Original Research

THE LIFESTYLE PATTERN & PREVALENCE OF OBESITY AND OVERWEIGHT AMONG THE ADOLESCENTS OF BHOPAL CITY, MADHYA PRADESH, CENTRAL INDIA

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ABSTRACT

Introduction: Adolescence means "grow to maturity". It is derived from the Latin verb Adolescere. This is a period of life between childhood and adulthood during which growth and development occur. The trend of consumption of fast food increases worldwide and in India fast food production and consumption are high. Physical inactivity is associated with a high risk of non-communicable diseases. In India non-communicable diseases like metabolic syndrome are growing fast currently. **Methods:** It was a cross-sectional study. Sampling was done by using Systematic multistage random sampling. By using the formula $N= Z^2 PQ/ d^2$, the Sample size was calculated as 322. 536 adolescents of age (13-17 years) group were enrolled from the four schools in a different quadrant of Bhopal city. **Results:** In the present study 35.26% (189) adolescents were boys and 64.74% (347) were girls. In this study Prevalence of overweight/pre-obese in boys was found at 8.06% & in Girls, it was 12.17%. Whereas the prevalence of obesity in boys was found 1.45% and in girls, it was 3.7%.**Conclusion:** Adolescents who spent leisure time on television or computer/internet were found overweight and obese relative to those who spend less time. The prevalence of overweight and obesity was found less in adolescents who were highly active as per the physical activity index as compared to those who were less active.

Keywords: Life style, Physical Activity, Overweight, Obesity

Introduction

Adolescence means “grow to maturity”. It is derived from the Latin verb Adolescere. This is a period of life between childhood and adulthood during which growth and development occur as physical and mental, behavioral patterns, emotional, and social changes and challenges (Bhaveet et al.,2002). According to WHO, Adolescence is a stage of life between 10 -19 years of age (Harrington R.,2000). In India adolescent population is about one-fifth of the total population (approx 21.1%) (Handbook S.,2014). The trend of consumption of fast food increases worldwide and in India, fast food production and consumption are high(Ashikaran et al.,2012).In recent years it is observed that most of young people are having a poor diet(Whitney et al.,1999).Most of the individuals of this age group(Adolescents) are influenced by their peers and advertisements on television(Croll et al.,2001). Globally, insufficient physical activity is one of the 10^{th} risk factors for mortality. Physical inactivity is associated with a high risk of non-communicable diseases. In India, non-communicable diseases like Metabolic syndrome are growing fast currently. It is associated with diabetes, obesity, hypertension and insulin resistance (Huang PL et al., 2009).Overweight and obesity are defined by abnormal or excessive fat accumulation that causes a health risk. A body mass index (BMI) over 25 is marked as overweight, and over 30 is marked as obese. According to the global burden of the disease this issue has grown to epidemic proportions, with over 4 million people dying each year as a result of being overweight or obese in 2017(Obesity.,WHO).In a study, researchers found the prevalence of Overweight 12.64% and obesity 3.39%(Midha T et al.,2012).

Due to epidemiological transition, patterns of health and diseases have been changed and trends of non-communicable diseases are increased now a day along with communicable diseases. As adolescent is a critical phase of development of various biological, psychological, social and environmental changes. Overweight and obesity, which is a confirmed risk factors for the non-communicable diseases are marginally increasing among them. So this study is conducted for the assessment of the association of the life styles pattern with the obesity and overweight in adolescents.

The objective of the current study was to calculate the prevalence of overweight and obesity among adolescents and assess the life style pattern among adolescents.

Methods:

The present study was a cross-sectional study conducted for duration of 4- months from October 2016 to January 2017. 536 adolescents of age (13-17 years) group were enrolled in the four schools in a different quadrant of Bhopal city in Madhya Pradesh, India, with their consent. The approval was obtained from the ethics committee of the institute.

Sample Size: By applying the formula of sample size calculation $N= Z^2PQ/ d^2$,with an estimated prevalence of 16% (overweight and obesity), 4% precision and 95% confidence interval, we found a sample size of 322 and considering 20% non- responder, finally it comes to 388(536).Sampling was done by using Systematic multistage random sampling. First list of all schools was obtained from the Bhopal school authorities and then four schools were randomly selected.

Inclusion criteria: All adolescents who were present at school during study periods and provided their consent was included.

Exclusion Criteria: Adolescents who were not present in the school during study periods and did not provide consent were excluded.

Data Collection and Procedure:

A self-administered pre-tested semi-structured questionnaire was used. There were three parts to the questionnaire. In part one of the questionnaire, we collected information on socio-demographic variables (Age, sex, height, weight), and in the second part by using the Global Based Health Survey (GSHS) dietary module modified for India we collected information about food consumption patterns (GSHS India., 2006).Details of food (Fruits, vegetables, junk food, and carbonated drink) items consumed in the last 7 days were collected by using the module. Intake of food was categorized as follows,≤1 time per day, 2-3 times per day, and 4 or more times per day as Low, Moderate, and High respectively. The Youth Risk Behavior Survey (YRBS) questionnaire was used to assess TV watching and Computer/Internet usage and respondents were grouped as ‘’Low’’, “Moderate” and “High (CDC.,2017).A standardized procedure was followed for the measurements of Weight and height. Normal weight, overweight and obesity were categorized based on WHO classification (WHO.,2003).

The third part of the questionnaire was designed to collect the intensity formation (low, moderate, high) duration (minutes), and physical activity performed by individuals in a week. The questionnaire covers activities by various modes such as transport, household, outdoor, fitness, sport etc. Based on the metabolic equivalent (MET) value assigned to every physical activity performed by participants calculation of total energy expenditure was done per week. The physical Activity Index (MET minutes per week) was calculated by multiplying the intensity of various activities (in METs) and time spent on the activity (in minutes/week) (Ainworth et al.,2011).Based on the total METs-min/week, the Physical Activity Index Categorizes as highly active >1680 METs-min per week, moderately active: 840 to 1680 MET-min per week, and low activity level: < 840 METs-min per week(WHO., 2010).

Statistical Analysis: The analysis part was done by using Excel and the software epi- info 7.The test for significance applied was applied Chi- square with a P-value < 0.05.

Results:

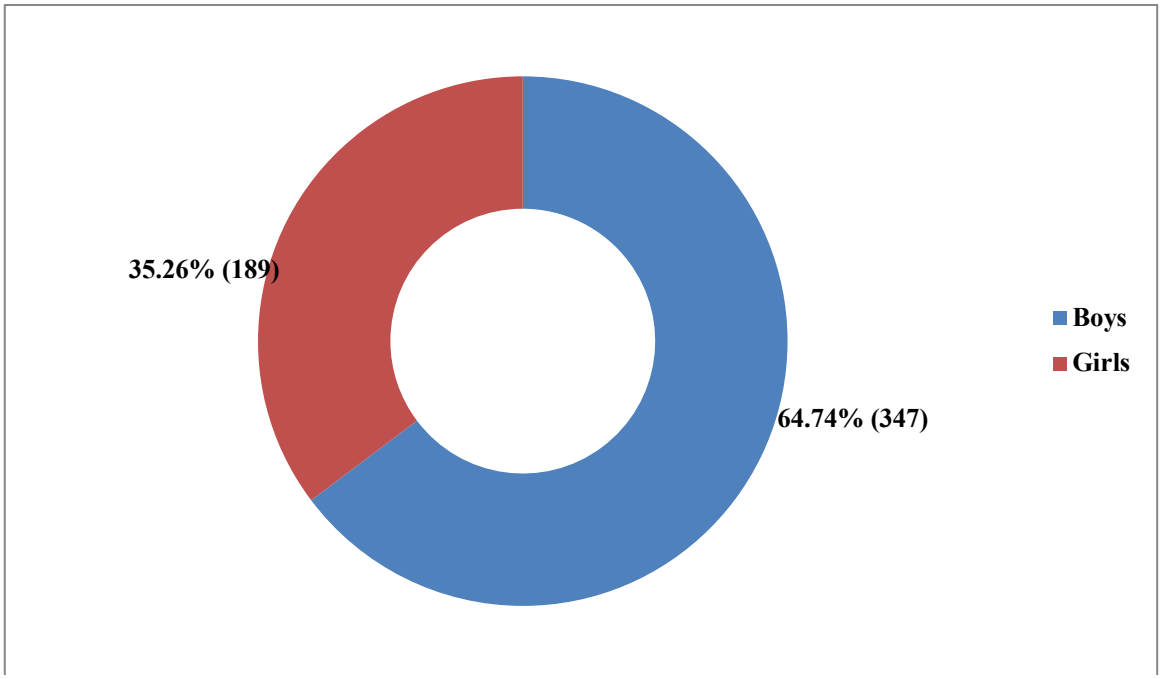

Fig No.1: Distribution of Adolescents on the basis of their sex

The above figure represents that the male and females contribute to the sample size of about 65% and 35% respectively.

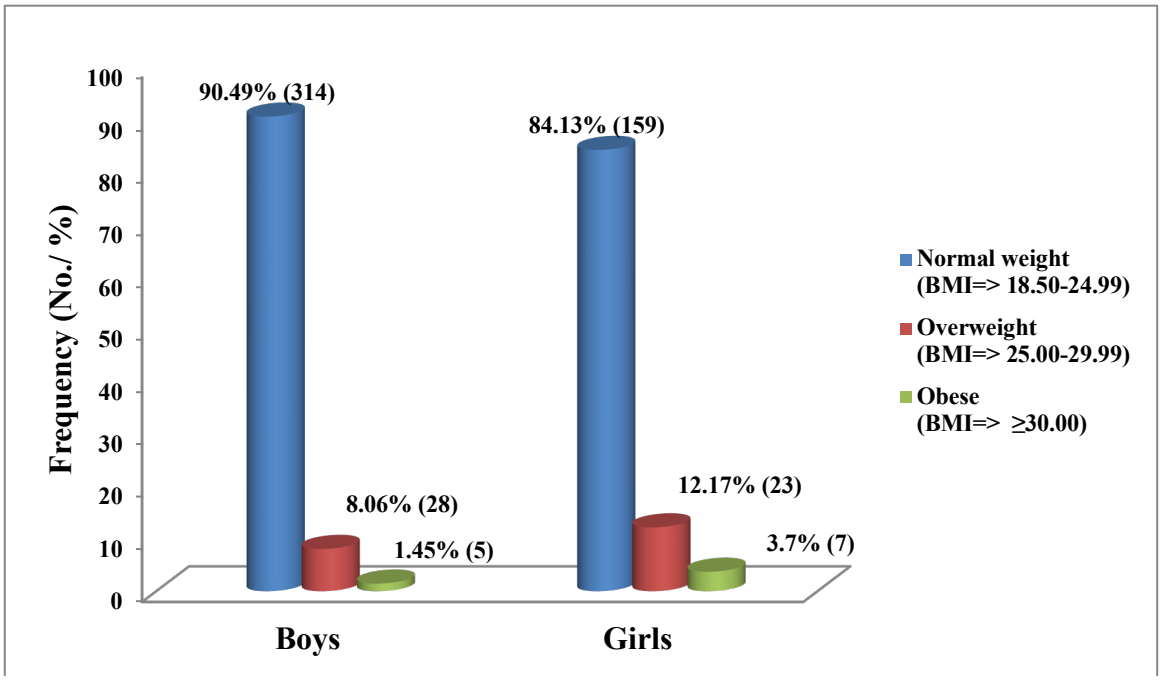

Fig No.2: Distribution of Adolescent boys and girls on the basis of their BMI

The above figures represent that the problem of being overweight and obesity was high in girls as compared to boys. BMI of about 90.5% of boys and 84% of girls lies within the normal range. The prevalence of overweight in boys was 8% and in girls, it was about 12%.whereas the prevalence of obesity in boys was 1.5% and in girls, it was about 3.7%.

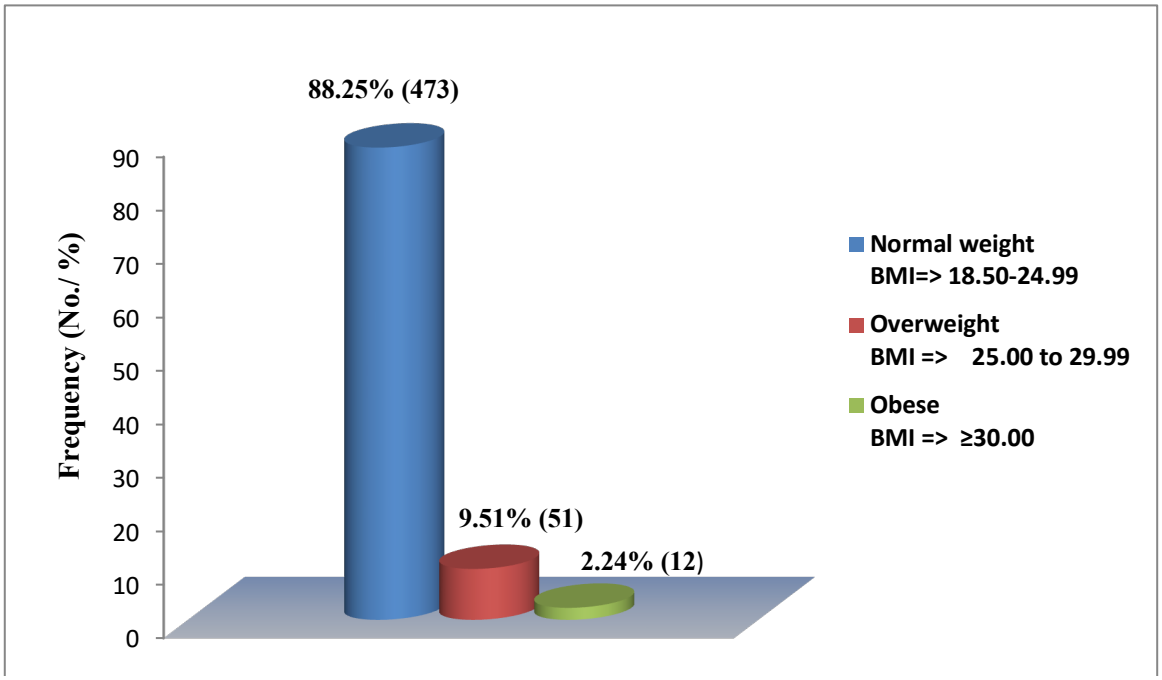

Fig. no.3: Distribution of adolescents on the basis of BMI

The above figures represent about the pattern of Body mass index distributed among the sample-sized adolescents. About BMI of 88% of adolescents lies in the range of normal while the prevalence of overweight and obesity was found 9.51% and 2.24% respectively.

Table no. 1 showed that there was a significant association (p-value <0.05) found for the level of leisure-time activities performed between normal-weight adolescents and adolescents with overweight and obesity. It means that adolescents with normal BMI spent their time less on watching TV and on computers and the internet as compared to an adolescent with BMI in the range of overweight and obesity. Similarly, adolescents with normal BMI spent more time in physical activity as compared to overweight and obese adolescents.

Table no. 1: Leisure-time activities and their association with overweight /obesity

Level of Leisure-time activities	**Frequency of adolescents with Normal Weight No. (%)**	**Frequency of adolescents who were Overweight /Obese**	**Total**	**P –value**
TV Viewing				
Low	102 (94.44%)	6 (5.56%)	108 (100.00%)	**0.002977* (<0.05)**
Moderate	154 (91.66%)	14 (8.34%)	168 (100.00%)	
High	217 (83.46%)	43 (16.54%)	260 (100.00%)	
Computer/ Internet use				
Low	91 (94.79%)	5 (5.21%)	96 (100.00%)	**0.013362* (<0.05)**
Moderate	161 (90.49%)	17 (9.55%)	178 (100.00%)	
High	221 (84.35%)	41 (15.65%)	262 (100.00%)	
Physical Activity Index				
Low Activity (<840 METs-min/week)	297 (85.84%)	49 (14.16%)	346 (100.00%)	**0.042873*(< 0.05)**
Moderate active (840-1680 METs-min/week)	142 (91.61%)	13 (8.39%)	155 (100.00%)	
Highly active (>1680 METs-min/week)	34 (97.14%)	1 (2.85%)	35 (100.00%)	
Total	**473 (88.23%)**	**63 (11.75%)**	**536 (100.00%)**	

Table no. 2 showed that there was a significant association (p-value < 0.05) found for the intake of carbonated drinks and junk food between normal-weight adolescents and adolescents with overweight and obesity. It means that overweight and obese adolescents had included carbonated drinks and junk foods in their diet plan more than the normal BMI adolescents. However, this study didn't stabilise any significant association between the intake of fruits and vegetables in their diet between normal BMI and overweight /obese adolescents.

Table No. 2: Association between Dietary Habits and Overweight/Obesity

Dietary Variables Value	**Frequency of Normal adolescents No. (%)**	**Frequency of Overweight/Obese Adolescents No. (%)**	**Total**	**P- Value**
Fruits				
Low	23 (85.18%)	4 (14.82%)	27 (100.00%)	**0.576188**
Moderate	98 (85.96%)	16 (14.04%)	114 (100.00%)	**(> 0.05)**
High	352 (89.11%)	43 (10.89%)	395 (100.00%)	
Vegetables				
Low	29 (80.55%)	7 (19.45%)	36 (100.00%)	**0.075133**
Moderate	103 (84.43%)	19 (15.57%)	122 (100.00%)	**(> 0.05)**
High	341 (90.21%)	37 (9.79%)	378 (100.00%)	
Carbonated drinks				
Low	298 (97.07%)	9 (2.93%)	307 (100.00%)	**0.00001***
Moderate	108 (83.72%)	21(16.28%)	129 (100.00%)	**(< 0.05)**
High	67 (67.00%)	33 (33.00%)	100 (100.00%)	
Junk Food				
Low	224 (98.68%)	3 (1.32%)	227 (100.00%)	**0.00001***
Moderate	153 (91.07%)	15 (8.93%)	16(100.00%)	**(< 0.05)**
High	96 (68.08%)	45 (31.92%)	141 (100.00%)	
Total	**473 (88.25%)**	**63 (11.75%)**	**536 (100.00%)**	

Discussion:

This study was conducted for the assessment of various lifestyles patterns such as physical activity, dietary habits and leisure time activities and their effects on the prevalence of overweight and obesity in adolescents.

In our study we found that 35.26% (189) adolescents were boys and 64.74% (347) were girls while in another study, 461 (51.2%) subjects were males and 439 (48.8%) were females (Kotian MS et al.,2010). Our study found the prevalence of overweight/pre-obese in boys was 8.06% & in girls, it was 12.17%. Whereas the prevalence of obesity in boys was 1.45% and in girls, it was 3.7% (Fig no.2) while in another study the prevalence of overweight among boys and girls was 9.3%, 10.5% and of obesity it was 5.2% and 4.3%, respectively(Kotian MS et al.,2010).

In the present study, overall prevalence of overweight/pre-obese and obesity was found 9.51% and 2.24% respectively (fig no. 3). The findings are similar to the study, where the prevalence of overweight and obesity was 9.9% and 4.8% respectively and11.4% and 2.7%respectively (Kotian et al.,2010) (Bhat et al.,2017). Similar findings was also observed in the study, where the overall prevalence of overweight and obesity was found to be 22.5% and 9.7% respectively and the prevalence of overweight and obesity in boys was 20.4% and 10.3% respectively and in girls 24.9% and 9.7% respectively(Saikia D et al.,2016).

Results of our study showed (table no.1) that low level of physical activity is significantly (p value<0.05) associated with overweight /obesity, and high TV viewing and high use of computer/internet use significantly (p value<0.05) associated with overweight/obesity among adolescents. While In other study, overweight and obese adolescent were significantly less involved in vigorous physical activity (Saikia D et al.,2016). Overweight and obesity were marginally higher among adolescents who were not involved in physical activities such as walking, cycling, and jogging (Laxmaiah A et al.,2007).

Results of our study revealed that the consumption of high or more carbonated drinks and junk food is associated with overweight and obesity significantly (p value<0.05). The findings of our study are supported by various other studies, overweight and obesity were 5.6 times higher among those who ate chocolates daily in addition to a normal(Kotian et al.,2010). Researchers of the other study found significant association of daily intake of deep fried/fast food, bakery products, butter/ghee, carbonated soft drinks, chocolate, and sharbat /syrups with overweight and obesity(Saikia D et al.,2016). Researchers also states that junk food and chocolate eating habits have more prevalence of obesity and overweight than underweight (Goyal R et al.,2010).

Conclusion: This study concluded that the problem of overweight and obesity is a major health problems among adolescents. Prevalence of overweight and obesity was more common in Adolescents who spend their leisure time activity more with Television or computer/internet, as compared to those who spend less time with them. The problem of overweight and obesity was seen less in adolescents who were highly active as per the physical activity index as compared to those who were less active. This problem was also seen more in adolescents who were consuming more carbonated drinks and junk food.

Recommendations :- As many studies reveal that being overweight and obese is an emerging health problem among adolescents also, so governments should emphasize health promotion and provision of health education regarding physical activities and modifying lifestyles & dietary behaviors in the school curriculum in private schools as well.

Limitations:- Results of the study would be better generalized if we could include more numbers of schools. By including more numbers of schools in different areas of the Bhopal city we would better understand the variability in the lifestyle patterns and might the prevalence we get would be more précised and selection bias would be controlled in better way.

Conflicts of Interest

The author declares no conflicts of interest.

References

- Ainsworth, B. E., Haskell, W. L., Herrmann, S. D., Meckes, N., Bassett Jr, D. R., Tudor-Locke, C., & Leon, A. S. (2011). Compendium of Physical Activities: a second update of codes and MET values. *Medicine & science in sports & exercise*, *43*(8): 1575-1581.
- Ashakiran, D. R., & Deepthi, R. (2012). Fast foods and their impact on health. *Journal of Krishna Institute of Medical Sciences University*, *1*(2):7-15.
- Bhat, R. A., & Murtaza, S. T. (2017). Physical activity levels, overweight and obesity among school going adolescents and their associations with lifestyle habits. *European Journal of Physical Education and Sport Science*.
- Bhave, S.Y., & Nair, M. K. C. (2002). Course manual for adolescent health. Part-II: Indian perspective. *Adolescent health. New Delhi: Indian Academy of Pediatrics*:7-11
- Croll, J. K., Neumark-Sztainer, D., & Story, M. (2001). Healthy eating: what does it mean to adolescents?. *Journal of nutrition education*, *33*(4):193-198.
- Centre for Disease Control and Prevention. State and Local Youth Risk Behaviour Survey.2017 Available on http://www.cdc.gov/healthyouth/yrbs/pdf/questionnaire/2015.pdf.
- GSHS India, Central Board of Secondary Education(CBSE) GSHS Questionnaire [Internet]. 2006. Available from: www.cdc.gov/gshs.
- Goyal, R. K., Shah, V. N., Saboo, B. D., Phatak, S. R., Shah, N. N., Gohel, M. C., & Patel, S. S. (2010). Prevalence of overweight and obesity in Indian adolescent school going children: its relationship with socioeconomic status and associated lifestyle factors. *The Journal of the Association of Physicians of India*, *58*: 151-158.
- Handbook, S. (2014). Rashtriya Kishor Swasthya Karyakram. *Adolescent Health Division Ministry of Health and Family Welfare Government of India*.
- Harrington, R. (2000). Childhood depression: is it the same disorder. *Childhood onset of "adult" psychopathology: Clinical and research advances*: 223-243
- Huang PL.(2009) A comprehensive definition for metabolic syndrome. Dis Model Mech.;2(5-6):231-7. doi: 10.1242/dmm.001180. PMID: 19407331; PMCID: PMC2675814

- Kotian, M. S., & Kotian, S. S. (2010). Prevalence and determinants of overweight and obesity among adolescent school children of South Karnataka, India. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*, *35*(1): 176.

- Laxmaiah, A., Nagalla, B. Vijayaraghavan, K., & Nair, M. (2007). Factors affecting prevalence of overweight among 12-to 17-year-old urban adolescents in Hyderabad, India. *Obesity*, *15*(6) :1384-1390.

- Midha, T., Nath, B., Kumari, R., Rao, Y. K., & Pandey, U. (2012). Childhood obesity in India: a meta-analysis. *The Indian Journal of Pediatrics*, *79*(7) : 945-948.

- Obesity- WHO | World health organization, https://www.who.int

- Saikia, D., Ahmed, S. J., Saikia, H., & Sarma, R. (2016). Overweight and obesity in early adolescents and its relation to dietary habit and physical activity: A study in Dibrugarh town. *Clinical Epidemiology and Global Health*, *4* :S22-S28.

- Whitney E. Rolfes S. Understanding Nutrition.(1999) An International Thomson Publishing Co. Belmont.CA.pp.181-522

- WHO (2003, Tech. Rep. Ser. No. 916).

- World Health Organisation (2010).Global Recommendations on Physical Acivity for Health; WHO Press: Geneva, Switzerland,.