



Changes in health quality, lifestyle and habits in adolescents induced by COVID-19 pandemic.

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ABSTRACT

Introduction: The Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) pandemic affected and altered several parts of our daily habits and lifestyle. Adolescents could not remain unaffected. The purpose of this review is to evaluate changes in health and daily habits of adolescents during the COVID-19 pandemic.

Material and Methods: A detailed search of the literature was conducted in Pubmed to find published articles related to changes in health, lifestyle and daily habits of adolescents during the COVID-19 pandemic.

Results: A total of 22 articles met the inclusion criteria and found suitable for this study. Additional resources from World Health Organization (WHO) and American Academy of Pediatrics (AAP) official websites provided useful information were also included. COVID-19 pandemic has caused changes in adolescents' sleep habits and quality, such as increase in sleep duration and later bed time. Screen time increased but physical activity decreased. Moreover, eating patterns were altered and there was a tendency for weight gain. Adolescents' mental health and behavior were also affected, and in many cases there an increase in mood changes, especially in depressive symptoms.

Conclusion: COVID-19 pandemic has unquestionably changed the adolescents' everyday habits and lives. Considering that adolescence is the period in which physical and mental development of young people take place, it should be kept in mind that the results of such effects might accompany them in their adult life.

Key Words: *health; lifestyle and habits; adolescents; COVID-19*

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Introduction

The first definition of bullying was provided by According to the World Health Organization (WHO), as of 11 July 2021, more than 185 million cases of coronavirus disease 2019 (COVID-19) have been confirmed and more than 4 million deaths have been addressed globally due to severe acute respiratory syndrome coronavirus 2019 (SARS-CoV-2) [1]. WHO characterized the health crisis as a pandemic on 11th of March 2020 [2]. Consequently, restrictions were implied globally in order to minimize the spread of the virus and protect public health. Lockdowns and social distancing measures were imposed including closure of schools.

The ongoing COVID-19 pandemic affected significantly adolescents' lifestyle as well as their physical and psychological health. Adolescence is a tough period for teenagers who experience a lot of changes. Additionally, under the present situation adolescents had to cope with this new everyday reality due to the restrictive measures adopted for the present pandemic. As each person faces this situation differently, teenagers also responded differently in these current conditions and adaptations. In general, adolescents stayed at home, slept more, spent more time playing with digital gadgets, while exercised less.

Following the above, the purpose of this review is to evaluate changes in health daily habits of adolescents during the COVID-19 pandemic.

Materials and Methods

An advanced executive literature search was conducted in PubMed, using the following terms: "lifestyle AND adolescents AND covid19", "health quality AND adolescents AND covid19" "changes AND habits AND adolescents AND covid19. The resulting literature was carefully screened by a single investigator. Only studies written in English were included. Additional search filters such as text availability, article type, and publication date were not applied. Further references from the initial articles with useful information related to the aim of the review were also screened. Current data from the official website of WHO concerning the number of confirmed cases and deaths from COVID-19 were also included.

Results

The initial literature research via Pubmed revealed 19 articles. Of them, 17 were written in English language and related with the aim of the present study. Through snowballing technique, five more articles were added. Hence, a total of 22 articles were included and four other references from WHO official website and American Academy of Pediatrics were used.

The reports from the articles proved that COVID-19 pandemic affected adolescents including their sleep habits. Some of the authors observed that adolescents slept later in night [3],[4],[5]. Kaditis et al.[6] noticed that 89.8% of teenagers used to go to bed after 10pm on weekdays and there was a significant increase in later sleep hours in weekends. A later waking up in the morning was also stated, although Segre et al. suggested that waking up time remained stable. [3],[4],[6]. Generally most of the authors suggest that the sleep duration increased [3],[7],[8],[9],[10]. In a very interesting study Androutsos et al. underlined that during the lockdown 4.8% of adolescents were sleeping less than 8 hours instead of 15.4% before the quarantine [11]. However, Kaditis et al. stated that sleep duration of adolescents was the same (40%) despite the shifts of bed and wake time [6]. Moreover, Ramos Socarras et al. stated that there was an improvement in self-reported sleeping quality and feeling somnolence in adolescents, presenting no difficulties in falling asleep [5],[3]. Nevertheless, problems were not missed. For example, nocturnal and early morning awakenings were observed.[3],[4] Segre et al. claimed that 28% of adolescents had sleeping difficulties and some of them wanted to sleep with their parents[4],[7],[8]. A considerable correlation of sleep habits with screen time, the perception of flow time' in other words, whether teenagers felt that time passed slow or fast, social-demographic factors and mental health was also reported [3],[4],[5],[6],[8],[9],[10].

As far as screen time is concerned, an increase was observed in hours spent [3],[5],[6],[8],[9],[10],[11],[12],[13]. Segre et al. [4] claimed that 31.7% of adolescents spent more than 2 hours in their free time and 68.3% less than 2 hours. In another study, Al Hourani et al. showed that 70% of adolescents spent more than 3 hours per day in front of a screen [7]. Francisco et al. also observed that before quarantine,

they used to spend less than 1 hour [7],[12] and during the pandemic the use was increased. In addition, in Italy, Portugal and Spain the

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was noted [3],[4],[7],[8],[10],[14],[15]. Mastorci et al. described a decrease in exercise, more frequent in boys, whereas, Ali et al. mentioned that 64.2% of females also avoid any kind of exercise [5],[16]. Furthermore, Androutsos et al. claimed that 66.9% of parents observed that the physical activity of their children was declined [11]. Characteristically, Ng et al. stated that 20% of the Irish teenagers took part in their study, had increased their physical activity, 30% had no changes during the pandemic and 50% of them characterized by physical inactivity [17]. Those observations were also confirmed in Al Hourani's et al. study, which found that more than 50% of adolescents did not exercise or exercise for less than an hour [12]. It should be noted that Orgilés et al. emphasized the role of the family relationships, highlighting good family relationships, as an enhancing factor to adolescents exercise [8].

Weight gain during COVID-19 pandemic seemed to be related with physical inactivity [4],[11],[12],[13],[14],[15],[17]. There was a lack of weight control in obese or overweight adolescents during quarantine [15]. Androutsos et al. noted that 35% of adolescents increased their weight due to large consumption of breakfast and salty snacks [11]. Orgilés et al. suggested that during COVID-19 pandemic the prevalence of overweight reduced from 23.3% to 20.7% but prevalence of obesity increased from 12.9% to 16.4% [8]. According to the study of Dondi et al. took place in Italy, weight increased in 31.8%, reduced in 6.4% and remained stable in 61.8% of teenagers [13]. Fernandez-Rio et al. noticed weight loss in adolescents [18]. Moreover, mood changes determined the shifts in weight [13]. Głabska et al. underlined that adolescents thought that health and weight control were of great importance and considered mood or sensory appeal of food to be less attractive [14].

Eating habits have been altered too. For example, food intake raised [12],[18],[19],[20]. Dondi et al. revealed 27.3% increase of food consumption, 12.9% decrease and no changes (59%) concerning food intake [13]. Segre et al. claimed that teenagers consumed different amount of food in comparison with pre-COVID-19 era [4]. Cipolla et al. stated that teenagers with obesity or being overweight increased the consumption of carbohydrates in contrast to vegetables and fruit, while 1/3 consumed more sugar drinks but the number of daily meals remained the same [15]. In addition, Dondi et al. supported that

more teenagers preferred snacks, fruit juices and soft drinks [13]. Two studies described a rise in consumption of vegetables, fruit and fresh fruit juices, with girls to consume more vegetables than boys [11], [19]. Mastorci et al. reported that during the lockdown the adolescents of their study chose Mediterranean diet, however, according to Ruiz-Roso et al. there was an increase of consuming sweets in teenagers, as 20.7% of them ate sweets on daily basis [16],[19]. Especially, adolescents under the age of 14 years old ate a lot of fried food, over 14 years old consumed a lot of vegetables and fruit and over 17 years old had the larger consumption of sweets. Furthermore, concerning the quality of the food, Pietrobelli et al. claimed that increased the consumption of chips, red meat and sugar drinks and in another study was underlined the increased consumption of high calories food, sweets and preference of high perishable food [9],[21]. The literature revealed that due to quarantine, parents remained more time in home and engaged with cooking and leading to better quality of food [11],[15],[20]. Moreover, consumption of fast food reduced, and Ruiz-Roso et al. referred that during pandemic 64% of adolescents ate fast food less than one time per week, instead of 44.6% before COVID-19 era [11],[19].

Concerning the results, COVID-19 pandemic caused negative feelings to adolescents such as psychological distress, anxiety, worry, fear and decline in mental health [4],[7],[8],[15],[16]. Dondi et al. stated that adolescents felt nervous (73.5%) and lonely (68.9%) [13]. Moreover, Mastorci et al. claimed that females were more depressed and had less self-perception than males, while Francisco et al. mentioned that boys faced much more anxiety than girls. It is also interesting that Spanish teenagers evoked behavioral alternations whereas Portuguese appeared mood shift [7],[16]. Stress and dreariness could cause awkward eating patterns led to emotional overeating as some teenagers had the tendency to face their problems with food [15]. However, a minority reported good feelings, hope and calmness [20]. Furthermore, Mastorci et al. referred that adolescents felt more controlled and less independent [16].

The closure of schools, led some teenagers that did not attend online classes to start a hobby and females addressed that time passed very fast [5]. Adolescents avoid attending online lessons because they consider online teaching as ineffective, due to technical difficulties. Moreover, they believed that the intera-

ction between them and their teachers was limited via distance-based learning [5]. Closed schools, however, induced adolescents' isolation from their peers and their social relationships [7],[8],[16],[20]. Hence, they stayed home and spent a lot of time with their family that led to frequent arguments [5][20]. Ares et al. suggested that 61.8% believed that family cohabitation was easy, while 11.4% thought that was challenging. Although adolescents used the various social media to be informed for COVID-19 pandemic, sometimes seem to fed up with news related to the pandemic [5],[20].

Discussion

Undoubtedly, COVID-19 pandemic changed adolescents' lifestyle and affected their physical and psychological health. We should also take into consideration that adolescence is a tough period as teenagers experience a lot of changes. An additional alteration that had to cope with is the new everyday reality that has formed due to the restrictive measures of the pandemic.[22] It should be highlighted though, that every person faces this situation with different ways. That is confirmed by the literature concerning the various responds of teenagers about the impact of the pandemic on them. That is because, socio-economical status, demographic and psychological factors played an important role [23]. Generally, adolescents stayed at home, slept more, spent more time playing with digital gadgets and exercised less [8].

Many adolescents altered their sleep habits due to the new everyday lifestyle. Closure of schools led to online classes and therefore, to a more flexible schedule [3],[11]. Hence, the sleep duration increased. In other words, from this aspect, lockdown appeared as a protective factor for the duration of sleep. Characteristically, some adolescents reduced the use of alarm, as they did not have to wake up to early anymore.[5] Moreover, teenagers the more they stayed at home, the more they slept [4][24]. Those who sleep many hours, considered that time passed very fast [5]. Francisco et al. suggest that the mean duration of sleep during the COVID-19 pandemic was 9.51 hours per night and accordant with the suggestive hours of sleep from WHO and American Academy of Sleep Medicine (98-10 hours for adolescents) [7]. Nevertheless, the social distancing and isolation that caused distress and negative feelings in teenagers and later bed time should be examined as they can offset the benefits of longer sleep duration [3],[7]. Moreover, the increased

use of screens and digital gadgets seemed to reduce the duration of sleep and affect the dreams [5],[6],[8]. The dreams can also be affected from family conflicts and arguments and from the high tiredness level of adolescents [5]. Ramos Socarras et al. and Segre et al. did not notice any changes in dreams or nightmares [3],[4]. Regarding the screen use, Kaditis et al. recommended stop using them one hour before sleeping because they may spoil the sleep quality.[6]It should not be omitted that, the screen use has increased so much due to the online conduction of school classes. In addition, another reason is that adolescents spent their spare time with electronic gadgets while they stayed isolated in their home in order to alleviate their boredom [11]. Furthermore, adolescents engaged with a hobby and remain busy during the day did not face insomnia. Ali correlated insomnia with anxiety and depressed, too. Hence, excessive screen use, physical inactivity and poor quality of mental health affected sleeping patterns [5].

COVID-19 pandemic affected more adolescents with poor habits of exercise before the pandemic and those who were overweight or obese [17]. Generally, physical inactivity in combination with the isolation at home, increased screen usage, led to emotional shifts and behavioral changes and related to a tendency of constant food consumption. Weight gain was not only related to less exercise, but correlated with the eating habits of adolescents. It is of high importance to emphasize the crucial role of maintenance normal weight, especially taking into consideration the COVID-19 infection effect. Obese and overweight people are in high risk of severe illness from COVID-19 and complications [11]. Parents and adolescents should be informed about the side effects of obesity and the benefits of healthy diet and physical activity. According to WHO guidelines, [25] adolescents should consume at least five portions of fruit and vegetables daily, fat intake should be less of the 30% of the energy intake and salt consumption should be limited, too. Moreover, the consumption of free sugars should be reduced to less than 10% of total energy intake [25]. Androutsos et al. suggested that attention should be paid not only to measures for the restriction of the pandemic, but importance should be given in measures for prevention and treatment of obesity, too [5]. For instance, surveillance of food advertisements and recommendations for healthy eating habits could help. Moreover, special care should be given to vulnerable populations, among which are adolescents and families

of low socio-economic status. Adams et al. reported that families with low socio-economic status and lack of money, preferred high processed food as they could not afford buying healthy foods [21].

Home environment played also an important role during the COVID-19 pandemic. Segre et al. suggested that adolescents living in cities and in small apartments had reduced physical activity, with consequences in their physical health, mental status and sleeping habits [4],[7]. In contrast, adolescents inhabiting in houses had more opportunities for exercise. In addition, if there was a garden in a house, teenagers had contact with the nature. Neighbors are also important as the interaction of them is considered as a social contact, reducing the feeling of loneliness [6],[7]. During COVID-19 pandemic the members of each family stayed together in the home more time than used to. Hence, there was more time for interaction among them. Having siblings could also improve the well-being and the mental status of adolescents [7]. However, problems were not missed. Parents sometimes appeared stressed and their children seemed to be influenced too. Moreover, arguments and family conflicts were mentioned and seemed to affect their mental health, their eating habits and sleeping patterns [5], [7], [8], [11], [20]. Particular attention should be paid to cases that adolescents are abused or neglected by their family [22]. So, some homes do not allot always a safe environment that ensures the healthy physical and psychological development of the teenagers. The role of parents is significant during this taught time. Francisco et al. recommend that parents should be by the side of their children and explain to them the current situation. The researchers suggested that parents should show their understanding to their children and their concerns and should try to spend their time creatively with the adolescents. That is a way to strengthen the relationships between parents and adolescents. Furthermore, adolescents should be motivated to maintain contact with their peers through technology's possibilities and use rationally electronic gadgets [7]. Moreover, concerning screen use, parents should follow the recommendations of American Academy of Pediatrics (AAP) [26]. In other words, parents should place limits concerning the time spent in front of screens and assure that screen use do not take the place of exercise or sleep of teenagers. Additionally, parents should teach their children not to use screens while they are eating or driving. Last but not least, parents should inform their children about online safety

according to the AAP [26].

Conclusion

COVID-19 pandemic has affected undoubtedly the everyday habits of adolescents such as physical activity, eating and sleeping habits, reading and education. All these changes affected not only the physical health of young adolescents worldwide but also their mental status, social behavior and relationships. Given that the pandemic is still present, yet is unknown when we will return to our previous, normal lives, so, teenagers should be supported and motivated to follow a healthy lifestyle.

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