

**NUTRITIONAL STATUS OF OMANI ADOLESCENT GIRLS**

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**ABSTRACT**

**Background:** Many countries are experiencing what has been termed the “double burden of malnutrition” where problems of nutritional deficiencies coexist with problems of nutritional excess. Poor nutrition during adolescence implies a poor quality of life and additional health and morbidity risks for the adolescents themselves. **Objectives:** The objectives of the present study were to assess the nutritional status of school going adolescent girls. **Materials and Methods:** A community based cross sectional study was carried out in Omani adolescent girls. Data collection tool used was a pretested, structured questionnaire to assess the sociodemographic variables. Weight and height was measured and body mass index was calculated to classify the girls according to their nutritional status using WHO cut offs for BMI. Data analysis was done using SPSS version 22. **Results:** Mean BMI of girls was  $23 \pm 5.4$  kg/m<sup>2</sup>. Nineteen percent girls were undernourished, 52.6% had normal weight and 28.4% were overweight. More girls in the younger age group were overweight while more girls in the older age group were underweight. Girls with educated mothers had higher BMI than those whose mothers were illiterate. Similarly girls studying in grade 9 also had higher BMI compared to girls studying in grade 10. **Conclusion:** One third of the girls were overweight and one fifth was undernourished. Mother’s education did not have significant effect on nutritional status of girls.

**KEYWORDS:** BMI, Girls, Underweight, Overweight.

**INTRODUCTION**

Adolescence is the second fastest period of growth after infancy, and thus a period of high nutritional requirements to meet the physiological demand for development. Approximately 20% of total height gain occurs in adolescence and up to 50% of adult bone mass is achieved during this period. Because of the dynamic changes occurring during this period, assessing nutritional status during adolescence, particularly via anthropometric measurements, can be challenging. At the same time, adolescence may represent a “window of opportunity” during which health problems from earlier in life can be addressed to establish a healthy diet and physical activity that continue into adulthood.<sup>[1]</sup>

Many countries are experiencing what has been termed the “double burden of malnutrition” where problems of nutritional deficiencies coexist with problems of nutritional excess. It was found that 11% of girls were underweight, 61% were normal and 28% were overweight or obese in Saudi Arabia adolescent study. The findings revealed that adolescent girls face two contrasting nutrition situations, underweight and overweight.<sup>[2]</sup> Similar findings were reported in other Arabian Gulf countries, indicating the need for

intervention programs to promote better nutrition among school children and adolescents.

Poor nutrition during adolescence implies a poor quality of life and additional health and morbidity risks for the adolescents themselves; it is directly linked to the health and nutrition of their future children too. Underweight status in adolescents was shown to be associated with scoliosis, osteoporosis, pubertal delay, and psychiatric disorders.<sup>[3]</sup> In addition, it was recently reported that underweight in adolescents is associated with poor perceived health.<sup>[4]</sup> Among women, thinness, or low maternal body mass index (BMI), has been associated with intrauterine growth retardation, the primary cause of low-birth weight, and a principal cause of neonatal morbidity and mortality and preschool stunting.<sup>[5]</sup>

On the other hand rates of overweight and obesity have increased exponentially over the past three decades, identifying targets for obesity prevention in children and adolescents have become a key public health goal.<sup>[6]</sup> Nowadays when 23% of children and adolescents are overweight or obese,<sup>[7]</sup> understanding of the impact this excess weight might have on their future health is crucial. The rise in BMI during the transition to

adulthood is associated with a number of concomitant social trends that have redefined this life stage.<sup>[8]</sup> Inactivity historically increases with age;<sup>[9]</sup> over the last decade, however, the drop off in physical activity has migrated into the adolescent and young adult ages.<sup>[10]</sup> A study conducted in 15 European countries presents alarming statistics showing that the rate of overweight ranged between 18% and 50% among girls and between 18% and 57% among boys.<sup>[11]</sup> Nearly 53.6% of Omani women were reported to be overweight or obese.<sup>[12]</sup> Obesity in childhood and adolescence appears to track into adulthood and it is associated with cardiovascular complications, diabetes, hypertension, depression, mortality and morbidity of adulthood.<sup>[13]</sup> Cardiovascular disease is a leading cause of death,<sup>[14]</sup> and there are indications that higher BMI values during childhood and adolescence increase this risk.<sup>[15]</sup>

Anthropometric measurements remain the most practically useful means for the assessment of the nutritional status of a population.<sup>[16]</sup> Body Mass Index is the measure of body weight based on a person's weight and height. Even though it does not actually measure percentage of body fat, it is used to estimate a healthy body weight based on a person's height, assuming an average body composition. BMI may not accurately represent body fatness. BMI percentile indicates the relative position of the child's BMI number among children of the same sex & age. Thus this study was carried out to assess the nutritional status of adolescent girls in Oman, both underweight and overweight.

## MATERIALS AND METHODS

A community based cross-sectional study was conducted in Omani adolescent girls. The study setting was girls' high schools specifically grade 9 and 10. In all the 8 Omani high schools, girls who gave informed consent were included in the study.

A validated, structured questionnaire was used to collect data on sociodemographic variables. Weight in kilogram to the nearest 0.1 kilogram and height in centimeter to the nearest 0.1 centimeter was measured using DETECTO weighing scale. These measurements were later used to calculate the body mass index by dividing the weight in kilogram by height in meter squared. Girls were categorized according to their body mass index using the World Health Organization (WHO) cut-points for Body mass index, BMI (kilogram per meter squared) as less than 18.5 underweight, 18.5-24.9 healthy weight, 25.0-29.9 overweight.<sup>[17]</sup> Also BMI was classified as per WHO percentile distribution in which BMI < 5 percentile indicated thinness, and BMI ≥ 85 overweight and obesity. BMI values in between 5 and 85 percentile are referred to normal weight youth. The research proposal was approved by the Research and Ethical Review and Approval committee of the Directorate of health.

Data analysis was done using SPSS software. Proportions were summarized as number of girls and percent for each assessed variable in the questionnaire. Categorical data was summarized as frequency and percent while continuous data was summarized as mean with standard deviation. Chi-square test was used as test for proportions and one way ANOVA was used to test the means, non-parametric tests were used for ordinal variables. A p value less than 0.05 was considered for statistical significance.

## RESULTS

The nutrition assessment of girls was done using body mass index classification by WHO. Mean BMI of study population was found to be  $23 \pm 5.4 \text{ kg/m}^2$ . According to the WHO classification using BMI, 189 girls (52.6%) had normal weight, 68 girls (19%) were undernourished and 102 girls (28.4%) were overweight. More girls in the younger age group were overweight than the girls in older age group; maximum overweight were of age 14 years (31.8%) followed by 15 years (28.9%). While undernourished girls were more in the older age group than the younger age group, maximum undernourished girls (27.3%) were of age 17 years (Table 1).

**Table 1: Age distribution of girls according to nutritional status.**

Age	Total (n)	Undernourished (%)	Overweight (%)
14	85	14.1	31.8
15	159	21.4	28.9
16	104	18.3	25.0
17	11	27.3	27.3

Mean BMI was more in girls studying in grade 9 ( $23.2 \pm 5.4 \text{ kg/m}^2$ ) compared to girls studying in grade 10 ( $22.8 \pm 5.2 \text{ kg/m}^2$ ). Mean BMI of girls whose mothers were highly educated was more ( $24 \pm 5.1 \text{ kg/m}^2$ ) than the girls whose mothers were illiterate ( $22.9 \pm 5.4 \text{ kg/m}^2$ ) (Figure 1). However, the grade in which the girls were studying, age of the girls and mother's education did not affect the BMI significantly ( $p > 0.05$ ).

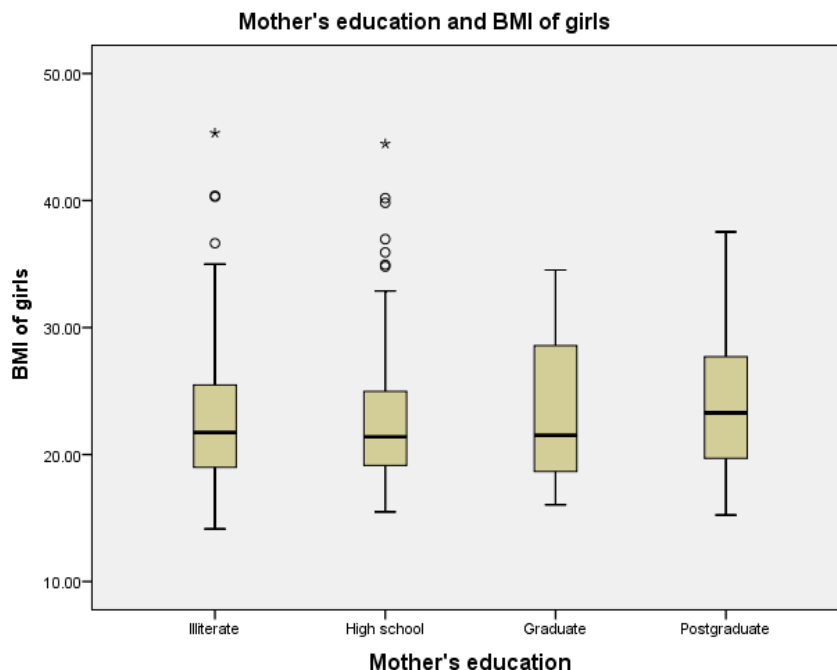


Figure 1: Mother's education and BMI distribution of girls.

When the girls were classified according to percentile distribution of BMI, it was found that most of the girls (80.2%) were within 5<sup>th</sup> and 85<sup>th</sup> percentile. Only 18 girls (5%) were less than 5<sup>th</sup> percentile whereas 53 girls (14.8%) were more than 85<sup>th</sup> percentile. Mean BMI and standard deviation of girls in less than 5<sup>th</sup> percentile

group was  $15.9 \pm 0.6 \text{ kg/m}^2$ , in 5<sup>th</sup> to 85<sup>th</sup> percentile was  $21.6 \pm 3.07 \text{ kg/m}^2$  and in more than 85<sup>th</sup> percentile group was  $32.9 \pm 3.9 \text{ kg/m}^2$ . There was a strong correlation between BMI category classification by WHO and BMI distribution by percentiles ( $p < 0.001$ ) (Figure 2).

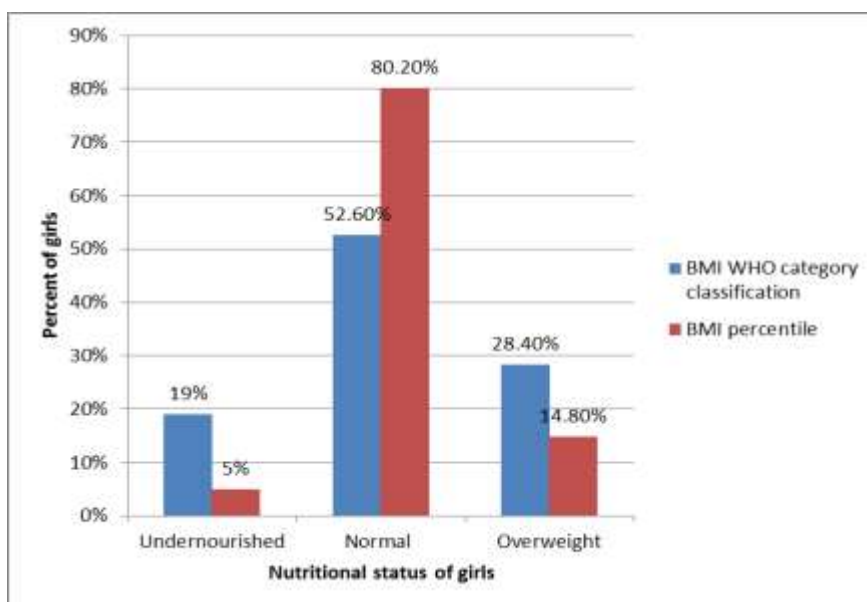


Figure 2: Correlation of nutritional status by BMI category and percentile distribution.

**DISCUSSION**

According to the WHO BMI classification 52.6% of the girls were normal, leaving 18.9% undernourished and 28.4% overweight. A study in Iran school going girls reported 6.4% overweight and 8.3% obese girls,<sup>[18]</sup> Compared to the current study, Taheri et al reported

lower mean BMI in girls as  $20.58 \pm 3.84 \text{ kg/m}^2$ . A similar study by Musaiger et al in Oman found that 24% of girls were under-weight, while only 12% over-weight or obese.<sup>[19]</sup> Prevalence of overweight of 21.9% was reported in north of Iran.<sup>[20]</sup> Prospective study by Ogden et al, showed, increase in children with high BMI over a

30 year period from 1965-1994.<sup>[21]</sup> The findings support the growing trend of increasing BMI worldwide. In 2013 study from US reported that 3.7% girls were underweight, 69.7% normal, 15.7% overweight and 10.9% were obese.<sup>[22]</sup> A lesser overweight rate of 19% among adolescent girls in Islamshahr-Iran was reported.<sup>[23]</sup>

68.52 % adolescent girls of Varanasi and 69.3 % subjects of Ratnagiri were found to be underweight compared to only 18.9 % in the current study.<sup>[24,25]</sup> Ghosh et al found overall underweight level of 46.1%.<sup>[26]</sup> The lower figures of under nutrition in our subjects may relate to urban habitation which makes them accessible to food and lesser physical activities compared to other studies.

Study in Kawre district in Nepal found that highest (49.5%) prevalence of underweight was among 11 years of adolescent girls and the lowest (20.7%) was found in the age group of 13 years.<sup>[27]</sup> These finding are in contrast to the current study, the differences are due to the age group of the adolescents considered for the study. A noteworthy point is that both thinness and overweight were coexisting among the girls in studied area.

BMI of girls with educated mothers was higher than those with illiterate mothers in the current study. Significant associations were also found between BMI categories among urban school adolescents and mother's educational level in Malaysia.<sup>[28]</sup> The temporal sequencing of rising maternal employment followed by rising adolescent obesity have led some to think of a causal relationship. A common concern is that any time mothers give to paid work results in an equivalent loss of time and attention for their children.<sup>[29]</sup> Database of Latino adolescents in the US showed a strong inverted association between BMI and education of parents.<sup>[30]</sup> It is necessary to target both parents and adolescents when designing obesity interventions and tailor programs to Oman culture that address the lack of physical activity and high energy dense diet.

## CONCLUSION

The current study highlights the extent of nutritional status in adolescent girls ranging from underweight to overweight which is like a double edged sword. Findings underline the need for adequate health awareness by schools on the dietary habits and life style of growing girls. Tackling malnutrition is critical for adolescent girls because inadequate nutrition wreaks havoc not only on her own health but also on the health of her children in future. Addressing women's malnutrition has a range of positive effects because healthy women can fulfill their multiple roles; generating income, ensuring their families' nutrition, and having healthy children more effectively and thereby help advance countries' socioeconomic development. The authors declare that they have no competing interests.

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