



Psychological, Nutritional and Behavioral Impact of COVID-19 Lockdown: A Cross Sectional Study on Egyptian Children

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Objective Coronavirus disease 2019 (COVID-19) is contemplated as the most exceptional global health crisis, becoming a vigorous, powerful destroyer of both health and economy in the 21st century. Although young children are clinically less affected by COVID-19 than adults, they are concomitantly influenced by the pandemic in many aspects.

Methods This study is an attempt to investigate the negative effects of the lockdown on the psychological, nutritional, physical, as well as the behavioral aspects among Egyptian children and adolescents. A cross-sectional study was conducted using a formulated online survey among a total of 672 participant aged 6–18 years.

Results During the lockdown 58.9% of the participants reported increase in their weight, 64.6% of reported decrease in their physical activity, moreover 86.9% reported increased time consumed on the computer/TV/mobile, and 54.7% reported sleeping problems.

Conclusion COVID-19 pandemic had a massive influence on children's health globally, in many aspects whether medical, physical or psychological. All these intimations have to be highlighted and dealt with clearly to avoid both short/long-term sequel.

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Keywords Egypt; COVID-19; Lockdown; Nutrition; Anxiety; Sleep problems.

INTRODUCTION

Children and adolescents represent 52% of the Egyptian population, being premeditated as the most vulnerable category affected by COVID-19's psychosocial and economic impact. Maneuvers done to face this pandemic have drawbacks on both children and adolescents, restricting their educational accessibility, making them susceptible to different degrees of poverty, violence as well as mental disorders.¹ Although young children are clinically less affected by COVID-19 than adults, they are concomitantly influenced by the pandemic, its broader socio-economic risks are fatal and with sequel for the whole society.²

COVID-19 is considered the most exceptional global health crisis, on March 11, 2020, COVID-19 has been announced by the world health organization (WHO) to spread from Wuhan

till it reached 222 countries, killing 1.5 million and infecting 85 million person.³ In February 14th, Egypt announced the 1st confirmed case.⁴

According to the WHO guidelines,⁵ obesity is considered as one of the crucial risk factors predisposing for COVID-19. Hence, it is obvious that the society's readiness to conflict any warning could be attained by dietary pliability. Luckily, giving attention to diet intake is among the 2030 Agenda for Sustainable Development, where chances for setting up collaborations between equity and health might be attained.⁶

Several studies have focused on the link between adolescents with obesity and mental health, as adolescence is an important developmental period where appearances and peer approval are key values. Increased body dissatisfaction, low self-esteem, and perceived stigmatization due to obesity are hypothesized to increase the risk of psychiatric disorders and in particular, depression.⁷

The appearance of pandemics leads to the emergence of massive psychosocial disturbances and mental health symptoms affecting the whole. This was obvious following both the severe acute respiratory syndrome coronavirus 1 and 2.⁸ Depression, anxiety and unreliability together with diminished health care accessibility & food insecurities could influence children obe-

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sity and eating disorders. There are several factors that empower the degree of psychological drawbacks of pandemics including the hidden means of virus transmission, lockdown, misleading data, and future unpredictability.⁹

Following COVID-19 pandemic, governments has been forced to shut down schools, clubs and even public gardens. Children are restricted from meeting their friends or joining family time, they are being locked down doing daily monotonous routine. Fear of being hospitalized, fear of losing family members or even fear of death are the most common stressful thoughts that might affect the childrens' mood during the pandemic. This may present as behavioral disorders, sleep disturbance, night terrors, and loss of appetite. Adolescents appear to express themselves better and have a more settled ability to adapt with stressful circumstances and face situations of insecurity better than children.¹⁰

In an attempt to explore the psychological wellbeing of the Egyptian children and adolescents during lockdown, this study was conducted to investigate the negative effects of the lockdown on the psychological, nutritional, physical, and behavioral aspects among Egyptian children and adolescents using a formulated online survey.

METHODS

Study design

This study is a descriptive cross-sectional study that was conducted by using an online survey on 672 children. The target population was Egyptian primary and secondary school children and adolescents (Cairo governorate) from 6–18 years. Both sexes were included. Children with any chronic illness or mental disorder were excluded from the study. Children were divided according to age into 4 main clusters (6–9, 9–12, 12–15, 15–18).

Measurement

A self-administrated online survey with multi-component questions was designed using Google form documents. Data including age, gender, residence and medical status was obtained at the beginning of the questionnaire. Children in the age category from (6–9) years were guided by their caregiver. The survey was conducted between: 1–30 October 2020 (6 months after the lock down which started on 24th of March, 2020). Egypt was subjected to full lock down from 24th March, 2020 till 7th August, 2020. Depending on a systematic review,^{11,12} inquiries concerning the nutritional habits were added such as bodyweight changes, the number of meals/day, changes of dietary habits, and coping methods during the COVID-19 pandemic. Internal consistency of the food added in the food frequency questionnaire was evaluated using Cronbach's alpha,

a value of 0.84 was derived ensuring validity. Physical activity questions were assessed using the International Physical Activity Questionnaire Short Form (IPAQ-SF)¹³ having a Cronbach's alpha value 0.81 while sleep was assessed using BEARS sleep screening tool¹⁴ having a Cronbach's alpha value 0.76. The psychological status including anxiety and stress in children were assessed using Spence Children anxiety scale.¹⁵ It consists of 6 main domains: obsessive compulsive disorders, social phobia, panic, separation anxiety, physical injury fear, and generalized anxiety. The survey was done namelessly to guarantee maximum privacy. All questions were asked twice, once before COVID-19 pandemic and the other time during lockdown.

Ethics approval and consent to participate

Ethical consideration (RHDIRB2020110401) in the form of online informed written consent was obtained prior to beginning of this study.

Statistical analysis

Data was revised, coded, tabulated using Statistical package for social science (SPSS version 21.0; IBM Corp., Armonk, NY, USA). Frequency and percentage of non-numerical data was presented as (mean and standard deviation). Chi-square test was used to examine the relationship between two qualitative variables. Two-tailed p value <0.05 was considered statistically significant.¹⁶

Data analysis: power of sample size was calculated using Epicalc program version 1.02 (Virasakdi Chongsuvivatwong, Epidemiology Unit, Prince of Songkla University, Thailand) based on an effect size of 0.5, the overall type 1 error rate alpha <0.05, a total of 220 subjects are expected to achieve a power more than 80%.

RESULTS

Participants in this study (n=672) were divided according to age into 4 main categories, 6–9 years (21.7%), 9–12 years (24.4%), 12–15 years (30.1%) and 15–18 years (23.8%). Males

Table 1. Frequency of socio-demographic data

Socio-demographic data	Value
Age	
6–9	146 (21.7)
9–12	164 (24.4)
12–15	202 (30.1)
15–18	160 (23.8)
Gender	
Male	324 (48.2)
Female	348 (51.8)

represented 48.2% and females 51.8% (Table 1).

49.4% from the participants reported that websites and social media are their main source of information, 20.2% reported television, 15.5% reported health professionals and the minority 14.9 reported family and friends. 40.5% experienced infection and isolation of a close relative, 13.4% experienced death of a close relative, and 8% experienced parental unemployment (Table 2).

Regarding the dietary habits, 58.9% reported increase in their weight (measured in kgs) during the period of lockdown, 28.3% reported no change, and 12.8% reported decrease in

their weight. 59.5% reported eating 2–4 meals/day, 25.9% reported eating 4–6 meals/day and 14.6% reported eating 1–2 meals/day (Table 3). When comparing the nutritional habits pre COVID-19 with the lockdown, results showed statistical significant increase in the habit of having breakfast daily from 9.2% to 66.1% ($p < 0.001$), statistical increase in the consumption of healthy food from 4.2% to 15.5%, statistical increase in the consumption of dense food from 8.6% to 31.3%, however there was statistical decrease in the consumption of fast delivered food from 21.1% to 3.3% as well as statistical decrease in the consumption of home-made food from 66.1% to 32.4% ($p < 0.001$). 17.6% reported no changes in their feeding habits (Table 4).

Regarding the physical activity, 64.6% reported decreased physical activity, 20.8% reported no change however 14.6% reported increased physical activity. On the other hand, 86.9% reported increased time consumed on the computer/TV/mobile, 9.5% reported no change while 3.6% reported decrease in the consumed time (Table 5). When comparing the physical activity habits pre COVID-19 with the lockdown, results showed statistical significant decrease in exercising every-day

Table 2. Frequency of general questions

	Value
What is the main source of your health-related information?	
Websites & social media	332 (49.4)
Health professionals	104 (15.5)
TV	136 (20.2)
Friends & family	100 (14.9)
Did you experience any of the following negative effects of COVID-19?	
Death of a close relative	90 (13.4)
Infection and isolation of a close relative	272 (40.5)
Parent unemployment	54 (8.0)
None of the above	256 (38.1)
How often do you think or talk about COVID-19 and its negative effects	
Often	212 (31.5)
Sometimes	338 (50.3)
Rarely	88 (13.1)
Never	34 (5.1)

Table 3. Frequency of questions for nutritional habits

	Value
How do you describe the change in your weight during the lockdown?	
Increased	396 (58.9)
Decreased	86 (12.8)
No change	190 (28.3)
How do you describe your eating frequency during the lockdown?	
1–2	98 (14.6)
2–4	400 (59.5)
4–6	174 (25.9)

Table 4. Comparison between before & after questions for nutritional habits

	Before (N=672)	After (N=672)	Total (N=1,344)	χ^2	p value
How often do you have breakfast weekly?				253.8	<0.001 HS
Everyday	62 (9.2)	444 (66.1)	506 (37.6)		
3–5 days	138 (20.5)	112 (16.7)	250 (18.6)		
Less than 3	368 (54.8)	84 (12.5)	452 (33.6)		
Never	104 (15.5)	32 (4.8)	136 (10.1)		
	Before (N=336)	After (N=336)	Total (N=672)	χ^2	p value
Did the consumption of your food items change after the lockdown?				206.5	<0.001 HS
No	0	118 (17.6)	118 (8.8)		
I am more to homemade food	444 (66.1)	218 (32.4)	662 (49.3)		
I am more to delivered fast food	142 (21.1)	22 (3.3)	164 (12.2)		
I am more to dense food	58 (8.6)	210 (31.3)	268 (19.9)		
I am more to nutrition healthy food	28 (4.2)	104 (15.5)	132 (9.8)		

Chi-square test. HS, highly significant

from 33.3% to 8.9%, significant decrease in exercising 1–3 times/week from 56.3% to 38.4%, however those who did not exercise significantly increased from 10.4% to 52.7% ($p<0.001$). On the other hand, the time interval spent on TV and social media significantly increased from 24.4% to 37.5% (4–6 hours), from 6% to 32.7% (6–8 hours) while 17.3% reported spending 8–10 hours on TV & social media ($p<0.001$) (Table 6).

Regarding sleep, 50% reported increase in their sleeping habit, 31.8% reported no change while 45.2% stated no sleeping problems, 19% had a difficulty to fall asleep, 16.1% had a problem waking up during sleep, 11.9% had a problem waking up feeling tired, & 7.7% had a problem sleeping too much (Table 7). When comparing the sleep habits pre COVID-19 with the lockdown, results had shown significant decrease in the % of sleeping less than 7 hours from 41.4% to 5.4%, while there was significant increase in the % of sleeping more than 10 hours from 4.8% to 49.7% ($p<0.001$). On the other hand, the energy level status of being energized significantly decreased from 55.4% to 7.7%, and significantly increased in the lazy state from 3.6% to 54.8% ($p<0.001$) (Table 8).

Regarding stress and anxiety related problems, Spence Children Anxiety Scale with its 6 main domains was applied. A

T-score of 60 or above indicate elevated levels of anxiety. The mean of Generalized Anxiety T-score was 67.44, the mean of separation anxiety T-score was 62.49, the mean of Physical injury fears T-score was 61.16, the mean of social phobia T-score was 60.93, the mean of obsessive-compulsive disorder T-score was 59.98, while that of panic agoraphobia T-score was 58.72 respectively (Table 9).

DISCUSSION

COVID-19 pandemic has given rise to an unpredicted disruption in the health care process all over the world. Humanity is hoping that it may end up soon provided that an effective vaccine/treatment becomes available. Till then, preventive measures together with medical treatment are the only defending mechanisms.¹⁷

Effect of COVID-19 lockdown on children's weight is doubtful. Being home for long time together with decreased physical activities might lead to obesity, however, the economic adverse effects of the lockdown especially in developing countries, might affect the parent's income to secure adequate nourish-

Table 5. Frequency of physical activity questions

	Value
How do you describe the change in your physical activity during the lockdown	
Increased	98 (14.6)
Decreased	434 (64.6)
No change	140 (20.8)
How do you describe the change in time spent on computer/mobile/TV after the lockdown?	
Increased	584 (86.9)
Decreased	24 (3.6)
No change	64 (9.5)

Table 6. Comparison between before & after for physical activity questions

	Before (N=672)	After (N=672)	Total (N=1,344)	χ^2	p value
How often did u exercise?				153.8	<0.001 HS
No	70 (10.4)	354 (52.7)	424 (31.5)		
1–3 times/week	378 (56.3)	258 (38.4)	636 (47.3)		
Everyday	224 (33.3)	60 (8.9)	284 (21.1)		
In average how many hours do you spend on the TV/SS				263.2	<0.001 HS
2–4	468 (69.6)	84 (12.5)	552 (41.1)		
4–6	164 (24.4)	252 (37.5)	416 (31.0)		
6–8	40 (6.0)	220 (32.7)	260 (19.3)		
8–10	0	116 (17.3)	116 (8.6)		

Chi-square test. TV, television; SS, smart screens; HS, highly significant

Table 7. Frequency of sleep questions

	Value
How would you describe change in your sleeping habit during the lockdown?	
Increased	336 (50)
Decreased	122 (18.2)
No change	214 (31.8)
Do you currently have any sleeping problems?	
No	304 (45.2)
Yes, I have difficulty to fall sleep	128 (19.0)
Yes, I sleep too much	52 (7.7)
Yes, I wake up during sleep	108 (16.1)
Yes, I wake up feeling tired	80 (11.9)

Table 8. Comparison between before & after for sleeping questions

	Before (N=672)	After (N=672)	Total (N=1,344)	χ^2	p value
In average I sleep				220.6	<0.001 HS
Less than 7 hours	278 (41.4)	36 (5.4)	314 (23.4)		
7 to 10 hours	362 (53.9)	302 (44.9)	664 (49.4)		
More than 10 hours	32 (4.8)	334 (49.7)	366 (27.2)		
My energy level state is				272.2	<0.001 HS
Energized	372 (55.4)	52 (7.7)	424 (31.5)		
Neutral	276 (41.1)	252 (37.5)	528 (39.3)		
Lazy	24 (3.6)	368 (54.8)	392 (29.2)		

Chi-square test. HS, highly significant

Table 9. T-score descriptive analysis for spence children anxiety scale

Variable	N	Minimum	Maximum	Mean	Std. Deviation
Obsessive compulsive disorder T score	672	50	70	59.98	4.949
Social phobia T score	672	41	69	60.93	5.246
Panic agoraphobia T score	672	50	65	58.72	4.057
Separation anxiety T score	672	40	65	62.49	4.345
Physical injury fears T score	672	42	70	61.16	4.346
Generalized anxiety T score	672	50	69	67.44	5.997
Total SCAS T score		40	65	58.56	3.423

SCAS, Spence Children Anxiety Scale

ment to their children leading to under nutrition. Results in this study revealed 58.9% increased weight, 28.3% no change, and 12.8% reported decreased weight. In addition, 59.5% reported eating 2–4 meals/day, 25.9% reported eating 4–6 meals/day and 14.6% reported eating 1–2 meals/day.

This agrees with an Egyptian study¹⁸ that revealed increased body weight lockdown by 37.4%, weight loss by 20.1%, and 50% change in the sum of daily meals.

Similarly in Kuwait,¹⁹ there was an increased weight in participants during lockdown which was 4.5 times greater among unhealthy diet consumers.

Consistently in Poland,²⁰ 18% and 30% suffered from weight loss and gain respectively, while over 43.0% consumed more snacks. Similarly, a study conducted by Phillipou et al.²¹ revealed increased greediness in Australian children which reflects the changed eating behavior of children in both countries.

Results in this study showed increase in consuming healthy food from 4.2% to 15.5%, increase in consuming dense food from 8.6% to 31.3%, however there was decrease in the consumption of fast delivered food from 21.1% to 3.3% as well as decrease in the consumption of home-made food from 66.1% to 32.4%.

Similarly in UAE¹² the nutritional habits shifted to an unhealthy pattern rather than the healthy Mediterranean diet, in spite of preparing more homemade food yet more dense

foods were consumed.

Egyptian research²² conducted on school aged children revealed that skipped breakfast was always linked to obesity, however regular intake of school meals improved the cognitive functions, nutritional state, bone growth in addition to body weight.

In this study, when comparing the nutritional habits pre COVID-19 with the lockdown, results showed statistical significant increase in the habit of having breakfast daily from 9.2% to 66.1%, this may be one of the positive feedbacks of the lockdown that might improve children's health and wellbeing.

Results in this study revealed 64.6% decrease in the physical activity status, 20.8% reported no change however 14.6% reported increased physical activity.

This is concomitant with different research work showing that COVID-19 lockdown had a substantial influence on lifestyle behaviors worldwide, such as decreased sports involvement and exercising.^{23,24}

Social isolation and COVID-19 lockdown might lead to negative impacts on children's mental health, not only the direct influence of the virus but its unknown consequences anticipate stress, anxiety and even suicide.²⁵

Results of this study showed that children are prone to suffer from generalized anxiety disorder, separation anxiety, obsessive compulsive disorder, physical injury fears and social

phobia (T-score >60 in all those domains).

Similarly, another Egyptian study¹⁸ on Egyptian youth proved the presence of different grades of anxiety and depression.

Concomitant with a study in Spain²⁶ which was conducted during the first weeks of COVID-19 pandemic and revealed that many students suffered from variable degrees of depression and anxiety.

Similarly in China,²⁷ a study conducted on youth from 12–18 showed dominant symptoms of anxiety and depression following COVID-19 outbreak.

COVID-19 impacts the mental health of youth, among individual psychological symptoms, depressive symptoms were the most prevalent in most studies, followed by anxiety symptoms. The teachers or parents should also be vigilant to identify behavioral and emotional changes in their students or children during this time so that early management can be sought. Measures may also be taken up at the government and administrative level to screen vulnerable children, like those infected with COVID-19, or with COVID-19 affected family members/parents, or those with a family history of psychiatric illness.²⁸

The relation between depression and sleep is multiplex starting from sharing the same clinical manifestations to neurobiology. Depressive symptoms and sleep appear to be linked together in an abnormal pattern.²⁹

Studies have showed that almost 75% of children and adolescents with depressive manifestations suffer from sleep disruption, with over 50% suffer from insomnia.³⁰

Results of this study showed that 50% of the participants reported increase in their sleeping habit, 31.8% reported no change while 18.2% reported increased sleeping time interval. 45.2% stated no sleeping problems, 19% had a difficulty to fall asleep, 16.1% had a problem waking up during sleep, 11.9% had a problem waking up feeling tired, and 7.7% had a problem sleeping too much.

This agrees with Alamrawy et al.¹⁸ who revealed a sleep variation pattern during the COVID-19 pandemic that might contribute to psychopathology. Sleep problems make children vulnerable to anxiety and mood disorders.

A study conducted by Cheikh Ismail et al.¹² revealed a higher percentage of participants reporting poor sleep quality during the pandemic (28.1%) compared to before the pandemic (17.3) ($p < 0.001$), and sleep disturbances were also more common during the pandemic (60.8%) compared to before (52.9%) which agrees with the results of our study.

Sufficient sleep of good quality is extremely important for both growth and immunity of children. Therefore, internet mediated sleep intervention programs represent a future direction to reduce sleep problems in children as well as supporting the family wellbeing during the COVID-19 pandemic.³¹

Internet-assisted cognitive-behavioral therapy (ICBT) is a way to deliver cognitive-behavioral therapy (CBT) that has been found to generate similar effects as face-to-face CBT in some studies. Overall, clinician-assisted ICBT is becoming one of the most evidence-based forms of psychological treatment.³²

The European Academy for Cognitive Behavioral Therapy for Insomnia (CBT-I) mapped out practical sleep-related recommendations for infants and young children with sleep problems. They evaluated the long term effectiveness of a CBT-I program in school aged children with insomnia ranging from 5–10 years. These programs were parent focused, 80% of parents rated most modules as adequate, 74.9% found tips and tricks concerning sleep problem-solving helpful, and 91% found the group format very helpful. More than 50% rated the on-line format as comfortable.³³

The strengths of this research includes timing of data gathering one month after lockdown which minimizes the incidence of memory failure for previous habits. In addition, the questionnaire was given in both English and Arabic language to facilitate answering. However, the study had several limitations, first the cross sectional design of the study limits the possibility of temporality, in addition self-reported eating habits, sleep pattern and physical activity are less reliable than when being device based, they may be subjected to under or over estimation. Moreover, only articles written in English language were considered, some studies might have been missed. Also, we did not study the impact of COVID-19 on children with preexisting psychiatric/physical illness. Finally, no long term effects of the lockdown were detected.

To conclude, COVID-19 pandemic had a massive influence on children's health globally, in many aspects whether medical, physical or psychological. All these intimations have to be highlighted and dealt with clearly to avoid both short/long-term sequel. Future research addressing long term sequel of COVID-19 lockdown as well as vaccination of children and their parent's acceptance should be continued in further research.

Availability of Data and Material

The datasets generated or analyzed during the study are available from the corresponding author on reasonable request.

Conflicts of Interest

The author has no potential conflicts of interest to disclose.

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