Indian Journal of Science and Technology, Vol 9(45), DOI: 10.17485/ijst/2016/v9i45/101272, December 2016
ISSN (Print) : 0974-6846
ISSN (Online) : 0974-5645

Effect of Workplace Intervention on Prevalence of Musculoskeletal Symptoms on University Employees in Saudi Arabia

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Abstract

Objectives: We examined the effect of twelve week non supervised exercise programme on prevalence of musculoskeletal symptoms on university employees at work place in Saudi Arabia. We also followed up participants in intervention group for six months after twelve weeks of exercise programme to examine if non supervised exercise programme has a sustainable effect. **Methods/Statistical Analysis:** We randomized twenty-seven males whose age was from (27–57 y) into two groups; intervention (n = 13) and control group (n = 14). Twelve weeks of non-supervised programme was given to intervention group. Exercise sessions were offered two times in each week constituting 30 min of aerobic and eight core exercises for resistance training. Intervention group participants were followed six months after 12 weeks of exercise. **Findings:** No significant difference in prevalence of musculoskeletal symptoms during past 12 months and past 7 days between intervention and control after 12 weeks of exercise at workplace. Wilcoxon signed rank test revealed significant difference with in intervention group after 6 month follow up only on depression (Z = -2.530, P = .011), fasting blood sugar with in intervention group (Z = -2.313, P = .021) and low density lipoprotein (Z = -1.958, P = .050). **Application/Improvement:** Twelve weeks of non-supervised intervention at work place was not effective in bringing significant change in prevalence of musculoskeletal symptoms in participating subjects. After six month follow up no significant change was seen in most of the parameters except fasting blood sugar, low density lipoprotein and depression.

Keywords: Exercise, Musculoskeletal Symptoms, University, Work Place

1. Introduction

It has been found that musculoskeletal symptoms prevail more in occupations that are more physically demanding compare to occupations that required less physical demands[1,2]. But if we look at some studies, prevalence of musculoskeletal symptoms were also on higher side and that too more specifically in the region of neck, shoulders, upper limbs and low back[1–5]. Further it is worth mentioning here that, older people have more chances of low back, shoulder and feet pain[6].

Work is very important but at the same time work should not pose health risk to worker. The health risk from work can be caused by stress which can be either mental or physical, this may cause functional damages and loss of labor capacity along with alteration social and personal attributes[7]. Apart from industry, educational institutions can also result in work-related health problems. Now a day there is an excessive use of computers in each area and this might result in rapid and highly repetitive movements, prolonged static postures and musculoskeletal pains due to mechanical stress[8]. Furthermore,

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musculoskeletal disorders are mainly responsible for absenteeism and higher costs on the public health[9]. There are quite few studies indicating that bad health of employees along with an unhealthy lifestyle are not very productive, and they take more sick leaves in addition to less performance[10–14]. Higher body mass index and lack of physical exercise could be the risk factors for musculoskeletal pain[15].

It has been reported that sustained physical activities not only provide positive impacts on musculoskeletal, cardiovascular, respiratory, and endocrine systems but also take various psychological effects[16]. Therefore, we examined the effect of twelve week non supervised exercise programme on prevalence of musculoskeletal symptoms on university employees at work place in Saudi Arabia. We also followed up participants in intervention group for six months after twelve weeks of exercise programme to examine if non supervised exercise programme has a sustainable effect on musculoskeletal symptoms, physical and physiological parameters.

2. Materials and Methods

2.1 Participants

We selected subjects from King Fahd University of Petroleum & Minerals (KFUPM). All 30 participants voluntary took part in the study. They were then randomly categorized into two equal groups; intervention and control group. During the exercise program 2 subjects from exercise group did not turn up and one subject withdrew from control group. All participating subjects had signed a written informed consent. The present study was approved by Research Committee of KFUPM.

2.2 Design of the Study

Non Supervised exercise programme was offered to the subjects in intervention group. Exercise programme was offered two times per week with not more than three days gap between the sessions. While the subject belongs to the control group continued with their regular lifestyle after 12 week of intervention, measurements were again repeated for post test data. Subjects in the intervention group were further followed up for next six months after finishing 12 weeks of exercise programme. Since it was non supervised program, we gave lecture at baseline and in week six to the intervention group. Investigators also issued guidelines to the subjects in the form broacher and posters for compliance. Each subject was supposed to maintain a formatted diary which delivered subjects before the start of exercise programme in order to record his activities on daily basis. Total duration of exercise programme was twelve weeks having two exercise sessions each week. The programme constitutes one session each of resistance and aerobic training. An aerobic session consists of running on treadmill for 30 minutes. Resistance training consisted of following weight training exercises; front shoulder press, chest, pectoral fly, abdomen exercises, triceps and biceps curl, leg curl and extension.

2.3 Measuring Tools

Prevalence of Musculoskeletal Symptom was measured by standard Nordic musculoskeletal questionnaire (NMQ)[17]. Depression was measured by employing PHQ-9 depression scale[18]. To measure the work ability of participants we used work ability index (WAI)[19,20]. Omron M6 Comfort was used record participant's blood Pressure while resting heart rate was recorded in seating position after sufficient rest with the help of Polar FT 60. Body fat percent was measured by Omron Scale (BF508). Averages of 3 recordings were taken for blood pressure, resting heart rate and fat percent. Testing for total cholesterol, triglycerides, fasting sugar, low density lipoprotein, high density lipoprotein and very low density lipoprotein was done in standardized laboratory. All test s were performed with twelve hours of fasting.

2.4 Statistical Analysis

Keeping in mind the small size of sample and non-normal data, we used non parametric statistics to study the effect after 6 months follow up. Wilcoxon signed rank test was used to find difference between two groups after 6 follow up period. Difference between two groups on musculoskeletal symptoms was measured using chi square test. Statistical significance was set at $P < 0.05$.

3. Results and Discussion

Musculoskeletal symptoms at baseline, 12 weeks and 6 months follow up both for intervention and control groups were shown in Table 1 & 2. We did not observe any adverse complications during the study period. Outcomes of 6 month follow up for physical parameters, lipid profile, depression and works ability were shown in Table 3.

Table 1. Prevalence of Musculoskeletal Symptoms During Past 12 months and 7 Days

Body Parts	During Past 12 Month					During Past 7 Days				
	Baseline 12 Weeks 6 M					Baseline 12 Weeks 6 M				
	IG	CG	IG	CG	IG	IG	CG	IG	CG	IG
Neck	31(4)	36(5)	8(1)	21(3)	8(1)	0(0)	14(2)	0(0)	7(1)	8(1)
Shoulders	23(3)	50(7)	8(1)	28(4	8(1)	15(2)	21(3)	8(1)	7(1)	8(1)
Elbows	8(1)	21(3)	8(1)	7(1)	15(2)	0(0)	7(1)	0(0)	0(0)	0(0)
Wrist/Hands	31(4)	14(2)	8(1)	7(1)	8(1)	23(3)	14(2)	0(0)	0(0)	8(1)
Upper Back	23(3)	7(1)	8(1)	14(2)	15(2)	0(0)	7(1)	0(0)	7(1)	8(1)
Lower Back	31(4)	21(3)	15(2)	14(2)	8(1)	8(1)	14(2)	0(0)	0(0)	0(0)
Hip/Thigh/Buttock	0(0)	7(1)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
Knees	38(5)	14(2)	38(5)	21(3)	23(3)	38(5)	7(1)	15(2)	14(2)	15(2)
Ankles/Feet	15(2)	21(3)	8(1)	14(2)	8(1)	0(0)	14(2)	8(1)	7(1)	8(1)

Data presented as %(n), P<0.05, IG (Intervention Group, N=13), CG (Control Group, N=14, 6M (Follow up 6 months after 12 weeks of intervention)

Table 2. During Past 12 Months Have You Been Prevented From Carrying Normal Activities

Body Parts	Baseline 12 Weeks 6 M				
	IG	CG	IG	CG	IG
Neck	0(0)	0(0)	0(0)	0(0)	0(0)
Shoulders	8(1)	0(0)	8(1)	0(0)	15(2)
Elbows	0(0)	0(0)	0(0)	0(0)	8(1)
Wrist/Hands	0(0)	7(1)	0(0)	0(0)	0(0)
Upper Back	0(0)	7(1)	8(1)	0(0)	15(2)
Lower Back	8(1)	0(0)	0(0)	0(0)	8(1)
Hip/Thigh/ Buttock	0(0)	7(1)	0(0)	0(0)	0(0)
Knees	0(0)	0(0)	15(2)	0(0)	23(3)
Ankles/Feet	0(0)	7(1)	0(0)	0(0)	0(0)

Data presented as %(n), P<0.05, IG (Intervention Group, N=13), CG (Control Group, N=14, 6M (Follow up 6 months after 12 weeks of intervention)

3.1 Results

3.1.1 Musculoskeletal Symptoms

Prevalence of musculoskeletal symptoms during past 12 month and 7 days in intervention and control group was reflected in Table 1. From the analysis of data it was clearly evident that there was no significant difference in prevalence of musculoskeletal symptoms during past 12 months between intervention and control after 12 weeks of exercise at workplace. In intervention group highest prevalence of musculoskeletal symptoms was seen in one or both knees (38%) followed by lower back (15%), neck, shoulder, elbows, wrist/hand, upper back, ankles/feet (8% each) and lowest in hips/thighs/buttocks with (0%). On the other hand in control group highest prevalence of musculoskeletal symptoms was seen in shoulder (28%) followed by neck and knees (21% each), upper back, lower back and ankles/feet (14% each), elbows and wrists/hands (7% each) and lowest in hips/thighs/buttocks with (0%).

No significant difference was observed in prevalence of musculoskeletal symptoms during past 7 days between intervention and control group post 12 weeks. For intervention group prevalence of musculoskeletal symptoms was highest in one or both knees (15%) followed by shoulders and ankles/feet (8% each) and no symptoms in neck, elbows, wrists/hands, upper back, lower back and hips/thighs/buttocks (0% each). For control group again highest prevalence was seen in one or both knees (14%) followed by neck, shoulders, upper back and ankles/feet (7% each) and no symptoms were seen in elbows, wrists/hands, lower back and hips/thighs/buttocks with (0%).

When asked if participants were prevented from carrying out normal activities during past 12 months, in control group all participant's response was 'no' while in intervention group 15% responded that they were prevented from doing normal activity due to symptoms in one or both knees and 8% each due to symptoms in shoulders and upper back.

We followed intervention group for 6 month after 12 weeks of intervention. It was found that there was no significant difference seen with respect to prevalence of musculoskeletal symptoms during past 12 months and 7 days period.

Table 3. Change From 12 Weeks Intervention to Six month Follow up (Wilcoxon Signed Rank Test)

Variable	Intervention Group (n=13)		
	12 Weeks	6 Months	P Value
Body Weight (kg)	80.6 (68.6 – 96.9)	81.3(66-89.85)	.373
Body Fat Percent (%)	25.2(19 – 28)	23.6(18.5-27.35)	.813
Body Mass Index (kg/m^2)	24.6(22.8-29)	23.3(23.1-28.4)	.258
Systolic Blood Pressure (mmhg)	121(111-122)	112(101-121.5)	.398
Diastolic Blood Pressure (mmhg)	73 (66-80)	69(63.5-77.5)	.888
Resting Heart Rate (bpm)	65 (62-70)	64(61.5-73.5)	.859
Fasting Blood Sugar (mg/dl)	87 (79 –96)	81(77.5-89.5)	.021*
Total Cholesterol (mg/dl)	164 (146-183)	165 (136-182.5)	.284
Triglyceride (mg/dl)	62 (56-99)	75(60-102.5)	.859
High Density Lipoprotein (mg/dl)	46 (40-50)	48 (41-55)	.191
Low Density Lipoprotein (mg/dl)	107 (78-115)	98 (75-108.5)	.050*
Very Low Density Lipoprotein (mg/dl)	12 (11-20)	15 (12-20.5)	.859
Depression (Score)	.00 (.00-1.00)	1.00(1.00-2.00)	.011*
Work Ability Index (Score)	47 (44-49)	45.5(43.5-48)	.166

Data shown as median (IQR), P<0.05

3.1.2 Depression and Work Ability (six month follow up)

Wilcoxon signed rank test revealed significant difference in depression scores with in intervention group after 6 month follow up period (Z = -2.530, P = .011). While no significant changes were observed in work ability index (Z = -1.385, P = .166).

3.1.3 Lipid Profile and Fasting Blood Sugar (six month follow up)

Significant change was seen in fasting blood sugar with in intervention group (Z = -2.313, P = .021) from 12 week to 6 month period. Wilcoxon signed rank test also revealed significant change in low density lipoproteins scores (Z = -1.958, P = .050) with in intervention group. However Wilcoxon signed rank failed to revealed any significant change in total cholesterol (Z = -1.071, P = .284), triglycerides (Z = -.178,P = .859), high density lipoproteins (Z = -1.309, P = .191) and very low density lipoproteins (Z = -.178, P = .589).

3.1.4 Physical Parameters (six month follow up)

After 6 month of follow up period there was no significant change seen with in intervention group on following physical parameters; body mass (Z = -.892, P = .373), body fat percent (Z = -.237, P = .813), body mass index (Z = -1.130, P = .258), systolic blood pressure(Z = -.844, P = .398), diastolic blood pressure (Z = -.141, P = .888) and resting heart rate (Z = -.178, P = .859).

3.2 Discussion

3.2.1 Musculoskeletal Symptoms

From the results it was observed that there is a prevalence of musculoskeletal symptoms among university employees. There was no significant difference seen in intervention and control group on prevalence of musculoskeletal symptoms as a result of 12 weeks exercise programme. Our results are not in line with many previous studies which reported significant change in musculoskeletal symptoms in different body parts in exercise groups[21,22]. This could be due to different type sample and exercise programed offered in those studies. However, our results are somewhat similar to study done on Brazilian university employees where prevalence of musculoskeletal symptoms were reported[23].

In present study there was high prevalence of musculoskeletal symptoms in knees (38%) intervention group which could possibly related to working environment and which indicates possible workplace inadequacies. Similar suggestions were reported in a study on musculoskeletal symptoms in Brazilian public university[23]. We have observed more prevalence of musculoskeletal symptoms in previous 12 months than compare to during 7 days which suggest that these symptoms were chronic in

nature as also reflected in study on Brazilian university employee[23].

The intervention did affect symptoms in certain body parts but not statistically significant which suggest that exercise specific to the body part may be more appropriate in reducing the symptoms as also suggested in another study[21].

3.2.2 *Depression, Work Ability, Physical Parameters & Lipid Profile (six month follow up)*

We followed participants in intervention group after 12 weeks of exercise programme for 6 months. After 6 months of follow up significant changes were observed in depression scores. This is positive change in outlook of participants and might be attributed to the peer support. Peer support is important factor associated with depression[24]. But no significant change was seen in their work ability. Similarly, no significant change was seen in body weight, body fat percent, body mass index, systolic blood pressure, diastolic blood pressure and resting heart rate. But there was noticeable improvement in all physical parameters which indicate that participants continued the exercise programme after 12 weeks of intervention.

Significant difference was seen in fasting blood sugar and low density lipoprotein after six month follow up. Significant difference in low density lipoprotein was reported in similar study after 12 weeks of intervention[25]. Other variables such as total cholesterol, triglycerides, high density lipoprotein and very low density lipoprotein did not show any significant difference after follow up period. Mixed results after follow up period may indicate that participant did continue exercise programme and were motivated enough to follow the programme. Adherence to the physical activity was not enough to bring significant changes in all variables. Noticeable improvement in most of the variables suggest that 12 weeks of intervention at work place was somehow beneficial to bring positive change in general outlook of employees towards physical activity.

4. Conclusions

Twelve weeks of non-supervised intervention at work place was not effective in bringing significant change in prevalence of musculoskeletal symptoms in participating subjects. After six month follow up no significant change was seen in most of the parameters except fasting blood sugar, low density lipoprotein and depression.

5. Acknowledgement

The authors would like to acknowledge the support provided by the Deanship of Scientific Research at King Fahd University of Petroleum & Minerals (KFUPM) under Research Grant IN131049.

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