The Influence of Yoga- on Risk Profiles Programs in Women with Diabetes type II

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ABSTRACT

**Background:** The goal of research is the effect of 12-weeks yoga exercise on physiological factors and blood sugar of patients who suffer from diabetes type II. **Methods:** In this semi-experimental research, from the females who have diabetes in Isfahan Town, 26 women with age range of (45-60) years old and weight range of (60-91 kg) voluntarily and in access choice and were put in two kinds of experimental (16 patients) and control (10 patients) group. Experimental group within the period of 12 weeks (3 sessions in week, each session 75 minutes) did a selected yoga exercise, Whereas control group had no regular and systematic physical activity. In this research, variables to be tested were blood sugar, plasma insulin level, leptin level, systolic blood pressure and also, weight, body mass index that before and after the exercise period these tested variables were measured. For analyzing the data from the descriptive and inferential statistics were used T-test for the difference between the means of the independent groups. A significant level (p<0.05) was considered for all the examinees. **Results:** findings of research show a significant difference between average of blood sugar, plasma insulin level, leptin level, systolic blood pressure and also, weight, body mass index that before and after the exercise period these tested variables were measured. For analyzing the data from the descriptive and inferential statistics were used T-test for the difference between the means of the independent groups. A significant level (p<0.05) was considered for all the examinees. **Conclusions:** findings of research showed that a period of selected yoga exercise which caused to significant improvement in blood sugar of patients having diabetes type II.

Key words: diabetes type II, body composition, yoga exercise, blood sugar, leptin

Introduction

Diabetes mellitus (DM) is the single most important metabolic disorder that affects nearly every organ system in the body. People with diabetes are 25 times more likely to develop blindness, 17 times more likely to develop kidney disease, 30-40 times more likely to undergo amputayion, 2-4 times more likely to develop myocardial in fraction and twice as likely to suffer a stroke than non-diabetic. The prevalence of Type II diabetes in Iran 7.7% [2] and 14% have been reported in Tehran [3] Non-insulin dependent diabetes mellitus (NIDDM) is a common disorder of glucose homeostasi [4] While diabetes is a glycemic disorder, diagnosed on the basis of elevated blood glucose levels, it is a complex condition characterized by multiple, underlying and interlated metabolic abnormalities linked to insulin resistance [5,6,7] these alterations, together comprising the insulin resistance or metabolic syndrome, collectively and independently predict the development of DM2 and related vascular disorders, including atherosclerosis and CV [6,8] core features of the insulin resistance syndrome (IRS) are glucose intolerance, insulin resistance, athogenic dyslipidemia, visceral adiposity and high blood pressure. Prevalence of type 2 diabetes mellitus is expected to rise more rapidly in future because of increasing obesity and reduced physical activity level [11] Obesity indepenendently increases the risk of developing diabetes 10-fold compared with for patients who are normal weight [12].

Leptin is the major regulator of body fat. It is protein released by fat cells into blood and crosses the blood- brain barrir (BBB) to interact with its receptors the accurate nucleus to affect feeding,
thermogenesis and other functions. Within normal and obese body weight ranges, serum and cerebrospinal fluid (CSF) levels of leptin directly correlate with body mass index [13]. Physical activity is a core component of type 2 diabetes prevention programs [14,15]. One important regimen for people with diabetes and for those at risk for developing diabetes is engagement in appropriate physical activity. The beneficial effects of physical activity typically include reductions in glucose level, body weight, blood pressure (BP) and cholesterol [16]. The American Diabetes Association (ADA) recommends that individuals with type 2 diabetes perform at least 150 min of moderate intensity aerobic exercise per week [17]. However, for many older patients with type 2 diabetes, the presence of diabetic complications or coexisting conditions such as obesity, degenerative arthritis or cardiovascular disease may preclude participation in aerobic activities. Older adults with diabetes have significantly greater difficulty walking one-quarter mile, climbing stairs, or doing housework and perform worse on measures of physical performance such as walking speed chairstands, and tandem stand compared with their counterparts [18].

Yoga, a form of physical activity consisting of various postures (Asana) and breathing and meditation techniques (Pranayama), has been shown to have therapeutic benefits for individuals with diabetes [19]. In addition, adults participating in a yoga intervention found that yoga was easily learned and performed. Once learned, yoga can be practiced at any time on an individual basis, thus reducing common barriers to physical activity such as time conflicts and poor weather. Despite its popularity and positive physiologic effects, however, yoga has not been widely recognized in efforts to prevent and treat major chronic health conditions [20]. The purpose of this study was to assess the feasibility of implementing a 12-week yoga program among adults at high risk for type 2 diabetes, cardiometabolic risk factors (i.e., blood glucose levels, ...)

Methods:

This is a kind of semi-experimental, partial research associating with a two group plan. The statistical population includes all of the women (affected) with type 2 diabetes among those who referred to Iranian health clinic of Isfahan, twenty-six patients who were volunteer to participate in the study and possessed the condition of the study (such as woman sexuality, affected with diabetes type 2 according to the doctor’s diagnosis and medical evidences, between 45-60 years, without any record of cardiovascular diseases and somatic regular activity, without using insulin and diabetes complications) were selected by the accessible method (after their presence interview with useful screening).

Necessary information about the nature, the way of running the study, and some points that the subjects are forced to observe in the study were given to them before getting the testimonial, the subjects were introduced to the laboratory for implementing glucose testing and measuring the level of insulin. Randomly, they were divided into experimental (16 persons, weight 47±9.9) and control group (10 persons, weight 75/6±10.3). Experimental group were performing the yoga selected exercise for 12 weeks (3 sessions in a week, 75 minutes) under the coach observation. Exercise program included the asana exercise that includes tensional and flexibility acts that whole muscles involved in tensional acts continued painfully muscular contraction for 45 minutes, then pranayama continued that have performed in a sitting posture with a smooth back associated with a deep breath and expiration with special and regular rhythm by keeping breath for a short time to start the next step of the exercises. And final step of the exercises included mediation exercise for 15 to 20 minutes. These exercise were doing after pranayama exercises that include sleeping in privacy, breathing regular rhythm, isometric contractions of large muscle, tension and release, unclench and focus.

After completing 12 week exercise period, post-test was done to determine and compare the results of yoga selected exercise on glucose of insulin plasma level, leptin level, blood pressure systolic, weight and BMI and its difference with control group. For measurement laboratory factors study, 10cc venous blood samples were taken and the following methods were measured.

Glucose: was measured by enzyme-calorimetry method and by applying glucose oxidase enzyme with using kit Pars Azmun Firm and by means of Biochemistry Auto Analyser, a classic version made in Iran, Sanjesh equipment fair.

The level of insulin plasma: was measured by Sandwich Elisa and by using Elisa Reader, Awareness Technology model, made in American.

Systolic pressure: in the sitting posture from the right arm after fifteen minutes relaxation with an standard mercury pressure-gangedenice measured and the average of two order measurement with a five minutes relaxation interval was recorded as glucose.

The level of leptin: Leptin levels were measured using a sandwich ELISA(DRG Leptin(sandwich) ELIZA, Germany).

Length and weight: was measured by wall lengthmeter considering 1 centimeter, seca laboratory scale, made in Germany, considering 0/1 kilogram.

BMI: was computed by dividing the weight on length square.

Data analysis of the current study have been done in descriptive and deductive levels. At the descriptive level, scattering and central trend
indicators such as mean and standard deviation were used and at the deductive level the impact of yoga selected exercise and the investigation of the difference in the obtained changes (t-test, the difference of independent groups mean) were used.

A significant level was considered for all tests (P≤0/05). All of the computations have been done.

Findings:

Indicators describe the variables glucose, insulin, leptin, systolic blood pressure, body weight and BMI in both pre-and post-tests are given in Table 1.

Table 2 shows the obtained results of t-test and the amount of changes in blood glucose, plasma insulin, systol blood pressure, weight and BMI, in experimental and control groups (obtained F) are not significant. That is there is no significant difference between the scattering of experimental and control groups and the inserted value in the above tables in t-test are homogeneous with the related values of t-test. The obtained t for comparing the experimental and control groups shows the significant difference between the means of two groups in blood glucose variables, plasma insulin level, Leptin level and systol blood pressure while the obtained t in comparing the experimental and control group with weight and BMI variables doesn’t show a significant difference (P≤0/05).

Table 1: the descriptive indicators of the investigative variables of pre-test and post-test

<table>
<thead>
<tr>
<th>variable</th>
<th>Indicators Groups</th>
<th>Experimental group</th>
<th>Control group</th>
<th>Subtraction of means</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>Standard deviation</td>
<td>Mean</td>
</tr>
<tr>
<td>Blood glucose</td>
<td>Pre-test</td>
<td>144/5</td>
<td>55/6</td>
<td>135/5</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>115/12</td>
<td>27/1</td>
<td>149</td>
</tr>
<tr>
<td>Insulin level</td>
<td>Pre-test</td>
<td>10/9</td>
<td>4/5</td>
<td>10/4</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>6/9</td>
<td>4/7</td>
<td>12/4</td>
</tr>
<tr>
<td>Leptin level</td>
<td>Pre-test</td>
<td>17/6</td>
<td>14/2</td>
<td>19/5</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>15/4</td>
<td>8/1</td>
<td>15/1</td>
</tr>
<tr>
<td>Sistol blood pressure</td>
<td>Pre-test</td>
<td>139/2</td>
<td>17/1</td>
<td>136/06</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>117/2</td>
<td>4/1</td>
<td>136/6</td>
</tr>
<tr>
<td>weight</td>
<td>Pre-test</td>
<td>74/8</td>
<td>9/9</td>
<td>75/6</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>71/18</td>
<td>9/4</td>
<td>77/3</td>
</tr>
<tr>
<td>BMI</td>
<td>Pre-test</td>
<td>30/7</td>
<td>4/9</td>
<td>28/8</td>
</tr>
<tr>
<td></td>
<td>Post-test</td>
<td>29/2</td>
<td>4/1</td>
<td>29/5</td>
</tr>
</tbody>
</table>

Table 2: the results of t-test in post-test associated with groups separation in the investigative variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Indicator Groups</th>
<th>Variance homogeneous test</th>
<th>The subtraction of means</th>
<th>Difference of the subtraction of means</th>
<th>Degree of freedom</th>
<th>t-test</th>
<th>Significant level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose</td>
<td>Expermental group</td>
<td>/.98</td>
<td>-29/3</td>
<td>15/8</td>
<td>24</td>
<td>-2/1</td>
<td>.4</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td></td>
<td></td>
<td>13/5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulin level</td>
<td>Expermental group</td>
<td>/.62</td>
<td>1/9</td>
<td>3/9</td>
<td>24</td>
<td>-2/4</td>
<td>.2</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leptin level</td>
<td>Expermental group</td>
<td>/.77</td>
<td>-.2/1</td>
<td>-.2/2</td>
<td>24</td>
<td>.3/2</td>
<td>.75</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td></td>
<td></td>
<td>-.4/3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sistolbloob pressure</td>
<td>Expermental group</td>
<td>2</td>
<td>-.21/9</td>
<td>-22/48</td>
<td>24</td>
<td>-3/7</td>
<td>.1</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td></td>
<td></td>
<td>-.58</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>weight</td>
<td>Expermental group</td>
<td>/.1</td>
<td>-.3/6</td>
<td>5/3</td>
<td>24</td>
<td>1/1</td>
<td>.7</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td></td>
<td></td>
<td>1/7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td>Expermental group</td>
<td>/.4</td>
<td>-.1/5</td>
<td>-.2/13</td>
<td>24</td>
<td>-1/8</td>
<td>.8</td>
</tr>
<tr>
<td></td>
<td>Control group</td>
<td></td>
<td></td>
<td>.63</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
**Discussion:**

**Blood glucose and plasma insulin levels:**

The results of the current study showed that using yoga selected exercise for 12 weeks caused the significant decrease in blood glucose and insulin plasma level. The results of the study in the field of glucose were in agree with Amitas 11 research results. Also Yang [16] and Gordon [21] reported the significant decrease in plasma insulin level and glucose in their studies.

Type 2 diabetes is association with an increased plasma insulin concentration (hyperinsulinemia). This occurs as a decrease in carbohydrate utilization and strong and the resultant increase in blood glucose. However, even the increased levels of insulin are not sufficient to maintain normal glucose regulation because of the greatly diminished insulin sensitivity of the peripheral tissues, a condition referred to as insulin resistance [22].

The exercise and training studies have supported the contention that physical activity improves insulin sensitivity independently of any effect of activity on weight loss and fat distribution [23].

Exercise training in humans results in numerous beneficial adaptations in skeletal muscles, including an increase in glucose transporter -4 (Glut-4) expression. A single bout of exercise increases the rate of glucose uptake into the contracting skeletal muscles, a process that is regulated by the translocation of GLUT-4 to the plasma membrane and transverse tubules. There is evidence that exercise stimulates muscle glycogen synthesis, increases insulin sensitivity, reduces blood glucose levels [21].

Various yoga- asanas may be directly rejuvenating cells of pancreas as a result of which there may be an increase in utilization and metabolism of glucose in the peripheral tissues, liver and adipose tissues through enzymatic process [22].

The serum insulin levels comeback to normal value after 12 week yoga program. The beneficial effect on the insulin kinetics may be improving the sensitivity of the target tissues thus decreasing insulin resistance and consequently, increasing peripheral utilization of glucose.

**Leptin level:**

The results of the current study showed that yoga selected exercise for 12 weeks don’t cause the significant decrease in leptin level.

Insulin and leptin are hormones that are secreted from adipose tissue and through the central nervous system to regulate food intake and body weight [24].

Leptin is recognized to play an integral role in endocrine regulation of metabolism. It is clearly evident that leptin is decreased during calorie restriction [25]. Have reported higher serum leptin levels were reduced after weight reduction as plasma leptin concentrations correlated with BMI [26]. Physical activity may lower leptin concentrations not only due to decreased body fat mass but potentially through an increase in leptinsensitivity [27].

**Sistol blood pressure:**

One of the aims of this study was the investigation of the impact of yoga selected exercises on sistol blood pressure in diabetic type 2 patients. Since diabetic people have overweight and high blood pressure, exercise can be effective in decreasing blood pressure [28].

The results of the study showed that using yoga selected exercise for 12 weeks have a significant impact on decreasing sistol blood pressure. The results of this study in this field of sistol blood pressure were in agree with the results of Yang et al. [16] and Innes research [29] but they were not in agree with Horden’s research [30] results. The existing difference between the intensity and duration of the exercising plans as well as the difference between age and sex of the research samples. The exact function of the the impact of exercise on the decrease of blood pressure is unknown. Although it relates to the decrease of the generated catecholamines which are produced by doing exercise. This reaction associated with the decrease of the environmental resistance against the blood flow and then cause the decrease of blood pressure. Also sportive activities are able to facilitate the repulsion of sodium from kidneys and consequently cause the decrease of liquid content and blood pressure (31). It seems that sportive activities are able to decrease the blood pressure by increasing the number of arterioles in active skeletal muscles, exhalent increase, decrease of because of dilatability, resistance decrease against the blood flow, the improvement of bloody vessel neural regulation, decrease of environmental resistance, decrease of heart beat in activity and relaxation time [32].

One of the major difficulty of diabetic patients is insulin resistance. This malady is produced by decreasing insulin capability for producing its effect on environmental aim tissues (especially muscles and liver). Decreasing in the number of connection place and the activity of the insulin kynaz signals are the causes of generating the resistance, if the patient is fat. Therefore pancreas β cells secrete more insulin. The increase of insulin secretion and remaining more in blood flow are the major reasons of blood pressure. Then sportive activity increase the sensitivity of aim tissue to insulin by increasing the number of transmitter and decreasing glucose prevent the extreme secretion of insulin as well as keeping insulin in blood flow for much time and cause the decrease of blood pressure. [33] Some researcher believe that after yoga practices and unclench, an enzyme cause the reduction of the...
epinephrine environmental activity in reply to the feedings and other triggers and help to decrease the blood pressure. Also performing calmative techniques cause the decrease of neural system activity that can decrease heartbeat and blood pressure. Calmative activities decrease the sampathic activity and increase the parasampathic neural system activity that may be the possible reasons to decrease the blood pressur [34]

**Weight and BMI:**

The results of the current study showed that yoga selected exercise for 12 weeks don’t cause the significant decrease in weight and BMI.

The results of the study were in agree with the studies of Alexander and et al [35] and they were in agree with the studies of Mercuri and et al [36] in the field of BMI. Recently 1/1 milliard adults have overweight throughout the worldAnd 313 million of them are fat. Different studies reported the prevalence of abdominal obesity in diabetic people [37] Most nutriment reasearchers and specialists suggest doing permanent and durable aerobic exercise to consume fats as a source of producing energy and also suggest using low fat diet (less than%30) to loss weigh [38]The intensity of exercise is important to loss the weight since there is no intense physical moving and activity in yoga exercise, these changes didn’t occur. High intense exercise cause to enter more intestinal-abdominal fat to metabolic cycle and secrete lipolihichormones and finally increase the oxidation of fat acids.So calmative yoga exercises didn’t have a significant decrease in intestinal-abdominal obesity. But some researchers believe that asana yoga is designed to control automatic neural system with the activation of hypothalmus. Hypothalamus controls a part of sleep, emotions, endocrine glands such as thyroid, hypophysis, pancrease and adrenal glands and starvation. Therefore it relates to the decrease or increase of weight [16]

**References**


