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Review Article

Physical Inactivity: A Social Burden

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ABSTRACT

Physical inactivity in children and youth in India is a major public health problem. The 2016 Indian Report Card on Physical Activity for Children and Youth has been conceptualized to highlight this epidemic by appraising behaviours, contexts, strategies, and investments related to physical activity of Indian children and youth. It is clear from available literature that physical inactivity or its surrogates constitute an important independent risk factor for NCD. The basic premise of this review is that childhood physical activity may have a bearing on NCD by improving the health status of children, preventing early development of risk factors contributing to chronic disease, delaying the early onset of NCD in adulthood, and by increasing the likelihood of maintaining adequate physical activity in adulthood.

Keywords: Physical Inactivity, Childhood Obesity.

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INTRODUCTION

Physical inactivity in children and youth in India is a major public health problem. Physical inactivity is an independent risk factor for NCD and studies which evaluate the association of overweight/obesity and NCD risk without documenting physical activity levels, ignore the mechanistic evidence that the protective effect of physical activity on NCD, is mediated through multiple pathways, in addition to that of weight reduction. Estimating the economic burden of physical inactivity is an area of increasing importance that requires further development.

REVIEW

The 2016 Indian Report Card on Physical Activity for Children and Youth has been conceptualized to highlight this epidemic by appraising behaviors, contexts, strategies, and investments related to physical activity of Indian children and youth.[1]

The World Health Organization (WHO) defines physical activity as a bodily movement produced by skeletal muscles that substantially elevates energy expenditure.[2] It may promote weight loss, reduction of visceral fat, lower blood pressure[3] and even prevent of the onset of type 2 diabetes.[4] Furthermore as evidenced by Willet et al., regular (>3 times per wk) physical activity, exercised with moderate intensity, reduces the rise of risk factors related to NCDs.[5] Few studies[6,7], conducted up to day in India about the association between metabolic and contextual causes of obesity in children, found some relevant links among weight increase and a general reduction of physical activities, enhanced by sedentary lifestyles. As highlighted by small scale studies, realized in the 1990s and based on urban samples, the proportion of the overweight population in Indian towns and cities is large and increasing, ranging from 33 % to 51 %.[8] A progressive transition of Asian population from rural to metropolitan areas may explain the rapidly escalating epidemics of NCDs in large urban contexts.[9] Furthermore, as pointed out by Ramachandran et al. , lifestyle changes resulting in decreased levels of physical activity and increased intake of energy dense diet could be related to three main reasons: 1) a nutrition transition, with a rising prevalence of obesity and overweight in the general population in developing countries, especially in South-Asia[10,11]; 2) introduction of fast food consumption products (snacks and soft drinks)[12] and finally 3) migration processes from rural to urban areas.[9]

Chadda et al.[13], however, recent socio-cultural changes, due to a passage from extended to nuclear family structures, along with consequences caused by urbanization processes, alteration of social roles and status, as well as a general rise of employment within the female population, have seen an increasing rate of stress related factors, promoting a certain vulnerability to psychological and physiological disorders. Such changes explain the decrease of gender related differences in levels of inactivity within the sample gathered for this research if compared to former studies.[14,15] Though women result to be less active than men (considering general motor performances), these differences are quite small.

If recent researches evidenced some associations between rise of inactivity and indoor lifestyles[16-18], this study intended analyzing the influence of quality of food intake and socio-demographic variables on frequency and intensity of physical activity. Play time, as pointed out by Burdette et al.[19] progressively reduces to mostly indoor activities, provoking a general decrease of physical performance.

Reduced levels of physical activity in India's children population could, therefore be related to such a post-modern reality, where the duty of full-employment of both parents might promote indoor living habits. Considering statistics published by WHO on adult population in India, nearly 16 % of the population results to be inactive.[20]

This association seemed to be related to socio-economic status as well as to higher educational attainment of children's parents. These findings suggest that better economic status generally promotes an healthy lifestyle, contrary to former studies[21-23] affirming that increasing levels of economic incomes are related to rise of NCDs, especially obesity and diabetes in India.[21]

There is a strong, continuous, and independent relationship between blood pressure and cardiovascular disease and all-cause mortality. Physical inactivity is strongly positively associated with hypertension, and intervention studies have demonstrated that increased physical activity is effective in the treatment of high blood pressure in a variety of populations.[24] Several studies have provided ample evidence that hypertension in adults has its onset in childhood which has caused growing concern with monitoring arterial BP in children in the last few decades.[25] Therefore, the trend in blood pressure in children with respect to increase in age may be important predictors of subsequent trend in adult hypertension. A number of physical activities and intervention studied performed in children and adolescents described the influence of physical activity pattern and blood pressure.[26,27] Several studies have reported useful data on the benefits of exercise, health, and nutritional program in children.[28,29]

Levels of overweight and obesity are increasing in both developed and developing countries. Although individual energy intake and expenditure are the direct determinants of weight gain, attitudes and behavior of other family members may influence individual practices. There are intrafamilial similarities in energy intake[30,31] and physical activity[32,33] and these, together with other risk factors for chronic disease, are likely a mix of heredity and environment. The results of a study by Pe´russe et al.[30] indicate that the similarities in energy intake are more strongly associated with home environmental conditions rather than with genetic factors. Parents are likely to influence eating and activity behaviors of their offspring through control over the home environment[34] and this may lead to obesity-related behaviors.[35] Childhood overweight and obesity[36,37] as well as dietary and physical activity habits[38,39] track into adulthood and may contribute to the subsequent development of cardiovascular disease, diabetes and cancer.[40,41] This emphasizes the need to intervene early in life to promote healthy dietary and physical activity behaviours.

The family environment has been shown to have a major effect on the development of overweight and obesity in the offspring.[42,43] Although both genetic and environmental factors could influence this association, the fact that significant correlations exist for dietary intake and physical activity between spouses as well as weight status suggests that the environment has a major influence on lifestyle behaviours in our study group. Pe´russe et al., using pathways analysis, showed that the total transmissible variance between family members ranged from 28% for carbohydrate intake to 45% for total daily energy intake. More than 50% of the variation observed in the energy intake component was explained by environmental factors. A similar analysis for physical activity indicated that although the propensity to be spontaneously active may be influenced by genetics, environmental factors accounted for 71–88% of the phenotypic variance.

Thakor et al., 2004, found that both SBP and DBP were significantly associated with outdoor playing taking the whole sample as one, but not in different sex or age group, except that the SBP was significantly correlated with outdoor playing in 10–13 years of age group in boys.[44] Hansen and Hyidebebrendt 1989 found an inverse correlation between blood pressure and physical fitness.[45] Klesges et al., 1990, found no consistent relationship between various childhood activity factors and cardiovascular risk factors, weight and blood pressure.[46] Jenner et al., 1992, reported that the number of physical active days per week was negatively correlated with DBP in girls, while relationship with SBP in girls and SBP and DBP in boys was non-significant.[47]

There are several compelling reasons why children and adolescents should be studied while investigating the association between physical inactivity and NCD.

1. Although most chronic diseases associated with physical inactivity occur during adulthood, the antecedents of these may begin early in childhood and adolescence.[48,49]

2. Young children generally enjoy active play. As age progresses, the physical activity of children becomes more structured with most of their activity achieved through organized sports. These play activities involve many muscle groups that promote cardio-respiratory development, muscular strength and endurance, speed, power and flexibility and also help attain a desirable body composition.[50]

3. Modifiable high risk behaviour, such as physical inactivity in childhood, determines behaviour in adulthood. Poor health habits learned, practiced and set in youth may exacerbate the problems of chronic disease later.[51] However, childhood risk profiles may also carry their own independent risk. For instance, irrespective of adult weight status, adults who were obese as children had increased morbidity and mortality.[52]

4. Children and adolescents are particularly vulnerable to peer pressure which may promote the adoption of adverse risk behaviour. However, this can also be used to promote positive behaviour. Peers have a major influence on physical activity in school children and hence programmes that promote physical activity need to include peers in the process.[53] Peer support to physical activity manifests in the form of social integration or companionship during play and emotional support in encouragement of physical activity in elementary school aged children.[54] Social desirability has less of a role to play in physical activity of children[55], while this could be an issue in adults.

5. The barriers and motivations for physical activity can be very different from those of adults. Children reported parental and peer support, safe environment, enjoyment, self-efficacy, weight management and fitness as motivators for physical activity.[56,57] In general, lack of time due to homework, negative experiences in school, competitive classes, peer pressure, lack of energy and preference for sedentary pursuits were considered barriers of

physical activity in children[58], while competitive sports and highly structured activities were recorded as barriers to physical activity in very young children.[57] A study on young African-American girls indicated that perceived lack of affordable and accessible recreation facilities at home or in the community were also barriers to physical activity.[59]

6. Physical activity declines within the lifecycle and some of these declines are evident in childhood/adolescence with girls being more affected than boys.[60-62] Hallal and colleagues[48] in a birth cohort study indicated that behavioural factors were programmed at infancy, indicating that apart from the genetic endowment, early habit formation and socio-cultural factors could play a role.

Sex, family income, maternal education, birth order and reported activity at 4 y of age predicted adolescent physical activity. Increased family income and maternal education and higher birth order as well as being a girl predicted later adolescent sedentary lifestyles. In a study in the United States[63], 17 % of 0–11 mo and 48 % of 12–23 mo children watched more than 2 h of television per day and this duration tended to increase with age. The effect of such increases in sedentary behaviour could affect habitual behaviour from the period of infancy and track through to adulthood to impact morbidity, mortality and longevity. The first few years of life involve a period of motor learning that provides the foundation for more complex and skilled performance which get honed further between 5 to 8 y of age.[50] Interfering in this natural process could lead to weight gains early in life.

7. Apart from the association of chronological age on physical activity and inactivity, puberty also plays an important role, even in boys.[64] Irregular menstrual cycles may reduce physical activity patterns as also early puberty.[65] Apart from these there are variable social issues that arise around puberty which define roles, responsibilities and negotiation power; these may impact physical activity in various ways.

8. There are disturbing trends which suggest that there has been a secular decline in physical activity patterns in children and adolescents.[66-68] Data on secular changes in physical activity are sparse and for the most part rely on sequential cross sectional studies, although some cohort data exist.[69] There is some evidence of a decline in physical activity in parts of Europe[70] and the United States[69], although in some instances the changes were fairly small.[71] In India, data are even more sparse, although Swaminathan et al., described significant reductions in moderate to vigorous activity in girls in as little a follow up as a year.[60]

9. Interventions in children, adolescents and young adults may have the greatest impact in reducing the future burden of NCD. This is particularly relevant in India where the disease burdens due to NCD, occur relatively early[72] and includes acute myocardial infarction[73], diabetes[74] and hypertension.[75]

Tracking of Physical Activity from Childhood to Adulthood

Tracking is generally defined as the maintenance of a variable's relative position in a group over time.[76] A high degree of tracking of physical activity would support early measurement and intervention during the period of childhood as a strategy to ensure healthy levels of physical fitness and physical activity.[77] Tracking of physical activity may mean that the behavior is influenced either by genetics or by habits formed early in life. Studies that evaluate the tracking of physical activity vary; some are over short periods of time spanning half to one decade[78] others over longer periods.[79,80] The Terman Life cycle study, spanning over 50 y with information on physical activity collected from the year 1922 at about age 10 till the participant reached the 6th decade of life, showed that active energetic children tended to become active energetic adults.[79]

Promoting physical activity during childhood has multiple benefits. It enhances physiological and psychological development which affects the health status and quality of life of the child, delays or retards the evolution of health risk factors that contribute to degenerative disease in adulthood and helps establish and maintain adequate levels of physical activity throughout life. There are relatively little data on physical activity patterns of children in India, and much is not known about its determinants. Physical inactivity is an independent risk factor for NCD and studies which evaluate the association of overweight/obesity and NCD risk without documenting physical activity levels, ignore the mechanistic evidence that the protective effect of physical activity on NCD, is mediated through multiple pathways, in addition to that of weight reduction. Estimating the economic burden of physical inactivity is an area of increasing importance that requires further development. There is a marked lack of consistency in methodological approaches and transparency of reporting. Future studies could benefit from cross-disciplinary collaborations involving economists and physical activity experts, taking a societal perspective and following best practices in conducting and reporting analysis, including accounting for potential confounding, reverse causality and comorbidity, applying discounting and sensitivity analysis, and reporting assumptions, limitations and justifications for approaches taken.

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