

## THE INTERACTIONS BETWEEN PHYSICAL ACTIVITY AND DIETARY BEHAVIOUR IN MOROCCAN ADOLESCENTS

### ВЗАЄМОЗВ'ЯЗОК ФІЗИЧНОЇ АКТИВНОСТІ ТА ХАРЧОВОЇ ПОВЕДІНКИ У МАРОККАНСЬКИХ ПІДЛІТКАХ

*Seniuk I.V., El-Assri Abdeladim, Briber Mustapha, Berry Zakaria  
Сенюк І.В., Ель-Ассрі Абделадім, Брібер Мустафа, Беррі Закарія  
National University of Pharmacy, Kharkiv, Ukraine  
Національний фармацевтичний університет, м. Харків, Україна*

**Анотація.** У цій статті розглядається питання актуальності занять спортом серед студентів та його впливу на студентське життя. Методи покращення студентського життя завдяки новим звичкам. Постанови нових цілей у майбутньому, впровадження здорового способу життя. Психічно-емоційний вплив спорту на студентів. Ідеї, щодо впровадження та збільшення рівня зацікавленості у занятті спортом серед студентської молоді. Загальний аналіз ситуації сьогодення, ставлення до спорту, то Фізична активність визначається як будь-який рух тіла, створюваний скелетними м'язами, який призводить до витрат енергії вище основного рівня, і регулярна фізична активність широко визнана як така, що має важливі переваги для здоров'я. Характер та інтенсивність фізичної активності відрізнялися між статями. Підлітки-чоловіки були більш активними, ніж підлітки-жінки, протягом типового тижня і займалися фізичною активністю більш високої інтенсивності, ніж підлітки-дівчата, які проводили більше часу, ніж підлітки-чоловіки, у фізичній активності помірної інтенсивності. Особливе занепокоєння викликає той факт, що кожен п'ятий з опитаних підлітків був малоактивним: майже 45% респондентів повідомили, що дивилися телевізор більше 2 год на день, а 38% - користувалися комп'ютером протягом аналогічного періоду часу. Що стосується харчування, то більшість підлітків повідомили, що вони не снідають і не вживають молоко та молочні продукти, фрукти та овочі щодня. Натомість більшість повідомили, що споживають пончики, тістечка, цукерки та шоколад більше 3 разів на тиждень, а близько 50% вживають солодкі напої більше 3 разів на тиждень.

**Ключові слова:** спосіб життя, фізична активність, харчова поведінка, зміцнення здоров'я, серцево-судинні захворювання, марокканські підлітки.

**Abstract.** Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure above basal level and regular engagement in physical activity is widely acknowledged as having important health benefits. Physical activity patterns and intensity differed between genders. Male adolescents were more active than female adolescents across a typical week and engaged in more vigorous-intensity physical activity than female adolescents, who spent more time than male adolescents in moderate-intensity physical activity. Of particular concern was that one in five of the adolescents surveyed was inactive, with almost 45% of the sample reporting television viewing for more than 2 h/d and 38% engaged in computer use for a similar period. From a dietary perspective, most adolescents reported that they do not take breakfast or consume milk and dairy products, fruits and vegetables on a daily basis. In contrast, most reported consumption of doughnuts, cakes, candy and chocolate more than 3 times per week and approximately 50% consumed sugary drinks more than 3 times per week.

**Keywords:** lifestyle, physical activity, dietary behaviour, health promotion, cardiovascular disease, Moroccan adolescents.

**Introduction.** Physical activity is defined as any bodily movement produced by skeletal muscles that results in energy expenditure above basal level and regular engagement in physical activity is widely acknowledged as having important health benefits [1]. For example, physical activity has been described as essential for the normal growth and development of children and adolescents, in addition to its beneficial effects in reducing the risk of obesity and associated health problems such as type 2 diabetes mellitus, Cardiovascular Disease (CVD) and bone health problems [2]. Encouraging all children and adolescents, irrespective of their level of overweight, to increase participation in physical activity and exercise, and reduce sedentary or inactive behaviours, will help to avoid excess weight gain over time. Physical activity contributes to the improvement of body composition and assists in maintenance of weight loss [3]. A recent study showed that physical activity plays an important role in the prevention of overweight and obesity in childhood and adolescence, and reduces the risk of obesity in adulthood [4]. Without appropriate involvement in physical activity, there is an increased likelihood that children will live less healthy lives than their parents. However, particular emphasis must be placed on educating children and families affected by obesity about the range of health benefits associated with physical activity rather than simply focusing on the need for weight loss per se [5].

**The aim of the study.** The study aimed to detail the lifestyle (physical activity and dietary habits) of Moroccan adolescents.

**Materials and methods.** A literature search was conducted in PubMed, Scopus and Web of Science databases using keywords. Cross-sectional study undertaken in the framework of the Arab Teens Lifestyle Study (ATLS). Physical activity and dietary habits were determined using a validated questionnaire in public secondary schools.

**Results.** Major findings included a large proportion of adolescents who reported unhealthy dietary practices including skipping breakfast and making less healthy food choices in a typical week. This was coupled

with inadequate levels of physical activity in many adolescents and high levels of inactivity or sedentary behaviours.

Interventions that promote a healthy and active lifestyle play an important role in the prevention and management of overweight and obesity in this population, particularly school-based interventions [6]. The present study showed that most female adolescents (67%) engaged in physical activity at school with classmates, while 27% of male adolescents practised physical activity with friends at school, in the street and at sports clubs. Based on the time spent at school, this setting seems to be the most practical as well as the most common place to participate in physical activity. Respondents also confirmed that the preferred time of day for physical activity was during the morning.

Results of the present study indicated some differences between genders in size and shape measures, including higher height, weight and body surface area values in male adolescents and higher body mass index (BMI) among female adolescents. The higher BMI among female adolescents is consistent with the high proportion of physical inactivity reported, the lower time and energy expenditure associated with vigorous-intensity physical activity, and also physiological factors. Low levels of habitual physical activity and insufficient vigorous-intensity activity have been reported as risk factors for higher BMI in this population. Moroccan female adolescents do not spend enough time engaged in vigorous-intensity physical activity and also only expended approximately half the energy of male adolescents in physical activity. A combination of optimal nutrition and regular physical activity during a child's formative years increases the likelihood of a healthy pattern of physical maturation consistent with genetic potential [7].

Similarly, previous studies have shown that children and adolescents who participate in higher levels of physical activity are less likely to display risk factors for CVD [8] and are more likely to have positive outcomes in weight regulation [9]. As a group, one in five Moroccan adolescents was categorized as inactive; or 33% of female

adolescents v. 9% of male adolescents. The prevalence of physical inactivity among Moroccan female adolescents is higher than reported in other countries such as Finland (16%), Australia (27%) and the USA (31%). Worldwide, physical inactivity contributes to nearly two million deaths [10].

Our results showed that nearly 45% of adolescents spend more than 2 h/d in television viewing, and 38% engaged in computer use for a similar period. Such adolescents may be at greater risk of developing obesity and related diseases, particularly if physical activity levels are also low. A previous study showed that children who watch television for 1 h/d or less have a lower prevalence of obesity. However, the television viewing time among Moroccan adolescents is lower than reported in a national survey in the USA, which revealed that 65% to 67% of adolescents watched television for more than 2 h/d, and higher than reported in Chinese adolescents (24%) [11]. In summary, today's young people spend more time than previous generations did in sedentary pursuits, including television viewing and computer use [12].

Breakfast consumption is associated with a variety of positive outcomes, including improved daily nutrient intake profiles [13], a healthy body weight, and better cognitive functioning and school performance [14]. However, 60% of the adolescents in the present study reported not taking breakfast on a daily basis.

Similarly, dairy products (milk, yoghurt and cheese) are a very important source of  $Ca^{2+}$  during childhood, adolescence and the third age, yet most of the present cohort did not consume milk and dairy products on a daily basis, nor consume fruits and vegetables on a daily basis. Adult studies have shown that prudent dietary patterns high in fruits and vegetables are associated with low prevalence of the metabolic syndrome [15]. Unfortunately, only 28% and 49% of our study population consumed fruits and vegetables respectively on a daily basis rather than the recommendation of at least five times per day as a protective factor against obesity, diabetes, CVD and cancers.

In summary, most adolescents in the present study reported unhealthy dietary habits, including the consumption of foods

such as doughnuts, cakes, biscuits, sweets and chocolate and sugary drinks more than three times weekly. These practices are consistent with many parts of the world where the "normal" diet is becoming increasingly energy-dense and sweeter, with high-fibre foods being replaced by more highly processed versions. A continuation of such poor dietary practices increases the risk of adolescents to develop non-communicable diseases as unhealthy eating is considered one of the main causes [16].

More interventions promoting sound nutritional practices and increased physical activity are needed in Morocco to reduce physical inactivity and sedentary behaviours and limit the intake of unhealthy foods contributing to overweight and obesity and related complications. There is very strong evidence of the effectiveness of such approaches. For example, a project in Finland reported a reduction in the burden of CVD by 70% through the promotion of good nutrition and physical activity, as well as the implementation of food policies [17].

**Conclusions.** In conclusion, the present study described, for the first time, the lifestyle habits of a sample of Moroccan adolescents. From both a dietary and physical activity perspective, the habits of the adolescents surveyed were not consistent with a healthy lifestyle and the prevention of non-communicable diseases in adulthood. A concerted effort on the part of all relevant government agencies will be needed to develop school- and community-based interventions, and to promote physical activity and healthy eating practices among Moroccan children and adolescents. Future large-scale studies involving nationally representative samples of adolescents are recommended. Further work is also recommended to validate the self-report physical activity instrument against a gold standard reference approach such as the doubly labelled water technique.

#### **References.**

1. US Department of Health and Human Services. Physical Activity and Health: A Report of the Surgeon General. Atlanta, 1996; GA: Centers for Disease Control and Prevention, National Centers for Chronic Disease Prevention and Health Promotion.

2. Hills, A.P. et al. (2013) Physical activity and development and obesity. *Curr Obes Rep.* 2, 261-266.
3. Jakicic, J.M. (2009) The effect of physical activity on body weight. *Obesity* (Silver Spring) 17, Suppl; 3, S34-S38.
4. Hills, A.P. et al. (2011) Physical activity and obesity in children. *Br J Sports Med*; 45, 866-870.
5. Hills, A.P. et al. (2010) Addressing childhood obesity through increased physical activity. *Nat Rev Endocrinol*; 6, 543-549.
6. Mulle, M. et al. (2005) School- and family-based interventions to prevent overweight in children. *Proc Nutr Soc*; 64, 249-254.
7. Hills, A.P. et al. (2007) The contribution of physical activity and sedentary behaviours to the growth and development of children and adolescents: implications for overweight and obesity. *Sports Med*; 37, 533-545.
8. Ekelund, U. et al. (2006) TV viewing and physical activity are independently associated with metabolic risk in children: the European Youth Heart Study. *PLoS Med* 3, e488.
9. Lemura, L.M., Maziekas, M.T. (2002) Factors that alter body fat, body mass, and fat-free mass in pediatric obesity. *Med Sci Sports Exerc*; 34, 487-496.
10. World Health Organization. The World Health Report 2002. Reducing Risks, Promoting Healthy Life. Geneva: WHO.
11. Li, M. et al. (2007) Physical activity and sedentary behavior in adolescents in Xi'an City, China. *J Adolesc Health*; 41, 99-101.
12. Hills, A.P. et al. (2010) Addressing childhood obesity through increased physical activity. *Nat Rev Endocrinol*; 6, 543-549.
13. Affenito, S.G. et al. (2005) Breakfast consumption by African-American and white adolescent girls correlates positively with calcium and fiber intake and negatively with body mass index. *J Am Diet Assoc*; 105, 938-945.
14. Rampersaud, G.C. et al. (2005) Breakfast habits, nutritional status, body weight, and academic performance in children and adolescents. *J Am Diet Assoc*; 105, 743-760.
15. Pereira, M.A. et al. (2002) Dairy consumption, obesity, and the insulin resistance syndrome in young adults: the CARDIA Study. *JAMA*; 287, 2081-2089.
16. Popkin, B.M. (2006) Global nutrition dynamics: the world is shifting rapidly toward a diet linked with noncommunicable diseases. *Am J Clin Nutr*; 84, 289-298.
17. Puska, P. et al. (2002) Influencing public nutrition for noncommunicable disease prevention. From community intervention to national programme – experiences from Finland. *Public Health Nutr*; 5, 245-251.

#### **Information about the Authors/Відомості про авторів**

1. **Сенюк Ігор Валерійович**, кандидат фармацевтичних наук, доцент закладу вищої освіти, кафедра біологічної хімії, Національний фармацевтичний університет, м. Харків, Україна.

**Seniuk Igor Valeriyovych**, Candidate of Pharmaceutical Sciences (PhD), Associate Professor of Higher Education, Department of Biological Chemistry, National University of Pharmacy, Kharkiv, Ukraine.

e-mail: [citochrom@gmail.com](mailto:citochrom@gmail.com)

ORCID: <https://orcid.org/0000-0003-3819-7331>.

2. **El-Assri Abdeladim**, 4th year student of higher education of Faculty for Foreign Citizens' Education, National University of Pharmacy, Kharkiv, Ukraine.

**Ель-Ассрі Абделадім**, здобувач вищої освіти 4 курсу факультету з підготовки іноземних громадян, Національний фармацевтичний університет, м. Харків, Україна.

3. **Briber Mustapha**, 4th year student of higher education of Faculty for Foreign Citizens' Education, National University of Pharmacy, Kharkiv, Ukraine.

**Брібер Мустафа**, здобувач вищої освіти 4 курсу факультету з підготовки іноземних громадян, Національний фармацевтичний університет, м. Харків, Україна.

4. **Berry Zakaria**, 4th year student of higher education of Faculty for Foreign Citizens' Education, National University of Pharmacy, Kharkiv, Ukraine.

**Беррі Закарія**, здобувач вищої освіти 4 курсу факультету з підготовки іноземних громадян, Національний фармацевтичний університет, м. Харків, Україна.