Serum leptin, cholesterol and blood glucose levels in diabetics following a yoga and diet change program

Comment to:

Statins and beta-cell function
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Dear Editor,

Statins are known to lower total and LDL cholesterol, and to raise the HDL-C level [1]. It was hypothesized that statins may also delay the progression of diabetes, possibly related to the fact that elevated serum cholesterol can impair insulin secretion and increase the rate of apoptosis in beta cells.

Several lifestyle modifying programs have been beneficial in diabetes by increasing physical activity, and modifying the diet [2]. Yoga is one such intervention which includes practicing specific techniques (viz., yoga postures, voluntarily regulated yoga breathing, and meditation) along with changes in diet and understanding certain philosophical principles [3].

In a summary report covering several studies it was reported that both short and long term yoga practice improved glycemic control [4]. The possible underlying mechanism was a change in insulin kinetics (decreased insulin resistance, increased insulin sensitivity, with increased insulin receptors) or a decrease in counter-regulatory hormones such as cortisol, which was also reported. Yoga practice has also been shown to reduce total cholesterol, LDL, triglycerides and increase HDL [5].

Serum cholesterol levels have been positively correlated with leptin, a hormone produced by adipose tissue [6]. This was based on a study on 1734 men, including patients with coronary heart disease and controls. Baseline leptin levels correlated with total cholesterol and triglyceride levels; correlations which persisted after adjustment for body mass index. Leptin levels also varied with insulin sensitivity in lean and obese persons [7].

While serum leptin levels have been shown to reduce in obese persons after a one week yoga and diet change program [8], there has been no study on serum leptin in diabetics following yoga. Hence the present single-group study assessed the effect of a one week yoga and diet change program on fasting blood glucose, glycated hemoglobin, total cholesterol, and serum leptin levels in diabetics. Thirty-one persons with type 2 diabetes mellitus (group mean age ±SD, 47.8±6.2 years; 3 females) were recruited from 543 diabetics who had enrolled for a one week residential yoga and diet change program. The 31 patients selected had been diagnosed as having type 2 diabetes by the endocrinologist treating them. None of them had complications of diabetes, and while none of them required insulin all of them were taking oral antidiabetic medication (i.e., biguanides). They were all naive to yoga. The patients gave their signed consent to participate in the study which had the approval of the institution’s ethics committee.

Blood samples were collected after an overnight fast, to measure total cholesterol, fasting blood glucose, glycated hemoglobin, and serum leptin. The yoga program consisted of two sessions each day, between 05:00 and 07:00 hours and between 17:00 and 19:30 hours. The program included voluntarily regulated breathing, loosening exercises, and yoga postures. None of the participants’ medication was changed during the program, though their fasting and post-prandial blood glucose were measured daily with a standard glucometer. They were also advised to consult their regular endocrinologist for a re-evaluation after returning home. An essential part of yoga includes a change in diet, to a plant-based diet, rich in fiber and low in saturated fat. Participants were not given restricted portions, but based on the amount they chose to eat, which was recorded in a daily diary, their average intake was 1800 Kcal per day. At the end of a week the total cholesterol reduced from a group mean (±SD) of 177.66±40.12 mg/dL (before) to 157.66±29.61 mg/dL (after the program; p<0.01, paired t-test), and fasting blood glucose reduced from 196.97±91.06 mg/dL (before) to 162.77±74.30 mg/dL (after the program; p<0.01, paired t-test).

Changes in total cholesterol and fasting blood glucose have been shown in diabetics after yoga [9]. In the present study the emphasis was on the decrease in serum leptin from a group mean (±SD) of 20.72±22.55 ng/ml (before) to 7.44±7.38 ng/ml (after the program; p<0.01, paired t-test). Raised leptin levels have been associated with beta cell dysfunction and insulin resistance [10]. Hence like the reduction in cholesterol [1], lower serum leptin levels may have facilitated beta cell functioning and hence helped in glycemic regulation.

The present study included both yoga and diet change making it difficult to understand whether either of them individually would have had the same effect. However, a study on 90 overweight adults randomized to three groups suggests certain possible trends [11]. The three groups were: (i) diet change, (ii) exercise, and (iii) diet change along with exercise. Serum leptin levels showed significant within-group decreases after 6 months, but there was no difference between groups. These results suggest that separating yoga and diet change may not have influenced the results, as yoga, like exercise, increases physical activity. A further three-armed, randomized trial could be planned separating yoga, diet change, and yoga with diet change. However, ideally yoga should be considered as a way of life, which includes certain dietary specifications.

In summary the present results showed that a one week yoga and diet change program reduced fasting blood glucose and cholesterol in diabetics, with a possible connection between the two [1], and also lowered serum leptin levels which may have contributed to the benefits seen [10].

References:


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