

Physical activity levels during Covid-19 among nurses at a Saudi teaching hospital: a cross sectional study

Ranya A. Ghamri
Sofyan O. Faidah

Department of family medicine at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia

Corresponding author:

Dr. Sofyan O. Faidah

Department of family medicine at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia

Tel.: +966591036363

Email: sofyam.faidah@gmail.com

Received: May 2022 Accepted: June 2022; Published: July 1, 2022.

Citation: Ranya A. Ghamri, Sofyan O. Faidah. Physical activity levels during Covid-19 among nurses at a Saudi teaching hospital: a cross sectional study. World Family Medicine. 2022; 20(7): 111-121.

DOI: 10.5742/MEWFM.2022.9525104

Abstract

Background: Previous studies have revealed that despite evidence of the advantages of exercise, nurses have one of the lowest levels of physical activity participation across all occupational groups.

Methods: a cross sectional study was done on 316 nurses at King Abdulaziz University Hospital (KAUH), Jeddah, Saudi Arabia. An online questionnaire was used to collect demographic data, work conditions, smoking status and chronic diseases. The International Physical Activity Questionnaire (IPAQ) was used to assess the physical activity level.

Results: The nurses in the trial had a considerably higher number of days spent doing vigorous and moderate physical activities a week before Covid-19, as well as spending more time doing them. Furthermore, they had a considerably higher percentage of days walking for at least 10 minutes at a time in a random week before the Covid-19 pandemic. According to the International Physical Activity Questionnaire (IPAQ), 32.6 percent, 40.2 percent, and 27.2 percent of the nurses in the study, respectively, had a low, moderate, or high level of physical activity, compared to 3.2 percent, 36.4 percent, and 60.4 percent a week before the pandemic. Nurses who were married, lived in villas, and earned a monthly salary of 10,000-20,000 S.R. had a higher level of physical activity.

Conclusions: Hospital management should provide in-service education courses on healthy behaviors and physical activity to nurses in order to maintain their health and ensure higher levels of performance.

Keywords: physical, activity, Covid-19, nurses, teaching, Jeddah

Introduction

The corona virus outbreak (Covid-19) has spread throughout the world [1,2]. The epidemic was first discovered in Wuhan, China, in December 2019 [3]. On March 2, 2020, the first confirmed case of Covid-19 were reported in Saudi Arabia. There have been 375,333 confirmed cases of Covid-19 since March 2021, with 6,466 confirmed deaths [4-5].

Adults aged 18 to 64 should engage in 150–300 minutes of moderate-intensity aerobic physical activity, 75–150 minutes of vigorous-intensity aerobic physical activity, or a combination of moderate- and vigorous-intensity activity throughout the week, according to the World Health Organization [6]. Physical activity has several health benefits, including aiding in the management and prevention of diseases such as diabetes, cardiovascular disease, cancer, and other noncommunicable diseases. Around the world, 80 percent of teenagers are reported to be insufficiently physically active. It is also predicted that one out of every four persons does not achieve the global physical activity recommendations [6].

Healthy asymptomatic adults should engage in moderate-intensity exercise during the Covid-19 pandemic, according to a previous study, while high-intensity exercises will necessitate extra caution [7].

Nurses are the largest professional category in the healthcare workforce [8]. Despite evidence of favorable effects from exercise participation, previous research has found that nurses have one of the lowest levels of physical activity engagement among professional categories [8-9]. This topic has been explored in prior research publications to our knowledge; nonetheless, our goal is to strengthen the findings on this topic in Saudi Arabia's western region. We anticipate that the results will demonstrate a decrease in physical activity among nurses as a result of the Covid-19 epidemic.

Subjects and Methods

Study design and time frame: a cross sectional study was done in the time from December 2021 to January 2022.

Study setting: the study was conducted at KAUH (King Abdulaziz University Hospital), Jeddah, Saudi Arabia.

Sampling technique: a simple random sampling methodology was followed.

Study participants: the inclusion criteria were all registered nurses working in all wards of the hospital regardless of years of experience. And the exclusion criteria were all nursing interns and students.

Study instrument: a predesigned questionnaire was used to collect data about participants demographics, duration in KSA, duration of work in KAUH, work department, smoking status and chronic diseases. The participants' physical activity level was assessed by the International Physical Activity Questionnaire (IPAQ). Physical activity categories were determined based on the International Physical Activity Questionnaire (IPAQ) MET minutes scoring. A high level of physical activity on the IPAQ suggests that the physical activity levels amount to at least one hour of moderate intensity activity per day. Those with a high IPAQ score engage in vigorous intensity activity on at least three days per week, achieving a minimum total physical activity of 1500 MET minutes per week, or 7 or more days of any combination of walking, moderate intensity, or vigorous intensity activities, achieving a minimum total physical activity of 3000 MET minutes per week. On most days, scoring a moderate level of physical activity on the IPAQ suggests you're doing something roughly similar to half an hour of moderate intensity physical exercise. Those with a moderate IPAQ score engage in 3 or more days of vigorous intensity activity and/or 30 minutes of walking per day, 5 or more days of moderate intensity activity and/or 30 minutes of walking per day, or 5 or more days of any combination of walking, moderate intensity, or vigorous intensity activities, achieving a minimum total physical activity of at least 600 MET minutes per week. Scoring a low level of physical activity on the IPAQ means that you are not meeting any of the criteria for either moderate or high levels of physical activity [10,11].

Statistical analysis: data were analyzed statistically using (SPSS) version 25. To test the relationship between variables, qualitative data was expressed as numbers and percentages, and the Chi-squared test (χ^2) was used. Quantitative data was expressed as mean and standard deviation (Mean \pm SD), and non-parametric variables were tested using the Mann-Whitney and Kruskal Wallis tests. McNemar test was used to compare physical activity before and after COVID-19 pandemic. A p-value of less than 0.05 was considered statistically significant.

Results

(Table 1) shows that the mean age of studied nurses was 36.91 ± 5.56 years, 89.6 were females, 75% were married and 89.9% were living in apartments. Of them, 90.8% had a monthly income < 10,000 S., 37.7% have been living for 6-10 years in KSA and 38.8% were working in KAUH for 6-10 years.

Table 1. Distribution of studied nurses according to their demographic characters, duration in KSA and duration of work in KAUH (No.:316)

Variable	No. (%)
Age	36.91 5.56
BMI	25.36 1.99
Gender	
Female	283 (89.6)
Male	33 (10.4)
Marital status	
Not married	51 (16.1)
Married	237 (75)
Divorced	28 (8.9)
Housing type	
Apartment	284 (89.9)
Villa	12 (3.8)
Other	20 (6.3)
Monthly income	
< Under10,000 S.R	287 (90.8)
10,000-20,000 S.R	29 (9.2)
How long have you been living in Saudi Arabia?	
Less than 1 year	4 (1.3)
1-5 years	80 (25.3)
6-10 years	113 (35.8)
More than 10 years	119 (37.7)
How long have you worked as a nurse in KAUH?	
Less than 1 year	7 (2.2)
1-5 years	91 (28.8)
6-10 years	122 (38.6)
More than 10 years	96 (30.4)

(Table 2) shows that most of the participant nurses (16.1%) were working at the medical department, followed by the pediatric department and the cardiac department. About 5% (5.4%) were current smokers, and 31.3% had chronic diseases with hypertension (15.8%) being the most common disease.

Table 2. Distribution of studied nurses according department in KAUH, smoking status and chronic diseases (No.:316)

Variable	No. (%)
Which department do you work in at KAUH?	
Medical	51 (16.1)
Family medicine	6 (1.9)
Wound care	6 (1.9)
Isolation	1 (0.3)
ICU	11 (3.5)
PICU	1 (0.3)
NICU	2 (0.6)
ER	21 (6.6)
Pediatric ER	1 (0.3)
Labor room	7 (2.2)
OR	13 (4.1)
Surgical	16 (5.1)
Other...	94 (29.7)
Pediatric	28 (8.9)
Cardiac	18 (5.7)
Radiology	6 (1.9)
ENT	3 (0.9)
Psychiatry	5 (1.6)
Ophthalmology	1 (0.3)
OB/GYN	25 (7.9)
Smoking	
Yes	17 (5.4)
No	288 (91.1)
Ex-smoker	11 (3.5)
Chronic illness	
Yes	99 (31.3)
No	217 (68.7)
What chronic disease?	
Diabetes mellitus	8 (2.5)
Hypertension	50 (15.8)
Dyslipidemia	25 (7.9)
Thyroid disorder	16 (5.1)
None	217 (68.7)

(Table 3) shows that in a random week before Covid-19, studied nurses had a significantly higher percent of having more days of doing vigorous physical activities like heavy lifting, jogging compared to a week after Covid-19 ($p > 0.05$). In addition, they showed a highly significant higher percent of spending more time in doing vigorous physical activities on one of those days ($p > 0.05$).

At the same time, a random week before Covid-19, nurses had a significant higher percent of doing moderate physical activities (that do not include walking) compared to a week after Covid-19 ($p > 0.05$). And they had a highly significantly higher percent of spending more time doing moderate physical activities on one of those days.

Nurses also had a significant higher percent of having more days walking for at least 10 minutes at a time in a random week before Covid-19 compared to a week after Covid-19 ($p > 0.05$). They also had a highly significantly higher percent of spending more time walking on one of those days ($p > 0.05$). Studied nurses showed a significant higher percent of spending more time sitting on a week day in a random week before Covid-19 compared to a week after Covid-19 ($p > 0.05$).

Table 3. Difference between participants' responses to items of the International Physical Activity Questionnaire (IPAQ) during the last 7 days and a random week before the COVID-19

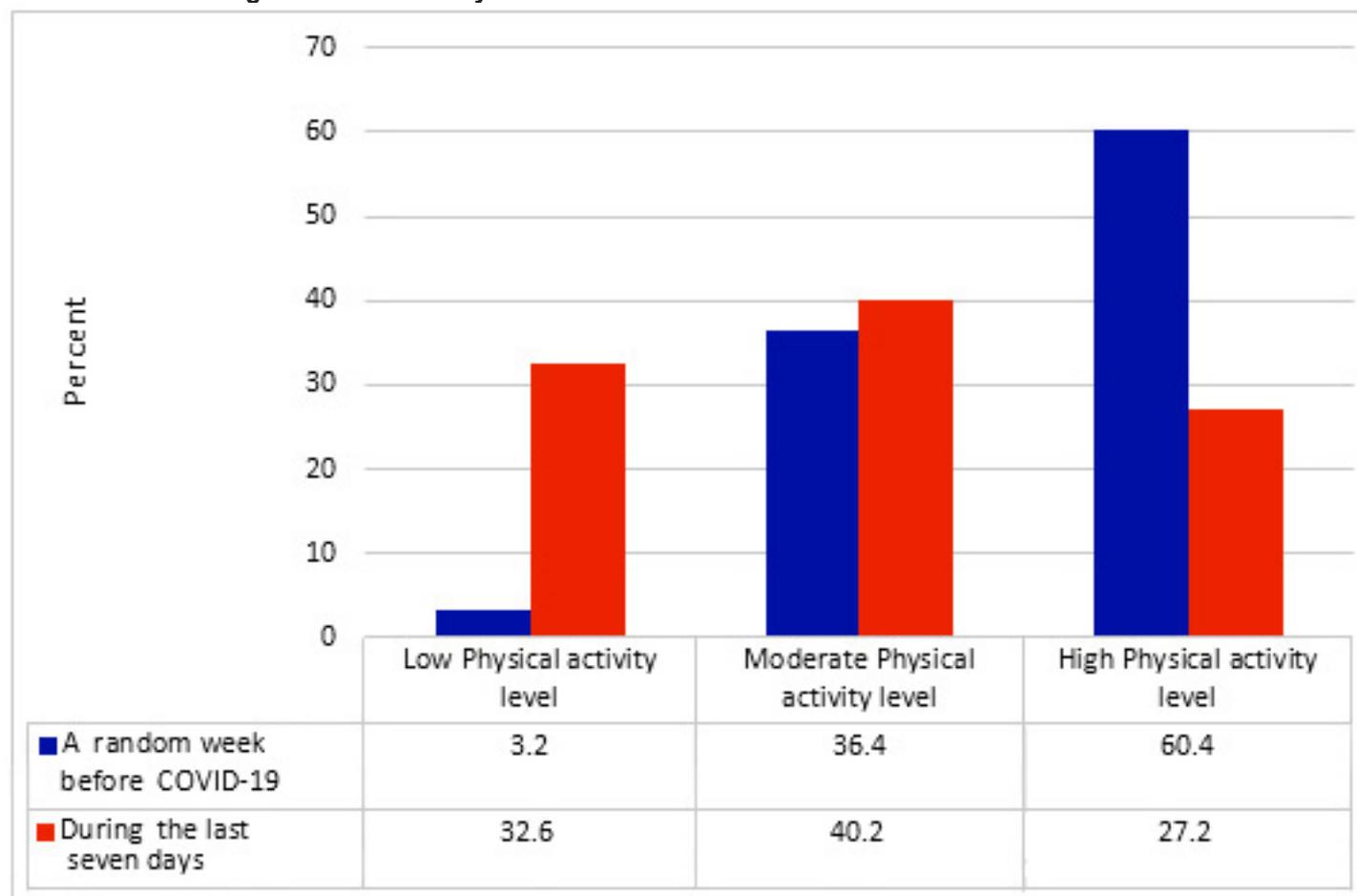
Variable	During COVID-19		A random week before COVID-19		χ^2	P-value
	Question response	No. (%)	Question response	No. (%)		
Q1 Q1 During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics, or fast bicycling?	1 2 3 5 None (mean \pm SD)	1 (0.3) 3 (0.9) 1 (0.3) 2 (0.6) 309 (97.8) 0.07 \pm 0.48	1 2 3 4 7 None (mean \pm SD)	2 (0.6) 3 (0.9) 1 (0.3) 1 (0.3) 1 (0.3) 308 (97.5) 2.75 \pm 1.98	97.75	< 0.001
Q2 How much time (hours or minutes per day) did you usually spend doing vigorous physical activities on one of those days?	30 45 60 90 None (mean \pm SD)	1 (0.3) 1 (0.3) 5 (1.6) 1 (0.3) 308 (97.5) 1.47 \pm 9.48	20 45 60 90 None (mean \pm SD)	1 (0.3) 1 (0.3) 5 (1.6) 1 (0.3) 308 (97.5) 3.93 \pm 2.37	64	< 0.001
Q3 During the last 7 days, on how many days did you do moderate physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? (Do not include walking)	1 2 3 4 7 None (mean \pm SD)	2 (0.6) 6 (1.9) 2 (0.6) 1 (0.3) 4 (1.3) 301 (95.3) 0.16 \pm 0.88	1 2 3 4 7 None (mean \pm SD)	1 (0.3) 6 (1.9) 1 (0.3) 2 (0.6) 5 (1.6) 301 (95.3) 0.17 \pm 0.87	52.42	< 0.001
Q4 How much time (hours or minutes per day) did you usually spend doing moderate physical activities on one of those days?	120 15 30 40 60 None (mean \pm SD)	5 (1.6) 2 (0.6) 3 (0.9) 2 (0.6) 3 (0.9) 301 (95.3) 3.1 \pm 16.53	15 30 40 90 120 180 None (mean \pm SD)	1 (0.3) 6 (1.9) 2 (0.6) 1 (0.3) 3 (0.9) 2 (0.6) 310 (95.3) 72.33 \pm 57.59	89.99	< 0.001

(Table 3. Difference between participants' responses to items of the International Physical Activity Questionnaire (IPAQ) during the last 7 days and a random week before the COVID-19 continued)

Q5 During the last 7 days, on how many days did you walk for at least 10 minutes at a time?	2 4 5 6 7 None (mean±SD)	2 (0.6) 1 (0.3) 9 (2.8) 1 (0.3) 300 (94.9) 3 (0.9) 6.83± 0.86	1 3 5 7 8 None (mean±SD)	4 (1.3) 1 (0.3) 10 (3.2) 295 (93.4) 1 (0.3) 5 (1.6) 6.85± 0.79	29.93	< 0.001
Q6 How much time (hours or minutes per day) did you usually spend walking on one of those days?	10 120 15 150 180 20 240 25 30 40 60 None (mean±SD)	4 (1.3) 57 (18) 4 (1.3) 4 (1.3) 21 (6.6) 30 (9.5) 4 (1.3) 46 (14.6) 90 (28.5) 4 (1.3) 36 (11.4) 16 (5.1) 60.28 ±54.4	15 20 25 30 45 60 90 120 150 160 80 None (mean±SD)	2 (0.6) 1 (0.3) 1 (0.3) 3 (0.9) 2 (0.6) 110 (34.8) 1 (0.3) 116 (36.7) 2 (0.6) 2 (0.6) 71 (22.5) 5 (1.6) 110.18± 47.65	15.6	< 0.001
Q7 During the last 7 days, how much time (hours or minutes per day) did you spend sitting on a week day?	1 10 12 15 2 3 4 5 6 7 8 9 (mean±SD)	12 (3.8) 27 (8.5) 3 (0.9) 1 (0.3) 16 (5.1) 4 (1.3) 4 (1.3) 18 (5.7) 46 (14.6) 51 (16.1) 79 (25) 55 (17.4) 7.1 ±2.34	1 10 11 12 2 3 4 5 6 7 8 9 (mean±SD)	5 (1.6) 27 (8.5) 1 (0.3) 3 (0.9) 8 (2.5) 5 (1.6) 4 (1.3) 17 (5.4) 51 (16.1) 54 (17.1) 82 (25.9) 59 (18.7) 7.36 ±1.97	36.9	< 0.001

(Figure 1) illustrated that during a random week after Covid-19; 32.6%, 40.2% and 27.2% of studied nurses had a low, moderate, and high physical activity level based on the International Physical Activity Questionnaire (IPAQ) MET minutes scoring. A random week before the Covid-19 3.2%, 36.4% and 60.4% of studied nurses had a low, moderate, and high physical activity level based on the International Physical Activity Questionnaire (IPAQ) MET minutes scoring. There was a significant difference between the physical activity levels in the two periods in the favor of the random week before COVID-19 ($p = < 0.05$).

Figure1. Relationship between physical activity categories among studied nurses a random week before the COVID-19 and during the last seven days



(McNemar-Bowker Test = 11.48, $p = 0.022$).

(Table 4) shows that a non-significant relationship was found between Physical activity categories among studied nurses after Covid-19 and their demographic characters, smoking status and chronic diseases ($p > 0.05$).

Table 4. Relationship between physical activity categories among studied nurses a random week after the COVID-19 and their demographic characters, smoking status and chronic diseases (No.:316)

Variable	Physical activity level			X ²	P-value
	Low No. (%)	Moderate No. (%)	High No. (%)		
Age	37.48 ± 5.66	36.46 ± 5.33	36.92 ± 5.76	2*	0.605
BMI	25.4 ± 2.1	25.48 ± 2.01	25.13 ± 1.83	2*	0.492
Gender					
Female	91 (32.2)	111 (39.2)	81 (28.6)	2.76	0.251
Male	12 (36.4)	16 (48.5)	5 (15.2)		
Marital status					
Not married	15 (29.4)	23 (45.1)	13 (25.5)	2.8	0.591
Married	80 (33.8)	95 (40.1)	62 (26.2)		
Divorced	8 (28.6)	9 (32.1)	11 (39.3)		
Smoking					
Yes	3 (17.6)	10 (58.8)	4 (23.5)	3.63	0.457
No	96 (33.3)	114 (39.6)	78 (27.1)		
Ex-smoker	4 (36.4)	3 (27.3)	4 (36.4)		
Chronic illness					
Yes	32 (32.3)	41 (41.4)	26 (26.3)	0.1	0.949
No	71 (32.7)	86 (39.6)	60 (27.6)		
Housing type					
Apartment	90 (31.7)	117 (41.2)	77 (27.1)	1.8	0.771
Villa	5 (41.7)	3 (25)	4 (33.3)		
Other	8 (40)	7 (35)	5 (25)		
Monthly income					
< Under 10,000 S.R	98 (34.1)	114 (39.7)	75 (26.1)	3.82	0.148
10,000-20,000 S.R	5 (17.2)	13 (44.8)	11 (37.9)		

N.B.: * = Kruskal Wallis test

(Table 5) shows that in a random week before the Covid-19; married nurses, those living in villas and those having a monthly income ranging from 10,000-20,000 S.R had a significantly higher percent of those who had a high physical activity level ($p < 0.05$).

Table 5. Relationship between physical activity categories among studied nurses a random week before the COVID-19 and their demographic characters, smoking status and chronic diseases (No.:316)

Variable	Physical activity level			X ²	P-value
	Low No. (%)	Moderate No. (%)	High No. (%)		
Age	40.9 ± 7.5	36.95 ± 6.12	36.96 ± 5.02	2*	2.82
BMI	26.66 ± 3.29	25.06 ± 2.3	25.5 ± 1.7	2*	2.95
Gender					
Female	8 (2.8)	104 (36.7)	171 (60.4)	1.07	0.585
Male	2 (6.1)	11 (33.3)	20 (60.6)		
Marital status					
Not married	4 (7.8)	22 (43.1)	25 (49)	11.08	0.026
Married	6 (2.5)	78 (32.9)	153 (64.6)		
Divorced	0 (0.0)	15 (53.6)	13 (46/4)		
Smoking					
Yes	0 (0.0)	7 (41.2)	10 (58.8)	3.17	0.53
No	9 (3.1)	106 (36.8)	173 (60.1)		
Ex-smoker	1 (9.1)	2 (18.2)	8 (72.7)		
Chronic illness					
Yes	4 (4)	32 (32.3)	63 (63)	1.24	0.536
No	6 (2.8)	83 (38.2)	128 (59)		
Housing type					
Apartment	6 (2.1)	101 (35.6)	177 (62.3)	23.69	< 0.001
Villa	0 (0.0)	4 (33.3)	8 (66.7)		
Other	4 (20)	10 (50)	6 (30)		
Monthly income					
< Under 10,000 S.R	9 (3.1)	113 (39.4)	165 (57.5)	12.14	0.002
10,000-20,000 S.R	1 (3.4)	2 (6.9)	26 (89.7)		

N.B.: * = Kruskal Wallis test

Discussion

This study aimed to assess the physical activity level during Covid-19 among Saudi nurses. Based on our study's results, the physical activity levels have definitely been impacted by the Covid-19 pandemic.

Prior to the Covid-19 epidemic, physical activity levels among the nurses surveyed were generally greater. Nurses had a significantly greater % of days completing vigorous and moderate physical activity, as well as more days walking for at least 10 minutes, in a random week prior to Covid-19.

Staff nurses are at a higher risk of musculoskeletal injuries as a result of lifting, transporting patients, and other postural requirements of their job [12]. These injuries have an effect on not only their health but also their work performance and productivity [13].

Existing data confirms that physical activity levels among study nurses were low even before the pandemic. According to a study conducted by Saridi et al. 2019 [14], most staff nurses have a low level of physical activity due to a lack of free time and lengthy working hours, as well as a lack of interest in participating in physical activity [14]. At the same line, Chin et al. (2016) [15] found that most of nurses don't engage in regular aerobic physical activity. In addition, Molina (2017) discovered that healthcare professionals have low levels of physical activity [16].

This outcome, however, differed from that seen in earlier international research. According to Bakhshi et al. (2015) [17], a large percentage of registered nurses are physically active. In terms of national research, a recent Saudi study found that 60.2 percent of nurses exercised, with walking being the most common sort of physical activity indicated by 66.1 percent of respondents [18].

The present body of knowledge on the degree of physical activity following the Covid-19 pandemic is extremely sparse. Our hypothesis was that the pandemic had a negative impact on physical activity levels, and our hypothesis was proven right. This was in line with a recent study that looked into the link between physical activity levels and the mental health burden of healthcare personnel in Singapore during the Covid-19 lockdown. The study discovered that these healthcare workers' exercise frequency, length, and intensity decreased considerably during the lockdown compared to before the lockdown. Moderate-to-extremely-severe depression, anxiety, and stress were found in 25.3 percent, 37.2 percent, and 11.9 percent of the participants, respectively. Exercise duration reductions were revealed to be a major risk factor for mild stress and moderate-to-severe depression, but increased exercise frequency was proven to be a protective factor against sad mood [19]. Our data confirms that the introduction of lockdown has considerably interrupted the exercise habits of healthcare professionals [20,21], which is consistent with research assessing the impact of lockdown on the general population.

The effect of stress on the nursing staff is one element that could contribute to the reported outcomes. Nurses are already stressed out during their shifts, and the Covid-19 pandemic has just added to their workload and stress levels. As a result, nurses who had time for physical activity prior to the Covid-19 pandemic now have less time and energy [19]. It's also likely that gyms, parks, and other places where people can engage in physical activity are limited. The majority of nurses' physical activity comprised walking, according to our findings. Perhaps our findings would be drastically different if the nurses in this study had greater access to physical activity facilities with more equipment and activities (e.g. cycles, weights, swimming pools, etc.) [22,23].

Nurses' job performance reflects the quality of care provided and, as a result, patient outcomes, and if staff nurses are not physically fit or ignore their own health behaviors, not only will their health suffer, but so will their performance [24].

The strength of our study includes the number of participants and variety of nurses from different sectors of the hospital.

Limitations

A limitation of the present study is the use of a pre-designed questionnaire that may have a recall bias. The limited participation of certain sectors of the hospital was another limitation.

Conclusion

The current study found that a week before COVID-19, the nurses in the study had a significantly greater percentage of days spent undertaking vigorous and moderate physical activities, as well as spending more time doing these activities. Furthermore, in a random week prior to Covid-19, they had a significantly higher percentage of days walking for at least 10 minutes at a time. According to the International Physical Activity Questionnaire (IPAQ), 32.6 percent, 40.2 percent, and 27.2 percent of the nurses in the study had a low, moderate, or high level of physical activity, respectively, compared to 3.2 percent, 36.4 percent, and 60.4 percent a week before the pandemic. Married nurses, those who lived in villas, and those with a monthly salary of 10,000-20,000 S.R. had a significantly greater percentage of those who exercised before the pandemic. To maintain nurses' health and assure higher levels of performance, hospital management should offer in-service education sessions on healthy behaviors and physical activity.

Ethical approval: The ethical approval was obtained from the Committee of Bioethics at King Abdulaziz University (KAUH).

Acknowledgment: The authors gratefully acknowledge the cooperation of all participants.

References

- 1- Arshad Ali S, Baloch M, Ahmed N, Arshad Ali A, Iqbal A. The outbreak of Coronavirus Disease 2019 (COVID-19) - An emerging global health threat. *J Infect Public Health*. 2020; (4):644-46. doi: 10.1016/j.jiph.2020.02.033.
- 2- Islam MS, Ferdous MZ, Potenza MN. Panic and generalized anxiety during the COVID-19 pandemic among Bangladeshi people: An online pilot survey early in the outbreak. *J Affect Disord*. 2020;276:30-37. doi: 10.1016/j.jad.2020.06.049
- 3- Guo YR, Cao QD, Hong ZS, Tan YY, Chen SD, Jin HJ, Tan KS, Wang DY, Yan Y. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak - an update on the status. *Mil Med Res*. 2020;7(1):11-21. doi: 10.1186/s40779-020-00240-0.
- 4- World Health Organization. Saudi Arabia. <https://www.who.int/countries/sau/>. 2021.
- 5- Saudi Ministry of Health (MOH). Saudi Arabia. MOH reports first case of coronavirus infection.2020. <https://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/News-2020-03-02-002.aspx>
- 6- <https://www.who.int/news-room/fact-sheets/detail/physical-activity>World Health Organization. Physical Activity. 2021. <https://www.who.int/news-room/fact-sheets/detail/physical-activity>.
- 7- Chen P, Mao L, Nassis GP, Harmer P, Ainsworth BE, Li F. Coronavirus disease (COVID-19): The need to maintain regular physical activity while taking precautions. *J Sport Health Sci*. 2020 Mar;9(2):103-104. doi: 10.1016/j.jshs.2020.02.001.
- 8- Burke E, McCarthy B. The lifestyle behaviours and exercise beliefs of undergraduate student nurses. *Health Educ J*. 2011; 111: 230-46. doi:10.1108/0965428111123501
- 9- Kim Y. Effect Factors on Health Promotion Lifestyle of Shift Work Nurses. *Korean J Occup Health Nurs*. 2011; 20: 356-64. <https://doi.org/10.5807/kjohn.2011.20.3.356>
- 10- Tomioka K, Iwamoto J, Saeki K, Okamoto N. Reliability and validity of the International Physical Activity Questionnaire (IPAQ) in elderly adults: the Fujiwara-kyo Study. *J Epidemiol*. 2011;21(6):459-65. doi: 10.2188/jea.je20110003.
- 11- Mäder U, Martin BW, Schutz Y, Marti B. Validity of four short physical activity questionnaires in middle-aged persons. *Med Sci Sports Exerc*. 2006;38(7):1255-66. doi: 10.1249/01.mss.0000227310.18902.28.
- 12- Hemed A, Taha N, Elwahab H, Mohamed E. Effect of educational program on nurses' performance regarding body mechanics. *Zagazig Nursing Journal*. 2017; 13(2):21-36. https://znj.journals.ekb.eg/article_38595_6b7ad6f3067034e5ef0059297d70b16d.pdf
- 13- Götte M, Seidel CC, Kesting SV, Rosenbaum D, Boos J. Objectively measured versus self-reported physical activity in children and adolescents with cancer. *PLoS One*. 2017 ;12(2):e0172216. doi: 10.1371/journal.pone.0172216.
- 14- Saridi M, Filippopoulou T, Tzitzikos G, Sarafis P, Souliotis K, Karakatsani D. Correlating physical activity and quality of life of healthcare workers. *BMC Res Notes*. 2019;12(1):208-14. doi: 10.1186/s13104-019-4240-1.
- 15- Chin DL, Nam S, Lee SJ. Occupational factors associated with obesity and leisure-time physical activity among nurses: A cross sectional study. *Int J Nurs Stud*. 2016;57:60-9. doi: 10.1016/j.ijnurstu.2016.01.009
- 16- Molina Aragonés JM, Sánchez San Cirilo S, Herreros López M, Vizcarro Sanagustín D, López Pérez C. Prevalencia de actividad física en profesionales de atención primaria de Cataluña [Prevalence of physical activity in primary health care workers of Catalonia]. *Semergen*. 2017 ;43(5):352-7. Spanish. doi: 10.1016/j.semerng.2016.04.026.
- 17- Bakhshi S, Sun F, Murrells T, While A. Nurses' health behaviours and physical activity-related health-promotion practices. *Br J Community Nurs*. 2015;(6):289-96. doi: 10.12968/bjcn.2015.20.6.289.
- 18- Al-Tannir MA, Kobrosly SY, Elbakri NK, Abu-Shaheen AK. Prevalence and predictors of physical exercise among nurses. A cross-sectional study. *Saudi Med J*. 2017;38(2):209-12. doi: 10.15537/smj.2017.2.15502.
- 19- Kua Z, Hamzah F, Tan PT, Ong LJ, Tan B, Huang Z. Physical activity levels and mental health burden of healthcare workers during COVID-19 lockdown. *Stress Health*. 2022;38(1):171-9. doi: 10.1002/smi.3078.
- 20- Jacob L, Tully MA, Barnett Y, Lopez-Sanchez GF, Butler L, Schuch F, et al. The relationship between physical activity and mental health in a sample of the UK public: A cross-sectional study during the implementation of COVID-19 social distancing measures. *Ment Health Phys Act*. 2020;19:100345. doi: 10.1016/j.mhpa.2020.100345.
- 21- Meyer J, McDowell C, Lansing J, Brower C, Smith L, Tully M, Herring M. Changes in Physical Activity and Sedentary Behavior in Response to COVID-19 and Their Associations with Mental Health in 3052 US Adults. *Int J Environ Res Public Health*. 2020;17(18):6469-82. doi: 10.3390/ijerph17186469.
- 22- Stults-Kolehmainen MA, Sinha R. The effects of stress on physical activity and exercise. *Sports Med*. 2014;44(1):81-121. doi: 10.1007/s40279-013-0090-5.
- 23- Melnyk BM, Hsieh AP, Tan A, Teall AM, Weberg D, Jun J, et al. Associations Among Nurses' Mental/Physical Health, Lifestyle Behaviors, Shift Length, and Workplace Wellness Support During COVID-19: Important Implications for Health Care Systems. *Nurs Adm Q*. 2022 01;46(1):5-18. doi: 10.1097/NAQ.0000000000000499.
- 24- Wilkerson A, Thomas H, Nahar V. Correlates of physical activity behaviour among nursing professionals: A systematic search and literature review. *Journal of Health and Social Sciences* .2019; 4(2):157-72 .10.19204/2019/crr15