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Phytochemical Profiling of *Irumal Maathirai* - A Siddha Herbo-Mineral Formulation Used in Treating Respiratory Ailments

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ABSTRACT

Bioactive constituents present in the medicinal plants are responsible for various therapeutic applications. Phytochemical screening is the primary tool to unlock these specific secondary metabolites which hold the medical potential of the plants.

Objective: This study aimed to perform preliminary phytochemical screening of Irumal maathirai to identify the various bioactive components of therapeutic value.

Materials and Methods: Various solvent extracts (aqueous, ethanolic, chloroform) of Irumal Maathirai were obtained and the extracts were undertaken for qualitative phytochemical screening using standard colorimetric assays.

Results: The preliminary analysis indicated the presence of flavonoids, steroids, tannins, phenols, triterpenoids, saponins and reducing sugars in significant concentration.

Discussion: The presence of these phytochemicals indicate that the Drug Irumal Maathirai hold anti-oxidant, anti-inflammatory, anti-microbial, Immunomodulatory effects. These findings provide a basis for further pharmaceutical development.

Key words: Phytochemical screening, Bioactive compounds, Secondary metabolites, Irumal Maathirai, Anti-oxidant, Immunomodulatory.

1. INTRODUCTION

Global healthcare is currently shifting towards evidence based traditional medicine. One such oldest traditional system is siddha system of medicine, raised from Tamil civilization of south India. It is rooted in the philosophy “food is medicine” and “medicine is food”. It emphasizes holistic health approach by balancing the three humors vatha, pitha, kapha and panchaboothas. The pharmacopeia of siddha relays not only on plants but also metals and minerals. Every formulation undergoes a classical process of purification where the pharmacological activity of the drug is enhanced and the toxic effects is neutralized.

One of such potent formulation from siddha pharmacopeia is Irumal maathirai, indicated for cough and respiratory ailments. Formulation of Irumal Maathirai contains aloe vera, licorice, white pepper, and borax. Poly herbo-mineral nature of Irumal Maathirai facilitates the complex synergistic therapeutic potential rather than a single bioactive principle. Though Traditionally

this formulation established a potential role in respiratory ailments, the precise molecular mechanism remains insufficient to meet out modern pharmacological standards.

Identification of bioactive phytochemicals, functional groups and bioactive compounds is essential to establish tradition medicine for global use. Utilizing phytochemical screening, the study aims to establish various bioactive compounds present in Irumal Maathirai.

2. MATERIALS AND METHODS

2.1 Preparation of Irumal Maathirai:

Irumal Maathirai contains *Aloe barbadensis, Glycyrrhiza glabra*, *Piper nigrum* and *Sodium biborate*. The required raw drugs were sourced from an authentic drug store. All the drugs were authenticated, purified, processed and formulated as per literature *Kannusamy Parambarai Vaithiyam.*

2.2 Phytochemical analysis:

2.2.1 Test for alkaloids:

Mayer's test: 2ml of ethanolic extract of the test drug was taken in a test tube and 2ml of Mayer's reagent was added slowly along the sides of the test tube and observed for the appearance of precipitation.

2.2.2 Test for flavonoids:

Alkaline reagent test: 2 ml of aqueous extract was taken in a test tube and few drops of 10% sodium hydroxide solution was added and observed for color change. Then few drops of dilute hydrochloric acid was added and observed for color shift.

2.2.3 Test for saponins:

The froth test (foam test): 5 ml of aqueous extract was taken in a test tube and the test tube was shaken vigorously for about 30 seconds and left undisturbed for 10-15 minutes and observed for formation for any lather formation.

2.2.4 Test for steroids:

Salkowski's test: 2ml of ethanolic extract of the test drug was taken in a test tube. To that, 2 ml of chloroform was added and dissolved. 2-3ml of concentrated sulfuric acid was added slowly along the sides of the test tube and left undisturbed and observed for the separation of liquid layers and color changes.

2.2.5 Test for tannins:

The ferric chloride test: 2ml of aqueous extract of the test drug was taken in a test tube and few drops of 5% ferric chloride was added and observed for color change.

2.2.6 Test for triterpenoids:

The Liebermann-Burchard test: 2ml of ethanolic extract of the test drug was taken and 2ml of chloroform was dissolved and a few drops of Acetic anhydride was added and mixed well and allowed to cool. Then, 1ml of concentrated sulfuric acid was added along the sides of the test tube. Formation of any color junction between the two liquid junctions was observed.

2.2.7 Test for coumarins:

The Sodium hydroxide test: 2 ml of aqueous extract was taken in a test tube and to 2 ml of 10% Sodium hydroxide solution was added and observed for color change.

2.2.8 Test for glycosides:

Borntrager's test (for anthraquinone glycosides): 5 ml of aqueous extract was hydrolyzed with dilute HCl and the hydrolysate was filtered. To the 2 ml of the filtrate, 2 ml of chloroform was added and shaken and the chloroform layer was separated. To the separated chloroform layer, equal volume of 10% ammonia solution was added and observed for any changes in color.

2.2.9 Test for phenols:

The lead acetate test: 2 ml of aqueous extract was taken in a test tube and few drops of 10% lead acetate solution was added and observed for any formation of precipitate.

2.2.10 Test for cyanins (anthocyanins, betacyanin):

Sodium hydroxide test: 2ml of aqueous extract of the test drug was taken in a test tube and few drops of 10% sodium hydroxide solution was added and observed for the color change.

2.2.11 Test for sugars:

Benedict's test: 2ml of the aqueous extract of the test drug was taken in a test tube and 1 ml of benedict's reagent was added and

the mixture was placed in boiling water bath for about 10 minutes and observed for formation of any colored precipitate.

2.2.12 Test for proteins:

Biuret test: 2 ml of aqueous extract of the test drug was taken tin the test tube and 1ml of 10%sodium hydroxide was added and mixed well. To that, few drops of 1% copper sulphate solution was added along the sides of the test tube and observed for any color change.

3. RESULTS

The preliminary phytochemical screening of the test drug, Irumal maathirai, showed the presence of flavonoids, steroids, tannins, phenols, saponins, triterpenoids and reducing sugars. The results were elaborated in the table 1.

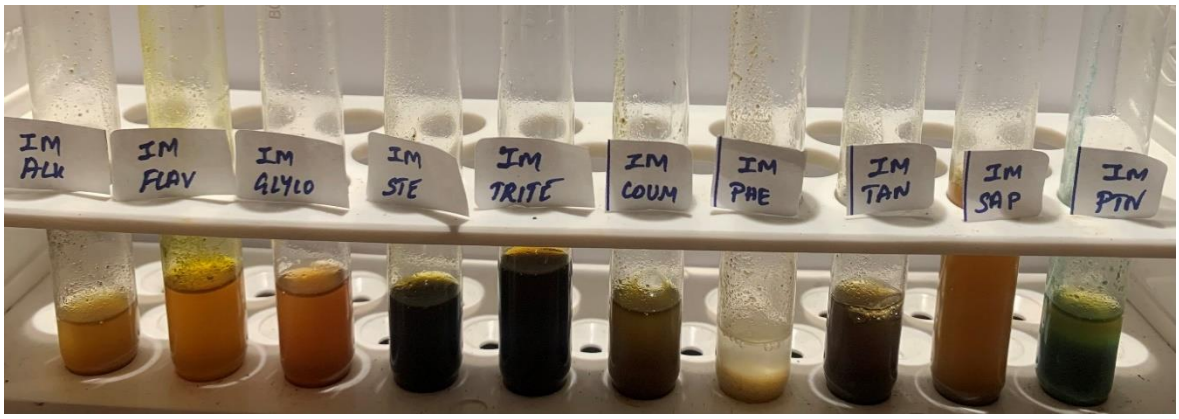

Fig. 1: Preliminary qualitative phytochemical analysis of extracts of Irumal Maathirai.

Table 1: Preliminary qualitative phytochemical analysis of extracts of Irumal Maathirai.

S. No	Test for phytochemicals	Observation	Result
1	Alkaloids	No precipitation was formed. Solution remained clear.	Absent
2	Flavonoids	Intense yellow color was formed while adding alkali and yellow color disappeared upon adding dilute hydrochloric acid.	Present
3	Saponins	Thick layer of lather/ form was observed.	Present
4	Glycosides	No color change was observed	Absent
5	Phenols	Heavy white color precipitate was formed	Present
6	Steroids	Reddish-brown color in the lower chloroform layer was observed. The upper sulfuric acid layer showed yellow with green florescence.	Present
7	Tannins	Dark blue to black color change was noted	Present
8	Triterpenoids	A reddish-brown-colored ring was formed between the junction of two liquids.	Present
9	Anthocyanins	No changes in color	Absent
13	Betacyanin	No changes in color	Absent
10	Coumarins	No color change was noted	Absent
11	Sugars	Yellow to orange colored precipitate was formed.	Present
12	Proteins	No color change was noted	Absent

4. DISCUSSION

The preliminary phytochemical analysis of the drug Irumal Maathirai revealed the presence of various phytochemicals suggesting that the drug exhibit pharmacological potential.

[2] Flavonoids are the polyphenolic compounds well known for their potent antioxidant property. Various studies revealed that flavonoids possess a numerous health benefits including anticancer, anti-inflammatory, antiviral, neuro-protective and cardioprotective properties. [3] Various studies demonstrate that Triterpenoids exhibit cytotoxic, anti-inflammatory, anti-viral antioxidant, antidiabetic, anti-obesity and hepatoprotective effects. [4] Tannins possess many pharmacological properties

including antioxidant, anti-microbial, anti-viral, anti-mutagenic, anti-carcinogenic properties. External treatments with tannin help in wound healing. [5] Saponins are found to possess various pharmacological actions including anti-inflammatory, anti-viral, anti-angiogenic, cytotoxic, hypolipidemic, hypoglycemic properties. Saponins are also known for surfactant properties and they enhance immune response by stimulating B-cell and T-cell responses. [6] Plant steroids are bioactive compounds and have been suggested to exhibit numerous pharmacological actions including hypo-lipidemic, anti-microbial, anti-diabetic, anti-obesity and immunomodulatory effects.

5. CONCLUSION

The preliminary phytochemical analysis of Irumal maathirai confirms the presence of flavonoids, tannins, saponins, phenols, triterpenoids. These bioactive compounds have been proposed to have anti-microbial, anti-viral, anti-inflammatory, hepatoprotective, cytotoxic effects and these effects provide a strong therapeutic potential of the drug.

Declaration by Authors
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REFERENCES

1. Senguttuvan, J., Paulsamy, S., & Karthika, K. (2014). Phytochemical analysis and evaluation of leaf and root parts of the medicinal herb, Hypochaeris radicata L. for in vitro antioxidant activities. *Asian Pacific journal of tropical biomedicine*, *4*(Suppl 1), S359–S367. https://doi.org/10.12980/APJTB.4.2014C1030
2. Safe, S., Jayaraman, A., Chapkin, R. S., Howard, M., Mohankumar, K., & Shrestha, R. (2021). Flavonoids: structure-function and mechanisms of action and opportunities for drug development. *Toxicological research*, *37*(2), 147–162. https://doi.org/10.1007/s43188-020-00080-z
3. Abdullah Al Mamun Sohag, Md. Tahmeed Hossain, Md. Arifur Rahaman, Papia Rahman, Mohammad Shahinul Hasan, Rakhal Chandra Das, Md Kibria Khan, Mahmudul Hasan Sikder, Mahboob Alam, Md Jamal Uddin, MD. Hasanur Rahman, Md. Tahjib-Ul-Arif, Tofazzal Islam, Il Soo Moon, Md. Abdul Hannan, Molecular pharmacology and therapeutic advances of the pentacyclic triterpene lupeol Phytomedicine, Volume 99, 2022, 54012, ISSN 0944-7113, https://doi.org/10.1016/j.phymed.2022.154012.
4. Maugeri, A., Lombardo, G. E., Cirmi, S., Süntar, I., Barreca, D., Laganà, G., & Navarra, M. (2022). Pharmacology and toxicology of tannins. *Archives of toxicology*, *96*(5), 1257–1277. https://doi.org/10.1007/s00204-022-03250-0
5. Khan, M. I., Karima, G., Khan, M. Z., Shin, J. H., & Kim, J. D. (2022). Therapeutic Effects of Saponins for the Prevention and Treatment of Cancer by Ameliorating Inflammation and Angiogenesis and Inducing Antioxidant and Apoptotic Effects in Human Cells. *International journal of molecular sciences*, *23*(18), 10665. https://doi.org/10.3390/ijms231810665
6. Nattagh-Eshtivani, E., Barghchi, H., Pahlavani, N., Barati, M., Amiri, Y., Fadel, A., Khosravi, M., Talebi, S., Arzhang, P., Ziaei, R., & Ghavami, A. (2022). Biological and pharmacological effects and nutritional impact of phytosterols: A comprehensive review. *Phytotherapy research: PTR*, *36*(1), 299–322. https://doi.org/10.1002/ptr.7312
7. Brain KR, Turner TD. The Practical Evaluation of Phytopharmaceuticals. Bristol: Wright Scientechnica; 1975:36-45

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