



PREVALENCE OF OVERWEIGHT AND OBESITY AMONG ADOLESCENTS IN INDIA: A SYSTEMATIC REVIEW

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ABSTRACT

Background: Obesity among adolescent is emerging as a major global public health problems leading more preponderance towards associated morbidity and mortality in later stages of life. So, a systematic review of published studies was done to have an overview over prevalence of overweight and obesity among adolescents in India.

Methods: A systematic review of literature of research papers on prevalence of overweight and obesity among adolescent in India was done published from 2006 to 2016. Literature search was conducted using electronic databases. Data were extracted independently with respect to epidemiological estimates, study population characteristics, study design, and assessment methods and criteria. Out of 234 published articles screened, 12 studies were included in the review that met the inclusion criteria.

Results: Overweight and obesity in adolescent ranged from 2.2 to 25.8% and 0.73 to 14.6 % respectively. The prevalence was comparatively higher in urban areas than in rural areas and males were more preponderate to get overweight/ obese.

Conclusions: The study revealed towards rise in prevalence of overweight and obesity especially in male adolescents belonging to urban area thereby indicating the need to provide of immediate and comprehensive targeted intervention for adolescents.

Key Words: Adolescents, Obesity, Overweight

INTRODUCTION

Obesity has been evident in human records for over twenty thousand years and has affected numerous aspects of human life and society.^[1] WHO defines overweight and obesity as “abnormal or excessive fat accumulation that presents a risk to health”.^[2] Obesity can be viewed as the first wave of a defined cluster of NCDs (Non-communicable diseases) called -New World Syndrome, creating an enormous socio-economic and public health burden associated with an increased risk for type 2 diabetes mellitus, hypertension, dyslipidemia, cardiovascular diseases, obstructive sleep apnea, musculoskeletal disorders, some cancers, as well as mortality.^[3]

According to World Health Organization (WHO) obesity has reached to epidemic proportions globally, with more than one billion adults overweight with 300 million of them clinically obese. The problem of overweight and obesity is

confined not only to adults but also being reported among the lower age groups and evidences over the past decades indicate towards increasing childhood and adolescent obesity. Various studies conducted in India reported prevalence of overweight among adolescents ranging between 2.2% to 25.0%.^[4] According to the latest estimates from the International Obesity Task Force about 155 million school-age children between 5 and 17 years of age, worldwide are overweight and 30-45 million within that are classified as obese.^[5] Globally an estimated 10.0% of children in school-age group are overweight and 2-3% of them are obese.^[6] Overweight and obesity among children and adolescents has increased significantly in the developed economies during the last two decades and same type trends are being observed even in the developing countries, though less rapidly.

India is also passing through phase of transition in terms of socio-economic development which has the potential effects

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to alter the nutritional status. Over the past few years, childhood obesity is increasingly being reported with the transforming behavioral lifestyle of families with increase in their purchasing power. Proportion of hours spend in sedentary in have also increased due to television, video games and computers which have replaced social activities including the outdoor games. In India, a large proportion of overweight children coexist along with those who are undernourished. The problem of overweight and obesity is not restricted only to the urban areas but also spanning its wings among children and adolescents in rural areas. Adolescent overweight and obesity is of major concern because overweight during adolescence is associated with increased morbidity and mortality in adulthood and overall increase in morbidity and mortality in later life.^[6] Adolescent life phase is best opportunity for appropriate interventions aimed to prevent overweight and obesity because they possess the cognitive as well behavioral abilities necessary to understand and act on health and behavioral change instructions, while treatment of overweight and establishing behavioral changes in adults are difficult and often not effective or feasible, especially in the long term.^[6] Acquiring healthy dietary and physical activity habits during childhood and adolescence thus seem a more promising formula than altering in unhealthy habits in adults. India is mainly associated with under nutrition but the problem of overweight and obesity is now an emerging health problem and is likely to be a major public health problem in the near future. There are very few studies on overweight and obesity among adolescent school girls and majority of them have been carried out in metropolitan cities. The aim of the present study is to systematically review prevalence of Overweight and Obesity in Adolescents in India.

Methods:

Search strategy for identification of studies:

We systematically searched online databases for articles published since 2008. The literature search was conducted in Cochrane, Medline, Scopus and various other electronic data bases using MeSH terms: “overweight”; “obesity”; “adolescent”; “prevalence” and “India” following Boolean search strategy. In total 234 articles were selected, which were screened by two authors independently and thereafter data was extracted from 12 reliable studies. Data available for obesity and overweight were deeply reviewed for each study.

Study selection

The study selections were based on original articles for overweight and obesity in adolescent in India. Both title and abstract review of all the selected articles, with the following inclusion and exclusion criteria were assessed for reliable studies.

Inclusion criteria:

1. Cross-sectional studies conducted in between 2006-2016.
2. Studies in context to Indian population with age group 11-19 years.
3. Weight and height objectively measured.

Exclusion criteria:

1. Case-reports, review articles and conference abstracts.

Study selection and data extraction:

List of references were indecently appraised by two reviewers and their assessment was done for their eligibility to be included in review. Data were obtained based on operational criteria and assessment methods, study design, study population characteristics and study time frame.

Analysis

As the present review aimed to have an overview over prevalence of overweight and obesity among adolescent in India in different demographic populations and at unlike frame of time, a wide variation in the results was expected. Since the timing of obtaining samples, demographic area and assessment methods and criteria were more likely to be dissimilar over time, pooled estimates for any demographic variables or epidemiological indices were not estimated and only a descriptive analysis has been provided.

RESULTS

Various electronic databases were searched for studies and after screening of title, abstract and full articles 12 research studies were found to meet the inclusion criteria. The prevalence of overweight and obesity in adolescent ranged from 2.2 to 25.8% and 0.73 to 14.6 % respectively. Laxmaiah *et al.*, studied the factors affecting prevalence of overweight urban adolescents in Hyderabad, India found that the prevalence of overweight among adolescents was 7.2% and prevalence of obesity was 1.3%.^[7] Deshmukh *et al.*, reported the prevalence of overweight/obesity to be 2.2% in the rural area of Wardha District.^[8] Kotian *et al.*, reported the prevalence of overweight and obesity as 9.9% and 4.8% respectively amongst the adolescent school children of Mangalore city, Karnataka.^[9] Agarwal *et al.*, conducted a school based cross sectional study on thousand adolescents, having equal number of boys and girls and reported overall incidence of obesity 3.4%; however a significantly greater number of boys (15%) as compared to girls (10.2%) were overweight.^[10] Bharati *et al.*, studied the correlation of overweight and obesity among school going children found 4.3 per cent of the

children were overweight/obese.^[3] It was also found that the risk of overweight/ obesity was significantly higher among children from urban area than rural area. Unnithan and Syamakumari assessed the prevalence of overweight, obesity and underweight among school children in the rural and urban areas of Thiruvananthapuram and showed that the prevalence of overweight and obesity were higher among urban children.^[11] Tharkar and Viswanathan studied the impact of socioeconomic status on prevalence of overweight and obesity among children and adolescents in urban India and reported overall prevalence of overweight 15.5 % among the adolescents and both overweight (22%) and obesity (13.7%) were highest among girls from affluent families.^[12] Goyal *et al.*, carried out the study school going adolescents and found prevalence of overweight as 14.3% among boys and 9.2% among girls and obesity was 2.9% in boys and 1.5% in girls.^[13] Vohra *et al.*, studied children from 5th to 12th standard at Lucknow city and found 4.17% were overweight, and 0.73% were obese. Risk of overweight/obesity was significantly higher in children who played outdoor games for lesser duration and those who consumed fast foods.^[14] Nawab *et al.*, studied the prevalence and behavioral determinants of overweight and obesity in school going adolescents from affluent and non-affluent school of Aligarh and reported prevalence of overweight and obesity was 9.8% and 4.8%, respectively.^[16] Sohani *et al.*, studied the prevalence of obesity related indices and reported prevalence of obesity was 4.5% while there were 20% overweight subjects.^[17]

DISCUSSION

The study was aimed to review systematically the available literature on overweight and obesity prevalence amongst adolescents in India. Twelve original articles were considered that met the inclusion criteria. When the prevalence was analysed according to gender, majority of the studies reported boys as compared to girls were more overweight and obese;^[8, 9, 13, 15, 16] while study conducted by Tharkar and Vishvanathan reported both overweight and obesity to be higher among the girls.^[12] However in one of the study conducted by Marcelino *et al.* any such type of difference was not observed in the prevalence of overweight / obesity with respect to gender. This might be due to difference in sample size or baseline characteristics of the study population or may be attributed to the method of assessment of the obesity. When the studies were reviewed with respect to place of residence adolescents residing in urban areas were found to be more overweight and obese than those belonging to be rural areas.^[3, 11, 15] The probable cause might be the difference with respect to lifestyle, eating habits and comparatively less physical activity among those belonging to urban areas. The adolescents residing in urban areas are more exposed to junk foods, used to

indoor games spending majority of their times in television watching. Similar findings were also reported in other studies.^[19, 20] Apart from that SES and standard of living were found to have influential effect on overweight and obesity status. Goyal *et al.*, reported prevalence of overweight and obesity to be more in both the genders in upper SES group.^[13] Similarly Nawab *et al.*, showed higher prevalence of overweight and obesity among adolescents and obesity belonging to affluent group Adolescents belonging to affluent group are more pre-pondered towards sedentary lifestyle and luxurious living pattern.

LIMITATION

The reviews have some limitations; limited numbers of reliable studies were available on overweight and obesity among adolescent in India over past few years. Apart from that, those available were quite heterogeneous with respect to study population, sampling method, sample size, age-groups; method and criteria for assessment of obesity and overweight and in terms of their baseline characteristics. Despite these limitations the current review provides inferential results about prevalence of overweight and obesity among adolescents in India.

CONCLUSIONS

The inference of the review indicates towards increasing prevalence of overweight and obesity with males adolescent residing in urban areas having more susceptibility. The results from the study emphasise the need for immediate primordial and primary prevention based intervention so as to prevent the consequences and complication in future.

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Table 1: Descriptive analysis of the studies reviewed.

| Author | Year | Age-group/ School grade | Place | Urban/ Rural | Sample size | Prevalence of Overweight | Prevalence of obesity |
|---|------|---|--------------------------------|------------------|-------------|-----------------------------|--------------------------|
| Laxmaiah et al ^[7] | 2006 | 12-17 yrs | Hyderabad | Urban | 1208 | 7.1% | 1.3% |
| Deshmukh et al ^[8] | 2006 | Adolescents | Wardha | Rural | 746 | 2.2% | --- |
| Kotian et al ^[9] | 2007 | 12-15yrs | South Karnataka | Urban | 900 | 9.9% | 4.8% |
| Agrawal et al ^[10] | 2008 | Adolescents | Ludhiana (Punjab) | Urban | 1000 | 12.7% | 3.4% |
| Bharti et al ^[3] | 2008 | 10-17yrs | Wardha | Urban / Rural | 2555 | 3.1 % | 1.2% |
| Unnithan and Syamakumaril ^[11] | 2008 | 10-15yrs | Thiruvananthapuram (Kerala) | Rural | 3886 | 10.1% | 2.6% |
| Tharkar and Vish- vanathan ^[12] | 2008 | 8-15yrs (Early adolescent group included) | Chennai | Urban | 1193 | 15.5% | |
| Goyal et al ^[13] | 2010 | 12-18yrs | Ahemdabad | Urban | 5664 | 23.5% | 4.4% |

Table 1: (Continued)

| Author | Year | Age-group/ School grade | Place | Urban/ Rural | Sample size | Prevalence of Overweight | Prevalence of obesity |
|------------------------------|------|--|-------------|------------------|-------------|-----------------------------|--------------------------|
| Vohra et al ^[14] | 2011 | 5 th – 12 th standard (Adolescent group included) | Lucknow | Urban | 407 | 4.17% | 0.73% |
| Alok et al ^[15] | 2012 | 14-16 yrs | Surat | Urban / Rural | 389 | 26.3%/25.8% | 14.6%/12.8% |
| Nawab et al ^[16] | 2014 | Adolescents | Aligarh | Urban | 660 | 9.8% | 4.8% |
| Sohani et al ^[17] | 2014 | 11-19yrs | Maharashtra | Semi- urban | 585 | 20% | 4.5% |