.

Article Received on
23 Feb. 2022,

Revised on 16 March 2022,
Accepted on 06 April 2022

DOI: 10.20959/wjpr20225-23766

***Corresponding Author**
Dr. Kajal Sharma
P.G Scholar of Dravyaguna Department, Government P.G Ayurvedic Rishikul College.

ABSTRACT

Plants are an important source of bioactive molecules for drug discovery. Extraction is an important step in the itinerary of phytochemical processing for the discovery of bioactive constituents from plant materials. Modern method of extraction are effective in advancing the developmental of traditional herbal remedies. extraction is a procedure of extracting out the useful chemical constituents from a part of plant or crude drug or animal tissue by treating it with a solvent. Natural medicine were the only option for the prevention and treatment of human diseases for thousands of years. Today, it is very crucial to develop effective and selective methods for extraction and isolation of those bioactive natural products. This review paper provides information about various plant extract as well as various extraction procedure that are normally used.

1. INTRODUCTION

The chemistry of plants is very divergent. Medicinal plants have been a source of wide variety of biologically active compounds for many centuries and used extensively as crude materials or as pure compounds for treating various disease conditions. Relatively 1-10% of plants are used by human out of estimated 250,000-500,000 species of plants on earth. Plant based traditional medicine plays a key role in the development and advancement of modern

studies by serving as a starting point for the development of novelties in drug discovery. Many inert substances (like cellulose, cutin, lignin, suberin etc.) as well as therapeutically important constituents (like alkaloids, glycosides, fats etc.) are found in plants. Now a days, active principles of herbs are extracted out and purified for the therapeutic use instead of using crude herb for the regulated and selective activity of the herb. This process of extracting out useful matter from crude drug/ herb leaving aside the inert constituents is called extraction. The extracted out useful part is called extract and the phytochemicals obtained in extract are known as extractives or active principles.

Types of extracts

1.1. Dry extracts

1.2. Aqueous extracts

1.3. Fluid extracts

1.4. Oily extracts

1.5. Viscous extracts

1.6. Oleo resin

1.7. Tinctures

Phytochemical analysis of herbs / plants- many active substances or extractives (active principle) have been isolated from different crude drugs through extraction. These are

1.1. Alkaloids

1.2. Glycosides

1.3. Pigments

1.4. Tannins

1.5. Saponins

1.6. Phytosterols

1.7. Fixed oils

1.8. Proteins and free amino acids

2. HOW THE EXTRACTIVES ARE DETECTED IN THE DRUG?

The air dried powder of the crude drug is extracted in soxlet apparatus with petroleum ether benzene, solvent ether, chloroform, acetone, ethanol and methanol successively. Then the drug is macerated with chloroform water.

2.1. Each time before extracting with next solvent, the powdered drug is dried in hot air oven below 50c.

2.2. Each extract is concentrated by distilling off the solvent and then evaporating to dryness on water bath.

2.3. The quantity of the each extract obtained with each solvent is weighed.

2.4. The colour and consistency of the extract obtained with each solvent are noted.

2.5. The extracts may contain along with desired extractives (alkaloids, glycosides etc.) some other substances such as chlorophyll, other pigments, inorganic and organic acids, resins, fatty substances etc.

2.6. The above said undesired substances are removed from the extracts by adopting suitable purification methods such as sublimation, distillation, fractional liberation, fraction crystallization or chromatography.

Now, the extracts is tested for presence of different extractives.

2.7. Detection of glycosides, carbohydrates and sugar.

A small portion of extract is hydrolysed with dilute Hcl for few hours in water bath. Now, it is subjected to Liebermann - Burchard's legal and Bontrager's test to detect the different glycosides in the herb / plant extract.

2.8. Dissolve 200 ml of alcoholic and aqueous extracts separately in 5ml of distilled water and filter it. The filtrate is subjected to molishs test to detect the different carbohydrates in extract of herb.

2.9. 200mg of extract is dissolved in water and treated with Fehling's Barford's and Benedict's reagents to detect the presence of different sugars in the extract of herb.

List of some glycosides with their sources and uses

S.no.	Glycoside	Type of glycosides	Source	Uses
1.	Barbaloin	Anthracene glycoside	Ghritkumari(aloe vera)	Purgatives
2.	Aloemodin	Anthracene glycoside	Ghritkumari(aloe vera)	Purgatives
3.	Sennosides A&B	Anthracene glycosides	Senna(cassia angustifolia)	Purgative,bitter
4.	Digoxin	Cardiac tonic	Leaves of hritpatri(digitalis purpurea)	Cardiac tonic
5.	Digitoxin	Cardiac tonic	Leaves of hritpattri(digitalis purpurea)	Cardiac tonic
6.	Thevetin	Cardiac tonic	Seeds of karveera(thevetia nerifolia)	Cardiac tonic

7.	Oleandrin	Cardiac tonic	Leaves of karveera(nerium oleander)	In cardiac insufficiency
8.	Glycyrrhizin	Saponin	Dry roots of mulethi(glycyrrhiza glabra)	Expectorant, antipeptic ulcer
9.	Shatavari	Saponin glycoside	Dry roots of shatavari(asparagus racemosus)	Galactogogue
10.	Bacosides A andb	Saponin glycosides	Leaves and stems of endri(bacopa moniera)	Nervenic tonic
11.	Steriodial sapogenins	Saponin glycosides	Dried roots of gokshura(Tribulus terretris)	Diuretic
12.	Hesperedin	Flavanoid	Kind of unripe, green citrus fruits	In capillary fragility
13.	Psoralen	Coumarin	Vaakuchi(psoralea corylifolia)	In leucoderma
14.	Corylifolin	Coumarin	Vaakuchi(psoralea corylifolia)	In leucoderma
15.	Picroside	Glycosidial bitter	Dried rhizome of kutki(picrorrhiza kurroa)	Bitter-tonic, hepato-protective.
16.	Andrographolide	Glycosidial bitter	Dried leaves of kaalmegha(andrographics panculata)	Hepato-protective, bitter tonic

3. DETECTION OF TANNINS AND PHENOLIC COMPOUND

Take small quantity of alcoholic and aqueous extracts in water. It is treated with dilute(5%)ferric chloride solution, 1% solution of gelatin containing 10%Nacl, 10% lead acetate and aqueous bromide solution to confirm the presence of tannins and phenolic compounds in the extract.

S.no.	Tanin	Type of tannin	Source	Uses
1.	Chebuic acid	Hydrolysable tannin	Dried ripe fruits of haritaki(Termalia chebula)	Astringent, stomachic, purgative
2.	Gallic acid	Hydrolysable tannin	Haritki(Termanalia chebula)	Astringent, stomachic, purgative
3.	Ellagic acid	Hydrolysable tannin	Dried stem bark of arjuna(Termanalia arjuna)	Cardiac tonic and hypotensive
4.	Vitamin C	Hydrolysable tannin	Fruits of amla(emblica officinalis)	Laxative, diuretic
5.	Ketosterol	Condensed tannin	Dried stem bark of Ashoka(saraca asoca)	

4. DETECTION OF ALKALOID

A small quantity of solvent free extract obtained with chloroform, alcohol, water are taken and stirred separately with a few drops of dilute hcl and filtered. The filtrate is now tested with any of alkaloidal reagents e.g.

4.1. Hagers reagent(yellow precipitate confirms presence of alkaloids)

4.2. Mayers reagent(creamy precipitate confirms presence of alkaloids)

4.3. Wagners reagent(reddish-brown precipitate confirms presence of alkaloids)

4.4. Dragendroffs reagent (orange brown precipitate confirms presence of alkaloids)

5. DETECTION OF SAPONIN

Take 1ml of alcoholic and aqueous extract and dilute them separately to 20ml with distilled water and shaken in a graduated cylinder for 15 min. if a layer of foam on the surface appears, it confirms presence of saponins in the extract.

6. DETECTION OF FIXED OILS AND FATS

A small quantity of petroleum ether and benzene extract is pressed between two filter papers . oil stains on filter paper indicates the presence of fixed oils in extract. Take small quantity of petroleum ether or benzene extract along with a drop of phenolphthalein and a few drops of 0.5N alcoholic potassium hydroxide. Hear this mixture for 1-2 hours on water bath. Either formation of soap or partial n neutralization of alkali indicate the presence of fixed oils and fats in the extract of herb.

7. DETECTION OF PROTEINS AND FREE AMINO ACIDS

Take a small quantity of alcoholic and aqueous extracts and dissolve in few ml of water and subject it to Millions biuret and ninhydrin tests to detect proteins and few aminoacids in extract.

8. DETECTION OF VOLATILE OILS

Take 50gm powder of crude herb in a volatile oil estimation apparatus and subject it to hydro-distillation. The distillate is collected in the graduated tube of apparatus in which aqueous portion is automatically separated from the volatile oil, if it is present in the drug and returned back to the distillation flask.

9. EXTRACTION

It is the separation of medicinally mixture of many plants metabolites, such as alkaloids, glycosides, phenolics, terpenoids, and flavonoids using selective solvents through standard procedure. This solvent used for extraction is called as menstruum and the residue left behind after the process is called as marc.

Solvents used in extraction- in extraction process, a solvent is employed which is capable of penetrating the tissue of the drug and dissolves the active principles contained in the drug. various solvents.

9.1. Water- it is a solvent for proteins, colouring matter gums, glycosides, sugars, salts, many organic acids, fats, oils, and a few alkaloids.

9.2. Alcohol-alcohol is a solvent of alkaloids, alkaloidal salts, glycosides, volatile oils, and resins. alcohol also dissolves many forms of colouring agents, tannins, many organic acids and salts. Process used for extraction- mainly there are 4 methods used in extraction

9.2.1. Infusion

9.2.2. Decoction

9.2.3. Maceration and modified maceration process

9.3. Percolation

This is the procedure used frequently to extract active constituents in the preparation of tinctures and fluid extracts. It is more efficient than maceration because it is a continuous process in which the saturated solvent is constantly being replaced by fresh solvent. The plant material is moistened prior to their placement in the percolator with a proper amount of menstrum, it is placed in a sealed container and leave for four hours. Plant material must be conveniently placed in the percolator so as to allow the passage of fluid and the complete contact with the plant material. The percolator must be filled with liquid and covered up. The bottom outlet is opened until get a regular dipping and then closes. After 24 hour, leave it to drip slowly and added enough menstruum to a proportional volume of ¾ of the total volume required for the final product. The wet mass is pressed to extract the maximum residual fluid fretained and supplemented with sufficient menstruum to get the proper proportion, its filtered or clarified by decantation. It is usually done at moderate rate (6drops/min) until the extraction is completed before evaporation to get a concentrated extracts.

9.3.1. Infusion process

In this process, the whole of the drug is treated with whole of menstruum for definite period of time(usually 15 minutes). Cold or hot water is used as menstruum this process. The drug is treated with menstruum for 15minutes and the extract is filtered. The final volume is produced by adding more water.

9.3.2. Decoction process- in this process, the extract is extracted out by boiling whole of the drug with whole of the menstruum i.e, water for definite period of time generally for 10 minutes. After boiling, extract is filtered and final volume is produced by adding more water. Decoction usually contains higher concentration of active constituent's than infusion.

9.3.3. Maceration process- This is a method of solid -liquid extraction.in this process , the powdered solid materials is placed in a closed vessel and the solvent is added. Then vessel is kept aside for seven days. Appropriate time is allowed for the solvent to diffuse through the cell wall to solubilize the constituent present in plant. After this specified period, extract is strained and marc is pressed. The extracted liquid is mixed with strained liquid and the product is clearified by filtration.

Maceration process for organized drug	Maceration process for unorganized drug
1. This process is used for organized structured herbs like roots, stems, leaves, flowers etc.	This process is used for unorganized structured herbs such as oleo resins,gum resins etc.
2. The whole of the drug is treated with whole of the menstruum at once in this process.	The whole of the drug and only 4/5th volume of the menstrum is used.
3. Extraction time is 7 days.	Extraction time varies from 2-7 hours.
4. After specific period extract is filtered and marc is pressed.	After specific period extracts is filtered and marc is washed.
5. Filtrate and expressed liquid are mixed and final volume is adjusted.	Filtrate and liquid obtained on washing are mixed and final volume is not adjusted.
6. Major part of drug remains undissolved.	Major part of drug remains dissolved.
7. Quantity of marc is large.	Quantity of marc is comparatively small.
8. It is used for making tinctures from organized parts of orange, lemon etc.	It is used for making tinctures from unorganized parts like tolu and myrh etc.

10. CONCLUSIONS

Several works have been done on medicinal plant either to investigate and prove a reported claim of biological activity or to mimic its traditional medicinal use based on ethnomedicinal survey. Large numbers of medicinal plants have been extracted, fractionated, and compounds isolated successfully. Advancement and modification of these methods periodically will ease research processes and improve the outcome

REFERENCES

1. K. Burley and F. Park, "Meeting the challenges of drug discovery: a multidisciplinary re-evaluation of current practices," Genome Biol., 2005; 6: 330.

2. Ingle KP, Deshmukh AG, Padole DA, Dudhare MS, Moharil MP, Khelurkar VC. Phytochemicals: Extraction methods, identification, and detection of bioactive compounds from plant extracts. J Pharmacogn Phytochem, 2017; 6: 32–6. [Google Scholar]
3. Azwanida NN. A review on the extraction methods use in medicinal plants, principle, strength, and limitation. Med Aromat Plants, 2015; 4: 196. [Google Scholar]
4. Pandey A, Tripathi S. Concept of standardization, extraction, and pre-phytochemical screening strategies for herbal drug. J Pharmacogn Phytochem, 2014; 2: 115–9. [Google Scholar]
5. Doughari JH. Phytochemicals: Extraction methods, basic structures, and mode of action as potential chemotherapeutic agents, phytochemicals—a global perspective of their role in nutrition and health. In: Venketeshwer R, editor. A Global Perspective of Their Role in Nutrition and Health. InTech; 2012. [Last accessed 2019 Jun. 10]. Available from: www.intechopen.com . [Google Scholar]
6. Sasidharan S, Chen Y, Saravanan D, Sundram KM, Yoga Latha L. Extraction, isolation and characterization of bioactive compounds from plants' extracts. Afr J Tradit Complement Altern Med., 2011; 8: 1–10. [PMC free article] [PubMed] [Google Scholar]
7. Tiwari P, Kumar B, Kaur M, Kaur G, Kaur H. Phytochemical screening and extraction: A review. Int Pharm Sci., 2011; 1: 98–106. [Google Scholar]
8. Dravyaguna Adarsh (Volume One) (Kendriya Bharatiya Chikitsa Parishad dwara nirdarit navin Pathyakramnusar).