

Efficacy of an Ayurvedic Drug Thyronil over Thyroid Disorder using Blood Samples by FTIR-ATR technique

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Abstract : Fourier Transform Infrared - Attenuated Total Reflectance (FTIR-ATR) technique is a modern spectroscopic technique used for elemental analysis of biological samples. During the recent times the use of FTIR-ATR has received quite a lot of attention not only for understanding the biological nature of the disease, but also for diagnosing it. From a diagnostic and therapeutic point of view, it is fundamental to study the physical and chemical changes occurring in the tissues and cells due to diseases and disorders. In the present study, FTIR-ATR spectra of the pre and post treatment of the hypothyroid and hyperthyroid disorder patients along with the healthy subjects are represented to find the efficacy of the drug thyronil. The FTIR-ATR spectral analysis revealed the differences in some major metabolic components in blood viz., LDL, total cholesterol and triglycerides that clearly demarcated between control and thyroid disordered patients. Measurements were recorded on 150 blood samples belonging to 50 hypothyroid, 50 hyperthyroid and 50 healthy subjects. Spectral recordings were taken before treatment, 60 days after treatment, 90 days after treatment and compared with the healthy spectra. Hypothyroid patients are found with elevated TG levels associated with increased levels of LDL. Hypothyroid patients may also exhibit elevated levels of HDL mainly due to increased concentration of HDL particles. Hypothyroid patients spectra show a remarkable increase from the control persons in LDL, total cholesterol, triglycerides and the biomarkers decrease towards the healthy spectrum during the ayurvedic drug therapy whereas spectra of hyperthyroid patients show a remarkable decrease in values of LDL, total cholesterol and triglycerides and increase towards the healthy ones during the course of treatment. The efficacy of the ayurvedic drug is validated by calculating the values of the biomarkers that brings the difference in the values of the disorder and are calculated using the internal ratio parameters viz triglycerides/ glucose [$R_1 (I_{3060}/I_{1080})$], total cholesterol/ glucose [$R_2 (I_{2933}/I_{1080})$] and LDL/ glucose [$R_3 (I_{1460}/I_{1080})$]. These parameters could be used as a basis for deriving a spectral method for analyzing thyroid disordered blood samples. It is shown that Fourier Transform Infrared - Attenuated Total Reflectance spectroscopy (FTIR-ATR) could be a possible technique for the analysis of efficacy of the ayurvedic drug thyronil using blood in thyroid disorder patients.

Keywords : FTIR-ATR, hypothyroid, hyperthyroid, pregnancy, Ayurvedic drug thyronil, efficacy.