

Lifestyle Behaviors and Obesity: Brief Observations from the Arab Teens Lifestyle Study (ATLS) Findings

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Abstract

It is well recognized that unhealthy lifestyle behaviors, such as physical inactivity, sedentary behaviors, unhealthy dietary habits and insufficient sleep are associated with many adverse health outcomes, like weight gain, obesity, reduced cardiorespiratory and musculoskeletal function, less favorable metabolic health, insulin resistance and type 2 diabetes, decreased cognitive function and mental health. The present article summarizes the findings of the Saudi data set of the Arab Teen Lifestyle Study (ATLS). The main results indicate that Saudi adolescents 14-19 years old exhibited many unhealthy lifestyle behaviors, comprising physical inactivity, high screen time, insufficient sleep duration and less favorable dietary habits including breakfast skipping. These unhealthy lifestyle habits were coupled with high prevalence of overweight/obesity and abdominal obesity. Female adolescents appear to be at more risks of inactivity and sedentary behaviors than males. The findings also revealed significant gender by physical activity and gender by screen time interactions. Moreover, Saudi males in public schools were more active than in private schools, whereas the opposite was true for females. Compared with females, male adolescents in private schools have higher odds of being overweight or obese than those in public schools. Reasons for being active appeared to be also different between male and female adolescents. Males were active for health and recreation whereas females were mainly active for weight loss. Lack of time was the primary reason for inactivity in both sexes. The major predictors of the total time engaged in physical activity were gender, intakes of fruit, milk, energy drinks and vegetables and waist to height ratio. Finally, healthful dietary habits (breakfast, fruit, vegetables and milk) associated mostly with physical activity, whereas unhealthful dietary habits (consumption of sugar-sweetened drinks, fast foods, cake/donuts and energy drinks) were related most to screen time. Based on the study's findings, there is an urgent need for a national policy promoting active living and reducing unhealthy behaviors among Saudi adolescents. Furthermore, interventional studies are required to figure out the most feasible approach to combat obesity, inactivity, sedentary behaviors and unhealthy eating habits among Saudi youth.

Keywords: Lifestyle behaviors; Physical activity; Sedentary behaviors; Screen time; Dietary habits; Obesity; sleep; Adolescent; Arab Teens Lifestyle Study; ATLS

Introduction

Lifestyle refers to people's behavioral patterns. It is well recognized that cultural values and beliefs as well as socio-economic and the built environment can greatly influence such behaviors. Lifestyle related risks appear to be linked to many non-communicable diseases (NCDs), with enormous global mortality and economic cost [1]. According to the world health organization (WHO), non-communicable disease (NCDs) caused nearly 40 million deaths in 2012; something equivalent to 68% of total global deaths. It is expected that by 2030, NCDs will be the leading cause of death in every part of the world

[1]. Furthermore, it is estimated that 40% of the global NCD burden appear to be linked to four modifiable behavioral risk factors including physical inactivity, smoking, unhealthy diet and alcohol abuse [2]. Physical inactivity and low intake of fruits and vegetables for example are considered among the major yet preventable risk factors for NCDs [3]. Physical inactivity alone is globally responsible for 9% of premature mortality, or more than 5.3 million deaths annually [4].

It is well recognized that unhealthy lifestyle behaviors, such as physical inactivity, sedentary behaviors, unhealthy dietary habits and insufficient sleep are associated with many

adverse health outcomes, like weight gain, obesity, reduced cardiorespiratory and musculoskeletal function, less favorable metabolic health, inflammation, insulin resistance and type 2 diabetes mellitus, decreased cognitive and mental health [3-5]. On the other hand, ample evidence has shown significant associations between healthy lifestyle and improved health and well-being [4,6]. Furthermore, recent research on tracking of lifestyle habits showed that persistent physical inactivity from youth to adulthood was linked to increased risk of impaired glucose metabolism in adulthood [7].

The Kingdom of Saudi Arabia has recently seen enormous economic growth accompanied by technological transformation. This has led to major negative changes in the people's lifestyle behaviors. Subsequently, physical inactivity, sedentary behaviors and increased consumption of caloric dense diet and sugar-sweetened beverages became prevalent among Saudi society, especially among youth [8,9]. Such negative lifestyle behaviors contributed considerably to a rise in lifestyle-related NCD's in the country, which includes obesity, diabetes mellitus, coronary artery diseases and hypertension [9-11]. In fact, a recent national survey showed that overweight plus obesity (BMI>25 kg/m²) prevalence among youth 15-24 years old in Saudi Arabia is considerably high, reaching 54.1% and 51.6% for young males and females, respectively [12].

In the current article, brief observations from the findings of the Arab Teen Lifestyle Study (ATLS) were presented. Such results were derived from the Saudi Arabian data sets of ATLS. Saudi Arabia is a rapidly developing country and the data collected from this country within ATLS project represent the largest data set with 2906 participating adolescents between the ages of 14 and 19 years, drawn randomly from 3 major cities in the country representing central, eastern and western parts. These findings highlight the importance of implementing behavioral interventional programs as first step to reduce obesity and unhealthy living behaviors among children and adolescents and may substantially enhance health and well-being of Saudi youth.

Brief description of ATLS

The Arab Teens Lifestyle Study (ATLS) is a school-based multicenter epidemiological study investigating lifestyle behaviors and dietary habits in relation to weight status, health and well-being of adolescents living in major urbanized Arab cities [13,14]. It targeted the students in public and private secondary schools, with varying ages between 14 and 19 years. The collected variables included age, city location, physical activity/inactivity, screen time, dietary habits, average weekly sleep duration, body mass index and waist circumference. The International Obesity Task Force (IOTF) age- and sex-specific BMI cut-off reference standards were used to identify overweight and obese adolescents between the ages of 14 and 17 years [15]. For participants 18 years and older, we used the known WHO adult cut-off points.

Lifestyle habits were assessed using the Arab Teen Lifestyle Study (ATLS) questionnaire [13,14]. The self-administered questionnaire was previously shown to be a reliable and valid instrument for assessing physical activity and other lifestyle habits in a group of youth aged 14-25 years old [16,17]. The physical activity questions included information on the frequency, duration and intensity of light-, moderate- and vigorous-intensity physical activities during a typical (usual) week, including activity domains related to transport, household, fitness and sport or leisure-time activities. Activity energy expenditure were derived from metabolic-equivalent of task (MET) values based on the compendium of physical activity [18] and compendium of physical activity for youth [19]. The level of physical activity was calculated as the total activity energy expenditure in METs-minutes per week and the METs-minutes per week spent in moderate- and vigorous-intensity physical activity. Sedentary behaviors was assessed using typical time spent per day during weekdays and weekends on all the screen-related activities, including television (TV) viewing, video and computer games, and leisure use of computer and internet. In addition the participants were asked to report their typical sleep duration. Dietary habits were assessed using the number of frequency intakes of certain eating habits during a typical week, including breakfast, fruit, vegetables, milk/dairy products, fast foods, French fries/potato chips, cake/donuts and chocolate/candy. These items have been previously validated [20]. The participants of ATLS study were selected randomly using a multistage stratified cluster sampling technique. The study protocol and procedures were ethically approved by the Research Center, College of Education, King Saud University. Also, approvals from schools were obtained as well as consents from students and parents (for minors).

Major findings from ATLS Saudi Arabian data set

The prevalence of overweight plus obesity across all reported adolescents' ages ranged from 39.9% to 45.6% in males and from 30.4% to 38.7% in females. In addition the prevalence of abdominal obesity in males and females was 35.9% and 30.3%, respectively. Higher prevalence of obesity was observed in adolescents from private schools. Such a high prevalence of overweight and obesity among Saudi adolescents represents a major public health concern [21]. A significant negative association between breakfast intake and adolescent's BMI was observed [14]. Furthermore, based on the whole Gulf Cooperation Council (GCC) countries, using ATLS data pooled from eight major GCC cities, higher daily breakfast consumption also showed favorable association with obesity measures and health behaviors among adolescents [22]. In addition, compared with non-obese, obese male and female adolescents were significantly less active, especially more so in vigorous physical activity, and had less favorable dietary habits [23]. Indeed, logistic regression analysis revealed that overweight plus obesity (derived from BMI) as well as abdominal obesity (derived from WHtR) was significantly and inversely associated

with vigorous physical activity and frequency of breakfast and vegetable intakes, and lower consumption of sugar-sweetened beverages [23].

Adolescent obesity is arguably the most serious public health challenge of the present century [24] and its prevalence among Saudi children and adolescents is rising over the past decades [25]. Presently, one in three Saudi children or adolescents are overweight or obese [12,21]. Today, there is a real local concern about the escalating trend of unhealthy lifestyle behaviors by Saudi youth, and the possible role of such behaviors in the development of childhood obesity in the country [11,12,21,26]. The recommendations, though, for the prevention and management of childhood obesity emphasize lifestyle modification, including having sufficient physical activity, reducing sedentary behaviors and avoiding unhealthy dietary habits [27].

As to the physical inactivity prevalence, it was found that 45.5% of males and 78.1% of females were inactive [14]. In addition, 84% of males and over 91% of females had spent more than 2 hours per day on sedentary activity (screen time) [14]. It was clear from the findings that females appeared consistently at more risks of both physical inactivity and sedentary behaviors than males. There were also significant gender by physical activity and gender by screen time interactions [14]. It is now well recognized that sedentary behaviors are associated with adverse health outcomes in a way that appears to be different from those attributed to the lack of physical activity [28]. It is worth noting that due to high prevalence of physical inactivity, Saudi population seems to have among the highest global Population Attributable Fractions (PAFs) for coronary heart disease (11.4%), diabetes (14.1%), breast cancer (19.9%), colon cancer (20.4%) and all-cause mortality (18.4%) that associated with physical inactivity [4]. These figures are considerably much higher than those reported for the average PAFs for the whole WHO regions or those observed in Eastern Mediterranean Region countries [4].

It is interesting to note that ATLS findings pertaining to Saudi adolescents showed contrasting results relative to gender or school's type. Saudi males in public schools were more active than in private schools, whereas the opposite was true for females [14,29]. Also, compared with females, male adolescents in private schools have higher odds of being overweight or obese than those in public schools [23]. Furthermore, timing of exercise seems to be somewhat different relative to gender. Females exercise mostly at home, whereas males exercise at public places [29]. The majority of females exercise alone or with relatives, whereas males largely exercise with friends [29]. Reasons for being active appeared to be also different between male and female adolescents. Males were active for health and recreation whereas females were active for weight loss and recreation [29]. As to the most important reasons for not being sufficiently active, lack of time was the primary reason for

inactivity in both sexes. The major predictors of the total time engaged in physical activity were gender, intakes of fruit, milk, energy drinks and vegetables and waist to height ratio (multiple $R=0.38$) [29]. Moreover, compared with females, Saudi males spent significantly more time per week in leisure-time physical activities but not in non-leisure-time physical activity [30]. In addition, females in private schools spent more time per week in leisure-time physical activities than females in public schools [29]. There was a significant interaction between genders by obesity levels in leisure-time physical activity. Gender, and other factors, predicted total duration spent in leisure-time and non-leisure-time physical activity [30].

Results from ATLS showed that unhealthy dietary habits were also widely prevalent among Saudi adolescents, including skipping breakfast, low intakes of fruit and vegetables and high consumption of fast foods, French fries/potato chips and chocolates and candy [14]. Moreover, unhealthy behaviors, such as increased screen time and unhealthy dietary habits, appear to aggregate in this group of adolescents. This clustering effect of lifestyle habits among Saudi young people was clear when we analyzed the data using two-way ANCOVA tests, while controlling for age. Healthful dietary habits (intakes of breakfast, fruit, vegetables and milk/dairy products) associated mostly with increased levels of physical activity, whereas unhealthful dietary habits (higher consumption of sugar-sweetened drinks, fast foods, cake/donuts and energy drinks) were related most to higher screen time [31].

Further, ATLS findings observed a high prevalence of short sleep duration among Saudi adolescents [32]. There was a significant gender by school type interaction in sleep duration, while age was controlled. Moreover, short sleep duration was significantly associated with increased risk of overweight and obesity among Saudi adolescents [32]. In addition, there were some novel findings of the ATLS study pertinent to Saudi adolescents pointing to general and abdominal obesity associations with sleep duration. The results showed that sleep duration in adolescents was more influenced by the joint general obesity and abdominal obesity [33]. Thus, having high BMI and high waist to height ration (WHtR), compared with low BMI and low WHtR, was significantly associated with reduced sleep duration. However, having high BMI-low WHtR or low BMI-high WHtR did not significantly associate with reduced sleep duration among Saudi adolescents [33].

With the preceding ATLS's results description, it appears that the promotion of healthy lifestyles, in a rapidly developing country such as Saudi Arabia, should be a national public health priority. There is a pressing need for national policy and strategy focusing on promoting active living and healthy eating while reducing sedentary behaviors among Saudi children and adolescents. Future research needs to address the determinants of sedentary behaviors, physical inactivity and unhealthy dietary habits among Saudi youth, using both longitudinal

and interventional researches. Understanding the role of lifestyle factors on health outcomes such as weight gain, body composition, cardio-metabolic health and cognitive function as related to the health and well-being of the Saudi people appears very important, in order to initiate prevention programs for public health promotion and disease prevention. Moreover, it is necessary to uncover the complex relationships between lifestyle behaviors and sociodemographic characteristics and the built environment within the relevant cultural context within the country. Thus, facilitating the adoption of healthy lifestyle behaviors. Adopting healthy lifestyle programs has been recommended by many respected health organizations including the World Health Organization (WHO) [1]. Indeed, the WHO has identified applied research on behavioral risk factors for NCDs as one of the key strategic approaches to be undertaken for Saudi Arabia's Country Health Strategy [26]. In addition, the recent Saudi Arabia Ministry of Health Initiatives [34] and Saudi Vision 2030 [35] have stressed the importance of healthy lifestyle in improving the health and prosperity of all segments of Saudi population.

Conclusions

ATLS research project has produced many interesting findings using a sample of adolescents living in a country that is experiencing a lifestyle transition. The key findings of ATLS indicated that the prevalence of many unhealthy lifestyle behaviors was quite high among Saudi adolescents, especially in females. Such lifestyle behaviors included increased physical inactivity, high screen time, insufficient sleep duration and less favorable dietary habits including breakfast skipping. These unhealthy lifestyle habits were accompanied by high prevalence of overweight/obesity and abdominal obesity. The results also revealed significant gender by physical activity, gender by screen time and gender by school type interactions. Also, reasons for being active appeared to be significantly different between male and female adolescents. There seems to be clustering effects of healthy/unhealthy lifestyle behaviors among Saudi adolescents. Breakfast, fruit, vegetables and milk intakes are associated mostly with physical activity, whereas unhealthful dietary habits like consumption of sugar-sweetened drinks, fast foods, cake/donuts and energy drinks were related most to screen time. The major predictors of the total time involved in physical activity were gender, intakes of fruit, milk, energy drinks and vegetables and waist to height ratio. Based on these results, there is an urgent need for national policy promoting active living and healthy eating and reducing sedentary behaviors among Saudi adolescents. Furthermore, interventional studies are necessary to figure out the most feasible approach to promote healthy living and to combat obesity, inactivity, sedentary behaviors and unhealthy eating habits among Saudi youth.

Conflict of Interest

The author declares that he has no competing interests to declare.

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