Original Article

The effect of physical education program on the physical fitness levels of the orientation students of King Fahd University of Petroleum and Minerals

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Abstract

The purpose of the study was to find out the effect of the Physical Education Program on the physical fitness levels of the orientation students of the KFUPM. 1244 Orientation students between 18 to 25 years were divided into underweight, normal weight, overweight and obese, based on BMI to undergo the P.E. Program. A pre and post-test was done on age, height, weight, body fat, body mass index, 50 M run, 550 M run, sit ups, standing long jump and sit and reach. The duration of the PE program was 30 minutes twice per week in volleyball and football for 8 weeks. The statistical tools used were mean, S.D. and t- test. The results showed that there was no difference in height of the students, but with regard to other physical and motor performance variables there was significant difference from pre to post-test in the overall analysis. The group wise analysis also showed improved performance in all the variables except the obese group which showed insignificant difference in 50mts run and 550 meters run with mean reading 9.08 ± 0.96 and 9.06 ± 1.01 for pre to post-test respectively. The Program of Physical Education had a significant effect on the performance of the orientation students in the physical characteristics and motor performance variables of 4 groups from pre to post-test. It was also concluded that the obese group also showed improved performance in a few variables, but in the runs of speed and endurance they showed insignificant difference.

Key words: Physical fitness, body mass index, orientation, & obese.

Introduction

Physical Fitness has been the watch word of this millennium. Globally, people of late have been realizing its importance and one can find groups of people exercising daily in the morning and evenings. The habit of physical activity should be inculcated right from the childhood and it is the parents who have a great role to play in the child's health (Bouchard et al. 1990). Now a days parents are exerting tremendous pressure on their wards to excel in academics, which keeps the student tied down to the books and long hours spent before the television and computers are to be squarely blamed for low fitness levels (Kirk. 2005). Good health was defined as the absence of disease, but later the concept has changed to wellness, which includes regular physical activity, proper nutrition, eliminating unhealthy behaviours and maintaining good emotional and spiritual health (Scott & Stephen. 2009). One of the key aspects for maintaining a healthy body is physical fitness which has a positive effect on the health by reducing the risk of disease and improving the Quality of life (Malina.1996). Physical activity includes all physical movement, regardless of the level of energy expenditure or the reason you do it. Physical activity can be occupational, lifestyle or leisure time. Virtually all conditioning activities and sports are considered exercise because they are planned and help maintain or improve physical fitness. The main thing that distinguishes exercise from other types of physical activity is that exercise is done specifically for health and fitness (Hardman.1998). The health benefits of regular physical exercise as stated by Armstrong (1996). 1. Improved Psychological well-being 2. Increased Longevity 3. Maintenance of working capacity during aging 4. Increased bone mass. 5. Reduced risk of Diabetes 6. Reduced risk of Heart Diseases.

It is recommended that teachers of physical education should translate the training principles into practice so that measurable training effect is enhanced. Studies have indicated that higher intensities with sufficient duration had resulted in greater adaptation. King Fahd university of Petroleum & Minerals is a unique university which has set trends with innovative programs both on the academic and physical education fronts. There is no other university in the Gulf region which makes physical education compulsory for all its students except KFUPM. The students have to participate in PE activity for half an hour twice a week and at the end of the program there is an assessment for giving grades to the students which carries credits. The main purpose of the study was to find out the effect of physical education program on the physical fitness levels of the orientation students of KFUPM.

Methodology

One thousand Two hundred Forty Four male subjects from King Fahd University of Petroleum and Minerals undergoing the orientation course were selected to participate in physical education program. Subjects were divided into four categories (underweight, normal weight, overweight and obese) based on their body mass index. The duration of the physical education program was for 30 minutes, twice per week. The disciplines covered in the orientation program were Football and Volleyball. All the subjects were tested prior to and after 8 weeks of physical education program. The test procedures administered were verbally explained and practically demonstrated. Quarries and doubts if any were answered. A questionnaire was circulated to elicit the information and details of the students' daily physical activity, the duration, intensity of the activity, and the game the particular individual practices and plays. The above questionnaire was standardized with a pilot study for its validity and reliability. The testers were trained to measure the physical activity in each class and the reliability and competence of the testers was arrived during the pilot studies. The variables measured during the study were age, height, body mass, body mass index, 50 meters run, 550 meters run, sit-ups, standing long jump, and sit & reach. The physical education program for the orientation course was for duration of 15 weeks. The first three weeks were devoted for the health education classes where the health issues were dealt as per the syllabus. The students had to undertake Pre physical fitness test for the next two weeks. The main physical education program was for a period of 8 weeks which consisted of the disciplines of Football and volleyball. Each of the activity lasted for four weeks. The duration of each class was 50minutes in which 5 minutes were spent for class roll call and 15 minutes for warm up. The main physical education program lasted for 30 minutes duration. During the concluding two weeks the students took the Post Physical Fitness Test.

Results

The purpose of this study was to examine the effect of the Physical Education Program on the Physical Fitness Levels of the Orientation students of KFUPM. The data has been analysed and presented in the following sequence: Physical Characteristics (Overall) and (Different Groups), Selected Physical Variables (Overall) and (Different Groups) .Physical Characteristics: Age, Body Mass, Height and Body Mass Index (overall).Table I shows the overall Mean and Standard deviation of Age, Body Mass, Height and Body Mass Index of the students in the pre and post-test. The mean age was 18.46 ± 0.85 years. The mean body mass was 71.72 ± 19.69 pre and 72.76 ± 19.46 post with a t value of 10.550 which were significant at .000. The mean pre height was 1.70 ± 6.50 and the post height was 1.70 ± 6.49 with t value being 1.668 which was not significant at 0.096. The Body Mass Index pre mean value was 24.57 ± 6.34 and the post mean was 24.93 ± 6.27 with t value being 10.702 which was significant at .000.

Table I showing the Physical Characteristics-Age, Body Mass, Height & Body Mass Index (Overall)

Variable	N	Pre	Post	t Value	Sig
		Mean $\pm$ SD	Mean $\pm$ SD		
Age	1244	18.46 ± 0.85	-	-	-
Body Mass	1244	71.72 ± 19.69	72.76 ± 19.46	10.550	.000
Height	1244	1.70 ± 6.50	1.70 ± 6.49	1.668	.096
Body Mass Index	1244	24.57 ± 6.34	24.93 ± 6.27	10.702	.000

N= Number of subjects

Selected Motor Performance Variables (Overall):1) 50 Meters 2) 550 Meters 3) Standing Long Jump 4) Sit Ups 5) Sit & Reach

Table II revealed that there was significant effect on the physical fitness program on all the Motor Performance variables under the study. The mean for the pre-test for 50 meters run was $7.73 \pm .86$ and for the post-test was $7.62 \pm .92$ with the t value -16.713 which was significant at .000. For the 550 meters Run the mean for the pre-test was $02:40 \pm 00.45$ and post-test was $02:31 \pm 00.48$ and the t value of -21.254 which was significant at .000. For the Standing Long Jump the mean for the pre-test was 1.77 ± 29.69 and post-test was 1.81 ± 30.05 and the t value was 40.771 which was significant at .000. The Sit Ups had a pre mean of 21.52 ± 4.74 and post of 24.05 ± 4.87 and the t value of 56.462 which were significant at .000. For the event Sit and Reach the mean for the pre-test was 26.83 ± 8.33 and post-test was 28.89 ± 8.37 and the t value was 40.647 which was significant at .000.

Table II showing the Selected Motor Performance Variables (Overall)

Variable		Mean		S.D.		t value	P value
		Pre	Post	Pre	Post		
50 Meters	N=1176	7.73	7.62	± 0.86	$\pm .92$	-16.713	.000
550 Meters	N=1002	02:40	02:31	± 00.45	± 00.48	-21.254	.000
Standing Long Jump	N=1240	1.77	1.81	± 29.69	± 30.05	40.771	.000
Sit Ups	N=1244	21.52	24.05	± 4.74	± 4.87	56.462	.000
Sit & Reach	N=1242	26.83	28.89	± 8.33	± 8.37	40.647	.000

Influence of Physical Education Program on the Motor Performance of different groups.

Table III a), b) and c) show the overall Mean and Standard deviation of Age, Body Mass, Height and Body Mass Index of the students in the pre and post-test for the four groups i.e. underweight, normal weight,

overweight and the obese. As per the table I a) the average age for underweight was 18.37 ± 0.69 years, for the normal weight the average age was 18.43 ± 0.79 years, for overweight the average age was 18.58 ± 1.02 years and for the obese average age was 18.50 ± 0.87 years. For underweight group the mean pre and post body mass as per table III a) were 49.64 ± 4.67 and 51.79 ± 5.20 respectively with t value of 11.465 which was significant at .000. The normal weight category had a mean body mass pre 62.97 ± 7.24 and post 64.22 ± 7.43 with t value of 9.286 which was significant at .000. For overweight the body mass pre was 79.73 ± 7.17 and post was 80.00 ± 7.79 and a t value of 1.206 which was significant at .000. The obese group had a body mass pre of 103.31 ± 15.99 and the post was 103.73 ± 16.88 resulting in a t value of 1.537 which was significant at .000. With regard to the height represented in table III b) there was no difference in all the four groups with the pre and post height of underweight group being the same as 169.97 ± 6.54 , the normal weight group had a pre and post height of 170.54 ± 6.46 and 170.55 ± 6.47 respectively with the t value of 1.635 which was not significant at .103 and the height of the overweight group for pre and post was very similar with the reading of 170.96 ± 6.62 and with regard to the obese values of pre and post height were 170.97 ± 6.42 and 170.98 ± 6.39 respectively with a t value of .576 which was not significant at .565. For the two groups underweight and the overweight the standard error of difference was 0 and hence there was insignificant difference in the pre and post height of these groups.

The Body Mass Index of the subjects which is represented in table III c) showed that the mean value for the underweight group pre and post was 17.17 ± 1.04 and 17.92 ± 1.34 respectively with the t value of 11.650 which was significant at .000. For the normal weight group the pre and post means for the BMI were as follows 21.62 ± 1.84 pre and 22.06 ± 2.05 post with the t value of 9.343 which was significant at .000. For overweight group the pre and the post means for BMI were 27.25 ± 1.36 and 27.34 ± 1.73 respectively with a t value of 1.233 which was insignificant at .219. The last group of obese had a pre and post Body Mass Index of 35.26 ± 4.43 and 35.40 ± 4.79 respectively with a t value of 1.506 which was insignificant at .133.

Table III a) showing the Motor Performance (Different Groups)

Groups	N	Age/y	Body Mass/kg		t value	Sig
			Pre	Post		
		Mean $\pm$ SD	Mean $\pm$ SD	Mean $\pm$ SD		
Under Weight	188	18.37 ± 0.69	49.64 ± 4.67	51.79 ± 5.20	11.465	.000
Normal Weight	575	18.43 ± 0.79	62.97 ± 7.24	64.22 ± 7.43	9.286	.000
Over Weight	255	18.58 ± 1.02	79.73 ± 7.17	80.00 ± 7.79	1.206	.229
Obese	226	18.50 ± 0.87	103.31 ± 15.99	103.73 ± 16.88	1.537	.126

Table III b) showing the Motor Performance (Different Groups)

Groups	N	Height/cm		t value	Sig
		Pre	Post		
		Mean $\pm$ SD	Mean $\pm$ SD		
Under Weight	188	169.97 ± 6.54	169.97 ± 6.54	--	.097
Normal Weight	575	170.54 ± 6.46	170.55 ± 6.47	1.635	.103
Over Weight	255	170.96 ± 6.62	170.96 ± 6.62	--	.096
Obese	226	170.97 ± 6.42	170.98 ± 6.39	0.576	0.565

Table III c) showing the Motor Performance (Different Groups)

Groups	N	Body Mass Index/kg/m ²		t value	Sig
		Pre Mean $\pm$ SD	Post Mean $\pm$ SD		
Under Weight	188	17.17 ± 1.04	17.92 ± 1.34	11.650	.000
Normal Weight	575	21.62 ± 1.84	22.06 ± 2.05	9.343	.000
Over Weight	255	27.25 ± 1.36	27.34 ± 1.73	1.233	.219
Obese	226	35.26 ± 4.43	35.40 ± 4.79	1.506	.133

Motor Performance variables for the underweight group.

In table IV the underweight group's analysis for the different test items is presented. The event of 50 meters run had a pre and post means of $7.31 \pm .34$ and $7.16 \pm .33$ respectively with a t value of -14.609 which was significant at .000. For the 550 meters run the group showed pre and post means of $02:17 \pm 00:20$ and $02:04 \pm 00:17$ respectively resulting in the t value of -18.744 which was significant at .000.

The variable of standing long jump had a pre and post means of 184.56 ± 24.26 and 188.94 ± 24.76 respectively with the t value of 19.433 which was significant at .000. For the sit ups the pre and post means were 20.77 ± 4.81 and 23.59 ± 5.00 respectively giving the t value of 28.848 which was significant at .000. Lastly in the event of sit and reach the pre and post mean values were 26.22 ± 8.01 and 28.57 ± 8.05 respectively with the t value of 23.445 which was significant at .000. Hence the results of the underweight group in all the test items of the study had shown improvements from pre to post-test which is quite encouraging and significant

Table IV showing the Selected Motor Performance Variables (Underweight Group)

Variable	N	Mean & S.D.		t value	P value
		Pre	Post		
50 Meters	180	7.31 ±.34	7.16 ±.31	-14.609	.000
550 Meters	160	02:17 ±00:20	02:04 ±00:17	-18.744	.000
Standing Long Jump	188	184.56 ±24.26	188.94 ±24.76	19.433	.000
Sit Ups	188	20.77 ±4.81	23.59 ±5.00	28.848	.000
Sit & Reach	188	26.22 ±8.01	28.57 ±8.05	23.445	.000

Motor Performance variables for the Normal weight group.

The data pertaining to the variables under the study for the normal weight group are presented in table V. In this group the event of 50 meters had shown the pre and post-test means of 7.34±.41 and 7.20±.43 respectively with the t value of -17.429 which was significant at .000. For the 550 meters run the pre and post-test means were 02:19±00:22 and 02:08±00:20 respectively with t value of -20.860 at .000 level of significance. Standing Long Jump had a pre and post-test means of 186.78±27.78 and 191.04±27.65 respectively and the t value was 29.045 which were significant at .000. For sit ups the pre and post-test means were 22.26±4.75 and 24.96±4.82 respectively with a t value of 41.649 which was significant at .000. The last item of sit and reach had pre and post-test means of 27.67±8.65 and 29.84±8.66 respectively resulting in the t value of 25.813 which was significant at .000, clearly indicating that there were significant improvements in all the motor performance.

Table V showing the Selected Motor Performance Variables (Normal weight Group)

Variable	N	Mean & S.D.		t value	P value
		Pre	Post		
50 Meters	541	7.34 ±.41	7.20 ±.43	-17.429	.000
550 Meters	449	02:19 ±00:22	02:08 ±00:20	-20.860	.000
Standing Long Jump	572	186.78 ±27.78	191.04 ±27.65	29.045	.000
Sit Ups	575	22.26 ±4.75	24.96 ±4.82	41.649	.000
Sit & Reach	574	27.67 ±8.65	29.84 ±8.66	25.813	.000

Selected Motor Fitness variables for the overweight group

The data pertaining to the variables under the study for the overweight group are presented in table VI. In this group the event of 50 meters had shown the pre and post-test means of 7.73±.51 and 7.65±.56 respectively with the t value of -5.717 which was significant at .000. For the 550 meters run the pre and post-test means were 02:43±00:28 and 02:36±00:31 respectively with t value of -7.530 at .000 level of significance. Standing Long Jump had a pre and post-test means of 174.66±26.00 and 178.08±26.06 respectively and the t value was 19.287 which were significant at .000. For sit ups the pre and post-test means were 21.95±4.68 and 24.30±4.60 respectively with a t value of 24.321 which was significant at .000. The last item of sit and reach had pre and post-test means of 27.65±7.77 and 29.62±7.65 respectively resulting in the t value of 21.385 which was significant at .000 indicating the improvement in all the physical fitness variables of the study.

Table VI showing the Selected Motor Performance Variables (Over weight Group)

Variable	N	Mean & S.D.		t value	P value
		Pre	Post		
50 Meters	241	7.73 ±.51	7.65 ±.56	-5.717	.000
550 Meters	210	02:43 ±00:28	02:36 ±00:31	-7.530	.000
Standing Long Jump	255	174.66 ±26.00	178.08 ±26.06	19.287	.000
Sit Ups	255	21.95 ±4.68	24.30 ±4.60	24.321	.000
Sit & Reach	255	27.65 ±7.77	29.62 ±7.65	21.385	.000

Motor Performance variables for the obese group

The data pertaining to the variables under the study for the obese group are presented in table VII. In this group the event of 50 meters had shown the pre and post-test means of 9.08±.96 and 9.06±1.01 respectively with the t value of -0.983 with the p value of 0.349 which is insignificant. For the 550 meters run the pre and post-test means were 03:49±00:50 and 03:46±00:54 respectively with t value of -1.961 and the p value of 0.051 which is also insignificant. Standing Long Jump had a pre and post-test means of 145.31±24.27 and 147.81±24.81 respectively and the t value was 12.459 which were significant at .000. For sit ups the pre and post-test means were 19.84±4.21 and 21.84±4.48 respectively with a t value of 17.744 which was significant at .000. The last item of sit and reach had pre and post-test means of 24.28±7.87 and 25.95±7.99 respectively resulting in the t value of 14.265 which were significant at .000. The results show that for the first two items the obese group had not shown improvements and with regard to the other three items there was significant and marked difference in the performance of the subjects.

Table VII showing the Selected Motor Performance Variables (Obese Group)

Variable	N	Mean & S.D.		t value	P value
		Pre	Post		
50 Meters	214	9.08 ±0.96	9.06 ±1.01	-0.983	.349
550 Meters	183	03:49 ±00:50	03:46 ±00:54	-1.961	.051
Standing Long Jump	225	145.31 ±24.27	147.81 ±24.81	12.459	.000
Sit Ups	226	19.84 ±4.21	21.84 ±4.48	17.744	.000
Sit & Reach	225	24.28 ±7.87	25.95 ±7.99	14.265	.000

Discussion

Physical Education Program in the colleges and Universities have the potential to provide 97% of the students with regular physical activity that has the multiple health benefits in the youth (Ross & Gilbert, 2005). To achieve high fitness levels the physical education programs should promote physical activity during physical education classes as well as outside of the Colleges. If the increases in physical activity are sufficient then it will result in improved physical fitness (Marrow & Freedom, 2004). Studies have indicated that if proper training principles were followed and with supplementary programs apart from regular physical education, health fitness levels improved (Werner & Durham, 2008, Ignico & Mahon, 2005, Derri et al., 2004, Hamlin, Ross & Sang, 2002). The results of this study have indicated that there was a marginal increase in the body mass and the body mass index of the students in the overall analysis. This can be attributed to few reasons and one of them being that the strata contains all the four groups together. The results might have influenced the increase in the overall body mass and thereby the body mass index. The hypothesis which stated that there will not be any significant change in the body mass and body mass index is rejected since there was an increase in the above variables. But on the other hand the hypothesis that there will not be any change in the height has been accepted as the results have indicated the same.

The health related physical education program which is provided at the KFUPM has substantially more physical activity and it is estimated that during the 15 week semester, students have spent more time in moderate to vigorous physical activity. National and International groups (Healthy People, 2007) recommend that young people should participate in at least 30 minutes of moderate to vigorous physical activity on most days. The program at KFUPM which is mandatory for all the students provides 30 minutes of physical activity twice a week. Although it is not possible for the University physical education to provide all recommended daily physical activity, physical education should be judged in part on how it contributes to national health objectives. Extracurricular programs, community programs and family involvement are needed to ensure that the students receive adequate amounts of physical activity.

It is reported that physical education classes should comply with minimum training principles to promote physical fitness. As Cooper (2001) suggested, any activity carried out by individuals must be strenuous enough (intensity), long enough (duration) to produce the training effect and it should be carried out at least two to three times a week (frequency). This is also in line with the minimum standards recommended by ACSM (1998) that activities of an aerobic nature must be followed at least 2 to 3 times a week with each session lasting for a minimum of 20 minutes to 60 minutes at a continuous pace or in intermittent bouts at an intensity of 50% to 60% of the HRMax. This has been followed by the KFUPM physical education department and the results of the study point out towards this aspect. The overall performance of the students in the selected motor variables under table II has been quite encouraging and significant as the students have shown improvements from pre to post in all the motor performance events under study.

As discussed earlier with regard to the increments in body mass and body mass index, the results in all the groups have shown a marginal increase as per table III a) b) and c). The increase of the above two variables for the underweight and normal weight groups can well be understood, this may be caused by the improvement in muscle mass and the physical education program might have had a training effect. But on other hand there was no increase of body mass and body mass index for overweight and obese groups. This can be attributed to the continuation of the daily intake of the nutrition in similar amounts by these two groups during the course of the study.

In tables IV and V are seen the performances of the underweight and normal weight students with regard to the motor performances in all the test items. The results observed are consistent with other studies (Malthi, 2003; Shabeshan, R. 2006; Williams, A. 1988) conducted in this area showing that there is a significant effect of the physical education program on all the parameters of the study variables. The above two groups have shown improved performance in the 50 meters run, 550 meters run, standing long jump, sit ups and sit and reach which corroborates with the studies done by James F.Sallis, et al., (2004), Coonam, D.T. et al., (2003). The results confirm to these studies that there was significant difference in the physical fitness variables of the underweight and normal weight students. With regard to the overweight students the table VI reveals that there was significant difference in all the physical fitness motor variables under study. The subjects performed better from pre to post in 50 meters run, 550 meters run, standing long jump, sit ups and sit and reach. This may be due to fact that the above group had enough amount of the physical activity to substantially increase their performance along with the other aspects like familiarization of the testing protocol and motivation.

Discussion on the obese groups leads to some interesting arguments. In general, low levels of physical activity are associated to high levels of obesity (In-Iw & Biro, 2011, Antonogeorgos, Papadimitriou, Panagiotakos, Priftis & Nicolaidou, 2010). However the majority of the research conducted under this scope chooses often to characterize in a specific moment a sample/population attempting to find patterns of physical activity associated to levels of body composition and other motor parameters (Nettle & Sprogis, 2011, Mascarenhas et al., 2005). Vanhelst et al., (2011) verified that obese student, it seems less attention of scientific community is done in monitoring and controlling the effects of a physical activity program on the levels of body composition and other physical parameters in obese s presented lower values of physical activity, when

compared to non-obese colleagues. Although the importance of physical activity and pre obese (Vanhelst et al., 2011, Mota, Riberio, Carvalho, Santos & Martins, 2009). Additionally, to the best of our knowledge the evaluation of body composition and other physical fitness variables in the above group (obese/pre obese students) is scarce. The discussion leads to the results of the study where in the obese subjects did not perform well in the motor fitness variables of 50 meters and 550 meters which tests the speed and the endurance of the students. One of the reasons may be, even though they had gained a little weight which was not significant, but because of their existing weight the above group cannot perform well in the events of short duration sprints and also the long distance which required sustenance of fatigue for a long time. But is it interesting to note that all the subjects performed well in the other three motor fitness variables like standing long jump, sit ups and sit and reach. This may be attributed to the fact they had gained more familiarization and psychological effect to perform well in these events.

Conclusion

In conclusion, the present investigation observed significant improvements in the physical fitness components (Speed, endurance, muscular endurance, explosive power and flexibility) of the three groups and to certain extent the last group, the obese due the intervention of the physical education program of the orientation students of KFUPM.

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