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தம்மின்தம் மக்கள் அறிவுடைமை மாநிலத்து
மன்னுயிர்க்கு எல்லாம் இனிது.

- திருக்குறள்: 8

Nothing is more pleasing to all parents
on this great earth than that their children
should possess real learning

The Sacred Kural : 8

COMPARISON OF THE HEALTH RELATED PHYSICAL FITNESS AMONG SCHOOL BOYS

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ABSTRACT

Socioeconomic transformation over the previous decade may have created a less active lifestyle and a decline in fitness among world wise children and adolescents. The aim of this study is to compare of the health related physical fitness among adolescent boys of Tamil Nadu. The sampling procedure used in this study is large distribution of random population. To achieve this purpose the health related physical fitness of different age group (13, 14, and 15 years) male school going students of Tamil Nadu in a total of 5000 subjects were selected in each age group. At the school level, health related physical fitness is one of the major problems among the pupil. Cardiorespiratory fitness (one mile run), musculoskeletal fitness [Muscular strength (puss ups), muscular endurance (sit ups), and flexibility (sit and reach)] and optimal body composition {sum of skin fold fat (Triceps & subscapular)} are the measurable components of health related physical fitness. The data were analyzed by one way analysis of variance, to find out whether there was any significant difference on health related physical fitness among the different age groups. The level of significance was fixed at 0.05, if the obtained F ratio is significant, Scheffe's post hoc test was applied to find out the means difference. The result clearly indicates that a significant difference lies among the three age group of school boys on *cardio respiratory fitness* in favor of 15 years followed by 14 years boys than 13 years boys, this study also showed that the significant differences between 13 years and 14 years, between 13 years and 15 and between14 years and 15 years was found *musculoskeletal fitness* (Muscular strength, muscular endurance, and flexibility) and study showed that the 13 years boys were having significantly more fatmass than 14 years and 15 years boys. However there is no significant difference found between 14 years and 15 years boys on fatmass.

Key Words: Health related physical fitness, Cardiorespiratory fitness, Musculoskeletal, Body composition

Introduction

The American College of Sports Medicine (ACSM) has identified five fitness factors that are health related physical fitness. The evidence to support these factors as related to health has come from the branch of medicine called epidemiology, which examines the incidence, frequency and distribution of disease. Health is defined as a state of complete physical, mental, social, and spiritual well-being, and not merely the absence of disease and infirmity. Physical fitness is a condition in which an individual has sufficient energy and vitality to accomplish daily tasks and active recreational pursuits without undue fatigue.

The end objective in promoting physical activity is health. The most notable, and undoubtedly still the most influential, definition of health is that of the World Health organization (WHO).The definition appeared in the preamble of the WHO constitution during the late 1940s " Health is a state of complete physical,mental,and social well-being, and not merely the absence of disease and infirmity."

Health-Related Physical Fitness

Health-related physical fitness is typified by an ability to perform daily activities with vigor and is related to a low risk of chronic disease. Health-related physical fitness consists of those components of physical fitness that have a relationship with good health. The components are commonly defined as body composition, cardiovascular fitness, musculoskeletal fitness (flexibility, muscular endurance, and muscular strength.)

From last 40 years the distinction between health-related physical fitness and skill-related physical fitness was not typically made. When tests of physical fitness are administered in school, medical and other settings it is typically health-related fitness components that are measured. Typically lab and field tests of health-related fitness involve some type of performance such as running, stretching, or doing a specific muscle exercise. Because body composition (also referred to as relative leanness) is not a performance measure, some question its inclusion as a component of health-related physical fitness. Possessing good health-related fitness is related to lower risk of illness and improved quality of life.

Body Composition

A health-related component of physical fitness that relates to the relative amounts of muscle, fat, bone and other vital parts of the body. This component of physical fitness is measured in the laboratory using such measures as underwater weighing and in the field using skinfold caliper. There are a variety of other methods of assessing body composition; also referred to as relative leanness (Howley and Franks, 1997). As noted previously body composition is the only non-performance measure among the health-related physical fitness components.

Cardiovascular Fitness

A health-related component of physical fitness that relates to ability of the circulatory and respiratory systems to supply oxygen during sustained physical activity. Cardiovascular fitness is also referred to as cardiovascular endurance, aerobic fitness and cardio respiratory fitness. A Max VO_2 test in the laboratory setting is considered to be the best measure of cardiovascular fitness. Commonly administered field tests include the mile run, the 12 minute run, the 1 mile run, the mile walk, the PACER run for children and various bicycle, step, and treadmill tests.

Musculoskeletal Fitness

(i) Flexibility:- A health-related component of physical fitness that relates to the range of motion available at a joint. Some experts specify that flexibility requires range of motion without discomfort or pain.Flexibility is specific to each joint of the body, thus there is no general measurement of flexibility as there is for cardiovascular fitness. Flexibility is typically measured in the lab using measurement devices such as a goniometer, flexometer and in the field with tests such as the sit and reach and the zipper.

(ii) Muscular Strength: - A health-related component of physical fitness that relates to the ability of the muscle to exert force. Like flexibility and muscular endurance, strength is specific in nature. For true assessment it would be necessary to test each major muscle group of the body. Lab and field tests are similar and involve the assessment of one repetition maximum (the maximum amount of resistance you can overcome one time). 1RM tests are typically conducted on resistance machines. Strength can also be assessed using dynamometers. Strength can be measured isometrically (static contractions) or isotonically (dynamic contractions).

(iii) Muscular Endurance: - A health-related component of physical fitness that relates to the muscle's ability to continue to perform without fatigue. Like flexibility, muscular endurance is specific in nature. For true assessment of muscular endurance it would be necessary to test each major muscle group of the body. Lab and field tests of muscular endurance are similar and are based on the number of repetitions that can be performed by the specific muscle group being tested (example: repetitions of push-ups or abdominal curls. Muscular endurance can be measured isometrically (static contractions) or isotonically (dynamic contractions).

Statement of The Problem

The purpose of the study is to compare the health-related physical fitness among school boys at the age of thirteen to fifteen years of Tamil Nadu state.

Methodology

Sampling Technique: - The sampling procedures should be based upon large distribution of random population. *Selection of Subjects:* - The study was designed to compare for the AAHPERD health related physical fitness test of different age group male school going students of Tamil Nadu.The total numbers of schools where classes of VII, VIII, IX and X standards are available in selected 20 districts were listed. From

each district 5 schools were selected at random, likewise 100 schools were selected at random in the whole state. Fifty subjects were selected from all 100 schools at random from the specified age group of 13, 14, and 15 years respectively. A total of 5000 student boys were selected in each age group. On the date of test, the subjects were within two months of their birthday. Thus, the age between 13 years ±2 month 14 years ± 2 month and 15 years ± 2 months were considered as 13,14and 15 years group respectively. *Selection of variable:* - The variables of the test battery were used to test the following:

1. cardio-respiratory system – one mile run
2. Body composition -sum of skin fold fat (Triceps & subscapular)
3. Flexibility– sit and reach
4. Muscular endurance – sit-ups
5. Muscular strength- Push ups

Statistical technique employed for analysis of data:-One way analysis of variance was applied to find out whether there was any significant difference on body composition among the different age groups. The level of significance was fixed at 0.05, if the obtained F ratio is significant; Scheffe's post hoc test was applied.

Result of the Study

Table I

Analysis of Variance of Health Related Physical Fitness Among The Three Different Groups

Variables	Sources of variation	Degree of freedom	Sum of scores	Mean sum of scores	F ratio
Cardio respiratory endurance	Between	2	2533.14	1266.57	214.58*
	with in	14997	88520.50	5.90	
Body composition	Between	2	1858.73	929.36	11.52*
	with in	14997	1209679.85	80.66	
Flexibility	Between	2	9487.09	4743.55	99.34*
	with in	14997	716123.68	47.75	
Muscular Strength	Between	2	4866.38	2433.19	84.31*
	with in	14997	432813.42	28.86	
Muscular Endurance	Between	14997	23421.81	11710.91	97.59*
	with in	2	1799636.6	120.00	

*Significant at 0.05 level (table value 2.99)

Table I show the calculated F ratio on cardio respiratory endurance, body composition, flexibility and muscular strength and endurance *214.58, 11.52, 99.34, 84.31 and 97.59* respectively, which is much more than the tabulated F-ratio at 0.05 level *2.99*.This is clearly indicates significant differences among the three age group.

Table II indicates the post hoc test for significant difference between 13 and 14 years, 13 and 15 years and 14 years and15 years of age, indicates significant difference in means for *cardio respiratory endurance* 0.73, 0.93 and 0.24 with CI 0.0046, body *composition* 0.63, 0.75 and 0.12 with CI 0.39, *flexibility* 0.99, 1.95 and 0.96 with CI of 0.383, *muscular strength* 4.7, 7.9 and 3.2 with CI 0.27 and *muscular endurance* 1.59, 3.06 and 1.47 with CI of 0.429 respectively.

The mean difference for *cardiorespiratory fitness* between the age groups of 13 and 14 years, 13 and 15 years and 14 and 15 years boys were 0.73, 0.93 and 0.24 respectively, which were higher than the CI. Hence it was concluded that, 15 years boys were better than 14 and 13 years boys on cardiorespiratory fitness further it has been concluded that 14 years boys were also better in cardiorespiratory fitness than 13 years boys.

The obtained mean difference for *body composition* as the mean difference of 0.63 is much

Table II
Scheffe's Post Hoc Test For Significant Difference Among Means of Different Age Groups on Health Related Physical Fitness

Variables	Post hoc test			Mean difference	C I
	13 years	14 years	15 years		
Cardio respiratory endurance	8.38	7.65		0.73*	0.0046
	8.38		7.41	0.93*	
		7.65	7.41	0.24*	
Body composition	17.20	16.57		0.63*	0.39
	17.20		16.45	0.75*	
		16.57	16.45	0.12	
Flexibility	25.60	26.59		0.99	0.383
	25.60		27.55	1.95*	
		26.59	27.55	0.96*	
Muscular Strength	7.5	12.2		4.7*	0.27
	7.5		15.4	7.9*	
		12.2	15.4	3.2*	
Muscular Endurance	37.01	38.60		1.59*	0.429
	37.01		40.07	3.06*	
		38.60	40.07	1.47*	

more than the critical difference of 0.39.Futher, significant difference is also found between the age group of 13 and 15 years as the mean difference of 0.75 is much more than the critical difference. On the other hand insignificant difference between means was found between age group of 14 and 15 years as the mean difference of 0.12 was less than the critical difference.

The obtained mean difference for *muscular strength, muscular endurance and flexibility* was significantly in favor of 15 years and 14 years respectively than 13 years.

Discussion

The Primary health goals are to avoid premature death and to avoid preventable disease. Components related to these goals include heredity; environment, habits and health status.Bahaviors that contribute to a healthy life are regular exercise, proper nutrition, adequate sleep, relaxation and abstinence from tobacco, excess alcohol and nonessential drugs.

Health-related goals can be realized by involving children in a wide variety of recreational and sport activities in a safe and supportive environment. The focus should be on achieving health related goals rather than simply increasing VO_2 max.Strenth training can be used as an effective part of an exercise program for children.

Cardio respiratory endurance is an important aspect of quality of life for healthy individuals, as well as a risk factor for coronary heart disease. The ability to utilize oxygen during exercise is the basis for this fitness component.

Muscular strength and endurance are important components contributing to health and physical fitness. Four out of five Americans experience low-back discomfort, and 80% of low-back problems are muscular in nature and can be corrected with strengthening exercises for the lower back and abdominal area. Studies have shown that strength training reduces the risk of joint and muscle injuries that may occur during physical activities. Also strength training can attenuate the loss in muscle strength and bone density associated with the universal process of aging.

The prospective population-based study shows that good Health related physical fitness including active lifestyle and reasonable high dietary energy intake may be vital modifiable factors that help in decreasing in middle-aged men for life long.

Implication

- Regular physical activities help prevent and delay premature development of a variety of major health problems.

- Some inherited characteristics and behaviors place an individual at higher risk of premature health problems (such as cardiovascular disease and low back problems) and death. Risk factors of high serum cholesterol levels, high blood pressue, glucose into lerance, high fibrinogen, obesity and mechanisms for stress reduction can be reduced or eliminated through physical activity.
- Regular exercise slows the rate at which Vo_2 max decreases with age. Exercise helps maintain strength, bone density and independence and reduces the chance of a bone break.

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