ORIGINAL ARTICLE

Effect of Raja Yoga Meditation on the Lipid Profile of Healthy Adults in Central India

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ABSTRACT

Objective: The aim was to observe the effect of Raja yoga meditation on serum lipid profile and fasting blood sugar (FBS) levels in healthy adults.

Material and Methods: The case-control study included total 100 participants of either sex, in the age 25-45 years. The participants were divided into two groups-meditators (50) doing Raja-yoga meditation for more than 5 years and non-meditators (50), who were age, height and weight, matched and served as controls. Serum total cholesterol (TC), triglycerides (TG), high-density lipoproteins (HDL), low-density lipoprotein (LDL), very LDL (VLDL) and FBS levels were estimated by kit method. The mean values for each parameter were compared using students-t test.

Results: Values for TC (134.34 ± 17.77 vs. 146.34 ± 30.83 mg/dl) and TG (101.6 ± 26.92 vs. 122.62 ± 43.82 mg/dl) were significantly less in meditators than non-meditators. HDL was (45.6 ± 7.03 vs. 41.86 ± 7.63 mg/dl) was significantly more in meditators. LDL (81.34 ± 16.71 vs. 86.4 ± 14.29 mg/dl) and VLDL (24.12 ± 10.53 vs. 27.48 ± 8.04 mg/dl) values were lower in meditators though were not statistically significant. The FBS level was lower in meditators (73.12 ± 12.43 vs. 76.52 ± 6.30 mg/dl).

Conclusion: Meditators, who were practicing Raja-yoga meditation for more than 5 years, showed lower levels of TC, TG, LDL, VLDL and FBS and higher level of HDL than non-meditators.

KEY WORDS: Lipid profile, meditation, Raja yoga

Introduction

Chronic stress can contribute to various physiological or psychological dysfunctions including high blood pressure, cardiovascular diseases (CVD), reduced immune function, thyroid disorders, alcoholism, diabetes, anorexia nervosa as well as depression and increased suicide attempts.[1] Among these, the CVD is significantly prevalent. The total number of annual deaths due to CVD is more than 17 million, approximately 29% of all deaths. Developing nations with high disability limited life years rates suffer more lost years of healthy life due to premature death from CVD (60-70%) whereas developed nations lose more years of healthy life due to disability from CVD (50-60%).[2]

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Stress, lifestyle changes and dyslipidemia are modifiable risk factors. Behavioral methods are recommended by the national cholesterol education program as the first line of prevention and treatment for hypercholesterolemia and other risk factors.[3] In recent years, there has been significant uptake of meditation and related relaxation techniques, as a means of alleviating stress and maintaining good health. Raja yoga meditation is a behavioral intervention which is practiced in India and all over the world. It appears to be the easy, practicable method of meditation, which one can follow on the day to day basis.[4] Some studies done on Raja-yoga meditators have shown increased parasympathetic activity in meditators and improvement in the lipid profile of meditators than non-meditators.[5-7] However, we have not come across any study done on the lipid profile of Raja-yoga meditators in central India. Therefore, we planned this study to find out the effect of Raja-yoga meditation on the lipid profile and fasting blood sugar (FBS) level of healthy volunteers of central India who were practicing it for 5 and more years for at least 1 h daily.

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Material and Methods

The cross-sectional study was conducted on 100 volunteers of either sex, between the ages 25 and 45 years. Sample size was calculated using the formula for the difference of mean, power of the study was 80%, α error 1.96 and significance level was set at 0.05. The study was approved by the Institutional ethics committee. Study group contained 50 meditators who were practicing Raja yoga meditation every morning (7.30-8.30) for more than 5 years, at the local Bramhakumari center situated in Mahal, Nagpur. The Raja yoga meditation is practiced in comfortable sitting posture with eyes open and gaze fixed on a meaningful symbol (light). At the same time, they were actively thinking positive thoughts about a universal force pervading all over as light and peace.[4] The non-meditators who were also 50 in number were selected randomly from the non-teaching staff of the Indira Gandhi Government Medical College, Nagpur, who had never done any kind of meditation. Both the meditators as well as non-meditators were having similar dietary habits and working conditions. Persons who were smokers, alcoholics, or suffering from any respiratory disease, hypertension, congenital or ischemic heart disease, chronic renal failure, diabetes, liver disease, persons taking medicines likely to alter the lipid profile, pregnant ladies, and persons doing any other exercise were excluded from the study.

The objectives of the study were explained to the participants, and their written informed consent was obtained. Equal numbers of male and female participants were included in each group. Anthropometric parameters like height and weight were measured, and body mass index (BMI) was calculated. The participants were called at 8 am after an overnight fast. Under all strict aseptic precautions, about 5 ml fasting blood sample was taken from each participant of both the groups with the help of disposable syringe and needle by venepuncture. Blood was collected in a plain bulb for lipid profile and fluoride bulb for FBS level. All the laboratory determinants were carried out in the Biochemistry Department of our Institute. The blood sample from plain bulb was centrifuged to separate serum for estimation of lipid profile. Serum total cholesterol (TC), triglycerides (TG), high-density lipoprotein cholesterol (HDL-C) were estimated by kits provided by Accurex Biomedical Pvt. Ltd; Thane, India.[8] Low-density lipoprotein cholesterol (LDL-C) and very LDL-C (VLDL-C) were measured using the indirect method - The Friedewald equation.[9] FBS level was quantitatively estimated in the laboratory of biochemistry with the help of semiauto analyzer Tranasia Erba chem - 5-plus.

Statistical methods

The data were analyzed to obtain the arithmetic mean for age, height, weight, TC, TG, HDL-C, LDL-C, VLDL-C and FBS. Difference in the mean values was subjected to Student's *t*-test. Significance level was set as $P < 0.05$: Significant, $P < 0.01$: Highly significant, $P < 0.001$: Very highly significant.

Results

Meditators and non-meditators did not show statistically significant difference in the mean values of physical characteristics such as age, height, weight and BMI as shown in Table 1. TC ($P < 0.05$), TG levels ($P < 0.01$) were significantly low in meditators than in non-meditators. The HDL-C ($P < 0.05$) was significantly high in meditators than in non-meditators. There was no statistically significant difference in the mean values of LDL-C and VLDL-C in the two groups ($P > 0.05$) though the values were lower in meditators than non-meditators as shown in Table 2. The lipid profile of both the groups in our study was in a normal reference range provided by our biochemistry lab. FBS level was lower in meditators than non-meditators though the value was not statistically significant ($P > 0.05$) as shown in Table 3.

Discussion

The values of lipid profile in our study were comparable with studies by other researchers.[6,7,10-13] Vyas and Dikshit compared the lipid profile of short (6 months-5 years) and long-term (>5 years) Raja-yoga meditators with non-meditators and found a significant reduction in serum cholesterol of both the groups than non-meditators.[6] In another study,

Table 1: Physical characteristics of non-meditators and meditators

Parameters	Mean±SD ((*n*=50))		*Z* value	*P* value
	Non-meditators	Meditators		
Age (years)	35.82±5.21	37.42±5.58	1.48	>0.05
Ht (m)	1.57±0.06	1.55±0.06	0.67	>0.05
Wt (kg)	56.34±9.12	55.44±8.64	0.10	>0.05
BMI (kg/m²)	22.98±3.66	22.07±2.36	0.38	>0.05

P>0.05 non-significant, Ht: Height, Wt: Weight, BMI: Body mass index, SD: Standard deviation

Table 2: Comparison of lipid profile in non-meditators and meditators

Parameters (mg/dl)	Mean±SD (*n*=50)		*Z* value	*P* value
	Non-meditators	Meditators		
TC	146.34±30.83	134.34±7.77	2.38	<0.05
TG	122.62±43.82	101.6±26.92	2.89	<0.01
HDL-C	41.86±7.63	45.6±7.03	2.55	<0.05
LDL-C	86.4±14.29	85.34±16.71	0.34	>0.05
VLDL-C	27.48±8.04	24.12±10.53	1.79	>0.05

P<0.01 highly significant, *P*<0.05 significant, *P*>0.05 non-significant, TC: Total cholesterol, TG: Triglycerides, HDL-C: High density lipoprotein cholesterol, LDL-C: Low density lipoprotein cholesterol, VLDL-C: Very low density lipoprotein cholesterol, SD: Standard deviation

Table 3: Comparison of FBS of non-meditators and meditators

Parameters	Mean±SD (*n*=50)		*Z* value	*P* value
	Non-meditators	Meditators		
FBS (mg/dl)	76.52±6.30	73.12±12.43	1.73	>0.05

P>0.05 non-significant, FBS: Fasting blood sugar, SD: Standard deviation

she studied the effect of Raja-yoga meditation on the lipid profile of postmenopausal women and found decrease TC and LDL in both short and long term meditators when compared to non-meditators.[7] Our study included only long-term meditators, and the results were compared with the non-meditators. A study was done to find out the effect of pranayama and yoga on lipid profile of normal healthy volunteers found increased HDL-C in men with pranayama while TG and LDL-C were decreased in women after yoga asanas.[11] Another study showed a decrease in TC, LDL-C and increased in HDL-C after 8 days Sudarshan Kriya yoga workshop.[12] These studies were longitudinal, and ours was a cross-sectional.

Almost any type of stress causes an immediate and marked increase in ACTH secretion by the anterior pituitary gland, followed within minutes by greatly increased adrenocortical secretion of cortisol. Cortisol promotes mobilization of fatty acids from adipose tissue. This increases the concentration of free fatty acids in the plasma. Cortisol also seems to have a direct effect to enhance the oxidation of fatty acids in the cell. The mechanism, by which cortisol promotes fatty acid mobilization, is not completely understood. However, part of the effect probably results from diminished transport of glucose into the fat cells. Alpha glycerophosphate derived from glucose is required for both deposition and maintenance of TG in these cells and in its absence fat cells begin to release fatty acids.[14] Kamei *et al*.[15] examined changes in brain waves and blood levels of serum cortisol during yoga exercise in seven yoga instructors and found that alpha power increased, and serum cortisol decreased. They stated that there was an inverse correlation between the alpha power and the cortisol levels in yogis. The decreased stress hormone level (cortisol) may support the biological mechanism of meditation in improving the lipid profile of meditators.

All nucleated cells synthesize cholesterol, but only hepatocytes can efficiently metabolize and excrete cholesterol from the body. The predominant route of cholesterol elimination is by excretion into the bile, either directly or after conversion to bile acids. Cholesterol in peripheral cells is transported from the plasma membranes of peripheral cells to the liver by an HDL-mediated process termed reverse cholesterol transport.[16] Thus, HDL plays an important role in lowering the cholesterol level in the blood and exerts its cardio-protective effect. The significantly increased HDL level in meditators than non-meditators in our study probably protect from the development of CVD.

Meditation via its action on the hypothalamus decreases the stress which causes a decrease in the secretion of corticotropin-releasing factor, ACTH and consequently the stress hormone cortisol.[17,18] Decreased cortisol causes decrease fat mobilization and decreased gluconeogenesis. This may be the probable mechanism in improving the lipid profile and FBS levels of meditators than non-meditators.

The lipid profile of both the groups in our study was in a normal reference range though the values of TG, TC and HDL-C were significantly less in meditators. Maintaining low cholesterol content is one of the important measures to protect against the development of atherosclerosis and its progression to serious vascular disease. Studies have shown that for each 1 mg/dl decrease in LDL-C in the plasma, there is about 2% decrease in mortality from atherosclerotic heart disease.[19]

Cortisol released in response to stress potentiates glucose stimulus for insulin secretion. Prolonged secretion of cortisol in large quantities can occasionally lead to exhaustion of beta cells of

islets of Langerhans and thereby increase the risk of developing diabetes mellitus.[20] Considering the possibility of Raja yoga meditation in alleviating the stress levels and thereby the blood glucose level in response to stress by above mechanism, we estimated fasting blood glucose levels and compared in both the groups. All the study participants showed the FBS values in the normal range (80-90 mg/dl).[20]

But there was no significant difference in the mean value of FBS level of meditators and non-meditators. Similar findings were also obtained by Sivasankaran *et al*.[10] Another study reported improvement in the FBS level which was statistically significant to the extent $P < 0.001$, but this study involved hath yoga as an intervention and was done in Type 2 diabetic patients in the longitudinal set up.[21]

Our study shows that the lipid profile of meditators who were practicing Raja Yoga meditation for minimum 5 years for at least 1 h daily is better than the non-meditators. The significantly increased HDL level in meditators than non-meditators in our study can protect the individual from the development of CVD. Raja yoga meditation can be looked upon an effective means for minimizing the development of CVD and maintaining good health. However, there are few limitations to our study. The study was carried out on the small group to see the effect of Raja yoga in a cross-sectional way. The longitudinal study should be carried out which should periodically assess the parameters of lipid profile.

References

1. Moraska A, Pollini RA, Boulanger K, Brooks MZ, Teitlebaum L. Physiological adjustments to stress measures following massage therapy: A review of the literature. Evid Based Complement Alternat Med 2010;7:409-18.
2. Global epidemiology of cardiovascular diseases. Available from:http://www.samples.jbpub.com/9781449653286/Chapter2pdf. [Last cited on 2012 Sep 15].
3. Calderon R Jr, Schneider RH, Alexander CN, Myers HF, Nidich SI, Haney C. Stress, stress reduction and hypercholesterolemia in African Americans: A review. Ethn Dis 1999;9:451-62.
4. Easy Raj Yoga. Bombay: Prajapita Bramhakumaris, Ishwariya Vishwa Vidyalaya; 1981. p. 82-5.
5. Telles S, Desiraju T. Autonomic changes in Brahmakumaris Raja yoga meditation. Int J Psychophysiol 1993;15:147-52.
6. Vyas R, Dikshit N. Effect of meditation on respiratory system, cardiovascular system and lipid profile. Indian J Physiol Pharmacol 2002;46:487-91.
7. Vyas R, Raval KV, Dikshit N. Effect of Raja yoga meditation on the lipid profile of post-menopausal women. Indian J Physiol Pharmacol 2008;52:420-4.
8. Henry JB. Clinical diagnosis and management by laboratory methods. In: Clinical Chemistry. 18th ed. Philadelphia: WB Saunders; 1991. p. 204-11.
9. Warnick GR, Knopp RH, Fitzpatrick V, Branson L. Estimating low-density lipoprotein cholesterol by the Friedewald equation is adequate for classifying patients on the basis of nationally recommended cutpoints. Clin Chem 1990;36:15-9.
10. Sivasankaran S, Pollard-Quintner S, Sachdeva R, Pugeda J, Hoq SM, Zarich SW. The effect of a six-week program of yoga and meditation on brachial artery reactivity: Do psychosocial interventions affect vascular tone? Clin Cardiol 2006;29:393-8.
11. Prasad KV, Sunita M, Raju PS, Reddy MV, Sahay BK, Murthy KJ. Impact of pranayama and yoga on lipid profile in normal healthy volunteers. J Exerc Physiol Online 2006;9:1-6.
12. Sayyed A, Patil J, Chavan V, Patil S, Charugulla S, Sontakke A, *et al*. Study of lipid profile and pulmonary functions in subjects participated in Sudarshan Kriya Yoga. Al Ameen J Med Sci 2010;3:42-9.
13. Vedamurthachar A, Bijoor AR, Agte V, Reddy S, Lakshmi B. Short term effect of Sudarshan Kriya Yoga on lipid and hormone profile of type 2 diabetic patients. Res J Chem Sci 2011;1:83-6.
14. Guyton AC, Hall JE. Adrenocortical hormones. In: Textbook of Medical Physiology. 11th ed. Philadelphia: Saunders; 2011. p. 954-5.
15. Kamei T, Toriumi Y, Kimura H, Ohno S, Kumano H, Kimura K. Decrease in serum cortisol during yoga exercise is correlated with alpha wave activation. Percept Mot Skills 2000;90:1027-32.
16. Kasper DL, Braunwald E, Fauci AS, Hauser SL, Longo DL, Jameson JL. Disorders of lipoprotein metabolism. In: Rader DJ, Hobbs HH, editors. Harrisons-Principles of Internal Medicine. 16th ed., Vol. 2. New York: McGraw Hill. 2005. p. 2288.
17. Walton KG, Pugh ND, Gelderloos P, Macrae P. Stress reduction and preventing hypertension: Preliminary support for a psychoneuroendocrine mechanism. J Altern Complement Med 1995;1:263-83.
18. MacLean CR, Walton KG, Wenneberg SR, Levitsky DK, Mandarino JV, Waziri R, *et al*. Altered responses of cortisol, GH, TSH and testosterone to acute stress after four months' practice of transcendental meditation (TM). Ann N Y Acad Sci 1994;746:381-4.
19. Guyton AC, Hall JE. Lipid metabolism. In: Textbook of Medical Physiology. 11th ed. Philadelphia: Saunders; 2011. p. 850-1.
20. Guyton AC, Hall JE. Insulin, glucagon and diabetes mellitus. In: Textbook of Medical Physiology. 11th ed. Philadelphia: Saunders; 2011. p. 968-73.
21. Gordon LA, Morrison EY, McGrowder DA, Young R, Fraser YT, Zamora EM, *et al*. Effect of exercise therapy on lipid profile and oxidative stress indicators in patients with type 2 diabetes. BMC Complement Altern Med 2008;8:21.

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