



## RESIDENTIAL YOGA AND DIET ON LIPID PROFILE IN POLICE OFFICERS

Shete Sanjay Uddhav\*, Thakur Ghanshyam Singh, Kulkarni Dattatraya Devarao

Research Assistant, Scientific Research Department, Kaivalyadhama, S.M.Y.M. Samiti, Lonavla, Dist. Pune, Maharashtra, India

Article Received on: 15/07/12 Revised on: 18/08/12 Approved for publication: 07/09/12

\*E-mail : shete.sanjay@gmail.com

**ABSTRACT**

This study was conducted with a view to observe the short term effect of residential yoga and diet program on lipid profile in police officers. The attributes of lipid profiles were measured at the beginning, middle (end of first week) and end of yoga intervention (end of second week) using pre-post single group design. The study was of two weeks conducted at Kaivalyadhama, Lonavla. The first week was self controlled period, whereas the second week was the experimental period. The participants were police officers recruited by Government of Maharashtra, who attended the yoga program. The intervention consisted of asana, pranayama, meditation, kriya and yogic diet. The outcome measures were lipoprotein profile and were determined in fasting blood samples, taken on day first, middle (end of first week) and last day of the camp. The results revealed that Cholesterol, triglycerides, HDL and very low density lipoprotein were significantly lower at the end of the camp. No significant difference was observed in case of low density lipoprotein (LDL) and cardiovascular risk ratio. The results suggest that short term yoga and diet modification program leads to improvement in lipoprotein profile.

**Key words:** Yoga, Lipid profile, Police

**INTRODUCTION**

Police force provides continuous service to the civilians. They have to serve round the clock for proper investigation, safety and justice. This job of Police tends to be stressful due to long working hours, irregular eating habits, sleepless nights, shift of duties and disturbed personnel life. In fact, Police work had been regarded by some researchers as one of the stressful occupation in the world<sup>1</sup> which leads to various stress related disorders like hypertension, diabetes and coronary heart disease.<sup>2-7</sup> Previous studies indicate that stressful situations in Police officers work affect their health and performance<sup>8-11</sup> and it is evident that stress leads to various psychosomatic disorders.<sup>12</sup> Furthermore, to alleviate the stress the policemen are inclined to the unhealthy habits like drinking liquor or chewing tobacco etc. This in turn lead them to suffer from many health hazards<sup>13</sup> including cardiovascular disease, headaches, and high blood pressure. It has been found that police officers have an increased prevalence of cardiovascular risk factors than the general population.<sup>14</sup> A twenty two year follow-up study on Helsinki policemen found coronary heart disease as a major cause of mortality among policemen.<sup>15</sup> A study on 213 male police officers aged 21 to 52 years conducted at Dallas and Richardson showed that younger police officers were average in physical fitness levels and coronary heart disease risk compared to the population of the same age. Further, middle aged police officers were shown to be lower in physical fitness levels and higher in coronary heart disease risk compared to their cohorts.<sup>16</sup> These investigations reveal the need for physical fitness and preventive programmes for police officers.

Among the various approaches to prevent and manage the coronary heart diseases physical activity conveys multiple well established health benefits.<sup>17-19</sup> In this context yoga is an alternative form of physical activity and may be attractive as an alternative to aerobic and strength training programs because it requires little space, virtually no equipment and has no side effects.<sup>20-23</sup> The efficacy of yoga intervention has been widely reported in cardiovascular diseases<sup>24-30</sup>. The previous studies reported outcomes of yoga intervention for 4 weeks or more on civil population. The present study, in fact,

evaluates the short term effect of yoga intervention on serum lipid profile which is an indicator of cardiovascular health in police officers.

**MATERIALS AND METHODS****Subjects**

Twenty four (n=24) male police officers, age ranged from 30-42 yrs, were deputed by the government of Maharashtra for a residential yoga camp organized by Kaivalyadhama Yoga Research Institute at Lonavla (India). Informed consent was obtained from all the participated Police officers with no yoga practice background. The subjects were examined by medical officer of Kaivalyadhama, Lonavla and those who are having known ailments or on medication were excluded from this study.

**Design and setting:**

The trial considered a single group design, where the participants were assessed for determination of lipid profiles on the first day (day 1) for the baseline values, on the day seven (Day 7) to assess any change in the blank or self controlled period, and on the day fourteen (day 14) to record the effects of yoga, if any.

**Measurements:**

Blood samples were drawn from the antecubital vein using a tourniquet after an overnight fasting. Serum samples were separated from whole blood by using Vacutainer blood-collection tubes (Becton Dickinson) by centrifugation at 1,000 g for 10 min after the blood was allowed to clot at room temperature for 30 min. Total cholesterol, Triglycerides and high density lipoprotein (HDL) were determined by the enzymatic method while low density lipoprotein (LDL) and very low density lipoprotein were determined by using Friedwald's equation.<sup>31</sup> The enzymatic assessment was done by using biochemical assay kits prescribed for the analyzer Statfax-2000 (Awareness technology, USA). The ratio of cholesterol/HDL was calculated mathematically from the measurements obtained.

**Intervention**

The residential yoga camp consisted of yoga module and yogic diet which is based on yoga texts.<sup>32</sup> Since day 1 to Day 7 was the blank period (self control period), the actual yoga practices started on day 7 to day 14. The yoga practices were

imparted in two sessions in each day (i.e., from day 7 to day 14). The morning session was between 06:00 hours and 08:00 hours while the evening session was between 16:00 hours and 18:00 hours respectively. Every day from 10:00 hrs to 12 hrs, the participants were oriented a series of theory lectures regarding health benefits of yoga. The yoga module includes asana, pranayama, meditation and kriya. The supine position asanas were arduhashalabhasana (One leg locust pose), halasana (Plough pose), viparita karani (Inverted pose), matsyasana (Fish pose), naukasana (Boat pose), setubandhasana (Bridge pose), sarvangasana (Inverted pose). The prone position asanas included were bhujangasana (Cobra pose), shalabhasana (Locust pose), dhanurasana (Bow pose). The sitting position asanas were vakrasana (Twisted pose), paschimatanasana (Seated forward bend pose), ushtrasana (Camel pose) while standing position asanas were tadasana (Mountain pose), chakrasana (Wheel pose), padahasthasana (Hand to foot pose), vrikshasana (Tree pose). The module for this experiment also includes pranayama (anulom vilom and bhramari), and kriyas (kapalabhati, vamaana dhauti and jalaneti), whereas each session was concluded with Om chanting and meditation.

### Statistical analysis

The levels of the variables recorded on day 1, Day 7 and Day 14 were compared by applying student's t- test for paired observations.

### RESULTS

The result of self control period (i.e., day 1 to Day 7) revealed no significant change in total cholesterol ( $t= 1.04$ ,  $p>0.05$ ), triglycerides ( $t= 0.98$ ,  $p>0.05$ ), high density lipoprotein ( $t= 1.12$ ,  $p>0.05$ ), low density lipoprotein ( $t= 0.67$ ,  $p>0.05$ ), very low density lipoprotein ( $t= 0.48$ ,  $p>0.05$ ) and cardiovascular risk ratio ( $t= 0.32$ ,  $p>0.05$ ).

However, the result of yoga training (i.e., day 7 to day 14) and diet indicates a statistically significant decrease in total cholesterol ( $t= 2.09$ ,  $p<0.05$ ), triglycerides ( $t= 2.07$ ,  $p<0.05$ ), high density lipoprotein ( $t= 2.10$ ,  $p<0.05$ ), and very low density lipoprotein ( $t= 2.07$ ,  $p<0.05$ ), whereas no significant change was evident in case of low density lipoprotein ( $t= 0.86$ ,  $p>0.05$ ) and cardiovascular risk ratio ( $t= 0.73$ ,  $p>0.05$ ). The values of groups mean, SD and t are presented in Table 1.

**Table 1** Variables recorded at the beginning (Initial), end of day 7 and end of day 14 (Final) of the yoga program (Mean  $\pm$  SD)

Variable	Initial (Day 1)	Middle (Day 7)	Final (Day 14)	t-value	
				Day1 vs Day 7	Day 7 vs Day 14
Total cholesterol (mg/dL)	200.8 $\pm$ 31.1	201.7 $\pm$ 28.3	193.0 $\pm$ 27.4	1.04	2.09*
Triglycerides (mg/dL)	171.8 $\pm$ 70.5	174.4 $\pm$ 70.5	162.8 $\pm$ 61.5	0.98	2.07*
HDL (mg/dL)	49.1 $\pm$ 3.9	45.9 $\pm$ 3.5	48.5 $\pm$ 3.1	1.12	2.10*
LDL (mg/dL)	117.1 $\pm$ 31.4	119.5 $\pm$ 30.8	116.7 $\pm$ 27.3	0.67	0.86
VLDL (mg/dL)	34.2 $\pm$ 14.1	35.6 $\pm$ 16.4	32.4 $\pm$ 12.3	0.48	2.07*
Ratio Chol/HDL	4.08 $\pm$ 0.71	4.08 $\pm$ 0.71	4.07 $\pm$ 0.62	0.32	0.73

### DISCUSSION

In this single group experiment, a one week residential yoga programme and diet could reduce total cholesterol, triglycerides, high density lipoprotein (HDL) and very low density lipoprotein (VLDL) in police officers. However, there was no significant improvement in low density lipoprotein and cardiovascular risk ratio. It is evident from past research reports that lipoproteins are major risk factors implicated in the causation of coronary heart disease.<sup>33,34</sup> Nevertheless, modification of lipid profile is important both for the prevention and progression of coronary heart disease.<sup>35,36</sup> In fact, the beneficial effects of physical activity<sup>37,38</sup> and dietary changes on human health has been underlined by several studies.<sup>39</sup> Yoga might have worked on similar mechanism to have beneficial to control major risk factors of coronary artery disease in the police officers.

Further, dietary habit of police professionals has a direct link to high rates of cardiovascular disease.<sup>40</sup> There is ample of evidence showing improvement in cardiovascular risk profile by modulating dietary change that in fact causes reduction in arterial blood pressure<sup>41,42</sup>, inflammation and coagulation markers.<sup>43</sup>

The present study shows favourable changes in lipoprotein levels in police officers due to yoga practices and dietary change. In earlier studies short term impact of yoga practices and dietary management shows reduction in risk of developing cardiovascular disease in common population.<sup>30,44</sup> Further, mental relaxation through meditation and other relaxation techniques in yoga might have played important role for lowering serum cholesterol.<sup>45-47</sup> However, the decrease in high density lipoprotein seen in this study may be due to drastic dietary change. Similar result was seen in earlier study with residential short term yoga and diet

programme in obese persons.<sup>44</sup> Anyhow decrease in high density lipoprotein is not appropriate for cardiac health but it has been found that yoga practices increase HDL levels.<sup>48</sup> Hence, there is need to see the long term effect of yoga and diet with minimum trans fatty acids and maximum monounsaturated fats, as trans fatty acids increase LDL levels and decrease HDL.

The significant changes in lipid profile observed in this study might be due to the yoga practices and lecture series. It is believed that yoga brings balance between sympathetic and parasympathetic activity.<sup>49</sup> Thus it may help in reducing stress which in turn might have brought favourable changes in lipid profile. Furthermore, the participants were away from the professional work pressure and stress for a week this might be another reason for bringing improvement in lipid profile.

Finally, the reduction in the lipoproteins, even though, is less in magnitude but significant because it was achieved in a very short span of time by a very simple and inexpensive intervention. This is of importance, because police officers are at higher risk of developing cardiovascular disease and they do not get much time to look after their health. Thus, the present study seems to be beneficial for them. The main limitation of the present study is that there was no control group. As the participants were deputed by government of Maharashtra especially for the yoga programme it was difficult to split them in two groups and, therefore, single group experiment as adopted in this study seems to logical and justified to observe the changes in lipid profiles.

The present trial can be considered as preliminary one; however, requiring a further longitudinal study (randomized controlled trial) on larger sample size seems to be justified to validate the results as appeared in this study.

**CONCLUSION**

A one week residential yoga and diet programme has potential benefits to restore cardiovascular health by controlling the lipid profiles in police officers. Repeated study in this direction on different population, under occupational stress, is recommended so that the result as appeared in this study can be generalized.

**ACKNOWLEDGEMENT**

The investigators are grateful to Swami Maheshananda (Chairman), O.P.Tiwari (Secretary) and Subodh Tiwari (Administrator) of Kaivalyadhama SMYM Samiti, Lonavla (India) for their inspiration about this project. They are also thankful to Dr. Desai, ADR, Scientific Research Department, Kaivalyadhama SMYM Samiti, Lonavla (India) for encouragement to complete this project.

**REFERENCES**

- Anshel M H. A conceptual model and implications for coping with stressful events in police work. *Criminal Justice and Behavior* 2000; 27: 375-400.
- Karasek RA, Theorell T, Schwartz JE, et al. Job characteristics in relation to the prevalence of myocardial infarction in the US Health Examination Survey (HES) and the Health and Nutrition Examination Survey (HANES). *Am J Public Health* 1988; 78: 910-918.
- Hammar N, Alfredsson L, Johnson JV. Job strain, social support at work, and incidence of myocardial infarction. *Occ Environ Med* 1998; 55: 548-553.
- Theorell T. Stress at work and risk of myocardial infarction. *Postgrad Med J* 1986; 62: 791-795.
- Falk A, Hanson BS, Isacson SO, et al. Job strain and mortality in elderly men: social network, support, and influence as buffers. *Am J Public Health* 1992; 82: 1136-1139.
- Franke WD, Cox DF, Schultz DP, Anderson DF. Coronary heart disease risk factors in employees of Iowa's Department of public safety compared to the cohort of the general population. *Am J Ind Med* 1997; 31:733-737.
- Vena JE, Violanti JM, Marshall J, Fiedler RC. Mortality of municipal workers. Cohort III .Police officers. *Am J Ind Med* 1986; 10: 383-397.
- Gershon RR, Lin S, Li X. Work stress in aging police officers. *J Occ Environ Med* 2002; 44: 160-167.
- Franke WD, Cox OF, Schultz DP, Anderson DE. Coronary heart disease risk factors in employees of Iowa's department of public safety compared to a cohort of the general population. *Am J Ind Med* 1997; 31: 733-777.
- Neylan TC, Metzler MA, Best SR et al. Critical incident exposure and sleep quality in police officers. *Psychoso Med* 2002; 64:345-352.
- Violanti JM. Police suicide: epidemic in blue. Springfield (IL): Charles C Thomas Publisher, 1996: pp-140.
- Bruce L, Kroes WH, Quinn RP. Job Stress: An unlisted occupational hazard Margolis. *J Occ Med* 1974; 16(10): 659-661.
- Appel LJ, Brands MW, Daniels SR, Karanja N, Elmer PJ, Sacks FM. Dietary approaches to prevent and treat hypertension. *Hypertension* 2006; 47: 296-320.
- Tharkar S, Kumpatla S, Muthukumar P, Viswanathan V. High prevalence of metabolic syndrome and cardiovascular risk among police personnel compared to general population in India. *J Assoc Physicians India* 2008; 56: 845-849.
- Pyorala M, Miettinen N, Laakso M, Pyorala K. Plasma insulin and all cause, cardiovascular and non-cardiovascular mortality in Helsinki policemen. *Diabetes Care* 2000; 23:1097-1102.
- Pollock ML, Gettman LR, Meyer BU. Analysis of physical fitness and coronary heart disease risk of Dallas area police officers. *J Occ Med* 1978; 20(6): 393-398.
- Powell KE, Thompson PD, Caspersen CJ, Kendrick JS. Physical activity and the incidence of coronary heart disease. *Annu Rev Public Health* 1987; 8: 253-287.
- Paffenbarger RS, Hyde RT, Wing AL, Hsieh CC. Physical activity, all-cause mortality, and longevity of college alumni. *N Engl J Med* 1986; 314: 605-613.
- Morris JN, Clayton DG, Everitt MG, Semmence AM, Burgess EH. Exercise in leisure time: coronary attack and death rates. *Br Heart J* 1990; 63: 325-334.
- Chandler K. The emerging field of yoga therapy. *Hawaii Med J* 2001; 60: 286-287.
- Raub JA. Psychophysiologic effects of Hatha Yoga on musculoskeletal and cardiopulmonary function: a literature review. *Journal of Alternative and Complementary Medicine* 2002; 8:797-812.
- Gimbel MA. Yoga, meditation, and imagery: clinical applications. *Nurs Pract Forum* 1998; 9: 243-255.
- Labarthe D, Ayala C. Nondrug interventions in hypertension prevention and control. *Cardiology Clinics* 2002; 20: 249-263.
- Rugmini PS, Sinha RN. The effect of yoga therapy in diabetes melitus. *New Approaches to Medicine and Health* 1995; 2: 40-46.
- Monro R, Power J, Coumar A, Dandona P. Yoga therapy for NIDDM: a controlled trial. *Compl Med Research* 1992; 6: 66-68.
- Ornish D, Scherwitz LW, Billings JH, et al. Intensive lifestyle changes for reversal of coronary heart disease. *J Am Med Assoc* 1998; 280: 2001-2007.
- Damodaran A, Malathi A, Patil N, Shah N, Suryavanshi, Marathe S. Therapeutic potential of yoga practices in modifying cardiovascular risk profile in middle aged men and women. *J Assoc Physicians India* 2002; 50: 633-640.
- Yogendra J, Yogendra HJ, Ambardekar S, Lele RD, Shetty S, Dave M, Husein N. Beneficial effects of yoga lifestyle on reversibility of ischaemic heart disease: caring heart project of International Board of Yoga. *J Assoc Physicians of India* 2004; 52: 283-289.
- Malhotra V, Singh S, Singh KP, Gupta P, Sharma SB, Madhu SV, Tandon OP. Study of yoga asanas in assessment of pulmonary function in NIDDM patients. *Indian J Physiol Pharmacol* 2002; 46: 313-320.
- Bijlani RL, Vempati RP, Yadav RK, Ray RB, Gupta V, Sharma P, Mehta N, Mahapatra SC. A brief but comprehensive lifestyle education program based on yoga reduces risk factors for cardiovascular disease and diabetes mellitus. *The Journal of Alternative and complementary medicine* 2005; 11(2): 267-274.
- Friedewald WT, Levy RI, Fredrickson DS. Estimation of the concentration of low-density lipoprotein cholesterol in plasma, without use of the preparative ultracentrifuge. *Clin Chem* 1972; 18: 499-502.
- Ornish DM, Gotto AM, Miller RR, et al. Effects of a vegetarian diet and selected yoga techniques in the coronary heart disease. *Clin Res* 1979; 27: 270.
- Das S, Yadav D, Narang R, Das N. Interrelationship between lipid peroxidation, ascorbic acid and superoxide dismutase in coronary artery disease. *Curr Sci* 2002; 83(4): 488-491.
- Frost PH, Davis BR, Burlando AJ, et al. Serum lipids and incidence of coronary heart disease: findings from the Systolic Hypertension in the Elderly Program (SHEP). *Circulation* 1996; 94: 2381-2388.
- Mahajan AS, Reddy KS, Sachedva U. Lipid profile of coronary risk subjects following yogic lifestyle intervention. *Indian Heart J* 1999; 51: 37-40.
- Avins AL, Browner WS. Improving the prediction of coronary heart disease to aid in the management of high cholesterol levels: what a difference a decade makes. *J Am Med Assoc* 1998; 279: 445-449.
- Sesso H, Paffenbarger R, Lee IM. Physical activity and coronary heart disease in men. *The Harvard Alumni Health Study. Circulation* 2000; 102: 975-980.
- Abramson JL, Vaccarino V. Relationship between physical activity and inflammation among apparently healthy middle-aged and older US adults. *Arch Intern Med* 2002; 162: 1286-1292.
- Zambon D, Sabate J, Munoz S, et al. Substituting walnuts for monounsaturated fat improves the serum lipid profile of hypercholesterolemic men and women. A randomized cross over trial. *Ann Intern Med* 2000; 132: 538-546.
- Coman G, Evans B. Stressors facing Australian police in the 1990s. *Police Studies: International Review of Police Development* 1991; 14(4):153-165.
- Lakka TA, Venalainen JM, Rauramaa R, et al. Relation of leisure-time physical activity and cardiorespiratory fitness to the risk of acute myocardial infarction. *N Engl J Med* 1994; 330:1549-1554.
- Kokkinos PF, Holland JC, Narayan P, Collier JA, Dotson CO, Papademetriou V. Miles run per week and high-density lipoprotein cholesterol levels in healthy, middle-aged men. A dose-response relationship. *Arch Intern Med* 1995; 155:415-420.
- Wannamethee SG, Lowe GDO, Whincup PE, Rumley A, Walker M, Lennon L. Physical activity and hemostatic and inflammatory variables in elderly men. *Circulation* 2002; 105:1785-1790.
- Telles S, Naveen VK, Balkrishna A, Kumar S. Short term health impact of a yoga and diet change program on obesity. *Med Sci Monit* 2009; 15(12): 1-6.
- Cooper MJ, Aygen MM. A relaxation technique in the management of hypercholesterolemia. *J Hum Stress* 1979; 5: 24-27.
- Helminen A, Rankinen T, Halonen P, Vaisanen S, Rauramaa R. Positive and negative life changes and LDL cholesterol. *J Biosoc Sci* 1999; 31: 269-277.

47. Gokal R, Shillito L, Maharaj SR. Positive impact of yoga and pranayam on obesity, hypertension, blood sugar, and cholesterol: a pilot assessment. *Journal of Alternative and Complementary Medicine* 2007; 13(10):1056-1057.
48. Mahajan AS, Reddy KS, Sachdeva U. Lipid profile of coronary risk subjects following yogic lifestyle intervention. *Indian Heart J* 1999; 51:37-40.
49. Anand BK. Yoga and medical sciences. *Indian J Physiol Pharmacol* 1991; 35(2): 84-87.

Source of support: Nil, Conflict of interest: None Declared