ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

FT-IR Characterization Analysis of the Siddha Formulation Brahmananda Bairava Maathirai.

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ABSTRACT

The aim of the present study was to characterize the siddha formulation Brahmananda Bairava Maathirai (BBM) using FT-IR analysis. The FT-IR spectroscopy applied in the mid infra-red region 4000 cm^{-1} to 400 cm^{-1} revealed the presence of functional groups like primary aliphatic amines, alcohols, phenols, nitro compounds, carboxylic acids, alkynes, esters, ethers, alkyl halides. This study highlights the application using modern standardizing techniques for bringing the Herbo mineral formulation into focus.

Keywords: Brahmananda Bairava Maathirai (BBM), FT-IR, Siddha formulation, Herbo-mineral formulation.

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ISSN: 0975-8585

INTRODUCTION

Siddha Materia medica are classified into three categories which include herbal, mineral and drugs from animal origin. The dosage forms of Siddha medicine is divided into 32 internal and32 external types. Though they were used higher category of medicines which is mostly herbo-mineral and animal origin drugs. Siddha Herbo-mineral formulations are gaining popularity worldwide due to the presence of nano size particles which have properties like increased bioavailability, minimal side effect, and longer shelf life period and need less therapeutic dosage. Therapeutic activity of a herbo- mineral formulation depends on its phytochemical constituents. Standardization is a system that ensures a predefined amount of quantity, quality and therapeutic effect of ingredients in each dose [1]. standardization is an important step for the establishment of a consistent biological activity, a consistent chemical profile, or simply a quality assurance program for the manufacturing of an herbal drug[2].The Siddha Pharmacology (Gunapadam) now undergoes numerous scientific validations and standardization methods for their safety and efficacy which in turn confirms the safety of these time tested formulations. Herbal, Mineral, Animal product cannot be considered scientifically valid if the drug tested has not been authenticated and characterized in order to ensure reproducibility in the manufacturing of the product. Till date, lesser studies have been conducted on standardization of such preparations. So, an attempt was made to ensure the formulation.

MATERIAL AND METHODS

In the present study, Herbo-mineral preparation (Brahmananda Bairava Maathirai) has been selected to establish its standardization status from the classical Siddha literature [3]. The key ingredients used in the formulation was listed in the Table 1.Purification and Preparation of the BBM was carried out as per classical text literature mentioned.

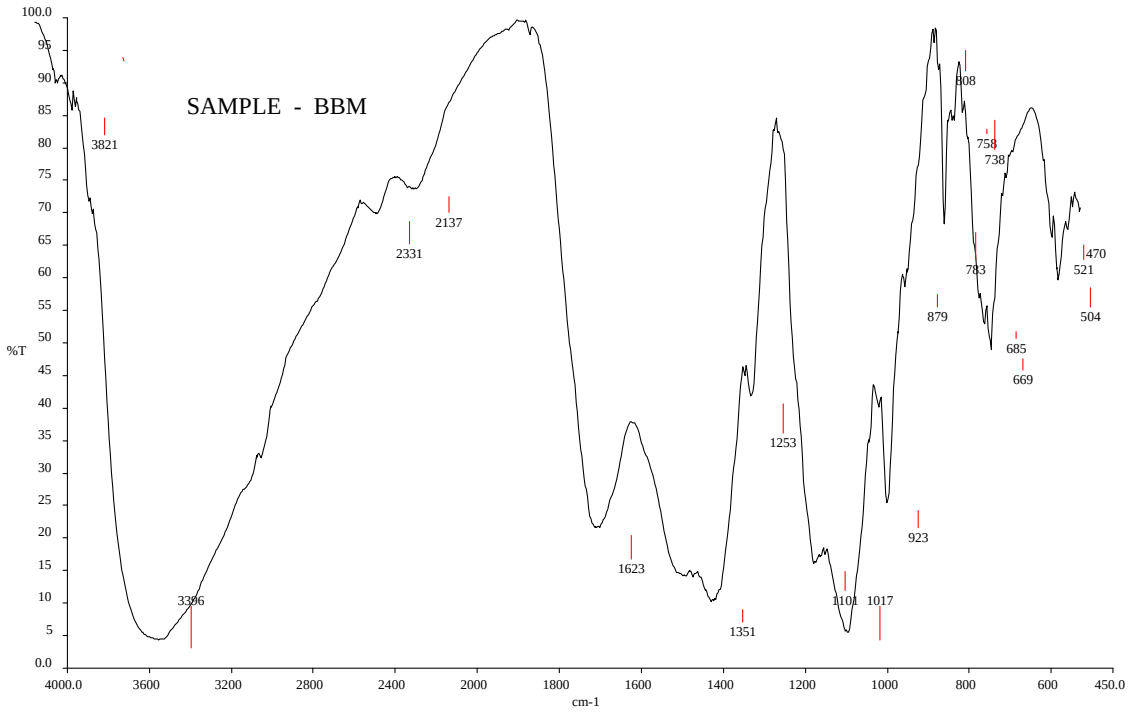
Table 1: Herbo-mineral formulation Brahmananda Bairava Maathirai (BBM)

No.	Siddha Name	Scientific Name	Qty
1.	Venkaram	Sodium tetraborate	1 PART
2.	Gandhagam	Elemental Sulphur	1 PART
3.	Manoseelai	Red Orpiment	1 PART
4.	Karunabi	*Aconitum ferox*	1 PART
5.	Paththira Thalagam	Arsenic trisulphide	1 PART
6.	Chukku	*Zingiber officinale*	1 PART
7.	Lingam	Processed in Mercuric sulphide	6 PART
8.	Inji Saaru	*Zingiber officinale* -Juice	Q.S

Fourier Transform-Infra Red Spectroscopy (FTIR):

Wave number (cm-1)	Vibrational modes of BBM in IR region	Functional groups
3396	O–H stretch, H–bonded	alcohols, phenols
2137	–C≡C– stretch	alkynes
1623	C=O stretch	carbonyls (general)
1351	N–O symmetric stretch	nitro compounds
1253	C–O stretch	alcohols, carboxylic acids, esters, ethers
1107	C–N stretch	aliphatic amines
1017	C–N stretch	aliphatic amines
923	O–H bend	carboxylic acids
879	N–H wag	1°, 2° amines
808	C–Cl stretch	alkyl halides
783	C–Cl stretch	alkyl halides
752	C–Cl stretch	alkyl halides
738	C–Cl stretch	alkyl halides
685	C–Br stretch	alkyl halides
669	C–Br stretch	alkyl halides
521	C–Br stretch	alkyl halides

ISSN: 0975-8585



IR data acquired with perkin elmer FT-IR spectrometer. For sampling techniques, KBr method [4] was carried out at SAIF,IIT, Chennai. About 1/8th of the solid powder of BBM was taken on a micro spatula and about 0.25-0.50 teaspoons of KBr was added and grounded using an agate motor and pestle to give a very fine powder. The finely powder sample was mixed with about 100 mg dried potassium bromide salt. The mixture was then pressed under hydraulic press using a die to yield a transparent disc (measure about 13 mm diameter and 0.3 mm in thickness) through which the beam of spectrometer passed. The computer display showed spectrum of graphs with peaks and the results were printed. The spectrum that appears denotes the molecular absorption and transmission. The analysis was carried out using BRUKER RFS 27: Stand-alone FT-Raman Spectrometer.

RESULTS AND DISCUSSION

Fourier Transform-Infrared Spectroscopic Analysis

FTIR instrumental analysis was done. The test drug was identified to have 15 peaks. They were the functional groups present in the BBM. The Table 1 and Figure 1 shows the presence of Primary aliphatic amines, Alcohols, Phenols, Nitro compounds, Carboxylic acids, Alkynes, Esters, Ethers, Alkyl halides groups which represents the peak value. The FTIR analysis of BBM shows the spectrum that appears which denotes the molecular absorption and transmission. It forms the molecular fingerprint of the sample. It is the functional group and determines the amount of compounds present in the sample. These functional groups may be responsible for the therapeutic effect of the drug.

CONCLUSION

The instrumental analysis FTIR shows the presence of functional groups through their stretch and bends which responsible for its functional activity. It was to subject for further many studies to validate its efficacy and safety through proper standardization procedure for its potency and efficacy. Thus this drug can be taken to the next level of isolation of the active principles which is responsible for the therapeutic effect.

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ISSN: 0975-8585

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