

The Physiological Implications of Physical Activity in the Growth and Development of Children and Adolescents

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Abstract

The technological changing nature of Nigerian Society and even the world at large have physiological implications on the growth and development of the growing children in later years. The paper reviews the influences of physical activity in relation to aerobic fitness, obesity, coronary heart disease (CHD), muscular strength and skeletal development of the children and adolescents. Physical activity is inversely and casually related to the incidence of CHD in adult-life. An early life time habit of physical exercises from childhood will prevent poor health habits, ensure maintenance of desirable weight and decrease the risk of serious diseases that could lead to early disability. and death. Vigorous exercises doses of sufficient intensity and duration will promote better aerobic fitness, and muscle strength and endurance to withstand stress and strain of daily work of youth exuberance.

Parents, teachers, school administrators, mass-media and the government at all levels need to play active role to inculcate in the children the motor skills and knowledge of benefits of physical activity.

Introduction

The changing nature of Nigerian Society and even the world at large have had profound implications for the growth and development of the children and youths. The achievement in the physical sciences and technology has adversely affected the play life of a typical child. According to Kraus (1971), an extensive international study carried out by UNESCO in 1965, discovered that depending on the native country's television availability with other gadgets, school age children spent 12-24 hours a week watching home screens. Comparing the statistics to the recent development computer games, and other technological innovations, school-age children would have doubled their watching time by 2002. He went on to say that the negative influence of TV apart from its questionable level of taste and pre-occupation with violence and sadism, is its passive and lonely character.

Uzoalor (1999) commented that the school child especially from age 7 to 14 needs various exercises with vigorous movements. Big muscle activities such as ball games, running, swimming and gymnastics are suitable for this age group so as to prevent poor health habits.

Hein and Ryan (1960) indicated that through various clinical observations and experimental studies, exercises have been discovered to profit a growing body in maintaining a desirable weight; preserving the health of the cardiovascular system; aiding the individual to meet emergencies and prolonging life.

Meyer (1965) said that exercises is essential to the control of obesity and circulatory illnesses and helps in preserving youthful body contours and maintaining the general level of condition of the body. There is a growing conviction that adult health and well being has its origin in behaviours established during childhood (Activity and Health Research, 1992, Lowek 1988, Coronary Prevention Group 1989). There is also a general agreement that young people should be encouraged to adopt active life styles which can be sustained into adulthood. However,

despite the general acceptance of the desirability of promoting physical activity with young people, understanding the potentials of physical activity to confer health benefits during childhood and adolescence is limited.

In adult life, the efforts of regular physical activity in promoting aerobic fitness (American College of Sports Medicine, 1988), increasing muscular strength (Bray, 1990), lowering blood lipids (Durstine and Haskell, 1994), reducing High Blood Pressure (HBP) (Hagberg, 1990), countering obesity (Bray, 1990), retarding osteoporosis (Smith, Smith & Gilligan 1990) improving blood glucose control (Kriska, Blair & Perea, 1994) and increasing psychological well being are extensively documented.

This paper will therefore look into the influence of physical activity in relation to aerobic fitness, obesity, Coronary Heart Disease (CHD) or Cardiac health, skeletal development and muscular strength of the young people.

Physical Activity and Aerobic Fitness

The development of good aerobic power (fitness) is dependent on the ability to take in, transport and utilize oxygen. This quality is dependent on several factors, the most important of which are healthy lungs, sound heart and blood vessel, quantity and quality of the blood and specific cellular components that help the body in utilizing oxygen during exercise (Williams & Morton, 1986).

Several studies have been carried out to determine the aerobic fitness of the young people in relation to their physical activity (AL-Hazzaa & Suleiman, 1993, Rowland, 1994), and it has been discovered that there is no much relationship because of the low-level of physical activity of most young people. The vast majority of the children and adolescent rarely experience physical fitness of sufficient intensity and duration to increase their Peak Oxygen Uptake (POD) which is the index for aerobic fitness.

However, the available evidence does suggest that young people's peak Vo_2 increases with appropriate exercise training though the changes are relatively small to moderate when compared to those observed in adult subjects. There is an increase in cardiac output (in cross-sectional studies), at a given exercise intensity, elevated blood volume, elevated plasma volume and an increase in total Haemoglobin, a reduced heart rate and enhance stroke volume. (Soto, Zauner & Otis, 1983). These enhance better performance in any activity that requires strength endurance or flexibility.

Physical Activity and Muscular Development

Studies of muscular strength in childhood and adolescence have been extensively carried out. It has been discovered that in boys and girls, muscular strength increase linearly with chronological age from 13 or 14 years of age in boys and 15 years in girls, through the pubertal years. This follows a marked increase in strength, and a slower increase into early and mid-twenties in boys and no clear adolescent spurt in girls (Beunen & Malina, 1983, Malina & Bouchard, 1991).

Armstrong and Welsman (1997) confirmed that both boys and girls experience an increase in muscular strength with increase in chronological age, body size, and muscle mass. Though genetic factors affects the rate of increase, strength development through resistant activity will promote better strength of muscles to withstand stress and strain of daily works of the youthful exuberance.

Physical Activity and Skeletal Development

Bone is a dynamic living tissue, which is continually being remodeled from childhood through adolescence and into early adult life. Bone is deposited faster than it is broken down and bones become larger and more dense and this is dependent on peak Basal metabolic rate (BMP)

which is probably attainable by age of thirty. Bone mass adapts to the mechanical strain placed upon it by skeletal loading (Maquet and Furlong, 1986, Armstrong and Welsman, 1997). Repeated application of skeletal loads can produce strain above threshold level, stimulate an increase in bone mass and enhance structure and mechanical properties in proportion to the induced level of strain. Since immature bones experience greater increase in bone formation than mature bones, adequate physical activity should be done by young people, with special skeletal loading programme to increase BMR and bone strength (Currey and Bulter, 1975). Activities such as running, walking and jogging enhance skeletal health to prevent osteoporosis and other bone diseases.

Physical Activity and Obesity

More recent studies have associated childhood obesity with both immediate health consequences and adverse metabolic complications in adulthood. (Armstrong & Welsman, 1997, Uzoalor, 1999). If energy intake consistently exceeds energy requirements there will be a progressive accumulation of body fat. Obesity may therefore result from either high-energy intake or low energy expenditure or a combination of both factors. A regulated reduction in energy intake will promote significant loss of body mass in the obese (Epstein et.al, 1984, Forces, 1987).

Physical activity has the greatest potential for increasing an individual's energy expenditure. Also, increase physical activity with life style modification may also have positive effects on blood lipid profile, blood pressure and glucose metabolism and provide a long-term success in obesity management.

Juvenile obesity has been associated with various immediate health problems and appears predictive of adult obesity and coronary heart disease (Armstrong & Welsman, 1997). It is also identified as a major health problem with adverse effect on life expectancy. (Slattery, 1996).

Physical Activity and Cardiac Health or Coronary Health disease (CHD)

A life of inactivity has been attributed to CHD risk factor. Major factors identified through studies are adverse lipid and lipoprotein profile, increase in blood pressure, cigarette smoking and inadequate physical activity. Other contributory factors are obesity, diabetes mellitus and some psychological traits (Bray, 1990, Armstrong & Welsman, 1997, Uzoalor, 1999). However physical activity has been discovered to prevent or alleviate all these conditions.

Armstrong and Welsman (1997) explained that coronary atherosclerosis has its origin from childhood and adolescence and potential coronary candidates may be identified from childhood. McGill (1984) declared that it can be said with certainty that coronary atherosclerosis has its origins in childhood at least by age 10 and possibly earlier. Children between 9 and 11 years approximately tire easily because of their rapid growth. Though there are certain factors that cannot be controlled such as heredity, sex, race and age, other factors can be controlled through formation of positive habit from childhood. Vigorous exercise will serve as a natural defence of the body, and as a protective measure against incidence of CHD, through well planned programmes as early as possible.

How Physical Activity Reduce Coronary Heart Disease (CHD)

Children with either of the parent having CHD have tendency of being a victim in later years. Such children could take physical activity as a life long venture to reduce the risk of CHD. Powell, Thompson, Caspersohn and Kendrick (1987) concluded that physical activity is universally and casually CHD related to the incident: Physical activity may reduce the incidence of CHD in adult, improves blood lipid and lipo-protein profile; reduces arterial blood pressure, reduces cigarette smoking, decrease adiposity, psychological well being, retards atherosclerosis, decreases platelet adhesiveness, increase fibrin lyses and plasma volume, coronary

artery diameter, coronary collateral visualization and improves aerobic fitness. (Armstrong and Welshman, 1997).

Conclusion

The effect of a life style of physical activity of children and adolescents can not be overemphasized. Physical activity can be seen to play significant role in the better growth and development of children and adolescents in relation to their aerobic fitness, better bone ossification, maximum muscular strength to withstand stress and strain of life, and also immunity against some life shortening diseases.

Recommendations

Based on this write up, the following recommendations are made to the parents, teachers, school administrators and the community and government.

Parents should not be discouraged by the religious and societal biases to hinder their children and adolescents from a life of physical activities.

Parents and teachers should play significant role to ensure sound physiological health status of children and adolescents who shall become leaders of tomorrow. This will reduce economic and financial losses due to health care delivery measures.

Parents should also monitor and reduce the watching time of their children at home, and instead encourage them to engage in physical activities that involve gross and fine movements such as running, walking, jogging, swimming and other outdoor activities.

There should be public enlightenment for the parents, school administrators and even the public at large in relation to the risk factors, and move to inculcate in the children and adolescents a habit of keeping fit the mass media has a big rote to play here.

School physical education programmes should include experiences that will result in knowledge about the value of physical activity, essential of motor skills, strength, stamina and appropriate citizenship qualities.

Government at all levels should made funds available for recreational centres at accessible locations in the community. They should also ensure adequate funds are made available to school for sports facilities and equipment yearly for continuity.

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