ORIGINAL ARTICLE

Impact of COVID-19 lockdown on dietary habits and weight among Tunisian adults

Impact du confinement lié à la COVID-19 sur les habitudes alimentaires et le poids des adultes tunisiens

Yosra Hasni[1,2], Sawsen Nouira[1], Hamza El Fekih[1], Wiem Saafi[1], Souleima Bedhiafi[2], Yasmine Karrai[2], Rabeb Hammami[2], Leila Alouen[2], Molka Chaieb[1]

1. The university hospital of Farhat Hached Sousse, Faculty of Medicine of Sousse, University of Sousse.
2. The Higher Central School of Paramedical and Health Sciences.

Abstract

Background: COVID-19 lockdown measures have profoundly altered lifestyle habits, exposing individuals to significant health risks
Aim: This study aims to assess the impact of quarantine measures in Tunisia, with a focus on examining changes in dietary habits, levels of physical activity, psychological patterns, and factors contributing to weight gain.
Methods: This is a cross-sectional study involving 1,016 participants and employed a mixed-methods approach to gather data on dietary habits, physical activity levels, and psychological indicators. Statistical analyses, including binary logistic regression, were conducted to identify independent risk factors associated with weight gain during the quarantine period.
Results: Approximately 36.4% of participants reported experiencing weight gain, with a notable prevalence among younger age groups. Increased consumption of sweets, pasta, and fried foods, coupled with reduced intake of water, vegetables, and fruits, were associated with weight gain. Furthermore, a decline in physical activity levels and elevated scores of anxiety and depression were observed among individuals who reported weight gain. Binary logistic regression highlighted snack frequency, fried food consumption, and pasta intake as significant independent risk factors for weight gain.
Conclusion: The results underscore the importance of understanding the complex impacts of lockdowns on lifestyle habits and mental health to guide future interventions, which are necessary to mitigate adverse health consequences and promote healthy lifestyles in the post-pandemic period.

Key words: confinement, COVID-19 pandemic, dietary habits, physical activity, mental health

Résumé

Introduction: Les mesures de confinement liées à la pandémie de COVID-19 ont profondément modifié les habitudes de vie, avec une exposition à des risques significatifs pour la santé.
Objectif: Cette étude vise à évaluer l'impact du confinement en Tunisie sur les habitudes alimentaires, l'activité physique et la santé mentale, en mettant l'accent sur les facteurs contribuant à la prise de poids.
Méthodes: Un questionnaire en ligne a été utilisé pour recueillir des données sur les habitudes alimentaires, l'activité physique et les scores d'anxiété et de dépression.
Résultats: Un total de 1 016 adultes ont participé à l'étude. Environ 36,4% des participants ont signalé une prise de poids, plus fréquente chez les plus jeunes. Une augmentation de la consommation de sucreries, de pâtes et de fritures, ainsi qu'une diminution de la consommation de légumes et de fruits ont été associées à la prise de poids. Une réduction de l'activité physique et des scores plus élevés d'anxiété et de dépression ont été observés chez ceux qui ont pris du poids.
Conclusion: Les résultats soulignent l'importance de comprendre les impacts complexes du confinement sur les habitudes de vie et la santé mentale pour orienter les interventions futures, qui sont nécessaires pour atténuer les conséquences néfastes sur la santé et promouvoir des modes de vie sains postpandémie.

Mots clés : confinement, pandémie de COVID-19, habitudes alimentaires, activité physique, santé mentale

Correspondance
Sawsen Nouira
The university hospital of Farhat Hached Sousse, Faculty of Medicine of Sousse, University of Sousse.
Email: susanboujebha@gmail.com

LA TUNISIE MEDICALE-2025; Vol 103 (01): 152-157 DOI: 10.62438/tunismed.v103i1.5118

Introduction

After the first confirmed case in Wuhan, China (December 2019), COVID-19 rapidly spread worldwide, affecting 210 countries. In less than 3 months, the World Health Organization (WHO) declared SARS-CoV-2 a pandemic, leading to a severe respiratory illness. On March 2, 2020, Tunisia reported its first confirmed case of COVID-19 in a 40-year-old man who had recently traveled to Italy (1). Since then, Tunisia has experienced four additional waves. During the fourth wave, the number of new cases was the highest since the start of the epidemic, with nearly 10,000 new infections per day and over 100 daily deaths (2). Regional Public Health delegations in each governorate played a crucial role in tracing close contacts around a confirmed case (2). Special emergency measures were implemented, contributing to slowing down the epidemic's spread. This has consequently engendered an unprecedented anxiety at a global level (3).

The condition of confinement has resulted in diverse economic, social, and health consequences. Indeed, these measures have exacerbated extant social disparities with consequential effects on healthcare accessibility, diminished physical activity (PA), and perturbed dietary equilibrium.

The nutritional status is a key element in the functioning and maintenance of the immune system's integrity. For the immune system, closely relies on the quality and quantity of consumed nutrients, including carbohydrates, lipids, proteins, water, and micronutrients. It is well-established that nutrient deficiency or inadequacy (resulting from insufficient dietary intake, reduced absorption, or limited bioavailability) must be corrected to properly sustain immune system function (4).

The changes in various aspects of life and the altered daily routines prompted researchers to investigate individuals during this pivotal period. The condition of confinement coupled with the continuous influx of pandemic-related news, has the potential to elicit negative emotions like anxiety, and stress. These emotional responses were associated with heightened food consumption, particularly the consumption of “miraculous” drinks characterized by high sugar content (5).

Similar trends have been noted in various populations. Research indicates that post-lockdown, dietary patterns and PA were adversely affected (6,7). Individuals reported an uptick in regular meals, increased snacking, and a sense of diminished motivation and control over food (6, 8).

Therefore, a comprehensive examination of the effects of the COVID-19 pandemic and subsequent quarantine on the health of the Tunisian population is imperative. The goal is to develop targeted interventions aimed at improving lifestyles post-pandemic and preventing similar health outcomes in emergency scenarios.

The objective of our study was to assess the impact of the COVID-19 lockdown in Tunisia on dietary habits, PA, and psychological patterns, as well as to identify factors associated with weight gain.

Methods

Study Type

This is a cross-sectional study involving voluntary participants. The study was conducted through an online questionnaire, shared on social networks from April 15, 2021, to May 31, 2021, in Tunisia, using the Web 2.0 tool: Google Forms. The link was sent in Arabic and French, allowing participants to choose their preferred language.

Study Population

The survey targeted the Tunisian population, utilizing an online platform accessible via any device with an internet connection.

In this study, we included individuals aged 18 years and above, regardless of whether they were infected with COVID-19 or not.

Data collection tool

The data collection was conducted using a questionnaire, developed by the authors of this study, available in both Arabic and French versions, capturing the following data: sociodemographic characteristics. We also recorded personal history and anthropometric data. The body mass index (BMI) was categorized, according to the WHO guidelines, as follows: Underweight is defined as a BMI of less than 18.5; Normal weight ranges from 18.5 to 24.9; Overweight, or pre-obesity, is from 25 to 29.9; and Obesity is classified as a BMI of 30 or higher (9).

Information on dietary habits (daily consumption of certain foods, frequency of food intake, and number of meals per day) and lifestyle habits (stimulants, alcohol, sleep quality, self-medication, and PA) were studied. An assessment of the psychological state of participants was conducted using the DASS-21 scale (The Depression, Anxiety, and Stress Scale) (10). Google Forms served as the utilized platform, and the questionnaire link was shared through various social media channels, including WhatsApp, Facebook, Twitter, Snapchat, and Instagram.

Data analysis

Data were analyzed using the Statistical Package for Social Sciences, SPSS Version 26. Comparisons of two means for independent series were conducted using the independent samples t-test. Comparisons of percentages for independent series were performed using the Pearson chi-square test. For the identification of risk factors, we employed both univariate and multivariate analysis. In order to identify independently associated risk factors with the event, a stepwise descending logistic regression was conducted (in the first step, all factors with "p" values ≤ 0.2 were introduced). The multivariate analysis allowed the calculation of adjusted odds ratios, measuring the specific role of each factor. In all statistical tests, the significance threshold was set at 0.05.

Ethical Considerations

This study does not present any conflicts of interest or ethical issues. It was conducted in accordance with the law, respecting the integrity and anonymity of individuals. The study was disseminated through social networks and all participants were fully informed about the study requirements. They were required to consent to data sharing and the privacy policy before participating in the study.

Results

We collected data from 1,035 participants, excluding 19 individuals who were under the age of 18. We included 1,016 participants who were divided into 688 females (67.7%) and 328 males (32.3%), with a sex ratio (M/F) of 0.47. According to our findings 282 participants were affected by COVID-19 and 734 were not affected (Table 1).

Table 1. Clinical characteristics of the participants

Clinical Characteristics		Prevalence n (%)
Sex	Male	328(32.3)
	Female	688 (67.7)
Age	Under 20 years old	171 (16.8)
	20 to 40 years old	614 (60.4)
	More than 40 years old	230 (22.6)
Region of Tunisia	North	270 (26.6)
	Center	559 (55)
	South	187 (18.4)
Marital Status	Single	628 (61.8)
	Married	367 (36.1)
	Divorced	17 (1.7)
	Widowed	4 (0.4)
Level of Education	Secondary	97 (9.5)
	University	919 (90.5)
Profession	Manager	292 (28.7)
	Professional	202 (19.9)
	Student	426 (41.9)
	Employee	13 (1.3)
	Unemployed	58 (5.7)
	Retired	8 (0.8)
Medical History	Diabetes	28 (2.8)
	Hypertension	41 (4.0)
	Dyslipidemia	13 (1.3)
	Asthma	9 (0.9)
	Thyroid Disorder	30 (3.0)
BMI categories	Underweight	68 (6.7)
	Normal weight	548 (53.9)
	Overweight	301 (29.6)
	Obesity	99 (9.8)
COVID-19 Infection	Yes	282 (27.7)
	No	734 (72.2)

n number; BMI Body Mass Index

They were distributed across regions, with 55% from the central region, 26.6% from the south, and 18.4% from the north.

Based on BMI categories, the majority of participants fell into the normal weight range (53.9%), followed by overweight (29.6%), obesity (9.8%), and underweight (6.7%). Concerning weight changes during the COVID-19 lockdown, 36.4% of participants reported an increase in weight, while 33% reported weight loss, and 24% reported no change. Weight gain was more significant in women than in men (64.8% vs. 34.2%), but without a significant difference (p=0.57). Similarly, weight loss was more pronounced in women than in men (65.6% vs. 33.4%) but without a significant difference (p=0.18). Those who experienced weight gain were younger compared to those with weight loss or stable weight (28.9±10.8 years vs. 32.5±12.7 years), (p=10-3).

The number of individuals who gained weight during the lockdown was significantly higher for singles (65.9%) compared to married individuals (32.7%), with a p-value of 0.007. For those who gained weight, 8.7% had a high school degree, and 91.3% had a university education level. However, this difference was not statistically significant (p=0.6). There was a clear and statistically significant link between changes in weight during the COVID-19 lockdown and individuals' employment status, participants who gained weight during this period, they were primarily students in 47.4% of cases and employed full-time in 24.8%, retirees in 0.3% of cases (p=0.013).

A change in their eating habits was reported by 65.2% of cases. For individuals who gained weight post-lockdown period, we observed that more than half of participants (52%) had 3 meals (p=10-3). Additionally, we noted that among this group the majority often had 2 snacks or more (49.7%) compared to 1 snack (22.4%) (p= 10-3) (Table 2).

Table 2. Changes in Dietary Habits and Physical Activity According to Weight Changes During the COVID-19 Lockdown in Tunisia

Variables		Total (n=1016) n (%)	Weight change		P-value
			No Weight gain (n=575) n (%)	Weight gain (n=367) n (%)	
The number of daily meals	=3 meals	527(51)	333 (32)	194 (19)	<0.001
	>3meals	204(20)	83(8)	121(11.9)	
	<3meals	211(21)	159(16)	52(5.1)	
The number of snacks per day	No snacks	387(38)	286(28.1)	101(10)	<0.001
	1 snack	209(20.5)	126(12.4)	83(8.1)	
	≥2 snacks	346(34)	163(16)	184(18.1)	
The consumption of sweets per day	Decreased	575(56.5)	318(31.2)	106(10.4)	<0.001
	Increased	367(36.1)	257(25.2)	261(25.6)	
The consumption of pasta per week	Decreased	563(55.4)	382(37.5)	181(17.8)	<0.001
	Increased	375(36.9)	189(18.6)	186(18.3)	
The consumption of fried food per week	Decreased	570(56.1)	430(42.3)	140(13.7)	<0.001
	Increased	300(29.5)	140(13.7)	160(15.7)	
The consumption of fruits and vegetables per day	Decreased	557(54.8)	353(34.7)	204(20.07)	<0.001
	Increased	385(28)	222(21.8)	163(16.04)	
The physical activity	Decreased	568(55.9)	308(20.4)	260(25.5)	<0.001
	No change	262(25.7)	188(18.5)	74(7.2)	
	Increased	112(11)	79(7.7)	33(3.2)	

Weight gain was significantly associated with an excess intake of sweets (70.5%, p= 10-3) and an excess intake of pasta (50.7%, p=10-3).

We also observed that participants experiencing weight gain had a higher frequency of fried food intake (42.3%, p=10-3), an excess intake of salty food (43.5%, p= 10-3), intake of stimulants (47.4%, p= 0.01), and alcohol consumption (4.7%, p= 0.65). Furthermore, drinking less water per day was associated to weight gain (61.3% drank less than 2 liters per day) (p=0.29). The consumption of less vegetables and fruits (55.1%) was associated with weight gain (p=10-3).

In 70.2% of participants who gained weight during the lockdown, a reported decrease in PA was noted (p= 10-3). This activity was of a duration of less than 30 minutes per day in 68.4% of cases, while in 13.4%, it exceeded 30 minutes per day (p= 0.006).

An elevated average anxiety score showed an association with weight gain (10.4 ± 9.5), with a non-significant disparity (p = 0.08). Conversely, the average depression score was notably higher (14.1 ± 10.1), exhibiting a significant difference with a p-value of 0.016.

Following a binary logistic regression, analysing the variables of interest, we observed that weight gain was associated with direct and independent risk factors, particularly the number of snacks (≥2 per day) (p=10-3), and the consumption of fried foods per week (p=10-3) (Table 3).

Table 3. Factors associated with weight gain

	P	OR	Confidence interval 95%
The number of snacks (≥2) per day	10^{-3}	1.47	1.28-1.69
The consumption of fried food per week	10^{-3}	1.76	1.29-2.38
Constant	10^{-3}	0.30	

P p value ; OR odds-ratio

Discussion

To face the pandemic, one of the most widely adopted measures by governments worldwide has been lockdown which has negatively affected many health-related variables. The primary objective of this study was to assess the repercussions of COVID-19 quarantine on dietary habits, PA, and psychological patterns in Tunisia and to identify predictors of weight gain.

According to our results, during the lockdown, weight gain was observed in 36.4% of cases. This was explained, in part, by a change in dietary behavior; indeed, 65.2% of cases reported a change in their eating habits. According to our study, weight gain was associated with the number of snacks ≥ 2 per day, and increase in fried food intake.

Zachary et al (11) conducted a study to assess the impact of lockdown during COVID-19 on behaviors associated with weight gain. Participants who reported weight gain mentioned increased eating in response to stress (p = 0.041), and snacking after dinner (p = 0.016). Significant relationships were found between predictive variables such as time spent on PA and reported weight gain (r = -0.155, p = 0.034). Thus, they concluded that risk factors for weight gain during lockdown included snacking after dinner, lack of dietary restraint, eating in response to stress, and reduced PA (11).

Another study conducted in Jordan between March and April 2020 demonstrated a significant weight gain for participants with overweight (36.4%) and obesity (41.1%) compared to those with normal weight (28.5%, p<0.05). The study also noted a significant increase in appetite for participants with overweight (44.4%) and obese (50.2%) compared to those with normal weight (40.4%, p<0.05). Furthermore, the study reveals an increase in appetite and a significant disruption in the sense of satiety. Additionally, there is no correlation between these variables and the participants' BMI. This is supported by a decrease in PA (12).

Data indicate an increase in the consumption of alcoholic beverages, confectionery, nuts, desserts, and homemade snacks during the lockdown, although this increase is lower than that reported in other studies such as the one by Scamozzino and Visioli in 2020 (13), which recorded a 10.1% increase in the consumption of alcoholic beverages compared to 1.79% in the Spanish study (14). Additionally, in the Italian study (13), 21.2% of respondents increased their consumption of fruits and vegetables. This difference may be attributed to variations in the samples or the initial consumption levels of these products (13).

In an Italian study, half of the participants increased their consumption of comfort foods, whether sweet or savory. The noteworthy aspect worth discussing is the 36.8% decrease in alcohol consumption, and this self-reported decline in alcohol intake was mirrored by an increase in the consumption of tea, coffee, and herbal infusions (13), similar to our study where we found an increase in stimulant consumption in 47.4% of cases.

According to a study in Chile, low water consumption was associated with weight gain along with low intake of legumes and high consumption of foods rich in refined sugars, saturated fats, sodium, and fried foods (15). During the lockdown, given the stress and anxiety-inducing atmosphere caused by COVID-19 and the altered routine, there was an increased desire to consume pleasurable foods (16), such as refined sugars and saturated fats (in addition to fried foods), turning this consumption into a risk factor for obesity and causing an increase in the pro-inflammatory state (17,18).

In our study, there was a decrease in activity during the lockdown, which was associated (p=10-3) with weight gain These results align with recent studies that underscore a significant proportion of individuals (>50%) reporting alterations in their PA and a rise in sedentary behavior (19). The indirect challenges of such a pandemic on mental health are at least twofold: the potential psychological impact of confinement on the general population and on vulnerable individuals, especially those suffering from mental disorders. In line with research on the psychological consequences of COVID-19 in China (20,21) and previous studies on the psychological consequences of other pandemics (22,23,24), the perceived impact of COVID-19 on daily life was associated with increased anxiety and financial worries (25).

In our study, a statistically significant association was observed between COVID-19 infection and anxiety.

Furthermore, weight gain after the lockdown was significantly associated with depression. As the crisis subsides, considering that it could lead to significant symptoms of psychological distress or contribute to the emergence of established pathologies, it is essential to define a screening and intervention strategy in this context (26).

Numerous factors have been proposed to account for these elevated levels of anxiety and depression, including issues such as job loss, fear of infection, concerns about the national sociopolitical climate, and exposure to media (27,28,29,30).

In this regard, telemedicine can be an interesting solution, allowing online monitoring and used to assess the impact of the pandemic on mental health. However, caution should be exercised when spending too much time searching for pandemic information on social media, given the infodemic and emotional contagion through online social networks (31).

Strengths

This research project is among the first to address the issue of changes in eating behavior during COVID-19 in Tunisia. Insights into nutritional behavior during the pandemic can aid public health authorities in refining future nutritional policies, especially if new pandemics emerge and confinement measures are required. The study boasts a robust sample size of over 1,000 participants, with representation from all three regions of Tunisia within a concise 2-month period.

The questionnaire was offered in two versions : one in French and the other in Tunisian dialect. This likely contributed to the high participation rate and the generally complete and reliable nature of the responses.

Limitations

During the course of our work, we encountered several difficulties. The validity of responses is a general issue with online questionnaires. For participants who confirmed their infection with the coronavirus, the responses were subjective and lacked confirmation through PCR analysis or imaging. Moreover, in measuring weight, we relied on values recalled and reported by participants before and after confinement. This approach may have introduced errors, as not all participants used the same measuring instrument, leading to potential issues with recall and precision. Lastly, by conducting our survey in a digital format, we primarily reached a population aged between 20 and 40 years, who are more frequent users of social media.

Conclusion

Post-lockdown, participants adopted new habits, particularly in homemade cooking and decreased PA. This pattern aligns with global findings where changes in eating behavior, PA, and the higher level of anxiety during lockdown led to weight gain.

Based on these results, we recommend avoiding overeating by adhering to a healthy and balanced diet, focusing on low glycemic index carbohydrates, and protein-rich foods with lower fat content. Daily PA is encouraged, along with proper hydration.

These findings could be used to develop tailored recommendations for future pandemic situations, helping to preserve the health of populations by promoting healthier lifestyle choices and mitigating the negative impacts of lockdown measures.

References

1. Safer M, Letaief H, Hechaichi A, Harizi C, Dhaouadi S, Bouabid L, et al. Identification of transmission chains and clusters associated with COVID-19 in Tunisia. BMC Infect Dis. 2021 May 19;21(1):453.
2. Bentlage E, Ammar A, How D, Ahmed M, Trabelsi K, Chtourou H, et al. Practical Recommendations for Maintaining Active Lifestyle during the COVID-19 Pandemic: A Systematic Literature Review. Int J Environ Res Public Health. 2020 Aug;17(17):6265.
3. World Health Organization. Immunité collective, confinement et COVID-19 [Internet]. [cité 25 mai 2021]. Disponible sur: https:// www.who.int/fr/news-room/q-a detail/herd-immunity lockdowns-and-covid- 19
4. Mehta NM, Duggan CP. Nutritional Deficiencies during Critical Illness. Pediatr Clin North Am. 2009;56(5):1143-60.
5. Wu Y, Ho W, Huang Y, Jin D-Y, Li S, Liu S-L, et al. SARS-CoV-2 is an appropriate name for the new coronavirus. Lancet. 2020;395(10228):949-50.
6. Robinson E, Boyland E, Chisholm A, Harrold J, Maloney NG, Marty L, et al. Obesity, eating behavior and physical activity during COVID-19 lockdown: a study of UK adults. Appetite. 2021; 156:104853. doi: 10.1016/j.appet.2020.104853
7. Dergaa I, Abdelrahman H, Varma A, Yousfi N, Souissi A, Ghram A, et al. COVID-19 Vaccination, Herd Immunity and The Transition Toward Normalcy: Challenges with The Upcoming Sports Events. J Annals of Applied Sport Science. 2021 ;9(3).
8. Ammar A, Brach M, Trabelsi K, Chtourou H, Boukhris O, Masmoudi L, et al. Effects of COVID-19 home confinement on eating behaviour and physical activity: results of the ECLB-COVID19 international online survey. Nutrients. 2020 ; 12:1583
9. Classification de l'obésité et le surpoids chez l'adulte selom l'indice de masse corporelle (IMC) ou (BMI) [Internet]. [cité 15 juin 2021]. Disponible sur: https://www.aly- abbara.com/utilitaires/calcul%20 imc/IMC_fr_classification.html
10. Lovibond, S. H., & Lovibond, P. F. Depression Anxiety Stress Scales (DASS--21, DASS--42) [Database record]. APA PsycTests. (1995). https://doi.org/10.1037/t01004-000
11. Zachary Z, Brianna F, Brianna L, Garrett P, Jade W, Alyssa D, et al. Self-quarantine and weight gain related risk factors during the COVID-19 pandemic. Obes Res Clin Pract. juin 2020;14(3):210-6.
12. Olaimat AN, Aolymat I, Shahbaz HM, Holley RA. Knowledge and Information Sources About COVID-19 Among University Students in Jordan: A Cross-Sectional Study. Front Public Health. May 2020; 29(8):254.
13. Scarmozzino F, Visioli F. Covid-19 and the Subsequent Lockdown Modified Dietary Habits of Almost Half the Population in an Italian Sample. Foods. 2020;9(5):675.
14. Sánchez-Sánchez E, Ramírez-Vargas G, Avellaneda-López Y, Orellana-Pecino JI, García- Marín E, Díaz-Jimenez J. Eating Habits and Physical Activity of the Spanish Population during the COVID-19 Pandemic Period. Nutrients. 2020;12(9):2826.
15. Reyes-Olavarría D, Latorre-Román PÁ, Guzmán-Guzmán IP, Jerez-Mayorga D, Caamaño-Navarrete F, Delgado-Floody P. Positive and Negative Changes in Food Habits, Physical Activity Patterns, and Weight Status during COVID-19 Confinement : Associated Factors in the Chilean Population. Int J Environ Res Public Health. Jul 2020;17(15):5431.

16. Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for CoVID- 19 quarantine. Eur J Clin Nutr.2020;74(6):850-1.
17. Oginsky MF, Goforth PB, Nobile CW, Lopez-Santiago LF, Ferrario CR. Eating Junk- Food" Produces Rapid and Long-Lasting Increases in NAc CP-AMPA Receptors: Implications for Enhanced Cue-Induced Motivation and Food Addiction. Neuropsychopharmacol. 2016;41(13):2977-86.
18. Katelyn AC, Tinuke OD, Henry L, Leonard HE. Reinforcement Pathology and Obesity. Current Drug Abuse. Reviews. 2011;4(3):190-6.
19. Martinez-Ferran M, de la Guía-Galipienso F, Sanchis-Gomar F, Pareja-Galeano H. Metabolic Impacts of Confinement during the COVID-19 Pandemic Due to Modified Diet and Physical Activity Habits. Nutrients. May 2020;12(6):1549.
20. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. Psychiatry Research. 2020;287:112934.
21. Chen W-C, Huang AS, Chuang J-H, Chiu C-C, Kuo H-S. Social and economic impact of school closure resulting from pandemic influenza A/H1N1. Journal of Infection. 2011;62(3):200-3.
22. Wheaton MG, Abramowitz JS, Berman NC, Fabricant LE, Olatunji BO. Psychological Predictors of Anxiety in Response to the H1N1 (Swine Flu) Pandemic. Cogn Ther Res. 2012;36(3):210-8.
23. Tausczik Y, Faasse K, Pennebaker JW, Petrie KJ. Public Anxiety and Information Seeking Following the H1N1 Outbreak: Blogs, Newspaper Articles, and Wikipedia Visits. Health Communication. 2012;27(2):179-85.
24. Tull MT, Edmonds KA, Scamaldo KM, Richmond JR, Rose JP, Gratz KL. Psychological Outcomes Associated with Stay-at-Home Orders and the Perceived Impact of COVID-19 on Daily Life. Psychiatry Res. 2020;289:113098.
25. El-Hage W, Hingray C, Lemogne C, Yrondi A, Brunault P, Bienvenu T, et al. Les professionnels de santé face à la pandémie de la maladie à coronavirus (COVID-19) : quels risques pour leur santé mentale ? Encephale. juin 2020;46(3):S73-80.
26. Khubchandani J, Sharma S, Webb FJ, Wiblishauser MJ, Bowman SL. Post-lockdown depression and anxiety in the USA during the COVID-19 pandemic. J Public Health. 2021;43(2):246-53.
27. Czeisler MÉ, Lane RI, Petrosky E, Wiley JF, Christensen A, Njai R, et al. Mental Health, Substance Use, and Suicidal Ideation During the COVID-19 Pandemic -United States. MMWR Morb Mortal Wkly Rep. 2020 ;69(32):1049-1057. doi: 10.15585/mmwr.mm6932a1.
28. Twenge JM, Joiner TE. U.S. Census Bureau-assessed prevalence of anxiety and depressive symptoms in 2019 and during the 2020 COVID-19 pandemic. Depress Anxiety. 2020;37(10):954-6. doi: 10.1002/da.23077.
29. Daly M, Robinson E. Acute and longer-term psychological distress associated with testing positive for COVID-19: longitudinal evidence from a population-based study of US adults. Psychol Med. 2023;53(4):1603-10. doi:10.1017/S003329172100324X.
30. Olagoke AA, Olagoke OO, Hughes AM. Exposure to coronavirus news on mainstream media: The role of risk perceptions and depression. Br J Health Psychol. 2020;25(4):865-74. doi: 10.1111/bjhp.12427.
31. Ni MY, Yang L, Leung CMC, Li N, Yao XI, Wang Y, et al. Mental Health, Risk Factors, and Social Media Use During the COVID-19 Epidemic and Cordon Sanitaire Among the Community and Health Professionals in Wuhan, China: Cross-Sectional Survey. JMIR Ment Health. May 2020;7(5):e19009.