Functional groups identification through FTIR Characterization of siddha poly herbal formulation “Muppirandai chooranam”

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Abstract

Herbals play a vital role for the treatment of many diseases in humans. Since thousands of years ago herbal medicine and their therapeutic significance were mentioned in ancient texts. Scientific validation and characterization of herbal formulations are essential for gaining the entire knowledge regarding the medicinal principles of concern formulation and their proper use to cure diseases. FTIR characterization was carried out for the siddha herbal formulation “Muppirandai chooranam” to identify its functional groups. Some organic functional groups such as alcohol/phenols, alkyl groups, carboxyl groups, amides, aromatic, alkyne, alkane, alkene were identified in poly herbal siddha drug “Muppirandai chooranam”. This identified functional groups will help to evaluate the molecular structure regarding research findings for this herbal formulation “Muppirandai chooranam” in future for its extensive use.

Keywords: Herbal drug, Pirandai, Siddha drug, FTIR characterization, Chooranam

Introduction

Herbal medicines contribute a lot to cure many diseases\textsuperscript{1}. Herbal medicines are the hope for the people all over the world now to get proper safe remedy from the diseases. Though herbal and poly herbal preparations are being considered as good in nature because of its therapeutic value, characterization is also essential to known the structural and functional property of herbal formulations for wide use. Even for herbal drug scientific validation is needed for safe use before going to administer clinically\textsuperscript{2}. FTIR spectrum analysis is very helpful nowadays to identify the presence of functional groups. Characterization of herbal formulations are essential to identify the lead molecule for further research to elucidate the structure of functional compounds which is reasonable for its therapeutic value. Here one siddha herbal formulation “Muppirandai Chooranam” was subjected into FTIR Characterization to create fingerprints for standardization of this drug.

Experimental section:

Details regarding the sample:

“Muppirandai chooranam” is a poly herbal formulation which indicated as a drug in siddha sastric text
“Yaekoebu vaithiya chindhamani 700” for the treatment of peptic ulcer, ascites, jaundice, edema, Menorrhagia, Renal calculi, cardiac disorders etc., The ingredients of Muppirandai chooranam are five in number. They are Cissus quadrangularis (three sided), Trachyspermum ammi, Piper nigrum, Piper longum, Zingiber officinale (dried). The drug was prepared as per the text.

Fig 1  Image of Muppirandai chooranam

Details regarding the FT-IR analysis.

FT-IR spectra were recorded at SAIF, IIT Madras, India. The Perkine Elmer Spectrum One Fourier Transform Infrared (FTIR) Spectrometer was used to derive the FT IR Spectra of Muppirandai chooranam in Potassium Bromide (KBr) matrix with scan rate of 5 scan per minute at the resolution 4cm-1 in the wave number region 450-4000cm-1. The samples were grounded to fine powder using agate motor and pestle and the mixed with KBr. They were then Pelletized by applying pressure to prepare the specimen (the size of specimen about 13 mm diameter and 0.3 mm in thickness) to recorded the FT-IR Spectra under Standard conditions. FT-IR Spectra were used to determine the presence of the functional groups and bands in the Muppirandai chooranam. The recorded spectrum shows in figure 2.

Results

Fig: 2 FTIR Spectra of “Muppirandai chooranam”
Table [1] FTIR interpretation of “Muppirandai chooranam”

<table>
<thead>
<tr>
<th>Wave number (cm⁻¹)</th>
<th>Vibrational modes of “Muppirandai Chooranam” in IR region</th>
<th>Functional group</th>
</tr>
</thead>
<tbody>
<tr>
<td>3385</td>
<td>O-H Stretch</td>
<td>Alcohol/Phenol</td>
</tr>
<tr>
<td>2923</td>
<td>C-H Stretch</td>
<td>Alkyl</td>
</tr>
<tr>
<td>2853</td>
<td>O-H Stretch</td>
<td>Carboxylic Acid</td>
</tr>
<tr>
<td>2075</td>
<td>-C=C- Stretch</td>
<td>Alkyne</td>
</tr>
<tr>
<td>1745</td>
<td>C=O Stretch</td>
<td>Carboxylic Acid</td>
</tr>
<tr>
<td>1637</td>
<td>C=O Stretch</td>
<td>Amide</td>
</tr>
<tr>
<td>1460</td>
<td>C=C Stretch</td>
<td>Aromatic</td>
</tr>
<tr>
<td>1376</td>
<td>-C-H Bending</td>
<td>Alkane</td>
</tr>
<tr>
<td>1243</td>
<td>C-N Stretch</td>
<td>Amine</td>
</tr>
<tr>
<td>1162</td>
<td>C-N Stretch</td>
<td>Amine</td>
</tr>
<tr>
<td>1117</td>
<td>C-N Stretch</td>
<td>Amine</td>
</tr>
<tr>
<td>722</td>
<td>=C-H bending</td>
<td>Alkene</td>
</tr>
</tbody>
</table>

In the FT-IR Spectra analysis, this poly herbal siddha drug “Muppirandai Chooranam” sample exhibits the peak value shows in Table 1 at the wave number of 3385, 2923, 2853, 2075, 1745, 1637, 1460, 1376, 1243, 1162, 1117, 722 having O-H Stretch, C-H Stretch, O-H Stretch, –C=C- Stretch, C=O Stretch, C=C Stretch, -C-H Bending, C-N Stretch, C-N Stretch, =C-H bending. This indicates the presence of some organic functional groups such as alcohol/phenols, alkyl groups, carboxyl groups, amides, aromatic, alkyne, alkane, alkene.

Discussion

The presence of some organic functional groups such as alcohol/phenols, alkyl groups, carboxyl groups, amides, aromatic, alkyne, alkane, alkene were identified in the poly herbal siddha medicine “Muppirandai Chooranam” through FTIR spectrum analysis. There may be the presence of some inorganic compounds in this drug such as potassium, ammonium, sodium and majorly as zinc compounds were confirmed through the frequencies observed at the above mentioned wave number.

Conclusion

These observed data from this FTIR characterization helps to standardize this siddha compound drug “Muppirandai chooranam” regarding its functional behaviour. The presence of Zinc compounds majorly and all other compounds like potassium, sodium, ammonium will helps to treat human diseases especially peptic ulcer. The salts of zinc was found that it prevents gastric ulceration in albino rats. Research study found that the presence of aluminium in antacids exhibits ulcer healing property and induce mucosal protection in rats. This identification will become a platform for further research in future regarding the therapeutic uses like anti-ulcer activity of this siddha herbal formulation “Muppirandai chooranam”.

Acknowledgments

The authors wish to thank The Vice Chancellor, The Tamilnadu Dr.MGR Medical university, Guindy, Chennai and to Indian Medicine And Homoeopathy Department, Arumbakkam, Chennai and specially thank to The Principal, Government siddha medical college, Palayamkottai and to Mr.S.Krishnasamy, Mrs.K.Revathi, K.Venkateswaran, Dr.K.Rajamaheswari MD(S) and Late.Vaithiyar K.Subramanian R.I.M.P, Pattukkottai for their full support to complete this study.

References