

The Effect of Socioeconomic Status, Number of Siblings and Parental of Education on Children' Body Mass Index at Jeddah, Saudi Arabia: Cross Sectional Study

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Abstract

Objective: To assess the effect of socioeconomic status, number of family members and parental educational level on children's body mass index (BMI).

Methods: A cross-sectional survey was conducted in 2014-2015 among children and adolescents aged 2-18 years old, in Jeddah, Saudi Arabia. They were visiting an ambulatory clinic at King Abdulaziz University Hospital. A representative sample of 521 children was collected using questionnaires completed by health personnel. Height and weight of the children were measured by trained health personnel and BMI was calculated.

Results: The prevalence rates of overweight, obese and severely obese children were 36, 154, and 162 respectively. Children were more to be obese if they had families with low income (P-value=0.015), compared to families with high income. Obesity rates decrease when the family consists of four or less members. In contrast, the BMI increases when the family members are more than four (P-value= .0001). Also, we found that BMI increases with low parents educational level (P-value=0.0001 for father's educational level) (p-value=002 for mothers educational level)

Conclusion: Overweight and obesity among children living in Jeddah, Saudi Arabia is associated with low family income, low educational levels of both parents and increases the number of family members.

Keywords: Childhood; Obesity; Parents; Economy; Education; Siblings; Multifactorial

Introduction

Obesity in children is a complex disorder. Its prevalence has increased significantly in all pediatrics age group in both sexes, and in various ethnic and racial groups over the recent years. It is considered a major health concern of the developed world. Many factors such as socioeconomic status, parent's educational level, number of family members and so many other factors are believed to play a role in the development of obesity.

One of the important determinants of childhood overweight and obesity is socioeconomic disparity, which has been observed in high and low income countries [1]. Overweight and obesity are more common in the lower social classes of affluent societies and in the upper social classes of poorer societies [2,3].

Globally, the relationship between childhood obesity and family based factors, including parental educational level and number of family members has been extensively explored [4,5]. Family provides social and interpersonal support that is mandatory in shaping and maintaining children's eating habits and physical activities pattern [6]. Therefore, when the parents are aware and well educated, they might be able to support their children and instruct them more to avoid obesity. Another key characteristic is family structure and number of siblings [7]. This factor may play a role in different ways, such as the parent's attention on one or two children are much easier than concentrating on more than three children. Due to lack of recent local researches in our society. We believed it is a major concern in our country. So, we are trying to find the main causes which lead to child obesity and can be avoided by good education in our community. The child is a stone building of community, to have a healthy wellbeing society we should have healthy children.

The aim of this study was to evaluate the effect of socioeconomic status, parent educational level and number of family members on body mass index (BMI).

Definitions

According to our economic financial status of our population, we have defined low economic status as the monthly income ranges between 2000 and 4000 Saudi Riyals. Middle economic status is defined as the monthly income ranges between 5000 and 9000 Saudi Riyals. High economic status is defined as the monthly income is more than 10,000 Saudi Riyals. In regard levels of education of both fathers and mothers, we considered them uneducated if they have no education at all. A low educational level consists of parents who have finished their high school, and a high educational level where defined as parents who have finished their bachelor's degree or even higher.

According to our community, we considered a family with 4 members as a small family and more than 4 as a big family. P-value will be significant if it less or equal to 0.05.

Methodology

Study design, population and data collection

A cross-sectional retrospective survey was conducted in Jeddah in 2014-2015 among children and adolescents aged 2-18 years old. Males and Females were selected randomly to represent different economic status, parental educational level and family structure of Jeddah

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population in the sample. A total of 521 children (283 males and 238 females) provided complete data for the analysis.

A cross-sectional questionnaire-based study design was used. A set of standardized data collection sheets entailing a series of questions with multiple answer choices were including: monthly income, parental educational level and number of family members. Data were collected over the course of six months, from August to February (2014-2015). The participants were directed to an ambulatory clinic in King Abdulaziz University Hospital in Jeddah, Saudi Arabia.

The exclusion criteria were a child on dietary intervention, exposure to hormonal therapy, development of secondary obesity due to endocrinopathies, serious intercurrent illness and data insufficiency due to incomplete questionnaires were excluded. Medical students volunteered to fill in the questionnaires.

The Research and Ethics Committee at King Abdulaziz University Hospital in Jeddah approved the study. Written and verbal consent were obtained prior to filling the questionnaire from children and their parents. Children agreement was obtained before measuring their weight, height and calculating BMI. Each participant in the sample received a questionnaire to be answered by parents or guardians and completed by trained health personnel. For our research we used a general survey including personal data, demographic data, parent's educational level and occupation, family income, family structure, physical activity, nutritional status and medical history of the child.

Trained health personnel at the Ambulatory Clinic collected anthropometric data. Height was measured using a wall-mounted stadiometer, with the children not wearing shoes and their shoulders in a relaxed position and their arms hanging freely. Weight was measured with a beam-balance scale, which was re-calibrated for every new subject. Subjects were weighed barefoot and wearing minimal clothing. Obesity and overweight were defined using the growth chart standards (above 95th percentile). Body mass index (BMI) is a measure used to determine childhood overweight and obesity. BMI charts. Normal weight is BMI between 5th – 85th percentiles. Overweight is defined as a BMI at or above the 85th percentile and below the 95th percentile for children and teens of the same age and sex. Obesity is defined as a BMI at or above the 95th percentile for children and teens of the same age and sex. Severe obesity is BMI > 99th percentiles.

BMI is calculated by dividing a person's weight in kilograms by the square of height in meters. For children and teens, BMI is age- and sex-specific and is often referred to as BMI-for-age. A child's weight status is determined using an age- and sex-specific percentile for BMI rather than the BMI categories used for adults. This is because children's body composition varies as they age and varies between boys and girls. Therefore, BMI levels among children and teens need to be expressed relative to other children of the same age and sex (29). BMI percentile was determined for each subject according to the Centers for Disease Control and Prevention (CDC).

Statistical Analysis

A one way Analysis of Variance (ANOVA) was conducted to test the difference between the BMI means in each category of monthly income and parent's educational levels as defined in methodology.

Another test Tukey's honest significant difference test (Tukey's HSD test) was performed to test the mean differences between each category of economic status and parents educational levels as well. Point biserial correlation - special case of person correlation was used to test the relation between BMI and number of family members.

Results

By using ANOVA, we tested the relation between mean BMI and the economic status of the family. We found that the BMI is increasing when the income decrease (Table 1). Also, Tukey HSD test was performed and showed a significant difference between BMI means in low income families (Table 1). The same tests were done to see the effect of each parent's educational level on BMI. By ANOVA we found a significant difference in BMI means with lower parent's educations and we confirmed it with Tukey HSD test too (Table 1). Furthermore, number of family members showed a significant relation with BMI. The more the family members are, the more BMI increases. Tables 2 and 3 show a descriptive analysis of income groups and parents educational levels and the mean BMI of each group.

Discussion

The purpose of this study is to test the prevalence of obesity and overweight with a random sample in Jeddah city and simultaneously evaluate the socioeconomic risk factors, parental educational level and number of family members. The studied sample included 2-18 years old participants. A cross-sectional survey was conducted among school children in Riyadh, Saudi Arabia. A representative sample of 1243 (542 male and 701 female) children aged 6-16 years found children were more likely to be overweight if their families had higher income (P-value <0.01), compared to families with low income [8]. Another study was done on 1072 children in Saudi Arabia, 14.9% out of them were obese, 95% of the obese children having high family income [9]. A Jordanian study was done on 2131 children; it reported a significant relation between obesity and being overweight with high family income in 19.4% and 5.6% respectively [10]. On the other hand, a study conducted in United State of America showed that family income and childhood obesity are negatively correlated in general, as for children in very low-income families are positively correlated and significant among high-BMI children [11]. Moreover,

Monthly income	Number of participants (total 441)	BMI means	P- value
Low	86	28.1483	.011
Middle	105	26.0450	.087
High	250	26.8252	.371

Table 1: Shows monthly income categories and mean BMI of each category with the number of participants involved in each one.

Particulars	Number of participants (total 441)	BMI means	P-value
Uneducated fathers	7	27.1600	.816
fathers with low education	151	28.3220	.0001
fathers with high education	291	26.3619	.907
Uneducated mothers	25	28.0712	.964
mothers with low education	186	27.7989	.003
Mothers with high education	253	26.2217	.175

Table 2: Shows parents educational categories and mean BMI of each category with the number of participants involved in each one.

Family members	Number of normal weight participants	Number of overweight participants	Number of obese participants	Number of morbidly obese participants
More than 4 members	6 (1.7%)	26 (7.4%)	109 (31.1%)	110 (31.4%)
4 members or less	7 (2%)	8 (2.3%)	36 (10.3%)	

Table 3: Shows number and percentage of participants with their BMI categories and the number of family members.

another American study shown 28 - 38% of children and adolescents were in the high risk group for obesity. Low socioeconomic status had robust and high significance correlations between risk of obesity [12]. In Switzerland, a cross sectional study included 8544 primary school children were collected and analyzed. The prevalence of overweight and obese children was 16.9%. Children with low economic status are more likely to be overweight or obese [13]. A study In Brazil showed the prevalence of obesity among 300 children aged 7 to 12 years who were attending three schools of different socioeconomic levels, the prevalence of obesity in the sample was 16.7% distributed as follows: 38% for high socioeconomic level, 12% for middle socioeconomic level, and 4% for low socioeconomic level [14]. In South Eastern Poland, a study was done on 2182 boys and 2066 girls selected randomly from elementary school, it has reported no correlation was found between children obesity and family income [15]. In our sample, we tested the difference between mean BMI in low-income families, mean BMI in middle-income families and mean BMI in high-income families. It showed an increase in the mean BMI among the low-income families group (P-value=0.015). This means that the lower income families have higher risk for obesity. Obesity is affected by parent's educational level. In our sample, we tested both father's educational levels and mother's educational levels separately. Low father's educational level had a significant increase on the mean BMI (P-value=0.001). Low mothers educational levels also had a significant increase on the mean BMI (P-value=0.002). A study conducted during the period of January to March in Saudi Arabia involved 2239 female school children randomly selected were found the prevalence of overweight and obesity were 20% and 11%, respectively. The prevalence of overweight was higher among school children with highly educated mothers (P=0.008) [16]. Other study done in Kuwait which included cross sectional sample of 3473 children, parents' educational level were found to be significantly associated with overweight and obesity [17]. In Denmark, a random sample of 512 children aged from four to fourteen was selected to study the correlation between overweight and educational level of the parents. High educational level of the parents was significantly associated with overweight children [18]. In Norway, 3166 children were included in a study that showed children of low-educated mothers had an increase in mean BMI (P-value=0.01), whereas corresponding trends for children who had mothers with higher educational background were non-significant (p>0.30) [19]. In contrast, a Swedish study included 3636 children showed the prevalence of overweight was 15.6% and 2.6% out of them were obese. There was an association with high maternal education [20]. A study conducted in Pakistan included 1860 children showed significant correlation between overweight and obesity with higher parental education (P-value= 0.001) [21].

Number of family members and siblings is believed to be an obesity risk factor. Surprisingly, we found that the more the family members are, the more BMI increases (P-value=0.0001). An American longitudinal Study showed that children with no siblings had higher BMI ($P \leq 0.01$) and higher probability of being obese ($P \leq 0.05$) than their counterparts with two or more siblings. They also had a larger increase in BMI from kindergarten through 8th grade than children living with two or more siblings (P=0.02) [22]. 12350 children included in a study showed the higher the number of siblings, the lower the BMI. Over the 2-year follow-up, the risk of overweight/obesity was significantly lower with the higher number of siblings living in the household [23]. A study conducted in Santiago included 652 children, found higher number of siblings was protective (6-68% less risk for 2 siblings compared with no sibling and 10-73% less for ≥ 3 siblings) [24]. Several studies in Japan have investigated the relationship between the number of siblings and childhood overweight. Data from

4026 children were analyzed. A larger number of siblings decreased the incidence of overweight (P-value<0.001) [25]. Another study done in Los Angeles found children with siblings had lower BMI and were less likely to be obese than children without siblings [26]. A study involving 273 children found the prevalence of an overweight or obese child was 42.5%. The only children had higher rate of overweight or obesity compared to those having one or more siblings. Having at least one brother was associated with lower rate [27]. In contrast, a study done on 344 children in Kenya revealed that overweight and obesity was significantly higher among children who had no siblings compared with those with at least one sibling (p=0.02) [28,29].

Most of researches conducted in developed countries which are usually highly educated so they have a better chance to have a good income and better job opportunities which make them having less number of children to give them proper care. While our country still in developing process.

This study has some limitation. It is cross-sectional. A snapshot the situation may provide differing results if another timeframe had been chosen. Difficult to make causal inference. Prevalence-incidence bias. Especially in the case of longer lasting obesity. Difficult to determine whether the outcome (obesity) followed exposure to factors (socioeconomic, parents education and number of siblings) or exposure resulted from the outcome. Associations identified may be difficult to interpret.

Recommendations

We strongly encourage and stress about the importance of education, especially in parents. Educated parents are generally more aware about the wellbeing of their children. More so, a higher education qualifies for a better job opportunity. Hence, a better income that can provide for the family. We also recommend parents to practice family planning, as it might be more manageable to pay full attention to the children. Also, it is easier to provide and supply for a smaller family than a bigger one.

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References

1. Shrewsbury V, Wardle J (2008) Socioeconomic status and adiposity in childhood: a systematic review of cross-sectional studies 1990-2005. *Obesity* (Silver Spring) 16: 275-284.
2. Sobal J (1991) Obesity and socioeconomic status: a framework for examining relationships between physical and social variables. *Med Anthropol* 13: 231-247.
3. Sobal J, Stunkard AJ (1989) Socioeconomic status and obesity: a review of the literature. *Psychol Bull* 105: 260-275.
4. Baltrus PT, Lynch JW, Everson-Rose S, Raghunathan TE, Kaplan GA (2005) Race/ethnicity, life-course socioeconomic position, and body weight trajectories over 34 years: the Alameda County Study. *Am J Public Health* 95: 1595-1601.
5. INCLEN (1996) Body mass index and cardiovascular disease risk factors in seven Asian and five Latin American centers data from the International Clinical Epidemiology Network (INCLEN) *Obes Res* 4: 221-228.
6. Sallis Nader (1988) Family determinants of health behaviors. In: Gochman

- DS, editor. *Health behavior: emerging research perspectives*. New York (NY): Plenum Press 3: 107-124.
7. Gruber KJ, Haldeman LA (2009) Using the family to combat childhood and adult obesity. *Prev Chronic Dis* 6: A106.
 8. Al Alwan A, Al Fattani A, Longford N (2013) The effect of parental socioeconomic class on children's body mass indices. *J Clin Res Pediatr Endocrinol* 5: 110-115.
 9. Alam AA (2008) Obesity among female school children in North West Riyadh in relation to affluent lifestyle. *Saudi Med J* 29: 1139-1144.
 10. Khader Y, Irshaidat O, Khasawneh M, Amarin Z, Alomari M, et al. (2009) Overweight and obesity among school children in Jordan: prevalence and associated factors. *Matern Child Health J* 13: 424-431.
 11. Jo Y (2014) What money can buy: family income and childhood obesity. *Econ Hum Biol* 15: 1-12.
 12. Vieweg VR, Johnston CH, Lanier JO, Fernandez A, Pandurangi AK (2007) Correlation between high risk obesity groups and low socioeconomic status in school children. *South Med J* 100: 8-13.
 13. Jeannot E, Mahler P, Elia N, Cerruti B, Chastonnay P (2015) Sociodemographic and Economic Determinants of Overweight and Obesity for Public-school Children in Geneva State, Switzerland: A Cross-sectional Study. *Int J Prev Med* 6: 39.
 14. Arteaga H, Dos Santos JE, Dutra de Oliveira JE (1982) Obesity among schoolchildren of different socioeconomic levels in a developing country. *Int J Obes* 6: 291-297.
 15. Mazur A, Klimek K, Telega G, Hejda G, Wdowiak L, et al. (2008) Risk factors for obesity development in school children from south-eastern Poland. *Ann Agric Environ Med* 15: 281-285.
 16. Mazur A, Klimek K, Telega G, Hejda G, Wdowiak L, et al. (2008) Risk factors for obesity development in school children from south-eastern Poland. *Ann Agric Environ Med* 15: 281-285.
 17. Al-Saeed WY, Al-Dawood KM, Bukhari IA, Bahnassy A (2007) Prevalence and socioeconomic risk factors of obesity among urban female students in Al-Khobar city, Eastern Saudi Arabia, 2003. *Obes Rev* 8: 93-99.
 18. al-Isa AN, Moussa MA (1999) Factors associated with overweight and obesity among Kuwaiti kindergarten children aged 3-5 years. *Nutr Health* 13: 125-139.
 19. Matthiessen J1, Stockmarr A, Fagt S, Knudsen VK, Biloft-Jensen A (2014) Danish children born to parents with lower levels of education are more likely to become overweight. *Acta Paediatr* 103: 1083-1088.
 20. Biehl A, Hovengen R, Grøholt EK, Hjelmæsæth J, Strand BH, et al. (2013) Adiposity among children in Norway by urbanity and maternal education: a nationally representative study. *BMC Public Health* 13: 842.
 21. Moraes L, Lissner L, Yngve A, Poortvliet E, Al-Ansari U, et al. (2012) Multi-level influences on childhood obesity in Sweden: societal factors, parental determinants and child's lifestyle. *Int J Obes (Lond)* 36: 969-976.
 22. Mushtaq, Gull, Shahid, Shafique, Abdullah, et al. (2011) Family-based factors associated with overweight and obesity among Pakistani primary school children 16: 11-114.
 23. Chen AY, Escarce JJ (2014) Family structure and childhood obesity: an analysis through 8th grade. *Matern Child Health J* 18: 1772-1777.
 24. Formisano, Hunsberger, Bammann, Vanaelst, Molnar, et al. (2014) Family structure and childhood obesity: results of the IDEFICS Project 17: 2307-2315.
 25. Rios-Castillo I, Cerezo S, Corvalán C, Martínez M, Kain J (2015) Risk factors during the prenatal period and the first year of life associated with overweight in 7-year-old low-income Chilean children. *Matern Child Nutr* 11: 595-605.
 26. Ochiai, Shirasawa, Ohtsu, Nishimura, Morimoto, et al. (2012) Number of siblings, birth order, and childhood overweight: a population-based cross-sectional study in Japan. 11:12:766.
 27. Chen AY, Escarce JJ (2010) Family structure and childhood obesity, Early Childhood Longitudinal Study - Kindergarten Cohort. *Prev Chronic Dis* 7: A50.
 28. O'Connor TM, Hilmers A, Watson K, Baranowski T, Giardino AP (2013) Feasibility of an obesity intervention for paediatric primary care targeting parenting and children: Helping HAND. *Child Care Health Dev* 39: 141-149.
 29. Florence, Anselimo, Alice (2013) Overweight and obesity among public and private primary school children in Nairobi, Kenya 5: 85-90.