

HYDRODISTILLATION OF *STEPHANIA GLABRA* TUBERS AND *WOODFORDIA FRUTICOSA* LEAVES

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ABSTRACT

By considering the importance of essential oils for good hale and health of mankind in recent time, present study is focused on hydrodistillation of *Stephania glabra* (SG) and *Woodfordia fruticosa* (WF). Volatile oils of the SG tubers and WF leaves were obtained by hydrodistillation by using clevenger apparatus (lighter than water). Thin layer chromatography was performed for decoction of SG tubers. 0.33% volatile oil was isolated from 30g powder of both plants. Along with volatile oil Rf value of the decoction of SG tuber was found to be 0.93, 0.5 and 0.03.

Keywords: Essential oils, *Stephania glabra*, *Woodfordia fruticosa*, Hydrodistillation, Chromatography.

INTRODUCTION

A popular alternative medicine therapy, aromatherapy or essential oil therapy is a natural, gentle treatment that can be used as an adjunct and sometimes as an alternative to the many conventional pharmaceutical medications that people with physical disabilities, including spinal cord injury (SCI), multiple sclerosis (MS) and Arthritic pain, frequently rely upon. By expanding the healing armamentarium available to us, these oils have the potential to reduce our reliance on these pharmaceuticals and exposure to their side effects. In the Vedic literature of India; one can find references of many uses and applications of essential oils. Use of aromatics has been profusely mentioned in Ayurveda "Gandhshastra"- the science of odor which deals with the cosmetics and fragrances. Oils, such as myrrh, lotus, and sandalwood oils were widely used in ancient Egyptian purification and embalming rituals. The Chinese have ancient herbal traditions that can be found recorded 2000 years before Christ. Hippocrates of Greece, known as the "father of medicine", prescribed perfume fumigations and fomentations. Essential oils are cited repeatedly in many Judeo-Christian and Muslim religious texts. They were used to cure every ailment "from gout to a broken head." Clove and lemon were highly valued as antiseptics hundreds of years before the discovery of modern antiseptics. Cave paintings in France suggest that plants have been used in medicine as long ago as 1000BC. Interestingly, India which was once a world leader of fragrance industry has lost its position due to rapid advancement made by European industry in last century¹. Krill Oil, which is naturally rich in Omega-3 phospholipids, has been demonstrated to give a substantially greater reduction of fat in the heart and liver than Omega-3 from fish oil².

How essential oils do works? ¹

- Converts smell
- Aroma enters nose
- Connects with cilia
- Reaches olfactory bulb
- Connected to Brain
- Impulse Reach the limbic system to electrical Impulse

Essential oils from number of plants have been reported to possess different pharmacological activities like antimicrobial in *Melaleuca alternifolia*³ and *Woodfordia fruticosa*⁴, Antibacterial activity of essential oils and their major constituents against respiratory tract pathogens by gaseous contact⁵, in acute otitis⁶ as an expectorants⁷, in chronic bronchitis⁸, analgesic activity⁹, anti-inflammatory activity^{10, 11}, in the treatment of post operative nausea and vomiting¹², essential oils from *Zingiber Officinale*, in case of arthritis¹³. Essential oils from the leaves of *Woodfordia fruticosa* was identified as sesquiterpenoids (β -caryophyllene, γ -curcumen, germacrene-D, β -selinene, elemol) and monoterpenoids (α -pinene, 2, 6 dimethyl-1, 3, 5, 7 octatetraene)¹⁴

MATERIALS AND METHODS

Plant material-

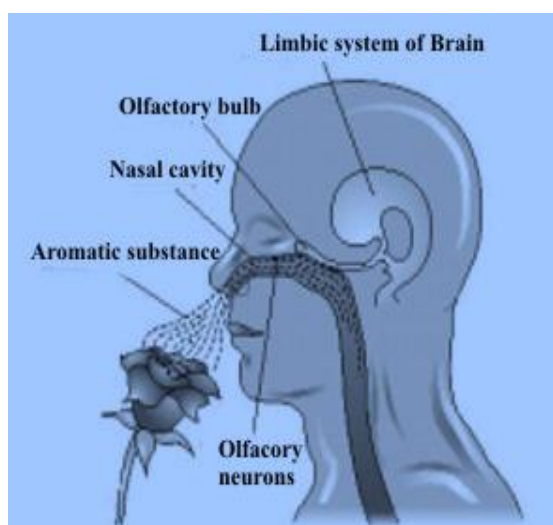
Collection and preparation

Stephania glabra (SG)-Fresh tubers were dug up from the forest of Gharsi village hills of Solan district of Himachal Pradesh, India in the month of October. Tubers were washed to remove all muddy impurities and peeled out to remove outer pulp. After the removal of outer pulp the rhizome looked in different color yellow (matured) and fade white (immature). Tubers were cut into two to three pieces and then peeled with the help of a grater. The peeled material first dried in sunlight for two days and then in shade for one week. Finally the dried material was grinded to get powder.

Woodfordia fruticosa (WF)-Fresh leaves of *Woodfordia fruticosa* were collected from the Gharsi village hills of Solan district of Himachal Pradesh India and dried in shade to avoid the loss of any volatile oil fraction on drying. Dried leaves were grinded to get fine powder.

Authentication-The plants were authenticated in the department of forestry Y.S. Parmar University Solan HP.

Extraction Of Volatile Oil- 30g of immature (assembly A) and 30 g of matured (assembly B) tuber's powdered material of SG was filled in two volumetric flasks of 250 ml capacity (Fig-1) similarly, powdered leaves of WF were added to two different assemblies A and B. The clevenger apparatus were adjusted carefully. The extraction was done for 6 hrs for first day and for 3 hrs in next day¹⁵, ¹⁶. Similarly on the other side 30g of WF powder was added to two



flasks of 250 ml of capacity for hydrodistillation by cleveger apparatus. The percentage yields of volatile oil obtained was calculated.^{15, 16}



Assemblies for SG



Assemblies for WF

Fig.1: Showing adjustment of A and B Assembly for SG and WF



Volatile Oil of SG in Side Tube

Fig.2: Showing accumulation of SG oil in side tube (assembly B)



Fig3: Showing accumulation of volatile oil of SG in Assembly B in last three hours

Chromatography- The TLC plates were prepared by using silica gel 'G', by pouring method, activated and then used for chromatography. The amount of volatile oil was very less and could not be collected. Due to this reason the decoction of the drug was used for TLC. The solution is spotted on two different TLC plates with the help of capillary tube as a fine spot at two cm above from base. The plates were then kept in solvent system in chamber. The solvent system was let to run upto 1/3rd of TLC plate. Plates were removed and dried in air and kept in iodine chamber to visualize the spot. The R_f values of each spot visualized on plate were calculated.¹⁷⁻²⁰

Solvent system- Ethyl acetate: Toluene (7:93)

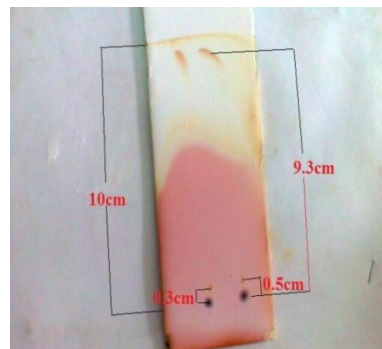


Fig-4: Showing TLC plate after elution of sample of SG.

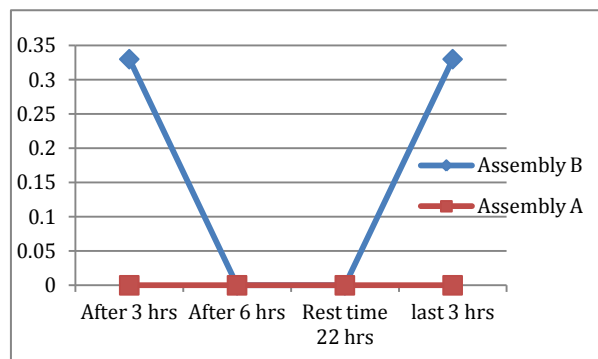
Visualizing agents- Iodine chamber

RESULT

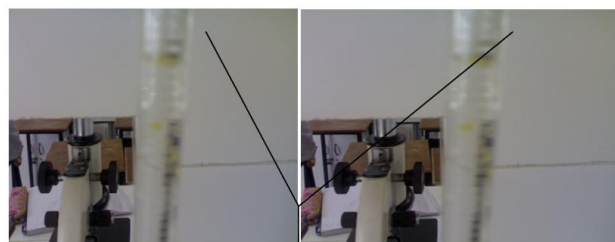
Percentage yield of essential oil from *Stephania glabra* tubers (SG) was calculated. The volume of volatile oil was recorded at 3 hrs, 6 hrs and then after a gap of 22 hrs the extraction was restarted for 3 hrs more. The percentage yield of recorded volume was calculated and tabulated in table no.1 and 2. Similarly, the percentage yield of volatile oils from *Woodfordia fruticosa* was obtained and tabulated in table no 3.

Table 1: showing the Percentage of volatile oil from SG tubers.

Flask No.	Amount taken (in grams)	Amount obtained (in ml)	Percentage yield
Percentage yield after 3 hours			
A	30	00	00
B	30	0.1	0.33
Percentage yield after 6 hours			
A	30	00	00
B	30	0.1	00
Percentage yield in last 3 hours			
A	30	00	00
B	30	0.1	0.33

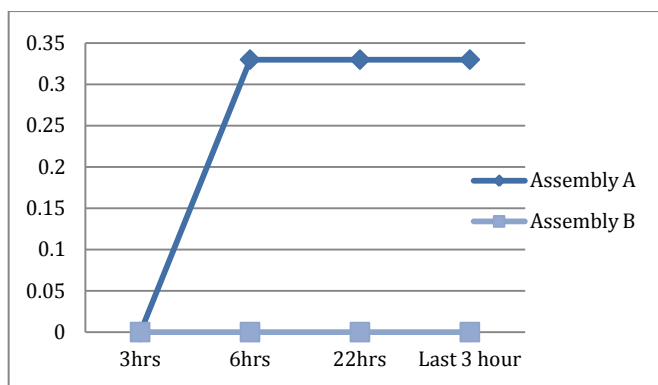


Graphical comparison of percentage yields of SG oil in both assemblies.



Accumulation of Volatile oil from WF (assembly A)

Fig3: Showing accumulation of volatile oil of WF in Assembly B in last three hours.



Graphical presentation of Percentage Yields of volatile oils from WF leaves.

R_f values of SG decoction- Two pairs of parallel spots were visualized on the TLC plate (fig-4). The R_f value of each spot was calculated and recorded as 0.93 for two spots and 0.05 and 0.03 for next two.

DISCUSSION

The hydrodistillation of SG tubers provided the 0.33 % v/w of volatile oil from 30g of powdered material from assembly 'B' but no amount of volatile oils from assembly 'A' was observed. During first 3 hrs of distillation the volatile oil was observed at the top of water in the side tube (fig-2). The amount of oil in the side tube was measured with the use of a centimeter scale. The distance of 0.2 cm of scale was found to be 0.1ml in the cleverger volume scale. During next three hrs oil ran down back in the flask and no amount of volatile oil was observed this time. When the distillation was restarted 0.1 ml of volatile oil was obtained from assembly 'B' but no amount of volatile oil was observed in assembly A. Similarly, the volatile oils of WF were obtained. 0.33% of the oil was obtained from 30g of leaves powder of WF in assembly 'A'. The volatile oil of *Stephania glabra* was too less to collect therefore the decoction of the plant was used for TLC. Instead of non polar solvent system polar solvent system (ethyl acetate: toluene 7:93) was opted with the thought that some amount of the oil contents must be there in the decoction of SG. The R_f values were recorded as 0.93 for two parallel spots and 0.05 and 0.03 for next two (fig-4).

CONCLUSION

From this study it can be concluded that the volatile oils of SG and WF is lighter than water. By knowing the pharmacological importance of rhizome of *Stephania glabra* and leaves of *Woodfordia fruticosa*, the present study is focused on the percentage yield of volatile oils which would help the researchers for the renaissance of the hidden medicinal potential from the essential oils of both plants.

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