Effect Of COVID 19 Pandemic On Physical Activity, Dietary Behaviours And Sleep Quality Among Elderly: Comparative Study

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Abstract

Study's purpose: to assess effect of covid 19 pandemic on physical activity, dietary behaviours and sleep quality among elderly. **Methodology:** A comparative descriptive study conducted in a rural area at Sharkia Governorate, Manshet Abd Elatif Waked with a random sample composed of 300 older adults Physical Activity was measured by International Physical Activity Questionnaire - Short Form, Dietary Behaviours were measured by Short Diet Behaviours Questionnaire and Sleep Quality was measured by Pittsburgh Sleep Quality Index (PSQI). **Major results:** the total mean score of physical activity among the studied elderly was 7.62±3.50before covid 19 then decreased to be 4.75±4.16 during covid 19, total mean score of diet behavior was6.64 ± 1.52 before covid 19 then decreased to 6.35 ± 1.50 during covid 19, and the total mean score of sleep behaviors among the studied elderly was 4.88±2.24 before covid 19 then increased to be 5.51±2.41 during covid 19,that indicates poor sleep quality during covid19. Statistically significant negative correlation between physical activity mean score and sleep behaviors and. Statistically significant positive correlation between diet behaviors mean score and physical activity mean score **Recommendations:** development of health promotion interventions to support positive physical activity, dietary behaviors, and sleep quality using alternative coping strategies.

Keywords: COVID-19, Elderly, Physical Activity, Dietary Behaviours, Sleep Quality, Comparative Study

Introduction

People worldwide are living longer. By 2030, 1 in 6 people in the world will be aged 60 years or At this time the share of the population aged 60 years and over will increase from 1 billion in 2020 to 1.4 billion and By 2050, the world's population of people aged 60 years and older will double (2.1 billion). (WHO, 2022).

The COVID-19 pandemic is a global outbreak of coronavirus, an infectious disease caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) virus, The first cases of novel coronavirus (nCoV) were first detected in China in December 2019, with the virus spreading rapidly to other countries across the world. This led WHO to declare a Public Health Emergency of International Concern on 30 January 2020, and to characterize the outbreak as a pandemic on 11 March 2020 (Cao et al., 2020).

Age is the strongest risk factor for severe COVID-19 outcomes. Patients with one or multiple of certain underlying medical conditions are also at higher risk(Rosenthal et al., 2020).The United States has lost nearly 1.1 million lives to COVID-19, of which about 790,000 are people ages 65 and older. People 65 and older account for 16% of the total US population but 75% of all COVID deaths to date (Kaiser Family Foundation (KFF), 2022).

Active aging involving regular physical activity and avoidance of prolonged time spent sitting is associated with a reduced risk of premature mortality, morbidity, better management of chronic disease (Ozemek et al., 2019). The coronavirus disease 2019 (COVID-19) pandemic has exacerbated this problem (Browne et al., 2020). While confinement to the home can be a safe measure against the spread of the coronavirus, it reduces people's physical activity and changes their exercise patterns (Constandt et al., 2020).

Exercise during the pandemic is important in preventing the health risks associated with physical inactivity and, more specifically, in increasing wellbeing and immunity and reducing stress and anxiety (Hammami et al., 2020).

Adequate nutrition is critically important for an optimally functioning immune system, and both malnutrition and overnutrition can adversely affect immune responses. (Lange & Nakamura, 2020).During covid 19 Adequate nutrition enhance immune responses (Galdeano et al., 2019) and modestly decrease the incidence and duration of viral respiratory tract infections (Xu et al., 2020).

The risk of respiratory tract infections in smokers may be increased (Lawrence et al., 2019) . It is becoming increasingly clear that smoking may have negative effects on covid 19 infection . for example, the percentages of current and former smokers were higher in severe as compared to non-severe COVID-19 cases(Zhang et al., 2020).

Sleep appears to be a crucial element of the immune system(Besedovsky et al., 2019) , and sleep deprivation and altered sleep patterns may increase susceptibility to infection with covid 19 . Sleep quality during the pandemic may be poorer due to anxiety and stressors related to COVID-19(Wang et al., 2020).

Nurses are expected to play an even more pivotal role in preparation for and management of- the pandemic by providing health education about Healthy dietary intake, avoid bad health behaviours as smoking (Iddir et al., 2020). Encourage home-based exercise programs to remain physically active during covid 19 pandemic, (Cunningham & O'Sullivan, 2020) and play an educator role by providing health education to keep good sleep quality during the pandemic (Edinger et al., 2021).

Method

Study Design and Ethical Considerations

A comparative Descriptive study design was utilized to conduct the current study from the beginning of May 2022 up to the end of October 2022. in Manshet Abd Elatif Waked Village in Sharkia Governorate which was randomly selected from 30 villages of kafer Saker center which also was selected randomly from the 23 centers of Sharkia governorate. The study was approved by the Research Ethics Committee (REC) and the Postgraduate Committee of the Faculty of Nursing at zagizag University. Verbal consent was obtained from older adults after a description of the purpose of the study.

Sample

A multistage cluster sample composed of 300 older adults aged 60 years or above, free from psychiatric disorders and dementia, and able to communicate was selected in the recruitment of this study.

A Multistage cluster sampling technique was used in the recruitment of this study subjects as follows: **Firstly**, the study was conducted in Sharkia Governorate, which consists of 23 center. The investigators used simple random sampling technique to pick up a random center, it was kafer Saker center (consists of 30 villages). **Secondly**, the investigators picked up one village from the 30 villages randomly (Mainsheet Abd Ellatief Wakied). **Thirdly,** the selected village was divided into 12 clusters, (nearly 75 elderly individuals are living in each cluster). Accordingly, 6 clusters were selected randomly. **Finally**, all the elderly individuals in the selected clusters who achieved the inclusion criteria were included in the study sample till reaching the calculated sample size (300).

Sample size calculation

The sample size was calculated by software Epi-info package, assuming a prevalence of covid 19 among elderly is 51.0% (Singhal et al., 2021) from 900 elderly were residing in Mainsheet Abd ellatief wakied, level of confidence 95%, margin of error 5% and power of test were 80%. The sample size will be 300 elderly patients

Tool of data collection

Four tools were used to collect the study data. **Tool I:** an interview questionnaire that was developed by the researchers based on the literature review. It consisted of demographic characteristics of the elderly which includes age, gender, marital status, educational level, current occupation, crowding index, monthly income, the source of income, and living condition.

Tool II: International Physical Activity Questionnaire - Short Form:

According to the official IPAQ-SF recommendations, data are summed within each item

(i.e., vigorous intensity, moderate intensity, and walking) to estimate the total amount of time engaged in physical activity per week. It constituted of 7 questions before and during covid 19 pandemic.

Scoring system :

According to the official IPAQ-SF guidelines, data from the IPAQ-SF are summed within each item (i.e., vigorous intensity, moderate intensity, and walking) to estimate the total amount of time spent engaged in PA per week. Additionally, the total PA mean score (sum of performed vigorous, moderate and walking activity) was calculated. The higher the score, the higher the level of participation physical activity.

Tool III: Short Diet Behaviors Questionnaire:

The SDBQ-L is a newly developed crisis-oriented short questionnaire to assess dietary behaviors before and during covid 19 pandemic . The SDBQ-L has five questions related to "1. unhealthy food", "2. eating out of control", "3. snacks between meals", "4. number of main meals/day", and" 5 Use the internet, social media, and apps for dieting purposes " Regarding the first question related to unhealthy food, explanation was provided with the question as follows: "1. How likely are you to have an unhealthy diet/food? (high in calories from sugar or fat, colorants, salt and tropical oils; and low in fibers and vitamins (e.g., fried potato crisps/chips, cakes, white sauces. respondents are asked about frequency of their participation in certain activities, and the number of times they consumed certain foods for a week .

Finally questions adopted from the Yonsei Lifestyle Profile which is developed by Park & Park. (2020). It consists of nine items for nutrition were assessed using a five-point Likert scale to measure nutrition during the week before and after COVID-19 in order to measure the participants' nutritional status. but we had removed the questions related to drinking alcohol habits, so it included only seven questions. The amount of carbohydrates, proteins, fats, vitamins, minerals, and water, the participants consumed, and the frequency of drinking and smoking, were measured. For example, the participants were asked, "Before the COVID-19 pandemic, how often do you consume carbohydrate-rich foods such as rice, bread and flour in the last week? They are asked to respond to each question twice, basing their answer on their typical routines before and after the onset of COVID-19 pandemic.

Scoring system :

The SDBQ-L is a newly developed crisis-oriented short questionnaire to assess dietary behavior The SDBQ-L has 5 questions related to "unhealthy food", "eating out of control", "Regular eating of the main meals of the day (i.e. breakfast, lunch and dinner)", "snacks between meals". The response choices and their designated scores were as follows: "Never" = 1; "Sometimes" = 2; "all the time" = 3.These choices and points were applied for the all questionnaires except Q3, the choices and the designated scores for it were as follows: "Never" = 3; "Sometimes" = 2; "all the time" = 1. Total score of this questionnaire, corresponded to the sum of the scores in the 4 questions. The total score for the SDBQ-L is from "1" to "12", where "1" designates healthy dietary behaviors and "12" designates unhealthy dietary behaviors

Finally, 7 items for nutrition were assessed using a five-point Likert scale to measure nutrition during the week before and after COVID-19 in order to measure the participants' nutritional status. The amount of carbohydrates, proteins, fats, vitamins, minerals, water, and the frequency of drinking and smoking, were measured. For example, the participants were asked, "Before the COVID-19 pandemic, how often do you consume carbohydrate-rich foods such as rice, bread and flour in the last week?" Participants answered these questions by selecting one of the choice of the five-point Likert scale: (1) never, (2) 1–2 times per week, (3) 3–4 times per week, (4) 5–6 times per week, and (5) every day. A higher score indicated more consumption of each type of nutrition.

Tool IV: Pittsburgh Sleep Quality Index (PSQI):

The sleep quality was assessed by the PSQI Buysse et al., (1989) The PSQI questionnaire is composed of 19 questions and has been shown to be reliable and valid in older adults. It is used to assess Sleep Quality among elderly before and during COVID19 pandemic . It was composed of 8 questions

Scoring system :

PSQI is a self-rated questionnaire which assesses sleep quality and disturbances over a 1-month time interval. In this instrument, 19 individual items generate 7 "component" scores: subjective sleep quality, sleep

latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication, and daytime dysfunction. A global score of subjective sleep quality (range 0–21) is then determined by the sum of the 7 component scores with the higher scores representing poorer subjective sleep quality. Habitual sleep efficiency was derived from the formula: hours of sleep/(get-up time - usual bedtime) ×100%. Sleep disturbance was derived from CPSQI items of "wake up in the middle of the night or early morning", "have to get up to use the bathroom", "cannot breathe comfortably", "cough or snore loudly", "feel too cold", "feel too hot", "had bad dreams", and "have pain". Higher scores indicate more sleep disturbances. Daytime dysfunction was derived from CPSQI items of "during the past month, how often have you taken medicine (proscribed or over the counter) to help your sleep" and "during the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity". Higher scores indicate more daytime dysfunction. The respondents were diagnosed as poor sleepers if they obtained a CPSQI global score of >5 . The criteria of poor sleeper yielded a sensitivity and specificity of 98% and 55%, respectively, in primary insomniacs vs. controls according to the diagnostic criteria for primary insomnia on the basis of the DSM-IV .

Statistical analysis

Data entry and statistical analysis were done using SPSS 23.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables, and means and standard deviations and medians for quantitative variables. Cronbach alpha coefficient was calculated to assess the reliability of the developed scales through their internal consistency. The McNemar test was used to determine if there are differences on a dichotomous dependent variable. The Friedman test is the non-parametric alternative to the one-way ANOVA with repeated measures. It is used to test for differences between groups when the dependent variable being measured is ordinal.

Quantitative continuous data were compared using the non-parametric Mann-Whitney or Kruskal-Wallis tests and paired t test. Qualitative categorical variables were compared using chi-square test. Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. Spearman rank correlation was used for assessment of the inter-relationships among quantitative variables and ranked ones. In order to identify the independent predictors of life style behaviors multiple linear regression analysis was used and analysis of variance for the full regression models was done. Statistical significance was considered at p-value <0.05.

Results

Regarding the demographic characteristics of the older adults in the study sample, **Table 1:** shows 74.7 % of them were aged between 60 and 69 years, mean age 65.59± 5.85 years. Besides, 52% were male and 71.3% were married. Among the studied elderly, 95.7 % lived with family. Moreover, the current study also indicates that, 52.7% of the studied elderly were having less than or equal two chronic diseases with a mean number of diseases 1.08 ± 1.15 disease. 70.3% of elderly were not infected with covid 19 and the infected constitutes (29.7%), the infected elderly had covid 19 from a year ago (48.3%),

Figure (1): demonstrates that, 64.3% of the studied elderly were illiterate, followed by intermediate education (14.3 %) then the elderly who able to read and write (8.0)

Table (2): indicates that the total mean score of physical activity among the studied elderly was 7.62±3.50before covid 19 then decreased to be 4.75±4.16 during covid 19, total mean days per week of moderate physical activites was 2.83 ±2.24 then decreased to be 2.07±2.23. Additionally, total mean days per week of walking was 4.26 ±1.46 then decreased to be 2.42±2.24. This difference is statistically significant p>0.001.

Table (3): reveals that 35.7% of the elderly ate out of control all times before covid 19 which decreased to be 20.7% during covid 19. Also , before covid 19 of the elderly was on regular eating of the main meals (49.7%)which increased to be 54.3% during covid 19 . This difference was statistically significant p>0.05.total mean score of diet behavior was6.64 ± 1.52 before covid 19 then decreased to 6.35 ± 1.50 during covid 19.

Table (4): indicates that the total mean score of food intake among the studied elderly was highly statistically significant increased, regarding Foods rich

in protein, vitamin-rich foods and water intake during covid 19 .

Table (5): explicates that the total mean score of sleep behaviors among the studied elderly was 4.88±2.24 before covid 19 then increased to be 5.51±2.41 during covid 19,that indicates poor sleep quality during covid19. this difference was statistically significant p>0.001.

Table (6): shows that there were highly statistically significant relations between physical activity mean score of the studied elderly during covid 19 and their demographic characteristics as gender, had covid 19, covid 19 complication , seriousness on covid 19 condition and number. of chronic diseases at P < 0.01. Additionally, there were statistically significant relations with marital status, education, work ,living with whom and number. of medication at P < 0.05. It is clear that the higher physical mean score among elderly who were male, divorced, having high education (university/ post educated), working, living with family, did not have covid 19 or it's complication, their condition was not serious, having no chronic diseases and having no medication .

Table (7): represents that there were statistically significant relations between total diet behaviors mean score of the studied elderly during covid 19 and their demographic characteristics as number. of chronic diseases and number. of medication at P < 0.05. It is clear that the higher mean score of the diet behavior was among elderly with no chronic diseases wasn,t taking any medication.

Table (8): represents that there were ahighly statistically significant relations between total sleep quality of the studied elderly during covid 19 and their demographic characteristics as number of chronic diseases P < 0.01. Additionally, there were statistically significant relations between sleep quality of the studied elderly , gender and number of medication at P < 0.05. It is clear that the higher percentage of the elderly with a good sleep quality were male, with no chronic diseases and was not taking any medication.

Table (9): reveals positive correlation between physical activity and social participation (.325) and also between diet behavior and physical activity (.114). While, a statistically significant negative correlation between sleep behaviors and social participation and physical activity(-.216 & -.132) .

Table (10):During covid 19 physical activity was negatively correlated with elderly's age ,female gender, unmarried marital status,not working, living with family, having covid 19 number of diseases and number of medications.On the other hand the positive correlation between level of education and physical activity.Regarding diet behaviors was negatively correlated with number of diseases and number of medications . regarding sleep quality was positively correlated with number of diseases and number of medications .

Table (11): reveals that the statistically significant independent positive predictors for physical activity score were education level and hadn,t covid 19. On the other hand, age, female gender and number of diseases were statistically significant independent negative predictors. The model explains 16% of variation in physical activity score.

Table (12): Shows that the only statistically significant independent negative predictor for diet behaviors score was number diseases. The model explains 3.2% of variation in diet behaviors.

Table (13): reveals that the statistically significant independent positive predictor for sleep behaviors score was No. of diseases. The model explains 8.8% of variation in sleep behaviors.

Discussion

Concerning demographic characteristics, it is clear from the results of the current study that the mean age of the studied elderly was 65.59± 5.85 years and their age ranged between 60-85 years; this might be due to the presence of a larger individuals' number of this age group in Egypt as confirmed by CAPMAS **(CAPMAS, 2022)** which reported that the number of elderly people (60 years and over) in Egypt reached 6.8 million, representing 6.7% of the total population. This result is nearly in agreement with **Rashid et al. (2020)** in India, who found that the average age of the studied elderly was 68.2 ± 0.4. Likewise, **Arthur et al. (2020)** in Ghana, who found that the target population for the study was who were aged 60 years and above.

Moreover, the current study findings revealed that slightly more than half of the study sample were male .

This might be attributed to that the number of the elderly males elderly at Manshet abd elatif waked was more than the elderly females number **(CAPMAS, 2022).** This finding goes in the same line with **Sadeghi et al. (2022)** study conducted in the north of Iran, at Babol University of Medical Sciences (MUBABOL), which mentioned that more than half of their study subjects were male .

Also, the current study results showed that slightly less than three-quarters of the studied elderly were married and slightly less than two-thirds were illiterate. Married; this could be due to traditions, norms and customs in the Arabic World, which dictate that men and women's relationships should be formalized through marriage. Illiterate: this could be due to the fact that the studied elderly were living in rural areas where there was a lack of interest in education and they were preoccupied with farming. This result is confirmed by a study in Indonesia by **Dewi, & Krisnatuti (2020)** who reported that most of the study sample were married. Similarly, **Kulkarni et al. (2023)** in Gankal Village, Bangalore rural district (India), who found that the majority of the study participants were illiterates.

As regards occupation before retirement, less than half of them were house wife, in line with the female percentage from the study sample and also due to the majority of women in rural areas doesn't work . This result is confirmed by a study in southwest of Iran: by **Boustani et al (2023).**

Also, the majority of the studied elderly were still living with their family; It might be due to that most of them were still married and living with their spouse's in addition to the fact that the most common type of family in rural areas is the extended family and there are strong relationships between elderly people and their progeny in rural areas.

The above mentioned result are in agreement with the results of the study carried out by **Marzo et al. (2022)** an online survey in six countries: Bangladesh, Iran, Iraq, Malaysia, Palestine, and Sri Lanka, which reported that the studied sample were not working and more than two thirds of them were living with there family.

In terms of medical history, the current study discovered that about two thirds of the study samples were having chronic conditions, with a mean number of diseases 1.08 ± 1.15 and the most common comorbid diseases are hypertension and diabetes mellitus, Such results might be due to physiological changes in body systems as people get older, such as the cardiovascular, respiratory, and immunological systems. Also, comorbidities like hypertension and diabetes are common among the elderly.

The present finding is in agreement with the results of study carried out by **Rivera-Hernandez et al. (2021)** in Brazil demonstrated that about half of older adults had hypertension and one- third had diabetes.

Concerning covid 19 history of the studied elderly, the results of the current study showed that slightly less than one third of the studied elderly were infected with covid 19 , and about half of them had covid 19 from a year ago . This may be due to that covid 19 was a pandemic and the elderly population was the most susceptible group. This result is in agreement with a study carried out in Egypt by **Khalaf et al. (2021)** who reported that slightly less than one third of the elderly were infected with covid 19.

Regarding physical activity before and during COVID19 Pandemic, the present study demonstrated that the total mean score of physical activity among the studied elderly was 7.62±3.50before covid 19 then decreased to be 4.75±4.16 during covid 19, total mean days per week of moderate physical activites was 2.83 ±2.24 then decreased to be 2.07±2.23. Additionally total mean days per week of walking was 4.26 ±1.46 then decreased to be 2.42±2.24. This may be due to that worldwide spread of the covid 19 pandemic led the governments to apply unprecedented containment measures. The Egyptian government has been issued to state an absolute ban to get away from the home, except to make essential work or activities. Quarantine has upset the normality of Egyptian elderly's daily life, forcing elderly to social distancing and self-isolation and lead to changes of physical activity (for example, walking and exercising) and activities of daily living of elderly (for example, commuting and shopping) due to social distancing efforts. Hence, an involuntary prolonged stay at home may encourage sedentary behavior as well as during covid 19 pandemic.

In the same context, the results of a study conducted by **Maugeri et al. (2020)** in Italy revealed that total physical activity significantly decreased

between before and during COVID-19 pandemic (Mean: 24.29 vs. 15.77 MET–min/wk, ****p < 0.0001). Furthermore, **Castañeda-Babarro et al. (2020)** in Spain reported that the mean score of time in vigorous activities among the studied sample was 219 ± 196 min/wk before covid 19 then decreased to be 182 ± 184 min/wk during covid 19, time in moderate activities was 149 ± 174 before covid 19 then decreased to be 145 ± 170 during covid 19, and Walking Time was 282 ± 253 before covid 19 then decreased to be 116 ± 189.3 during covid 19.

Additionally, a study conducted by **Sasaki et al. (2021)** in Japan clarified that total mean score of physical activity before covid 19 was 3678.2 ± 4163.1 then decreased to be 3484.8 ± 4112.3 during covid 19, total mean days per week of moderate physical activites before covid 19 was 1064.7 ± 1332.8 then decreased to be 1002.6 ± 1306.4 during covid 19, and total mean of walking before covid 19 was 922.9 ± 1035.5 then decreased to be 877.4 ± 1028.9 during covid 19. By **Visser et al. (2020)** in the Netherlands revealed that about half of the sample reported a decrease in physical activity and exercise due to covid 19 pandemic .

Another study finding was that there statistically significant relations between physical activity of the studied elderly during covid 19 and gender, marital status, education, work ,living with whom , number of medication, previous covid infection, covid 19 consequences , severity of covid 19 condition and number of chronic diseases

In the same context, the results of a study conducted by **López-Bueno et al. (2020)** in Spain showed that men is more physically active than women, lower levels of PA in older participants, explained by the ageing process itself. Another highlight was that university degree holders performed higher Physical activity this might be due to a higher awareness of having a healthy lifestyle, and unemployed participants of this study showed lower Physical activity levels than those employed.

Concerning dietary behaviors among elderly before and during COVID19 Pandemic, the present study demonstrated that total diet behavior mean score before covid was 6.64 ± 1.52, then it decreased to be 6.35 ± 1.50 during covid 19, this may be due to the improvement of community awareness about the importance of eating healthy diet to improve the immunity during the COVID-19 infection . So, the elderly recognized What food and drink could affect their body's ability to prevent, fight and recover from covid 19 infections, although it may play a profound role in the host response to an infectious agent. While no foods or dietary supplements can prevent or cure COVID-19 infection, healthy diets are important for supporting immune systems. Furthermore, the World Health Organization (WHO) also offered several food and nutritional tips during self-quarantine.

The current study results revealed that Health-related food choices included higher intake of food rich in protein, vitamin, mineral and water drinking among the studied elderly during covid19 than before covid 19 firstly food rich in protein and decrease in smoking frequency during covid 19

In the same context, the results of a study conducted by **Rodríguez-Pérez et al. (2020)** in Spain outlined healthier dietary behaviours during the confinement when compared to previous habits, where healther dietary behaviours mean score 6.53 ± 2 to 7.34±1.93 during the confinement, additionally, a study by **Sidor & Rzymski (2020)** in Poland revealed that the intake of fruits and vegetables (vitamin rich foods) increased by around 12% during covid 19,the highest frequency of consuming fast-foods (3.2%), meat (40.4%), and dairy (54.2%),this study also indicates that 45% of smokers experienced a rise in smoking frequency during covid 19. This is in contrary with the current study result because the current study had a close relative who dead due to covid 19 infection make them fear of death so they tried to stop the poor health choices as smoking.

Moreover, the current finding that there is a positive correlation between diet behavior and physical activity this may be due to that physical activity lowers sedentariness and sleep disturbance **(Bates et al., 2021)**, which are, in turn, linked to less deteriorated dietary behavior (Du et al., 2021).

In the same context, the results of a study conducted by **Morres et al. (2021)** in Greek outlined that the increased physical activity, associated with healthier eating behaviors.

Our next notable finding was that mean score of smoking during covid 19 was 2.11 ±1.78 then decreased

to 1.99 1.72±during covid 19 this may be due to that individuals who smoke during this period may be affected by the COVID-19 pandemic and associated with more severe outcomes. Another aspect to note is that of the variation of the family lifestyle habits of each smoker; for example, spending more time in the home with children or nonsmoking cohabiting partners has likely led people to slightly reduce their consumption of cigarettes in order to respect their family members.

In the same context, the results of a meta-analyses on 24 countries covering multiple regions of the world. conducted by **Sarich et al. (2022)** indicated that the prevalence of smoking during the COVID-19 pandemic was observed to be lower than pre-pandemic.

Concerning sleep quality level among elderly before and during COVID19 Pandemic, the present study demonstrated that nearly three quarters of the studied elderly reported a good Sleep quality before covid 19 , while during covid 19 nearly half of the studied elderly reported poor sleep quality. This indicate worsening of sleep quality during covid 19 . This may be due to that Social isolation, home confinement, anxiety, fear of getting infected, stress, and economic uncertainties due to the current COVID-19 pandemic directly impact sleep, promoting circadian disruption and acting as precipitators or perpetuators of insomnia. Among older adults, loneliness seems to be an important additional factor.Also, reduced exposure to the sunlight, limited activity during the day, and alterations in the food time may lead to dysregulation in the circadian rhythms and, in consequence, may affect sleep

Our next notable finding was that sleep quality positively correlated with female gender this may be due to the changing hormone profile across the reproductive life of a woman, from puberty through the reproductive period to the postmenopausal years, may have a significant influence on sleep leading to sleep alteration or disruption and other vulnerabilities specific to psychological disorders in women.

In the same context, the results of a study conducted by **Franceschini et al. (2020)** in Italy showed that More than half of participants reported poor sleep quality. Also the female gender is more exposed than the male to having problems with sleep.

Conclusion

The current study findings revealed that COVID 19 affected negatively on physical activity and sleep quality. On the other hand it affected positively on dietary behaviours.

Recommendations

Based on the results of this study, it is important to develop a health promotion interventions to support positive physical activity, dietary behaviors and sleep behaviors using alternative coping strategies.

Declaration of Conflicting Interests

The Author(s) declare(s) that there is no conflict of interest.

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Table 1: Demographic characteristics and medical history of the studied elderly (N=300)

Demographic characteristics	(n=300)	
	Frequency	Percent
Age group: /year		
60-	224	74.7
70-	62	20.7
80-	14	4.6
Mean ± SD	**65.59± 5.85**	
(range)	**(60 – 85)**	
Gender:		
Male	156	52.0
Female	144	48.0
Marital status:		
Married	214	71.3
Widower	82	27.3
Divorced	4	1.4
Occupation before retiree:		
House wife	131	43.7
Crafts	30	10.0
Farmers	68	22.7
Tradesman	7	2.3
Employee	64	21.3
Living with whom:		
Alone	13	4.3
With family	287	95.7
Total no. of chronic diseases:		
No chronic disease	111	37.0
≤ 2	158	52.7
> 2	31	10.3
Mean ± SD	**1.08 ± 1.15**	
(range)	**(1– 8)**	
Had Covid 19:		
Yes	89	29.7
No	211	70.3
If yes time of getting covid 19:n=89		
Less than a year ago	15	16.9
A year ago	43	48.3
More than a year ago	31	34.8

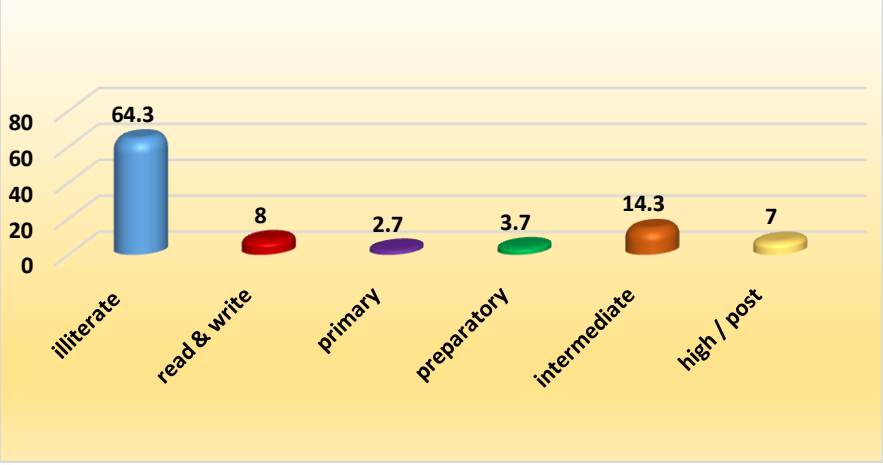

Figure (1):distribution of the studied elderly by level of education

Table (2): comparison of total physical activity mean score among elderly before and during covid 19

Items		Before (n=300)		During (n=300)		*t- test*	(p-value)
		M	**SD**	**M**	**SD**		
Vigorous (hard) physical activity	**Days / week**	.17	.79	.14	.72	1.215	.290
	Minutes/day	1.15	5.19	.93	4.95	1.617	.107
Moderate physical activities	**Days / week**	2.83	2.24	2.07	2.23	8.25	**.000****
	Minutes/day	10.53	8.12	8.05	8.33	7.083	**.000****
Walking	**Days / week**	4.26	1.46	2.42	2.24	14.844	**.000****
	Minutes/day	17.83	7.82	10.65	9.98	13.32	**.000****
All PA [physical activity]	**Days / week**	5.67	2.60	3.64	3.17	13.09	**.000****
	Minutes/day	29.52	14.36	19.63	17.44	12.92	**.000****
Total physical activity mean score:		7.62 ± 3.50		4.75 ± 4.16		14.406	**.000****

**: Significant **: Highly significant*

Table (3): comparison of diet behaviors among elderly before and during covid 19

Items		Before (n=300)		During (n=300)		*Friedman Test*	(p-value)
		No	**%**	**No**	**%**		
I eat unhealthy food	Never	149	49.7	160	53.3	2.13	.144
	Sometimes	95	31.7	87	29.0		
	All times	56	18.7	53	17.7		
eating out of control	Never	92	30.7	144	48.0	57.88	**.000****
	Sometimes	101	33.7	94	31.3		
	All times	107	35.7	62	20.7		
Regular eating of the main meals of the day (i.e. breakfast, lunch and dinner)	Never	99	33.0	93	31.0	8.17	**.004***
	Sometimes	52	17.3	44	14.7		
	All times	149	49.7	163	54.3		
Have a snack between meals or a late night snack?	Never	263	87.7	260	86.7	.400	.527
	Sometimes	33	11.0	37	12.3		
	All times	4	1.3	3	1.0		
Use the internet, social media, and apps for dieting purposes	Never	289	96.3	288	96.0	2.00	.157
	Sometimes	10	3.3	10	3.3		
	All times	1	0.3	2	0.7		
Total diet behavior mean score:		6.64 ± 1.52		6.35 ± 1.50		**t-test** 5.85	**.000****

**: Significant **: Highly significant*

Table (4): comparison of food intake mean score among elderly before and during covid 19

Items	Before (n=300)		During (n=300)		*t-test*	(p-value)
	M	SD	M	SD		
Foods rich in carbohydrate	5.00	.00	4.99	.17	1.00	.318
Foods rich in protein	4.99	.17	3.52	1.19	5.10	**.000****
Fatty foods	4.98	.18	4.98	.18	.000	1.0
Vitamin-rich foods	2.93	.96	4.29	1.17	19.94	**.000****
Mineral-rich foods	3.58	1.40	3.71	1.40	3.21	**.001***
Smoking	2.11	1.78	1.99	1.72	2.45	**.015***
Glasses of water	2.82	.68	2.92	.70	4.19	**.000****

: Significant* *: Highly significant*

Table (5): Total PSQI of elderly before –during covied 19

T-PSQI	Pre (n=300)		Post (n=300)		*McNemar Test*	(p-value)
	No	%	No	%		
Good sleep 0-5	214	71.3	176	58.7	28.52	**.000****
Poor sleep 6-21	86	28.7	124	41.3		
Paired t-test						
Total PSQI mean score:	4.88±2.24		5.51±2.41		6.03	**.000****

T-PSQI global score of > 5 were defined as having poor sleep quality, while T-PSQI global scores of ≤ 5 were defined as good sleep quality. **: Significant* ***: Highly significant*

Table (6): Relation between total PA [physical activity] mean score of the studied elderly during covid 19 and their demographic characteristics

Characteristics		Total PA		Mann Whitney Test	P
		M.	SD.		
Age group (years)	60-69 70-79 80-85	5.02 3.84 4.36	4.22 3.84 4.29	H=3.92	.141
Gender:	Male Female	5.77 3.64	4.14 3.91	4.49	**.000****
Marital status:	Married Divorced Widower	5.24 7.25 3.34	4.18 4.99 3.74	H=13.44	**.001***
Education	Illiterate Read & write Primary Preparatory Intermediate University / post	4.29 4.08 3.13 6.73 5.67 7.33	4.01 4.13 3.48 4.17 4.43 4.04	H=16.10	**.007***
Education	Work Not work	5.80 4.50	3.87 4.20	2.28	**.022***
With whom you live	Alone With family	2.38 4.85	3.28 4.17	2.16	**.031***
Income	Sufficient Insufficient	4.79 4.51	4.10 4.49	.535	.593
Had covid 19	Yes No	3.36 5.33	3.98 4.11	3.81	**.000****
Covid 19 let any complications:	Yes No	1.79 3.65	3.09 4.08	8.11	**.000****
The condition was serious: n=89	Yes No	2.25 3.77	3.60 4.06	7.89	**.000****
No. of chronic diseases:	No 1-2 3-8	5.47 4.74 2.19	4.16 4.19 3.00	H= 7.83	**.000****
No. of medication:	No 1-2 3-4 More than 5	5.64 4.81 4.18 3.14	4.23 4.04 4.08 3.92	H=4.17	**.007***

(H) Kruskal Wallis ***(*) statistically significant at p≤0.05***

Table (7): Relation between total diet behaviors mean score of the studied elderly during covid 19 and their demographic characteristics

Characteristics		Total diet behaviors		Mann Whitney Test	P
		M.	SD.		
Age group (years)	60-69 70-79 80-85	6.39 6.27 6.00	1.49 1.54 1.47	.530	.589
Gender:	Male Female	6.46 6.23	1.61 1.37	1.70	.193
Marital status:	Married Divorced Widower	6.33 6.50 6.38	1.53 1.29 1.45	H=.049	.952
Education	Illiterate Read & write Primary Preparatory Intermediate University / post	6.27 6.79 6.00 7.27 6.35 6.19	1.46 1.47 1.69 1.42 1.74 1.21	H=1.50	.188
Current work:	Work Not work	6.55 6.29	1.67 1.46	1.31	.253
With whom you live	Alone With family	6.15 6.36	1.57 1.50	.224	.637
Income	Sufficient Insufficient	6.33 6.41	1.48 1.58	.115	.735
Had covid 19	Yes No	6.10 6.45	1.14 1.62	3.41	.066
Covid 19 let any complications:	Yes No	6.28 6.07	1.07 1.15	1.83	.163
The condition was serious: n=89	Yes No	5.92 6.17	.97 1.19	1.95	.144
No. of chronic diseases:	No 1-2 3-8	6.72 6.15 6.03	1.53 1.48 1.30	H= 5.72	**.004***
No. of medication:	No 1-2 3-4 More than 5	6.68 6.37 6.04 5.88	1.52 1.48 1.59 1.17	H= 14.68	**.002***

(H) Kruskal Wallis ***(*) statistically significant at p≤0.05***

Table (8) Relation between total sleep quality of the studied elderly during covid 19 and their demographic characteristics

Characteristics		Total sleep quality				X^2 Test	P
		Good n=176		Poor n= 124			
		No.	%	No.	%		
Age group (years)	60-69	130	58.0	94	42.0	2.36	.308
	70-79	40	64.5	22	35.5		
	80-85	6	42.9	8	57.1		
Gender:	Male	102	65.4	54	34.6	6.05	**.014***
	Female	74	51.4	70	48.6		
Marital status:	Married	120	56.1	94	43.9	4.17	.124
	Divorced	4	100.0	0	0.0		
	Widower	52	63.4	30	36.6		
Education	Illiterate	111	57.5	82	42.5	1.80	.876
	Read & write	14	58.3	10	41.7		
	Primary	5	62.5	3	37.5		
	Preparatory	5	45.5	6	54.5		
	Intermediate	27	62.8	16	37.2		
	University / post	14	66.7	7	33.3		
Current work:	Work	38	67.9	18	32.1	2.39	.121
	Not work	138	56.6	106	43.4		
With whom you live	Alone	11	84.6	2	15.4	3.77	.052
	With family	165	57.5	122	42.5		
Income	Sufficient	146	58.6	103	41.4	Fisher	1.00
	insufficient	30	58.8	21	41.2		
Had covid 19	Yes	48	53.9	41	46.1	1.17	.279
	No	128	60.7	83	39.3		
Covid 19 let any complications:	Yes	5	35.7	9	64.3	3.44	.179
	No	43	57.3	32	42.7		
The condition was serious: n=89	Yes	11	45.8	13	54.2	2.06	.357
	No	37	56.9	28	43.1		
No. of chronic diseases:	No	82	73.9	29	26.1	19.91	**.000****
	1-2	83	52.5	75	47.5		
	3-8	11	35.5	20	64.5		
No. of medication:	No	75	72.1	29	27.9	12.02	**.007***
	1-2	50	51.0	48	49.0		
	3-4	30	53.6	26	46.4		
	More than 5	21	50.0	21	50.0		

(*) statistically significant at p≤0.05

Table (9): Correlation between elderly' total mean score of life satisfaction, mental wellbeing, mood & feeling, social participation, physical activity, diet behaviors and sleep behavior.

Scores	Total mean score		
	Physical activity	Diet behaviors	Sleep behavior.
Physical activity			
Diet behaviors	**.114***		
Sleep behavior.	**-.132***	.048	

R: Pearson's correlation coefficient (*) statistically significant at p<0.05 (**) statistically significant at p<0.01

Table (10): Correlation between elderly' characteristics and their life satisfaction, mental wellbeing, mood & feeling, social participation, physical activity, diet behaviors and sleep behavior during covid 19.

Items	Spearman's rank correlation coefficient		
	Physical activity	**Diet behaviors**	**Sleep behavior.**
Age	**-.142***	-.060	.107
Gender [female]	**-.166****	-.058	**.142***
Marital status[unmarried]	**-.214****	-.035	-.055
Education level	**.169****	.044	-.074
Current work [not work]	**-.132***	.103	.061
Living with whom[family]	**-.118***	-.020	-.012
Had covid 19 [yes]	**-.221****	-.031	-.063
No. of diseases	**-.173****	**-.145***	**.131***
No. of medication	**-.216****	**-.157****	**.176****

R: Pearson's correlation coefficient (*) statistically significant at p<0.05 (**) statistically significant at p<0.01

Table (11): Best fitting multiple linear regression model for physical activity score

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	**Std. Error**	**Beta**			**Lower Bound**	**Upper Bound**
(Constant)	4.381	1.462		2.996	**.003**	1.503	7.259
Age	-.857	.418	-.114	-2.053	**.041**	-1.679	-.035
Gender [female]	-1.388	.489	-.167	-2.840	**.005**	-2.350	-.426
Education level	.397	.133	.171	2.981	**.003**	.135	.659
Had covid19 [no]	1.895	.509	.208	3.725	**.000**	.894	2.896
No of diseases	-.754	.370	-.115	-2.039	**.042**	-1.482	-.026

R-square=0.16 Model ANOVA

Table (12): Best fitting multiple linear regression model for diet behaviors score

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	**Std. Error**	**Beta**			**Lower Bound**	**Upper Bound**
(Constant)	6.658	.131		50.994	**.000**	6.401	6.915
No. of diseases	-.425	.135	-.180	-3.155	**.002**	-.690	-.160

R-square=0.032 Model ANOVA F=9.95 p<0.001

Table (13): Best fitting multiple linear regression model for sleep behaviors score

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	4.135	.422		9.800	**.000**	3.304	4.965
Gender	.441	.275	.092	1.606	.109	-.100	.982
No. of diseases	.991	.216	.261	4.577	**.000**	.565	1.417

R-square=0.088 Model ANOVA F=14.29 p<0.001

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