International Journal of Research in Medical Sciences
*Khan K et al. Int J Res Med Sci. 2016 Aug;4(8):3563-3569*
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20162330

**Research Article**

# Exploring nutritional status, physical activity and body mass index of Pakistani teens

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**Received:** 24 June 2016
**Accepted:** 12 July 2016

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## ABSTRACT

**Background:** Obesity is becoming an increasingly prevalent problem in Pakistan, as it has in other developing countries. Childhood obesity poses high cost to the well-being and negatively affects children's health, causes chronic disease as children grow older. The aim of this study was to explore nutritional status, physical activity and body mass index (BMI) of school and college going students of mid and late adolescence age (14 to 19 years) studying in multi-ethnic city of Karachi, Pakistan.
**Methods:** A descriptive cross-sectional study was carried out among school and college going students of public and private educational institutes of Karachi, Pakistan. The study sample of 171 students was conveniently selected from these institutes. The data was collected through a semi-structured questionnaire. In order to calculate BMI, the height and weight of each student were measured after completion of the questionnaire. The data were entered and analysed using IBM SPSS version for Windows 20.0 software.
**Results:** The average age of the respondents was 16.2 years with 68% students belonged to school and 32% to College, and 57.3% were males and 42.7% were females. More than half sample (59.6%) participants belonged to privileged and 40.4% to underprivileged class. The sample was eating a wide variety of junk food in daily routine including chips, packed fruit juices, packed flavoured milk, ice creams/ frozen yogurts both at home and at school/college. The physical activity of the school students was found to be better than the college students. No participant had regular activity or strenuous physical games for more than one hour per day. Around one third (38%) respondents used to watch TV or play computer games for more than two hours a day. Almost half of the students' BMI was within the normal ranges, but remaining half of the sample was either overweight or underweight.
**Conclusions:** This study indicates that a large proportion of school and college students had physical inactivity, unhealthy dietary habits and they were overweight. All these interrelated factors were independent of their household socioeconomic condition and ethnicity. There is a need to educate and create awareness about healthy lifestyle among the adolescents and the community at large.

**Keywords:** Nutritional status, Physical activity, BMI, Pakistani teens

## INTRODUCTION

Childhood obesity has more than doubled in children and quadrupled in adolescents in the past 30 years.[1, 2] In 2012, more than one third of children and adolescents were overweight or obese.[1] Pediatric obesity during middle childhood and adolescence, may not only have lasting effects on self-esteem, body image and economic mobility and also has long-term effects on health and well-being. The definitions of overweight and obesity in children differ between epidemiological studies. Overweight is defined as having excess body weight for a particular height from fat, muscle, bone, water, or a combination of these factors.[3] Obesity is defined as

having excess body fat.[4] Overweight and obesity are the result of "caloric imbalance"—too few calories expended for the amount of calories consumed—and are affected by various genetic, behavioral, and environmental factors.[5,6]

Obesity is the most prevalent nutritional disorder of children and adolescents nowadays. This epidemic has affected a wide age range, most ethnic groups, and people of every socioeconomic status, though sometimes in disproportionate ways.[7,8]

Pakistan is a country in transition and now faces double burden of coexistent over-nutrition and under-nutrition. Obesity is becoming an increasingly prevalent problem in Pakistan, as it has in other developing countries, with undernutrition remaining a problem simultaneously.[9]

Pakistan's neighbouring country India has the double burden as well; a study done on school children in urban Madras found the number of overweight boys to be 17.8%, and girls 15.8%. In affluent cities of India, prevalence of obesity reach the levels of industrialized countries, with values increasing with socioeconomic class.[10,11]

This should be seen in the context of the double burden – a WHO study found 30–70% of Indian adults to be underweight, greater than the proportion in Sub-Saharan Africa.[12] The prevalence of obesity in adolescents in Pakistan is already significant, with one study putting the prevalence of adolescents with a BMI greater than 25 at 18%, which is comparable with figures in the West.[13]

According to National Health Survey Pakistan, prevalence of obesity is more in urban population as compared to rural population.

Childhood obesity is strongly associated with sedentary life styles and increased caloric intake, less physical activity and high socioeconomic status.[14-17] Awareness about balanced diet, improvement in the level of education and socioeconomic conditions and increased physical activity could help in decreasing the obesity in children.[17]

Childhood obesity and overweight is an emerging problem in Pakistan[18]. As a developing nation, it is important to address this issue to decrease the disease burden [19].The aim of current study is not only to explore the nutritional preferences, physical activity and BMI of the of the teens in their mid and late adolescence phase but also to compare the privileged and underprivileged teens in this regard.

## METHODS

A descriptive cross-sectional study was carried out among school and college going students of public and private educational institutes of Karachi, Pakistan. The study sample was conveniently selected from the institutes. After the formal permission from the school management, as the second step students were given guardians consent forms to be signed by parents at home. The assisting teachers explained the purpose and procedures of the study.

All the students were permitted by their guardians to participate in the study. The data was collected by trained data collectors under the supervision of their teachers through a semi-structured questionnaire developed through literature review.

In order to calculate BMI, the height and weight of each student were measured after completion of the questionnaire. For this purpose standardized weighing scales and measuring tapes were used.

A total of 171 students were recruited for the study. Both male and female students of 14 to19 years of age with signed written consent were found eligible for the study.

The data were entered and analysed using IBM SPSS VERSION for Windows 20.0 software.

### *Ethical considerations*

Informed consent was obtained prior to the interview. Participation was voluntary and no coercion was used in the data collection process.

They were fully informed of the nature of the study and the use of the data. They were free to withdraw from the interview at any time or refuse to answer any particular question. Participants were also ensured of confidentiality. No personal identifying information was obtained for any part of the investigation.

## RESULTS

### *Response rate*

The questionnaires were completed by 171 students. No refusal was encountered. The participation and cooperation of students was appreciable.

### *General characteristics*

Among the respondents, 57.3% (n=98) were males and 42.7% (n=73) were females. The average age of the respondents was 16.2 years with standard deviation of 1.45 with minimum being 14 years and maximum age of 19 years. 68% (n=116) students belonged to school, and 32% (n=55) to College.

One fourth 25.7% (n=44) students were residents of North Karachi, 22.2% (n=38) were the residents of Hub Chowki while the rest had residence scattered across northern areas of Karachi. Majority 50.9% (n=87) of students were Urdu speaking, 22.8% (n=39) were Baloch,

11.1% (n=19) were Sindhi, 9.4% (n=16) were Punjabi while 5.8% (n=10) students belonged to Pathan ethnic background. The participants were divided into privileged 59.6% and underprivileged class 40.4% based on their family income up to Rs.100,000 and above or below Rs. 50,000 per month (Table 1).

**Table 1: Demographic characteristics of the participants (N=171).**

| Variable | Category | % |
|---|---|---|
| **Gender** | Male | 98 (57.3%) |
| | Female | 73 (42.7%) |
| **Age (years)** | 14 | 15.2 |
| | 15 | 24 |
| | 16 | 29.2 |
| | 17 | 15.2 |
| | 18 | 7.6 |
| | 19 | 8.8 |
| **Education Status** | 8th Standard | 25.1 |
| | 9th Standard | 29.2 |
| | 10th Standard | 10.5 |
| | 11th Standard | 18.7 |
| | 12th Standard | 16.4 |
| **Ethnicity** | Urdu Speaking | 87 |
| | Sindhi | 19 |
| | Baloachi | 39 |
| | Punjabi | 16 |
| | Pathan | 10 |
| **Household Income/month** | <10000 | 1.2 |
| | <25000 | 10.5 |
| | <50000 | 28.7 |
| | <100000 | 39.2 |
| | >100000 | 20.4 |

**Table: 2: Residential areas of the sample.**

| Area | Frequency | Percent | Valid percent | Cumulative percent |
|---|---|---|---|---|
| Ahsanabad | 1 | 0.6 | 0.6 | 0.6 |
| Ali Md Goth | 2 | 1.2 | 1.2 | 1.8 |
| Baldia Town | 2 | 1.2 | 1.2 | 2.9 |
| Buffer Zone | 7 | 4.1 | 4.1 | 7.0 |
| F B Area | 7 | 4.1 | 4.1 | 11.1 |
| Gulshan e Iqbal | 5 | 2.9 | 2.9 | 14.0 |
| Gulshan e Maymar | 10 | 5.8 | 5.8 | 19.9 |
| Hub Chowki | 38 | 22.2 | 22.2 | 42.1 |
| Liaqatabad | 1 | 0.6 | 0.6 | 42.7 |
| Mangopir | 3 | 1.8 | 1.8 | 44.4 |
| Naval Colony | 4 | 2.3 | 2.3 | 46.8 |
| Nazimabad | 3 | 1.8 | 1.8 | 48.5 |
| New Karachi | 14 | 8.2 | 8.2 | 56.7 |
| Noorani Goth | 2 | 1.2 | 1.2 | 57.9 |
| North Karachi | 44 | 25.7 | 25.7 | 83.6 |
| North Nazimabad | 15 | 8.8 | 8.8 | 92.4 |
| Saeedabad | 1 | 0.6 | 0.6 | 93.0 |
| Shadman Town | 5 | 2.9 | 2.9 | 95.9 |
| Surjani Town | 7 | 4.1 | 4.1 | 100.0 |
| Total | 171 | 100.0 | 100.0 | |

**Table 3: Consolidated table of all variables.**

| Factor | Observation | School | College | Chi Value | P Value |
|---|---|---|---|---|---|
| **Detailed dietary preference and consumption** | | | | | |
| **French fries/ day** | Yes | 82 (70%) | 47 (85%) | 4.514 | 0.105 |
| | No | 34 (29%) | 8 (15%) | | |
| | No | 44 (38%) | 42 (77%) | | |
| **Cold drinks and juices/ day** | Yes | 92 (79%) | 38 (69%) | 4.374 | 0.112 |
| | No | 24 (21%) | 17 (31%) | | |
| **Packed chips / day** | Yes | 79 (68%) | 40 (72%) | 0.631 | 0.73 |
| | No | 37 (32%) | 15 (28%) | | |
| **Ice creams / day** | Yes | 81 (70%) | 31 (56%) | 3.472 | 1.76 |
| | No | 35 (30%) | 24 (44%) | | |
| **Flavoured milk / day** | Yes | 24 (21%) | 7 (12%) | 7.574 | 0.23 |
| | No | 92 (79%) | 48 (88%) | | |
| | No | 4 (3%) | 10 (18%) | | |
| **Junk foods** | Yes | 79 (68%) | 30 (54%) | 2.968 | 0.227 |
| | No | 37 (32%) | 25 (46%) | | |
| **Daily normal activity** | No Activity | 25 (22%) | 11 (20%) | 10.991 | 0.89 |
| | < 15 Min/Day | 43 (37%) | 15 (27%) | | |
| | < 30 Min/ ay | 41 (35%) | 27 (49%) | | |
| | <One Hr/Day | 7 (6%) | 2 (03%) | | |
| | >One Hr/Day | 00 (00%) | 00 (00%) | | |
| **Daily strenuous activity / games** | No Activity | 33 (28%) | 25 (45%) | 6.27 | 0.394 |
| | < 15 Min/Day | 50 (43%) | 18 (32%) | | |
| | <30 Min/ Day | 30 (26%) | 11 (20%) | | |
| | <one Hr/ Day | 3 (2.6%) | 1 (02%) | | |
| | >One Hr/Day | 0 (00%) | 0 (00%) | | |
| **Daily TV computer viewing** | Nill | 0 (00%) | 0 (00%) | 3.882 | 0.693 |
| | <30 min/ Day | 7 (6%) | 5 (9%) | | |
| | <One Hr/Day | 30 (26%) | 9 (16%) | | |
| | >One Hr/Day | 35 (30%) | 20 (36%) | | |
| | >Two Hr/Day | 44 (38%) | 21 (38%) | | |
| **Body mass index** | Under wt. | 34 (29%) | 15 (27%) | 2.454 | 0.652 |
| | Normal Wt. | 64 (55%) | 28 (51%) | | |
| | Over wt. | 18 (16%) | 12 (22%) | | |

***Dietary habits***

The majority of the students were eating wide variety of junk food including chips, packed fruit juices, packed flavoured milk, ice creams/ frozen yogurts at home as well as at school which was high in sugars, fats, cholesterols and additives not good for health.

Table 3 shows Chi square test for the data reflecting that general behaviour regarding the food intake, dietary habits and health consciousness is almost the same in the students of all the institutes representing the underprivileged and privileged population.

The children are more prone to eat junk food and this trend is common in all institutes.

***Daily physical activity***

The physical activity of the school students was found to be a little better than the college students. Majority of students 67.3% (n=115) were active at school while 32.7% (n=56) had no activity at school. 76.6% (n=131) were physically active at home while 23.4% (n=40) had no activity at home.

No participant had regular activity for more than one hour, 5.3% (n=09) used to have daily activity of less than one hour, maximum 39.8% (n=68) respondents used to have daily activity of less than thirty minutes, 33.9% (n=58) had daily activity of less than just fifteen minutes at home or at school, while 21.1% (n=36) respondents had no physical activity either at home or at school.

When asked about strenuous physical games, not a single respondent was taking part in games of more than one hour a day, 2.3% (n=04) were having games of less than one hour, 24% (n=41) were enjoying strenuous games for less than thirty minutes, 39.8% (n=68) were playing games for less than fifteen minutes while 33.9% (n=58) have no games at home or at school (Table 3).

***Leisure time activity and frequency of electronic entertainment***

Around one third 38 % (n=65) respondents used to watch TV or play computer games for more than two hours a day, other one third 32.2% (n=55) for less than two hours a day, while 22.8 % (n=39) for less than one hours a day and only 7% (n=12) for less than thirty minutes a day (Table 3).

***Height, weight and BMI***

The average height of the respondents was measured to be 1.652meters with standard deviation of 0.097meters, minimum being 1.39meter and maximum 1.90meters. The average weight of the students was found to be 57.105kg with standard deviation of 11.11kg with minimum weight being 37kg and maximum weight of 100kg. Almost half of the Students' BMI was within the normal ranges, but remaining half of the sample was either overweight or underweight. A reasonable quantity (22%) of college students was found to be overweight. (Table 3)

## DISCUSSION

The present research contributes to assess the nutritional status and physical activity of school and college students, of mid and late teens (14 to 19 years) studying in multi-ethnic city of Karachi, Pakistan. We selected teens of privileged (59.6%) and underprivileged (40.4%) socioeconomic backgrounds and included all ethnic groups in our study sample and the findings of present study revealed that the dietary habits and physical activity of adolescents are independent of their household socioeconomic condition and ethnicity. These findings are inconsistent with other studies which state that childhood obesity is most frequent in upper socioeconomic strata of developing nations, probably owing to adoption of an increasingly Western lifestyle.[20–24] In the USA, prevalence rose more than twice as fast among minority groups compared with white groups, exacerbating pre-existing racial-ethnic disparities.[8] The effect of television viewing on obesity risk is of particular interest. Television viewing is thought to promote weight gain not only by displacing physical activity, but also by increasing energy intake.[25,26] The time spent in sedentary behaviors may result in decreased overall energy expenditure and increases risk of overweight and obesity and associated health outcomes.[27,28] Present study shows that more than one third (38%) respondents were spending most of their leisure time on electronic entertainment. Researchers have hypothesized that watching television cause obesity by one or more of three mechanisms: (1) displacement of physical activity, (2) increased calorie consumption while watching TV; caused by the effects of advertising, and (3) reduced basal metabolism.[29] Television advertising could adversely affect dietary patterns at other times throughout the day.

US and British children are exposed to about ten food commercials per hour of television time (amounting to thousands per year), most for fast food, soft drinks, sweets, and sugar-sweetened breakfast cereal.[30–32] Exposure to 30-second commercials increases the likelihood that children would later select an advertised food when presented with options.[33] Moreover, television viewing during mealtime is inversely associated with consumption of products not typically advertised, such as fruits and vegetables.[34] In an experimental study by Robinson,[35] measures of adiposity increased significantly over an academic year in children in a control school who continued to watch television at their usual rates, compared with children in an intervention school who decreased television viewing by about 40%. Since, our study data also showed the preference of unhealthy food including high percentages of junk food, French Fries, Cold Drinks and juices, Packed Chips, ice creams and flavoured milk in their daily routine and also a big number of them rely on television for their entertainment, then it can be stated that there could be an association between television watching and unhealthy dietary habits among adolescents but cannot be confirmed this interrelation because the sample was also using internet and games in addition to watching television.

Regular physical activity throughout life is important for maintaining a healthy body, enhancing psychological well-being, and preventing premature death.[36] Some researchers have suggested that childhood obesity is largely the result of a decline in regular physical activity.[37] There is an inverse relation between childhood obesity and physical activity as it can be clearly seen from our study. A review of other literature suggests that overweight among preschool children, as well as older children, may be associated less with increased energy intake and more with low physical activity.[38] These findings are further affirmed by the current study which by showing a significantly high percentage of adolescents 33.9% had daily activity of less than just fifteen minutes at home or at school/college, while 21.1% respondents had no physical activity either at home or at school. Thus no participant had regular activity for more than one hour and not a single respondent was taking part in games of more than one hour a day.

Findings of a cross-sectional study suggest that obese children in South Carolina spent less time in moderate and vigorous physical activity than their non-obese counterparts.[39] One positive finding of current study was that the physical activity of the school students was found to be a little better than the college students. It shows that

the children can be promoted to improve their physical activity in their mid teens through health education that a lifestyle characterised by lack of physical activity and excessive inactivity (particularly television viewing) might cause obesity in them. Almost half (55% in school and 51 in college students) of the sample in present study fall in normal range of BMI-for-age (between 15th and 85$^{th}$ percentile), 16% school going and 22% college students were overweight while 29% (school) and 27% (college) were below normal range which is in agreement with a study done Adeel Anwar and colleagues in Lahore in 2010 and other studies from Pakistan and neighbouring countries like India.[40-43]

## CONCLUSION

This study indicates that a large proportion of school and college students of age 14 to 19 years had physical inactivity, unhealthy dietary habits and they were overweight. All these interrelated factors were independent of their household socioeconomic condition and ethnicity. One favorable finding of current study was better physical activity among school going teens as compared to college students which recommends that the best age of health promotion among adolescents is med-adolescence.

### *Limitation of study*

The participation in the study was voluntary so the data gathered for this study may not be generalized.

### *Recommendations*

- The dietary and physical activity behaviors of children and adolescents are influenced by many sectors of society, including families, communities, schools, child care settings, medical care providers, faith-based institutions, government agencies, the media, and the food and beverage industries and entertainment industries. All of these sectors can play a very positive role in adoption of healthy lifestyle habits among children which can lower the risk of becoming obese and developing related diseases.
- Schools play a particularly critical role by establishing a safe and supportive environment with policies and practices that support healthy behaviors and providing opportunities for students to learn about and practice healthy eating and physical activity behaviors.

## ACKNOWLEDGEMENTS

Authors would like to acknowledge the immense help received from the scholars whose articles are cited and included in references of this manuscript. The authors are also grateful to authors / editors / publishers of all those articles, journals and books from where the literature for this article has been reviewed and discussed.

*Funding: No funding sources*
*Conflict of interest: None declared*
*Ethical approval: The study was approved by the Institutional Ethics Committee*

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**Cite this article as:** Khan K, Jameel N, Khalil R, Gul S. Exploring nutritional status, physical activity and body mass index of Pakistani teens. Int J Res Med Sci 2016;4:3563-9.