



## Fourier Transform Infra Red (FT-IR) Spectral Studies of Novel Poly-Herbal Formulation of Anti-Obesity Drug

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### Abstract

Pharmacological analysis of medicinal plants remains a challenging issue for analytical chemists as medicinal plants are a complicated system of mixtures. Many highly sophisticated separation techniques, for example, high performance liquid chromatography (HPLC), gas chromatography (GC) and mass spectrometry (MS) are amongst the most popular methods of choice used for quality control of raw material and finished herbal product. Comparatively, the application of, Fourier Transform Infra Red (FT-IR) spectroscopy in herbal research is limited. The present study was carried out to characterize the bioactive constituents present in the novel antiobesity Polyherbal formulation (PHF) using FT-IR spectroscopy. An aqueous extract of PHF consisting of the following plants *Commiphora mukul (Stocks) Hook*, *Garcinia gummi-gutta(L.) Roxb*, *Plantago ovata Forrsk* was prepared and supplied by Lanson Biotech, Chennai, subjected to FT-IR analysis. The results showed the detection of bands of various bio molecules, which has a variety of pharmacological effects on the living system.

**Key words:** FT-IR, *Commiphora mukul (Stocks) Hook*, *Garcinia gummi-gutta (L.) Roxb*, *Plantago ovata Forrsk* , Polyherbal, Anti obesity drug .

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### Introduction

Globally, it has been estimated that there are more than 1 billion over weight adults and 300 million of are obese. Obesity and being overweight are major risk factors for chronic diseases such as type –II diabetes, cardiovascular diseases, hypertension, stroke and certain types of cancer [1-3]. Numerous drugs, which were approved and initially available in the market for the treatment of obesity, have been withdrawn because of their adverse effects. Consequently, attention has, in the recent

years, turned to medicinal plants. Utilizing them, many studies have been conducted to develop novel anti-obesity drugs and dietary supplements with minimal or nil side effects. [4]

With a history of more than 200 years, the Ayurvedic system is one of the oldest systems of medicine. Several prototypes derived from herbal plants are utilized for various kinds of diseases and disorders. [5-6] Literature review has revealed that flavonoides, sitosterols, tannins and saponins are known to have an anti-obesity activity by varying mechanisms. An aqueous extract of PHF, containing the above mentioned phytochemicals, consisting of the following plants *Commiphora mukul (Stocks) Hook*, *Garcinia gummi-gutta(L.) Roxb*, *Plantago ovata Forrsk* was prepared and supplied by Lanson Biotech, Chennai.

Compared to the synthetic drugs, herbal drugs are a complicated system of mixture. The methods for identification of ‘Herbal drug’ are mainly intended to obtain a characteristic fingerprint of a specific plant that represents the presence of a particular quality defining chemical constituent. For

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such purposes, chromatographic techniques such as high performance liquid chromatography (HPLC), gas chromatography (GC), gas chromatography–mass spectrometry (GC-MS) and thin layer chromatography (TLC) have been used widely [7-9] as compared to FT-IR. However, in recent years, FT-IR has been commonly employed to identify phytochemical constituents and elucidate compound structures. Owing to the finger print characters and extensive applicability to the sample, this method is broadly accepted in pharmacopeia. [10] As such, the aim of the present study was to characterize the bioactive constituents present in the novel antiobesity Polyherbal formulation (PHF) using FT-IR spectroscopy.

## Materials and Methods

**Preparation of Polyherbal formulation:** PHF containing following plants *Commiphora mukul (Stocks)Hook*, *Garcinia gummi-gutta(L.) Roxb*, *Plantago ovata Forrsk* was taken in the ratio of 1:1:1. The extraction of the formulation is performed using Indigenous, eco-friendly manufacturing process and also reduces the extractability of hydrophobic impurities (Patented technology), Polyherbal formulation was prepared and supplied by Lanson Biotech chennai, India.

**Sample preparation:** Small amount of sample was milled until fine powder and was filtrated with sieves. KBr of spectroscopy grade was also filtrated with sieves. 2 mg sample was mixed uniformly with 100 mg KBr (2% w/w) and homogenized.

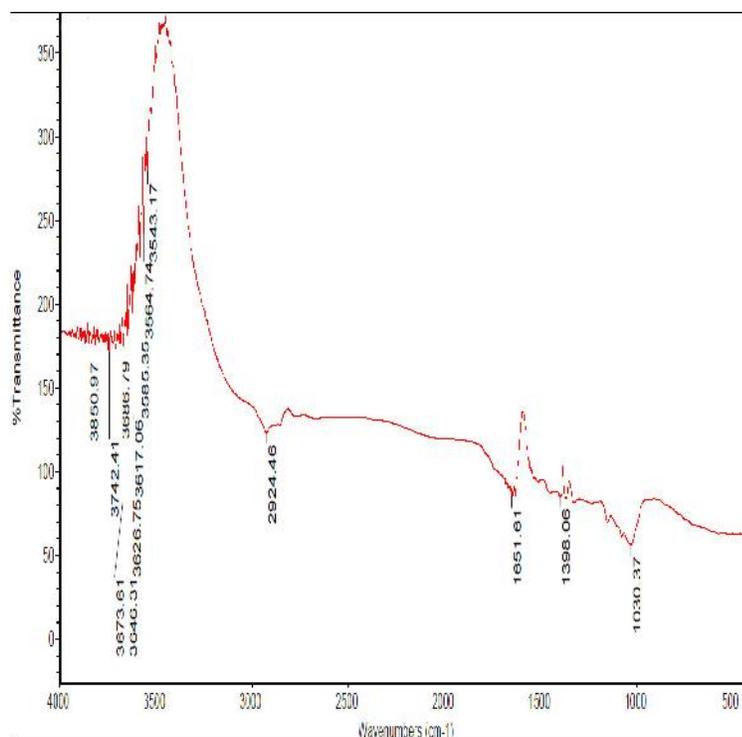
The FTIR spectra were recorded in the mid-IR region 4000-400  $\text{cm}^{-1}$  at resolution 4  $\text{cm}^{-1}$  with 32 scans using Thermo scientific Nicolet Is5 FTIR instrument. Dried sample was grounded with KBr and pressed to form pellets, then the spectra was recorded at room temperature against KBr pellet as standard. This study was carried out in Department of Biotechnology, Pondicherry University.

## Results and Discussion

FT-IR spectroscopic studies have shown the existence of various chemical in PHF of antiobesity drug. The IR spectra were recorded and the data as spectra data of PHF of anti obesity drug (Figure-1). The results of the FTR analysis of each peak values in response to the individual components are as follows (Table-1).

1. The band at  $1030.37 \text{ cm}^{-1}$  assigned for C–N stretch in aliphatic amines.
2. The band at  $84.992 \text{ cm}^{-1}$  assigned for C–H wag (–CH<sub>2</sub>X) in alkyl halides.
3. The band at  $1651.61 \text{ cm}^{-1}$  assigned for C–C stretch (in–ring) in aromatics.
4. The band at  $3543.17 \text{ cm}^{-1}$  assigned for C–H stretch in alkanes.
5. The band at  $3564.74 \text{ cm}^{-1}$  assigned for O–H stretch, H-bonded in alcohols, phenols
6. The band at  $3585.35 \text{ cm}^{-1}$  assigned for O–H stretch, H-bonded in alcohols, phenols.
7. The band at  $3617.06 \text{ cm}^{-1}$  assigned for O–H stretch, free hydroxyl in alcohols, phenols.
8. The band at  $3626.75 \text{ cm}^{-1}$  assigned for O–H stretch, free hydroxyl in alcohols, phenols
9. The band at  $3646.31 \text{ cm}^{-1}$  assigned for O–H stretch, free hydroxyl in alcohols, phenols

The presence of various functional groups like aliphatic amines, alkyl halides, aromatics, alkanes, alcohols and phenols has been reported for various medicinal properties like Hypolipidemic [11], anti-inflammatory [12], antitumor[13], antimicrobial & antiulcer [14].



**Figure 1:** The IR spectra data of PHF of anti obesity drug.

**Table 1:** FTIR analysis of each peak values in response to the individual components are as follows.

Position- (Cm <sup>-1</sup> )	Intensity	Bond	Functional groups
1030.37	56.461	C–N stretch	aliphatic amines
1398.06	84.992	C–H wag (–CH <sub>2</sub> X)	alkyl halides
1651.61	85.098	C–C stretch (in–ring)	Aromatics
2924.46	123.069	C–H stretch	Alkanes
3543.17	279.228	O–H stretch, H-bonded	alcohols, phenols
3564.74	241.853	O–H stretch, H-bonded	alcohols, phenols
3585.35	224.021	O–H stretch, H-bonded	alcohols, phenols
3617.06	204.631	O–H stretch, free hydroxyl	alcohols, phenols
3626.75	187.866	O–H stretch, free hydroxyl	alcohols, phenols
3646.31	176.987	O–H stretch, free hydroxyl	alcohols, phenols

## Conclusion

In the present study we examined the potential of FTIR spectroscopy for easy and identification of various functional group responsible for medicinal properties. The presence of characteristic functional groups like aliphatic amines, alkyl halides, aromatics, alkanes, alcohols and phenols are responsible for the various medicinal properties of this herbal formulation. Further research may help in the identification of new bioactive compounds present in this polyherbal formulation.

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