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Effect of Naturopathic Fasting Therapy on Serum Lipid Profile and Haematological Indices in Healthy Individuals.

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ABSTRACT

Naturopathic fasting therapy (NFT), a low calorie diet was described as a safe, harmless and effective method for reducing the body weight and thereby it may have beneficial effects on lipid profile. The present study aims at observing the changes induced by NFT on haematological indices and serum lipid profile in healthy individuals. A total of 30 college students of age group 18-24 years were selected for the study for a single group pre-post trial. The subjects were evaluated for lipid profile by using Autoanalyser -ErbaChem 5X and haematological indices was assessed by using Sysmex xt-1800i automated hematology analyzer on Day 1 (baseline) and Day 10 (post). The intervention included the NFT where the subjects were provided with normal vegetarian diet on the first day, lemon- honey juice and mixed fruit diet on second day, lemon honey juice on the third to ninth days and, lemon honey juice and mixed fruit diet on the tenth day. Data was verified for normal distribution and analyzed by using paired sample 't' test with SPSS (Version 20.0) package. The results have shown decrease in the total serum cholesterol and triglycerides and Hemoglobin, PCV, RBC Count and MCHC were increased significantly compared to the baseline values after the NFT. The present study concludes that NFT can be implemented as a treatment regimen for treating subjects with altered lipid status and also shown positive changes in the haematological indices.

Keywords: Naturopathic fasting therapy, Haematological indices, Lipid profile

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INTRODUCTION

Naturopathy is a system of man, building in harmony with the constructive principles of nature on physical, mental, moral and spiritual planes of being [1] and consists of non-invasive treatment modalities like diet therapy, fasting therapy and physical exercises [2]. Fasting is defined as abstinence from all food and drink except water for a specific period of time, usually for a therapeutic or religious purpose. Since early times, fasting has been advocated for spiritual development and promotion of health. Fasting as a religious practice developed independently among different people and religions worldwide [3]. The therapeutic application of fasting could be practised as dry fast, water fast and juice fasts [4]. The safest and most effective method of fasting is a lime juice and honey fast. The body eliminates the accumulated wastes during fasting. This cleansing process is accelerated by drinking alkaline juices prepared from fresh fruits or vegetables [5].

Naturopathic fasting is a mode of caloric restriction (CR) and a very robust intervention that produces a number of associated health benefits and ameliorates diseases with aging [6]. CR has been demonstrated to improve health and increase longevity in a diverse group of species [7]. Additionally, CR appears to delay the onset of the following diseases: autoimmune diseases, atherosclerosis, cardiomyopathies, cancer, diabetes, renal diseases, neurodegenerative diseases, and respiratory diseases [8].

Altered lipid status, dyslipidemia is a major risk factor for development of coronary heart and cerebrovascular diseases [9]. High levels of LDL cholesterol lead to atherosclerosis increasing the risk of heart attack and ischemic stroke. HDL cholesterol reduces the risk of cardiovascular disease as it carries cholesterol away from the blood stream [10]. Also it was seen that there is improvement in blood lipid levels with reduction in weight [11]. Though naturopathic fasting therapy (NFT) is known to cause weight reduction in humans [4], conflicting data have been published concerning the effect of fasting on serum lipid profile. The contradictory reports may be explained by sex and/or age differences, presence of obesity, hyperlipidemia, different health states, medications, and different diets (partial or total starvation) and physical activity during fasting [12]. So, this study was designed to investigate changes in serum levels of lipid components following NFT.

There are only a few studies done to assess the haematological indices during fasting. A study on Islamic fasting in Ramadan has shown slightly increased hematocrit (Hct) on 15th and 28th of fasting but it is not matched with the changes in hemoglobin (Hb) level [13]. Another study done on Ramadan fasting has shown slight increase in Hb and Hct but did not exceed the normal limits [14]. In a study by Sattarivand *et al*, changes of haematological parameters were in normal ranges and a decrease in Hb was observed [15]. Another study by Azizi and Rasouli has shown normal blood cell count and Hct during Ramadan fasting [16]. Studies on Islamic fasting in Ramadan have shown different findings in haematological indices. So, this study was also designed to assess the changes in haematological indices following naturopathic fasting therapy.

METHODOLOGY

A total of 30 healthy volunteers of both genders of age group 18-24 years (group mean age \pm SD; 20 \pm 0.8 years) were selected for a single group pre-post trial from a residential college in south India. Students who have had a history of anxiety or depression or any other psychiatric problem or were under any psychiatric or who have indulged in substance of abuse were excluded from the study. Also, students who have a history of kidney disease were excluded. Subjects were explained in detail about the procedures involved in assessments as well as intervention. A signed informed consent was taken from each subject. The project was approved by the Institutional Ethics Committee.

Design

Pre – Post interventional study: The study was designed to assess the effect of NFT on haematological indices and serum lipid profile in healthy volunteers. Subjects were measured on Day-1 and Day-10 by collecting a blood sample at 8am in the morning.

Assessments

The subjects were assessed for the serum lipid profile and haematological indices. Blood samples were taken from the antecubital vein following an overnight 12-hour fast.

Serum lipid profile: The following parameters were analyzed with each serum sample. (i) Total Cholesterol (ii) Triglycerides (iii) HDL-C (iv) LDL-C and (v) VLDL-C. These were measured using ERBA Lipid Profile Reagents from Transasia bio-medicals and Autoanalyser -ErbaChem 5X.

Haematological Indices: Subjects were assessed for haematological indices viz., Hb, WBC (TC & DC), Platelet count, RBC count, PCV, MCV, MCH, and MCHC by Sysmex xt-1800i automated haematology analyzer.

Intervention

The intervention includes the naturopathic fasting therapy where the subjects were provided with normal vegetarian diet on the first day, lemon honey juice and mixed fruit diet on second day, lemon honey juice from the third to ninth days and, lemon honey juice and mixed fruit diet on tenth day. The quantity of lemon honey juice provided was 250 ml. Following is the diet schedule followed for the Naturopathic fasting therapy. Details of diet followed in the Naturopathic fasting therapy are given in Table-1.

Table 1: Diet given in the 10 days Naturopathic fasting therapy

Day	Break Fast	Lunch	Evening Snack	Dinner
Day-1	Normal boiled diet			
Day-2	Lemon honey juice	Mixed Fruit diet	Lemon honey juice	Mixed Fruit diet
Day-3 To 9	Lemon honey juice	Lemon honey juice	Lemon honey juice	Lemon honey juice
Day-10	Lemon honey juice	Mixed Fruit diet	Lemon honey juice	Mixed Fruit diet

Note: Servings= Lemon honey juice (250 ml/time); Fruit diet containing Water melon, Pineapple & Papaya (300 grams/time); Normal boiled diet (200 grams of rice with 100 grams of boiled vegetables)

Data analysis

Data were analyzed using IBM SPSS 20. The data was checked for normality and then a paired samples t-test was performed to investigate statistically significant difference within the group. For all the analysis, we considered 95% confidence intervals and $p < 0.05$ as significant.

RESULTS

Table-2 showed the results of Baseline and post test values of Serum Lipid Profile. The results have shown statistically significant changes in HDL-Cholesterol ($P=0.001$), LDL-Cholesterol ($P=0.001$) after the naturopathic fasting therapy. Though there is a decrease in the total serum cholesterol and triglycerides compared to the baseline, it is not statistically significant. Table-3 showed the results of Baseline and post test value of haematological Indices. Hemoglobin concentration was increased significantly compared to the baseline values after the NFT. A significant increase in the values of PCV, RBC and MCHC was also observed. WBC total count was significantly decreased. Percentage of Neutrophils significantly decreased and lymphocytes increased.

Table 2: Baseline and post-test values of Serum Lipid Profile

SI.NO	Variables (mg/dL)	Baseline	Post-Test	P Value
1	TC	180.89±36.40	164.60±30.34	0.062
2	TG	125.97±49.26	104.80±40.98	0.254
3	HDL-C	36.06±07.27	32.34±06.64	0.001**
4	LDL-C	118.09±29.78	111.57±28.94	0.001**

Note: all the values are in mean ± standard deviation. * $p < 0.05$, ** $p < 0.01$. TC= Total Cholesterol; TG= Triglycerides; HDL-C= High Density Cholesterol; LDL-C= Low density Cholesterol

Table 3: Baseline and post-test value of Haematological Indices

SL.No	Variables	Baseline	Post-Test	P Value
1	Haemoglobin(g/dL)	13.33±1.92	14.33±1.90	0.001**
2	WBC (cells/cu mm)	6713.33±1125.48	5703.33±1020.31	0.001**
4	Neutrophils (%)	54.40±5.49	49.88±6.59	0.001**
5	Lymphocytes (%)	37.03±5.68	41.87±7.13	0.001**
6	Mixed cell (%)	8.57±1.68	8.27±1.93	0.38
7	Platelets (lakh cells/cu mm)	3.14±0.58	3.15± 0.72	0.97
8	Packed Cell Volume (%)	30.04±6.95	31.75±4.50	0.05*
9	RBC (million cells/cu mm)	4.29±0.51	4.53±0.51	0.00**
10	MCV (cu μ)	72.03±8.03	70.66±7.57	0.06
11	MCH (pg)	40.37±50.66	31.82±3.15	0.36
12	MCHC (%)	43.37±2.25	45.05±1.46	0.00**

Note: all the values are in mean ± standard deviation. *p= 0.05, ** p<0.01. WBC= White blood cell; Mixed cell= includes eosinophils, monocytes & basophils, MCV= Mean Corpuscular Volume; MCH= Mean Corpuscular Haemoglobin; MCHC= Mean Corpuscular Haemoglobin Concentration.

DISCUSSION

Unhealthy lifestyle characterized by improper dietary habits as well as lack of regular exercise is an underlying cause of metabolic disorders including obesity, dyslipidaemia, diabetes, and hypertension [17]. In contrast, maintaining a balanced diet of moderate energy intake, and a regular exercise not only decreases body weight, but also plays an important role in the prevention and management of obesity and sequelae [18]. In this context, the NFT, a mode of dietary restriction may provide an interesting opportunity to reduce food intake and maintaining good health.

The results of the present study demonstrate that there is reduction in the total serum cholesterol level followed by naturopathic fasting therapy. This may be attributed to the diet followed in the present study, citrus juices which are rich in flavonoids and vitamin C. As shown by a study, where cholesterol-fed rats supplemented with mixtures of principal citrus flavonoids, the serum cholesterol level was decreased and *in vitro* activities of hydroxyl methyl glutaryl-CoA reductase and sterol *O*-acyltransferase were inhibited which are the two key enzymes in cholesterol metabolism [19]. One more reason which can be speculated is that, Vitamin C is necessary for the modulation of microsomal 7- α -hydroxylation for the transformation of cholesterol into bile acids in liver. This reaction becomes slowed down during Vitamin C deficiency and thus resulting in accumulation of cholesterol [20]. In naturopathic fasting therapy supply of Vitamin C in the form of Lemon honey juice could be the contributing factor for the reduction in the cholesterol level. The results of the study demonstrate that naturopathic fasting therapy may be useful to maintain the total serum cholesterol level and thereby to prevent the development of hypercholesterolemia. The results of the present study shows slight decline in the serum triglycerides though not significantly. But earlier studies with fasting have shown conflicting data. A study by Vaisman *et al* showed that 6 days of subtotal starvation (837 kJ/d) did not affect serum triacylglycerol [21]. Perk *et al* showed a slight reduction in the serum triglycerides at the end of Ramadan fasting [22]. Previous study on fasting has shown decrease in plasma insulin concentration and which enhances lipolysis by the removal of inhibition of hormone sensitive lipase activity [23]. Another study has described the Vitamin C as an essential factor for the biosynthesis of carnitine which is useful for the subsequent fat oxidation by shuttling long chain fatty acids across the mitochondrial membrane, which may help to reduce the serum triglyceride level [24].

In the present study LDL-Cholesterol and HDL-Cholesterol are reduced significantly. Similar results are also shown by another study made during Christian fasting [25]. As increase in HDL-Cholesterol is associated with decreased risk of atherosclerosis and other heart associated diseases, future studies should possibly consider extending the duration of the fast, as well as modifying food choices in an effort to maintain or improve HDL-C levels.

Results of the present study indicate a significant increase in Hemoglobin, RBC count and MCHC levels. Most of the earlier studies attribute the increase in hemoglobin and MCHC to dehydration during

fasting [7, 13]. But in the present study subjects were allowed to drink sufficient quantity of water, so there may be some other underlying mechanism for increase in haemoglobin concentration. One of the earlier studies showed intakes of honey in the diet, increases antioxidant status, Vitamin C, serum iron and Hb levels [20]. Despite the impressive results of naturopathic fasting therapy found in this study, cautious interpretation of study findings is warranted because of some limitations, such as experimental design was without a control condition, and so it is not known whether the observed beneficial effect is sustained beyond the study period.

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