

influence quality of sleep which is identified to endanger immune function that is a vital aspect for pertaining to COVID-19 [8].

A balanced diet comprising a variety of vitamins and minerals, together with healthy lifestyle factors such as sufficient sleep and exercise and low stress, most efficiently primes the body to combat infections and diseases.

The present study aimed to assess how mothers managed their children at home during the first wave of COVID-19 lockdown as regards health practices such as, hand washing, eating behaviors, and their daily lifestyle such as physical activity, screen time, and sleep during the first wave.

Design and Methods

Study subjects

An online survey (using a Google form) was conducted during the lockdown of the first wave of the pandemic and the nationwide quarantine due to COVID-19 during the period from May 17, 2020, to the June 01, 2020 to explore the status of health practices of children and adolescents during the lockdown.

Inclusion criteria

The following criteria were include in the study:

Mothers whose children <18 years of age and agreed to participate in the study.

Exclusion criteria

The following criteria were excluded from the study:

Mothers who have no children under 18 years old, mothers did not complete the survey, and mothers who refused to participate in the study. As it was not feasible to do a community-based national sampling survey during this distinct period, the researchers decided to assemble the data online.

Specific questionnaire forms were prepared with different questions that fulfill the objective of the study by one of the team members. Questionnaire forms were reviewed by two researchers to assess the suitability, clarity, and appropriateness of the questionnaire. A brief description of the study, its objectives, and the assertion of confidentiality were given to the participants before starting the study. Confidentiality was asserted by giving a specific code to every participant. The participants (250 mothers) completed an online questionnaire following their agreement to contribute in the study.

Ethical approval

The study was in full compliance with the rules and regulations of the Ethical Committee of the Medical Research Unit of the National Research Center, Egypt. Approval number was 20094.

The structured questionnaire included different parts:

1. Sociodemographic characteristics of mothers and their husbands, including their education and occupations. Children (576 child) were classified to three age groups (<5 years of age, 5–<12 years, and 12–<18 years of age)
2. Hand washing behaviors in different circumstances, and how to protect themselves and others from infection with COVID-19 as recommended by the WHO, and centers for diseases control and prevention, 2020 [9], [10]. Answers were categorized as follow: always, sometimes, and never
3. Mothers, practices of shopping, and eating behaviors during COVID-19 lockdown were explored
4. Dietary supplements used by mothers and their children (especially vitamins C, D, and zinc) during COVID-19 lockdown were detected
5. Drinking water, physical activity, screen time, and setting a specific time to go to bed were also involved in the questionnaire.

Data processing and statistical analysis

All data were extracted by excel forms then transformed to SPSS to facilitate the analysis. Descriptive analysis for all variables was performed as frequency and percentage. Impact of mothers, and fathers, education and job on children, and behaviors were tested using Chi-square test.

Results

Sociodemographic characteristics

All respondents mothers were <50 years old, and as regards to their children (n=576), 43.4% of them were between age of 5 and <12 years (Table 1).

COVID-19 and hand washing behaviors

Our results showed that 96% of the respondent mothers were talking with their children about COVID-19 pandemic. A higher percentage of respondent mothers (83.6%) reported that their children always washed their hands with soap and water when their hands are visible dirty; meanwhile, the percentage decreased to 62.8% when their hands are not visibly

Table 1: Sociodemographic characteristics of the study participants (n = 250)

Variable	Number	Percent
Mothers age groups (years)		
25-<35	101	40.4
35-50	149	59.6
Children age group (years) (n = 576)		
<5	189	32.9
5-<12	250	43.4
12-<18	137	23.7
Marital status of mothers		
Married	241	96.4
Divorced	6	2.4
Widow	3	1.2
Educational level of mother		
Pre-university	12	4.8
University	150	60.0
Post university	88	35.2
Mother's occupation		
Governmental sector	96	38.4
Private sector	51	20.4
Free work	12	4.8
No work	91	36.4
Educational level of father (n = 247)		
Pre-university	11	4.4
University	178	71.2
Post University	58	23.2
Father's occupation (n = 247)		
Governmental sector	90	36.0
Private Sector	106	42.4
Free work	45	18.0
No work	6	2.4

*Pre-university: Primary, preparatory, and secondary education. *University: After secondary education. *Post university: Post graduate.

dirty. About 20% of the respondent mothers mentioned that their children cleaned their hands using alcohol-based hand rub when their hands are not visibly dirty, as shown in Figure 1.

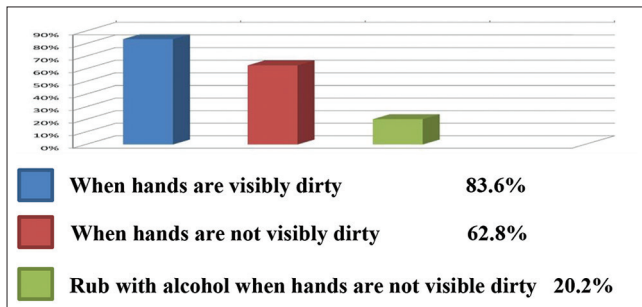


Figure 1: Hand washing behavior of children during COVID-19 lockdown

The daily hand washing practices by children are shown in Table 2.

Table 2: Daily hand washing practices by children as reported by mothers (n = 250)

Variable	Always		Sometimes		Never	
	No.	Percent	No.	Percent	No.	Percent
My children wash their hand with soap and water						
After playing with animals	61	24.4	16	6.4	9	3.6
After coughing or sneezing	61	24.4	129	51.6	60	24.0
Before, during, and after preparing food	179	71.6	56	22.4	15	6.0
Before eating	149	59.6	80	32.0	21	8.4
After toilet use	215	86.0	28	11.2	7	2.8

Practices performed by children and adolescents to protect others from getting sick are shown in Table 3.

Results revealed that father's job had a significant association with hand washing practices of their children (p=0.024), while the other sociodemographic variables had no effects, as shown in Table 4.

Table 3: Children's practices to protect others from getting sick

Variable	Yes		Sometimes		No	
	No.	Percent	No.	Percent	No.	Percent
For every child, his/her own personal utensils	156	62.4	65	26.0	29	11.6
Children avoid shaking hands, hugging or kissing any person	133	53.2	98	39.2	19	7.6
Children on coughing or sneezing, they cover their mouth, and nose with flexed elbow or tissue	152	60.8	87	34.8	11	4.4
Children throw tissue into closed bin immediately after use	203	81.2	38	15.2	9	3.6
Children clean hands with alcohol based hand rub or soap and water after sneezing or coughing	92	36.8	105	42.0	53	21.2
Children did not spit on the ground	231	92.4	8	3.2	11	4.4

Table 4: Relationship between father's occupation and hand washing practices of children when hands were visible dirty

Hand washing	Father's job				p-value
	Governmental sector (%)	Private sector (%)	Free job number (%)	No work number (%)	
Always	81 (90)	89 (84)	35 (77.8)	3 (50.0)	0.024
Sometimes	7 (7.8)	17 (16.0)	10 (22.2)	3 (50.0)	
Never	2 (2.2)	0 (0.0)	0 (0.0)	0 (0.0)	

Shopping practices and eating behaviors during COVID-19 lockdown

The study showed that 74.4% of the mothers stopped buying prepared food from outside, and 88% of them were keen to prepare healthy meals for their families. More than one quarter of their children shared them in food preparation, as shown in Table 5.

Table 5: Shopping practices and eating behaviors during COVID-19 pandemic

Variable	Yes		Sometimes		No	
	No.	Percent	No.	Percent	No.	Percent
Did you stop buying prepared food from outside?	186	74.4	41	16.4	23	9.2
Did you lessen times for going to shopping?	245	98.0	0	0	5	2.0
Did you prepare your meals at home?	245	98.0	5	2.0	0	0
Did your children share in the buying process?	12	4.8	32	12.8	206	82.4
Did your children share in setting the table for eating?	178	71.2	58	23.2	14	5.6
Did your children share in food preparation?	69	27.6	114	45.6	67	26.8
Are you keen to prepare healthy meals to your children?	220	88.0	29	11.6	1	0.4
Are you keen that your children eat salad every day?	154	61.6	85	34.0	11	4.4
Did all the family eat together?	220	88.0	26	10.4	4	1.6

The most frequent food items consumed by the whole family 1 week before the survey were eggs (90.8%), garlic (80.4%), onions (94.4%), oranges (40.4%), strawberries (44.4%), and bananas (56%). On the other hand, green leafy vegetables as spinach and broccoli were consumed by small number of families (9.2%, and 8.4%, respectively).

Dietary supplements use during COVID-19 lockdown

Dietary supplement use (always) by mothers and their children was 41.6% versus 38.3%, respectively. The highest percentage of those children who took dietary supplements was among those aged 6-12 years. The most frequent dietary supplements

used were zinc, vitamins D, and C (14.0%, 20.8%, and 24.0%, respectively), as shown in Figures 2 and 3.

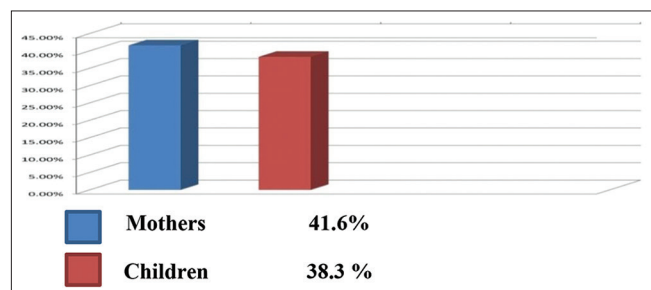


Figure 2: Dietary supplements intake during COVID-19 lock down

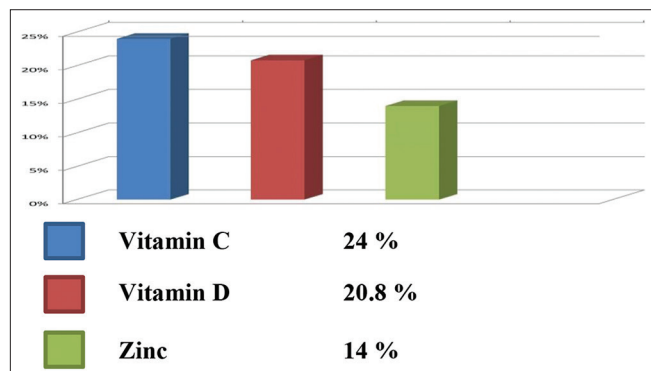


Figure 3: Most frequent dietary supplements used by children during COVID-19 lock down

Going outside during COVID-19 lockdown

About 6% of the respondent mothers mentioned that their children were always getting outside home during COVID-19 pandemic, whereas 52.8% of mothers sometimes allowed their children to go outside, while 41.2% of mothers did not allow their children to go outside home during the pandemic. Wearing masks was always practiced by 42.8% of children who went outside during the pandemic against 31.3% who did not wear.

Daily life practices of children during COVID-19 quarantine

Drinking enough water was practiced by 78% of the studied children as reported by their mothers. Meanwhile, 39.2% of them did not practice any physical activity. More than one quarter (27.2%) of the children had no chance for sun exposure. Mothers reported that they could not limit the screen time for their children (28.3%). As regards to sleeping behaviors, only 32% of the respondent mothers succeeded in setting a specific time for their children to go to bed, though 84% of them stated that their children slept 8 h per day, as shown in Table 6.

Discussion

The COVID-19 pandemic has conducted evident changes to health and social behaviors [8].

Table 6: Daily life practices of children during COVID-19 quarantine

Variable	Yes		Sometimes		No	
	No.	Percent	No.	Percent	No.	Percent
Sun exposure	78	31.2	104	41.6	68	27.2
Practicing any physical activity	62	24.8	90	36.0	98	39.2
Enough water intake	196	78.4	53	21.2	1	0.4
Limited screen time	108	43.2	71	28.4	71	28.4
Did you set a specific time for going bed?	80	32.0	77	30.8	93	37.2
Did your children sleep 8 h per day?	210	84.0	30	12.0	10	4.0

Our study showed that more than 75% of the included children were <12 years. This means that their mothers were responsible for their education about hygiene, their nutrition, and how to protect themselves from getting infected with COVID-19 virus.

Our study showed that most of the enrolled mothers talked with their children about COVID-19. This is in agreement with the WHO guidance which recommended discussion of COVID-19 with children in a truthful and age-appropriate way. Silence and secrets do not protect the children. This will help alleviate the emotional feelings as sadness and fear from children and feeling safe in their community [11].

Mothers reported that their children washed their hands using soap and water when they were visibly dirty (83.6%), while 62.8% of mothers reported that their children cleaned their hands by soap and water when their hands were not visibly dirty. Our results were higher than those reported by Chen *et al.*, 2020 who found that 42.05% of primary school students showed a good behavior of hand washing [12]. In regards to hand washing after going to the toilet, our results were similar to that reported by Mohammed and Khameis, 2020, who reported that 83.7% of the respondents in their study washed their hands after using the toilet [13]. Additionally, in regards to hand washing after sneezing and coughing, our results were less than that reported by Mohammed and Khameis, 2020, who reported that 33.3% of the respondents in their study washed their hands after sneezing and coughing [13]. Previous studies have stated that a proper hand washing intervention could disrupt the cycle of transmission and decrease the risk between 6% and 44% [14]. Therefore, hand hygiene education is curiously valuable in avoiding infectious diseases particularly for young children. Consequently, family hygiene education should be conducted depending on children’s cognitive ability. Parents must increase the level of self-protection alertness and make themselves disciplined [12]. Hence, hand washing is a key to retain children well.

Our study showed that the majority of the participated children showed good hygiene behaviors such as not spitting on the ground, avoided shaking hands, or kissing any person, they covered their mouth and nose with flexed elbow or tissue on coughing or sneezing, to protect others from getting sick. The well-known ways of transmission of COVID-19 are droplet and contact transmission [15]. Consequently, the

prevention is constantly more significant than treatment in infectious diseases, particularly for such a very contagious virus as COVID-19.

Practices of shopping and eating behaviors have altered through COVID-19 pandemic. It is advocated to lessen visits to the supermarket by arranging meals [16]. This was the case in our study. A number of the respondent mothers stated that their children shared in food preparation. Our results were in agreement with Raja, 2021 who reported that 96.1 % of the parents prepared food at home during the lockdown [17]. Furthermore, an Italian survey showed that during the lockdown, Italians have more preference to cook and the intake of homemade desserts, pizza, and bread has increased, while the intake of processed meat, snacks, sugary, and carbonated drinks has declined [18]. Philippe *et al.*, in 2021, stated that parents cooked more with their children during lockdown [19]. During regular daily life, several individuals frequently do not have the time to make home-cooked meals. Staying for a long period of time at home during COVID-19 lockdown may provide the opportunity to prepare those recipes that individual formerly did not have time to make using items with less preservatives and additives. Spending more time at home during this period may also offer novel prospects to involve children in cooking healthy foods that can aid them to obtain significant life skills that they can convey into adulthood [20]. Furthermore, COVID-19 lockdown made many families spending more time at home, which give new chances to share meals together. Family meals are a significant chance for parents to be role models for eating healthy food, and for boosting family bonds [20].

A lower percentage of the respondent mothers stated that their children were getting outside home during COVID-19 pandemic, and 42.8% of them wore masks. These results were less than what was reported by Chen *et al.*, 2020, who found that 51.6% of the primary school students had a good behavior of mask-wearing [12]. Getting outdoors is a preferred past time of adults and children similarly, but with the continuing COVID-19 pandemic, parents are confronted with handling how to have a good time being outside while protecting their family's health. As the virus spread primarily through respiratory droplets, people may become infected by touching their mouth, nose, or eyes after touching surfaces contaminated with the virus [21]. To safely enjoy spending time outdoors, people should follow the precautions, for example, wearing a mask, keeping at least one meter away from each other, regularly washing hands, trying to avoid peak times and crowded settings, and take roads that are less congested whenever probable [21].

The majority of the participated mothers were keen to prepare healthy meals to their children and they were also keen that their children ate salad every day. As there is no evidence-based treatment for COVID-19 and the current proof proposes that the only justifiable way to live in the current state is to reinforce the immune

system; therefore, the intake of optimum nutrient through well-balanced meals and the usage of good hygiene habits is possibly the utmost efficient attitude for handling the continual risk of viral infection [5]. A bidirectional correlation presents between nutrition and infection, whereby poor nutritional state disposes one to infection and where infection is aggravated by a poor nutritional state. As a result, malnutrition diminishes the immune response of the body and increases vulnerability to infection [22]. Micronutrients (vitamins and minerals) have a significant role in the function of the immune system. Sufficient consumptions of these micronutrients can be got through a daily diet that contains fish, meat, beans and lentils, dairy foods, eggs, strawberries, citrus fruits (e.g., orange and lemon), and vegetables such as spinach and carrots [5]. Moreover to the significance of nutrition in the prevention of COVID-19, nutritional status has a fundamental role for optimum prognosis and can govern the clinical severity of COVID-19 in individuals infected with SARS-COV-2 [23]. Although, in the present scenario, COVID-19 has executed a new set of challenges for the individual to sustain a healthy diet. Self-isolation and lockdown measures may impede the access to fresh food that may lessen the chances to continue eating a healthy diet [20]. There is no single food that will prevent from contracting COVID-19, but eating foods from a diversity of food groups will often be adequate to gain a healthy and balanced diet [22], which assure a robust immune system that is capable to combat the virus [24]. Hence, the role of nutritional status cannot be overpassed.

Mothers were keen that their children got enough water intakes. Similarly, Raja, in 2021, found that 64.8% of children drank enough water during COVID-19 lockdown [17]. Direct relationship between hydration and health has been formerly affirmed. Dehydration can lead to enhanced production of the stress hormone cortisol, which is related to immune suppression [25]. Good hydration supports the body's immune function. Thus, recommendation for the significance of drinking water, milk, tea, and consuming other food containing water has to be conveyed by healthcare professionals and dietitians through the COVID-19 pandemic [5].

Consumption of dietary supplements by mothers went in parallel with their children. They were used after physician's consultation. Hanbazaza and Wazzan, in 2021, found that 23% of the children administered supplements during COVID-19 which be considered lower than our results [26]. Micronutrients participate to the function of the immune system through a variability of pathways in both innate and adaptive immune responses. Vitamins C and E, alongside with zinc and selenium, defend against free radical damage during intensification of oxidative stress. In addition, these nutrients have an effect on the antibody production and function. At present, they have antimicrobial activity and control the inflammatory response [27]. It was proposed that vitamin D could have an important role in decreasing the risk of COVID-19 [28]

as well as probable severe consequences of COVID-19 [29].

Therefore, dietary supplements have to be provided to individuals who actually have deficiencies of micronutrients, for example, some individuals in whom, diet only might not be adequate to attain the consumption of these nutrients [22].

About one-third of the respondent mothers succeeded in setting a specific time for their children to go to bed, though 84% of them stated that their children slept 8 h per day. More than a quarter of the participated mothers could not limit screen time. This is in agreement with other studies.

Increased free time for the youth has led to increased leisure screen time and social media than before the COVID-19 outbreak in Canadian children and youth [30], and Indian adolescent [31]. Furthermore, Hanbazaza and Wazzan, in 2021, found that 75% of the parents reporting their children spending 3 h or more time playing video games during COVID-19 curfew [26]. Fibit, in 2020, also reported an alteration in patterns of sleep from their global community. They disclosed that people are going to bed later and attaining more sleep than usual since the COVID-19 outbreak [32]. An ominously later bedtime in quarantine was seen more obvious in young people; the time to get up was also later in confinement. Furthermore, there was increased use of screens in the evening [33].

Sleep has an important effect on the immune system through the action of centrally produced cytokines that are adjusted during sleep, so insufficient sleep has been associated with suppressed immune function [1]. A current review accomplishes that not only the risk of infection but also the severity of infection with SARS-COV-2 are affected by the quality of sleep [34]. Therefore, it is important to maintain a proper quality of sleep in containment to sustain immune function.

More than one-third of the participated mothers stated that their children did not practice any physical activity, and more than a quarter of them reported that their children have no chance for sun exposure during COVID-19 quarantine. This is in agreement with other studies. Hanbazaza and Wazzan, in 2021, and Maximova *et al.*, in 2022, reported that the majority of children had a decrease in physical activity during COVID-19 lockdown [26], [35]. Furthermore, Hartley *et al.*, in 2020, reported that exposure to daylight has declined to <1 h per day through quarantine [33].

Lessening in physical activity and increased sedentary behaviors through COVID-19 confinement could be related to a greater degree of adverse consequences, for example, impairment of immune function, poor quality of sleep, and lower well-being [36]. Consequently, the significance of physical activity through COVID-19 lockdown and sustaining the recommended levels of exercise has been lately highlighted to alleviate the harmful outcomes of

physical inactivity on the immune system [1]. Parents should start novel activities and hobbies and motivate their children to play and be active while following rules on physical distancing [30].

Diminished exposure to sunlight during COVID-19 confinement could lessen levels of vitamin D which is chiefly produced endogenously through exposure of the skin to ultraviolet B irradiation [37]. Vitamin D deficiency has been related to vulnerability to infection, mostly respiratory infections [38].

Strengths and limitations of the study

The strengths of the present study are the inclusion of different health behaviors for children and their mothers, and the timing of data collection relative to lockdown. The main limitation of the present study was that, people were not acquainted to this type of research, so there was a great disagreement to participate from the start in spite of the great effort done by all team members to communicate with the mothers. Furthermore, we could not reach to participants with different socioeconomic status.

Conclusion

This study demonstrated that COVID-19 pandemic has resulted in substantial alterations in daily life and health behaviors for children and their families as a result of measures of restrictions. These modifications comprised hand washing practices, food hygiene, dietary habits, social life, alterations in bed time and walking up, reduced physical activity, insufficient exposure to daylight, and incapability to limit screen time.

Recommendation

It is emphasized to sustain good hand washing behaviors and making it a social custom during COVID-19 and beyond. Furthermore, a balanced and healthy diet is significantly needed through the existing situation to guarantee a healthy immune system. Parents should continue to set routines for their children, embracing regular sleep and wake times, and supervised time for screens, and they should integrate physical activity into the daily routine of children. More studies about the influences of dietary supplements on effects related to COVID-19 are needed.

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