The epidemiological profile associated with lifestyle risk factors and nutritional status for COVID-19 patients in the Iraqi population

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Abstract

Objectives. To determine the prevalence of COVID-19 infection and to identify the lifestyle factors and nutritional status associated with the epidemiological profile of COVID-19 patients.

Materials and Methods. This cross-sectional survey was carried out in the eighteen Iraqi governorates, from 1st August to 20th of October 2020. At the end of this study, 433 participants were recruited.

Results. The prevalence of coronavirus infection was 37.18%. Smoking and active physical activity were relatively higher for COVID-19 patients who are male, and belonged to the under-45 age range were 91.3%. It notices that COVID-19 patients who smoked and had active physical activity were married, residents in urban, and worked. Likewise, COVID-19 patients who had equal or more than an institute/college level of education are smokers and had active physical activity. Obesity prevalence was higher for patients aged <45 (92.2%), and higher for females (51%). The proportion of obesity was generally higher for married and for those living in urban areas (92.2%). Obesity was significantly more common among those in worked (70.6%).

Conclusions. Of note is the high prevalence of COVID-19 infection observed. A strong correlation between the prevalence of active physical activity among COVID-19 patients and gender, marital status, residence, education, and occupation. Unexpectedly, the prevalence rate of obesity among COVID-19 patients correlating with socio-demographic status did not yield a significant difference.

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Key words: coronavirus, COVID-19, epidemiological profile, lifestyle risk factors, nutritional status.

Funding: none.

Conflict of interest: the authors declare no potential conflict of interest.

Ethical approval and consent to participate: no specific consent is needed for statistical analyses of aggregated deidentified data.

Availability of data and materials: data and materials are available by the authors.

Received for publication: 13 September 2022.
Accepted for publication: 14 October 2022.

Journal of Public Health in Africa 2023; 14:2323
doi:10.4081/jphia.2023.2323

Introduction

Coronavirus (SARS-CoV-2) is one of the three different types of coronavirus that causes a health crisis in the last two decades and represents a major public health challenge worldwide.[1] The first COVID-19 human infection was described at the end of 2019 in Wuhan, China, and it has reached an outbreak across the world, which continues to spread unchecked.[2] On the eleventh day of March 2020, COVID-19 was declared a pandemic disease by the World Health Organization (WHO).[3] Coronavirus infection and its chronic sequel have become significant in life-threatening,[4] most importantly, owing to the higher complications associated with a severe acute respiratory syndrome.[5] The leading route of infection transmission is person-to-person.[6] Iraq is a country where the COVID-19 pandemic is high resulting in significant national morbidity and mortality.[7] Indeed, the first Iraqi case of coronavirus in the current pandemic was recognized in the second half of February 2020 in patients from Najaf city.[8] An important issue for patients is to recognize the determinants related to higher risk factors. The factors affecting infection are, for instance, socioeconomic status and lifestyle factors.[9] Gender has been identified to be one of the strongest sociodemographic factors that predict infection.[10] Studies have also shown that patient age has always proved to be the most important factor in the incidence, prevalence of disease, and mortality rate.[11] Unhealthy lifestyle behaviors are major contributors to infection-related conditions, morbidity, and premature death.[12] Moreover, previous studies have been generated reporting that smoking habit was known to influence health at various levels.[10] The implementation of control measures for infection identifying the risk factors affecting it and the patient's living habits can reduce diseases and death.[9] During the period under review, food habits are a strategy that represents a significant for COVID-19 risk management because a healthy nutrition status has been identified as a trigger for the immune system in order to fight infection.[13,14] Therefore, this study first sought to determine the prevalence of COVID-19 infection; secondly, to identify the lifestyle factors and nutritional status associated with the epidemiological profile of COVID-19 patients of the Iraqi population.

Materials and Methods

Study design, area, and period

This is an epidemiological study and a cross-sectional survey was carried out at the eighteen Iraqi governorates and undertaken from 1st August to 15th of October 2020.

Study participants

The sample frame consists of both males and females and all age groups. At the end of this study, 460 participants have been recruited.

Inclusion and exclusion criteria

The study included individuals who resided in Iraq, both males and females and all age groups. If the selected respondent refused to participate or did not meet the inclusion criteria were excluded.

Study methods

A questionnaire about the epidemiological profile and lifestyle risk factors was given to the participants to be filled. Data was collected through a self-administered questionnaire. The survey was participated through an online link on social media (Facebook, Telegram, and WhatsApp) with a request to circulate the questionnaire. It had three sections: i) first part focused on sociodemographic characteristics such as gender, age, marital status, residence, education level, and occupation; ii) the second part of the questionnaire focused on behavioral lifestyles which included smoking habits, and exercise practice. The smoking habit was divided into three categories: never smoking, smoking (included no. of cigarette smoking/day, age at beginning of cigarette smoking in years and duration of smoking), and quitting smoking (ex-smokers). The number of cigarettes smoking/per day was classified into:[15] light smokers = 1-10 cigarettes/day; moderate smokers = 11-20 cigarettes/day; heavy smokers = more than 20 cigarettes/day. Pack-years of smoking were calculated by multiplying the average number of cigarettes smoked per day by the number of years of smoking and dividing by 20.[16] Pack-years of smoking classified into:[17] light smokers = 1-20 pack-years; moderate smokers = 21- 40 pack-years; heavy smokers >40 pack-years. To measure self-reported exercise habits, participants were asked how often they daily performed strenuous, moderate, and mild exercise. A validated physical activity was defined according to occupational activity and was further classified into: active if participants had jobs (involving heavy and intense physical activity), and sedentary if participants didn't have jobs; iii) the third part focused on food habits and nutritional status. Food habits were verified and assessed using a self-report that consisted of questions about food habits and their frequency: daily intake of milk, soft drink, fruit, vegetable, nuts, animal fat, vegetable fat, carbohydrate, eating contains fats, sweets, fast food, tea, coffee and at least two times a week intake of meat, fish, chicken. The participants involved in the current study self-reported their weights and heights. The body mass index (BMI) was then calculated as weight (kg) divided by squared height (cm). Adults and children participants were classified into subgroups according to their BMI (Table 1).[18,19]

Statistical analysis

Statistical analyses were performed using SPSS software (version 25). Descriptive analysis using frequencies, proportions, means, and standard deviation was computed. All variables were analyzed individually for an association with COVID-19 risk using Chi-square analysis and Fisher Exact test, analysis of variance where appropriate. P-value <0.05 was considered a statistically significant association.

Results

The self-reported demographic characteristics of the 433 respondents are summarized in Table 2. Among baseline respondents, most of the respondents assessed were female (55%). The prevalence of coronavirus infection was 37.18%, higher among males (52.8%) than among females (47.2%), though with significant differences (P=0.008). The average age was 33.33 years old ±8.9920 years, while 88.7% of the respondents were aged less than 45 years old. Approximately 92% of the respondents were from the demographically urban area whereas 8.5% of the respondents came from a rural area and the difference was found to be statically not significant (P>0.05). In terms of education, nearly 94% of all respondents had attained equal or more than institute/college while only 6.21% had less than institute/college. More than two-thirds of the patients were married and 61.9% were government employed. There was a significant difference between the studied groups in terms of marital status and occupation status (P<0.05).

The proportion of lifestyle risk factors for respondents was assessed for each individual involved in the study and results are summarized in Table 3. Among the lifestyle risk factors assessed in this study, there are smoking habits, physical activity, exercise, and BMI. The proportion of current smokers was higher in the COVID-19 patients' group (14.3%) compared to the non-COVID-19 group (11.8%). It is important to highlight that physical activity for COVID-19 patients ranked the highest among non-COVID-19 patients (77.6% versus 74.3%). Among COVID-19 patients, 1.9% were underweight (29.8%), normal weight (46.6%), overweight (21.7%), and obese; corresponding figures for non-COVID-19 patients were 1.1%, 39%, 41.2% and 18.8%. The BMI distribution was shifted towards higher BMI in the COVID-19 patients versus non-COVID-19 patients sample and was significantly different (P=0.049). Notably, a total of 229 (52.9%) of the respondents surveyed reported exercising with 47.1% of the respondents reporting no exercise. The variables smoking, physical activity, and exercise presented no significant differences (P>0.05).

Smoking characteristics of the study population are presented in Table 4. Of all the respondents, the majority, 24 (43.6%) of them were moderate smokers and 20 (36.4%) were heavy smokers with a mean±SD 22.98±13.766. Among them, 56.4% began smoking between their 16th to 20th birthday and nearly 27.3% began smoking after 20 years of age. The mean age of the respondents was 19.42 with a standard deviation of 3.966 years. Very few smoking COVID-19 patients or smoking non-COVID-19 patients had smoked for more than 20 years. As expected, compared with smoking non-COVID-19 patients, smoking COVID-19 patients had longer durations of smoking (P<0.001). While those in the light, moderate, and heavy pack-year groups were 69.1%, 23.6%, and

Table 1. Adults and children participants classified into subgroups according to their body mass index.

Weight status category	Adults – BMI (kg/m^2)	Children percentile range – BMI (kg/m^2)
Underweight	<18.5 kg/m^2	<5th percentile (<18.5 kg/m^2)
Normal weight	18.5 -24.9 kg/m^2	5th - <85th percentile (18.5-24.9 kg/m^2)
Overweight	25.0 -29.9 kg/m^2	85th - <95th percentile (25.0-29.9 kg/m^2)
Obesity	≥30 kg/m^2	≥95th percentile (≥30 kg/m^2)

7.3%, respectively. As Table 5 indicates, of all the respondents, the most frequently consumed foods during the COVID-19 period are fruit (76.4%), vegetable (75.1%), meat (63.3%), fish (62.8%), chicken (83.6%), whereas animal fat was much less frequently consumed (13.4%). Moreover, tea is the most common drink used during the COVID-19 period (81.5%) followed by milk (30.9%), while coffee is consumed by only 26.3% of the respondents.

Results from the cross-tab analyses are shown in Table 6. All of the COVID-19 patients who are smokers were males and belonged to the <45 age range 91.3% (21/23) compared to 89.9% (124/138) who are non-smokers. This difference was statistically not significant (P=0.560). Similarly, COVID-19 patients who were married (69.6%) were more likely to smoke than those who were unmarried (30.4%). COVID-19 patients with an institute/college degree or higher (91.3%) were more likely to be smokers than those who had lower levels of education (8.7%). Results indicated that COVID-19 patients living in urban (91.3%) were more likely to smoke than those living in rural (8.7%). The likelihood of being a smoker was significantly higher for those who reported work than those who were unworked (P=0.016). Also, Table 6, shows

Table 2. Socio-demographic profile of study respondents.

Socio-demographic profile	Respondents		Total (F/%)	P
	COVID-19 patients (F/%)	Non-COVID-19 patients (F/%)		
Genders				
Male	85/52.8	110/40.4	195/45.0	0.008
Female	76/47.2	162/59.6	238/55.0	
Age mean±SD (3.33±8.9920)				
<45	145/90.1	239/87.9	384/88.7	0.297
≥45	16/9.9	33/12.1	49/11.3	
Residence				
Urban	148/91.9	248/91.2	396/91.5	0.469
Rural	13/8.1	24/8.8	37/8.5	
Education				
Less than institute/collage	10/6.21	5/1.84	15/3.46	0.5826
Equal or more than institute/collage	151/93.79	267/98.16	418/96.54	
Marital				
Single	46/28.6	112/41.2	158/36.5	0.0040*
Married	113/70.2	155/57.0	268/61.9	
Others (widow, divorce)	2/1.2	5/1.8	7/1.6	
Occupation				
Unemployed	23/14.3	60/22.1	83/19.2	0.0002**
Retired	2/1.2	1/0.4	3/0.7	
Government employed	102/63.4	163/59.9	265/61.2	
Private	9/5.6	17/6.2	26/6.0	
Free business	14/8.7	22/8.1	36/8.3	
Housewife	11/6.8	9/3.3	20/4.6	

*P-value calculator after inducing single and others into one. **P-value calculator after inducing retired, government employees, private, and free business into one and unemployed and housewife into one.

Table 3. Lifestyle factors of study respondents.

Lifestyle factors	Respondents		Total (F/%)	P
	COVID-19 patients (F/%)	Non-COVID-19 patients (F/%)		
Smoking				
Smoker	23/14.3	32/11.8	55/12.7	0.425
Non-smoker	131/81.4	233/85.7	364/84.1	
Quit smoker (ex-smokers)	7/4.3	7/2.6	14/3.2	
Physical activity				
Sedentary	36/22.4	70/25.7	106/24.5	0.251
Active	125/77.6	202/74.3	327/75.5	
Nutritional status (BMI) Mean±SD (26.59±5.450)				
Underweight	3/1.9	3/1.1	6/1.4	0.0493*
Normal weight	48/29.8	106/39.0	154/35.6	
Overweight	75/46.6	112/41.2	187/43.2	
Obese	35/21.7	51/18.8	86/19.9	
Exercise				
Strenuous	3/1.9	6/2.2	9/2.1	0.147
Moderate	22/13.7	26/9.6	48/11.1	
Mild	54/33.5	118/43.4	172/39.7	
Not do exercise	82/50.9	122/44.9	204/47.1	

*P-value calculator after inducing class overweight and obese into one and underweight and normal weight into one.

the association between physical activity and socio-demographic profile. Active physical activity was relatively higher for patients who are male (61.6%, P=0.000) and belonged to the under 45 age were 90.4% (113/161) compared with 88.9% (32/161) who have sedentary physical activity. This difference was not statistically significant (P=0.500). It was noticed that COVID-19 patients who were married resided in urban, worked and had a higher prevalence of higher active physical activity (82.4%, 97.6%, and 100%, respectively). Likewise, in COVID-19 patients who had equal or more institute/college level of education, active physical activity was 92% (115/161) compared with 91.7% (33/161) who are sedentary physical activity. The variables residence and occupation presented significant differences (P<0.05). Associations between socio-demographic profile and obesity were generally similar for COVID-19 patients (Table 6). Obesity prevalence was higher for males (54.5%) versus females (45.5%) and higher for patients aged <45 (89.1%) versus ≥45 years (10.9%), and the proportion obese was generally higher for married versus non-married (P=0.011) and for those living in an urban area (95.5%) versus rural area (4.5%). Additionally, there was a significant trend of decreasing obesity prevalence with decreasing education. Obesity was more common among those in worked (80.9%) versus unworked (19.1%). Obesity was not significantly associated with gender, age, education level, place of residency, and occupation.

Discussion

Not surprisingly, the prevalence of coronavirus infection in the present study was found to be 37.18% which is comparable to another Mexican study which shows a prevalence was 38%.[20] Generally, socioeconomic status is the most important determinant in health and is related to the spread of a wide range of communicable infectious diseases.[21] Male sex and older age are most likely associated with the negative outcomes of COVID-19.[22] The study findings have indicated a relatively high prevalence of COVID-19

Table 4. Smoking-related variables for study respondents.

Smoking characteristics	Respondents COVID-19 patients (F/%)	Non-COVID-19 patients (F/%)	Total (F/%)	P	Mean±SD
Number cigarette per day					
Light smokers	7/30.4	4/12.5	11/20.0	0.097	22.98±13.766
Moderate smokers	10/43.5	14/43.8	24/43.6		
Heavy smokers	6/26.1	14/43.8	20/36.4		
Age at beginning of cigarette smoking in years					
≤15	3/13.0	6/18.8	9/16.4	0.428	19.42±3.966
16-20	14/60.9	17/53.1	31/56.4		
>20	6/26.1	9/28.1	15/27.3		
Duration of smoking in years					
1-19	18/78.3	27/84.4	45/81.8	0.406	13.05±7.025
20-39	5/21.7	5/15.6	10/18.2		
≥40	0/00.00	0/00.00	0/00.00		
Pack- year smoking index					
Light smokers	18/78.3	20/62.5	38/69.1	0.170	14.6655±11.81885
Moderate smokers	4/17.4	9/28.1	13/23.6		
Heavy smokers	1/4.3	3/9.4	4/7.3		

*Fisher exact test.

Table 5. Food habits of study respondents.

Dietary habit	Respondents COVID-19 patients (F/%)	Non-COVID-19 patients (F/%)	Total (F/%)	P
Milk	44/27.3	90/33.1	134/30.9	0.126
Soft drink	34/21.1	72/26.5	106/24.5	0.128
Fruit	128/79.5	203/74.6	331/76.4	0.150
Vegetable	121/75.2	204/75.0	325/75.1	0.533
Nuts	65/40.4	104/38.2	169/39.0	0.367
Animal fat	28/17.4	30/11.0	58/13.4	0.043
Vegetable fat	82/50.9	163/59.9	245/56.6	0.042
Carbohydrate	97/60.2	146/a53.7	243/56.1	0.109
Eating contains fats	70/43.5	114/41.9	184/42.5	0.413
Meet	109/67.7	165/60.7a	274/63.3	0.086
Fish	99/61.5	173/63.6	272/62.8	0.367
Chicken	132/82.0	230/84.6	362/83.6	0.285
Sweet	50/31.1	79/29.0	129/29.8	0.368
Fast food	49/30.4	82/30.1	131/30.3	0.517
Tea	128/79.5	225/82.7	353/81.5	0.239
Coffee	42/26.1	72/26.5	114/ 26.3	0.512

Table 6. Smoking, physical activity, and nutritional status (BMI) associated with socio-demographic variables.

Socio-demographic profile	Smoking		Total (F/%)	P
	Smokers (F/%)	Smokers (F/%)		
Gender				
Male	23/100.0	62/44.9	85/52.8	0.000
Female	0/0.0	76/55.1	76/47.2	
Age				
<45	21/91.3	124/89.9	145/90.1	0.592
≥45	2/8.7	14/10.1	16/9.9	
Marital status				
Single/ separated (widow, divorce)	7/30.4	41/29.7	48/29.8	0.560
Married	16/69.6	97/70.3	113/70.2	
Education level				
Equal or more than institute/collage	21/91.3	127/92.0	148/91.9	0.582*
Less than institute/collage	2/8.7	11/8.0	13/8.1	
Residence				
Rural	2/8.7	7/5.1	9/5.6	0.377*
Urban	21/91.3	131/94.9	152/94.4	
Occupation				
Non- worked	1/4.3	35/25.4	36/22.4	0.016
Worked	22/95.7	103/74.6	125/77.6	
	Physical activity		Total (F/%)	P
	Sedentary (F/%)	Sedentary (F/%)		
Gender				
Male	8/22.2	77/61.6	85/52.8	0.000
Female	28/77.8	48/38.4	76/47.2	
Age				
<45	32/88.9	113/90.4	145/90.1	0.500
≥45	4/11.1	12/9.6	16/9.9	
Marital status				
Single/ separated (widow, divorce)	26/72.2	22/17.6	48/29.8	0.000
Married	10/27.8	103/82.4	113/70.2	
Education level				
Equal or more than institute/collage	33/91.7	115/92.0	148/91.9	0.5826*
Less than institute/collage	3/8.3	10/8.0	13/8.1	
Residence				
Rural	6/16.7	3/2.4	9/5.6	0.0043*
Urban	30/83.3	122/97.6	152/94.4	
Occupation				
Non-worked	36/100.0	0/0.0	36/22.4	0.000
Worked	0/0.0	125/100.0	125/77.6	
Nutritional status (BMI)				
Non obese				
	Nutritional status (BMI)		Total (F/%)	P
	Non obese (F/%)	Non obese (F/%)		
Gender				
Male	25/49.0	60/54.5	85/52.8	0.312
Female	26/51.0	50/45.5	76/47.2	
Age				
<45	47/92.2	98/89.1	145/90.1	.384
≥45	4/7.8	12/10.9	16/9.9	
Marital status				
Single/ separated (widow, divorce)	22/43.1	26/23.6	48/29.8	0.011
Married	29/56.9	84/76.4	113/70.2	
Education level				
Equal or more than institute/collage	46/90.2	102/92.7	148/91.9	.395
Less than institute/collage	5/9.8	8/7.3	13/8.1	
Residence				
Rural	4/7.8	5/4.5	9/5.6	0.3059*
Urban	47/92.2	105/95.5	152/94.4%	
Occupation				
Non-worked	15/29.4	21/19.1	36/22.4	0.105
Worked	36/70.6	89/80.9	125/77.6	

*Fisher exact test.

among adults aged under 45 years old (52.8%, P=0.297) in Iraq. Findings from another study in South Korea showed there was an association between age and COVID-19.[23] The possible explanation for this result is that the survey was conducted through social media and usually the participants of these media are from the youth age groups. The findings have appeared to indicate that COVID-19 infection was found to be significantly higher among males (90.1%, P=0.008). These findings suggest that male sex appeared to be the most important of the socio-demographic factors associated with COVID-19 infection among the study respondents. Similarly, the results from the current study are congruent with other studies results conducted in the same epidemic period, where the prevalence of COVID-19 was higher among males in the USA and in the Netherlands,[22,24] as well as with the results of the previous study in Mexico.[25] Education level was another socio-demographic factor that was related to COVID-19 infection in this study, respondents with a college degree or higher were more likely to be infected compared to those who had lower levels of education. It may be due to the fact that the study targeted groups on social media that are interested in scientific research, training courses, and educational workshops, so often its participants have higher educational degrees and had a quiet awareness about their medical conditions. Noteworthy, it appeared that the important prevalence of COVID-19 infection was found among the married study sample. Studies have suggested a link between marital status and human health in general.[26] Additionally, a majority of participants in the study reported engaging in government-employed (61.2%). One possible explanation might be that lack of social distancing, frequent contact, and working with groups as a result of the different tasks assigned to the employee. Thus, the government-employed are at greater risk for COVID-19 infection than others. Smoking has been consistently reported to raise the risk of COVID-19 infection and its progression.[27,28] Overall, the prevalence of smoking among COVID-19 patients in the study was 14.3% versus 11.8% among non-COVID-19 patients. Comparable with the other findings, the study done among Mexican outpatients, illustrated that 8.9% of patients were smokers.[25] The lower prevalence of smoking was probably due to the smoking risks awareness was more prevalent among respondents who have higher education degrees which represents the majority of the population of this study. At the time of the interview, this study identified that COVID-19 patients' smokers are predominantly male, young and married, and those with high education levels. Regarding residence and occupation, this study revealed a higher prevalence of COVID-19 smoking patients among urban residents and those who worked. Jackson *et al*. observed in their large survey that smoking leads to an increased risk of COVID-19 regardless of age and gender.[29] More than three-quarters of patients with COVID-19 were found to have active physical activity. In contrast to this result, another study found that COVID-19 infections decreased strongly with a high level of physical activity.[30] The results observation reveals the prevalence of active physical activity which is directly proportional to the age of ≤45, and with 61.6% male. There, it observed the vast majority of patients with COVID-19 who have active physical activity were married, residence in an urban area, and have higher education degree (82.4%, 92%, and 97.6% respectively. The physical activity variations are statistically significant (P<0.005). Ultimately, patients who worked and have active physical activity are reported by 100%. This is consistent with some points and inconsistency with others of a study done in Brazil by Vancini *et al*. The point of difference is that females tended to have a significantly higher level of physical activity, while the points of compatibility are, firstly a negative significant association between educational level and the high level of physical activity among COVID-19 patients. Secondly, the relatively high rate of the high level of physical activity among married COVID-19 patients.[30]

Studies have suggested a link between obesity and an increased risk of COVID-19 infection.[31] It is worth highlighting that the prevalence of overweight and obesity among COVID-19 patients was 68.3% (P<0.05). Similar to the results found in one meta-analysis study conducted by Popkin *et al.*, the authors report that obesity was statistically significantly associated with COVID-19.[32] In regard to gender, a majority (54.5%) of patients with COVID-19 were males, even though the difference was no statistically significant. In the current study, obesity was predominant in patients of ≤45 years of age (92.2%). There was a statistically insignificant association between obesity and age. With respect to education and residence, the prevalence of obesity was higher in patients with COVID-19 who have a high degree of education (92.7%) when compared to those who have lower education, and the difference is statistically insignificant (P=0.395). And the prevalence of obesity was 95.5% in urban areas. This study showed that the prevalence of obesity was found to be higher (80.9%) in worked patients with COVID-19, however, the difference is statistically not significant. Also, this study demonstrated a higher prevalence of obesity in married patients than in unmarried. The married-to-unmarried ratio was approximately 3:1. The higher prevalence of obesity in the study population has been attributed to different lifestyles, which included change in dietary habits, a decrease in physical activity during the COVID-19 pandemic.

Strength and limitations

This study has the strength that it was representative of all governorates of Iraq, including both urban well as rural areas. This study has several limitations. First, it studied only those individuals who responded to the online questionnaire. Although this could have introduced selection bias. Also, this study is limited by the self-report of COVID-19 infection and related factors.

Conclusions

The present study has profiled out different lifestyle factors and nutritional status that are possibly considerable for COVID-19 infection prevalence. Of note is the high prevalence of COVID-19 infection observed. Besides, it is noteworthy that gender is an important factor as there are accountable related to the prevalence of COVID-19 infections which clearly reflected that males were more affected than females. As such, the results highlight that smoking negatively impacts COVID-19 infection in gender and occupation. This conclusion displays a greater understanding of COVID-19 infection in smoking-related males. Unexpectedly, the prevalence rate of obesity among COVID-19 patients correlating with socio-demographic status did not yield a significant difference. It is important to note that a strong correlation between the prevalence of active physical activity among COVID-19 patients and gender, marital status, residence, education, and occupation. Therefore, these factors should be considered when screening is done among COVID-19 patients.

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