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Metabolic control and physical characteristics among University Employees: Effect of short term intervention at workplace

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General Note
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ABSTRACT

The aim of the study was to examine effect of non-supervised short term intervention on metabolic control and selected physical parameters in university employees. Thirteen university employees who were part of intervention group underwent 6 week of short term aerobic and resistance programme. Training was offered two times in week with resistance and aerobic training performed on alternate days. A Wilcoxon signed-rank test showed significant change in fasting blood sugar (Z = -2.714, P = .007) low density

lipoproteins (Z = -2.046, P = .041) and very low density lipoproteins (Z = -1.965, P = .049) with in intervention group. Further analysis of data revealed that 6 week of work place intervention failed to revealed any significant change in total cholesterol values (Z = -.489, P = .624), triglycerides (Z = -1.824, P = .068) and high density lipoproteins (Z = -.045, P = .964). Significant change was seen in body mass (Z = -2.224, P = .026), Body fat percent (Z = -2.667, P = .008) and body mass index (Z = -2.347, P = .019) in intervention group. Further positive significant change was also seen in systolic blood pressure (Z = -2.182, P = .029) and diastolic blood pressure (Z = -2.358, P = .018) along with resting heart rate (Z = -2.138, P = .033). Six week of short duration intervention at work place was quite effective in improving certain metabolic controls namely; low density lipoprotein, fasting blood sugar and very low density lipoprotein.

Keywords: Workplace, Intervention, Metabolic Controls

1. INTRODUCTION

There are no doubt about beneficial effects of physical activity on health and various other parameters. Exercise has become an important tool now days for improving public health and to make constructive utilization of leisure time. Work places are no exception to it. In fact people spend majority of their day time at work place, therefore taking care of health at workplace becomes very important. Workplaces are now witnessing increasing in physical activities during or after office hours along with marked increase in infrastructure and facilities for exercise. From perspective of public health, workplaces are suggested to be important for interventions involving physical exercise (Kuoppala et al., 2008; Arena et al., 2013). Adult employees spend quite a lot time at work, considering this intervention at work place has great potential to some of the common barriers to exercises and physical activity (Abraham & Graham-Rowe, 2009; Brownson et al., 2001). Apart from this places at work also provide more idealist opportunity to much larger population in order to promote health and prevention of diseases (Atlantis et al., 2006). Implementation of physical activity programmes at work places will help to keep workers healthy and it will also reduce cost of healthcare (Troiano et al., 2008; Golaszewski, 2000).

It is well known fact that doing thirty minutes moderate physical activity five times in week will be of immense health benefit to individuals (Donaldson, 2004). Generally many studies in past were conducted on 3 to 5 days in a week basis, as such activities and exercises will have a possible beneficial effects on individuals. On the other hand, it is also a fact for many people in today's busy schedule, finding 5 days in a week for exercise is not that easy on regular basis.

Since it is quite difficult to give supervised exercise training programme at workplace, therefore we opted for non-supervised training programme and allowed participants to go as per their convenience. Although supervised programmes has greater beneficial effect. There were many studies in past which were conducted at work place like industries and companies but there is dearth of studies done at university work place. Therefore we decided to undertake a study to examine effect of non-supervised short term intervention on metabolic control and selected physical parameters in university employees.

2. MATERIALS AND METHODS

Subjects

Research team approached subjects who are employed in university through email or personal face to face contact. There after we found 52 participants who volunteered themselves to be part this project. We applied exclusion criteria to all participants namely; cardiovascular diseases, breathing problems including asthma, history of psychological treatment. After applying exclusion criteria, we selected 15 participants who were then assigned to experimental group. All these 15 participants went for baseline assessment. Two participants from intervention group did not complete the intervention and withdrew themselves. A written informed consent was signed by subjects and they were informed about risk involved. Present study was approved by the Research Committee of King Fahd University of Petroleum and Minerals vide project number IN131049 dated April 24, 2014.

Intervention and Study Design

We offered all subjects in experimental group two sessions of training programme in a week. After baseline assessment we tested participants on same parameters again at the end of 6th week. A meeting of all participants were called after baseline measurement and we inform them about the exercise programme. A brochure and written information about exercise was distributed to all participants. They were asked to record their activities in formatted diary on regular basis. In the intervention, they have to perform both aerobic and resistance training. In aerobic session they are advised to run on treadmill or outdoor for 30 minutes. Exercise

intensity was monitored using Polar heart rate monitors and intensity was fixed at 65 to 75 percent of maximum heart rate. Eight core exercises were offered under resistance training programme. These were, shoulder press, chest press, pectoral fly abdomen curl, biceps curl, leg curl, triceps extension leg extension. After testing one RM (repletion maximum) we fixed the intensity at 60% to 70% of 1 RM.

Measurements and Tools

Standard testing protocols were observed in measuring metabolic controls. Participants observed 10 to 12 hours fasting before giving their blood samples. Heart rate and blood sample was measured using Omron blood pressure monitor after observing sufficient rest.

Statistical Analysis

Appropriate statistical tool was used to analyze the collected data. Normality of our data was check using Shapiro–Wilk test. Wilcoxon signed rank test was used to compare baseline and post 6 weeks measurement. Level of statistical significance was set at < 0.05.

3. RESULTS

The results of the study are very encouraging and they are presented in table 1. Participants mean age was 38.8 years. We did not observe any adverse complications during the entire training programme.

Table 1 Change from Baseline to 6 Week (Wilcoxon Signed Rank Test)

Variable	Intervention Group (n=13)		P Value
	0 Week	6 Week	
Body Weight (kg)	84.04 (70.9 – 99.5)	82.5(68.5-97)	.026*
Body Fat Percent (%)	25.26(22.5 – 28.4)	23.75(18.9-28.1)	.008*
Body Mass Index (kg/m^2)	26.3(22.6-29.5)	25.85(22.9-29.1)	.019*
Systolic Blood Pressure (mmhg)	125(116-132)	115.9(110-122)	.029*
Diastolic Blood Pressure (mmhg)	78.2(76-86)	71.6(66-78)	.018*
Resting Heart Rate (bpm)	75.4(65-80)	67.4(63-72)	.033*
Fasting Blood Sugar (mg/dl)	97.8 (89 –105)	90(80-96)	.007*
Total Cholesterol (mg/dl)	162.5 (139-189)	161.5 (144-180)	.624
Triglyceride (mg/dl)	115.8(78-144)	84.8(60-101)	.068
High Density Lipoprotein (mg/dl)	44.6(40-51)	44.5 (39-50)	.964
Low Density Lipoprotein (mg/dl)	94.8 (71-110)	100.9 (79-118)	.041*
Very Low Density Lipoprotein (mg/dl)	23.27 (16-29)	17.27(12-19)	.049*

Data shown as median (IQR), P<0.05

Metabolic Controls (baseline to 6 weeks)

A Wilcoxon signed-rank test showed that 6 week work place intervention elicit a statistically significant change in fasting blood sugar (Z = -2.714, P = .007) from 0 week to 6 week period. Wilcoxon signed rank test also revealed significant change in low density lipoproteins (Z = -2.046, P = .041) and very low density lipoproteins (Z = -1.965, P = .049) with in intervention group. Further analysis of data revealed that 6 week of work place intervention failed to revealed any significant change in total cholesterol values in the intervention group (Z = -.489, P = .624). There was no significant change observed in triglycerides (Z = -1.824, P = .068) and high density lipoproteins (Z = -.045, P = .964)

Physical Parameters (baseline to 6 weeks)

After 6 week of non-supervised training Wilcoxon signed-rank test revealed significant change in body mass of participants in intervention group (Z = -2.224, P = .026). A very significant change was also seen in body fat percent (Z = -2.667, P = .008) and body mass index (Z = -2.347, P = .019) in intervention group. Further positive significant change was also seen in systolic blood pressure (Z = -2.182, P = .029) and diastolic blood pressure (Z = -2.358, P = .018) along with resting heart rate (Z = -2.138, P = .033) (fig. 1-2).

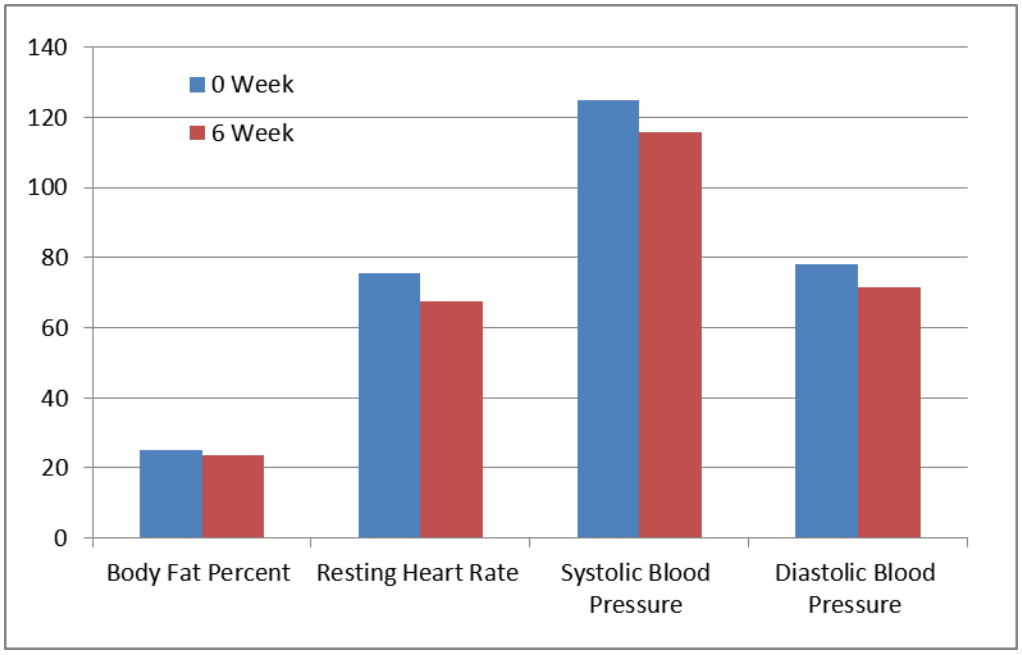

Figure 1 Mean Scores of different Physical Parameters at Baseline and after 6 Week

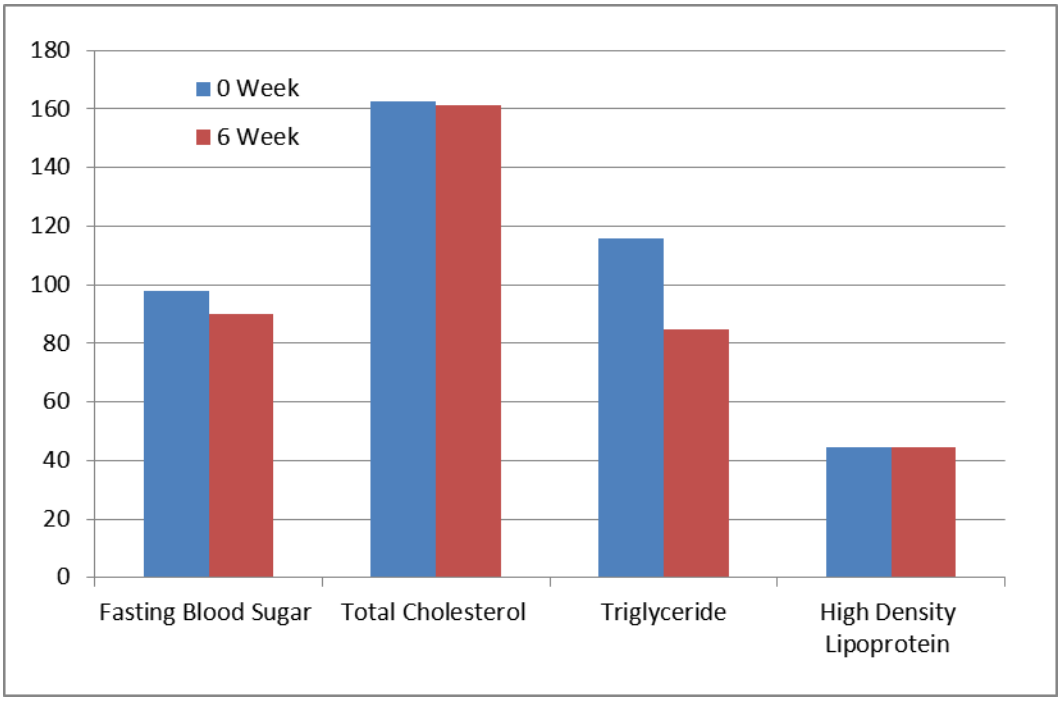

Figure 2 Mean Scores of Metabolic Controls at Baseline and after 6 Week

4. DISCUSSION

Physical Parameters

After short duration of 6 weeks of non-supervised training programme we found improvement in body mass, fat percent and body mass index. There was a significant reduction of fat, body weight and body mass index in the participants in experimental group. Our results are in line with another study where participants have shown reduction in fat and body weight (Calderon et al., 2008). Another study on workplace has shown positive effect of interventions on employee's body weight although the size of effect was small (Mhurchu et al., 2010).

Along with reduction in body mass and percentage of fat we also found notable decrease in both systolic and diastolic blood pressure. There are couples of studies where improvement in blood pressure was seen as result of interventions at work place (Shimizu et al., 2004; Pescatello et al., 2001). A study done by Christensen et al., have also shown reduction in body mass, fat percentage and body mass index due to intervention at work place, but they could not find improvement in blood pressure (Christensen et al., 2012). Resting heart in our study was also reduced significantly post intervention. This is supported by another study where significant reduction in heart rate was found after 10 weeks of supervised programme, but there was no change in systolic and diastolic blood pressure values (Zeeuw et al., 2010).

Metabolic Controls

After 6 weeks of short intervention at work place, we found bit mixed results with regard to metabolic control and lipid profile of university employees. We found significant improvement in fasting blood sugar, low density lipoproteins and very low density lipoproteins after 6 weeks of aerobic and resistance training. Our results are partly supported by Fritsch et al., where they found significant reductions in low density lipoproteins and total cholesterol values, however high density lipoproteins did not change significantly in their study (Berryman et al., 2009). Another study did found significant improvement in total cholesterol; low density lipoprotein, triglycerides, and body mass (White & Jacques, 2007). In another study it was found that 24 weeks of exercise training helped in fat percent loss and reduction in total cholesterol and low density lipoprotein (Grandjean et al., 1996).

Our training programme failed to illicit significant changes in total cholesterol, high density lipoproteins and triglyceride in university employees. This is supported by a study where no changes were seen in groups for very low density lipoprotein and triglycerides. But high density lipoprotein increased 6 mg/dl in experimental group although this was not statistically significant ($p<0.0625$) (Grandjean et al., 1996).

Our programme was of very short duration. Despite that we are able to see significant improvement in most of the parameters. There few limitations of our study. These limitations should be kept in mind while interpreting the results. Since we are male only university, it would not be appropriate to generalize results for female population. Since we did not control the diet of participant we may not assess how diet could have played its role in the outcome of results of this study. There could be some biasness in the selection of subjects, we might have recruited subjects who are highly motivated to take this study. Apart from that pep talk given by supervisors and our weekly booster emails along with other related materials might have also facilitated motivation among participants. Adherence to the training programme was very encouraging which is evident from the daily attendance record. Findings of our study are quite encouraging despite of having certain limitations. A bigger sample is suggested for better interpretation of results.

5. CONCLUSION

Six week of short duration intervention at work place was quite effective in improving certain metabolic controls namely; low density lipoprotein, fasting blood sugar and very low density lipoprotein. Further marked improvement was also seen in body mass, percentage of fat, body mass index, blood pressure and resting heart rate. However, there was no improvement seen in total cholesterol, triglycerides and high density lipoprotein.

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Authors Contribution

Rakesh Tomar - Principal Investigator
John Ainsworth Allen - Co-Investigator

Conflict of Interest

Authors hereby declare that they have no conflict of interest.

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