

## Impact of E-learning on Pediatric Lifestyle during Covid-19 Pandemic

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### ABSTRACT

**Background:** Coronavirus 2019 (COVID-19) has a global effect on our lifestyle, especially while lockdown. E-learning becomes essential worldwide to limit the pandemic. In this circumstance children tend to spend more time using the Internet for studying purposes and entertainment, subsequently, the prevalence of obesity increased from 8.9% to 11.5%. Furthermore, a study was accomplished in Switzerland. 75 percent of children, and up to 100 percent of adolescents have a tendency to utilize screen time, throughout detention, and the proportion of children who engage in less than two hours of light physical activity each day has doubled. There are insufficient studies performed in Saudi Arabia so we endeavored to decline the negative impact of E-learning on children's lifestyles.

**Aim:** To determine the Impact of E-learning on pediatric lifestyle during COVID-19 pandemic.

**Methodology:** A community-based cross-sectional study will conduct from December 2021 to February 2022 in the Kingdom of Saudi Arabia at primary health care centers and the data will be entered into an Excel sheet and analyzed by SPSS.

**Results:** After data is analyzed by SPSS, all results will be displayed

Properly using frequency distributions for categorical variables mean with SD or median for scale data.

**Conclusions:** After the study result.

**Key words:** COVID-19, Saudi Arabia, Contagious disease

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### INTRODUCTION AND LITERATURE REVIEW

Coronavirus 2019 (COVID-19) is a contagious disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). COVID-19 is causing substantial morbidity and mortality, straining health care systems. On March 11, 2020, World Health Organization considered COVID-19 a pandemic. In Saudi Arabia, the Ministry of Health imposed a lockdown to contain the spread of the virus by closing economic, social, and educational activities. As a result of the lockdown,

education has changed dramatically. E-learning became an alternative to traditional education in Saudi Arabia as well as other countries, whereby teaching is undertaken remotely and on digital platforms with the help of electronic resources accompanied by differences in time attendance on these platforms where some students attended morning and others evening.

This situation pushed Children to spend more time indoors using electronic media both for education and recreation and more sedentary time because of fewer opportunities to engage in physical activity without school activities. In addition to that, disturbance in sleeping hours and eating habits.

According to our literature review; we found that Body mass index (BMI) during COVID-19 Lockdown has increased among all participants from

17.32 to 17.80 kg/ m<sup>2</sup> [1]. and from 21.07 to 21.57 kg/ m<sup>2</sup> [2]. Students when asked if they had gained or lost

weight during this time, 37.1 percent said they had gained weight. Also, the prevalence of obesity increased from 8.9% to 11.5%, and the prevalence of overweight increased from 23.3% to 28.7%. Which occurred during the two summer vacations; no increase occurred during any of the three school years. In August 2020, a survey was performed in the emergency department of the University Hospital in Lausanne, Switzerland. 40% of children said they ate and snacked more than usual while confined. For 75 percent of children, and up to 100 percent of adolescents, screen time surged. During confinement, the proportion of children who engaged in less than 2 hours of light physical activity each day doubled [3]. Furthermore, an international survey of 820 adolescents conducted in Italy, Spain, Chile, Colombia, and Brazil found a significant increase in fried and sweet food consumption during COVID-19 restrictions, as well as a higher adherence to unhealthy food among adolescents whose mothers had a low education level [4]. Moreover, A survey of 41 obese children aged 6 to 18 years was undertaken in Italy over the course of three weeks of home confinement. It was discovered that during the lockdown, consumption of potato chips, red meat, and sugary drinks climbed dramatically, while time spent participating in sports was reduced by 2.3 hours per week, and screen time increased by 4.8 hours per day [5]. While during the COVID-19 lockdown, the prevalence of children who worsened their lifestyle behaviors was 95.2 percent for physical activity, 69.8% for screen usage, and 31.4 percent for adherence to the Mediterranean diet, respectively [6]. People of all ages and genders experienced significantly delayed sleep onset and wake-up times during lockdown, with an average between 22:00 and 00:00 before lockdown, but it lasted lengthy between 02:00 and 04:00 during the lockdown. Additionally, According to Ranjbar's findings, 13.4% of students slept 5 or fewer hours per day, 13% slept 6 to 8 hours per day, 12.8% slept 9 to 10 hours per day, 7.3 percent slept 11 to 12 hours per day, and 53.5 percent slept more than 12 hours per day. The average amount of time spent sleeping each day was 7.87 hours [7-10].

In our study, we attempted to determine the Impact of E-learning on pediatric lifestyle due to school closure during the COVID-19 pandemic, by assessing changes in childhood weight, sleeping hours, eating habits, and physical activity. and identify interventions to reduce the negative impact.

### Justification

The distinctive rise of E-learning because of the Covid-19 pandemic and the future role of E-learning in the educational process, push us to search for the negative health impacts on children of such type of learning. Through this study, we seek to identify these impacts, whether temporary or permanent, and how to prevent them.

### Study objectives

#### General objective

To determine the Impact of E-learning on pediatric lifestyle during the COVID-19 pandemic.

### Specific objectives

To assess the sleeping and eating habits changes during COVID-19.

To assess the physical activity changes during COVID-19.

To correlate lifestyle changes with E-learning.

## METHODOLOGY

### Study design

It was a community-based cross-sectional study to assess the Impact of E-learning on pediatric lifestyle during the COVID-19 pandemic.

### Study area

The study will be conducted in the Kingdom of Saudi Arabia at primary health care centers. The Kingdom of Saudi Arabia occupies about four-fifths of the Arab Peninsula, with a total area of around 2,000,000 square kilometers, and a population of 34.81million people.

### Target population

Targeting Saudi parents of children male and female between 7-15 years old in the Kingdom of Saudi.

### Study time period

For three months from December 2021 to February 2022.

### Sampling

The Sample size of this cross-sectional study was determined by using online statistical calculator software (Raosoft®, Inc). A sample size of 8,556,493 Saudi children was calculated to achieve a 95% confidence interval with a margin of error of 5%, which is 385 children.

### Data collection

The data was collected by the investigators themselves using an online form to conduct the questionnaire. The online survey is made based on previous studies, which will be filled by targeting parents of children aged 7-15 years old after reading the written consent form and explicitly agreeing to take part in the study to collect the data to identify the Impact of E-learning on pediatric lifestyle during COVID-19 pandemic.

### Data analysis

The data was analyzed using SPSS 23.0 mean  $\pm$  S. D was given for quantitative variables like age. Frequencies and percentages were given for qualitative variables. Pearson chi-square and /or fisher exact test was applied to observe associations between qualitative variables. A P-value of <0.05 will be considered as statically significant.

### Statistical considerations

The Sample size of this cross-sectional study was determined by using online statistical calculator software (Raosoft®, Inc). A sample size of 8,556,493 Saudi children was calculated to achieve a 95%

confidence interval with a margin of error of 5%, which is 385 children.

**Ethical consideration**

Informed consent will be obtained from all participants; there will be no physical, emotional, or mental harm to the participants. Confidentiality, respect, and dignity will be maintained throughout the research process. All data will be saved in an excel file and ensured by password only co investigates will have access.

**RESULTS**

A total of 857 participants were included in the current study; females were slightly dominant with a percentage of 440 (51.3%). The majority of children were in the age range of 7-12 years, and most of them, 676 (78.9%), were from the Middle region. More than one-half of the children, 544 (63.5%), were originally from a city. The majority of children were in primary school 766 (89.4%); Table 1 shows the demographics of children.

A few proportions, 165 (19.3%), reported that Morning was the time of learning, whereas the largest proportion, 692 (80.7%), reported Evening. More than one-half of children, 562 (65.6%), reported spending 4-6 hours with smart devices for learning, whereas 228 (26.6%) reported the same duration but for playing and watching. Physical activity decreased among 453 (52.9%) and increased among 201 (23.5%), while it was unchanged among 203 (23.7%). The largest proportion, 343(40%), reported physical activity before the pandemic as 1-3times/week, whereas after the pandemic, the largest proportion, 410 (47.8%), reported no change. More than one-half of children, 464(54.1%), spent more than one hour on physical activities before the pandemic, whereas 689(80.4%) spent less than one hour after the pandemic.

There were 720 (84%) reported changes in sleep habits during the pandemic, and there were 346 (40.4%) reported sleep disturbance during the pandemic. There

were 574 (67%) reported sleeping 7-9 hours before the pandemic, and 408 (47.6%) reported 7-9 hours during the pandemic. More than one-half 534 (62.3%) reported sleeping after midnight during the pandemic, whereas before the pandemic, 475 (55.4%) were going to sleep from 7-9 pm.

The number of main meals during the pandemic increased by 291 (34%), and more than one-half 467 (54.5%) reported eating fast food mainly during the pandemic. One- half of children showed a decrease in weight during the pandemic 448 (52.3%), and 409 (47.7%) reported increased weight. More than one-half reported an increase in the number of snacks during the pandemic 446 (52%). Also, more than one-half of children 247 (55.4%) reported an increase in weight in a range of 1-3Kg. Almost one-half of children, 430 (50.2%), reported new body pains during the pandemic. Only 82 (9.6%) and 48 (5.6%) agreed and extremely

**Table 1: Description of demographic data of children.**

Variables	Description (n=857)
Child's gender	
Male	417 (48.7)
Female	440 (51.3)
Child's age	
7-12 years	785 (91.6)
13-15 years	72 (8.4)
Region	
Middle	676 (78.9)
North	28 (3.3)
South	66 (7.7)
East	44 (5.1)
West	43 (5)
Residence	
City	544 (63.5)
Village	313 (36.5)
Educational level	
Primary	766 (89.4)
Intermediate	91 (10.6)

**Table 2: Habits and lifestyles of children during COVID-19.**

Time of classes during COVID-19 pandemic	
Morning	165 (19.3)
Evening	692 (80.7)
Time spent on smart devices during E-learning classes	
1-3 hrs	181 (21.1)
4-6 hrs	562 (65.6)
>6 hrs	114 (13.3)
Time spent on smart devices for playing or	
1-3 hrs.	430 (50.2)
4-6 hrs	228 (26.6)
>6 hrs	199 (23.2)
Did you notice any change in your child's physical activities during COVID-19 pandemic and E- learning period	
Increased	201 (23.5)
Decreased	453 (52.9)
No change	203 (23.7)
How frequently does your child do physical activities before COVID-19 pandemic and E-learning period	

No change	196 (22.9)
1-3 times/week	343 (40)
4-6 times/week	226 (26.4)
>6 times/week	92 (10.7)
How frequently does your child do physical activities during COVID-19 pandemic and E-learning period	
No change	410 (47.8)
1-3 times/week	348 (40.6)
4-6 times/week	62 (7.2)
>6 times/week	37 (4.3)
How many hours does your child spend on physical activities before COVID-19 pandemic and E-learning period?	
<1hr	393 (45.9)
>1hr	464 (54.1)
How many hours does your child spend on physical activities during COVID-19 pandemic and E-learning period?	
<1hr	689 (80.4)
>1hr	168 (19.6)
Do you feel that your child's number of main meals changed during COVID-19 pandemic and E-learning period?	
Increased	291 (34)
Decreased	285 (33.3)
No change	281 (32.8)
Do you feel that your child's eating type has changed during COVID-19 pandemic and E-learning period	
Fast food mainly	467 (54.5)
Healthy food mainly	109 (12.7)
No change	281 (32.8)
Did you notice any change in your child's sleep habit during COVID-19 pandemic and E-learning period	
Yes	720 (84)
No	137 (16)
How many total hours does your child spend while sleeping before COVID-19 pandemic and E-learning period?	
<7 hrs.	104 (12.1)
7-9 hrs.	574 (67)
9-13 hrs.	170 (19.8)
>13 hrs.	9 (1.1)
Did you feel that your child is having sleeping disturbances more during COVID-19 pandemic and E-learning period as compared to before?	
Yes	346 (40.4)
No	511 (59.6)
Have you noticed any change in your child's weight during COVID-19 pandemic and E-learning period	
Increased	409 (47.7)
Decreased	448 (52.3)
No change	0 (0)
Have you noticed that your child started to have a new complaint of any pain during COVID-19 pandemic and E-learning period?	
Yes	430 (50.2)
No	427 (49.8)
How much do you rate your satisfaction with your child changes during COVID-19 pandemic and E-learning period?	
Extremely disagree	302 (35.2)
Disagree	319 (37.2)
Neutral	106 (12.4)
Agree	82 (9.6)
Extremely agree	48 (5.6)
Do you feel that your child's number of snacks changed during COVID-19 pandemic and E-learning period?	
Increased	446 (52)
Decreased	78 (9.1)
No change	333 (38.9)
Amount of increase in weight during COVID-19 pandemic during COVID-19 pandemic and E-learning period?	
1-3 Kg	247 (55.4)
4-6 Kg	158 (35.4)
>6 Kg	41 (9.2)
Time to go to bed during COVID-19 pandemic and E-learning period	
7-9 pm	98 (11.4)
10 pm-12 am	225 (26.3)
After 12 am	534 (62.3)

How many total hours does your child spend while sleeping during COVID-19 pandemic and E- learning period?		
<7 hrs.	182 (21.2)	
7-9 hrs.	408 (47.6)	
9-13 hrs.	250 (29.2)	
>13 hrs.	17 (2)	
Time to go to bed before COVID-19 pandemic and E-learning period?		
7-9 pm	475 (55.4)	
10 pm-12 am	301 (35.1)	
After 12 am	81 (9.5)	

**Table 3: Relations of school time.**

	Time of classes		P-value*
	Morning	Evening	
Time spent on smart devices during E-learning classes			
1-3 hrs.	25 (15.2)	156 (22.5)	0
4-6 hrs.	102 (61.8)	460 (66.5)	
>6 hrs.	38 (23)	76 (11)	
Have you noticed that your child started to have a new complaint of any pain during COVID-19 pandemic and E-learning period?			
Yes	84 (50.9)	346 (50)	0.834
No	81 (49.1)	346 (50)	
How much do you rate your satisfaction with your child changes during COVID-19 pandemic and E-learning period			
Extremely disagree	44 (26.7)	258 (37.3)	0.098
Disagree	65 (39.4)	254 (36.7)	
Neutral	26 (15.8)	80 (11.6)	
Agree	18 (10.9)	64 (9.2)	
Extremely agree	12 (7.3)	36 (5.2)	
Did you notice any change in your child's physical activities during COVID-19 pandemic and E-learning period			
Increased	36 (21.8)	165 (23.8)	0.836
Decreased	88 (53.3)	365 (52.7)	
No change	41 (24.8)	162 (23.4)	
How frequently does your child do physical activities before COVID-19 pandemic and E-learning period			
No change	38 (23)	158 (22.8)	0.459
1-3 times/week	61 (37)	282 (40.8)	
4-6 times/week	51 (30.9)	175 (25.3)	
>6 times/week	15 (9.1)	77 (11.1)	
How frequently does your child do physical activities during the COVID pandemic			
No change	79 (47.9)	331 (47.8)	0.99
1-3 times/week	68 (41.2)	280 (40.5)	
4-6 times/week	11 (6.7)	51 (7.4)	
>6 times/week	7 (4.2)	30 (4.3)	
How many hours did your child spend in sports and movement activities before COVID-19 pandemic?			
<1hr	76 (46.1)	317 (45.8)	0.954
>1hr	89	375	
How many hours did your child spend in sports and movement activities during the day of COVID-19 pandemic?			
<1hr	135 (81.8)	554 (80.1)	0.609
>1hr	30 (18.2)	138 (19.9)	
Do you feel that your child's number of main meals changed COVID -19 pandemic			
Increased	68 (41.2)	223 (32.2)	0.031
Decreased	42 (25.5)	243 (35.1)	
No change	55 (33.3)	226 (32.7)	
Did you notice any change in your child's sleep habit during COVID-19 pandemic and E-learning period			
Fast food mainly	89 (53.9)	378 (54.6)	0.254
Healthy food mainly	27 (16.4)	82 (11.8)	
No change	49 (29.7)	232 (33.5)	
Did you feel that your child is having sleeping disturbances more during the E-learning period as compared to before?			
Yes	132 (80)	588 (85)	0.117
No	33 (20)	104 (15)	
How many total hours does your child spend while sleeping before COVID-19 pandemic and E-learning			
<7 hrs.	25 (15.2)	79 (11.4)	0.094
7-9 hrs.	114 (69.1)	460 (66.5)	
9-13 hrs.	23 (13.9)	147 (21.2)	

>13 hrs.	3 (1.8)	6 (0.9)	
Did you feel that your child is having sleeping disturbances more during the E-learning period as compared to before?			
Yes	60 (36.4)	286 (41.3)	0.243
No	105 (63.6)	406 (58.7)	
Have you noticed any change in your child's weight during the E-learning period			
Increased	89 (53.9)	320 (46.2)	0.075
Decreased	76 (46.1)	372 (53.8)	
No change	0 (0)	0 (0)	
Change of number of snacks during the pandemic			
Increased	98 (59.4)	348 (50.3)	0.063
Decreased	16 (9.7)	62 (9)	
No change	51 (30.9)	282 (40.8)	
Amount of increase in weight during COVID-19 pandemic			
1-3 Kg	55 (56.1)	192 (55.2)	0.474
4-6 Kg	37 (37.8)	121 (34.8)	
>6 Kg	6 (6.1)	35 (10.1)	
Time to go to sleep during the pandemic			
7-9 pm	33 (20)	65 (9.4)	0
10 pm-12 am	54 (32.7)	171 (24.7)	
After 12 am	78 (47.3)	456 (65.9)	
How many total hours does your child spend while sleeping During COVID and E-learning period			
<7 hrs.	41 (24.8)	141 (20.4)	0.016
7-9 hrs.	81 (49.1)	327 (47.3)	
9-13 hrs.	36 (21.8)	214 (30.9)	
>13 hrs.	7 (4.2)	10 (1.4)	
What time does your child go to the bed before COVID-19 pandemic			
7-9 pm	80 (48.5)	395 (57.1)	0.086
10 pm-12 am	70 (42.4)	231 (33.4)	
After 12 am	15 (9.1)	66 (9.5)	

agreed, respectively, regarding life satisfaction during the pandemic (Table 2).

### Chi-square test

Table 3 shows that school time was significantly affected by time spent on smart devices for E-learning ( $P=0.000$ ). In addition, the number of meals during the pandemic had a substantial effect ( $P=0.031$ ) on school time. Furthermore, school time was significantly affected by the time to go to sleep ( $p=0.000$ ) and total hours of sleep during the pandemic.

Table 4 shows that time spent using the smart devices for online classes during the pandemic was significantly associated with many factors such as time of classes (Morning or Evening,  $P=0.000$ ), New body complaints ( $P=0.000$ ), Life satisfaction ( $P=0.003$ ), Change in child's physical activities during COVID-19 pandemic and E-learning period ( $P=0.000$ ), Times of physical activities ( $P=0.000$ ), and Number of meals ( $p=0.025$ ).

In addition, time spent using the smart devices for E-learning during the COVID-19 pandemic was significantly associated with the Change in sleep nature ( $P=0.044$ ), Sleeping hours before and during the pandemic ( $P=0.021$  and  $P=0.015$ ), and Sleep disturbance ( $P=0.047$ ).

Table 5 shows the correlations between lifestyle changes during the COVID-19 pandemic and new related medical complaints. Time spent on smart devices for

learning and life satisfaction was significantly ( $P<0.05$ ) associated with new related medical complaints during the COVID-19 pandemic.

Additionally, new related medical complaints during the COVID-19 pandemic were significantly ( $P<0.05$ ) affected by the number of meals, Change in the number of meals, Change in eating habits, and Change in weight during the pandemic.

In addition, changes in child physical activities, times, and hours of physical activities before and during the pandemic had a substantial ( $P<0.05$ ) impact on new related medical complaints during the COVID-19 pandemic.

Furthermore, changes in sleep nature, sleep disturbance, time to go to sleep before and during the pandemic, and total hours of sleep were significantly ( $P<0.05$ ) associated with new related medical complaints during the COVID-19 pandemic.

Table 6 shows the correlation between parents' satisfaction with lifestyle changes and school time. Time spent on smart devices for E-learning and new body pains (complaints) during the pandemic significantly ( $P<0.05$ ) affected parents' satisfaction.

Additionally, parents' satisfaction was significantly ( $P<0.05$ ) affected by the number of meals, Change in the number of meals, Change in eating habits, Change in weight, and increase in weight during the pandemic.

In addition, changes in child's physical activities, times, and hours of physical activities before and during the pandemic had a substantial ( $P < 0.05$ ) impact on parents' satisfaction.

Furthermore, changes in sleep nature, sleep disturbance, time to go to sleep before and during the pandemic, and total hours of sleep significantly ( $P < 0.05$ ) affected parents' satisfaction.

### DISCUSSION

Pandemics force individuals to change certain behaviors instantly, including dietary habits [11]. An unhealthy nutritional routine can increase the risk of chronic

medical conditions such as diabetes and obesity, which can increase the complications of COVID-19 [12]. It is very important to document changes in lifestyle and dietary habits during the COVID-19 pandemic, especially in developing countries, as they have encountered dietary transitions in the past [13]. A previous study from Saudi Arabia during the COVID-19 pandemic showed that dietary habits had changed significantly during the COVID-19 pandemic; however, this study was conducted on the adult population [11]. Therefore, we conducted the current study to identify the lifestyle, including physical activity, sleeping habits, dietary habits, and E-learning of children during the COVID-19 pandemic and the impact of COVID-19 on E-learning and lifestyle.

**Table 4: Relations of time spent using smart devices for online classes.**

	Time with smart devices for learning			P value*
	1-3hrs	4-6hrs	>6 hrs.	
Rhythm of learning				
Day	25 (13.8)	102 (18.1)	38 (33.3)	0
Night	156 (86.2)	460 (81.9)	76 (66.7)	
Have you noticed that your child started to have a new complaint of any pain during COVID-19 pandemic and E-learning period?				
Yes	76 (42)	274 (48.8)	80 (70.2)	0
No	105 (58)	288 (51.2)	34 (29.8)	
How much do you rate your satisfaction with your child changes during COVID-19 pandemic and E-learning period				
Extremely disagree	51 (28.2)	198 (35.2)	53 (46.5)	0.003
Disagree	62 (34.3)	220 (39.1)	37 (32.5)	
Neutral	24 (13.3)	72 (12.8)	10 (8.8)	
Agree	26 (14.4)	48 (8.5)	8 (7)	
Extremely agree	18 (9.9)	24 (4.3)	6 (5.3)	
Extremely agree Did you notice any change in your child's physical activities during COVID-19 pandemic and E-learning period				
Increased	40 (22.1)	131 (23.3)	30 (26.3)	0
Decreased	74 (40.9)	307 (54.6)	72 (63.2)	
No change	67 (37)	124 (22.1)	12 (10.5)	
How frequently does your child do physical activities before COVID-19 pandemic and E-learning period				
No change	42 (23.2)	125 (22.2)	29 (25.4)	0.352
1-3 times/week	80 (44.2)	221 (39.3)	42 (36.8)	
4-6 times/week	37 (20.4)	161 (28.6)	28 (24.6)	
>6 times/week	22 (12.2)	55 (9.8)	15 (13.2)	
How frequently does your child do physical activities during the COVID pandemic				
No change	87 (48.1)	261 (46.4)	62 (54.4)	0
1-3 times/week	63 (34.8)	243 (43.2)	42 (36.8)	
4-6 times/week	13 (7.2)	39 (6.9)	10 (8.8)	
>6 times/week	18 (9.9)	19 (3.4)	0 (0)	
How many hours did your child spend in sports and movement activities before COVID-19 pandemic?				
<1hr	89 (49.2)	255 (45.4)	49 (43)	0.54
>1hr	92 (50.8)	307 (54.6)	65 (57)	
How many hours did your child spend in sports and movement activities during the day of COVID-19 pandemic?				
<1hr	136 (75.1)	459 (81.7)	94 (82.5)	0.131
>1hr	45 (24.9)	103 (18.3)	20 (17.5)	
Do you feel that your child's number of main meals changed COVID-19 pandemic				
Increased	57 (31.5)	186 (33.1)	48 (42.1)	0.025
Decreased	51 (28.2)	194 (34.5)	40 (35.1)	
No change	73 (40.3)	182 (32.4)	26 (22.8)	
Do you feel that your child's eating type has changed during COVID-19 pandemic and E-learning period				
Fast food mainly	87 (48.1)	308 (54.8)	72 (63.2)	0.15
Healthy food mainly	25 (13.8)	71 (12.6)	13 (11.4)	
No change	69 (38.1)	183 (32.6)	29 (25.4)	
Did you feel that your child is having sleeping disturbances more during the E-learning period as compared to before?				

Yes	142 (78.5)	477 (84.9)	101 (88.6)	0.044
No	39 (21.5)	85 (15.1)	13 (11.4)	
How many total hours does your child spend while sleeping before COVID-19 pandemic and E-learning				
<7 hrs	32 (17.7)	61 (10.9)	11 (9.6)	0.021
7-9 hrs	122 (67.4)	383 (68.1)	69 (60.5)	
9-13 hrs	26 (14.4)	111 (19.8)	33 (28.9)	
>13 hrs	1 (0.6)	7 (1.2)	1 (0.9)	
Did you feel that your child is having sleeping disturbances more during the E-learning period as compared to before?				
Yes	72 (39.8)	214 (38.1)	60 (52.6)	0.015
No	109 (60.2)	348 (61.9)	54 (47.4)	
Have you noticed any change in your child's weight during the E-learning period				
Increased	75 (41.4)	270 (48)	64 (56.1)	0.047
Decreased	106 (58.6)	292 (52)	50 (43.9)	
No change	0 (0)	0 (0)	0 (0)	
Change of number of snacks during the pandemic				
Increased	85 (47)	293 (52.1)	68 (59.6)	0.091
Decreased	14 (7.7)	51 (9.1)	13 (11.4)	
No change	82 (45.3)	218 (38.8)	33 (28.9)	
Amount of increase in weight during COVID-19 pandemic				
1-3 Kg	52 (61.2)	162 (55.3)	33 (48.5)	0.603
4-6 Kg	25 (29.4)	105 (35.8)	28 (41.2)	
>6 Kg	8 (9.4)	26 (8.9)	7 (10.3)	
What time does your child go to the bed during COVID-19 pandemic				
7-9 pm	26 (14.4)	58 (10.3)	14 (12.3)	0.676
10 pm-12 am	46 (25.4)	150 (26.7)	29 (25.4)	
After 12 am	109 (60.2)	354 (63)	71 (62.3)	
How many total hours does your child spend while sleeping During COVID and E-learning period				
<7 hrs.	34 (18.8)	113 (20.1)	35 (30.7)	0.001
7-9 hrs.	95 (52.5)	271 (48.2)	42 (36.8)	
9-13 hrs.	51 (28.2)	169 (30.1)	30 (26.3)	
>13 hrs.	1 (0.6)	9 (1.6)	7 (6.1)	
What time does your child go to the bed before COVID-19 pandemic				
7-9 pm	91 (50.3)	313 (55.7)	71 (62.3)	0.119
10 pm-12 am	67 (37)	203 (36.1)	31 (27.2)	
After 12 am	23 (12.7)	46 (8.2)	12 (10.5)	

**Table 5: Relations of new related medical complain.**

	New body pains (complains) during pandemic		P value*
	Yes	No	
Rhythm of learning			
Day	84 (19.5)	81 (19)	0.834
Night	346 (80.5)	346 (81)	
Time spent on smart devices during E-learning classes			
1-3 hrs.	76 (17.7)	105 (24.6)	0
4-6 hrs.	274 (63.7)	288 (67.4)	
>6 hrs.	80 (18.6)	34 (8)	
How much do you rate your satisfaction with your child changes during COVID-19 pandemic and E-learning period			
Extremely disagree	206 (47.9)	96 (22.5)	0
Disagree	177 (41.2)	142 (33.3)	
Neutral	25 (5.8)	81 (19)	
Agree	16 (3.7)	66 (15.5)	
Extremely agree	6 (1.4)	42 (9.8)	
Did you notice any change in your child's physical activities during COVID-19 pandemic and E-learning period			
Increased	126 (29.3)	75 (17.6)	0
Decreased	256 (59.5)	197 (46.1)	
No change	48 (11.2)	155 (36.3)	
How frequently does your child do physical activities before COVID-19 pandemic and E-learning period			



No change	86 (20)	110	
1-3 times/week	167 (38.8)	176 (41.2)	0.052
4-6 times/week	123 (28.6)	103 (24.1)	
>6 times/week	54 (12.6)	38 (8.9)	
How frequently does your child do physical activities during the COVID pandemic			
No change	243 (56.5)	167 (39.1)	
1-3 times/week	151 (35.1)	197 (46.1)	0
4-6 times/week	19 (4.4)	43 (10.1)	
>6 times/week	17 (4)	20 (4.7)	
How many hours did your child spend in sports and movement activities before COVID-19 pandemic?			
<1hr	173 (40.2)	220 (51.5)	0
>1hr	257 (59.8)	207 (48.5)	
How many hours did your child spend in sports and movement activities during the day of COVID-19 pandemic?			
<1hr	364 (84.7)	325 (76.1)	0.002
>1hr	66 (15.3)	102 (23.9)	
Do you feel that your child's number of main meals changed COVID -19 pandemic			
Increased	162 (37.7)	129 (30.2)	
Decreased	188 (43.7)	97 (22.7)	0
No change	80 (18.6)	201 (47.1)	
Did you notice any change in your child's sleep habit during COVID-19 pandemic and E- learning period			
Fast food mainly	298 (69.3)	169 (39.6)	
Healthy food mainly	42 (9.8)	67 (15.7)	0
No change	90 (20.9)	191 (44.7)	
Did you feel that your child is having sleeping disturbances more during the E-learning period as compared to before?			
Yes	393 (91.4)	327 (76.6)	0
No	37 (8.6)	100 (23.4)	
How many total hours does your child spend while sleeping before COVID-19 pandemic and E- learning			
<7 hrs.	53 (12.3)	51 (11.9)	
7-9 hrs.	282 (65.6)	292 (68.4)	0.502
9-13 hrs.	92 (21.4)	78 (18.3)	
>13 hrs.	3 (0.7)	6 (1.4)	
Did you feel that your child is having sleeping disturbances more during the E-learning period as compared to before?			
Yes	240 (55.8)	106 (24.8)	0
No	190 (44.2)	321 (75.2)	
Have you noticed any change in your child's weight during the E- learning period			
Increased	229 (53.3)	180 (42.2)	
Decreased	201	247	0.001
No change	0 (0)	0 (0)	
Change of number of snacks during the pandemic			
Increased	237 (55.1)	209 (48.9)	
Decreased	51 (11.9)	27 (6.3)	0
No change	142 (33)	191 (44.7)	
Amount of increase in weight during COVID-19 pandemic			
1-3 Kg	122 (51.5)	125 (59.8)	
4-6 Kg	94 (39.7)	64 (30.6)	0.134
>6 Kg	21 (8.9)	20 (9.6)	
What time does your child go to the bed during COVID-19 pandemic			
7-9 pm	29 (6.7)	69 (16.2)	
10 pm-12 am	97 (22.6)	128 (30)	0
After 12 am	304 (70.7)	230 (53.9)	
How many total hours does your child spend while sleeping during COVID-19 pandemic and E- learning period			
<7 hrs.	123 (28.6)	59 (13.8)	
7-9 hrs.	166 (38.6)	242 (56.7)	0
9-13 hrs.	132 (30.7)	118 (27.6)	
>13 hrs.	9 (2.1)	8 (1.9)	
Time to go to bed before COVID-19 pandemic and E- learning period			
7-9 pm	257 (59.8)	218 (51.1)	
10 pm-12 am	140 (32.6)	161 (37.7)	0.024
After 12 am	33 (7.7)	48 (11.2)	

**Table 6: Relations of parents' satisfaction.**

How much do you rate your satisfaction with your child changes during COVID-19 pandemic and E- learning period						
	Extremely disagree	Disagree	Neutral	Agree	Extremely agree	P value*
Rhythm of learning						
Day	44 (14.6)	65 (20.4)	26 (24.5)	18	12 (25)	0.09
Night	258 (85.4)	254 (79.6)	80 (75.5)	64 (78)	36 (75)	
Time spent on smart devices during E-learning classes						
1-3 hrs	51 (16.9)	62 (19.4)	24 (22.6)	26 (31.7)	18 (37.5)	0.003
4-6 hrs	198 (65.6)	220 (69)	72 (67.9)	48 (58.5)	24 (50)	
Have you noticed that your child started to have a new complaint of any pain during COVID-19 pandemic and E-learning						
Yes	206 (68.2)	177 (55.5)	25 (23.6)	16 (19.5)	6 (12.5)	0
No	96 (31.8)	142 (44.5)	81 (76.4)	66 (80.5)	42 (87.5)	
Did you notice any change in your child's physical activities during COVID-19 pandemic and E- learning period						
Increased	70 (23.2)	82 (25.7)	20 (18.9)	15 (18.3)	14 (29.2)	0
Decreased	204 (67.5)	177 (55.5)	44 (41.5)	24 (29.3)	4 (8.3)	
No change	28 (9.3)	60 (18.8)	42 (39.6)	43 (52.4)	30 (62.5)	
How frequently does your child do physical activities before COVID-19 pandemic and E-learning period						
No change	67 (22.2)	77 (24.1)	28 (26.4)	12 (14.6)	12 (25)	0.017
1-3 times/week	103 (34.1)	126 (39.5)	44 (41.5)	42 (51.2)	28 (58.3)	
4-6 times/week	89 (29.5)	85 (26.6)	26 (24.5)	21 (25.6)	5 (10.4)	
>6 times/week	43 (14.2)	31 (9.7)	8 (7.5)	7 (8.5)	3 (6.3)	
How frequently does your child do physical activities during the COVID pandemic						
No change	192 (63.6)	151 (47.3)	41 (38.7)	19 (23.2)	7 (14.6)	0
1-3 times/week	87 (28.8)	145 (45.5)	45 (42.5)	42 (51.2)	29 (60.4)	
4-6 times/week	10 (3.3)	19 (6)	13 (12.3)	14 (17.1)	6 (12.5)	
>6 times/week	13 (4.3)	4 (1.3)	7 (6.6)	7 (8.5)	6 (12.5)	
How many hours did your child spend in sports and movement activities before COVID-19 pandemic?						
<1hr	108 (35.8)	152 (47.6)	55 (51.9)	43 (52.4)	35 (72.9)	0
>1hr	194 (64.2)	167 (52.4)	51 (48.1)	39 (47.6)	13 (27.1)	
How many hours did your child spend in sports and movement activities during the day of COVID-19 pandemic?						
<1hr	252 (83.4)	278 (87.1)	79 (74.5)	53 (64.6)	27 (56.3)	0
>1hr	50 (16.6)	41 (12.9)	27 (25.5)	29 (35.4)	21 (43.8)	
Do you feel that your child's number of main meals changed COVID -19 pandemic						
Increased	122 (40.4)	114 (35.7)	29 (27.4)	17 (20.7)	9 (18.8)	0
Decreased	127 (42.1)	111 (34.8)	29 (27.4)	14 (17.1)	4 (8.3)	
No change	53 (17.5)	94 (29.5)	48 (45.3)	51 (62.2)	35 (72.9)	
Do you feel that your child's eating type has changed during COVID-19 pandemic and E-learning period						
Fast food mainly	208 (68.9)	184 (57.7)	41 (38.7)	28 (34.1)	6 (12.5)	0
Healthy food mainly	19 (6.3)	44 (13.8)	17 (16)	12 (14.6)	17 (35.4)	
No change	75 (24.8)	91 (28.5)	48 (45.3)	42 (51.2)	25 (52.1)	
Did you feel that your child is having sleeping disturbances more during the E- learning period as compared to before?						
Yes	287 (95)	289 (90.6)	75 (70.8)	44 (53.7)	25 (52.1)	0
No	15 (5)	30 (9.4)	31 (29.2)	38 (46.3)	23 (47.9)	
How many total hours does your child spend while sleeping before COVID-19 pandemic and E-learning						
<7 hrs	32 (10.6)	34 (10.7)	10 (9.4)	13 (15.9)	15 (31.3)	0
7-9 hrs	195 (64.6)	222 (69.6)	79 (74.5)	55 (67.1)	23 (47.9)	
9-13 hrs	75 (24.8)	59 (18.5)	17 (16)	14 (17.1)	5 (10.4)	
>13 hrs	0 (0)	4 (1.3)	0 (0)	0 (0)	5 (10.4)	
Did you feel that your child is having sleeping disturbances more during the E- learning period as compared to before?						
Yes	172 (57)	130 (40.8)	23 (21.7)	13 (15.9)	8 (16.7)	0
No	130 (43)	189 (59.2)	83 (78.3)	69 (84.1)	40 (83.3)	
Have you noticed any change in your child's weight during the E- learning period						
Increased	180 (59.6)	160 (50.2)	33 (31.1)	21 (25.6)	15 (31.3)	0
Decreased	122 (40.4)	159 (49.8)	73 (68.9)	61 (74.4)	33 (68.8)	
No change	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	
Change of number of meals during the pandemic						
Increased	184 (60.9)	171 (53.6)	40 (37.7)	34 (41.5)	17 (35.4)	0
Decreased	33 (10.9)	28 (8.8)	9 (8.5)	5 (6.1)	3 (6.3)	
No change	85 (28.1)	120 (37.6)	57 (53.8)	43 (52.4)	28 (58.3)	
Amount of increase in weight during COVID-19 pandemic						

1-3 Kg	79 (42.9)	100 (58.5)	28 (70)	26 (76.5)	14 (82.4)	
4-6 Kg	75 (40.8)	62 (36.3)	11 (27.5)	8 (23.5)	2 (11.8)	0
>6 Kg	30 (16.3)	9 (5.3)	1 (2.5)	0 (0)	1 (5.9)	
Time to go to sleep during the pandemic						
7-9 pm	19 (6.3)	19 (6)	16 (15.1)	20 (24.4)	24 (50)	
10 pm-12 am	58 (19.2)	89 (27.9)	29 (27.4)	36 (43.9)	13 (27.1)	0
After 12 am	225 (74.5)	211 (66.1)	61 (57.5)	26 (31.7)	11 (22.9)	
How many total hours does your child spend while sleeping During COVID and E-learning period						
<7 hrs	76 (25.2)	73 (22.9)	9 (8.5)	12 (14.6)	12 (25)	
7-9 hrs	106 (35.1)	153 (48)	69 (65.1)	55 (67.1)	25 (52.1)	0
9-13 hrs	112 (37.1)	88 (27.6)	25 (23.6)	14 (17.1)	11 (22.9)	
>13 hrs	8 (2.6)	5 (1.6)	3 (2.8)	3 (2.8)	0 (0)	
What time does your child go to the bed before COVID-19 pandemic						
7-9 pm	193 (63.9)	178 (55.8)	48 (45.3)	37 (45.1)	19 (39.6)	
10 pm-12 am	87 (28.8)	114 (35.7)	46 (43.4)	35 (42.7)	19 (39.6)	0
After 12 am	22 (7.3)	27 (8.5)	12 (11.3)	10 (12.2)	10 (20.8)	

Regarding education, the COVID-19 pandemic resulted in a significant change in the type of education, where the large majority of our children were using E-learning. This, in turn, led to using smart devices for learning; however, there was a significant difference between the duration of using smart devices for playing or watching and learning ( $P=0.0001$ ). The longest duration (>6h) while using smart devices for playing or watching was more common (23.2%) compared to those using the same duration for learning (13.3%). The type of education was affected by many factors. E-learning as the major method of learning among children was found to be significantly associated with children aged 7-12 years, having no complaints, primary level of education, evening time, using devices of 4-6hours, and unchangeable pattern of physical activity, spending more than one hour for physical activity before COVID-19, sleeping 7-9 hours before and during the pandemic, and going to sleep after midnight during the pandemic.

A previous study from India revealed that the COVID-19 pandemic had a significant impact on education [8]. A study from Saudi Arabia showed excessive use of electronic devices among children during COVID-19, which was similar to our findings. Moreover, children showed a low level of physical activity [14,15].

By investigating the physical activity of children in our study, we found that the COVID-19 pandemic also had an impact on the physical activity of children, where only 23.7% reported an unchanged pattern of physical activity, whereas the remaining proportions were either increased or decreased in their physical activity. There were significant differences between the times and hours of physical activities before and during the pandemic. The number of times of physical activity as well as the number of hours spent for physical activity significantly reduced during the COVID-19 compared to before pandemic.

In agreement with our findings, a study conducted on Polish children between the age of 6-15 years showed that there was a reduction in physical activity, where the mean number of days with one-hour activity was reduced

during COVID-19 compared to before the pandemic [16].

A study from Qatar that included 144 respondents demonstrated that during quarantine of COVID-19, there was a significant reduction in the total weekly average hours of physical activity [17], which was similar to our findings. It is well proven that regular physical exercise can help to treat and prevent non-communicable diseases such as diabetes and heart disease [18]. Physical activity is supposed to be increased during the pandemic and quarantine as there is an opportunity to introduce the activity and consolidate new physical activity habits as home-based exercise [18].

However, the reduction of physical activity during COVID-19 may lead to an increase in the risk of non-communicable diseases, especially with the change in sleep and dietary patterns. Our study showed that the COVID-19 pandemic changed the sleep pattern of children; most children experienced changes in sleep nature during the pandemic (84). Children significantly tended to stay up late, and more than one-half went to sleep after midnight during the pandemic compared to only 9.5% before the pandemic. However, the total sleeping hours weren't affected by the pandemic.

A previous Saudi study revealed that late bedtime among children during COVID-19 was evident and defined as midnight or later [15]. These findings can be supported by our findings, where the percentage of children sleeping after midnight was higher during the pandemic compared to before the pandemic.

A study conducted on 1016 Polish children revealed that sleep duration was reduced among children during the pandemic, whereas they experienced higher sleep quality [16]. This contrasted with our findings, as we found that the number of hours wasn't affected by the pandemic, but the time of sleep. Similar to our findings, a previous Qatari study revealed that the majority of children during quarantine of COVID-19 shifted their bedtime and wake time to later due to quarantine [17]. The COVID-19 pandemic also had a significant impact on the dietary habits of children in this study. The COVID-19 pandemic had a negative effect on the dietary habits of

children, where more than one-half changed their eating to fast food mainly, and 34% reported an increase in the number of meals eaten during the pandemic. Moreover, there was an increase in weight gain ranging from one Kg to more than six Kg; more than one-half reported weight gain of 1-3 Kg. In addition, 47.7% reported an increase in weight.

A cross-sectional study from Qatar found that there was a significant increase in the total number of main meals daily with higher consumption of unhealthy food during the quarantine of COVID-19. The rate of the daily amount of fast food significantly increased from 4.7% before quarantining to 11.3% during the quarantine [17]. This supports our findings that COVID-19 had a negative impact on the dietary habits of children.

Surekha et al. conducted a study on children with 3-15 years and revealed that there were significant differences in body weight and body mass index before and after quarantine. The mean BMI increased significantly after the lockdown compared to before the lockdown. This reflects the weight gain among children during the pandemic [1], which in turn supports our findings. The same findings were reported from the USA, where body mass index, overweight, and obesity increased among children during the COVID-19 lockdown [2]. This weight change can be explained by our findings, such as an increase in fast food consumption and an increase in the number of daily meals. However, psychologically, parents' concerns can be considered the strongest indicator of parental satisfaction. Assuming that parents strive for the best possible school education for their children. Smetackova, et al. concludes that more of the low-SES parents considered schools' approach to distance learning unsatisfactory. While Joseph HB conclude that more than half (52.2%) of parents reported that they were partially satisfied with children's online learning, whereas 26% were not satisfied. More than half of the parents (61.1%) experienced a great challenge and burden of online Learning [19,20].

This can be expressed by our results on parental satisfaction which shows that there was a greater percentage of disagreement (37.2%) and extreme disagreement (35.2%) and that it was significantly influenced by the amount of time spent on smart devices for e-learning and new body pain (complaints), the number of meals, changes in eating habits, weight changes, changes in the child's physical activities, changes in the nature

of sleep, sleep disturbances, the amount of time to go to bed before and during the pandemic. A cohort study done in Italy among children and adolescents during the second wave of COVID-19 disclosed adverse effects related to overuse of smartphone use were significantly more frequently reported during the COVID-19 pandemic, compared to the pre-epidemic period: Such as Musculoskeletal disorder. This is relevant to our findings, we found half of our samples (50.2%) complained of new pain during COVID 19 and

significantly associated with overuse of smartphones, (70.2%) of them used smartphones more than 6 hours moreover; there is significantly impact between new body pain and lifestyle changes, increase of numbers of meals and physical activities.

## CONCLUSION

The COVID-19 pandemic had a significant impact on the learning and lifestyle of children. It resulted in the tendency and increase in E-learning and lifestyle. The COVID-19 pandemic resulted in a reduction in physical activity, made a large proportion of children stay up late, and an increase in the number of meals and the consumption of unhealthy food. Therefore, the COVID-19 pandemic negatively and potentially affected the lifestyle of children, but turning to E-learning can be considered a positive impact.

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