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EFFECTS OF QUARANTINE DUE TO THE COVID-19 ON SLEEP DURATION AND QUALITY IN ALGERIANS

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Summary. This study tests the impact of COVID-19 on sleep of Algerian population before and during the COVID-19 quarantine by an estimated online survey, adapted from the PSQI Italian version. Including 1210 participants (age between 18-60 years old). The statistical analysis was carried out using SPSS version 22.0 software. Our results showed a significant change in sleeping quality during quarantine, the sleep timing markedly changed, we also noticed additional use of sleeping medications. Algerian scientists recommend to build public awareness and to provide necessary information regarding Algerian sleep quality, especially for Algerian adults.

Keywords: Quarantine, COVID-19, sleeping quality, Algerian population.

Introduction

From the end of December 2019 coronavirus disease 2019 (COVID-19) began to spread in central China (Zhu et al. 2020). As of March 4th 2020, more than 80 560 people had been diagnosed with COVID-19, and 3 010 patients had died from COVID-19 infection in China (Xiao, Zhang, Kong, Li & Yang 2020). Outside China the disease spread worldwide, nearly 13 570 patients were diagnosed with COVID-19 infection, and 270 patients had died from infection by this novel virus (Xiao et al. 2020). The outbreak of COVID-19 was recognized by the World Health Organization (WHO) as a Public Health Emergency of International Concern

(PHEIC) that endangers international public health (WHO -International Regulation(2005), 2007). The WHO has defined a PHEIC as an infectious disease with international spread, or an unusual, serious, or unexpected public health event that exceeds local health resources, or that requires immediate international action (WHO -International Regulation(2005, 2007).

On March 11th, 2020, the WHO declared the COVID-19 outbreak a pandemic (Cucinotta & Vanelli 2020). Data from China have indicated that older adults, particularly those with serious underlying health conditions, are at higher risk for severe COVID-19 associated illness and death than are younger persons ('The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China' 2020). Although the majority of reported COVID-19 cases in China were mild (81 %), approximately 80 % of deaths occurred among adults aged ≥ 60 years; only one (0.1 %) death occurred in a person aged ≤ 19 years ('The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China' 2020). Sporadic cases have been imported to Europe, Africa and North and South America via returning travelers from China. In Algeria, the first case of COVID-19 was reported on February 25th, 2020, when an Italian national tested positive in Ouargla region in the south of the country (Madani, Boutebal, & Bryant 2020), a few days later, on March 1, 2020, two cases were reported in Blida region in the North of Algeria, following their contacts with two Algerian nationals who came from France for holidays, they were detected positive after their return to France, since then, a COVID-19 outbreak has started in this region (Blida) that form a cluster of more than 5,4 million inhabitants with the surrounding cities (Algiers, Boumerdes, Tipaza) (Algerian Ministry of Health 2020, ONSA 2020), now, the epidemic is spreading to other parts of the country, until March 22, 2020, the Algerian authorities have declared 200 confirmed cases with a fatality rate of 8,5 % (Algerian Ministry of Health 2020).

This pandemic showed the lack of preparation of several European countries and the slow nature of the decision-making processes. This situation was also noted in other countries of Africa including Algeria which took the decision to isolate the region of Blida, the most affected at the start of the epidemic, which was somewhat delayed, and which facilitated the spread of the virus country (Madani et al. 2020).

Other decisions have been taken by the Algerian government, for example also in the context of social distancing through the demobilization of 50 % of the workers, the closure of schools, higher education units, and other structures, before extending partial containment from 7:00 p.m. to 7:00 a.m. to all states in the country, while 9 states have had their confinement extended from 3:00 p.m. to 7:00 a.m. The state of Blida, epicenter of the Covid-19 epidemic, in other words the "Wuhan of Algeria", has also been kept, by government decision, in total

confinement imposed since 23 March 2020 given the large number of cases recorded, and which continue at this time, since the strategies of containment and mitigation of the epidemic are based on the nature of the virus and its way of spreading (Fauci, Lane & Redfield 2020).

The current situation is likely to have negative effects on many factors that influence sleep quality. Most people are experiencing major changes in their routines, living with uncertainty, and with stress, insecurity about their health, and worries about the situation and its duration. Most working parents are having to combine their work with home-schooling, home administration and household errands. All these adjustments in turn may affect how many hours a day they can actually spend on sleep (Altena et al. 2020). Several studies have highlighted that sleep is vital for the immune system (Bryant, Trinder & Curtis 2004; Besedovsky, Lange & Born 2012). The National Sleep Foundation (NSF) reported that too much sleep will not necessarily prevent sickness but could instead adversely affect the immune system. On the other hand, sleep loss and sleep deprivation impair immune function, since the release of cytokines, a protein that targets infection and inflammation, will decrease (Bryant et al. 2004). Moreover, the infection-fighting antibodies and cells are reduced during periods when humans do not get enough sleep (Bryant et al. 2004). Thus, sleep influences the immune system through the action of centrally produced cytokines which are regulated during sleep. Therefore, it is recommended to get enough sleep each night to fight off infectious diseases. The recommended duration of sleep depends on gender, age and physical activity, with the optimal recommended sleep duration being usually between 7 and 9 hours of sleep per night in adults (Hirshkowitz et al. 2015). Sleep deprivation has been linked with an increased risk of injury the day after (Luke et al. 2011). In that regard, recent literature has shown the positive impact of napping for physical performance and oxidative stress in athletes (Romdhani et al. 2019). Therefore, athletes are encouraged to put a high priority on their sleep pattern, and if necessary, complement night sleep with naps when necessary.

Current evidence supports the general recommendation for obtaining 7 or more hours of sleep per night on a regular basis to promote optimal health among adults aged 18 to 60 years. Individual variability in sleep need is influenced by genetic, behavioral, medical, and environmental factors. A clearer understanding of the precise biological mechanisms underlying sleep need continues to require further scientific investigation (Watson et al. 2015). For this reason, the aim of our study was to show the coronavirus impact on sleep quality, among the Algeria population before and during the COVID-19 quarantine, through an online adapted of the PSQI the Italian version (Curcio et al. 2013).

Methods

Design Study

This research was carried out by team N°04 of the laboratory OPAPS of the Abdelahamid Ibn Badis Mostaganem University, under the number W0890404. The present study is a quick, large cross-sectional online survey conducted by using a social Medias.

Data collection

Participants answered the questionnaires anonymously on the Internet from June 01, 2020, to June 07, 2020. The electronic survey was designed and edited by 04 academic Researchers in physical education from different Algerian universities: University of Ahmed ben Yahia el wancharissiTissemsilt; University of Ghardaïa, and University of Abdelhamid ibn badis Mostaganem, following with a structured literature review. The survey was uploaded and shared online on the Google platform. A link to the electronic survey was distributed via a different way: invitation via e-mails, Facebook™. whatsApp™ and Twitter™.

Sampling

A short questionnaire collected information on some demographic and COVID-19 related information. Standardized questionnaires to evaluate sleep quality and sleep duration were administered. The online survey was anonymous and not attributable to the identity of the participants. 1210 Algerian participants between (18 – 60 years old), were included under this study and grouped basically on their (Gender; Age; Family situation; Educational level; Sports and Health). All the characteristics of the participants are reported in Table 1. Sleep quality during the past month was appraised with a six-question. These questions were adopted from the Pittsburgh Sleep Quality Index. Sleep duration was appraised using one question "During the past month, how many hours of sleep did you usually get each night? This may be quite different to the number of hours you spent in bed. (Enter total number of hours sleep per night)."

Statistical Analysis

This study adopts qualitative and quantitative contents analysis as methodological techniques for interpretation and analysis. All data were analyzed using SPSS 22.0 for Windows Hence. Statistical descriptions were made using the mean, standard deviation for continuous variables, and percentage for categorical variables. Independent-sample *t*-test to compare between sleep duration before home confinement and during home confinement.

Results

Descriptive Analysis

The characteristics of participants are shown in table 1. In sum, 1210 individuals completed the questionnaires, 991 (81.9 %) were male, and 219 (18.1 %) were female. Age range: (18 – 60 years old). The most represented age range was 18 – 30 years 689 (56.94 %). Family situation Most of the participants were unmarried 750 (61.98 %). Educational level Most of the participants were University education 1001 (82.72 %). Sports: Most of the participants were athletes - 873 (72.14 %). Health: Most of the participants were non-patients - 992 (81.98 %).

Table. 1

Demographic characteristics of study sample

Variable	**Sample**		
		n	**%**
Participants	Total	1 210	100
Gender	Male	991	81,9
	Female	219	18,1
Age	18-30yearsold	689	56,94
	31-45yearsold	455	37,60
	46-60yearsold	66	4,95
Family situation	Unmarried	750	61,98
	Married	447	36,94
	Divorced	13	1,07
Educationallevel	There is no	7	0,57
	Primaryeducation	2	0,16
	Basic or intermediateeducation	34	2,80
	High school	166	31,71
	Universityeducation	1 001	82,72
Sports	Athlete	873	72,14
	Non-athlete	337	27,85
	Non- patient	992	81,98

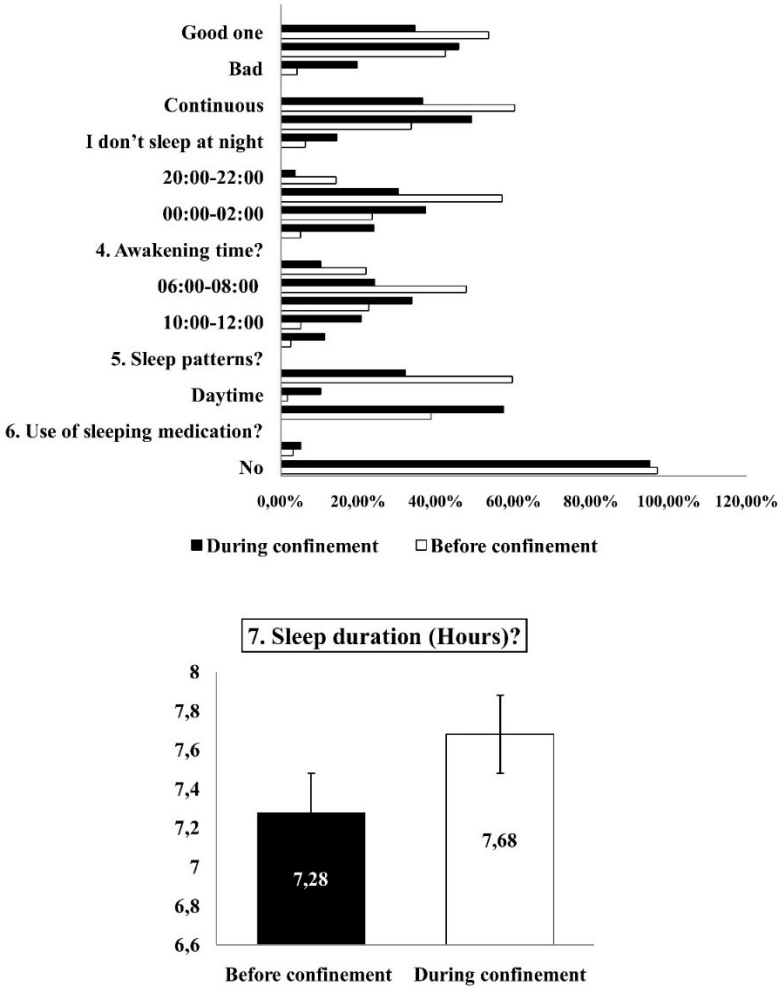


Figure 1

Show the results of the sleep questionnaire recorded before and during home confinement

Table 2 presents the differences in sleep Quality and sleep duration recorded before and during home confinement in the Algerians population, Considering Sleep Quality assessed by the PSQI, the Italian version (Curcio et al. 2013). By relying on the number **(n)** and percentage **(%).**

Table. 2

Results of the sleep questionnaire recorded before and during home confinement

Questions	**Before confinement**		**During confinement**		**Δ in %**
	n	**%**	**n**	**%**	
Question. 01.					**Sleep quality?**
Good one	647	53.5 %	418	34.5 %	19.00 %
Medium	512	42.3 %	554	45.8 %	-3.50 %
Bad	51	4.2 %	238	19.7 %	-15.50 %
Question. 02.					**Sleep nature?**
Continuous	728	60.2 %	442	36.5 %	23.70 %
Intermittent	407	33.6 %	594	49.1 %	-15.50 %
I don't sleep at night	75	6.2 %	174	14.4 %	-8.20 %
Question. 03.					**Sleep onset time?**
20:00-22:00	171	14.13 %	44	3.64 %	10.50 %
22:00-00:00	689	56.94 %	365	30.17 %	26.78 %
00:00-02:00	284	23.47 %	450	37.19 %	-13.72 %
After 02:00	60	4.96 %	289	23.88 %	-18.93 %
Question. 04.					**Awakening time?**
04:00-06:00	266	21.98 %	125	10.33 %	11.65 %
06:00-08:00	578	47.77 %	290	23.97 %	23.80 %
08:00-10:00	274	22.64 %	408	33.72 %	-11.07 %
10:00-12:00	62	5.12 %	251	20.74 %	-15.62 %
After 12:00	30	2.48 %	136	11.24 %	-8.76 %
Question. 05.					**Sleep patterns?**
Night	721	59.6 %	394	32.6 %	27.00 %
Daytime	21	01.7 %	123	10.2 %	-8.50 %
Scattered between night and day	468	38.7 %	693	57.3 %	-18.60 %
Question. 06.					**Use of Sleeping Medication?**
Yes	37	3.1 %	62	5.1 %	02.00 %
No	1 173	96.9 %	1 148	94.9 %	-02.00 %
Question. 07.					**Sleep Duration (Hours)?**
	X	**SD**	**X**	**SD**	**%**	**T test**	**Sig P<0.05**
	7.28	1.59	7.68	2.07	5.49 %	7.41	.000*

Discussion

The measurements taken by the Algerian authorities to prevent the spread of the Covid-19 epidemic, including the demand for home isolation, have influenced the lifestyle of Algerians because they spend most of their time at home. Sleep is a physiological state that needs its integrity to allow the living organism to recuperate normally (Muzet 2007), sleep is necessary for health as its loss or restriction is associated with multiple detrimental consequences (Imeri & Opp 2009). Good sleep quality is necessary for good health (Imeri & Opp 2009). Studies have reported an association between the poor sleep quality and high risk of falls, infections, or the cold virus as a consequence of a reduction of the immune response

(Prather, Janicki-Deverts, Hall & Cohen 2015). The results of our study showed that 19 % of the respondents experienced a change in their sleep quality, from good sleep to bad and medium sleep. 4 % recorded intermittent sleep and 14% did not sleep in night during this quarantine. We explain this change by the high level of stress, This stress is reinforced by the fear of being contaminated, of dying and/or contaminating loved ones (increased perceived stress), by isolation, feelings of loneliness, possible intra-family tensions (decreased perceived social support), loss of routines and means of action (decreased perceived control) (Guichard et al. 2020). Higher perceived stress is associated with poor sleep quality (Tworoger, Davis, Vitiello, Lentz & McTiernan 2005; Burgard & Ailshire 2009). The decrease in physical activity during this quarantine also influenced sleep quality (Mendelson et al. 2016), recent research has shown that activity levels during the day also affect sleep during the following night; low levels of activity (whether due to, e.g., depression or confinement) affect sleep negatively (Altena et al. 2020), Potter et al confirm that the physical activity during the day (but not late at night) improves sleep quality (Potter et al. 2016)

A lack of regular social interaction can indeed enhance stress and negatively affect sleep quality (Xiao et al. 2020). Another factor that influences the quality of sleep is the increase in time spent in bed (Guichard et al. 2020) Reduced sleep quality negatively affects life satisfaction, health status, social, and emotional domains (Casagrande, Favieri, Tambelli & Forte 2020). The present study demonstrated that more than half of Algerians (56.94 %) sleeps in the second third of the night before the quarantine, otherwise the sleep onset schedule is shifted to the last third of the night during the quarantine. These shift controversies Islamic laws, where the god in the Noble Qur'an (Quran.com 2016), (Quran "ElNour", verset 58 Page 357), and the Prophet Muhammed in Sunnah recommend sleeping the first third of the night. We think the quarantine delayed the Algerians' chronotype, which Individuals with an early chronotype naturally sleep earlier in the 24-hour day cycle, while those with a late chronotype sleep later (Gariépy, Doré, Whitehead & Elgar 2019). Chronotype refers to the natural preference in the timing of daily patterns of activities, such as eating, exercising, and sleeping, that is controlled by the biological circadian rhythm (Adan et al. 2012). This late sleep is due to excessive exposure to artificial light (Guichard et al. 2020), consumption of stimulants in the evening, environmental factors that fragment sleep such as noise, light, temperature etc...

We also record a shift in waking hours, this shift is estimated to be more than 4 hours, or 23.80 % of respondents shift their waking hours after 10:00,except that 32.6 % of respondents who maintain their sleep habits (at night), on the other hand, we register 10.2 % who change their sleep from night to day, and 57.3 % who have a sleep dispersed between day and night,

we see that this shift is due to late sleep, and without strict onset hours for school and businesses (Xiao et al. 2020). This sleep cycle disorganization may induce negative effects, or lack of sleep is associated with many diseases, including infection, and with increased mortality (Heslop, Smith, Metcalfe, Macleod, & Hart 2002). Most of our sample does not take medication to sleep, except 5.1% who take it, this result is very beneficial for the Algerian population, short sleep duration is associated with impaired immune and metabolic function (Ganz 2012), obesity, cardiovascular disease (CVD) and other chronic diseases, and increased mortality (Imeri & Opp 2009), Algerians retained their sleep duration 7.28 hours before confinement and 7.68 hours during confinement, but we record significant difference .000 in sleep duration in favor of sleep during confinement, this duration is consistent with National Sleep Foundation which shows that adequate sleep duration (i.e., 7 to 8 hours in 24 hours) are necessary for good health

Limitations and scope of the study

According to the results of the present study, our recommendations are to encourage those studies, which interact with lifestyle, health and wellbeing of the citizens. Not only during the COVID-19 pandemic but also in everyday citizens lifestyles. There was support by national data based on records and compared the lifestyle among of Algerian citizens.

Conclusion

During the corona virus pandemic, people around the world are facing a unique and difficult situation. Our data suggests negative changes in sleep (quality and duration) behaviors in Algerians population especially during the confinement imposed by Covid-19 pandemic. A group of researchers has referred to recommendations and scientific methods related to the quality and duration of sleep, which would allow regulate the biological clock to sleep, especially in the current circumstances and related to home confinement imposed by COVID-19, including: to maintain positive quality and duration sleep-related behaviors such obtaining 7 or more hours of sleep per night on a regular basis to promote optimal health among adults aged 18 to 60 years (Watson et al. 2015), to try exercising regularly, preferably in daylight, to try to get natural daylight during the day, particularly in the morning, and if not possible, have your home brightly lit in the daytime by opening curtains and blinds, or having lights on; to try to have dim light during the evening, with it even darker at night, to try to avoid using prescription sleeping medications if you can, their effectiveness is questionable and they can have some side-effects if taken for longer time (Curcio et al. 2013). Sleep necessity still require further scientific investigation. This recommendation creates a foundation to raise awareness and improve understanding of sleep effects on health and educating the public and healthcare

providers on the importance of adequate sleep quality and duration for health. In the end the researchers advised to promote research in the role of sleep in health and well-being.

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