

The association between physical activities and overweight/obesity among adolescent girls in three provincial girls' schools in Piliyandala Educational Zone, Colombo, Sri Lanka.

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Abstract:-Obesity/overweight in adolescents have declared as a risk for non-communicable diseases in late life. The level of physical activity is considered a useful determinant in assessing the risk of overweight/obesity. Thus, this study aimed to determine the association between activity level and overweight/obesity among adolescent girls. A descriptive cross-sectional study was conducted in three selected girls' schools in Piliyandala Educational Zone. A total of 277 participants between 10-19 years, who were willing to maintain a 3-day activity diary were selected by simple random sampling technique. A pre-tested questionnaire was used to obtain demographic data. Results revealed that prevalence of overweight and obesity were 15.2% and 13.7% respectively. About 48.4% were normal weight and 22.7% were underweight. The participants spent <2 hours (49.5%), 2-4 hours (35%), 4-6 hours (13%), >6 hours (2.5%) on mobile phone, computer and TV per day while they spent <2 hours (16.3%), 2-4 hours (32.1%), 4-6 hours (24.2%), >6 hours (27.4%) on education purposes (i.e. tuition /study at home). Around 47.3% participants spent 6-8h/day for sleep. The activity diary showed that 26% of students performed <60 min of exercises 1-3 days/week, while 74 % avoid perform any. In conclusion, risk of obesity/overweight was dominantly seen in

the adolescent girls in this study and it was significantly associated with activity level ($p<0.05$). Programmes on activity level modification would be an effective strategy in reducing the prevalence of overweight/obesity in adolescent girls.

Keywords: Obesity, Overweight, Physical activities

Introduction

Increase of overweight (OW) and obesity in adolescents have been identified as a common health problem which cause adverse health outcomes in adulthood, mainly the risk for non-communicable diseases. OW and obesity are defined as abnormal or excessive fat accumulation that may impair health (WHO, 2019). World Health Organization (WHO) defines the adolescents as the age group between 10 to 19 years. According to WHO (2019), the recommended cut off values of anthropometry in girls aged 5-19 years are interpreted as obese (>2SD), over weight (1SD up to 2SD), normal (-2SD up to 1SD), thinness (-3SD up to -2SD) and severe thinness (<-3SD). Adolescents are the rising population of a country, as the hormonal changes with the puberty increases the demand for nutrients. As a result, they are prone to consume more calories for fulfilling their nutritional needs. The American College of Obstetricians and Gynecologists

stated that the prevalence of obesity in female adolescents (12-19 years) continues to increase as they face medical, psychological and reproductive health challenges (ACOG committee opinion, 2017).

The risk factors affecting obesity can be divided as modifiable and non-modifiable risk factors. Among them socio economic status, birth weight, skipping breakfast meal, low fruit and vegetable consumption, high energy intake and level of physical activity were the most probable risk factors affecting obesity in adolescents (Rathnayake, Roopasingam and Wickramasighe, 2014). WHO states that increase of dietary intake and decrease of physical activities may result in obesity in adolescents (WHO, 2018). The journal of Nutritional disorders and therapy of Sri Lanka in 2015, showed that the prevalence of childhood obesity can be reduced by changing dietary practices and maintaining regular physical activity in the early childhood. According to the Annual Health Bulletin Report (2015) by Family Health Bureau (FHB) in Sri Lanka, the life expectancy of Sri Lankan women is 78.6 years and the life expectancy of Sri Lankan men is 72 years. Exploring about prevalence of obesity, OW among adolescent girls will be effective in eradicating the risk factors for non-communicable diseases mainly during child bearing ages of the girls.

Methodology

A descriptive cross-sectional study was conducted from January 2019 to December 2019, to determine the association between physical activities and overweight/obesity among adolescent girls in three selected provincial girls' schools in Piliyandala Educational Zone, Colombo, Sri Lanka.

Three schools were randomly selected from '1 AB' school category named as provincial schools in the Piliyandala Educational

Zone. The participants were selected from grades 5, 6, 7, 8, 9, 10, 11, 12 and 13 in each selected school using simple random sampling method. The participants were recruited after obtaining permission from the Zonal Director of Education, Piliyandala Educational Zone, Sri Lanka. The permission for the study was obtained from the principals of selected schools. The lists of students' names were obtained from the school principals of three selected schools. The permission of the class teacher was obtained and the consent from parent/guardian of the participants was obtained prior to the recruitment. Method of the study was explained to all the participants. The participants were free to ask any question from the investigators at any time during the study. Privacy and confidentiality of the participants were ensured throughout the study, mainly during obtaining anthropometric measurements.

A pilot study was conducted in a selected school in Kurunegala district, Mayurapada Central College, Narammala, Sri Lanka with 45 girls who fulfil similar inclusion and exclusion criteria. A self-administered questionnaire and a 3 day activity diary was used as study instruments. Minor changes were in cooperated to the study instruments according to the results of the pilot study. The data was analysed using SPSS 23.0 version. Crosstab was done to assess the association between risk factors. Level of significance was set as 0.05. The ethical clearance was obtained from the Ethical Review Committee of Faculty of Medicine, General Sir John Kotelawala Defence University (KDU), Sri Lanka.

Results and Discussion

According to the findings, majority of the adolescent girls were Sinhalese 99.6% (n=276) and only 0.4% (n=1) were Muslims. Majority 97%, (n=269) of the participants were Buddhists and 2.2% (n=6) were

Catholics, 0.4% (n=1) were Christians and 0.4 % (n=1) were Islamic respectively. The mean BMI of the participants was 19.94 Kgm⁻². Among the participants, 15.2% (n=42) were overweight and 13.7% (n=38) were obese. About 48.4% (n=134) were normal weight and 22.7% (n=63) were underweight (Figure 01). Similar to the findings of the present study another study conducted among adolescent girls in a National School in Batticaloa district showed that the prevalence of obesity and OW were 5.5% and 9.4% among the girls respectively (Karuppiah and Markandu, 2018). Hettiarachchi et al., 2018 revealed that 10.8% of the population was OW or obesity among 14-15 year-old adolescent school children in the Colombo Educational Zone. Further they showed that there was an equal distribution of OW and obesity among males and females (Hettiarachchi et al., 2018).

A native cross-sectional descriptive study among a sample of 1728 students signifying all schools in Colombo educational zone, which was selected using multi stage cluster sampling method, reported that prevalence of OW and obesity among adolescents was 10% and 3.9% (Katulanda et al., 2010). A systematic review and meta-analysis study in Asian countries conducted to estimate the prevalence of OW and obesity in children and adolescents through quantitative data synthesis using 47 studies revealed that the overall prevalence of obesity was 5.8% in Asian children and 8.6% in adolescents. At all they have concluded relevant health authorities should precede actions to prevent obesity and the rate of obesity (Mazidi et al., 2018).

Another descriptive study conducted in a district school of Bangladesh as a part of “Diabetics Awareness and screening program”, a surveillance program of Bangladesh Institute of Research and Rehabilitation of Diabetes, endocrine and

metabolic disorders at a tertiary hospital among 501 of study participants stated that the prevalence of OW, obesity and central obesity were 23%, 14% and 26% among girls respectively while 14% girls in normal body mass index (BMI) were centrally obese, 46% girls in OW and 54% girls in obese were centrally obese (Zabeen et al., 2015).

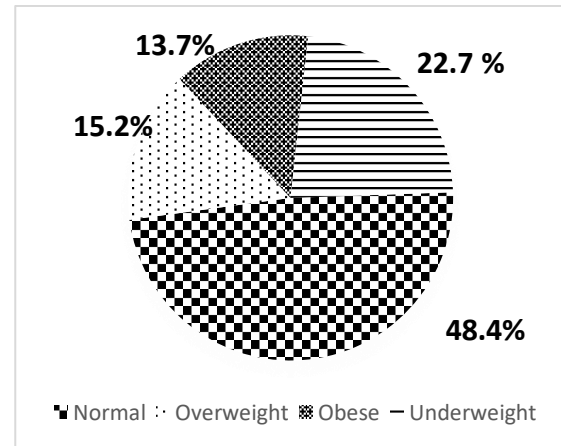


Figure 1 - Prevalence of obesity and OW among participants

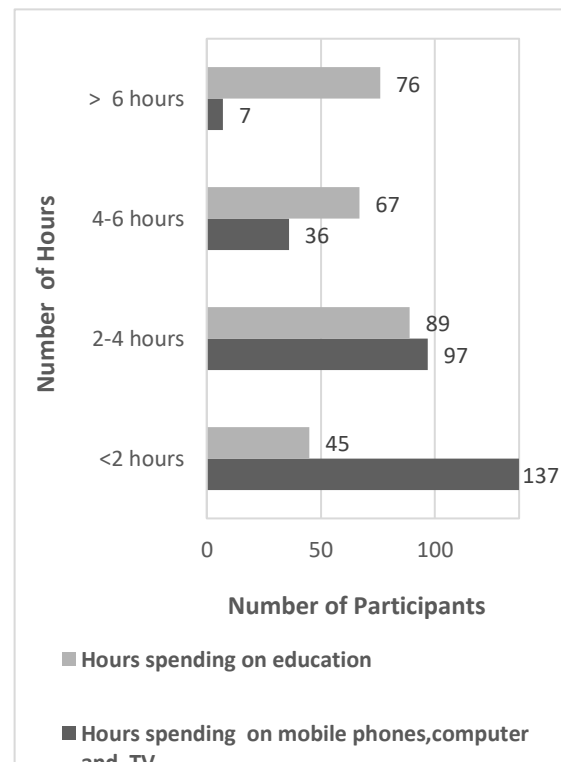


Figure 2 - Hours spending on mobile phones, computer and TV and Education

According to the findings of the activity diary, the participants spent <2 hours (49.5%, n=137), 2-4 hours (35%, n=97), 4-6 hours (13%, n=36), >6 hours (2.5%, n=7) on mobile phones, computer and TV per day (Figure 02). As stated by the WHO obesity report in 2017, usage of computer continuously or for 2 hours has been increased from the year 2002 up to 2014 of the girls in the countries of the European continent (Inchley et al, 2017). According to the results obtained, there was a significant association between hours spending on mobile phones, computer, television and their BMI ($p<0.05$). A recent study conducted in India also showed that reduce in physical activity, eating fast foods, watching television, are highly associated with obesity and OW in adolescents (Parimalavalli et al., 2014). The activity diary showed that 26% (n=05) of the students performed <60 min of exercises 1-3 days/week, while 74 % (n=72) avoid perform any.

When the hours spending on sleep was assessed, 47.3% (n=131) of the adolescents sleep for 6-8 hours per day while 28.5% (n=79) of the adolescents sleep for 8-10 hours, and 12.3% (n=34) of the adolescents sleep for 4-6 hours. About 11.9% (n=33) of the total participants spent >10 hours for sleeping. However, there was no significant association noticed between sleeping hours and BMI ($p>0.05$) in the study participants. A cross sectional study conducted among Korean -American children in United States (n=170) revealed that 60% and 88.8% of the participants met recommended hours of sleep on a weekday and a weekend day respectively. Further, they stated that only screen time was positively associated with BMI ($p<0.03$) (Jang et al., 2018). When number of hours spending on education was assessed, it was observed that 16.3% (n=45) of the adolescents engaged in studies for <2 hours. About 32.1% (n=89) of the

adolescents engaged in studies for 2-4 hours while 24.2% (n=67) of the adolescents engaged in studies for 4-6 hours. Only 27.4% (n=76) of the adolescents spent < 6 hours for their studies. According to the results of the present study, it was noticed that there was no significant association between, number of hours spending on academic activities with BMI ($p>0.05$).

Moreover, 74% (n=205) of the total study sample did not perform any exercises and only 26% (n=72) of the adolescents reported performing exercises in the present study. However, there was no significant association seen between regular exercises and BMI ($p>0.05$). WHO (2019) stated that changes in activity level can reduce the risk for obesity and OW. Further, it was observed that many study participants in the present study who are obese or OW, had already initiated at least one type of sport at their school. A trial sequential meta-analysis of randomized controlled exercise intervention trials in adolescents' in United states with 5436 citations screened in 971 boys and girls representing 20 studies were included in the study. The exercise sessions were carried out for 46 minutes per session 3 times per week and continued for 13 weeks. The results showed that decrease of BMI by 3.6% ($p< 0.001$) with regular exercises. They also concluded that exercise is associated with improvement in BMI among OW and obese children and adolescents (Kelley et al., 2015).

Conclusion

The prevalence of OW and obesity among adolescent girls, in the present study was observed and it was associated with the level of activities. The responsible authority should take action to prevent adolescent OW and obesity in Piliyandala Educational Zone, Sri Lanka. Early identification of

childhood obesity, will be effective in reducing adolescent obesity.

References

- ACOG committee opinion. (2017). obesity in adolescents.
- De Silva, A., De Silva, S., Haniffa, R., Liyanage, I., Jayasinghe, K., Katulanda, P., Wijeratne, C., Wijeratne, S. and Rajapakse, L. (2015). A cross sectional survey on social, cultural and economic determinants of obesity in a low middle income setting. *International Journal for Equity in Health*, 14(1).
- Family Health Bureau. (2015). *annual_report_2015.pdf*. [Online] Available at: <https://drive.google.com/file/d/1cym2eQEM1PGuEM52KucGwThDw1m4kgnY/view> [Accessed 21 Oct. 2019].
- Jang, M., Grey, M., Sadler, L., Jeon, S., Nam, S., Song, H. And Whittemore, R., 2018. Obesity-risk behaviours and their associations with body mass index (BMI) in Korean American children. *Journal of Clinical Nursing*, 27(17-18), pp.3408-3417.
- Karuppiah, D. and Markandu, M. (2018). Prevalence of obesity, OW and central obesity among adolescent girls in national school in Batticaloa district, Sri Lanka. *Sri Lanka Journal of Diabetes Endocrinology and Metabolism*, 8(1), p.17.
- Kelley, G., Kelley, K. And Pate, R., 2015. Exercise and BMI in Overweight and Obese Children and Adolescents: A Systematic Review and Trial Sequential Meta-Analysis. *BioMed Research International*, 2015, pp.1-17.
- Mazidi, M., Banach, M., Kengne, A. and Meta analysis Collaboration Group, L. (2018). Prevalence of childhood obesity and adolescent overweight and obesity in Asian countries: a systematic review and meta-analysis. *Archives of Medical Science*, 14(6), pp.1185-1203.
- Hettiarachchi, J., Jayatissa, R., Wickramasinghe, S. and Wijewardena, K. (2018). OW and obesity among adolescent school children in the Colombo education zone. *Journal of the Postgraduate Institute of Medicine*, 5(1), p.63.
- Inchley, J. (2017). Adolescent obesity and related behaviours. World Health Organization, Regional Office for Europe.
- Parimalavalli, R. and Kowsalya, T. (2014). Prevalence of OW/obesity among adolescents in urban and rural areas of Salem, India. *Journal of Obesity and Metabolic Research*, 1(3), p.153.
- Rathnayake, K., Roopasingam, T. and Wickramasinghe, V. (2014). Nutritional and behavioural determinants of adolescent obesity: a case-control study in Sri Lanka. *BMC Public Health*, 14(1).
- SM, M. (2015). Childhood Obesity: Epidemiology, Determinants, and Prevention. *Journal of Nutritional Disorders & Therapy*, 5(2).
- Who.int. (2018). Obesity and OW. [online] Available at: <https://www.who.int/news-room/fact-sheets/detail/obesity-and-OW> [Accessed 3 Jan. 2019].
- Who.int. (2019). [online] Available at: https://www.who.int/growthref/bmifa_girls_z_5_19_labels.pdf?ua=1 [Assessed 1 Jan. 2019]
- Zabeen, B., Tayyeb, S., Naz, F., Ahmed, F., Rahman, M., Nahar, J., Nahar, N. and Azad, K. (s). Prevalence of obesity and central obesity among adolescent girls in a district school in Bangladesh