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A PHYSICAL FITNESS INTERVENTION PROGRAM ON SELECTED HEALTH-RELATED FITNESS AMONG YOUTHS OF A COMMUNITY IN FIJI

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Abstract

The purpose of the study was to investigate the effect of a physical fitness intervention program on selected health-related fitness components among youth's boys in Fiji. A quasi-experimental pretest-posttest design was adopted for the study. Fifteen youths from Al Madina Clopcott club in Ba Fiji volunteered to be part of the study. One group pretest – post-test Quasi-Experimental design was used for the study. Pretest data on Body Fat, Basal Metabolic Rate, Body mass index, Reaction ability, Balance ability, and speed was found during a one-week camp. Before the commencement of the training. The youths went through an eight-week training program with five days of training per week. The different test was used to test components of fitness in the same environmental conditions; Data were collected from the youths after the training period during a one-week camp and analysed statistically using paired t-test. Significant improvements have been made due to the effect of the training program on all of the variables tested. The variable Body mass index did not show the significant difference due to only eight weeks of training and the fact that diet was not controlled for the participants.

Abbreviations

NCD- Non Communicable Disease
HRPF –Health Related Physical Fitness
PA- Physical Activity
USDHHS -US Department of Health & Human Services
CHD -Coronary Heart Disease

INTRODUCTION

Physical inactivity is the key factor of life-long well-being. Lack of activity increases the risk of heart disease, colon and breast cancer, diabetes mellitus , hypertension, osteoporosis, anxiety and depression, and other illnesses. Evolving literature has suggested that, in terms of mortality, the health burden of physical inactivity on the global population is similar to that of cigarette smoking. Dominance and significant risk of disease associated with physical inactivity have been described as a pandemic.

Prevalence, health impact and proof of changeability have all culminated in demands for intervention to increase physical activity over the lifespan of young people.Most young people do physical activity to take part in a particular sport. Young boys must realise that physical activity is not important for sports only. The physical activity aims to have good health and a life free from NCD. This the aim for this paper was to do an experimental study with a group of youth who volunteer from Al Madina Clopcott club in Ba Fiji to show them the effect of 12-week physical activity on the components of health-related physical fitness (HRPF)such as Body Fat, Basal Metabolic Rate, Body mass index, Reaction ability, Balance ability, Speed, Endurance, and Agility through a 12-week training pregame

Regular physical activity can help children and adolescents boost cardiorespiratory fitness, develop strong bones and muscles, control weight, reduce symptoms of anxiety and depression. Exercise reduces the risk of developing conditions such as heart disease, diabetes , high blood pressure: osteoporosis, and obesity.Recent news in Fiji highlights the importance of the population as a whole taking action to protect their health from non - communicable diseases (NCDs). The Ministry of Health and Medical Services and the World Health Organization (WHO) report that cardiovascular disease is the country's leading cause of death. In 2017, Fiji experienced nearly twice as many cardiovascular deaths compared to those caused by diabetes. The issue is in line with global trends; 17.7 million people are killed each year by cardiovascular disease, which accounts for 31 per cent of all deaths worldwide.

Statistics worldwide suggest that the state of aerobic fitness and other health - related well-being in school children is not very satisfactory (Derri, Aggeloussis, & Petraki, 2004; Gutin et al. , 1990, 1994; Hatano et al., 1997; Tomkinson, Olds, & Gublin, 2003; US Department of Health & Human Services,[USDHHS], 1996; 2001)Only half of children between 12 and 21 years of age participated in vigorous physical activity (PA) and one-fourth of the population reported that they did not participate in any physical activity

(USDHHS 1996). Despite this, many physical educators believe that being physically inactive and living a sedentary lifestyle is one of the causes of a dramatic increase in the prevalence of overweight.

In addition, the American Heart Association (1992) has suggested that a sedentary lifestyle is a modifiable risk factor for coronary heart disease (CHD). Conversely, evidence shows that both elevated physical activity (PA) and physical fitness are associated with improved risk factors (Caspersen, Nixton, & DuRant, 1998; Despres, Bouchard, & Malina, 1990; Sallis et al., 1997; USDHS, 1996, 2001, 2008). In recognition of this issue and in order to change the above, all school - going children should be encouraged and motivated to participate in PA by quality physical education programs in schools to teach and improve health - related fitness dimensions (Levin et al. , 2001; USDHS, 1996; 2001, 2008). Successful school - based physical education programs would have the potential to increase awareness and awareness of PA and therefore play an important role in promoting health - related fitness aspects and leading to public health (Wallhead & Buckworth, 2004).Education provided at school shall constitute lifelong learning and young children and adults shall make use of the knowledge acquired at school for physical activity for their general fitness and healthy living.

Physical fitness(PF) is a significant factor for good health (Lohman, Ring, Pfeiffer et al. , 2008; Ortega et al. , 2008; Arriscado et al. , 2014) and promotes a strong correlation between the rates of stamina, flexibility , agility and mortality due to chronic diseases. It is suggested that PF is an integral part of most, if not all, of the physical activity-related roles of the human body (Malina, Bouchard, and BarOr, 2004; Cadenas-Sánchez, 2016; Booth, Roberts, Laye, 2012). Much physiological functions are assessed during physical fitness tests. The degree of PA and PF in secondary school children has an impact on the health status of adults.

Coordination refers to the ability to correctly interpret multiple signals and execute more complex physical tasks. Hand - eye coordination, for example, requires young people to interpret visual information accurately in a way that allows them to catch a ball. It is a basic process of coordinating the central nervous system and the functional capacity of the different sense organs (Uppal, 2001). Reaction capability is the ability to rapidly trigger and perform rapid and well-directed signal action (Singh, 1991). Balance ability is the ability to sustain a static or dynamic balance condition called equilibrium capacity (Mishra, 2007).

The theories linking physical activity to body fat or weight have long suggested an inverse relationship between the two variables (Tiruneh G 2010). The relationship between physical activity and body fat or weight is based on the assumption that the energy intake of a normal - weight person is equal to or nearly equal to their energy expenditure (Tiruneh G 2010). In other words, a person becomes overweight or obese if the energy intake is higher than the energy intake, and one way to maintain the energy balance is to get rid of extra calories by performing physical activity (Esparza J, Fox C, Harper TI, Bennett HP, Schultz Ol & Valencia 2000). When physical activity is not continued,

even a person with a healthy weight can easily recover some or all of it (Tate, Jeffery, Sherwood, & Wing 2007).

The Body Mass Index (BMI) is an easy-to-use, low - cost weight monitoring tool. Although it is widely used in health settings to classify humans as underweight, normal weight, overweight and obese (WHO, 1995), its use in sporting communities has been debated because it is correlated with both fat and fat - free weight (Ode, Pivarnik, 2007). Notwithstanding this restriction, the body weight of an athlete can still be measured for a given size and thus lead to weight control.

The lack of physical activity kills the good condition of every human being, while the moment and the process of physical exercise protects because maintains it. Psychic stresses, anxieties, hypertension, BP, etc. of sedentary people have now risen (more) to enormous proportions. Exercise or physical activity helps to manage all of this by increasing the Basal Metabolic Rate (BMR). Research findings may eliminate myths regarding exercise and minimize the magical sheath. There are many people who do not training, and they are not aware of this fact. Proper exercise significantly improves our BMR. Exercise is closely linked to our state of health, and inadequate BMR frequently represents various disorders of the body and mind (Singh M, Durham DK, Yaduvanshi S, et al., 2010).

PARTICIPANTS

For this study, Voluntary response sampling technique was used to select the sample of 15 youths from a population of 40 members of Al Madina Clopcott club in Ba Fiji youth group. The youths selected were not active in any sports activity in school nor the community. The age of the participants ranged from 17-20 years. The 15 participants volunteered to be part of the research where parental consent was also taken as some participants were below the age of 18 years. All the 15. The pretest and post-test was done on the same participants

DESIGN AND PROCEDURE

One group pretest – post-test Quasi-Experimental design was used in which anthropometric measurements, clinical history, selected fitness components were measured for the group of youths before(pretest) and after (post-test) treatment was administered. Before the administration of the experiment and the test, consent was taken from the parents and the participants. permission to camp and use the facilities of Al Madina Clopcott club was obtained from the president.

TREATMENT

The present study was conducted for eight weeks. In the present study, treatment was done using mixed exercise methods to expose youths to a variety of exercise and train so that the sessions are interesting, and the youths remain motivated for the activity each day. Once the youths had assembled, they would undergo the warm-up and stretching exercises for about ten minutes and followed by the programme as listed in table 1 below.

Table 1. Programmes

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
WEEK 1	Slow jog 15-20min	Strength Training	REST	Coordinative Training	Agility Training	Low intensity run 25-30 min	REST
WEEK 2	Slow jog 15-20min	Strength Training	REST	Coordinative Training	Circuit Training	Low intensity run 30-40 min	REST
WEEK 3	Slow continuous run 30 min	Circuit Training	REST	Agility Training	Strength Training	Low intensity run 60 min	REST
WEEK 4	Slow continuous run 30 min	Interval Training	REST	Speed Training	Coordinative Training	10 K Jog	REST
WEEK 5	Slow continuous run 40 min	Speed Training	REST	Circuit Training	Tempo Run	Recreational Games	REST
WEEK 6	Slow continuous run 40 min	Coordinative Training	REST	High-Intensity Interval Training	Tempo Run	Low intensity run 60 min	REST
WEEK 7	Slow continuous run 30 min	Tempo Run	REST	High-Intensity Interval Training	Agility Training	10 K Jog	REST
WEEK 8	Slow continuous run 30 min	Circuit Training	REST	Coordinative Training	Tempo Run	Recreational Games	REST

Testing

To ensure that young people are physically ready to perform to their best potential. The Reacher organised a one-week camp before and after treatment. The camp was designed to monitor the nutritional and physical conditions of the youths. Moreover, the fitness test was done following the same guidelines before and after the treatment. The camp was held in the same venue for a pretest and post-test.

Test administration: The tests were held individually one by one with only the subject and researcher present at the place of experiment. As a first step in the test procedure, the subject was told the general nature and purposes of each test before starting the actual test. Before applying the test, the demo was

given to the subject. Each subject was given a practice trial before the actual commencement of the test.

Bioelectric impedance system was used to calculate Body Mass Index (BMI), Body Fat (BF) and Basal Metabolic Rate (BMR). Measurements were taken at normal body hydration at equivalent external temperature (28–32 ° C).

REACTION ABILITY: Criterion Measures: Visual Reaction Timer was used to determine the Reaction Ability of the subjects. The Equipment required were visual Reaction Timer, Table and Chairs, Pencil, Papers and Pad.

Procedure: Visual Reaction timer was kept on a table and started by plugging the plug. The subject was asked to sit on chair reachable to the table where the reaction timer was placed opposite to the scholar's chair. On signal, the lights blinked, the subject reacts immediately to the lights pressing the buzzer in front of particular light for measuring reaction time Instructions. The score was the time taken in $1/100^{th}$ seconds.

BALANCE ABILITY: Stork Stand Test was used to measure Balance ability of the subjects. The subject stood on the dominant leg while the other foot was placed inside of supporting knee. The subject was instructed to place the hands on the respective sides of the waist. The subject was informed that he should stand on the ball of the foot by raising his heel from the floor on the signal start. On the signal start, the subject raises the heel from the floor to maintain the balance as long as possible without moving the ball of the foot from its initial position, and the tester starts the stopwatch. The performer is also recognised to maintain balance with his best efforts and not let the heel to touch the floor for the longest duration. As soon as the subject loses the balance by touching the heel to the floor or loses the movement of the foot from the initial position, the tester stops the stopwatch. The scores are taken as $1/100^{th}$ seconds for the maintenance of the balance on the ball of the foot.

ORIENTATION ABILITY Numbered Medicine Ball Run Test is applied to measure Orientation Ability. For the test, the medicine balls weighing 3 kg and 4kg were used and arranged. On the signal, the subjects turned and ran towards the number called by the tester and touched the medicine ball and ran back to touch the sixth medicine ball, immediately another number was called. Similarly, a total of three times the number was called by the tester and the subjects performed accordingly. Scoring: The time taken to complete the course was noted in seconds.

SPEED: A standard test of 50 yards' dash (Johnson, Borrey and Nelson, Jack K.1988) is applied to measure speed. Subjects in pairs were asked to take the starting position and to wait for the signal from the pistol. The helpers recorded the time taken for the race up to 0.01 seconds.

AGILITY: Shuttle Run 10x10 yards (Johnson, Borrey and Nelson, Jack K.1988) is applied to measure agility. Two parallel lines were marked on the track or floor 10 yards apart—two wooden blocks placed behind one of the

lines. The subject starts from behind the other line. On the command GO the tester starts the stopwatch and the subject runs towards the blocks, pick up one block, runs back to the starting line, places the block behind the starting line, runs back and picks the second block to be carried back across the starting line. When the second block is placed on the ground the time stops, the time is recorded in seconds.

Score: The time taken to complete the course was noted in seconds and was recorded in $1/100^{th}$ second. Two trials were given to each subject, and the better one was recorded as a score.

Furthermore, the data were analysed using the paired sample t-test, which is a is a statistical procedure used to determine whether the mean difference between two sets of observations is zero. For this study, a paired sample t-test, fitness test was taken twice as pertest and post-test after the intervention training programme. For the statistical analysis, the level of confidence was set at 0.05. To ascertain the effect of the treatment between the experimental and the control group.

RESULTS

Table 2. Descriptive statistics for the physiological and health-related fitness parameters among youths of Al Madina Clopcott club

		Mean	Std. Deviation	Std. Error Mean
BMI	Pre	20.87	1.25	0.32
	Post	19.33	1.18	0.30
Body Fat	Pre	18.72	1.32	0.34
	Post	13.57	2.25	0.58
BMR	Pre	1693.73	100.39	25.92
	Post	1585.73	82.94	21.42
Reaction Ability	Pre	1.92	0.24	0.06
	Post	1.48	0.13	0.03
Balance Ability	Pre	10.17	0.72	0.19
	Post	8.40	0.49	0.13
Orientation Ability	Pre	9.06	1.22	0.31
	Post	9.35	0.28	0.07
Speed	Pre	7.15	0.29	0.07
	Post	6.07	0.43	0.11
Agility	Pre	10.79	0.42	0.11
	Post	9.97	0.44	0.11
Beep Test	Pre	7.80	0.77	0.22
	Post	5.13	0.83	0.20

As the analysis of the results indicate a normal distribution of scores and therefore results presented using mean and standard deviation for each physiological and health-related fitness parameters. The results indicated that the physiological parameters on the Post-test from Pretest improved (BMI=20.78-19.33, Body Fat=18.72-13.57, and BMR=1693.73-1585.73) as a result of the intervention training regime. The health-related fitness parameters

also improved (Reaction Ability=1.92-1.48, Balance Ability=10.17-8.4, Orientation Ability=9.06-9.35, Speed=7.15-6.07, Agility=10.79-9.97, and Beep Test=7.8-5.13) as a result determines from Pre-test to Post-test after the intervention of a training regime.

Table 3. Pretest and Post-test results for the physiological and health-related fitness parameters among youths of Al Madina Clopcott club in Ba Fiji

		Paired Differences				Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	t	
BMI	Pre -Post	1.54	1.73	0.45	1.20	0.25
Body Fat	Pre - Post	5.15	2.71	0.70	7.36	0.00
BMR	Pre - Post	108.00	148.44	38.33	2.82	0.01
Reaction Ability	Pre - Post	-0.44	0.27	0.07	-6.21	0.00
Balance Ability	Pre - Post	-1.77	0.86	0.22	-7.97	0.00
Orientation Ability	Pre - Post	-0.29	1.30	0.34	-0.87	0.40
Speed	Pre - Post	-1.09	0.52	0.13	-8.11	0.00
Agility	Pre - Post	-0.81	0.53	0.14	-5.96	0.00
Beep test	Pre - Post	-2.67	1.11	0.29	-9.28	0.00

Table 3 indicated the paired differences for mean, standard deviation, and standard error mean for Pre-test and Post-test for each physiological and health-related fitness parameters. Among the physiological parameters the results indicated that there is no significant difference for BMI (t=1.20, Sig 0.25) whereas, the significant differences existed for Body Fat (t=7.36, Sig. 0.00) and BMR (t=2.82, Sig 0.01). Among the health-related fitness parameters, the results indicated that there are significant differences for Reaction Ability (t=-6.21, Sig. 0.00), Balance Ability (t=-7.97, Sig. 0.00), Speed (t=-8.11, Sig. 0.00), Agility (t=-5.96, Sig. 0.00), and Beep test (t=-9.28, Sig. 0.00). Whereas, there is no significant difference in Orientation Ability (t=-0.87, Sig. 0.40). Thus, there is convincing evidence that physical activity intervention improves physiological and psychomotor parameters.

DISCUSSION

The present study examined the effect of the training program on body composition and selected fitness components and anthropometric characteristics without diet intervention, which were recruited at baseline over eight weeks. Its main findings are that physical training program has reduced Body Fat and Basal Metabolic Rate. Health-related fitness parameters Reaction Ability Balance Ability Speed Endurance and Agility showed significant improvement after eight weeks of mixed training. In order to keep the program varied, interesting and fun, yet able to provide adequate physical activity and improve youth adherence, we incorporated short - term games and various sporting activities. Some participants may find a lack of variety in slow continuous duration and interval duration of the training. Therefore they are reluctant to continue to exercise on a routine basis in effect (Piek et al.,2010). Since we conducted a feasibility study, we have ensured that all youth participating in the training program have been exposed to a substantial

dose of physical training. The training program has been designed in such a way that young people have had enough recovery and have been able to enjoy the activity as voluntary participation.

However, after the eight weeks of intervention, there was no significant difference in BMI, as shown in the tests. Observational studies have consistently shown that higher activity is associated with lower BMI and body fat (Andersen et al. ,2006, Ness et al. ,2007, Metcalf et al.,2011, Ekelund et al.,2010) On the other side, many approaches have not been able to improve such parameters. (Kamath et al. ,2008, Walters et al. ,2011) One reason for this failure is that more movement leads to higher calorie consumption, offsetting some benefit. BMI progress can, therefore, be accomplished through a combined approach or strategies aimed at improving nutrition rather than physical training alone. However, this theory seems to be incompatible with our findings, provided that our participants were encouraged not to change their dietary habits during the study period. Alternative explanations may be a lack of commitment to the intervention, or such intervention may simply replace the similarly usual activity of children. (Westerner et al.,2010).

BMI; as a measure of body composition; has known limitations, given that it reflects both fat and fat - free bodyweight components. (Sweeting,2007) Physical activity could increase lean muscle mass and decrease the fat component without any overall change in BMI. Despite these limitations, BMI is the most consistent measure of body composition reported. Besides, increased BMI in youth is associated with increased metabolic abnormalities as well as coronary artery disease and increased all-cause mortality later in life (Harris et al., 2009).

Both interval training and moderate-intensity continuous training decrease the body fat percentage, according to a recent review published in the British Journal of Sports Medicine. Interval training (Gennet, O'Rourke, Del 2006). In this research, both interval and slow-moving exercise were done by young people as per the training timetable. Slow continuous running applies to run long distances at relatively slow speeds. For, e.g., the participant in this study ran five miles from twenty to thirty minutes. Workouts were performed at 50-70 per cent of maximum heart rate at low intensity. Exercise protocols that can be carried out by overweight, inactive individuals that minimise body fat more effectively are required. Accumulating evidence suggests that moderate-intensity intermittent exercise can be a cost-effective and effective workout regimen to reduce overweight fat (Wu, Gao, Chen, Van, 2009).

Furthermore, the results indicated a slight decline in BMR after eight weeks of an intervention programme. The increase could have been more if the diet was also controlled for the participants the researchers suggest. BMR was reported to be a significant change when exercise training is combined with energy restriction, although energy intake was not restricted in the study (Van Dale et al. 1990). Moreover, another finding reported that dietary groups showed a significant decrease in BMR, while exercise training groups showed either no change or a smaller decrease in BMR, suggesting that a decrease in BMR from caloric restriction could be offset by exercise training (Lemmer, Ivey, Ryan,

et, 2001). BMR is sufficient energy for the brain and central nervous system, the heart, kidneys, liver, lungs, muscles, sex organs, and the skin to function properly. People who are overweight or obese do not necessarily have a slow BMR. Their BMR is usually faster to accommodate extra fat and to make their body work harder to perform normal body functions. Building lean muscle mass can increase BMR, but there is a limit on how much lean muscle mass can be built for both men and women. Some supplements may increase BMR, but also to a limit, and may have serious side effects. Expanding extra calories by increased physical activity is the most prudent way to increase metabolism. When human diets, BMR slows down in order to conserve energy and preserve vital organs. (Roy E. Weiss, 2016)

Current studies have shown that the 8-week training program has had significant effects on the performance of coordination, dynamic balance speed and agility of the youths. However, eight weeks of training is not significant for a profound change in fitness. Velmurugan & Palanisamy 2013) stated that a physical activity program helps to develop different components of fitness. Motor skills, including balance and coordination, are also known to control body movement, especially during activities or sporting activities. As a result, the current study has shown doing physical activity as in the training program is an effective way to improve performance in youths for their daily life's, particularly in terms of balance, coordination, speed and agility.

CONCLUSION

In conclusion, the important findings of this study will convince many young people about the importance of the physical activity. The study showed that eight weeks of training was sufficient to improve youth performance in both Body Fat, Basal Metabolic Rate and Body Mass Index. However, a regulated youth diet could have achieved a better outcome. The training program had a significant impact on the Reaction, the ability to balance, speed and agility. All parties, including parents, teachers and sports organisations, will play their important roles in ensuring that the training program becomes a daily part of the training sessions to achieve the goals of a healthy lifestyle among Fiji 's youth, as we have several NCD cases in Fiji.

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