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Relation Between Physical Activities and Dietary Habits in School Children of Riyadh, Saudi Arabia

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ABSTRACT

Physical activity and dietary habits during childhood play a major role in affecting physical, mental, and cognitive factors in adulthood. Physical inactivity and unhealthy diets may lead to health issues in the future. This study aimed to investigate the relation between dietary habits and physical activity among school children in Saudi Arabia. This cross-sectional study was performed in the capital city, Riyadh of Saudi Arabia and students included in the study were between 5 and 13 years of age who were recruited through an online questionnaire. A total of 122 Saudi students, including 46.8% boys and 53.2% girls, were selected from various schools in Riyadh city. Data on the dietary habits and physical activities of the school children were collected via a questionnaire. The results of the study confirm that 77% of children had a habit of eating fruits and vegetables. Above 60% of children had a habit of drinking soft drinks, and 84.4% of children showed an interest in eating fast food. Approximately 97% of children were addicted to eating snacks and the majority of students appeared to eat 1 h before going to bed in addition to having a habit of eating late dinners. The students were also actively involved in physical activities with 94.3% of the participants undertaking 1–6 h of physical exercise per week, including running and walking. In conclusion, the current study confirms a significantly high correlation of physical activity on consumption of excess fruits and vegetables as part of a dietary pattern and also on consuming high levels of fast foods and soft drinks. One of the major concerns is connected because of late dinner pattern.

KEY WORDS: DIETARY HABITS, PHYSICAL ACTIVITY, FRUITS, VEGETABLES, SCHOOL CHILDREN.

INTRODUCTION

Physical activity is defined as the skeletal muscular movement of a body which results in energy expenditure. The extensive benefits of participating in physical activities for children include positive physical self-concept, better academic outcomes, boosted global self-esteem, and improved physical and mental health, (Sneck et al., 2019). Physically active students have high energy intakes which balance energy expenditure through a healthy, balanced diet which further provides energy to manage stress (Caldwell et al., 2019). Low intake of dietary fat and high consumption of fruits and vegetables along with increased physical activities can lead to a healthy life without adverse effects during adolescence (Popkin et al., 2012). School children with low levels of physical activity are more likely to develop serious health issues in the long-term such as heart disease and weak bones (PeopleandServices, 2020).

A lack of physical activity can also lead to obesity, which is a commonly known risk-factor associated with low levels of physical exercise (Sun et al., 2020). A strong link was identified between health and education, which is associated with schools promoting physical activity in their students (Tercedor et al., 2017). Physical education

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plays a major role in an advantageous position for endorsing leisure benefits of physical activities (Polet et al., 2019). The World Health Organization (WHO) has stated that globally, nearly 1.9 million deaths are accredited to physical activity, and they recommend school children should participate in 60 min per day ophysical activity (Dobbins et al., 2013). Schools play an important role in creating a safe and caring environment that sustains healthy practices and also provides opportunities for students to learn and practice healthy eating habits and encourages regular physical activity Morbidity and Mortality Weekly Report (2011). Physical inactivity combined with sedentary factors and poor diet can lead to weight gain in children (Pozuelo-Carrascosa et al., 2018). The WHO confirms that physical inactivity in the fourth leading cause of global mortality (Alahmed et al., 2018).

Nutritional dietary habits in children are major developmental factors for improving physical, mental, and cognitive levels during adolescence (Kristo et al., 2020). A healthy diet is also used to prevent malnutrition and non-communicable diseases (NCDs). The consumption of processed foods can often modify individual lifestyles, including dietary patterns (Breda et al., 2019). The habit of consuming a balanced and healthy diet starts during childhood can prevent the development of NCDs and chronic diseases in adolescence and adulthood (Tambalis et al., 2019). Acidogenic foods with rich diets include animal meat, fish, cheese, rice, and cereals, and low alkaline foods such as fruits and vegetables support endogenous acid production. Conversely, poor diets and abnormal lipid profile are associated with the development of obesity and cardiovascular diseases (Aslani et al., 2020).

Healthy nutritional diets in small-aged school children safeguards enhanced health status during adulthood (Soheilipour et al., 2019). Breakfast is considered as the first meal of the day and should be considered a healthful diet as well as lifestyle which further can absolutely impact children's health, specifically, when involving high nutritional fiber, fruits, whole-grain, vegetables and regular products (Yu et al., 2019). But in a recent trend, some nuclear families have modified their lifestyle, including dietary habits. Fast food restaurants are one of the environmental factors that interact with particular characteristics to effect individual weight status. For example, fast food restaurants located near schools can influence body mass index (BMI) outcomes. Junk fast foods are high calorie foods that cause weight gain, resulting in obesity (Asirvatham et al., 2019, Jia et al., 2019).

The WHO estimates that 57% of children in Saudi Arabia are currently physically inactive (Alahmed et al., 2018). Limited studies have been documented about physical activity and other related factors in Saudi school children (Al-Hussaini et al., 2019); there are limited studies in adults, children, and expatriate populations from different regions of Saudi Arabia about a combination of physical activity factors (Al-Hazzaa et al., 2011, Darwish et al., 2014, Alzeidan et al., 2017). To the best of our knowledge, there are currently few studies on school children in the age range of 6–13 years with the combination of physical activity and dietary habits from the Kingdom of Saudi Arabia. Therefore, the current study aimed to determine the association between physical activity and dietary habits in Saudi school children.

MATERIAL AND METHODS

Design of the study: This cross-sectional study was conducted at the female campus of the Department of Community Health Sciences in the College of Applied Medical Sciences at King Saud University in the capital city of Saudi Arabia. A total of 122 children (age range, 5–13 y) were recruited for this study based on a multistage stratified sampling technique. The study participants confirmed their informed written consent (via parent or guardian) before participating in this study. This study was designed as a cross-sectional analytical pilot study performed in Saudi school children to record their BMI, dietary habits, and physical activities.

This study was performed in Riyadh city schools of the north, west, south, and eastern regions from international, non-profit, and national private schools of each region. The inclusion criteria were as follows: children from Riyadh prominence region with an age range of 5–13 years. The exclusion criteria: child with chronic diseases, child above or below the age range. A total of 122 samples were included as the final subset (46.8% boys and 53.2% girls). However, 22 students were excluded owing to unsigned consent forms.

Dietary habits: In this study, dietary habits regarding consumption of fruits, vegetables, junk food, soft drinks and snacks were recorded on a weekly basis.

Physical activities: The student's physical activities were recorded, including going to the gym, running, walking, involvement in physical activity classes conducted within school premises, and irregular physical activities.

Anthropometric and other measurements: Obesity was measured by BMI through the combination of weight in kg and height in cm. BMI classifications are based on WHO BMI for ages 5–19 years. Based on the BMI values, children were categorized as underweight, normal-weight, overweight, or obese (Khan et al., 2019).

Statistical analysis: Descriptive statistics were provided as means and standard deviations. Data was analyzed to examine the risk of obesity in Saudi children based on dietary habits and physical activities using SPSS version 15.0. Results were presented as percentages (%).

RESULTS AND DISCUSSION

In this cross-sectional study, a total of 122 students were recruited based on an online questionnaire form. The basic and anthropometric details of school children are presented in Table 1. Both girls and boys aged between

5 and 13 years were included in this study. The mean age of the total students was 9.41 ± 2.61. The results indicated that 54.9% of girls were more actively involved in the physical activity when compared to 45.1% of boys. The mean height and weight of both girls and boys was 125.52±24.3 and 35.1±17.9. The mean total BMI was found to be 22.6 ± 11.56 kg/m2. In this study, 12.3% of children were affected with different diseases such as asthma, eczema, allergy, cramps, herpes, epilepsy, epistasis, anemia, and hyperactivity.

Table 1. Basics characteristics of school children

Basic characteristics	Frequencies	Percentages
Age (Years)	9.41 ± 2.61	NA
Sex (Male: Female)	55: 67	(45.1%): (54.9%)
Weight (Kg)	35.1 ± 17.97	NA
Height (cm)	125.52 ± 24.3	NA
BMI (kg/m2)	22.6 ± 11.56	NA
Child affected with	(12.3%)	
specific disease	15	
Educated mothers	122	100%
Educated fathers	122	100%
Filled questionnaire	122	100%
Mother	105	86.1%
Father	03	2.5%
Sister	08	6.6%
Brother	02	1.6%
Grand mother	02	1.6%
Grand father	00	0%
Aunt	01	0.8%
Uncle	01	0.8%

Table 2. Categorization of children's body mass index (BMI)

Types of BMI	Frequencies	Percentages
Underweight	55	45.1%
Normal	29	23.8%
Overweight	23	18.8%
Obesity	15	12.3%
Morbid-Obesity	00	0%

The literacy rate for the children's parents was found to be 100%. In this study, a maximum of 86.1% of questionnaires was filled by the mother and remaining 13.9% of questionnaires was documented by father, brother, sister, grandmother, aunt, or uncle. Table 2 shows the BMI categories. Almost 45% students were in the underweight category, 23.8% in the normal-weight category, 18.8% in the overweight category, and 12.3% were obese. In this study, there was no student in the morbid-obesity category. The complete details collected regarding food habits in the children are summarized in Table 3. In this study, 77% of children had the habit of eating fruits such as dates, oranges, apples, bananas, and mangoes. Almost 76.2% of children reported eating healthy vegetables, i.e., cucumber, carrot, tomato, lettuce, and other greenery on a daily basis. More than 60% of children had the habit of drinking soft drinks, and 84.4% of children showed an interest in eating fast foods. Nearly 97% children were addicted toward snacks such as sweets, chips, cakes, crepe cookies, doughnuts, chocolates, and sweetened carbonated drinks. All children had the habit of consuming foods at different times before going to bed. A total of 23.8% of children indicated consuming dinner about less than an hour before bedtime, 41% of children indicated eating dinner an hour before going to bed, and approximately 30.3% of children indicated eating dinner 2–3 h before going to bed. Only 3.3% of children indicated having dinner 4 h before going to bed and finally 1.6% of children indicated having dinner more than 4 h before going to bed (Table 3).

Table 3. List of children's dietary habits

Dietary habits	Frequencies	Percentages
Habit of eating fruits	94	77%
Habit of eating vegetables	93	76.2%
Habit of drinking soft drinks	74	60.7%
Habit of eating fast foods	103	84.4%
Habit of eating snacks	118	96.7%
Dinner time (<1–4+hrs)	122	100%

Table 4. List of physical activities within school children

Activities	Frequencies	Percentages
Physical activity	115	94.3%
Physical effort	105	86.1%
Gym	14	11.5%
Running	115	94.3%
Walking	115	94.3%
Physical activity classes	88	72.1%
Irregular physical activity	34	27.9%

The list of physical activities that the children participated in is detailed in Table 4. In this study, 94.3% students were found to be actively involved in physical exercises, including running and walking, on a weekly basis. On regular basis, 6.5% students performed physical activities for a minimum of 1 h, 3.3% for a couple of hours, and 0.8% for 3 h regularly. Only 2.4% of children performed physical activities within their school premises. There were approximately 4.1% children who performed physical activity for 30 min. Approximately 33.6% students performed physical activity on a weekly basis for 1 h; 10.6% for 2 h; 11.5% for 3 h; 4.9% for 4 h; 4.1% for 5 h; 3.3% for 6 and 7 h; 1.6% for 10 h; and 0.8% for 8, 9, 12, 14, or 17 h. In total, 86.1% students made physical efforts and 13.9% did not. However, 38.6% made the effort 1–3 times/week, 13.1% did 4–6 times/

weeks, and 34.4% did on a daily basis. However, 13.9% students were motivated by family members.

Additionally, 11.5% students participated in the gym and 88.5% were not involved owing to the restricted age limit. Approximately, 72.1% students participated in physical activity classes conducted by their schools and among these, 36.1% and 18% participated for 1-2 and 3-4 times on a weekly basis, respectively and 18% actively participated on a regular basis. There were approximately 19.7% children who were unable to participate owing to a lack of physical activity sessions in a limited number of schools and only 8.2% students did not participate due to the inactive.

The purpose of designing this study involving school children between the age of 5 and 13 years is that both male and female students have maximum prospects for contributing to numerous types of physical activities in their routine life. This study aimed to investigate the relation between dietary habits and physical activity among Saudi school children. The results confirmed that >76% of Saudi children prefer to eat vegetables and fruits on a weekly basis, and almost 85% students prefer fast food and snacks. Additionally, the results highlighted that 94.3% students were actively involved in physical activity for 1–6 h per week.

In this study, 31% children were considered to be overweight and/or obese, and approximately 31% of the remaining children were found to be normal with the underweight criteria. Limited studies have been performed within this population of school children in Saudi with the combination of factors of physical activity and sedentary lifestyle related to other factors such as BMI, weight gain as overweight and obesity (Darwish et al., 2014, Al-Husaini et al., 2019, ElkhodaryandFarsi, 2017, Al-Nuaim et al., 2012, Alqahtani et al., 2015). A previous study with Saudi children and adolescents has confirmed with limited physical activity (Al-Hazzaa, 2002) and the same author previously conducted a similar study within the Saudi population and documented a 43.3–99.5% prevalence of physical activity (Al Hazzaa, 2004).

A previous study from Saudi Arabia has also concluded that 11%, 42.7%, and 46.3% of children spend 1–<2, 2–4, and >5 h in playing activities, (Darwish et al., 2014), whereas in our study, 33.6% students performed physical activity on a weekly basis for 1 h; 10.6% for 2 h; 11.5% for 3 h, 4.9% for 4 h, and 4.1% for 5 h. The WHO guidelines strongly recommend sustaining physical activity for a minimum of an hour per day in children to prevent certain diseases, (OjaandTitze, 2011). Physical activity is positively associated with lowering the risk of cardiovascular diseases and mortality, (Lind et al., 2017).

Physical inactivity is associated with the prevalence of weight gain, i.e., overweight or obesity in the children and in our study, only 18% of children were involved in sports activity for an hour and above in a day, which is less than a quarter of the sample, whereas the percentage of obesity and excess weight in our study did not exceed 30%. The 36.6% of students were addicted toward an electronic gadget or watching television for a couple of hours and 33.1% of these spent minimums of 3-4 h on daily basis. Al-Hazzaa et al (2006) performed a study with school children of Saudi Arabia and concluded that an increase in physical activity lowers the chances of developing obesity. Biddle et al (2017) systematically reviewed involving 29 original global studies and concluded that there is a limited association between sedentary behavior and adiposity in both children and adolescents. Zurita-Ortega et al (2017) conducted a study with children in Chile and confirmed that self-esteem was positively associated with physical activity engagement.

A similar follow-up study should be implemented in Saudi community to evaluate the social effects on physical activity. Based on the context of nutritional patterns, this study has documented the expected results on the behavior and choices of children who were enrolled in this study. The results of this study highlight that >75% students had a habit of regular consuming fruits and vegetables and 60%–84% students were addicted to soft drinks and fast foods. The data of the present study are also positively associated with those of previous studies performed by Luszczki et al (2019) and Kristo et al (2020).

The results of our study are similar to those of Nakahori et al., (2016). Numerous studies have been performed in different populations comprising school-going children aged 6–13 years and documented unhealthy eating habits with less physical activity which was shown to be associated with human diseases, (Vilchis-Gil et al., 2015, Lopez-Sobaler et al., 2003). However, based on the literature, several inconsistencies were recorded on the results and dietary effects in children. Extensive research with appropriate sample population is required to shed further insight on the matter.

One of the important issues raised in this study is the time at which dinner is consumed in relation to when children go to bed. Results indicated that 23.8% of children consumed dinner 30 min before bedtime, 41% did so 1 h before bedtime, 30.3% did so 2–3 h before bedtime, and 3.3% consumed dinner 4 h before bedtime, and 1.6% of children did so >4 h before bedtime. The majority of students appeared to eat 1 h before going to bed for sleeping. Okada et al (Okada et al., 2019) conducted a study on the habit of eating late dinners in 19,687 Japanese women between the ages of 40 and 74 years and confirmed that 11% of them had late dinners on a daily basis, 22% of women consumed snacks during bedtime, and 8% of women skipped breakfast and these lead to weight gain. Bo et al (Bo et al., 2014) confirmed that the consumption of excess calorie intake on a daily basis before bedtime may lead to an increased risk of obesity, metabolic syndrome, and/or non-alcoholic fatty liver disease.

CONCLUSION

The strength of the present study is to involve complete Saudi ethnicity of school children. The record of 7 days/ week helped us document the dietary habits and physical activities (Table 3 and 4) of the children in the study; finally, we have documented the BMI of the student. One of the limitations of this study is the low sample size with limited information. In conclusion, the current study confirms a high prevalence percentage of physical activity and consumption of excess fruits and vegetables along with the habits of consuming soft drinks and fast and junk food, including chips, which may belong to nuclear families. There is a need for future studies with large sample sizes, and it is recommended that restrictions be put on children consuming junk food, late night meal and soft drinks.

Conflict of Interest: None

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