

Omani physical education curriculum impact on physical fitness

A. Al-Shamli

Department of Physical Education, Sohar University, Sultanate of Oman

Abstract

School environment is an ideal setting to enhance physical fitness components, because virtually all students can be reached. However, it is important to use the scheduled time for physical education optimally and efficiently to improve physical fitness components levels. The objective of this study was to measure the impact of physical education curriculum on physical fitness components (cardiovascular fitness, body composition, flexibility, muscle strength and endurance) of male students. The experimental design was a pre-test, post-test design with two groups for eight weeks for 72 students. The experimental group enrolled in an additional physical education session once a week for 40 minutes that included a programme to improve the physical fitness components with medium intensity of 70-75% of maximum heart rate. While the control group enrolled in an additional physical education session followed the school physical education curriculum. The results showed a significant deference for the both groups and higher for the experimental group on the physical fitness components. The study recommends that the ministry of education may consider increasing the number of physical education sessions to twice a week or more and design physical education curriculum with various physical activities which can enhance and improve physical fitness.

Keywords: physical fitness, physical education, PE curriculum, Oman PE.

School environment is an ideal setting to enhance physical fitness components, because virtually all students can be reached. It is recommended by "Healthy People 2010" that all children should be engaged in moderate to vigorous physical activity for at least 50% of the physical education class time (USDHHS, 2000). Secondly, it is recommended that schools should provide daily physical education lessons for children of all ages. Increasing the frequency or duration of physical education classes is difficult because the time allocated to physical education is mostly limited within existing school programmes. Therefore, it is important to use the scheduled time for physical education optimally and efficiently to improve physical fitness components levels. According to Kahn et al. (2002) health-related physical education programmes are evaluated as effective in enhancing students' moderate to vigorous physical activity levels during physical education classes. In this context, Kann et al. (1996) showed that adolescence appears to be a period characterized by marked declines in physical activity. Changes occurring during adolescence, positive and negative habits regarding health are also acquired before adulthood (Trudeau et al. 1999). In subsequent studies, numerous researchers have showed that the rate of children and adolescents developing physical activity has decreased over the last few years due to increased influence of sedentary activities such as viewing television, surfing internet and playing video games (Berkey et al., 2000; Boreham & Riddoch, 2001; GSHS, 2005; Hassan & Al-Kharusy, 2000; Al Barwani et al., 2001; Telama & Yang, 2000; Van Mechelen et al., 2000). In support of that Gordon-Larsen et al. (2000) cited that adolescents spend less time in physical education sessions than younger children. These findings reinforce the need for physical activity intervention programmes for children and adolescents.

Physical Education is the primary source of physical activity and fitness instruction. It highlights the importance of physical activity as a physical component of a healthy lifestyle. A well-designed physical education program can motivate students to maintain healthy habits and regular physical activity (Beets & Pitetti, 2005; Boreham & Riddoch, 2001; Oman Physical Education Curriculum, 2008). It is also effective in enhancing students' physical activity-related knowledge (Hayman et al., 2004), attitude, behaviours, and physical fitness (Kohl, 2001). One of the Omani physical education curriculum goals is that addresses the students' fundamental need for regular physical activity to remain healthy and promotes many of the attitudes and behaviours that reduce health risks, including developing an appreciation of appropriate nutrition and exercise (Oman Physical Education Curriculum, 2008).

The physical education curriculum of Omani schools includes different sport activities such as football, volleyball, handball, gymnastics, basketball and track and field. These sports are divided into events over the academic year divided into two semesters. The events are different from one grade to

another. For example, students in grade eight have long jump and shot putt events in track and field, but the students in grade eleven have javelin throw and 4×400 relay. The events are distributed through each semester for 15 weeks. These sessions run once a week for 40 minutes.

The school time allocated to physical education is often limited and lessons run for 40 minutes. In practice, however, it is difficult to utilize the entire 40 minutes effectively. Therefore it is difficult to lengthen physical education sessions because they have to end early to allow the students' time to change back into their school uniforms for their following academic sessions. However, the experimental design in the present study intends to improve students' physical fitness by increasing students' activity levels during physical education sessions. The design that is suggested is by modifying current curricula and policies to improve the physical fitness components while in physical education classes. This can be achieved by different means such as adding additional physical education classes, lengthening existing physical education classes, or increasing from moderate to vigorous physical activity for students during physical education classes without necessarily lengthening class time (Bates, 2006). Examples of the last approach include changing the activities taught (e.g., substituting softball for football) or modifying the rules of the game so that students are more active (e.g., having the entire team run the bases together if the batter makes a hit in softball). Current study added additional physical education sessions during the week and increasing from moderate to vigorous physical activities during the sessions. The increase from moderate to vigorous physical activity includes a programme that aims to improve the physical fitness components.

The 10th grade physical education curriculum of Omani schools includes different sport activities and each activity is divided into events. The students have to take these activities during the study year for two semesters (Oman Physical Education Curriculum, 2008). Table (1) below shows the content of this curriculum where each sport activity divided into events.

Table (1)

The physical education curriculum of 10th grade

Content	Event
Track and field	Discus throw and javelin throw
Football	Side tackling and passing throw
Volleyball	One hand defense and scoring
Gymnastics	Front Somersault and cartwheel
Basketball	Scoring and dribbling and passing
Handball	Back throw and scoring after deception

As can be seen in the table, for example, in track and field the students have to study two events, discus throw and javelin throw, while in volleyball they have to learn one hand defense and shooting. An evaluation of these events highlights that students are inactive for a long time and do not engage in either moderate or vigorous physical activity (Al-Hazzaa & Al-Mozaini, 1999). This is on account of the number of students in each class, and the fact that the teacher has to attend to all the students, which involves correcting errors in performance, and limited equipment.

The experimental design was a pre-test, post-test design with two groups for eight weeks. Studies showed that the adaptation due to a training programme or regular participation in physical activity can be achieved within four to six weeks (Corbin et al., 2004). The students were selected from one school, and from three classes of 10th grade forty students aged 16-17 years were chosen. In support of the sample size Dell et al. (2002, p.207) cited that "10 subjects are sufficiently to find the effect of the factor X". Here, the factor X is the intervention programme Students were divided into three groups (one experimental group and one control groups). The experimental group enrolled in an additional physical education session once a week for 40 minutes that included a programme to improve the physical fitness components with medium intensity of 70-75% of maximum heart rate (Baquet et al, 2003). The control group enrolled in an additional physical education session followed the school physical education curriculum. The experimental programme

was established by reviewing the training guide (Gauer & O'Connor, 2001), exercise prescriptions (Bates, 2006) and using author experience in teaching and coaching. Prior to conducting the study, the researcher successfully approached the Ministry of Education for administrative permission to conduct the study, to allow the selection of research subjects and also to provide two physical education teachers to help with data collection. Pre and post tests of the physical fitness components (Cardiorespiratory fitness, body composition, flexibility, and muscle strength and muscle endurance) were gathered before and after the students enrolled in additional physical education sessions.

The programme contents shown in Table (2) have different activities which are divided so as to use the session time efficiently.

Table 2
The experimental programme content

Sessions	Content	Session intensity
Session 1	8 minutes Running around the field 4 minutes Stretching Modified push-up 15s * 2 times Sit-ups 20s * 2 times 16 minutes Football 3 minutes cool down	$70-75\% \text{ of maximum heart rate.}$ $220 - \text{age} = \text{maximum heart rate}$ $220 - (16-17 \text{ years}) * (70-75\%) = 140 - 150 \text{ b} \cdot \text{min}^{-1}$
Session 2	10 minutes Running around the field 6 minutes Stretching Modified push-up 15s * 3 times Sit-ups 20s * 3 times 10 minutes handball 3 minutes cool down	
Session 3	10 minutes Running around the field 6 minutes Stretching Modified push-up 10s * 4 times Sit-ups 20s * 4 times 10 minutes volleyball 3 minutes cool down	
Session 4	8 minutes Running around the field 5 minutes Stretching Modified push-up 15s * 4 times Sit-ups 20s * 4 times 12 minutes basketball 3 minutes cool down	
Session 5	8 minutes Running around the field 5 minutes Stretching Push-up 15s * 2 times Sit-ups 30s * 3 times 16 minutes javelin throw 3 minutes cool down	
Session 6	12 minutes Running around the field 6 minutes Stretching Push-up 20s * 2 times Sit-ups 40s * 3 times 12 minutes Football 3 minutes cool down	
Session 7	14 minutes Running around the field	

	5 minutes stretching
	Push-up 20s * 2 times
	Sit-ups 40s * 3 times
	10 minutes basketball
	3 minutes cool down
Session 8	12 minutes Running around the field
	6 minutes stretching
	Push-up 15s * 3 times
	Sit-ups 30s * 4 times
	12 minutes handball
	3 minutes cool down

As can be seen, each session includes a programme that aims to improve the five components, and ends with one of the curriculum activities that kept students active for most of the session as well as maintaining student interest and so not regarded as a chore by students.

Furthermore, running was used to warm up the students and improve the cardiovascular fitness. Studies had shown that aerobic physical activity such as running and swimming leads to improved cardiovascular fitness (Bates, 2006; Fletcher et al., 1996; Gauer & O'Connor, 2001; Leon, 1997; NIH, 1996; Pate et al., 1995; U.S Department of Health and Human Services, 1996). Push-up and sit-ups exercises are used to improve the muscle strength and muscle endurance (Caspersen et al., 1985, Caspersen et al., 2000; Gauer & O'Connor, 2001; Heyward, 1998a). Whereas, stretching exercise improve the flexibility (Gauer & O'Connor, 2001; Cumine, 1996; Gauer & O'Connor, 2001; Heyward, 1998a). Therefore, by increasing physical activity the fat percentage will decrease (Hill & Commerford, 1996; Ross et al., 2000a; Rowland, 2002; Thompson et al., 2004).

RESULTS

The study sample consisted of 72 male students of the 10th grade, who divided equally into 36 students in experimental group and 36 students in control group. The average age of the respondents was 16.37 years with a standard deviation of 0.49. The average weight was about 52.76 kg with a standard deviation of 9.28kg. The average height reported was 166.1 cm with a standard deviation of 7.82.

As shown below in Table 3, the physical fitness components of overall sample were body fat percentage 4.18 ± 1.3 , muscle strength 39.1 ± 6.77 kg, flexibility 39.2 ± 5.75 cm, muscle endurance 39.4 ± 7.17 times/minute, and cardiovascular endurance 7.52 ± 1.54 minutes.

Table 3: Summary results of the physical fitness components (overall sample)

Physical fitness components	Mean+SD
Body fat %	4.18 ± 1.3
Muscle strength	39.1 ± 6.77
Flexibility test (cm)	39.2 ± 5.75
Muscle endurance(times/1 minute)	39.4 ± 7.17
Cardiovascular endurance (minutes)	7.52 ± 1.54

Table 4 below shows the test significance of the mean difference of the pre and post- tests for each of the physical fitness components using the paired sample t-test.

Table 4 Summary results of paired sample t-test of overall sample in the physical fitness

Physical fitness components	Test	Mean	SD		<i>t</i> statistics	<i>p</i> - value
Body fat %	Pre	4.8883	1.6460	0.7164	8.872	0.01*
	Post	4.1719	1.2731			
Muscle strength	Pre	37.535	7.306	-1.564	-5.993	0.01*
	Post	39.099	6.766			
Flexibility test (cm)	Pre	37.635	5.736	-1.565	-7.641	0.01*
	Post	39.200	5.745			
Muscle endurance(times/1 minute)	Pre	37.31	7.25	-2.097	-8.404	0.01*
	Post	39.403	7.171			
Cardiovascular endurance (minutes)	Pre	8.0031	1.7576	0.3844	7.931	0.01*
	Post	7.6186	1.5375			

* Significant at 0.01 level of significance

As can be seen from the table4, all the components shows a significant difference ($p=0.01$). This means that the modification in the physical education curriculum with additional physical education session was effective.

When the test was carried out to compare experimental and control respondents, it also found that all components be significant as table 5 shows.

Table 5 below shows the test significance of the mean difference of the pre and post- tests for experimental and control groups in the physical fitness components using the paired sample t-test.

Table 5 Summary results of paired sample t-test of experimental and control groups in the physical fitness components.

Physical fitness components	Group	Test	Mean	SD	Mean deference	<i>t</i> statistics	<i>p</i> -value
Body fat %	Experimental	Pre	4.6956	1.2288	0.9283	8.436	0.01*
		Post	3.7672	.7947			
	control	Pre	37.267	6.406	0.5044	4.648	0.03**
		Post	38.933	5.863			
Muscle strength	Experimental	Pre	38.161	5.401	-1.667	-5.323	0.01*
		Post	40.083	5.870			
	control	Pre	39.69	5.52	-1.461	-3.467	0.01*
		Post	42.444	5.877			
Flexibility test (cm)	Experimental	Pre	7.3908	.9593	-1.922	-5.574	0.01*
		Post	7.1050	.8462			
	control	Pre	5.0811	1.9773	-1.208	-5.755	0.01*
		Post	4.5767	1.5230			
Muscle endurance(times/1 minute)	Experimental	Pre	37.803	8.192	-2.750	-7.699	0.01*
		Post	39.264	7.644			
	control	Pre	37.108	6.083	-1.444	-4.552	0.05**
		Post	38.317	5.558			
Cardiovascular endurance (minutes)	Experimental	Pre	34.92	8.03	0.2858	5.344	0.01*
		Post	36.361	7.124			
	control	Pre	8.6153	2.1390	0.4831	6.176	0.05**
		Post	8.1322	1.8806			

* Significant at 0.01 level of significance

** Significant at 0.05 level of significance

However, body fat, muscle endurance and cardiovascular endurance for experimental respondents showed more significant difference between the pre- test and post- test ($p=0.01$) than control respondents ($p=0.03$, $p=0.05$, $p=0.05$ respectively). While the test between pre- test and post- test showed equal significant difference in muscle strength test ($p=0.001$) and flexibility test ($p=0.001$) for both respondents.

In addition, the average mean for the pre test was higher than average mean for the post-test for the most components that showed significant difference (body fat percentage, flexibility, muscle strength and endurance, cardiovascular endurance) for both experimental and control groups.

Discussion

This study found that students had an average weight of 52.76 ± 9.28 kg. This is lower than the weight of American adolescents (75 kg) (Ogden et al., 2004) and Flemish adolescents (67 kg), (Deforche et al.,2003) but higher than Taiwanese adolescents (52.1 ± 11.6 kg) (Huang and Malina,2002) The average height of the sample was 166.1 ± 7.82 cm, which was also shorter than American adolescents (175.3 cm) (Ogden et al.,2004) and Flemish adolescents (178.1 cm) (Deforche et al.,2003) , but taller than Taiwanese adolescents (160.8 ± 7.4 cm) (Huang and Malina,2002).

Respondents in the current study have a lower body fat percentage ($4.18 \pm 1.3\%$) compared with the North American students (19%) (Ogden et al., 2004) and the Swedish students reported by Ekelund et al (2001) (15.5%). In abdominal muscle endurance (sit-ups), the students' scores average 39.4 ± 7.17 times. The results are higher than those reported by Huang and Malina (2002) for Taiwanese participants, who scored an average of 34.7 ± 9.6 times. The students in the present study scored lower in the 1-mile walk/run for cardiovascular endurance (7.52 ± 1.54 minutes) than the norms of the Presidential Physical Fitness Award (6.06-6.08 minutes) (Vilhjalmsson and Thorlindsson .1998), but higher than the study by Huang and Malina(2002) where students scored 8.34 ± 1.31 minutes.

This study found a significant difference in all physical fitness components (body fat percentage, flexibility, muscle strength and endurance, cardiovascular endurance) between adolescents in both groups (experimental and control), but it was higher in experimental group than control group. Thus, the additional physical education session was effective to improve the physical fitness components whether experimental or control students. Furthermore, the experimental programme was more significantly effective to improve the physical fitness than the normal additional curriculum physical education session. The study recommends that the ministry of education may consider increasing the number of physical education sessions to twice a week or more and design physical education curriculum with various physical activities which can enhance and improve physical fitness. Future intervention studies and work is needed to examine the fitness levels of female students in Oman, because at least one report suggests that their leisure and physical activity profiles may be quite different from males (Centers for Disease Control and Prevention, 2005).

References

- Al Barwani S, Al Abri M, Al Hashmi K, et al. Assessment of aerobic fitness and its correlates in Omani adolescents using the 20-metre shuttle run test A pilot study. *SQU J Sci Res Med Sci*. 2001;3:77-80.
- Al-Hazzaa, H. & Al Mozaini, K. (1999). The heart rate average during the physical education lessons in the average stage: a study on the pupils in Riyadh City. *King Saudi's university magazine: the educational sciences and the Islamic studies*. 11(1), 1-15.
- Baquet, G., Van Praaah, E., Berthoin, S. (2003).Endurance training and aerobic fitness in young people. *Sport Med*, 33(15), 1127-1143.
- Bates, H. (2006). *Daily physical activity for children and youth: a review and synthesis of the literature*. Alberta Education Cataloguing in Publication Data.
- Beets, M. & Pitetti, H. (2005). Contribution of Physical Education and Sport to Health-Related Fitness in High School Students. *Journal of School Health*, 75(1), 25-30.
- Berkey, C., Rockett, H., Field, A., Gillman, M., Frazier, L., Camargo, C. & Colditz, G. (2000). Activity, dietary intake, and weight changes in a longitudinal study of preadolescent and adolescent boys and girls. *Pediatrics*, 105(4), 1-9.

- Boreham, C. & Riddoch, C.(2001). The physical activity, fitness and health of children. *Journal of Sports Science*, 19, 915-929.
- Centers for Disease Control and Prevention. (2005). *Oman Global School-Based Student Health Survey*. Atlanta, GA: Centers for Disease Control and Prevention.
- Corbin, C., Pangrazi, R. & Le Masurier, G. (June 2004). Physical Activity for Children: Current Patterns and Guidelines. *president's Council on Physical Fitness and Sports*. 5(2).
- Deforche B, Lefevre J, De Bourdeaudhuij I, Hills AP, Duquet W, Bouckaert J. (2003). Physical fitness and physical activity in obese and nonobese Flemish youth. *Obesity*.;11:434-441.
- Dell, R.B., Holleran, S & Ramakrishnan, R.(2002). Sample Size Determination. *ILAR Journal*, 43(4), 207-213.
- Ekelund, U., Poortvliet, E., Nilsson, A., Yngve, A., Holmberg, A. & Sjostrom, M. (2001). Physical activity in relation to aerobic fitness and body fat in 14-to 15- year-old boys and girls. *Eur Journal of Applied Physiology*, 85, 195-201.
- Gauer, R.L. & O'Connor, F.G. (2001). *How to write an exercise prescription*.
- Gordon-Larsen. P., McMurray, R.G. & Popkin, B.M. (2000). Determinants of Adolescent Physical Activity and Inactivity Patterns. *Pediatrics*, 105(6).
- Hassan, O. & Al-Kharusy, W. (2000). Physical fitness and fatness among Omani schoolboys: a pilot study. *SQU Journal for Scientific Research: Medical Sciences*, 2, 37-41.
- Hayman , L., Christine, C., Daniels, S., Julia Steinberger, J., Paridon, S., Dennison, B. & McCrindle, B. (2004). Cardiovascular Health Promotion in the Schools: A Statement for Health and Education Professionals and Child Health Advocates From the Committee on Atherosclerosis, Hypertension, and Obesity in Youth (AHOY) of the Council on Cardiovascular Disease in the Young. American Heart Association. **Circulation**, 110, 2266-2277.
- Huang YC, Malina RM. (2002). Physical activity and health-related physical fitness in Taiwanese adolescents. *J Physiol Anthropol Appl Hum Sci*. 21:11-20.
- Kahn, H., Tatham, L., Rodriguez, C., Calle, E., Thun, M. & Heath C. (1997). Stable behaviors associated with adult's 10-year changes in body mass index and likelihood of gain at the waist. *Am J Public Health*, 87, 747-754.
- Kann, L., Warren, W., Harris W.A. & et al., (1996), Youth Risk Behavior Surveillance - United States, 1995. *J Sch Health*, 66, 365-377
- Kohl, H.W. (2001). Physical activity and cardiovascular disease: evidence for a dose response. *Medicine Science and Sports Exercise*, 33(6), S472-S483.
- Loucaides CA, Chedzoy SM, Bennett N.(2004). Differences in physical activity levels between urban and rural school children in Cyprus. *Health Educ Res*.19:138-147.
- Ogden CL, Fryar CD, Carroll MD, Flegal KM. (2004) .Mean body weight, height, and body mass index, United States 1960 2002. *Adv Data*.347:1-17.
- Oman Physical Education Curriculum*. (2008). Ministry of Education.
- Telama, R. & Yang, X. (2000). Decline of physical activity from youth to young adulthood in Finland. *Medicine and Science in Sports Medicine*, 32(9), 1617-1622.
- Trudeau, F., Laurencelle, L., Tremblay, J., Rajic, M. & Shephard, R. (1999). Daily primary school physical education: effects on physical activity during adult life. *Medicine and Science in Sports Medicine*, 31(1), 111-117.
- Van Mechelen, W., Twisk, J., Post, B., Snel, J. & Kemper, H.(2000). Physical activity of young people: the Amsterdam longitudinal growth and health study. *Medicine and Science in Sports Medicine*, 32(9), 1610-1616.
- Vilhjalmsson R, Thorlindsson T. (1998). Factors related to physical activity: a study of adolescents. *Soc Sci Med*.;47:665-675.