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Nutritional Habits of School aged Females with Overweight in Saudi Arabia

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Abstract

Increased overweight and obesity rates in Saudi adolescents suggest that the eating habits and their determinants need to be understood, especially among schoolgirls, who are a lesser-studied group in the Eastern Province of Kingdome Saudi Arabia (KSA). The current study assessed nutritional alhabits among elementary, middle and secondary school girls with overweight and obesity. A multi-stage sampling survey that measured weight status was carried out among 1500 girls aged 8–17 years from the Eastern Province public schools. Sociodemographic data, dietary habits, and anthropometric measures were gathered from the students(300) which were diagnosed with overweight and obesity using questionnaires and standardized tools. The studied students' nutrition consisted of frequent intake of energy-dense foods (e.g., bakery products 78%, crisps 74% in school) and sugary drinks (36% three times a day), but with low fruit/vegetable intake (40% in school, 24% at home). Skipping breakfast (42%) was prevalent with minimal adherence to physical activity (22%). In conclusion, the high prevalence of suboptimal dietary practices requires urgent nutrition education and other nutrition intervention targeting schoolgirls. Findings inform attempts to reduce diet-related health and learning risks in teen girls.

Key Words: nutritional habits, obesity, schoolgirls, Saudi Arabia.

Introduction

Childhood and adolescent nutrition is the foundation of healthy development, brain function, and later well-being ***(Alasqah et al., 2021)***. For school-age girls, eating patterns are central to maintain the physical and biological processes of puberty, optimizing school performance, and preventing non-communicable diseases (NCDs) in the future ***(Almughamisi et al., 2022)***. At an international level, the nutritional status of children has drawn considerable attention for public health because of the massive implications that are found for individuals' and population outcomes***(Carducci et al., 2024).***

The Kingdom of Saudi Arabia (KSA) is characterized by fast-moving urbanization, economic development, and changing social structures ***(Liguori et al., 2024)***, which affects traditional consumption patterns, leading towards higher intake by young people of relatively unhealthier diets **(*Joseph et al., 2023)***. This dietary change is especially common among schoolgirls, an age group that

is more specifically influenced by cultural, social, and environmental determinants on their eating habits ***(Mumena et al., 2023).*** Past studies have indicated a concerning pattern of unhealthy dietary behaviors among teens. For instance, in ***a 2021 Alaska study in Quasem*** , low intakes of key food groups such as fruits, vegetables, and milk have been noted among Saudi teenagers, in contrast to very high intake of sugar-sweetened carbonated beverages ***(Alcantara & Frontreras, 2024).*** Similarly, studies in the Eastern Province and elsewhere have found excessive reliance on high-calorie, low-nutrient foods, frequently supplemented by a lack of availability of healthier options in school canteens and inadequate nutrition education provision within the curriculum ***(Khudair & Mohammed, 2022; El-Adham et al., 2016).*** These observations highlight the significance of looking at the particular diets of young cohorts, especially elementary and middle-school-aged girls, whose dietary habits are still being developed and thus more likely to be changed.

School setting is an important predictor of dietary habits. School canteens in KSA serve energy-dense snack foods rather than nutritional meals, and nutrition education has low priority in formal education versus other subjects in regular tests ***(Jabri et al., 2021)***. Outside school environments, psychological determinants such as eating for emotion, peer influences, and internalized perception of body shape also pose difficulties to food choice among adolescent girls during the susceptible initial phase of transition from childhood into adolescence ***(Albu et al., 2023)***. Furthermore, increased consumption of media and more pervasive advertisements for nutrient-volant foods have been found to be associated with poor-quality diet, subsequently resulting in reduced intake levels of important micronutrient nutrients including calcium, zinc, and vitamins C and D ***(Negash et al., 2017).*** These complex influences demand the close analysis of both dieting behaviors and the contextual foundations upon which they rest.

School feeding interventions were shown to have a positive effect on nutritional status and elementary school performance in children in the Philippines, proving the effectiveness of targeted interventions ***(Guo Cheng et al., 2020).*** Among Iraqi middle school students, cross-sectional assessment found moderate-to-high practice rates of healthy eating but identified ongoing nutrition knowledge gaps ***(Draper et al., 2019)***. Likewise, Egyptian research had established a connection of poor nutrition details among children in primary school stage with learning shortage and health factors, citing extensive interrelatedness of learning, cognition, and nutrition ***(Mahmood et al., 2021).*** As an aggregate, all these studies assert that although nutrition issues overall exist, interventions for them and implications are context-dependent and support studies by country justification for KSA.

Despite increased literature on the nutrition of adolescents in KSA, relatively little work has focused specifically on girls in elementary and middle school ages ***(Cheng et al., 2012)***. This age group is a prime window of opportunity for the creation of long-term healthy eating habits but is relatively under-studied compared with older adolescents or mixed-sex populations. The socio-economic and cultural context of the Eastern Province is an important setting to help meet this research need. There is evidence to back that interventions are likely to work if culturally adapted and locally environment-oriented with local community and parent support ***(Gubbelts, 2020)***, and therefore, school-based, culturally specific interventions are likely to yield long-term results in KSA.

The aim of this study was to assess nutritional habits among school aged females with overweight and obesity in KSA (Eastern Province) to develop a tailored nutrition education program encouraging healthy eating in order to reduce the diet-related chronic disease in this vulnerable group.

Ultimately, this research is consistent with KSA's wider public health goals to encourage a healthier next generation through evidence-based nutrition ***(Talip et al., 2016).***

Participants and Methods

Study Design and Setting

A survey was conducted at five schools (2 elementary, 2 middle and one secondary) in KSA's Eastern Province to assess the students' eating habits and measure the prevalence of obesity.Eastern Province was selected because it has a diverse socio-economic profile and had reported dietary habit shifts, making it a representative setting for the investigation of nutrition practice in KSA.

Study Participants and Sample Size

The study population comprised female students from elementary, middle and secondary schools of the Eastern Province. Of 2000 examined students that were recruited through a multi-stage sampling method, a total of 300 students were overweight or obese and they were included in the study, schools were purposively selected based on accessibility and willingness to join; classes in those schools were then randomly selected; and students in such classes were systematically sampled to obtain coverage across grades.

The sample size was calculated using the Epi Calc 2000 software, based on the findings of ***AImaqhawi et al., 2022,*** that showed a prevalence of 15.9% overweight and obesity among the females' students, accordingly the total number of overweight and obese students in the studied school was expected to be 1431.41% of physical inactivity (less than 30 minutes/day) among school children in Saudi Arabia was set by ***AImaqhawi et al.,(2022)***, accordingly, the sample size was calculated to be 296 students using following parameters: setting the total population about 1431 female students with overweight and obesity, confidence level at 95% and margin of error ± 0.05, in addition, 10% non-response rate was considered with total sample size of 326 students.

Data Collection Tools

Two methods were utilized for the collection of data:The first method was a guided self-administered questionnaire which included two sections. Section one collected socio-demographic data about age, parents' education and occupation, number of siblings, and birth order. As for section two, it assessed the participants' eating habits including meal patterns, eating in distraction (e.g., watching TV), frequency of different food and drink consumptions (e.g., fruit, vegetables, fast food, sweet beverages), in addition to quality of perceived nutritional habits and reasons to change to a healthy diet. The questionnaire was drawn from reliable tools and pre-tested for cross-cultural sensitivity.The second method of data collection was anthropometric measurements**, w**eight and height were measured and recorded in anthropometric measurements sheets. Weight was measured using a calibrated level platform scale on a firm, flat surface. The students were instructed to stand in the center over the scale with weight evenly distributed. They were weighed in light indoor clothing; shoes, and sweaters were removed then the weights were recorded to the nearest 0.1 kg ***(WHO, 2017).***

As regards the height measurement,it was measured using a stadiometer. The students stood barefeet on a flat surface with heels together, arms by sides, and head positioned so that the line of vision was perpendicular to the body. Height was measured in centimeters and recorded to the nearest 0.1 cm ***(WHO, 2017).***

Both measurements were recorded twice for every participant, and the average was taken. BMI was determined by weight (kg) divided by height squared (m^2) and interpreted according to Centers for Disease Control and Prevention (CDC) growth charts ***(CDC, 2024).*** BMI percentiles were defined as underweight (≤5th percentile), normal weight (5th–85th percentile), at risk for overweight (85th–95th percentile), or obese (>95th percentile).

Ethical Considerations

All procedures were compliant with the ethical principles specified in the Declaration of Helsinki ***(World Medical Association, 1964)*** including the confidentiality of collected data. Parental or guardianship consent was obtained, along with assent from participants who were informed that participation was voluntary. The research protocol was ratified by the respective Eastern Province, KSA ethics committee.

Statistical Analysis

Data was entered and analyzed using IBM SPSS Statistics version 20.0 (Armonk, NY: IBM Corp). Descriptive statistics were controlled for participant demographics and dietary behaviors:Qualitative data (e.g., categorical variables) were reported as frequencies and percentages, whereas quantitative data (e.g., age, weight, height, BMI) were reported as ranges, means, standard deviations (SD).The Chi-square test was used to compare categorical variables between groups (e.g., socio-demographic characteristics against BMI categories).

Results

The research covered 300 Eastern Province girls in the Kingdom of Saudi Arabia from elementary, middle, and secondary schools. Socio-demographic profiles, food behaviors, BMI status, and their relationships were assessed through data analysis.

Table (1)

Distribution of the Studied Students According toSocio-Demographic Characteristics (n=300)

Socio-Demographic Characteristics	Category	No.	%
Age in years (School grade)	8–11 (Elementary)	122	40.7
	12–14 (Middle)	86	28.7
	15–17 (Secondary)	92	30.7
Father's Job	Teacher	72	24.0
	Engineer	36	12.0
	Administrative employer	72	24.0
	Free business	72	24.0
	Security	30	10.0
	Driver	18	6.0
Father's Education	Middle school	30	10.0
	Secondary school	42	14.0
	Diploma	54	18.0
	University education	174	58.0
Mother's Job	Teacher	96	32.0
	Administrative employer	48	16.0
	Security	12	4.0
	Housewife	144	48.0
Mother's Education	Elementary	6	2.0
	Middle school	54	18.0
	Secondary school	54	18.0
	Diploma	54	18.0
	University education	132	44.0
Number of Siblings	Mean ± SD	4.68 ± 1.31	
	Range	2.0 – 7.0	
Birth Order	First	12	4.0
	Second	60	20.0
	Third	78	26.0
	Fourth	78	26.0
	Fifth	42	14.0
	Sixth	24	8.0
	Seventh	6	2.0

Table (1) shows that more than one third of the studied sample were elementary school students,belonging to the age group 8-11 years (40.7%). Fathers tended to be in free enterprise, educators, or administrative bosses (24% each), and 58% had university education. Mothers tended to be teachers (32%) or housewife (48%), with 44% having university degrees, representing a fairly educated parent background. The average number of siblings was 4.68, with the majority being third or fourth born (26% each).

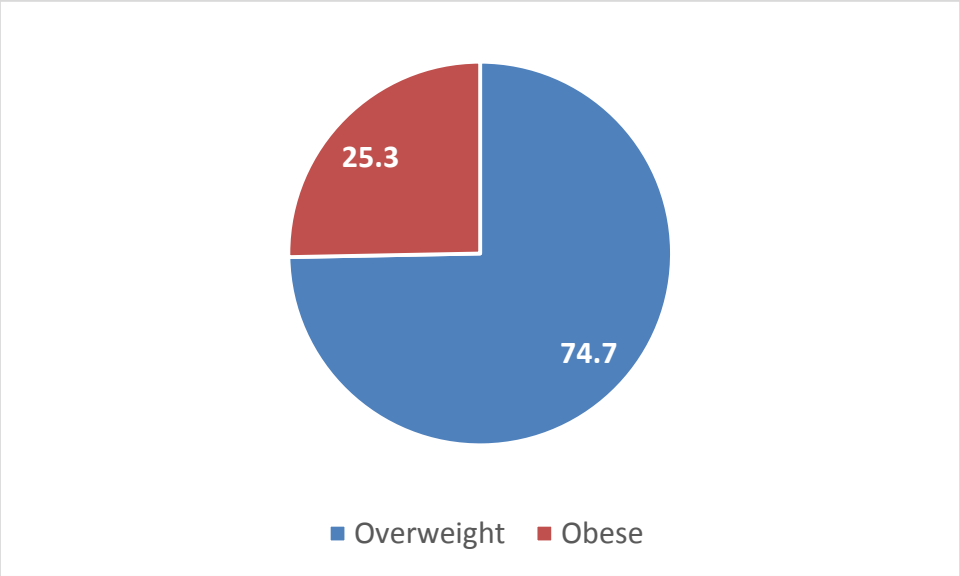

Figure (1)
Distribution of Study Participants According to BMI Categories Pie Chart

Figure (1) shows that of the 300 studied students74.7% were overweight while 25.3% were obese.

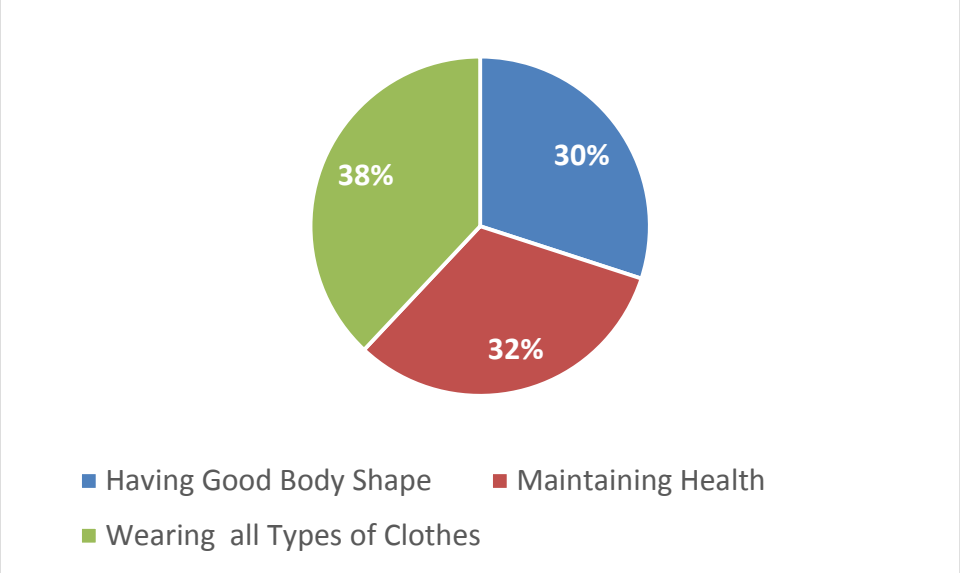

Figure (2)
Motives for Healthy Diet Pie Chart

Figure (2) reveals that aesthetic motives (38% clothes, 30% body shape) outweigh health concerns (32%) and reflects mixed priorities in dietary motivation.

Table (2)

Distribution of the Studied Students According to Meal Patterns (n=300)

Meal Pattern	Category	No.	%
Skipping main meals	Breakfast	126	42.0
	Lunch	24	8.0
	Dinner	42	14.0
	None	108	36.0
Fixed mealtimes	Yes	90	30.0
	No	78	26.0
	Sometimes	132	44.0
Taking snacks	Yes	168	56.0
	No	30	10.0
	Sometimes	102	34.0
Eating with family	Yes	66	22.0
	No	90	30.0
	Sometimes	144	48.0
Duration of meal consumption (minutes)	Less than 15	132	44.0
	15–30	138	46.0
	More than 30	30	10.0
Eating while watching TV	Yes	156	52.0
	No	36	12.0
	Sometimes	108	36.0
Eating before sleep	Yes	126	42.0
	No	54	18.0
	Sometimes	120	40.0
Timing of last meal	Before 9 pm	78	26.0
	From 9–12 pm	150	50.0
	After 12 am	72	24.0
Types of snacks consumed at school*	Sandwiches	162	54.0
	Bakery or biscuits	234	78.0
	Chips	222	74.0
	Chocolate	168	56.0
	Nuts	132	44.0
	Cooked meals	102	34.0
	Vegetables or fruits	120	40.0
Types of snacks consumed at home*	Sandwiches	138	46.0
	Bakery or biscuits	198	66.0
	Chips	198	66.0
	Chocolate	168	56.0
	Nuts	126	42.0
	Cooked meals	132	44.0
	Vegetables or fruits	72	24.0

*More than one answer allowed

As displayed in table (2), skipping breakfast was prevalent (42%), followed by 36% of participants who did not skip meals. Bakery foods (78%) and crisps (74%) were the most common school snacks, while vegetables and fruits were less prevalent (40%), suggesting a preference for energy-dense foods.Chips and bakery products were favorite home foods (66% each), while fruits and vegetables were consumed less frequently (24%). The overall vegetable/fruit intake is low, dropping from 40% at school to 24% at home, suggesting limited access or preference for healthier options outside structured settings.

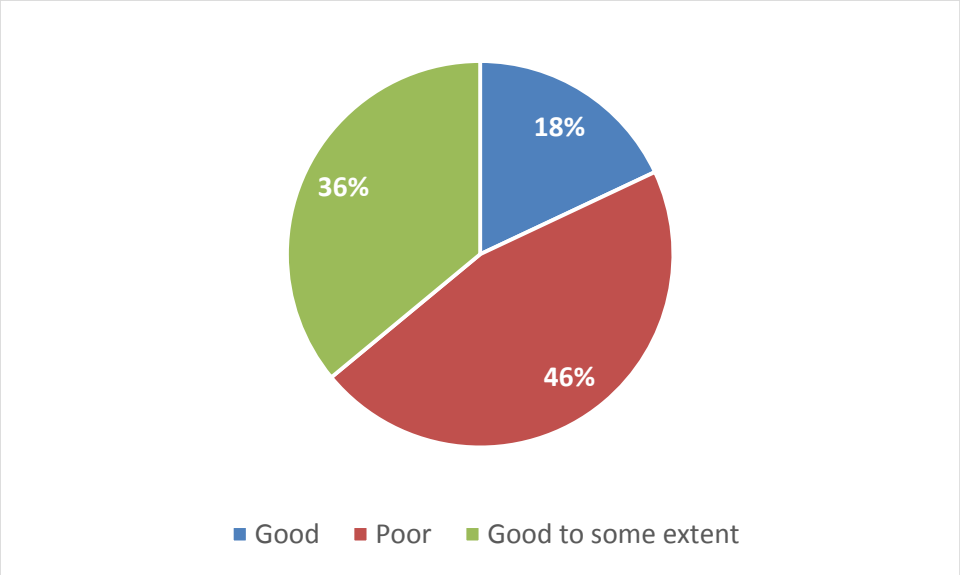

Figure (3)
Participants' Perceptions of their Nutritional Habits Pie Chart

Figure 3 tells that about half of the study participants believed that their nutritional habits were poor, a finding that favors behavior change in the future

Almost half (46%) were not consuming water, 36%were consuming fizzy drinks three times a day, and 34% were consuming sweets on a daily basis. Adherence to physical activity was minimal (22%) (Table 3).

Eating food outside the home was common (64%), with pizza and sandwiches being the favorites (82%), and frying being the most common method of preparation (38%)(Table 3).

Table (3)

Distribution of the Studied Students According to Nutritional and Physical Activity Habits(n=300)

Nutritional & Physical Activity Habits	Category	No.	%
Eating pickles	Yes	102	34.0
	No	84	28.0
	Sometimes	114	38.0
Eating outside the home	Yes	192	64.0
	No	24	8.0
	Sometimes	84	28.0
Types of foods consumed outside the Home*	Pizza or sandwiches	246	82.0
	Meat or fish	102	34.0
	Bakery	162	54.0
	Pasta	180	60.0
Type of fat used in Cooking	Animal Fat	126	42.0
	Vegetable Oil	60	20.0
	Both	114	38.0
Main method of cooking meat, fish, or chicken	Frying	114	38.0
	Grilling	96	32.0
	Boiling	24	8.0
	In the oven	66	22.0
Frequency of sweets consumption	Daily	102	34.0
	Once per week	54	18.0
	Once per month	12	4.0
	I don't eat	132	44.0
No water cups consumed per day	3	102	34.0
	4	42	14.0
	5	18	6.0
	None	138	46.0
No tea/coffee cups consumed per day	1	186	62.0
	2	60	20.0
	3	24	8.0
	None	30	10.0
No sugar teaspoons added per tea/coffee cup	1	30	10.0
	2	66	22.0
	3	120	40.0
	More than 3	30	10.0
	None	54	18.0
Frequency of fizzy beverages consumption per day	One time	78	26.0
	2 times	72	24.0
	3 times	108	36.0
	More than 3 times	42	14.0
Practicing any type of physical activity	Yes	66	22.0
	No	162	54.0
	Sometimes	72	24.0

*More than one answer allowed

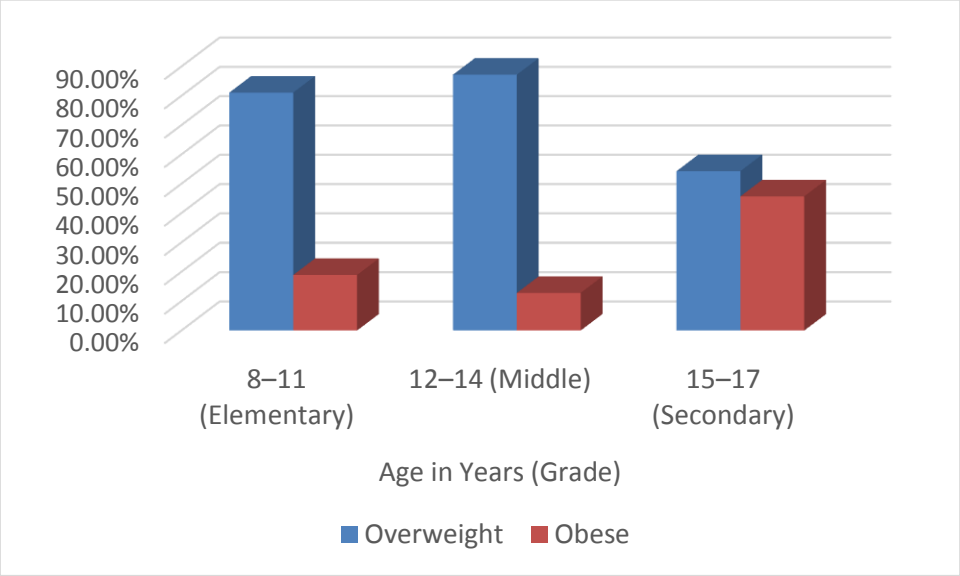

Figure (4)
Distribution of Overweight and Obesityby Age Group (Bar Chart)

Figure 4 shows that nearly half of the age group 15-17 years (secondary grade) had BMI greater of 97th percentiles or more which is significantly higher than the other age groups (P = <0.001), denoting significant relation between the age group and the overweight categories of the study participants, however, no significant relations were found between weight status and other socio-demographic characteristics (p > 0.05, using Chi-square).

Discussion

The present study aimed to assess the dietary habits of Saudi girls in Eastern Province (KSA) elementary, middle and secondary schools. The current research findings revealed that age has a significant relation with BMI regarding overweight and obese categories, which is inconsistent with the research of ***Khudair and Mohammed, (2022),*** who reported that older age, along with lower physical activity and greater food autonomy, provide more leeway for weight gain, however, the education levels of fathers and mothers (58% of fathers and 44% of mothers with university education) and their employment status did not serve as reliable predictors of the overweight category (p > 0.05), contrasting with findings by ***El-Adham et al., (2016),*** whose study found lower rates of obesity in Egyptians with higher-educated parents.

The dietary habits of this group were extremely dependent on energy-dense, nutrient-poor foods, with crisps and bakery items dominating school snacks (78% and 74% respectively) and home snacks (66% each). Furthermore, all participants reported consuming carbonated beverages at least once per day with 36% of themused to consumethis type of beverages three times a day. Similarly, high daily consumption rates with varied degree were documented by numerous studies from various countries across the adolescence stage, 32,4% in Malaysia ***(Zaki et al., 2025)***, average of 54.3% in 53 low- and middle-income countries ***(Yang et al., 2017)***, and average of 42.1% in eighteen countries in Africa, Asia and the Americas. ***(Smith et al., 2024)***, which is a worrisome finding as high carbonated

beverages consumption during the development of adolescents may reduce the accumulation of bone minerals and increase the risk of future fractures, besides, it is positively associated with obesity and type 2 diabetes mellitus risk***(Chen et al., 2020)***. On the contrary, water consumption was markedly below the recommended dietary allowances of total water for their age and sex which range from 1.7 liter/day for 8 years old females to 2.3 liters/day for 17 years old females, it can be inferred that students are replacing drinking water with soft drinks ***(Office of Dietary Supplements, 2024).***

Skipping breakfast (42%) was prevalent among the study participants, which may be compensated by high calorie consumption later in the day as observed by ***ALBU Adriana et al., (2023)***in Moldova. Among the unhealthy dietary habits was the low consumption of fruits and vegetables (40% at school, 24% at home) in consistency with ***Guo Cheng et al., (2020) and Negash et al., (2017)***from Turkey and India, respectively, highlighting a lack of dietary diversity, that poses a greater risk for obesity and hampers development and growth.

Many other habits, that can lead to obesity, were detected among the students such as eating while watching TV which is known to be associated with mindless eating ***(Boulos et al., 2012)***, physical inactivity and high sweets and table sugar intake. These findings are policy relevant. Structured engagement of students and caregivers in nutrition education, as advocated by ***Heydarzadeh et al., (2019)***, is necessary to harmonize home and school environments. Improving food quality at schools and controlling unhealthy foods, e.g., through kitchen gardens or subsidies ***(Hammoudi Halat et al., 2023)***, has the potential to maximize the availability of healthy food, as shown by ***Alcantara & Frontreras, (2024)*** in the Philippines.

Implications for Policy and Practice

The findings highlight the necessity of designing integrative nutrition education programs specifically targeting schoolchildren and their parents. Peer education model scan be crucial in bridging the gap between knowledge and behavior.Policymakers should focus on enhancing food quality in schools and regulating the availability of unhealthy foods. Fruit and vegetable subsidies or kitchen gardens can maximize access to fresh fruits and vegetables. An effectiveness assessment of such interventions includes longitudinal observations among different groups and inter-disciplinary partnerships with teachers, health workers, and other actors for developing long-term interventions towards preventing malnutrition.

Conclusion

The results of this research showed high prevalence of unhealthy dietary habits and physical inactivity among schoolgirls from the Eastern Province;the degree of obesity was influenced by age with little influence from other socio-demographic characteristics.

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العادات الغذائية للفتيات في سن المدرسة ممن يعانين من زيادة الوزن في المملكة العربية السعودية

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الملخص العربي

المقدمة:

تشير الزيادة الملحوظة في معدلات زيادة الوزن والسمنة بين المراهقين في المملكة العربية السعودية إلى الحاجة لفهم العادات الغذائية والعوامل المؤثرة فيها، لا سيما بين الطالبات، باعتبارهن فئة لم تحظ بالكثير من الدراسات في المنطقة الشرقية من المملكة. تهدف هذه الدراسة إلى تقييم العادات الغذائية لدى طالبات المدارس الابتدائية والمتوسطة والثانوية اللاتي يعانين من زيادة الوزن والسمنة.

وقد تم إجراء مسح باستخدام أسلوب العينة متعددة المراحل، شمل قياس الحالة التغذوية لـ 2000 طالبة تتراوح أعمارهن بين 8 و17 سنة من المدارس الحكومية في المنطقة الشرقية، تم تجميع البيانات الاجتماعية والديموغرافية، والعادات الغذائية، والقياسات الجسمية للطالبات (300) اللاتى تم تشخيصهن بزيادة الوزن أو السمنة، باستخدام استبيانات وأدوات قياس موحدة.

أظهرت النتائج أن النظام الغذائي للطالبات اللواتي شملتهن الدراسة اتسم بتناول متكرر لأطعمة عالية الطاقة (مثل المخبوزات بنسبة 78%، والمقرمشات بنسبة 74% داخل المدرسة)، مقابل استهلاك منخفض للفواكه والخضروات (40% في المدرسة، و24% في المنزل). كما لوحظ انتشار واسع لتخطي وجبة الإفطار (42%) واستهلاك المشروبات الغازية (100% مرة واحدة على الأقل يوميًا)، إلى جانب انخفاض مستوى النشاط البدني(22%).

فى الختام، تُظهر الدراسة انتشارًا واسعًا للممارسات الغذائية غير الصحية بين الطالبات، مما يستدعي تدخلات عاجلة في مجال التثقيف الغذائي وغيره من التدخلات التغذوية التى تستهدف الطالبات. تسهم هذه النتائج في توجيه الجهود الرامية إلى الحد من المخاطر الصحية والتعليمية المرتبطة بالنظام الغذائي لدى الفتيات المراهقات.

الكلمات المفتاحية: العادات الغذائية، السمنة، الطالبات، المملكة العربية السعودية.