Adolescent's Dietary Changes and Lifestyle Habits during Covid-19 Pandemic

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Abstract

Background: COVID-19 pandemic has had a great effect on the adolescents' dietary and life style habits. **Aim:** Explore adolescent' dietary changes and lifestyle habits during COVID-19 pandemic **Design:** Correlational-descriptive study design. **Setting:** This study was conducted at Suez Canal University, Faculty of Nursing in Ismailia City. **Subjects:** A convenient sample (500 students) of first year students of Faculty of Nursing, Suez Canal University for academic year 2021/2022. **Tools**: The structured questionnaire created in Google Form. **Results**: There was statistically significant differences regarding mean of mediterranean diet adherence screener scores and dietary habits before and during COVID-19. There were statistically significant differences regarding sleeping hours and electronic devices spent hours, while there were no statistically significant differences regarding smoked cigarettes and sport times. **Conclusion:** There were statistically significant negative correlations between mediterranean diet adherence screener and body mass index before and during COVID-19. There were statistically significant differences between level of mediterranean diet adherence screener scores and sport times and electronic devices spent hours before COVID-19. Also; there were statistically significant difference between level of mediterranean diet adherence screener scores and sleep hours and electronic devices spent hours during COVID-19. **Recommendations**: The study, emphasized on the importance of educating the adolescents about healthy diet, adequate sleep hours, practicing exercise and proper use of social media. Also; further studies should be conducted to analyze eating habits and life style to encourage the adoption of healthy diet and life style among adolescents.

Key Words: Adolescents, COVID-19 Pandemic, Dietary habits, Lifestyle habits

Introduction

The world in 2019–2020 has witnessed the emergence of a new Coronavirus Disease, called COVID-19, which has turned the globe upside down and disrupted main determinants of health *(Raman et al., 2020)*. It is a severe acute respiratory syndrome caused by SARS coronavirus 2 (SARS-CoV-2). It was supposed that in December 2019, SARS-CoV-2 apparently transit from animals to humans at the Huanan seafood market and rapidly spread from Wuhan City of Hubei, Province of China, to the rest of the world *(Wang, 2020)*.

Due to the growing case notification rates at Chinese and international locations, the World Health Organization (WHO) has declared the coronavirus disease 2019 (COVID-19) a pandemic which is defined as "occurring over a wide geographic area and affecting an exceptionally high proportion of the population *(WHO, 2020)*. A global coordinated effort is needed to stop the further spread of the virus; so that on the 30 January 2020, the WHO Emergency Committee declared a global health emergency *(Velavan & Meyer, 2020)*. In order to contrast and contain the spread of the new COVID-19 pandemic, at 25 March 2020, the Egyptian Government decided for more stringent containment measures. This led to the disruption of most daily activities *(Hassany et al., 2020)*.

The current Coronavirus disease COVID-19 pandemic influences lifestyle, especially diet and physical activity. The World Health Organization and the Spanish Academy of Nutrition and Dietetics 2020 indicate that a healthy diet can help in the prevention and treatment of the disease *(Lana et al., 2020)*. Thus, recommendations have been published for food and nutrition during the period of COVID-19 pandemic, because there is a

close relationship between the quality of a population's food and its health *(Muscogiuri et al., 2020).*

Adequate nutrition is considered a potential factor for health in the early stages of life and adolescence *(Glabska et al., 2020).* At this stage, it is essential to acquire good eating behaviors that can concomitantly influence current health status and predisposition to diseases, e.g., obesity, diabetes, cardiovascular pathologies, etc. *(WHO, 2017).*

It should be noted that, COVID-19 pandemic has two major influences: staying at home (which includes digital-education, smart working, limitation of outdoors and in-gym physical activity) and stockpiling food, due to the restriction in grocery shopping. In addition, the interruption of the work routine caused by the quarantine could result in boredom, which in turn is associated with a greater energy intake *(Moynihan et al., 2015)*. In addition to boredom, hearing or reading continuously about the COVID-19 from media can be stressful. This leads subjects toward overeating, especially 'comfort foods' rich in sugar, defined as "food craving" *(Yılmaz & Gökmen, 2020).*

This new condition may compromise maintaining a healthy and varied diet, as well as a regular physical activity. For example, limited access to daily grocery shopping may lead to reduce the consumption of fresh foods, especially fruit, vegetables and fish, in favour of highly processed ones, such as convenience foods, junk foods, snacks, and ready-to-eat cereals, which tend to be high in fats, sugars, and salt. Moreover, psychological and emotional responses to the COVID-19 pandemic *(Montemurro, 2020)*, may increase the risk of developing dysfunctional eating behaviors. It is well known how the experience of negative emotions can lead to overeating, the so-called "emotional eating" *(Van Strien, 2018)*.

The current COVID-19 pandemic can affect health and wellbeing through the reduction of physical activity and of exposure to daylight, and social isolation might increase the level of stress. These changes can impact daily activities as well as the sleep/wake pattern and circadian rhythmicity *(Altena et al, 2020).* In addition, it can

lead to substantial changes of the lifestyle of children, adolescents and their families with loss of the principal zeitgebers that help maintaining a regular routine and sleep/wake schedule. The restrictions led to unconstrained sleep schedules, prolonged screen exposure, limited access to outdoor activities and reduced peer interactions, as well as heightened stress and anxiety that can contribute to unhealthy sleep patterns and sleep disturbances in children and adolescents *(Wang et al, 2020).*

Significance of the study:

Eating habits and lifestyle modification may threaten our health. Maintaining a correct nutrition status is crucial, especially in a period when immune system might need to fight back *(Muscogiuri et al., 2020). Cutting et al., 2020* explored the changes in lifestyle associated with COVID-19 among adolescents and revealed that sports activities decreased, sleeping time increased and screen time increased significantly to about 4 h a day. Also; *Pujia et al., 2021* found a change in eating habits with an increase in consumption of sweet packaged snacks and processed meat, as well as bread, pizza and bakery products. A total of 59.7% of the participants reported body weight gain, with adolescents gaining weight more than children.

Understanding the effects of the pandemic on eating and lifestyle habits of adolescents can guide behavioral and psychological measures, directed at the adolescents and the communities, improving resilience, preventing diseases, and increasing the effectiveness of health approaches to mitigate the effects during this contingency and in others that could potentially occur. Therefore, the present study aims to explore adolescent's dietary

changes and lifestyle habits during COVID-19 pandemic.

Aim of the study:

This study aimed to explore adolescent' dietary changes and lifestyle habits during COVID-19 pandemic.

Research questions:

- What are the changes in dietary habits of adolescents due to COVID-19 pandemic?

- What are the changes in lifestyle habits of adolescents due to COVID-19 pandemic?

- Is there are relationship between changes in dietary and lifestyle habits of adolescents and COVID-19 pandemic?

Research Objectives:

- Identify changes in dietary habits of adolescents due to COVID-19 pandemic.

- Assess changes in lifestyle habits of adolescents due to COVID-19 pandemic.

- Determine the relationship between changes in dietary and lifestyle habits of adolescents and COVID-19 pandemic.

Research Design:

Correlational-descriptive study design was used in the present study.

Subject and Method

Setting:

This study was conducted at Suez Canal University, Faculty of Nursing in Ismailia City.

Subjects:

According to the WHO 2017 adolescence is defined as any person between ages 10 and 19; so that a convenient sample of first year students of Faculty of Nursing, Suez Canal University for academic year 2021/2022 (500 students which classified as the following: 430 adolescents participated and completed the study tool, 20 didn't competed plus 50 for pilot study).

Inclusion criteria of adolescent
1. Less or equal 19 years old.
2. Both genders.
3. Accept to participate in the study.

Tools of data collection: The structured questionnaire created in Google Form was used to collect the data of the present study. It consisted of four parts as the following:

The First part: <u>Personal data about the adolescent</u> which developed by the researchers and involved the characteristics of the studied adolescents included (5) questions which were gender, age, residence, number of siblings and family income.

The second part: <u>Anthropometrics measurements of the adolescents</u> which developed by the researchers and consisted from (2) questions which was the present weight in kilograms and height in centimeters.

The third part: <u>Dietary habits of the adolescents,</u> adapted from *Di Renzo et al., (2020)* after making some necessary modifications by the researchers after reviewing the related literature and it was concerned with identifying changes in dietary habits before and after COVID-19 pandemic. It was divided into two sections as the following *Section (A):* adherence to Mediterranean Diet (MD), using validated (24) items Mediterranean Diet Adherence Screener (MEDAS), *Section (B):* structured questionnaire packet consisted from (24) questions about food frequency, number of meals per day and daily consumption of certain foods for example junk food consumption, baked products, packaged sweets, salted snacks and others.

The fourth part: <u>Lifestyle habits of the adolescents,</u> adapted from *Di Renzo et al., (2020)* after making some necessary modifications by the researchers after reviewing the related literature and it was concerned with assessing changes in lifestyle habits before and after COVID-19 pandemic. It was consisted of (8) questions about hours of sleep, smoking habits, screen time, physical activity and practicing sports.

Scoring system for adherence to Mediterranean diet: The total numbers of questions in the structured questionnaire were 24 items, which score ranges from 0 to 24 points, the scores of the items were summed up and the total divided by the number of the items, theses scores were converted into a percent score. On the basis of the MEDAS values, participated adolescents were

divided in to three classes: (1) low adherence (score 0-5), (2) medium adherence (score 6-9) and high adherence (score >10) to the MD and difference in the compliance rates for each food were calculated

Method:-
Preparatory phase:

An official permission to conduct the study was obtained from Dean of the Faculty of Nursing and Vice Dean of the Faculty of Nursing for Education and Students Affairs, after explaining the aim, nature of the study and method of data collection by the researchers.

Pilot study:

A pilot study was carried out after the development of the study tool and before starting the data collection. It was conducted on 10% of the sample to test the clarity, objectivity and feasibility of the tools, and determine the time required to fill the tools. After obtaining the result of the pilot study, necessary modifications were done according to the study subject's response and the final form was developed. Those included in the pilot study were excluded later from the sample.

Ethical consideration:

Ethical approval was obtained by the Ethical Committee of Faculty of Nursing Suez Canal University (approval number: 126/10-2021). All ethical issue was ensured to all adolescent that all their answers in the questioner will be confidential and will be used for this study only. Assent was taken from each adolescent to participate in the study after explaining the aim of study to them in the information part which was in the beginning of the questionnaire and they have a right to refuse the participation in the research without any effect on the educational process received by the faculty.

Fieldwork

After obtaining permissions to proceed with the proposal study, the process of data collection was initiated by the researches. The period of data collection was extended over a period of 6 months, started from November, 2021 to the end of April, 2022. The structured questionnaire was adapted by the researchers after reviewing the related literatures and it was specifically built by using Coogle platform to collect the data online. The researchers specified the first part from the questionnaire as an information sheet in which the aim of the study was explained and ensuring that when the adolescent fill the questionnaire and press send it was be considered as an assent from the adolescent to participate in the study.

The invitation to participate in the study was made by one of social media methods (Facebook, Instagram, Twitter and Whats App) or by email. The adolescents were asked to read the questions well and answer precisely. The average time required for completion of structure questionnaire was around 30-45 minutes. Once the process of data collection was completed, each questionnaire was transmitted to the Google platform and the final database was downloaded as a Microsoft Excel sheet. The main limitation of the present study is represented by a self-reported questionnaire, which may lead to the actual misreporting of data but the researcher tried to overcome this by assuring all participants of being careful while filling out the questionnaire.

Statistical design:

The collected data were coded, organized, analyzed using statistical package for social science (SPSS) version 21 and tabulated. Descriptive statistics including the frequency distribution and percentages were used for the analysis of nominal data as demographic data of the studied nurses. Differences between variables through times of evaluation were analyzed using T-test. The statistical significance and associations were assessed using, the arithmetic means, the standard deviation (SD), (chi square test), McNemar-Bowker test, Pearson's tests used to explore correlation between the variables. Significant level was identified at p <0.05.

Results:

Table (1): Shows that the mean age of the studied adolescents was 18.48±.51. More than half of them were females and lived in urban area (57.7%, 50.2% respectively), more than two thirds of them have three or more than three siblings and have sufficient monthly family income (73.7%, 75.6% respectively). Regarding anthropometric

measurements this table shows that the mean weights of the studied adolescents were 66.06±9.52 kg, while their mean heights were 165.64±11.01 cm. Also this table illustrates that only (2.6%) of the studied adolescents were underweight, while more than half (61.3%) of them were within normal weight. This table shows that more than one third (34.2%) of the studied adolescents were overweight, while (1.4%) of them were moderate obese (class I) and only (0.5%) of them were severely obese (class II).

Figure (1): Illustrates that there was statistically significant differences regarding mean of Mediterranean diet adherence screener scores before and during COVID-19 by the studied adolescents were P value <.001

Figure (2): Illustrates that more than two fifth of the studied adolescents consumed one portion of cereals before and during COVID-19 (43.5%, 41.4% respectively). Also; nearly one third of them consumed one portion of bread before COVID-19, while nearly one third (32.3%) of them consumed two portions during COVID-19. Regarding milk and yoghurt this figure shows that nearly one third of the studied adolescents consumed one portion before and during COVID-19 (33.5%, 36.7% respectively). Moreover nearly one third of them consume one portion of dairy products before and during COVID-19 (30.7%, 32.8% respectively). There were statistically significant differences regarding portions of food consumption by studied adolescents before and during COVID-19 were P value were (<.001).

Table (2): Shows that more than two fifth (43.0%) of the studied adolescents consumed 2 eggs per week before COVID-19, while less than one third (30.7%) of them consumed 4 eggs per week during COVID-19. More than two fifths (41.9%) of them were particularly hungry between main meals before COVID-19, while more than one third (39.0%) of them were also particularly hungry after dinner during COVID-19. Regarding eating leftover food this table illustrates that more than one third of the studied adolescents never eat the leftover food neither before COVID-19 nor during COVID-19 (35.1%, 33.7% respectively). While more than half (55.8%) of the studied adolescents drunk 1liter to 2 liter of water per day before COVID-19 and more than two fifth (44.7%) of them drunk 1liter to 2 liter of water per

day during COVID-19. There were statistically significant difference regarding dietary habits before and during COVID-19 where P-value was (<.001).

Table (3): Illustrates that there were statistically significant differences regarding number of sleeping hours that the studied adolescents sleep per night daily and number of hours that they spent on electronic devices such as TV, phones, computers, games or other electronics where P-value was (<.001, <.001 respectively), while there were no statistically significant differences regarding number of smoked cigarettes per day and times of playing sport per week where P-value were (.154, .574 respectively).

Table (4): Regarding diet adherence screener this table shows that more than two fifths of the studied adolescent had medium diet adherence before and after COVID-19 (48.1%, 47.4% respectively). There was a statistically significant difference between diet adherence screener before and after COVID-19 between the studied adolescent where P-value was (<.001).

Table (5): This table illustrates that there were statistically significant differences between Mediterranean diet adherence screener (MEDAS) of the studied adolescents and their residence place before COVID-19 where P-value is (.041). Also; there were statistically significant difference between Mediterranean diet adherence screener (MEDAS) and monthly family income of the studied adolescent during COVID-19 where P-value was (.017).

Table (6): This table shows that there were statistically significant negative correlations between Mediterranean diet adherence screener (MEDAS) of the studied adolescents and their body mass index (BMI) before and during COVID-19 with P-value were (.046 and .035 respectively).

Table (7): This table illustrate that there were statistically significant differences between level of Mediterranean diet adherence screener (MEDAS) of the studied adolescents and number of their play sport times per weeks and the time the spent on electronic devices per day before COVID-19 where P-value were (.003, .033 respectively). Also; there were statistically

significant difference between level of Mediterranean Diet Adherence Screener (MEDAS) and number of hours that the studied adolescents sleep at night during and the time the spent on electronic devices per day during COVID-19 where P-value were (.021, .005 respectively).

Table (1): **Percentage distribution of the studied adolescents regarding their demographic characteristics (n=430)**

Items	No.	%
Age (Years)		
$\bar{x}$ ±SD Range	18.48±.51 17-19	
Gender		
Male	182	42.3
Female	248	57.7
Residence		
Urban	216	50.2
Rural	214	49.8
Number of siblings		
≤3	317	73.7
>3	113	26.3
Family income		
Sufficient	325	75.6
Insufficient	105	24.4
Anthropometric measurement		
Weight/kg ($\bar{x}$ ±SD)	66.06±9.52	
Height/cm ($\bar{x}$±SD)	165.64±11.01	
BMI		
<18	11	2.6
18-<25	264	61.4
25-<30	147	34.2
30-<35	6	1.4
≥35	2	.5

Figure (1): Mean score of Mediterranean Diet Adherence Screener before and during COVID-19 by the studied adolescents (n=430)
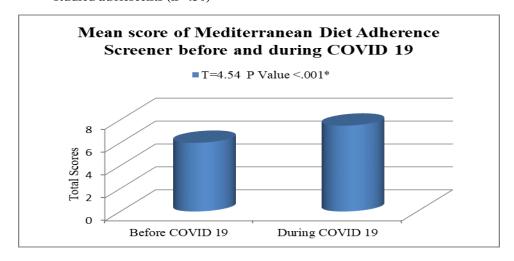

Mean score of Mediterranean Diet Adherence Screener before and during COVID 19

■T=4.54 P Value <.001*

Figure (2): Percentage distribution of portions of food consumption by studied adolescents before and during COVID 19 (n=430)

Portions of food consumbtion by studied adolescents

	Before COVID 19 (Cereals)	During COVID 19 (Cereals)	Before COVID 19 (Bread)	During COVID 19 (Bread)	Before COVID 19 (Milk and yougurt)	During COVID 19 (Milk and yougurt)	Before COVID 19 (Dairy products)	During COVID 19 (Dairy products)
None	13.3	12.8	9.5	12.8	27	22.1	10.7	12.1
Half portion	20.7	14.9	19.1	14.2	21.1	17.2	25.3	16
1 portion	43.5	41.4	33.7	28.4	33.5	36.7	30.7	32.8
2 portions	13.5	20.2	27	32.3	9.8	17	23.3	25.1
> 2portions	9	10.7	10.7	12.3	8.6	7	10	14

Cereals: T test= 50.98, P value <.001*
Bread: T test= 36.03, P value <.001*
Milk and yougurt: T test= 49.46, P value <.001*
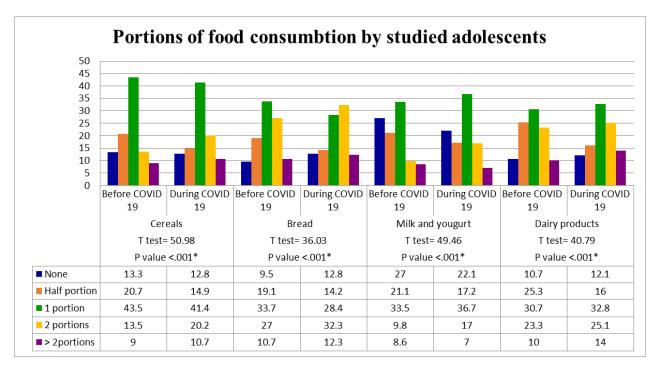Dairy products: T test= 40.79, P value <.001*

Table (2): Percentage distribution of the studied adolescents regarding their dietary habits before and during COVID-19 (n=430)

Items	Before COVID-19		During COVID-19		Sig.	P-value
	No.	%	No.	%		
Number of eggs consumed / week						
1. None	62	14.4	55	12.8	54.08	**<.001***
2. 1 egg	62	14.4	57	13.3		
3. 2 eggs	185	43.0	126	29.3		
4. 4 eggs	72	16.7	132	30.7		
5. > 4 eggs	49	11.4	60	14.0		
The time of the day you are particularly hungry						
1. Before main meals	165	38.4	131	30.5	24.07	**<.001***
2. between main meals	180	41.9	168	30.5		
3. After dinner	85	19.8	131	39.0		
The leftover food you eat						
1. Never	151	35.1	145	33.7	37.39	**<.001***
2. < 10%	111	25.8	91	21.2		
3. 10–30%	84	19.5	85	19.8		
4. 30–50%	53	12.3	74	17.2		
5. > 50% of the time	31	7.2	35	8.1		
Amount of water you drink / day						
1. < 1 L	134	31.2	113	26.3	57.09	**<.001***
2. 1 L–2 L	240	55.8	192	44.7		
3. > 2 L	56	13.0	125	29.1		

Test is McNemar-Bowker test *: Statistically significant at $p \leq 0.05$

Table (3): Percentage distribution of the studied adolescents regarding their Lifestyle habits before and during COVID-19 (n=430)

Items	Before COVID-19		During COVID-19		Sig.	P-value
	No.	%	No.	%		
Smoking						
1. None	336	78.1	331	77.0	9.36	.154
2. Yes, < 5 cigarettes	45	10.5	45	10.5		
3. Yes, 5–10 cigarettes	33	7.7	31	7.2		
4. Yes, > 10 cigarettes	16	3.7	23	5.3		
Sleeping hours						
1. <7 h per night	212	49.3	109	25.3	74.78	**<.001***
2. 7–9 h per night	159	37.0	185	43.0		
3. > 9 h per night	59	13.7	136	31.6		
Frequency of playing sport / week						
1. I didn't practice any sport	180	41.9	185	43.0	4.76	.574
2. 1–2 times a week	153	35.6	153	35.6		
3. 3–4 times a week	61	14.2	51	11.9		
4. > 5times a week	36	8.4	41	9.5		
Spent hours on electronic devices such as TV, phones, computers, games or other electronics / day						
1. I didn't use any electronic devices	44	10.2	38	8.8	84.75	**<.001***
2. 1–2 hours per day	196	45.6	96	22.3		
3. 3–4 hours per day	107	24.9	132	30.7		
4. > 4 hours per day	83	19.3	164	38.1		

Test is McNemar-Bowker test *: Statistically significant at p ≤ 0.05

Table (4): Relation between Mediterranean Diet Adherence Screener before and during COVID-19 (n=430)

Items	Before COVID- 19		During COVID- 19		Sig.	P-value
	No.	%	No.	%		
Mediterranean Diet Adherence Screener (MEDAS)						
Low	129	30.0	97	22.6	25.53	**(<.001*)**
Medium	207	48.1	204	47.4		
High	94	21.9	129	30.0		

Test is McNemar-Bowker test *: Statistically significant at p ≤ 0.05

Table (5): Relation between demographic characteristics of the studied adolescents and level of MEDAS before and during COVID-19 (n=430)

Items	Level of MEDAS											
	Before COVID-19						During COVID-19					
	Low		Medium		High		Low		Medium		High	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Gender												
Male	69	27.8	119	48	60	24.2	54	21.8	119	48	75	30.2
Female	60	33	88	48.4	34	18.7	43	23.6	85	46.7	54	29.7
P value	2.38 (.303)$^\$$						.207 (.902)$^\$$					
Residence												
Urban	76	35.5	93	43.5	45	21	48	22.4	111	51.9	55	25.7
Rural	53	24.5	114	52.8	49	22.7	49	22.7	93	43.1	74	34.3
P value	6.39 (**.041**)$^\$$						4.39 (.111)$^\$$					
Number of siblings												
≤3	98	30.9	152	47.9	67	21.1	76	24	143	45.1	98	30.9
>3	31	27.4	55	48.7	27	23.9	21	18.6	61	54	31	27.4
P value	.635(.716)$^\$$						2.79 (.248)$^\$$					
Income												
Sufficient	35	33.3	49	46.7	21	20	34	32.4	46	43.8	25	23.8
Insufficient	94	28.9	158	48.6	73	22.5	63	19.4	158	48.6	104	32
P value	.797 (.671)$^\$$						8.103 (**.017**)$^\$$					
BMI												
<18	1	9.1	7	63.6	3	27.3	2	18.2	7	63.6	2	18.2
18-<25	74	28	129	48.9	61	23.1	55	20.8	123	46.6	86	32.6
25-<30	49	33.3	69	46.9	29	19.7	37	25.2	71	48.3	39	26.5
30-<35	3	50	2	33.3	1	16.7	1	16.7	3	50	2	33.3
≥35	2	100	0	0	0	0	2	100	0	0	0	0
P value	9.57 (.290) ^{MC}						10.23 (.242) ^{MC}					

$^\$$ is Chi square test MC is Monte Carlo for Chi square test & Significant at $p < 0.05$

Table (6): Correlation between MEDAS score and body mass index of the studied adolescents (n=430)

GRSLSS	MEDAS score			
	Before COVID-19		During COVID-19	
	R	P value	r	P value
BMI	-.096	**.046***	-.102	**.035***

(r) is Pearson correlation & P-value is significant (two tailed significance) ≤.05

Table (7): Relationship between life style habits and level of MEDAS of studied adolescents before and during COVID 19 (n=430)

Items	Level of MEDAS											
	Before COVID-19						During COVID-19					
	Low		Medium		High		Low		Medium		High	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Smoking												
1. None	102	30.4	163	28.5	71	21.1	65	19.6	160	48.3	106	32.0
2. Yes, < 5 cigarettes	14	31.1	19	42.2	12	26.7	14	31.1	21	46.7	10	22.2
3. Yes, 5–10 cigarettes	9	27.3	16	48.5	8	24.2	9	29.0	12	38.7	10	32.3
4. Yes, > 10 cigarettes	4	30	9	48.1	3	21.9	9	39.1	11	47.8	3	13.0
P value	1.52 (.958)$						10.26 (.114)$					
Sleeping hours												
1. <7 h per night	62	29.2	105	49.5	45	21.2	36	33.0	50	45.9	23	21.1
2. 7–9 h per night	47	29.6	72	45.3	40	25.2	36	19.5	91	49.2	58	31.4
3. > 9 h per night	20	33.9	30	50.8	9	15.3	25	18.4	63	46.3	48	35.3
P value	2.80 (.592)$						10.61 (**.021**)$					
Frequency of playing sport / week												
1. I didn't practice any sport	72	40.0	73	40.6	35	19.4	45	24.3	91	49.2	49	26.5
2. 1–2 times a week	30	19.6	89	58.2	34	22.2	29	19.0	72	47.1	52	34.0
3. 3–4 times a week	16	26.2	31	50.8	14	23.0	8	15.7	23	45.1	20	39.2
4. > 5times a week	11	30.6	14	38.9	11	30.6	15	36.6	18	43.9	8	19.5
P value	19.64 (**.003**)$						10.59 (.102)$					
Spent hours on electronic devices such as TV, phones, computers, games or other electronics/day												
1. I didn't use any electronic devices	16	36.4	14	31.8	14	31.8	19	50.0	12	31.6	7	18.4
2. 1–2 hours per day	50	25.5	102	52.0	44	22.4	21	21.9	46	47.9	29	30.2
3. 3–4 hours per day	30	28.0	51	47.7	26	24.3	23	17.4	66	50.0	43	32.6
4. > 4 hours per day	33	39.8	40	48.2	10	12.0	34	20.7	80	48.8	50	30.5
P value	13.72 (**.033**)$						18.76 (**.005**)$					

$ is Chi square test & Significant at p < 0.05

Discussion:

Nutrition during childhood and adolescence is very important for growth and can have long-term health implications. Coronavirus disease COVID-19 pandemic influences lifestyle, especially diet and physical activity. The World Health Organization and the Spanish Academy of Nutrition and Dietetics 2020 indicate that a healthy diet can help in the prevention and treatment of the disease (*Lana et al., 2020*).

Therefore the current study aimed to explore adolescent' dietary changes and lifestyle habits during COVID-19 pandemic.

Regarding demographic characteristics of the studied adolescents (table 1), the current study showed that, the mean weight of them were 66.06±9.52 while their mean height were 165.64±11.01; also more than one third of them were overweight. From the researchers' point of view, increased sense of hunger and the

consequent changes in eating habits could justify the perception of weight gain which observed in the studied adolescents. These findings are goes in line with a study conducted by *Di Renzo et al., (2020)* who conducted a study about Eating habits and lifestyle changes during COVID-19 lockdown and found that the mean weight of the participants were 66.87±13.16, while their mean height were 167.58±8.47; also nearly one quarter of the participants were overweight. Also; these results were similar to *Pujia et al., (2021)* who conducted a study about The Effects of COVID-19 on the Eating Habits of Children and Adolescents in Italy and reported that there was increase in the body math index of the studied adolescents.

Concerning Mediterranean diet adherence (Figure 1), the current study finding illustrated that there were statistically significant differences regarding mean of Mediterranean diet adherence screener scores and portions of food consumptions before and during COVID-19 by the studied adolescents. From the researchers' point of view, the fear of getting the disease might be the leading cause for a balanced diet which was followed by the studied adolescents and which can help in maintaining immunity and is essential for prevention and management of the viral infection as COVID-19. Considering that COVID-19 has no effective preventive and pharmacological therapies available, healthy eating habits are beneficial in preventing such these diseases. These results were concurrent with *Roso et al. (2020)* who conducted a study about COVID-19 confinement and changes of adolescent's dietary trends and reported that there was greater adherence to un healthy diet during COVID-19 pandemic among adolescents whose mothers were highly and low educated. Regarding relation between Mediterranean diet adherence screener before and during COVID-19 (Table 4), the study illustrated that more than two fifths of the studied adolescent have medium diet adherence before and after COVID-19. These finding concur with *Di Renzo et al., (2020)* who found that less than two thirds of participant had medium diet adherence during COVID-19 lockdown.

On assessing the dietary habits of the studied adolescents before and during COVID-19 (Figure 2& table 2), the study results showed that more than half of the studied adolescents drink 1liter to 2 liter of water per day before COVID-19 and more than two fifth of them drink 1liter to 2 liter of water per day during COVID-19. These results were similar to *Bahatheg R. (2021)* who conducted a study about Young Children's Nutrition During the COVID-19 Pandemic Lockdown: A Comparative Study and reported that more than half of the studied children drinks a sufficient amount of water during COVID-19 Pandemic. Furthermore the current finding illustrated that more than one third of the studied adolescents were particularly hungry after dinner during COVID-19. From the researchers' point of view irregular eating habits and frequent snacking in the studied adolescents might be due to boredom and stress and it also important to highlight that these dietary habits are associated with a higher caloric intake and an increased risk of overweight. These findings are goes in line with a study conducted by *Hashem et al. (2020)* who conducted a study about Impact of Coronavirus Disease-19 Lockdown on Egyptian Children and Adolescents and reported that nearly half of the participant late snacks during night.

In relation to studied adolescent's life style habits (Table 3), the current study finding illustrated that there were statistically significant differences regarding number of sleeping hours that the studied adolescents sleep per night daily and number of hours that they spent on electronic devices. From the researchers' point of view prolonged period of staying at home during COVID-19 pandemic have increased consumption of electronic entertainment especially online gaming; excessive gaming has negative influences including harm to mental health, sleep patterns, or physical health. These results were concurrent with *Kifle et al. (2022)* who conducted a study about Assessment of lifestyle changes during coronavirus disease 2019 pandemic in Gondar town and reported that there was no statistically significant difference regarding number of hours spent on electronic devices for entertainment before and during COVID-19. While goes on line with *Di Renzo et al., (2020)* who reported that there was statistically significant difference regarding sleep pre and during COVID-19.

The current study finding showed that there was no a statistically significant difference regarding times of playing sport per week with

observable increase in the number of participated adolescents who didn't practice any sport neither before nor during COVID-19. From the researchers' point of view these might be due to the wide spread of social media and electronic games, which made adolescents discouraged from practicing any type of sports. This result was reluctant with a study conducted by *Farello et al. (2022)* about Children and Adolescents Dietary Habits and Lifestyle Changes during COVID-19 Lockdown in Italy and reported that there was statistically significant difference regarding training times per week pre and during COVID-19. Furthermore *Kifle et al. (2022)* who found that there was statistically significant difference regarding exercise practice by participants.

Concerning relation between demographic characteristics of the studied adolescents and level of Mediterranean diet adherence screener before and during COVID-19 (Table 5), the study result illustrates that there were statistically significant differences between Mediterranean diet adherence screener of the studied adolescents and their residence place before COVID-19. Also; there were statistically significant difference between Mediterranean diet adherence screener and monthly family income of the studied adolescent during COVID-19. From the researchers' point of view residence place and family income have a strong effect on eating habits and food choices; however we can't prove that it influence diet quality either directly or indirectly.

The present study was illustrated a statistically significant negative correlation between Mediterranean diet adherence screener score and body mass index of the studied adolescents before and during COVID-19. From the researchers' point of view increased boredom in adolescents was strongly connected with increased food responsiveness, increased emotional overeating and increased snack frequency. According the adolescents rely less on their internal signals for food intake and it is therefore important to encourage them to interpret the signals from the body and to control food intake even in challenging situations, such as in pandemic crises. Other factors may have increased the intake of comfort foods during the COVID-19, including more sedentary time at home, watching television during meals and other habit changes. These findings agree with *Pujia et al., (2021)* who found a greater weight gain in adolescents during

COVID-19 lockdown was associated with increased food consumption.

Regarding relation between life style habits and level of Mediterranean diet adherence screener of studied adolescents before and during COVID-19 (Table 7). The study finding illustrated that there were statistically significant differences between level of Mediterranean diet adherence screener and number of hours that the studied adolescents sleep at night during and the time the spent on electronic devices per day during COVID 19. From the researchers' point of view social media can have a positive impact on the extent of adolescents' commitment to obtaining the balanced diet. Therefore the long time that the adolescents spent on the electronic devices should be used to provide them with some educational programs about Mediterranean diet to improve their eating habits and consequently maintain their overall health. These results agree with *Androutsos et al. (2021)* who conducted a study about Lifestyle Changes and Determinants of Children's and Adolescents' Body Weight Increase during the First COVID-19 Lockdown in Greece and reported that there were statistically significant differences between sleep duration and screen time of the studied adolescents and their body weight.

Conclusion:

Based on the findings of the current study, there was a statistically significant difference regarding mean of Mediterranean diet adherence screener scores and dietary habits before and during COVID-19. There were statistically significant differences regarding number of sleeping hours that the studied adolescents sleep per night daily and number of hours that they spent on electronic devices, while there were no statistically significant differences regarding number of smoked cigarettes per day and times of playing sport per week. Also; there were statistically significant differences between Mediterranean diet adherence screener of the studied adolescents and their residence place before COVID-19, while there were statistically significant difference between Mediterranean diet adherence screener and monthly family income of the studied adolescent during COVID-19.

The study finding shows that there were statistically significant negative correlations

between Mediterranean diet adherence screener of the studied adolescents and their body mass index before and during COVID-19. There were statistically significant differences between level of Mediterranean diet adherence screener and number of sport times per weeks and the time the spent on electronic devices per day before COVID-19. Also; there were statistically significant differences between level of Mediterranean diet adherence screener and number of sleep hours at night during and the time the spent on electronic devices per day during COVID-19.

Recommendations:

At the light of study results, the present study recommends:

- Eating well-balanced meals, having adequate servings, sticking to home-cooked food, avoid irregular snacking, and keeping shared family mealtimes.

- Receiving adequate night sleeping, schedule suitable time for night going to sleep and morning waking up.

- Plan an educational program to educate the adolescents that social media has a beginning and an end; watching is not an all day mission.

- Provide educational sessions to teach adolescents about the importance of maintaining regular physical exercises and to keep away of cigarette smoking.

- Further studies should be conducted to analyze eating habits and life style to encourage the adoption of healthy diet and life style among adolescents.

Acknowledgments

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