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Impact of COVID-19 pandemic on sleep in children and adolescents

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ABSTRACT— When COVID-19 was identified as a pandemic in March 2020, lockdowns were requested by many nations around the world. The goal of this study was to review the literature on the impact of lockdown procedures implemented in response to the COVID-19 pandemic on children's and adolescents' sleep patterns and quality. We searched the pre-print, Embase, Ovid, Global Health, Google Scholar, and Web of Science databases. Additionally, we incorporated ad hoc studies conducted on children and adolescents (aged 19 years) exposed to COVID-19 lockdown and reported on various sleep quality outcomes, including risk, protective factors, and impact on psychological and mental health. According to the review, the Covid 19 pandemic significantly impacted children and adolescents' sleep quality, causing everything from insomnia to hypersomnia and negatively affecting their physical and mental health.

KEYWORDS: Pandemic, COVID-19, sleep, adolescents, children

1. INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) declared the coronavirus disease 2019 (COVID-19), which was discovered in Wuhan, China, in December 2019, to be a pandemic [31], [10].

Restrictions were initially enacted by the government in the UK in March 2020 in reaction to the COVID-19 epidemic. School closures were one of the limitations, with the exception of children of vital employees or those deemed "vulnerable." The well-being of young individuals, especially their sleep and mental health, may be impacted by these limitations. For instance, children have been shown to have a variety of negative health consequences during a school lockdown, such as decreased physical activity and increased sadness. However, it has been shown that from preschoolers to teenagers, sleep duration improves [27], [23].

Young people's well-being and healthy growth depend on getting enough sleep. A good night's sleep is dependent on the quantity, quality, and timing of sleep. Inadequate and disrupted sleep is linked to risky behaviors, including drug use, self-harm, suicide ideas and action, poor emotional control, low mood, anxiety, and melancholy. Adolescence is a time of biological and social transformation, increased emotional sensitivity, and increased risk for the beginning of mental health and/or social-emotional problems [24], [25]. There is evidence that addressing sleep issues may have a positive ripple effect on mental health outcomes, despite data pointing to a complicated and bidirectional link between sleep and mental health [14], [4].

From infancy through adolescence, there are recognized developmental changes in sleep, including a shift towards later bedtimes and sleep start, as well as a decrease in sleep duration. Pediatric sleep disorders are caused by biological, psychological, and sociocultural variables. For instance, psychosocial variables may worsen the biological inclination for delayed sleep in adolescence and increase the risk of acquiring

inadequate sleep. These factors include utilizing gadgets with displays and more autonomy [15], [16].

Early school start hours have been found to hinder sleep when cultural constraints are considered. On the other hand, research indicates that later start times for school are linked to longer sleep hours. However, the COVID-19 pandemic's limits led to changes in many students' timetables. Due to the decreased need to set aside time for commuting to school, many people did not need to get up early to make it to their classes. Students were more likely to be able to stay up longer and so wake up closer to their "preferred" or ideal waking time because of this, which offered the context for a natural investigation into sleep habits [3].

Schools are essential to young people's social lives. The majority of students' switch to remote learning has the potential to disrupt social networks, encourage peer isolation, and exacerbate loneliness [13]. On the other hand, home confinement may have increased interaction with families and caregivers and raised concerns about the well-being of weak family members, which may have been stressful, particularly for individuals who were already dealing with family difficulties before lockdown. There are indications that some kids and teenagers may have had less everyday stress, fewer symptoms of anxiety and depression, and increased well-being as a result of lockdown-induced changes, so it's important to keep this potential in mind [16], [11]. The author felt it important to examine how the COVID-19 epidemic has affected children's and adolescents' sleep as a result.

Study objectives

The purpose of this review was to:

- Investigate how the COVID-19 epidemic and quarantine procedures have affected children's and adolescents' sleep patterns.
- Determining the frequency and range of sleep disorders in children and adolescents during the COVID-19 pandemic.

2. Research strategy

Using MEDLINE, EMBASE, Google Scholar, PubMed, and Web of Science as his search tools, the author conducted a literature search. Three categories were used to group the search terms: Study population (infants, toddlers, kids, pediatricians, and teenagers), COVID-19 (COVID-19/SARS-CoV-2/coronavirus/2019 nCoV), and sleep (sleep/sleep patterns/insomnia/movement behaviors, psychological health, and quality of life). Finally, the references of the chosen articles were manually searched after the electronic search to find further articles.

Eligibility of studies

The research includes original studies analyzing the prevalence and range of sleep disruptions during the pandemic, including children and adolescents as the study population. If separate information was available for children and adolescents, studies that included children as a component of a broader research group were also included. Non-English language articles were not included. Research on sleep patterns in people with conditions other than neurobehavioral disorders was shunned.

Outcome measures

The incidence and pattern of sleep disruptions in young children and adolescents who were healthy throughout the COVID-19 pandemic served as the main outcome indicator. In addition, pooled estimates and prevalence served as the effects' metrics. Additional outcomes included how the pandemic affected children who were healthy in terms of sleep duration, quality, and intensity of insomnia.

After deleting duplicates, the author assessed the titles and abstracts of the obtained papers per the predetermined inclusion criteria. The author then obtained the whole texts of the studies that could be pertinent and evaluated them. An effort was made to avoid data duplication.

Study selection

Seventy-five articles in total were found during the first electronic search. The remaining 50 citations were examined for eligibility after 25 duplicates were eliminated. Eighteen were eliminated because they had no bearing on the important subject. Thirty-two possibly relevant publications' entire texts were assessed in order to determine if they met the criteria for the study's selection and were therefore included in the review.

Review:

Because of the COVID- 2019, many countries have entered a state of national or regional lockdown. To combat the spread of COVID-19, many countries have taken steps such as closing schools. According to the United Nations Educational, Scientific, and Cultural Organization, 29 nations' schools had closed as of March 18, 2021 (UNESCO) [32].

COVID-19 Negative consequences on the sleep of children and adolescents:

The virus itself is at the epicenter of the epidemic. While most children and adolescents seem to have relatively minor symptoms, they may nonetheless manifest and can include both temperature and breathing problems. Sickness or hospitalization may affect a person's ability to sleep. Isolation and protection could lead to more sedentary habits and food intake, which might eventually affect weight and, in turn, health and sleep. Given the broad changes in family financial circumstances, health issues, and future uncertainties, children and adolescents may also feel more stressed. These may also make it difficult to sleep [9].

Additionally, social isolation encouragement to remain indoors might limit sunshine exposure, which is essential for creating a consistent sleep schedule. Greater flexibility in waking and sleep times and greater opportunities for extended daytime naps may also have an effect on the latter. Although it is typically encouraged to limit activities in the bedroom to avoid associating the bed with arousal, remote learning may lead to an increase in the amount of time spent working in the bedroom or on the bed [9].

Youth can use technology for longer periods of time, especially before going to sleep, thanks to remote learning and the lack of in-person social contacts. Melatonin synthesis may be disrupted by increased exposure to alarming "blue light," which prevents the body from receiving a natural indication that it is time to sleep. In addition, introducing technology into the family may potentially expose some kids to cyberbullying and other online risks for the first time. It is obvious that risk variables that may, individually or together, disrupt young people's sleep during the COVID-19 epidemic need to be assessed and evaluated [7].

Covid 19, sleep and mental health:

Children and adolescents with mental health problems may be more likely to have trouble sleeping during the COVID-19 pandemic or to have long-term sleep problems after it. Worries and ruminations about COVID-19 may be more common in young people who are anxious or depressed, affecting their start and quality of sleep. It is essential to understand which young people are most at risk for developing sleep disorders and psychopathologies linked to COVID-19, why some subgroups may experience worse outcomes, what factors raise or lower risk, how sleep and mental health change over time, and the most effective ways to address sleep-related problems in various populations. During the COVID-19 epidemic, sleep patterns may have changed, which might have exacerbated or possibly caused psychopathology. Sleep

issues may worsen negative effects, making people more vulnerable to mood and anxiety issues [9].

Some youth may have more severe oppositionality and attentional issues as a consequence of shortened or inadequate sleep, which may result in behaviors that resemble ADHD and often co-occurring symptoms. Therefore, it will be crucial to evaluate sleep issues and psychopathology both during and after the COVID-19 pandemic. When taken into account with a developmental and mental health history, it should be possible to separate the onset, aggravation, and relationships among these issues [4], [32], [29].

During the COVID-19 epidemic in Shanghai, China, [32] undertook prospective research to evaluate children's and teenagers' sleep habits and their relationships with mental health. They found that both during and before the COVID-19 pandemic, there were big changes in how long people slept and how often they woke up. Moreover, during the pandemic, too little sleep and getting up late (like going to bed early and getting up late, or going to bed late and getting up late) were linked to a higher risk of mental diseases.

Adolescent sleep during the COVID-19 pandemic:
Adolescents may be more susceptible to the negative consequences of social isolation caused by COVID-19. They must maintain a physical distance from their acquaintances and, in some cases, love interests while constantly being in close contact with carers. Adolescents are putting peer relationships and independence higher on their lists of priorities. This could make them feel alone and cause problems between them and their parents (e.g., home learning or compliance with COVID-19 public health guidelines). The COVID-19 problem probably also affects things that teens do to figure out who they are, like part-time jobs, sports, and being creative (e.g., arts participation). A decrease in physical activity, an uptick in negative emotions, an increase in lethargy or sleeping practices, and an increase in screen time and online social networking may result from the loss of these in-person activities and associated peer interactions. These elements may affect sleep, sleep duration, and quality either alone or in combination [9].

Suggestions to improve sleep among children and adolescents:
While some children and adolescents' sleep may have been affected by the COVID-19 issue, it's also possible that some youngsters' sleep may have improved in other regions. First, strong "evening types" may benefit from the added freedom that home learning offers. Second, and related to this, there may be more opportunities for obtaining adequate sleep if less time is spent traveling to and from school or engaging in social and extracurricular activities. These factors, in particular, may suggest a bright spot for teenage sleep: Since there are no in-person schools, many adolescents no longer have to get up early for classes. So, they might be able to make and stick to a schedule that is more in sync with their natural circadian rhythm. This would make social jet lag less of a problem (more consistency is given between weekday and weekend sleep) [9], [26].

3. Discussion

Even when being confined to the house owing to the pandemic, sleep was perhaps the one lifestyle choice that could be controlled by an individual. However, the widespread psychological anxiety and terror likely make adult sleep issues worse. Moreover, during the pandemic, new psychiatric problems were found in children and adolescents, which may be linked to bad sleep habits [17].

Despite the longer sleep lengths seen in the 2020 research compared to the 2019 survey, many secondary school students said that their sleep quality had become worse during COVID-19 limitations and school closings. Females and older pupils showed this tendency in a very dramatic way. However, fewer of the younger students felt that the lockdown had a detrimental effect on the quality of their sleep. The

relationship between sleep quality and reported changes in happiness highlights the need to consider sleep quality when analyzing research on the well-being of young people [17].

It is Saudi Arabia. [1] conducted a research to examine the behavioral changes in children's mobility. It has been shown that one of the health repercussions of lockdowns connected to the COVID-19 outbreak has been the movement patterns of school-aged children. Additionally, it was shown that healthy levels of sleep, sedentary behavior(SB), and physical activity (PA)in Saudi children continued to decline five months after the Time 1 assessment. As Saudi Arabia emerges from the COVID-19 epidemic, these issues need quick action to guarantee that children's movement habits improve.

Only 3.4% of Saudi children completed all requirements for 24-hour mobility, according to [2] research, which validated similar findings. Children's PA levels decreased, they slept more, and they used electronic screen gadgets much more after COVID-19 than before. Girls regarded the modifications in PA and SB as being less positive than males did. Mothers and children with lower educational levels and monthly salaries were more likely to achieve the 24-hour mobility requirements, as were kids with older parents. Thus, they conclude that future studies should consider how the COVID-19 virus outbreaks negatively impacted Saudi children's mobility habits, particularly those of females. The findings reveal what has changed as a consequence of the COVID-19 limitations and may be used to inform Saudi Arabia's reaction tactics.

Insomnia and lower psychological resilience were linked to mental health problems among undergraduate students, according to a different Saudi Arabian study, and it is crucial to support student well-being outcomes throughout the pandemic by improving psychological resilience and developing sleep and mental health interventions [6].

This cross-sectional research looked at the effects of COVID-19, exposure, sleep, and physical activity on the mental health of Saudi undergraduate students during the second wave of the epidemic.. A convenience sample of 207 people, 94% of whom were single and 89 percent of whom were female, was taken. Measures included questionnaires for levels of exposure and perceived impact on the PSQI, GAD-7, PHQ-9, COVID-19, and a physical activity measure called COVID-19. The results showed that 50% of people were at risk for developing depression and that almost 43% of people experienced moderate anxiety. Additionally, a high percentage of poor sleep quality was found [5].

Attention span, emotional well-being, immunological function, and academic achievement may all be significantly impacted by sleep disorders. Therefore, 9–11 hours of unbroken sleep each night are advised for children aged 5–17. Children and adolescents who don't get enough sleep are more likely to get cardiometabolic diseases. They may also feel anxious or have mood swings, which could be made worse by poor mental health during the COVID-19 pandemic. [8] used parent ratings on a Likert scale to find that children slept more during the day, including naps than before the COVID-19 pandemic [8].

According to [20] lockdowns connected with COVID-19 were damaging to children's and adolescents' mobility patterns, with tighter lockdowns frequently having a more visible impact. A study has shown that under the lockdown, children and adolescents spend more time in front of devices and sleep for longer durations than they did previously.

[28] discovered that the majority of the study's participants in Egypt's children and adolescents had signs of sleep disorders. The most prevalent issues among participants were issues with starting and keeping sleep. They also claimed that during lockdowns, children were denied access to a typical way of life, engaged in

excessive screen time, made aware of the epidemic, and faced financial uncertainty in their families. All of these variables have the potential to cause sleep disorders and anxiety symptoms in children, as well as disruptive and protracted negative mental and cognitive repercussions.

Anxiety and depressive illnesses have a complicated and reciprocal association with sleep disturbances in Spain, according to [21]. The dynamic biopsychosocial balance that results in prenatal sleep is an evolutionary and active process, and the harmony between these three components is what drives sleep evolution. 1,028 children and adolescents, ages 6 to 18, living in Spain were found to have significant sleep disruption.

Italian children and adolescents were the subjects of a research to ascertain the effects of home confinement during the COVID-19 pandemic on sleep patterns and sleep interruptions; 4314 people were investigated, and all age groups showed a significant delay in bedtime and rising time. The biggest delays were seen in school-age children and adolescents: weekday bedtime _23 was recorded by 28.4 percent of 6 to 12-year-old children during lockdown vs. 0.9 percent before and by 63.5 percent compared to 12.3 percent of 13 to 18-year-old adolescents. The majority of respondents in all age groups woke up later than 8 in the morning, and sleep duration rose across the board, although not in the younger group. During the lockdown, screen use (apart from online classes) increased, mostly among older children but even among younger children. All groups saw a rise in sleep problems, although not among adolescents. The incidence of issues with falling asleep, anxiousness before bed, nocturnal awakenings, nightmares, and sleep terrors was higher in younger groups [12].

In Poland, self-reported data from 1016 participants were collected at two points before and during the COVID-19 lockdown to study how the lockdown and distance learning affected physical activity, eating habits, sleep patterns, and media use in children and adolescents ages 6 to 15. The study found changes in how people eat and work out regularly (reduced sleep duration with higher sleep quality and reduced physical activity). Along with a drop in smartphone use, the pandemic caused more people to use other types of media. During the COVID-19 epidemic, Polish children and adolescents used media less and spent less time in front of screens. They also got more sleep and exercised more [22].

A study was conducted to examine children's sleeping patterns before and after the SARS-CoV2 epidemic from the viewpoint of the parents and in many different nations. It was predicted that lockdown would result in longer stretches of sleep. However, the research finds that while lockdown was linked to later bedtimes and waking times, this change did not affect the amount of sleep more than 40% of children got. But as compared to young children, high children were more likely to sleep more throughout the week and primary pupils on the weekends [19].

In the similar vein, [18] meta-analysis research sought to determine the severity of sleep disruptions during the COVID-19 pandemic. According to the sleep findings, during the COVID-19 epidemic, four out of ten people complained of having trouble sleeping. Again, according to the patients, children and adolescents seemed to be the most impacted groups among those who had the ailment.

In the same vein, another meta-analysis research finds alarmingly high rates of sleep issues in children and adolescents during the COVID-19 epidemic. In contrast to pre-pandemic eras, children often had fewer sleep difficulties as a result of home confinement restrictions. Additionally, just around half of the healthy children reached the recommended sleep length. However, these findings should be seen in the context of the topic's paucity of research, which includes few studies done in varied groups, and the questionable

quality of the inferences made from these studies, the majority of which were online surveys [30].

4. Conclusion

Globally, the 2019 coronavirus illness pandemic has had an influence on primary and secondary schooling (COVID-19). In light of the COVID-19 pandemic, the prevalence of sleep problems in children and adolescents is worrisome. Children often had fewer sleep disruptions than they had in the pre-pandemic period. Additionally, during the pandemic, more kids had worsening sleep quality than had improved sleep, by almost a factor of three. During the pandemic, nearly half of healthy children did not get the recommended amount of sleep. These results must be viewed in the context of the scant amount of literature on the subject, the small number of studies that were included that were conducted on diverse populations, and the questionable caliber of the conclusions made by these studies, the majority of which were online surveys. Although the long-term neurobehavioral repercussions of the sleep problems reported during the epidemic have not yet been established, these data may serve as inspiration for ideas for preventatively regulating sleep during such unusual times of crisis.

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