Original article

Public nutritional Knowledge toward the COVID-19 among Palestinian Population: A Cross-Sectional Study

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Abstract

Background*:** COVID-19 is an emerging infectious disease that affected multiple countries and sustained person-to-person transmission making it a concerning and serious public health threat. This pandemic has emphasized that good nutrition and a healthy life is the key to strengthening immunity. ***Aim of the study: To assess knowledge of nutrition toward the COVID-19 among the Palestinian population. ***Methods*:** A cross-sectional online survey was launched at West Bank and Gaza Strip. A total number of 554 participants have shared the completion of this survey and the response rate was 90.2%. ***Results*:** The mean level of knowledge among participants was 65.38% and the study indicated that 55.8% behaving healthy nutritional habits. The analysis revealed that the mean score of knowledge increased by 1.61 comparing the oldest age groups (>30 years) against the youngest group. As the same as, the knowledge mean score increased by 2.46 among the obese individuals according to BMI classification (>30). Whereas, the knowledge mean score was increased significantly among those who work in medical sectors compared to others unemployed individuals. As well, the knowledge score increased by 2.04 among individuals with comorbidity than healthy ones. ***Conclusion:*** Nutritional knowledge score during COVID-19 was 67.03% and the knowledge about the body immunity system and the protective measures against COVID-19, scored a weighted mean of 76.21%. The level of knowledge among all participants did not reflect a satisfactory level of knowledge among the public regard COVID-19 while the level of behaving healthy nutritional habits illustrated that nearly 45% of the participants were practicing unhealthy nutritional behaviors.

Keywords: COVID-19; Nutritional knowledge; Nutritional habits; Immunity.

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Introduction

In December 2019, there was an episode of pneumonia of obscure reason in Wuhan, Hubei Province, China, which tainted in excess of 60 individuals on the 20th of that month. On December 31, the Wuhan Municipal Health Committee informed the World

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Health Organization (WHO) that 27 individuals had been determined to have pneumonia of obscure reason, being 7 of them fundamentally sick[1].The WHO reacted quickly by planning diagnostics advancement; giving direction on tolerant observing, example assortment, and treatment; and giving exceptional data on the flare-up[1]. Most nations in the locale are screening voyagers, expecting to identify COVID-19 cases to as a preventive safety measure. During the most recent twenty years, Covids have caused three plague of dangerous sickness: serious intense respiratory disorder (SARS), Middle East respiratory condition (MERS) and COVID-19. SARS-CoV-2 is by all accounts less destructive than SARS-CoV or MERS-CoV with death pace of 3.4%, 9.6% and ~35%, individually however seems, by all accounts, to be irresistible[2]. Coronavirus spread by human-to-human transmission through drop, and direct contact and has a hatching time of 2-14 days[3]. Until this point, a few antibodies has been delivered and most nations began to immunize their kin. Nevertheless, applying preventive measures to control COVID-19 contamination is yet the most basic mediation through increment mindfulness and information to secure general wellbeing; it might drastically change people's day-by-day propensities, practices including diet and way of life related practices. Perhaps the greatest test is centered on lessening aggravation, without compromising the right insusceptible reaction of the patient. In this situation, researchers should concentrate in successful medications as well as in wholesome help. The significance of a satisfactory healthful status and dietary propensities has been broadly featured in the COVID-19 pandemic, not just as an issue of staying away from the presence of non-transferable illnesses (NCDs) that can bring about more extreme contaminations, yet additionally as a method for tweaking the fiery status of the patients. For sure, the misstatement of the significance of sustenance in COVID-19 patients can significantly influence the result of these patients [3]. The aftereffects of environmental review showed that the problematic utilization of Vitamin D, Vitamin C, Vitamin B12, and iron is related with COVID-19 either frequency or mortality markers[4]. Zinc supplementation can be a helpful system to lessen the worldwide weight of disease in the older, there is a need the expanded answering to work on our comprehension of COVID-19 and the consideration of impacted patients[5]. Healthful mediations, including the supplementation of nutrients and minerals, in this manner agree to likely therapeutics for novel COVID-19, acting additionally about of the side effects of disease like loose bowels [2]. In any case, wholesome treatment shows up as first-line treatment and ought to be carried out into standard practice. Ideal admission, all things considered, essentially those assuming critical parts in insusceptible framework, ought to be guaranteed through an assorted and even eating regimen[4]. In addition, mechanical brokenness because of extreme heftiness might build the seriousness of lower respiratory lot disease and add to optional contamination[6]. Along these lines, severe preventive measures are important to ensure general wellbeing against COVID-19.

Aim of the study: This study aims to assess knowledge of nutrition and behavior toward the COVID-19 among the Palestinian population.

Methods:Study design and participants

A cross-sectional web-based study was dispatched in West Bank and Gaza Strip. Investment in the web-based poll was intentional and mysterious. Qualified respondents were grown-ups (18+) dwelling in one of the governorates of the West Bank and Gaza strip. The survey was created by Google Forms and was disseminated online through web-based media destinations and Hi-Tech correspondence helps. Facebook, WhatsApp, Telegram, and email were the most well-known electronic correspondence helps utilized. The review was led from October tenth to October 24th, 2020.among the Palestinian populace circulated on the web. An absolute number of 544 members finished the review. Members needed to answer a yes or no inquiry to affirm their eagerness to take an interest deliberately. Later affirmation of the inquiry, the member was told to finish oneself finished survey.

The fruition of the internet-based overview took around 8–10 min and incorporated various decision

questions, or yes/no/I do not know choices inside various areas. The not really settled the socio-segment factors of the members including sexual orientation, age, schooling level, conjugal status, work and spot and sort of home. The subsequent segment was about the clinical history and anthropometric information (announced weight and stature). The third segment estimated the members' information about COVID-19, like its sources, reasons for the pandemic, and transmission. The third area estimated the members' wholesome information about COVID-19, for example, significance of quality feast, wellsprings of nutrients, elective drugs used to battle COVID-19, food sources helps resistant framework and body water rate. The fourth segment estimated the members' information about invulnerability and security helps information against Covid, for example, assurance, immunizations and treatment against Covid, factors reinforcing and debilitate resistant framework, weight, dread and tension, smoking, and rest impacts on insusceptible framework. The fifth segment estimated the members wholesome information and propensities during COVID-19 pandemic, for example, number of suppers, tidbits and water eaten and intoxicated every day, natural products, red meat and cheap food utilization design, food synthesis in a dinner, and exercise design.

Ethical considerations

Moral endorsement to direct the review was acquired from the Palestinian Health Research Council (Helsinki panel) in Palestine (No. PHRC/HC/780/20; 5/10/2020). Each member read ahead of time an introductory letter connected to the poll which incorporates data about the review and its level headed, the intentional cooperation and obscurity of people, and the option to cease on the off chance that feeling distress with the study were thought of. Finally, members needed to give agree before filling the overview.

Statistical Analysis

The collected data was imported from the excel sheet to the Stata statistical software ver. 14.0 (Stata Corp., College Station, TX, USA). Descriptive statistics and frequency distributions were used to describe participant characteristics. Continuous data were expressed as mean and standard deviations, and categorical variables were expressed as numbers and percentages. Different between means was compared by one-way analysis of variance ANOVA. Generalized Linear Model (GLM) was run to assess the associations between response variables and predictors. Gaussian distribution, identity link and robust standard error were used. The aim behind using GLM was to use robust standard errors because of surveying data from many different governorates and having the chance to compare categorical predictors. Univariate analysis, followed by multivariable regression analysis was run, variables meeting the criteria had been entered the model for multivariable analysis. A backward stepwise elimination method was applied at a significant level up to 0.2 for including and excluding the variables from the final model. The conclusion for statistical inference detection was determined at the level of 0.05. For analysis of nutritional practices, the knowledge score was considered as an independent variable.

Results

Baseline characteristics of the study participants

An all-out number of 544 members from people in general have shared the culmination of this overview, with a reaction pace of 90.2%. The mean period of members was 28.43 years with a guidelines deviation (SD) of 10.97 years; a big part of the members were youthful grown-ups of under 22 years of age. The vast majority of the members were guys 72.4%. Too, most of them had a Bachelor's certificate (80.6%). Notwithstanding, around 54.3% of members were jobless. Members from the West Bank were some way or another more (65.7%) than those from Gaza Strip. Albeit the greater part of respondents (56%) were characterized inside typical body weight, just 13.4% were named fat with a weight file (BMI) of 30 and the sky is the limit from there and 27.3 were overweight (BMI>25); and just 7.4% of them griped of constant illnesses (Table 1).

Table 1: Baseline characteristics of Participants (n = 554)

Characteristics	Frequency	Percentage
Age (years), Mean (SD) =28.43 (10.97)		
18 – 22	259	46.8
23 – 30	122	22
> 30	173	31.2
Gender		
Male	401	72.4
Female	153	27.6
Governorates		
Gaza Strip	190	34.3
West bank	364	65.7
Marital status		
Unmarried	313	56.5
Married	241	43.5
Education levels		
School education	68	12.3
Bachelor degree	463	83.0
High education	26	4.7
Employment		
Unemployed	301	54.3
Medical sector	123	22.2
Education sector	60	10.8
Other sectors	70	12.5
BMI (Kg/m^2), Mean (SD) = 24.67 (5.09)		
Normal (18.5 – 24.9)	310	56.0
Underweight (<18.5)	19	3.4
Overweight (25 – 30)	151	27.3
Obese (>30)	74	13.4
Existing of Comorbidity		
No	513	92.6
Yes	41	7.4
Comorbidities per disease		
Hypertension	16	39.0
Diabetes mellitus	11	26.8
Heart diseases	1	2.4
Respiratory diseases	9	22.0
Others	4	9.8

Knowledge of participants regarding COVID-19

The knowledge of participants with respect to COVID-19 was evaluated by 62 inquiries. The inquiries were partitioned into three areas. The principal area assessing the overall information about COVID-19 and comprised of 14 inquiries. Important, it was scored the most minimal weighted mean (43.97%, SD=14.53) among the three spaces, with a scope of 14.28% to 85.71%. The subsequent space assessing the degree of healthful information explicitly during COVID-19 and comprised of 24 inquiries. The detailed weighted mean score was 67.03% with 8.47 SD, and a scope of 29.17% to 100%. The last space comprises of 24 inquiries additionally and assessing the information about the body resistance framework and the defensive measures against COVID-19, which scored a weighted mean of 76.21% with SD of 12.92, and a scope of 29.16% to 100% (Figure No.1).

The most extreme information score was 62 for all inquiries in the three areas, which was determined for 554 members. The complete mean score was 40.54 (95% Confidence span (CI) 40.18 to 40.89) with a SD of 4.23, and a scope of 23 to 51. The review uncovered that the determined complete weighted mean depicting the degree of information among all members was 65.38% (SD=6.8) which didn't mirror an agreeable degree of information among general society with respect to COVID-19 (Figure No.1). The degree of information was delegated information deficiency (<60%), moderate information (60% - 80%), and great information (>80%). Of the respondents, just 1.08% (n=6) scored a mean score of over 80%, nonetheless, three quadrants of the members recorded moderate grades somewhere in the range of 60% and 80% (76.35%, n=423), while around 22.56% (n=125) of them were delegated having information deficiency about COVID-19.

Nutritional habits of participants during COVID-19

The most extreme wholesome propensities score was seven. The absolute mean score was 3.90 and SD of 1.43. The review demonstrated that the weighted mean of acting solid dietary propensities among members was 55.8% (95% CI: 54.09 to 57.51) which showed that almost 45% of the members were rehearsing unfortunate wholesome practices (Figure No.1).

Table 2: Description of participants' general knowledge and nutritional habits regarding COVID-19 (n= 554).

Knowledge Domain	Mean	SD	95% Confidence interval	
General Knowledge about COVID-19	43.98	14.53	42.76	45.19
Nutrition knowledge during COVID-19	67.03	8.47	66.33	67.74
Knowledge about immunity and protective measures against COVID-19	76.21	12.9	77.29	75.13
Total Knowledge about COVID-19	**65.4**	**6.8**	**64.8**	**66.0**
Nutritional habits during COVID-19 epidemic	55.80	20.47	54.09	57.51

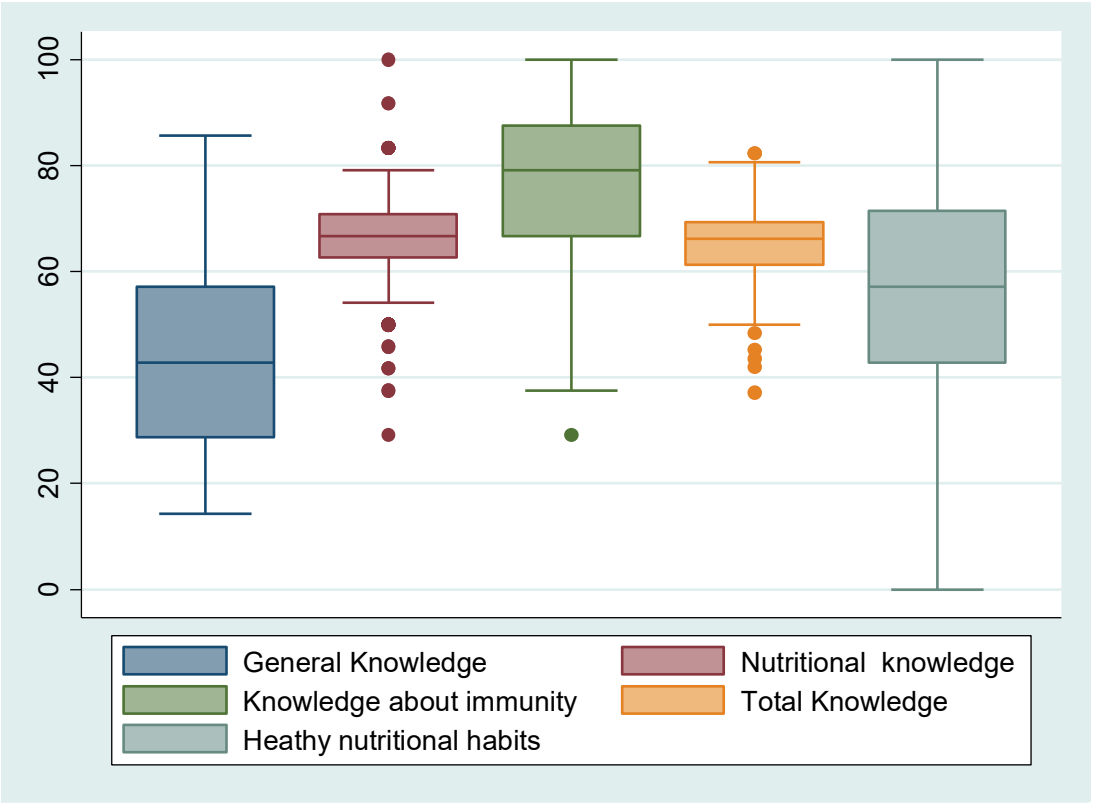

Figure No. 1: Level of knowledge and nutritional habits during COVID-19.

Relationship between knowledge of participants regarding COVID-19 and independent variables

A one-way ANOVA test was used to differentiate between the averages of the total knowledge score among the categories of the independent variable of two means and more. The study exposed borderline statistically significant mean differences related to age groups (P-value=0.0557). However, significant mean differences related to the BMI categories were discovered (P-value=0.0358), and the same for employment status classifications (P-value = 0.0333) and the governorate being lived in (P-value = 0.0444). However, no statistical inferences related to other variables were detected (Table 3).

As a whole of sum, the differences in the total mean score of participants' knowledge regarding COVID-19 were assessed amongst the three categories (knowledge deficit, moderate and good knowledge) which revealed significant differences among the mean levels of total knowledge (P-value < 0.0001). Moreover, the differences in the total mean score of participants' knowledge about COVID-19 were assessed concerning practicing healthy nutritional habits during the COVID-19 pandemic; nevertheless, no significant differences were found (Table 3).

Furthermore, Generalized Liner Model (GLM) was run under Gaussian distribution, identity link and robust standard error to assess the univariate association between the level of knowledge and the statically significant independent variables detected by the one-way ANOVA, which followed by a multivariable analysis. The analysis revealed that the mean score of knowledge increased by 1.61 (β =1.61; 95% CI: 0.33, 2.89; P= 0.014) comparing the oldest age groups (>30 years) against the youngest group. As the same as, the knowledge mean score increased by 2.46 (β=2.46; 95% CI:0.89, 1.02; P= 0.002) among the obese individuals according to BMI classification (>30) in comparison to the normal group; others groups did not report any significant associations. Whereas, the knowledge mean score was increase significantly among those who work in medical sectors (almost double) compared to others unemployed individuals (β=1.89; 95% CI:0.49, 3.28; P=0.008), nevertheless, the differences in knowledge among the other work sectors did not reach any statistical inferences (Table 4). As well, the knowledge score increased by 2.04 (β=2.04; 95% CI: 0.06, 4.02; P= 0.044) among individuals with comorbidity than healthy others ones. In addition, the site of living based of governorate was reported significant differences in some governorate comparing to others. Table 4 shows that Tubas (β=6.13; 95% CI: 0.84, 11.4; P= 0.023) and Jerusalem (β=3.06; 95% CI: 0.13, 5.98; P= 0.041) reported increase in the mean of knowledge level comparing to North Gaza Governorate as a reference group.

Multivariable regression analysis

Multivariable regression analysis was run by GLM under Gaussian distribution, identity link and robust standard error to assess the simultaneous relationship among response variables. Significant predictors from univariate regression analysis at 0.2 probability level was selected for including in the final model. Backward stepwise elimination method was used to determine the predictors, which remained associated with the mean score of knowledge at 0.05 probability level. Multivariable regression analysis showed that the predictors that influenced knowledge score were site of living in term of governorate, type of work, andbeing obese. Controlling for all other predictors, the mean score of knowledge increased by 4.2 among those who lived in Tubas (β=6.8; 95% CI: 1.46, 12.20; P= 0.013), and 3.9 for living in Jerusalem (β=3.9; 95% CI: 1.07, 6.71; P= 0.007), in addition to the governorate of Ramallah and Al-Bireh which became also significant as the mean score of knowledge increased by 4.2 (β=4.2; 95% CI: 0.82, 7.6; P= 0.015) compared to North Gaza governorate as a reference group. Furthermore, obesity kept its significant association as a predictor, since the mean score of knowledge increased by 2.3 among obese individuals compared to normal BMI individuals. Interestingly, working in medical sector was associated with better mean score of knowledge, as it was rise by 1.73 compared to others unemployed individuals (β=1.73; 95% CI:0.18, 3.27; P=0.029).

Relationship between nutritional habits of participants during COVID-19 and independent variables

Following the same approach of analysis, the study showed a statistically significant mean difference related to the living governorate (P-value <0.0001), as the same as the level of education (P-value = 0.0417). No significant relationship was detected between the level of knowledge and practicing healthy nutritional habits. Yet, no statistical inferences related to any other variables were detected (Table 3).

In univariate analysis, people living in Gaza and Salfit governorates were better at attempting healthy nutritional habits at a level slightly higher than the significance level of 0.05. However, Ramallah and Al-Bireh, Jenin, Tulkarm and Jericho governorates were significantly marked with better nutritional habits (Table 4), all were compared to the reference governorate (North of Gaza). Regarding educational levels, an interaction association was detected among groups, and so the linearity assumption was not actualized, besides no any statistical evidence were found comparing higher education with lower ones. Furthermore, the effect of knowledge about COVID-19 on participants' nutritional behaviors was investigated. However, statistical inferences were not detected among moderate and good knowledge individuals compared to those with a knowledge deficit (Table 4). Because site off living per governorate was the only variable remained statistically significant, no need to go forward for multivariable regression analysis.

Table 2: Mean scores differences and the relationships of response variables with the categories of predictors by One-way ANOVA.

Independent Variable	Total knowledge about COVID-19		P-value	Nutritional habits during COVID-19 epidemic		P-value
	Mean% (n)	SD		mean (n)	SD	
Age (years)						
18 – 22	64.76 (259)	6.82	0.0557	56.70 (259)	17.87	0.2563
> 22 – 30	65.28 (122)	7.14		56.91 (122)	20.03	
> 30	66.37 (173)	6.53		53.67 (173)	24.06	
Gender						
Male	65.38 (401)	6.88	0.9638	55.32 (401)	20.13	0.3760
Female	65.35 (153)	6.70		57.04 (153)	21.33	
Governorates						
North of Gaza	64.23 (28)	6.61	0.0444*	48.98 (28)	29.72	<0.0001*
Gaza	65.64 (59)	6.27		36.56 (59)	26.83	
Middle zone	63.72 (55)	6.88		54.28 (55)	20.83	
Khan Younes	66.65 (31)	6.31		51.6 (31)	21.41	
Rafah	65.84 (17)	7.15		49.5 (17)	23.21	
Ramallah and Al-Bireh	67.51(14)	4.64		67.34 (14)	13.06	
Nablus	66.13 (21)	6.59		55.10 (21)	16.47	
Bethlehem	63.77(61)	6.69		59.48 (61)	17.14	
Jenin city	65.16 (20)	5.62		62.14 (20)	12.5	
Tubas	70.36 (8)	7.26		58.3 (8)	22.18	
Tulkarm	65.35 (31)	7.93		61.75 (31)	17.06	
Qalqilya	66.77 (10)	6.37		58.57 (10)	10.54	
Salfit	63.27 (39)	5.84		60.44 (39)	14.08	
Jericho	65.59 (93)	7.42		62.06 (93)	14.67	
Jerusalem	67.28 (67)	7		57.99 (67)	16.28	
Marital status						
Unmarried	65.21 (306)	6.75	0.5867	56.81 (306)	18.84	0.1962
Married	65.53 (241)	7.00		54.53 (241)	22.36	
Education level						
School education	65.74(68)	6.64	0.2435	53.99 (68)	19.56	0.0417*
Bachelor degree	65.21(460)	6.21		56.58 (460)	19.99	
High education	67.43 (26)	6.59		46.70 (26)	28.15	
Employment						
Unemployed	64.98 (301)	6.63	0.0333*	56.29 (301)	18.12	0.3810
Medical sector	66.86 (123)	6.66		54.70 (123)	23.04	
Education sector	65.61 (60)	7.11		52.62 (60)	22.54	
Other	64.28 (70)	7.42		58.36 (70)	23.17	
BMI (Kg/m²)						
Underweight	64.93 (310)	7.07	0.0358*	52.63 (19)	22.36	0.2422
Normal	64.00 (19)	7.11		55.81 (310)	19.30	
Overweight	65.47 (151)	6.56		57.89 (151)	19.78	
Obese	67.39 (74)	5.97		52.37(74)	25.38	
Existing of Comorbidity						
No	65.23 (513)	6.86	0.0657	55.97(513)	20.09	0.4864
Yes	67.2 (41)	6.26		53.66 (41)	24.90	
Total knowledge about COVID-19						
Knowledge deficit	55.99 (125)	3.79	<0.0001*	54.17(125)	22.54	0.4508
Moderate knowledge	67.93 (423)	4.54		56.36 (423)	19.84	
Good knowledge	81.18 (6)	0.83		50.0(6)	19.69	

Table 4: Univariate regression analysis of response variables in relation to predictors by GLM.

Response variable	Predictors	Coefficient.	P-value	95% Confidence interval	
				Upper	Lower
Total knowledge about COVID-19	**Age groups**				
	18-22	Reference			
	23 – 30	0.52	0.502	-0.99	2.03
	> 30	1.61	0.014*	0.33	2.89
	BMI categories				
	Normal (18.5 – 24.9)	Reference			
	Underweight (<18.5)	-0.93	0.570	-4.14	2.28
	Overweight (25 – 30)	0.54	0.418	-0.77	1.85
	Obese (>30)	2.46	0.002*	0.89	1.02
	Employment status				
	Unemployed	Reference			
	Medical sector	1.89	0.008*	0.49	3.28
	Education sector	0.64	0.520	- 1.30	2.57
	Others sectors	- 0.70	0.468	- 2.58	1.19
	Comorbidity (yes)	2.04	0.044*	0.06	4.02
	Governorates				
	North of Gaza	Reference			
	Gaza	1.41	0.338	-1.48	4.29
	Middle zone	-0.5	0.743	-3.51	2.51
	Khan Younes	2.42	0.145	-0.83	5.67
	Rafah	1.62	0.438	-2.47	5.7
	Ramallah and Al-Bireh	3.28	0.056	-0.08	6.65
	Nablus	1.9	0.308	-1.76	5.56
	Bethlehem	-0.5	0.762	-3.38	2.48
	Jenin city	0.93	0.591	-2.47	4.34
	Tubas	6.13	0.023*	0.844	11.4
	Tulkarm	1.12	0.548	-2.53	4.78
	Qalqilya	2.55	0.263	-1.91	7
	Salfit	-1	0.536	-3.97	2.06
	Jericho	1.36	0.346	-1.47	4.2
	Jerusalem	3.06	0.041*	0.129	5.98
Nutritional habits during COVID-19	**Education level**				
	School education	Reference			
	University education	2.6	0.307	-2.38	7.56
	High graduate	-7.29	0.218	-18.87	4.29
	Governorates				
	North of Gaza	Reference			
	Gaza	-12.42	0.057	-25.19	0.357
	Middle zone	5.31	0.391	-6.81	17.42
	Khan Younes	2.63	0.694	-10.48	15.75
	Rafah	0.600	0.938	-14.63	15.83
	Ramallah and Al-Bireh	18.37	0.004*	5.69	31.04
	Nablus	6.12	0.349	-6.70	18.94
	Bethlehem	10.50	0.077	-1.13	22.14
	Jenin city	13.16	0.033	1.09	25.23
	Tubas	9.94	0.279	-8.05	27.95
	Tulkarm	12.77	0.042*	0.44	25.10
	Qalqilya	9.59	0.132	-2.88	22.06
	Salfit	11.46	0.054*	-0.21	23.12
	Jericho	13.08	0.022*	1.86	24.29
	Jerusalem	9.02	0.124	-2.47	20.51
	Total knowledge about COVID-19				
	Knowledge Deficit	Reference			
	Moderate Knowledge	2.19	0.325	-2.17	6.56
	Good Knowledge	-4.17	0.584	-19.09	10.75

Table 5: Multiple variable regression analysis by GLM for predictors of knowledge and practicing healthy nutritional habits during COVID-19 pandemic

Independent Variable	Total knowledge about COVID-19				Nutritional habits during COVID-19 epidemic			
	Adjusted Coefficient.	P-value	95% Confidence Interval		Adjusted Coefficient.	P-value	95% Confidence interval	
			Upper	Lower			Upper	lower
Governorates								
North of Gaza	Reference				Reference			
Gaza	1.41	0.338	-1.48	4.29	-12.42	0.057	-25.19	0.357
Ramallah and Al-Bireh	4.22	0.015*	0.82	7.6	18.37	0.004*	5.69	31.04
Jenin city	0.93	0.591	-2.47	4.34	13.16	0.033*	1.09	25.23
Tubas	6.8	0.013*	1.46	12.19	9.94	0.279	-8.05	27.95
Tulkarm	1.12	0.548	-2.53	4.78	12.77	0.042*	0.44	25.10
Salfit	-1	0.536	-3.97	2.06	11.46	0.054	-0.21	23.12
Jericho	1.36	0.346	-1.47	4.2	13.08	0.022*	1.86	24.30
Jerusalem	3.90	0.007*	1.07	6.72	9.02	0.124	-2.47	20.5
BMI (Kg/m^2)								
Normal	Reference							
Obese	2.30	0.010*	0.56	4.05	-	-	-	-
Employment status								
Unemployed	Reference							
Medical sector	1.73	0.029	0.18	3.27	-	-	-	-

*** Significant level at 0.05**

Discussion

Overview:

COVID-19 is an emerging infectious disease thataffected multiple countries, caused severe illness, and sustained person-to-person transmission making it a concerning and serious public health threat. Given the serious threats imposed by COVID-19 even in the presence of a COVID-19 vaccine. Preventive measures play an essential role in reducing infection rates and controlling the spread of the disease especially in the presence of several mutations in England, Australia, South Africa, Mexico and other countries. This indicates the necessity of public adherence to preventive and control measures. Healthy nutrition is an important tool for immunity support, which is affected by public knowledge, attitudes, and practices[7]. A healthy diet, which depends on plant food (vegetables, legumes, organic products), healthy fats, and rich protein-low fat food along with sufficient movement is the key procedure support immune system and resist viral infection in the communities, subsequently, this strategy could support the body in struggling diseases, such as, COVID-19[8]. Thus, this study aimed to assess knowledge of nutrition among the Palestinian population for the novel COVID-19. A total number of 554 participants from the public have shared the completion of this survey, with a response rate of 90.2%.

Baseline characteristics of the study participants

The survey was an initiative to understand knowledge of nutrition among the Palestinian populationtowards COVID-19. However, there was a predominance of age group, 18-22 years, students and higher qualification who had access to real-time information via social media. The knowledge of participants regarding COVID-19 was divided into three domains. The general knowledge about COVID-19 was scored the lowest weighted mean (43.97%, SD=14.53) among the three domains, with a range of 14.28% to 85.71%. The reported weighted mean score level of nutritional knowledge during COVID-19 was 67.03%, and a range of 29.17% to 100%. The knowledge about the body immunity system and the protective measures against COVID-19, scored a weighted mean of 76.21% with SD of 12.92, and a range of 29.16% to 100%.

Knowledge of participants regarding COVID-19

The current study exposed that the calculated total weighted mean describing the level of knowledge among all participants did not reflect a satisfactory level of knowledge among the public regard COVID-19. It could be attributed to the spread of myths and misinformation driven by fear, blame and stigma. The total mean score of participants' knowledge regard COVID-19 revealed significant differences among the mean levels of total knowledge (P-value < 0.0001). Of the respondents, only 1.08% scored a mean score of more than 80%; three quadrants of the participants recorded moderate grades between 60% and 80%, whereas about 22.56% of them were classified as having knowledge deficit about COVID-19. Statistical inferences were not detected among moderate and good knowledge individuals compared to those with a knowledge deficit; while[9]found that 51.7% of his study participants had deficit in knowledge. On other hand, unlike other studies only 1.08% (n=6) of the participants recorded high knowledge grades. We consider that this is primarily due to the sample characteristics: as high percentage of the participants were young, adult (18-30) years and the majority of the studied populations had a Bachelor degree.

Nutritional habits of participants during COVID-19

In the present study the maximum nutritional habits score was seven, the total mean score was 3.90, SD of 1.43 and the mean of behaving healthy nutritional habits among our participants was 55.8%; which illustrated that nearly 45% of the participants were practicing unhealthy nutritional behaviors. No significant relationship was detected between the level of knowledge and practicing healthy nutritional habits.Current results are in agreement with a Spanish studywhich showed a change in the dietary behaviors of the Spanish adult populationfrom 6.53 ± 2 to 7.34 ± 1.93 during the confinement (Overall, the score (ranging from 0 to 14) towards healthy foodduring the COVID-19 outbreak confinement[10].

Relationship between knowledge of participants regarding COVID-19 and independent variables

The differences in the total mean score of participants' knowledges about COVID-19 were assessed concerning practicing healthy nutritional habits during the COVID-19 pandemic, nevertheless, no significant differences were found. Present study exposed borderline statistically significant mean differences related to age groups (P-value=0.0557). The mean score of knowledge increased by 1.61 comparing the oldest age groups (>30 years) against the youngest group. However, significant mean differences related to the BMI categories were discovered, and the same for employment status classifications and the governorate being lived in.As the same as, the knowledge mean score increased among the obese individuals according to BMI classification (>30) in comparison to the normal group.This result is both consistent and contrary to some previous research[11,12].

Relationship between nutritional habits of participants during COVID-19 and independent variables

Interestingly, working in medical sector was associated with better mean score of knowledge, compared to others unemployed individuals which is contradictory with [13]study which found that a significant proportion of health care workers had poor knowledge of its transmission and symptom onset showed positive perceptions of COVID-19.. The knowledge score increased by 2.04 among individuals with comorbidity compared with healthy other individuals, The predictors that influenced knowledge score were site of living in term of governorate, type of work, and being obese. A statistically significant mean difference related to the living governorate (P-value <0.0001), and the level of education (P-value = 0.0417) were found. No significant relationship was detected between the level of knowledge and practicing healthy nutritional habits.Statistical inferences among moderate and good knowledge individuals compared to those with a knowledge deficit were not detected (Table 4). Accumulating evidence suggests that obesity is a major risk factor for the initiation, progression, and outcomes of COVID-19 [14]and the current study showed thatobesity kept its significant association as a predictor, since the mean score of knowledge increased by 2.3 among obese individuals compared to normal BMI individuals. Another study showed that nearly 52% reported eating and snacking more, respectively, and these tendencies were more frequent in overweight and obese individuals. (Sidor

and Rzymski, 2020)

Multivariable regression analysis showed that the predictors that influenced knowledge score were site of living in term of governorate, type of work, and being obese. Controlling for all other predictors, the mean score of knowledge increased by 4.2 among those who lived in Tubas and 3.9 for living in Jerusalem, in addition to the governorate of Ramallah and Al-Bireh, which became also significant as the mean score of knowledge increased by 4.2 compared to North Gaza governorate as a reference group. Interestingly, working in medical sector was associated with better mean score of knowledge, as it was rise by 1.73 compared to others unemployed individuals.

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