

Knowledge of healthy diets among adolescents in eastern Saudi Arabia

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BACKGROUND: Bad dietary habits, such as eating high-fat/high-energy food, can contribute to obesity in adolescents, which tends to persist into adulthood. The objective of this study was to determine the level and sources of knowledge about foods and healthy diets among male and female adolescents.

METHODS: This was a cross-sectional study of a sample of male (n=1240) and female (n=1331) adolescents from third grade, intermediate and all three grades of secondary school students in the Al-Khobar Area, eastern province of Saudi Arabia. A self-administered questionnaire was used to collect information.

RESULTS: Approximately 51% of the male and 65% of the female students recognized unsaturated fats as healthy foods. However, 10% of the males and 8% of females reported saturated fats as healthy food items. About 49% of the males and 66% of the females correctly defined cholesterol. Dietary knowledge of both male and female students on the dangers of unhealthy foods and the benefits of fiber-rich diets was found to be unsatisfactory. The main sources of knowledge about health and disease reported by the male and female respondents were television (58% and 61%, respectively), magazines (31% and 39%) and daily newspaper (33% and 34%). Primary health care centers (PHCCs) staff were the least source of knowledge (17% and 16%).

CONCLUSIONS: Knowledge of healthy diets among school students was inadequate. It is recommended that health education and information about healthy eating habits and lifestyle be included in school curricula.

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Unhealthy lifestyle contributes to many of the leading causes of death worldwide, including lung cancer, coronary heart disease, stroke, liver cirrhosis and accidents.¹⁻³ Faulty health-related behaviors such as cigarette smoking, dietary habits, substance abuse, and exercise patterns develop at the time of puberty and in adolescence.⁴⁻⁸ Bad dietary habits, such as eating high-fat/high-energy food, can contribute to obesity in adolescents,⁹ which tends to persist into adulthood.¹⁰ Childhood and adolescent obesity have both been linked to higher all-cause mortality in adulthood,^{11,12} as well as childhood hyperlipidemia, glucose intolerance, cholelithiasis and hypertension. Longitudinal increase in body mass index (BMI) is accompanied by an increase in blood pressure.¹³ Endocrine and pulmonary problems, as well as orthopedic, gastroenterological, and neurological difficulties are more common in obese children.¹⁴⁻¹⁶ In addition to the physical health consequences, both immediate and long-term, obesity has psychosocial effects and substantial economic costs.¹⁷⁻¹⁹

In Saudi Arabia, obesity is a common health problem among all age groups.²⁰⁻²⁵ In students, overweight ranges from 11.7% to 20.5% and obesity ranges from 9.5% to 20.5%.²⁶⁻²⁹ It is widely recognized that treatment of obesity is not only costly but also remarkably ineffective. Prevention is therefore crucial, and adolescents should be a priority target, as since it is the time when independence is established, and dietary and activity patterns may be adopted that are followed for many years to come. Obesity programs appear to be more successful in adolescents than adults.¹⁷ A better understanding of how young people themselves view health-related issues such as nutrition is central to effective strategies.³⁰ It is thus imperative to assess adolescent knowledge about healthy diets and its relationship to the prevalence of obesity. The specific objectives of this study were to determine the level and sources of knowledge about foods and healthy diets among male and female adolescents.

Methods

This cross-sectional study was conducted on Saudi male and female students in the third intermediate grades and all three grades of secondary school in the Al-Khobar area in eastern Saudi Arabia, using a multistage stratified self-weighting sampling design. We divided all schools in the study area by males and female schools, then into government and private schools, and subsequently into intermediate and secondary level schools. During the first stage, a systematic random sampling procedure was used to select schools. In the final stage, classes were selected from each level using a simple random sampling design. All students in the selected classes were included in the study.

The final sample of schools consisted of: a) four government and three private intermediate schools, and two each of government and private secondary schools for boys; b) five government and three private intermediate schools, and three government and two private secondary schools for girls. The total number of selected students was 2645, comprising 1298 males and 1347 females.

A self-administered pre-coded questionnaire was used for both male and female students. The questionnaire contained questions on knowledge of dietary fats (which is better for health, saturated or unsaturated), cholesterol (whether cholesterol is a type of protein, carbohydrate, unsaturated or animal fat). In addition, the respondents were asked to write five answers for each of the following questions: dangers

of high-cholesterol-containing foods, examples of high-cholesterol containing foods, dangers of obesity, benefits of fiber-rich diets on human health and examples of fiber-rich diets. If three answers or more were right that was considered sufficient knowledge and coded as one. Otherwise, it was considered as insufficient knowledge and coded as zero. At the end of the questionnaire, the students were asked about the sources of their knowledge concerning health and disease. A scoring system was used to classify knowledge as satisfactory or unsatisfactory. The investigator listed the correct items that constituted satisfactory knowledge. If the student correctly identified more than 50% of the correct items, he or she was considered to have satisfactory knowledge. The questionnaire was given to students with verbal and written instructions. Three male physicians and three females (one pharmacist and two nurses) from the boys and girls schools, respectively, participated in the data collection under investigator supervision. A pilot study was conducted in a male secondary school in Dhahran city to test both the clarity of the questions and the organizational procedures such as the time taken for completion of the questionnaire.

The data were entered into a personal computer and SPSS version 11 was used for data analysis. A *P*-value of <0.05 was taken as statistically significant.

Results

The study sample comprised 2571 students, 1240 (48.2%) of whom were males. The overall response rate was 97.5% (95.5% of the males and 98.8% of the females). About three-quarters of the students were from the government schools. Two-thirds were at the secondary school level and the rest at the intermediate level. The overall mean age (\pm SD) was 16.3 (\pm 1.7) years with no statistically significant difference between the male and the female students.

When asked what type of fat in food is healthy (saturated versus unsaturated), significantly more females than males answered unsaturated fats (65.3% vs. 51.1%, *P*<0.0001) (Table 1). About 10% of the males and 8% of females considered saturated fats as healthy food items. More female than male students correctly defined cholesterol as a type of saturated fat or animal fat (66% and 49%, respectively, *P*<0.00001) (Table 2). On the other hand, 39% of the male and approximately 24% of the female respondents' answer to the question was "I do not know" while nearly 6% and 2% of the male and female students, respectively, incorrectly defined cholesterol as a type of carbohydrate.

Table 1. Answer to “which type of fat in food is healthy?” as reported by male and female students in the Al-Khobar area.

Answer	Males		Females	
	No.	%	No.	%
Unsaturated fat	623	51.1	842	65.3
Saturated fat	124	10.2	108	8.4
Don't know	472	38.7	339	26.3
Total	1219	100.0	1289	100.0

P<0.0001 male vs. female, chi-square test

Table 2. Definition of cholesterol as reported by male and female students in the Alkhobar area.

Definition	Males		Females		P value
	No.	%	No.	%	
A type of saturated fat	514	42.2	816	61.3	<0.001
A type of unsaturated fat	56	4.6	64	4.8	NS
A type of animal fat	81	6.6	57	4.3	0.008
A type of protein	25	2.1	48	3.6	0.019
A type of carbohydrate	67	5.5	22	1.7	0.00001
Others	0	0	7.5	0.5	0.016
Don't know	476	39.0	317	23.8	0.00001
Total	1219	100.0	1331	100.0	

NS, not statistically significant

Table 3. Proportion of students who had satisfactory dietary knowledge, by gender.

Type of dietary knowledge	Males (n=1240)		Females (n=1331)		P value
	No.	%	No.	%	
Dangers of high cholesterol	50	4.0	63	4.7	NS
Examples of high-cholesterol-containing foods	288	23.2	349	26.2	NS
Dangers of obesity	93	7.5	160	12.0	0.0001
Benefits of fiber-rich diets	48	3.9	27	2.1	0.006
Examples of fiber-rich diets	341	27.5	322	24.2	NS

NS, not statistically significant

The level of dietary knowledge was similar in both genders for three of the five questions (Table 3). For the remaining two questions (dangers of obesity and benefits of fiber-rich diets), the females had better knowledge with respect to the dangers of obesity (12% versus 7.5%, *P*=0.0001) but not on the benefits of fiber-rich diets (3.9 % of the boys compared with 2.1% for the girls, *P*=0.006) (Table 3).

Regarding the sources of knowledge about health and disease as reported by both male and female students, television ranked first (58% and 61%), followed by magazines (31% and 39%), daily newspaper (33% and 34%), schools (28.6% and 32.5%), books (24.8% and 28.1%) and radio (23.5% and 22.2%). Primary health care center (PHCCs) staff were the least source of knowledge (17% and 16%).

Discussion

Nutritional knowledge of both male and female students about types of healthy fats in food was inadequate. This might be due to lack of education about nutrients, and/or unavailability of health information. This result is consistent with a study originating from western Australian involving 391 adolescents (mean age, 15.8 years) which showed that nutritional knowledge, particularly about fat, was deficient.³¹ A dietary study among college hostel female students aged 17-25 years in Saudi Arabia, showed that 98% of the students ate fast food rich in fat and calories from restaurants.³² A study of attitude and behavior towards risk factors for coronary heart disease in Abha, Saudi Arabia, also showed that only 15.7% of people with high dietary intake perceived their diet to be a health risk.³³

A high proportion of students in the present study could not define cholesterol correctly. The unsatisfactory knowledge of students about cholesterol, the dangers of high cholesterol in food, healthy fats in food, obesity and benefits of fiber-rich diets reflects the inadequacy of nutrition education in both boys and girls schools. Adequate and correct knowledge about healthy diet is a prerequisite for students to adopt a healthy dietary behavior with subsequent dissemination of the acquired knowledge to their parents, relatives and friends. However, this knowledge will not be sufficient by itself to change the behavior, but needs to be augmented by building skills, such as the presence of learning experiences in the school's cafeteria.^{34,35} Such school-based nutritional education and learning behavior was found to improve the students' eating habits.³⁶ Eating behavior is learned and if we are to prevent dietary problems,

correct health messages and behavior should be adopted at an early age.³⁴ Primary prevention of malnutrition could be done at school, through the promotion of healthy eating and physical activity.³⁷ More emphasis should be based on inclusion of adequate and sufficient nutrition and physical education in the school's curriculum in addition to health promotion and disease prevention concepts and strategies.³⁸ This can be done through lectures, training sessions, small group discussion, role-playing, pamphlets and booklets by the school health services in collaboration with other agencies. However, school staff alone cannot be held responsible for improving students knowledge and behavior. Parents, community, mass media, food industry and other related entities should play a role.³⁹ Students in this study stated that the main sources of health knowledge were television, magazines and newspaper, but not PHCCs. The fact that PHCCs were the least source of health information may be because adolescents, of all age groups, rarely visit PHCCs.⁴⁰ Nevertheless,

education strategies at the PHC level should be revised and improved. Moreover, these sources should be used as a means to improve the health knowledge and attitude of our students.

In conclusion, there is at present a paucity of information in Saudi Arabia on adolescent nutritional status, eating habits and underlying influences, and the impact of nutrition intervention in adolescence. It is thus imperative that both educational authorities and researchers attend to this area, and that health education and information about healthy eating habits and lifestyle be included in the school curriculum.

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