COVID-19 Related Fear, Knowledge, and Protective Behaviors among Middle-aged and Older Adults: A Comparative Cross-Sectional Study

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Abstract

Background: COVID-19 is a highly contagious new virus infection. The World Health Organization officially declared it a public health emergency on January 30, 2020. Its progression may be influenced by human behavior, which is affected by knowledge and perceptions. Individuals may be affected by its physical, psychological, and social repercussions. Fear is a psychological consequence affecting individuals, especially older adults. People need to be well-informed and adopt protective behaviors to dispel this fear and halt the infection's spread. **Aim:** Assess and compare COVID-19 related fear, knowledge, and protective behaviors among middle-aged and older Adults. **Research design**: A cross-sectional comparative research design was employed. **Setting:** The study was conducted at the Specialized Medical Hospital outpatient clinics affiliated with Mansoura University Hospitals. **Subjects:** A convenience sample of 246 patients; 123 were aged 20 to less than 60 years (middle-aged), and 123 were 60 and older (older adults) were eligible to participate in the study. Tools: Four tools were utilized: Demographic Characteristics and Health-related Data Structured Interview Schedule, Fear from COVID-19 Scale, COVID-19 Knowledge Questionnaire, and Self-reported COVID-19 Protective Behaviors Checklist. **Results:** Both the middle-aged and older adult groups had poor knowledge of COVID-19 (46.3% & 56.9%, respectively) and had unsatisfactory COVID-19 protective behaviors (55.3 % and 64.2%, respectively). As for the comparison between both groups, there was a statistically significant difference between middle-aged and older adult groups (p=0.000*) in which the older adult group had a lower level of knowledge, unsatisfactory health behaviors, and higher level of fear related to COVID-19 than middle-aged group (16.422±7.794, 20.211±6.731); (20.430±5.502, 23.813±4.123); (11.853±4.698, 21.325±6.327), respectively. **Conclusion:** The study's findings concluded that both age groups had poor knowledge, unsatisfactory health behaviors, and fears related to COVID-19. At the same time, the older adult group had lower mean scores of knowledge and health behaviors and higher levels of fear related to COVID-19 when compared with the middle-aged group. **Recommendations:** There is an urgent need for public health education through instructional programs for different age groups in Egypt to correct misconceptions and improve their knowledge and protective behaviors regarding COVID-19, as well as alleviate distressing feelings and fear.

Keywords: COVID-19, Fear, Knowledge, Middle-aged, Older Adult, Protective Behaviors

Introduction

Coronavirus (COVID-19) is a severe infectious disease causing significant global morbidity and mortality. The COVID-19 pandemic, first reported in China in December 2019, rapidly spread worldwide, prompting the World Health Organization (WHO) to declare it a global pandemic on March 11, 2020 (**Cucinotta & Vanelli, 2020**).

Corona-virusis a family of enveloped positive-sense, single-stranded RNA viruses that can cause respiratory or gastrointestinal disorders. It primarily affects birds and mammals and is then transmitted to humans (**Schoeman & Fielding,**

2019). Prior to the new COVID-19, there were two other viral outbreaks (**Li et al., 2020**). The Severe Acute Respiratory Syndrome Coronavirus was first discovered in 2003. The Middle East Respiratory Syndrome-Coronavirus (MERS-CoV) was first isolated in 2012 in Saudi Arabia. The World Health Organization announced that 684 people had died from MERS-CoV in 27 different countries, with 1917 cases having laboratory confirmation on December 2016 (**Bleibtreu et al., 2018**).

Late in December 2020, Wuhan, China, reported cases of individuals with viral pneumonia brought on by an unknown microbiological agent, leading to the discovery

of a novel Coronavirus (**Lu et al., 2020**). Soon after, comparable cases were discovered in other nations and the global infection rate quickly altitudes. More than 200,000 people have died, and over 3 million individuals have been infected globally to date, which has had a remarkable influence on both economic growth and public health (**Feng et al., 2020**).

In the majority of the world's countries, the new COVID-19 pandemic has extended. Because of the rise in the number of travelers, the number of new COVID-19 cases surged rapidly (**Li et al., 2020**). As an epidemic hazard, COVID-19 is turning into a global issue. In every age group, from young toddlers to the elderly, it can result in a wide spectrum of distinct clinical symptoms (**Baj et al., 2020**).

Coronavirus diagnosis is primarily dependent on respiratory symptoms and is considered the main indicator of COVID-19 clinical suspicion (**Huang et al., 2020**). And then, tests for COVID-19 infection have been developed, using an upper respiratory swab from the nose or mouth that is minimally invasive and lower respiratory tract specimens through sputum if produced with severe respiratory disease, to help identify infected patients (**World Health Organization, 2020**).

The clinical presentations of COVID-19, according to WHO, symptoms varied between age groups, including fever, sore throat, and new loss of taste or smell, headache, cough, exhaustion, and muscle or body aches. Some patients also had nausea, vomiting, and diarrhea as gastrointestinal complaints. Delirium, severe dyspnea, and tachypnea are prominent symptoms in old age. The severity of symptoms depends on several factors (**Centers for Disease Control and Prevention, 2020; World Health Organization, 2020**).

Age-related changes and comorbidities are significant factors in the severity and prognosis of COVID-19 (**Perrotta et al., 2020**). The risk of death is 23 times higher for adults over 65 years than for those under 65, and they account for 80% of hospital admissions (**Mueller et al., 2020**). COVID-19 in elderly people increases the risk of severe illness progression than middle-aged. The involvement of many lobes was more prevalent

in older adults (**Liu et al., 2020**). Furthermore, individuals who suffer from co-morbid conditions such as diabetes mellitus, chronic obstructive pulmonary disease, and cardiovascular disease are more likely to develop more serious complications leading to death (**Garnier-Crussard et al., 2020**).

Recent evidence reported that COVID-19 complications include shock, arrhythmia, acute respiratory distress syndrome, acute cardiac injury, liver dysfunction, and secondary infection. The severity of the illness was linked to the poor clinical outcome. Older adult typically experiences a faster progression of the disease; among individuals 65 years or older, the median number of days from the onset of the first symptoms to death is lower (**Huang et al., 2020; Wang et al., 2020**).

Currently, there is no specific medication or treatment available for newly diagnosed or suspected COVID-19 cases. As a result, the majority of existing therapies for pneumonia brought on by the novel COVID-19 virus have been symptomatic and respiratory support-base, which cause a significant burden on healthcare providers including nurses who are at the front line during the COVID-19 pandemic, providing direct care, offer screening information, and actively involved in evaluation and monitoring in the community (**Fawaz, Anshasi, & Samaha, 2020; National Health Commission of the People's Republic of China, 2020**).

The lack of curable treatment, along with the rapid spread of COVID-19, increased individuals' fear of getting infected and death. Additionally, health illiteracy and lack of knowledge regarding COVID-19 are significant indicators of improper healthy behavior and the rapid spread of the virus (**Nguyen, Nguyen, Nguyen, Sørensen, Pleasant & Duong, 2020**). Although people's protective behaviors are greatly influenced by their level of knowledge, there are misconceptions and false information about COVID-19 prevention and care-seeking strategies that can create confusion, contradiction, and false information regarding proper action, exacerbating psychological distress (**Geldsetzer, 2020**). Therefore, COVID-19-related fear, knowledge, and

protective behaviors should be addressed to help future research design proper strategies.

Significance of the study

COVID-19 rapid transmission is one of its defining characteristics, and it can happen through close contact with an infected individual **(Shereen et al., 2020).** The expectation of danger brings on an unpleasant and frequently intense feeling, such as fear. That being said, dread can become persistent and oppressive when the threat is constant and unpredictable, as with the present Coronavirus disease pandemic **(Mertens et al., 2020)**. Individuals must follow crucial control measures in order to ensure the greatest possible control over the spread of the illness, which is affected by their knowledge of and protective behavior with regard to COVID-19 **(World Health Organization, 2020).**

Notably, there is a lack of information and research addressing COVID-19-related fear, knowledge, and protective behaviors among specific age groups. Therefore, this study aimed to assess and compare COVID-19 related fear, knowledge, and protective behaviors among middle-aged and older adults.

Aim of the study

The current study aimed to:
- Assess COVID-19-related fear, knowledge, and protective behaviors among middle-aged and older adults.
- Compare the levels of COVID-19-related fear, knowledge, and protective behaviors among middle-aged and older persons.

Research questions:

Q1: What are middle-aged and older adults' levels of fear, knowledge, and protective behaviors regarding COVID-19?

Q2: Do middle-aged and older adults exhibit different levels of fear, knowledge, and protective behaviors related to COVID-19?

Q3: Is there any correlation between middle-aged and older adults' fear, knowledge, and protective behaviors about COVID-19?

Subjects and Methods

Research design:

A comparative cross-sectional research design was employed in this study.

Study setting:

The Specialized Medical Hospital outpatient clinics, which are affiliated to Mansoura University Hospitals, Egypt, served as the setting for data collection. The outpatient clinics where the study was conducted were the Internal Medicine and Liver Clinic, the Diabetes Clinic, the Endocrinology Clinic, the Geriatric Clinic, and the Cardiovascular Outpatient Clinic.

Subjects:

A convenience sample of 246 patients, 123 middle-aged adults, and 123 older adults were recruited based on the following **Inclusion Criteria;**

Middle –aged or adult patients (aged 20 to 60 years) and older adult patients (aged 60 years older and older) who could converse and were available when the data was being collected.

Sample size:

The sample size was determined at 1 % Alpha error (99.0 % significance) and 5% β error (95 percent power of the study) using the sample size calculator software (https://clincalc.com/stats/samplesize.aspx).
The sample size was estimated in this computation using the percentages of good COVID-19 knowledge in the African region and Europe, which are 10.1% and 18.2%, respectively **(Ali et al., 2020).**

Tools of data collection:

The following four tools were used for data gathering.

Tool I: Demographic Characteristics and Health-related Data Structured Interview Schedule:

The researchers developed this tool, which consisted of three sections based on the relevant literature **(Asaad et al., 2020; Qian et al., 2020; Zhu et al., 2020):**
- **Section I:** Demographic data as age, sex, place of residence, marital status, educational level, and income.
- **Section II:** Health-related data that included current co-morbid diseases (e.g.,

hypertension, diabetes Mellitus, liver diseases, etc.).

▪ **Section III:** Source of knowledge about COVID-19 consisted of one MCQ question about the source of COVID-19 knowledge if present.

Tool II: Fear from COVID-19 Scale:

Ahorsu et al. (2020) developed this scale to assess a person's fear of COVID-19. It includes seven questions as follows:

Fear from COVID-19 scale questions	
Q1	I'm most afraid of COVID-19.
Q2	It makes me uncomfortable to think about COVID-19 .
Q3	My hands become clammy when I think about COVID-19.
Q4	I'm afraid of losing my life because of COVID-19.
Q5	I become nervous or anxious when watching news and stories about COVID-19 on social media.
Q6	I can't sleep because I'm worrying about getting COVID-19.
Q7	My heart races or palpitates when I think about getting COVID-19.

The scoring system of the scale was established through the use of a five-item Likert-type scale, and the subjects indicated how much they agreed with the statement. "Strongly disagree," "disagree," "neither agree nor disagree," "agree," and "strongly agree" were the responses. Every question has a maximum score of five and a minimum score of one. More fear of COVID-19 corresponds with higher scores.

Tool III: COVID-19 Knowledge Questionnaire:

After appraising the relevant literature, the researchers developed this tool to assess the studied subjects' baseline knowledge of COVID-19 (**Centers for Disease Control and Prevention, 2020;Giao, Han et al., 2020; World Health Organization, 2020;Zhong et al.,2020**).It had thirty-two true or false questions. Answers to each question were provided as Yes, No, and I'm unsure. Split up as follows:

Questionnaire Questions (32)	Items of knowledge regarding COVID-19
Q1-Q2	Nature of the disease
Q3-Q16	Incubation period and mode of transmission
Q17-Q19	Signs &Symptoms of COVID-19
Q20-Q25	Risk factors, Diagnosis, Complications, and Treatment
Q26-Q32	Protective behaviors

Scoring system:

For every question, the correct answer receives a score of 1, while incorrect responses and unclear answers receive a score of zero. Out of 32 scores, the overall knowledge score was calculated. It was converted to a percentage and categorized as follows (**Taghrir et al., 2020**):

Level of knowledge	Scores (total scores=32)	Percentage
Poor	Less than 16 score	< 50%
Average	From 16 to 24 score	50 - 75%
Good	More than 24	75 % >

Tool IV: Self-reported COVID-19 Protective Behaviors Checklist:

The researchers designed this tool after studying relevant literature (**Delshad et al., 2020; Al Ahdab, 2020; World Health Organization,2020**) to assess the study subjects' self-reported COVID-19 protective behaviors. It contained 16 questions classified as:

Checklist questions	Self-reported COVID-19 protective behaviors
Q1-Q2	Hand hygiene
Q3	Avoid touching nose, mouth, and eye .
Q4	Wearing mask
Q5	Disinfectant of surfaces
Q6-Q7	Respiratory hygiene/cough etiquette
Q8-Q15	Social distancing
Q16	Self-isolation

Scoring system:

The response "Always done" receives two, "sometimes done" receives one, and zero for "Never" (**Nour et al., 2015**). Out of 32 scores, the total self-reported COVID-19 protective behaviors scores were calculated. After being transformed into a percent, it was classified as follows (**Taghrir et al., 2020**):-

COVID-19 protective behaviors	Scores (Total 32)	Percentage
Satisfactory	Less than 24	≥ 75%
Unsatisfactory	24 and more	< 75%

Validity of the study tools:

Nine experts in public health medicine, Gerontological nursing, Community health nursing, and Medical-surgical nursing evaluated the study tools to determine content

viability. Based on their findings, the appropriate adjustments were made.

Reliability of the study tools:

The reliability of Tool II, "Fear from COVID-19 Scale"& Tool III, "Knowledge regarding COVID-19 questionnaire" and Tool IV "Self-reported COVID-19 protective behaviors checklist" was applied to 25 individuals from the specified setting and then reapplied after two weeks to obtain the test-retest reliability: (r) r= 0.88 for tool II, r = 0.90 for tool III, and r = 0.86 for tool IV.

Pilot Research

In order to ensure the clarity, applicability, and feasibility of the developed tools and estimate the time needed to fill out the questionnaire sheet, a pilot study involving 10% of the study subjects (25) was conducted to carry out face validity. These participants were then excluded from the study sample.

Ethical consideration:

Ethical approval on the research proposal was obtained from the Faculty of Nursing, Mansoura University Research Ethics Committee. After being informed of the study's purposes, each studied subject provided consent for study contribution. The research participants' privacy and the confidentiality of the collected data were protected. The freedom to withdraw from the study at any moment and without consequence was communicated to the studied subjects.

Fieldwork of data collection Procedure:

The data collection process covered three months, from April 2020 to June 2020. It consisted of two phases; the preparatory phase and the operational phase:

Phase I: Preparatory phase:

- **Administrative stage:** Formal permission was obtained from the previously mentioned setting to conduct the study.
- **Reviewing the relevant literature:** after a comprehensive review of national and international literature from published scientific articles, internet scientific sites that served as the director for developing the study tools.
- **The researchers formulating the final version of the study tools as follows**; demographic characteristics and health-related data structured interview schedule

(tool I), knowledge regarding COVID-19 questionnaire (tool III), and self-reported COVID-19 protective behaviors checklist (tool IV). Furthermore, adopting tool II. After that, the researchers translated the tools into Arabic, and an English language specialist from Mansoura University's Faculty of Education verified the accuracy of the translation. This study employed a backup translation technique to guarantee translation validity. Finally, the final version of tools was ready for data collection.

Phase II: Operational phase:

The study variables were measured at this phase in a single time using all aforementioned tools and involved the following steps:

- The researchers visited the outpatient clinics six days a week (from Saturday to Thursday) from 8 am to 12 pm in accordance with the Specialized Medical Hospital's schedule, except for the Endocrinology clinic on (Sunday, Monday, and Thursday) and Geriatric clinic at (Saturday, Wednesday). Due to the COVID-19 era, each previous outpatient clinic worked from 8 am to 12 pm and received 15-20 patients per day only.
- The study included every patient who visited these clinics and met the research criteria. The researchers introduced themselves to the patients and briefly outlined the study's goal.
- Every subject meets with the researchers either inside or in the waiting area of an outpatient clinic. Every patient who met the study criteria was invited for a face-to-face interview.
- The researchers conducted a 15- to 20-minute questionnaire-based interview with each subject separately, utilizing all the study's tools to obtain the required data.
- For illiterate patients, the researchers read each question to the participants and noted precisely what each one of them replied.
- Owing to the spread of COVID-19, the researchers interviewed each patient separately in accordance with outpatient clinic policies, using masks and gloves, keeping a social distance, and not interacting with patients in crowded areas.

Statistical analysis:

Statistical Package for the Social Sciences (SPSS) version 22 was used to revise, code, tabulate, and analyze the gathered data. Firstly, a one-sample Kolmogorov- Smirnov test

was used to test data normality. Data were presented using descriptive statistics in the form of means and standard deviations, median, and Min-Max for quantitative variables, as well as frequencies and percentages for qualitative variables. A student t-test was used to compare two sample means to assess whether the means of two independent groups were statistically different. Furthermore, the One-way ANOVA (F) test was used to compare more than two means scores of studied variables. At the same time, the correlation between continuous data was tested using the Pearson correlation coefficient (r). Statistical significance was considered at p-value <0.05.

Results

Table (1) displays that 246 subjects were included in the study; half (50%) of them were middle-aged, and the other half were older adults with a mean age of 49.1870±7.3955 and 67.1545±5.52347, respectively. More than half of both age groups were male (64.2 %& 58.5% respectively). Concerning residence, more than half of the middle-aged adults (54.5%) have resided in urban areas. On the other side, about half of older adults resided in rural areas (51.2%). It was noticed that 83.7 % of middle-aged and 65% of older adults were married. Additionally, 52.8 % of middle-aged and 39.8 % of older adults had secondary education. The majority of the studied subjects from both groups did not have enough income. Regarding their health-related data, the most common comorbidity among both age groups was Diabetes Mellitus (61% and 64.2% correspondingly), followed by hypertension (28.5% and 37.4 %, respectively).

Figure (1) shows that social media was the most popular source of COVID-19 information among both groups (56.1% in middle-aged and 45.5 % in older adults). On the other hand, healthcare workers were the source of information among middle-aged and Internet among older adults (8.9% and 6.5%, correspondingly).

Table (2) displays that there was a statistically significant difference in all responses to COVID-19 knowledge questions about the nature of the disease, incubation periods and mode of transmission, signs and symptoms of COVID-19, risk factors, diagnosis, complications and treatment, and the protective behaviors

between both groups as the older adult group had lower knowledge scores than the middle-aged group.

Table (3) clarifies that there was a statistically significant difference in all responses to self-reported protective behaviors to COVID-19 questions regarding hand hygiene, wearing a face mask in public places, touching eyes, nose, and mouth with hands, respiratory hygiene/Cough Etiquette, clean and disinfecting frequently touched items, social distancing, and self-isolation among both groups as the older adult group had lower protective behavior scores than the middle-aged group.

Table (4) demonstrates that approximately half of the subjects in both middle-aged and older adult groups (46.3%, 56.9%, respectively) had poor levels of COVID-19 related knowledge with a statistically significant difference (P=0.000*) found between both groups in which the middle-aged had a higher mean score of knowledge (20.211±6.731) than older adults (16.422±7.794). Regarding COVID-19 protective behaviors, approximately two-thirds of the subjects in both middle-aged and older adult groups (55.3, 64.2, respectively) had unsatisfactory levels of COVID-19 protective behaviors with a statistically significant difference (P=0.000*) found between both groups in which the middle-aged had a higher mean score of protective behaviors (23.813±4.123) than older adults (20.430±5.502). Additionally, there was a statistically significant difference (p=0.000*) between middle-aged and older adult groups regarding fear of COVID-19, in which older adults had a higher level of fear (21.325±6.327) than middle-aged (11.853±4.698).

Table (5) shows that males in both groups have lower mean scores for fear of COVID-19 and higher mean scores for protective behaviors and knowledge about COVID-19 (P=0.000*). In both age groups, a statistically significant association was found between the study variables and income. Specifically, the study participants with enough income demonstrated higher COVID-19 knowledge, protective behaviors, and lower levels of COVID-19 fear (P=0.000*) than those without. Likewise, the studied subjects in both age groups living in rural areas scored lower on COVID-19 knowledge and protective behaviors and showed high fear of

COVID-19 than those residing in urban areas, with a statistically significant difference (p=0.000). Concerning the level of education, it was represented that the level of education was affected significantly by study variables in both age groups; for instance, illiterate subjects had both lower scores of COVID-19 knowledge and protective behaviors with higher fear of COVID-19 than others (P= 0.000).

Figures 2 & 3 signify a strong positive correlation between total COVID-19 knowledge and self-reported protective behaviors scores among both age groups, which is statistically significant with a value of (p= 0.000*).

Table (6) represents a strong negative correlation between fear of COVID-19 scores and both total knowledge and self-reported protective behaviors scores among both middle-aged and older adult groups, which is statistically significant.

Table (1): Percentage distribution of the studied groups according to their demographics and health-related data (N=246).

Items	Middle-aged group		Older adult group		Test of significance
	N	%	N	%	----
	123	50	123	50	
Age (years)	49.1870±7.39556		67.1545±5.52347		
Sex					
• Male	79	64.2	72	58.5	t=0.915
• Female	44	35.8	51	41.5	P=0.361
Residence					
• Urban	67	54.5	60	48.8	t=0.891
• Rural	56	45.5	63	51.2	P=0.374
Marital Status					
• Single	5	4.1	0	0	
• Married	103	83.7	80	65	F=12.186
• Divorced	6	4.9	2	1.6	P=0.001
• Widow	9	7.3	41	33.3	
Education					
• Illiterate	11	8.9	35	28.5	
• Read and write	13	10.6	17	13.8	
• Primary education	16	13	16	13	F=21.914
• Secondary education	65	52.8	49	39.8	P=0.000*
• University	18	14.6	6	4.9	
Income					
• Enough	32	26.0	18	14.6	t=2.231
• Not enough	91	74.0	105	85.4	P=0.027
Health-related data #					
• Hypertension	35	28.5	46	37.4	t=1.493 P=0.137
• Diabetes Mellitus	75	61	79	64.2	t=0.525 P=0.600
• Liver Diseases	3	2.4	10	8.1	t=2.003 P=0.064
• Ischemic Heart disease	15	12.2	17	13.8	t=0.378 P=0.706
• Respiratory Diseases	4	3.3	11	8.9	t=1.871 P=0. 630
• Gastritis	9	7.3	13	10.6	t=0.892 P=0.374
• Musculoskeletal Disease	4	3.3	14	11.4	t=2.469 P=0.084

 # means presence of this disease, more than one response   t= independent t test   F= One Way ANOVA
Significant at p ≤ 0.05

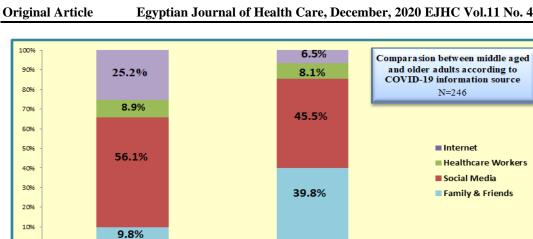**Figure (1):** Comparison between middle-aged and older adult groups according to their source of COVID-19 information

Table (2): Comparison between middle-aged and older adult groups according to their COVID-19 knowledge scores (N=246).

COVID-19 knowledge questions#	Middle-aged	Older adult	t (p-value)
	Correct answers		
	N (%)	N (%)	
Nature of the disease			
Q1: The Corona virus is considered manufactured in a laboratory and isn't natural.	73 (59.3)	60 (48.8)	-0.915 (0.007) *
Q2: The new Corona virus is an infection of the system, and is caused by a virus of the Corona virus subspecies, which is a broad strain of viruses that may infect animals and humans.	73 (59.3)	58 (47.2)	1.666 (0.042) *
Incubation periods and mode of transmission			
Q3: The incubation period of the virus, which is the period between infection with the Corona virus and the appearance of its symptoms, ranges from one day to 14 days.	75 (61)	58 (47.2)	1.923 (0.070) *
Q4: The new Corona virus is transmitted through droplets from an infected person while sneezing or coughing.	75(61)	59(48)	2.187 (0.026) *
Q5: The new Corona virus is transmitted through direct contact with an infected person	77(62.6)	61(49.6)	2.058 (0.019) *
Q6: It is possible that the new Corona virus is transmitted by touching contaminated tools or surfaces around him, and then touching the mouth, nose, or eyes.	76 (61.8)	63(51.2)	2.065 (0.004) *
Q7: The new Coronavirus can be transmitted through the air	79(64.2)	59(48)	1.675 (0.009) *
Q8: A person can be infected with the virus by someone who does not show symptoms.	60(48.8)	81(65.9)	2.594 (0.002) *
Q9: The new Coronavirus can be transmitted through mosquito bites.	61(49.6)	81(65.9)	2.737 (0.000) *
Q10: It is possible that the new Corona virus can be transmitted by eating contaminated food.	80(65)	62(50.4)	2.606 (0.000) *
Q11: It is possible that the new Corona virus can be transmitted through blood transfusion.	81(65.9)	62(50.4)	2.340 (0.001) *
Q12: It is possible that the new Corona virus can be transmitted through water.	80 (65)	64 (52)	2.476 (0.000) *
Q13: It is possible for the new Corona virus to be transmitted through hand-to-hand contact.	77 (62.6)	64 (52)	2.080 (0.001) *
Q14: A person infected with the new Coronavirus cannot infect	76 (61.8)	59 (48)	1.679 (0.006) *

COVID-19 knowledge questions#	Middle-aged	Older adult	t (p-value)
	Correct answers		
	N (%)	N (%)	
others if he does not suffer from a high fever.			
Q15: The new Corona virus infects the human body through the nose only and cannot enter through the eyes or mouth.	77 (62.6)	60(48.8)	2.191 (0.011) *
Q16: It is possible for the Corona virus to live on surfaces such as tables, keys, etc. for a period of time.	76 (61.8)	62(50.4)	2.194 (0.005) *
Signs and symptoms of COVID-19			
Q17: Headache, high fever, dry cough, and shortness of breath are among the most common symptoms of the emerging Coronavirus.	75 (61)	65(52.8)	1.803 (0.008) *
Q18: Most people infected with the virus suffer from mild symptoms, except for the elderly, who suffer from chronic diseases, and those who are obese are more susceptible to complications.	80 (65)	65 (52.8)	1.287 (0.026) *
Q19: Unlike the common cold, stuffy nose, runny nose and sneezing are less common in people infected with the virus.	101(82.1)	67(54.5)	1.951 (0.001) *
Risk factors, diagnosis, complications and treatment			
Q20: The elderly, those with chronic diseases, and pregnant women are the most vulnerable for COVID-19 infection.	92 (74.8)	67(54.5)	4.859 (0.000) *
Q21: Infants, girls, and young boys, it is difficult for the virus to cause death.	97 (78.9)	72(58.5)	3.398 (0.000) *
Q22: Confirmed diagnosis of the new Corona virus is made through a positive PCR test for the virus.	98 (79.7)	71(57.7)	3.509 (0.000) *
Q23: There is currently a treatment for the new Corona virus.	95 (77.2)	71(57.7)	3.805 (0.000) *
Q24: There is a vaccine to prevent the new Corona virus at present.	98 (79.7)	70(56.9)	3.326 (0.000) *
Q25: Infection with the new Coronavirus can lead to severe pneumonia, respiratory failure, and death.	97 (78.9)	66(53.7)	3.940 (0.000) *
Protective behaviors			
Q26: The risk of infection with the new Corona virus increases in crowded places.	97 (78.9)	67(54.5)	4.319 (0.000) *
Q27: Taking antibiotics without consulting a doctor is effective in preventing or even treating infection with the virus	95 (77.2)	66(53.7)	4.183(0.000) *
Q28: Smoking reduces infection with the emerging Coronavirus	95 (77.2)	64 (52)	4.268(0.000) *
Q29: Vaccination against seasonal influenza protects against infection with the virus.	95 (77.2)	63(51.2)	4.404(0.000) *
Q30: Isolating and treating patients infected with the virus is very important to reduce the spread of the virus.	94 (76.4)	61(49.6)	4.518(0.000) *
Q31: Does spraying the entire body with alcohol or chlorine help eliminate the new Corona virus?	93 (75.6)	63(51.2)	4.088(0.000) *
Q32: If a person feels any emergency symptoms such as high body temperature and cough He must stay at home, isolate himself from the rest of the family, and contact the relevant authorities.	93 (75.6)	62(50.4)	4.224(0.000) *

*# Only correct answers were presented   t=student independent test   *Significant at $p \leq 0.05$*

Table (3): Comparison between middle-aged and older adult groups according to their COVID-19 protective behaviors scores (N=246).

COVID-19 Protective behaviors	Middle-aged group			Older adult group			t (p-value)
	Always N (%)	Sometimes N (%)	Never N (%)	Always N (%)	Sometimes N (%)	Never N (%)	
Hand Hygiene							
Q1: I wash my hands and soap it up for 20 seconds.	31(25.2)	84 (68.3)	8 (6.5)	42 (34.1)	71(57.7)	10(8.1)	-1.012 (0.024) *
Q2: Protect your hand with alcohol or hand sanitizer gel if soap and water are not available.	61 (49.6)	55 (44.7)	7 (5.7)	42 (34.1)	72(58.5)	9 (7.3)	2.250 (0.099)
Q3: Avoid touching eyes, nose and mouth with hands.	72(58.5)	46 (37.4)	5 (4.1)	40(32.5)	81(65.9)	2 (1.6)	3.433 (0.002) *
Q4: You must wear a face mask or respirator in public places.	80 (65)	38 (30.9)	5 (4.1)	40 (32.5)	81(65.9)	2 (1.6)	4.419 (0.049) *
Q5: Clean and disinfect frequently touched items such as surfaces, keys, phones, etc.	84 (68.3)	34 (27.6)	5 (4.1)	20 (16.3)	103(83.7)	0(0)	7.923 (0.000) *
Respiratory Hygiene/Cough Etiquette							
Q6: Cover your mouth and nose with your elbow when coughing or sneezing if tissue is not available.	85 (69.1)	37 (30.1)	1 (0.8)	16 (13)	107 (87)	0(0)	10.382 (0.000) *
Q7: Use a tissue when you sneeze or cough and put it in the trash afterward.	27 (22)	94 (76.4)	2(1.6)	91 (74)	31 (25.2)	1 (0.8)	9.149 (0.003) *
Social Distancing							
Q8: Avoid leaving the house unnecessarily.	79 (64.2)	43 (35)	2(1.8)	24(19.5)	98(79.7)	1 (0.8)	7.653 (0.000) *
Q9: Avoid shaking hands with others and greet people from a distance.	55 (44.7)	68 (55.3)	0(0)	30(24.4)	90(73.2)	6 (2.4)	3.678 (0.000) *
Q10: Avoid crowded places.	55 (44.7)	68 (55.3)	0(0)	30(24.4)	91 (74)	2 (1.6)	3.592 (0.000) *
Q11: Maintain a personal distance of at least one meter away from others.	73 (59.3)	50 (40.7)	0(0)	49(39.8)	73 (59.3)	1 (0.8)	3.189 (0.823)
Q12: Avoid unnecessary meetings and parties.	84 (68.3)	39 (31.7)	0(0)	75 (61)	46 (37.4)	2 (1.6)	1.411 (0.004) *
Q13: Avoid family visits.	64 (52)	39 (31.7)	20(16.3)	59 (48)	62 (50.4)	2 (1.6)	1.277 (0.000) *
Q14: On public transportation, avoid touching different surfaces, whether by pressing different buttons.	43 (35)	73 (59.3)	7 (5.7)	52(42.3)	35 (28.5)	36 (29.3)	1.779 (0.000) *
Q15: When you have to touch surfaces, you should use tissues. If this is not available, use your knees, feet, and elbows instead of your fingertips.	43 (35)	71 (57.7)	9 (7.3)	53(43.1)	33 (26.8)	37(30.1)	1.569 (0.000) *
Self-isolation							
Q16: If you are suffering from symptoms such as cough, runny nose, fever, etc., will you stay at home in isolation and adhere to complete rest.	42 (34.1)	67 (54.5)	14 (11.4)	54 (33.3)	28 (22.8)	41 (43.9)	1.248 (0.000) *

 # Only correct answers were presented   *t=student independent test*   **Significant at p ≤ 0.05*

Table (4): Comparison between the middle-aged and older adult groups related to their level and mean scores of COVID-19 fear, knowledge, and protective behaviors (N=246).

Items	Middle-aged group		Older adult group	
	N (123)	**%**	**N (123)**	**%**
COVID-19 Knowledge				
• Good	39	31.7	30	24.4
• Average	27	22	23	18.7
• Poor	57	46.3	70	56.9
Mean ± SD	20.211±6.731		16.422±7.794	
Median (Min-Max)	22 (10 - 30)		14 (6 - 28)	
Test of significance	F= 8.075 P=0.000*		F=70.533 P=0.000*	
COVID-19 Protective behaviors				
• Satisfactory	55	44.7	44	35.8
• Unsatisfactory	68	55.3	79	64.2
Mean ± SD	23.813±4.123		20.430±5.502	
Median (Min-Max)	23 (15 - 30)		21 (12 - 28)	
Test of significance	t=7.611 P= 0.000*		t= 6.246 P=0.000*	
Fear of COVID-19				
Mean ± SD	11.853±4.698		21.325±6.327	
Median (Min-Max)	10 (7-25)		23(10-30)	
Test of significance	t=-12.009- P=0.000*		t= -5.771- P=0.000*	

*t= independent t test   F= One Way ANOVA   *Significant at p ≤ 0.05*
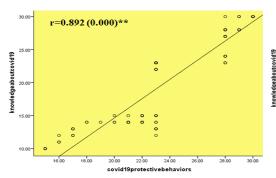
Table (5): Correlation between middle-aged and older adults' demographic characteristics and their mean scores of knowledge, protective behaviors, and fear related to COVID-19. (N=246)
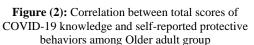
Items	N	COVID-19 Knowledge		Self-reported protective behaviors		Fear of COVID-19	
		Middle-aged	Older adult	Middle-aged	Older adult	Middle-aged	Older adult
		Mean ± SD		Mean ± SD		Mean ± SD	
Sex							
• Male	79	23.367±5.521	18.722±7.515	25.557±3.132	22.708±4.900	9.278±1.7167	18.861±6.080
• Female	44	14.545±4.702	13.176±7.047	20.681±3.850	17.215±4.666	16.477±4.819	24.803±4.911
Test of significance		$t= 8.821$ $P=0.000*$	$t=4.136$ $P=0.000*$	$t=6.246$ $P=0.000*$	$t=7.611$ $P=0.000*$	$t=-12.009-$ $P=0.000*$	$t=-5.771-$ $P=0.000*$
Residence							
• Urban	67	24.761±4.635	21.616±6.356	26.149±3.021	24.433±3.485	8.880±1.522	16.500±4.652
• Rural	56	14.767±4.398	11.476±5.488	21.017±3.487	16.619±4.213	15.410±4.747	25.920±3.768
Test of significance		$t=12.186$ $P=0.000*$	$t=9.483$ $P=0.000*$	$t=8.743$ $P=0.000*$	$t=11.177$ $P=0.000*$	$t=-10.631-$ $P= 0.000*$	$t=-12.367-$ $P=0.000*$
Marital Status							
• Single	5	30.000±0.000	_____	29.800±0.447	_____	7.000±0.000	_____
• Married	103	19.825±6.601	17.4750±7.6901	23.640±4.033	21.237±5.396	12.009±4.651	20.487±6.286
• Divorced	6	16.888±5.732	13.9268±7.4679	21.333±3.708	18.536±5.263	14.666±5.196	23.341±5.952
• Widow	9	23.666±5.573	25.500±0.707	25.500±3.146	27.000±0.000	9.000±2.449	13.500±0.707
Test of significance		$F=5.428$ $P=0.002*$	$F=4.422$ $P=0.014*$	$F=5.551$ $P=0.001*$	$F=5.025$ $P=0.008*$	$F=3.887$ $P=0.011*$	$F=4.564$ $P=0.012*$
Education							
• Illiterate	11	11.272±1.190	16.000±0.894	8.171±1.543	13.514±1.837	22.545±1.572	28.457±1.357
• Read & write	13	14.307±0.751	20.000±2.121	12.117±3.351	18.647±2.343	18.000±1.354	24.411±2.785
• Primary	16	13.687±0.793	21.937±0.997	13.875±1.746	21.187±0.981	12.312±1.815	22.562±3.690
• Secondary education	65	22.553±5.618	25.461±2.856	23.224±5.067	24.816±3.073	9.723±2.042	16.040±1.750
• University	18	27.277±3.511	27.055±3.368	28.000±0.000	28.000±0.000	8.166±1.504	10.833±0. 752
Test of significance		$F=42.662$ $P=0.000*$	$F=112.574$ $P=0.000*$	$F=47.774$ $P=0.000*$	$F=133.054$ $P=0.000*$	$F=168.305$ $P=0.000*$	$F=132.511$ $P=0.000*$
Income							
• Enough	32	21.681±6.557	17.257±7.557	25.274±3.207	21.219±5.1384	10.274±2.917	20.504±6.130
• Not enough	91	16.031±5.397	11.555±7.563	19.656±3.597	15.833±5.436	16.343±5.834	26.111±5.389
Test of significance		$t=-4.377$ $P=0.000*$	$t=-4.377$ $P=0.000*$	$t=-2.957$ $P=0.004*$	$t=-8.254$ $P=0.000*$	$t= 4.075$ $P=0.000*$	$t=7.611$ $P=0.000*$

t= independent t test   *F= One Way ANOVA*   *Significant at p ≤ 0.05*

Figure (2): Correlation between total scores of COVID-19 knowledge and self-reported protective behaviors among Older adult group

Figure (3): Correlation between total scores of COVID-19 knowledge and self-reported protective behaviors among middle-aged group
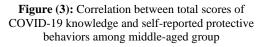
Table (6): Correlation between fear, knowledge, and protective behaviors total scores among middle-aged and older adults (N=246)

Item		Total COVID-19 knowledge scores		Total COVID-19 protective behaviors scores	
		Middle-aged	Older adult	Middle-aged	Older adult
Total fear of COVID-19 scores	r	-0.824-*	-0.959-	-0.900-	-0.973-
	P	0.000**	0.000**	0.000**	0.000**

** Correlation is significant at the 0.01 level (2-tailed).

Discussion

COVID-19 is an infectious disease caused by the SARS-CoV-2 virus. As of June 26, 2020, 9 581,803 COVID-19 cases, including 489,182 deaths, had been recorded globally since December 31, 2019. Up till June 26, 2020, 61,130 infections were registered in Egypt, with a sharply rising trend (**World Health Organization, 2020).**

Given that ageing is strongly linked to worse outcomes because of the pathophysiological changes that characterize the respiratory system, one crucial primary risk factor for COVID-19 mortality is thought to be age. Furthermore, among older adults, aging itself has been connected to significant psychological disorders, insecurity, and fear (**Gyasi, Phillips & Buor, 2020).** Assessing information and protective behaviors regarding the disease is the first line of defense against any infectious disease epidemic in nature. In addition, the impact of a pandemic on emotional reactions likes fear (**Doshi et al., 2020).** Thus, the study aimed to assess and compare middle-aged and older adult groups' fear, knowledge, and protective behaviors related to COVID-19.

Concerning demographic characteristics of the studied subjects, more than half of both age groups were male. Additionally, **Siddiqui et al. (2020)** found that more than half of respondents were males. Similarly, A hospital-based cross-sectional study by **Kebede et al. (2020)** showed that males comprised most of the participants. In contrast, a cross-sectional study about Egyptians' knowledge, perceptions, and attitudes toward the novel coronavirus disease by **Abdelhafiz et al. (2020)** revealed that about half of the participants were females. The variance in sample size could be the cause of this.

In terms of marital status, about two-thirds of older adults and the majority of middle-aged adults were married. Comparable findings were made by **Li et al. (2020),** who discovered that over half of the participants were married. Furthermore, according to **Alyami et al. (2020),** around two-thirds of the participants were married*.*

In relation to the study's findings on educational attainment, more than half of middle-aged adults and more than two-fifths of older adults had secondary education. This is in line with the findings of **Kebede et al. (2020),** who found that 75% of respondents only have a secondary education or less. On

the other hand, **Khaled et al. (2020)** reported that almost two-thirds of participants had a university degree. The diverse study subjects and settings could explain this discrepancy.

According to study participants' health-related data, the most common disease in both groups was Diabetes Mellitus. It is supported by the findings of **Wolf et al. (2020),** who discovered that more than half of the participants had diabetes mellitus. However, **Khaled et al. (2020)** discovered that the study's participants had diabetes mellitus in just 7.6% of cases.

As stated by this study, social media was the most popular way for middle-aged and older people to obtain information on COVID-19. Participants identified social media as their primary information source, which is consistent with the findings of **Abdelhafiz et al. (2020)**. Additionally, social media was cited as the primary source of COVID-19 information by **Bhagavathula et al. (2020)**. Furthermore, the majority of research participants got information through social media, according to findings by *Olaimat et al. (2020)*. This might be due to social media's abundance of channels, including radio, television, and more. It's also simple to access and available whenever you need it.

The novelty of COVID-19 and the uncertainty surrounding the outbreak's intensity are likely the causes of fear of it **(Asmundson & Taylor, 2020)**. According to the study results, both age groups showed a statistically significant difference in their fear of COVID-19, with the middle-aged group showing less fear than the older adult group. It is in agreement with **Mertens et al. (2020)**, who discovered that respondents expressed a wide variety of concerns about the coronavirus outbreak in their study about Fear of the Coronavirus (COVID-19). Additionally, according to **Guterres (2020)**, older adults worldwide are experiencing indescribable fear and pain as a result of the COVID-19 pandemic. This is anticipated as aging affects people's immune systems, making it more difficult for the body to fend against infections and illnesses, and because many older adults also have higher rates of health issues that are more difficult to manage and recover from.

When an older individual has COVID-19 disease, their chance of having lung or respiratory system complications grows with age **(Cameron, 2020).**

The study's findings about the subjects' knowledge of COVID-19 showed a statistically significant difference in both groups' knowledge of COVID-19, with middle-aged adults having a higher mean score than older adults. This is in line with the findings of **Alyami et al. (2020),** who found that participants aged 60 or more had lower knowledge scores about COVID-19. Similarly, **Abdelhafiz et al. (2020)** pointed out that older participants had a much lower mean knowledge score about COVID-19. In their representative cross-sectional study on women's knowledge, attitudes, and perceptions toward COVID-19 in Lower-Middle-Income nations, **Anwar, Araf, Newaz Khan, Ullah, Hoque, et al. (2020)** also revealed that the mean knowledge score of participants over 60 years of age was substantially lower.

Moreover, **Hezima, Aljafari, Aljafari, Mohammad, and Adel (2020)** discovered that younger adults possess greater knowledge than older ones in their study on the "Knowledge, attitudes, and practices of Sudanese residents about COVID-19". From the perspective of the researchers, it might be explained by the fact that, during the COVID-19 pandemic, most older adults live alone and don't get any visits from anybody trying to raise their knowledge of the virus. Furthermore, compared to middle-aged adults, the majority of older adults had lower educational levels.

Concerning protective behaviors against COVID-19, the study's findings revealed a statistically significant difference between both age groups regarding COVID-19 Protective behaviors as middle-aged had higher mean scores of protective behaviors than older adults. Analogously, **Naser, Dahmash, Alwafi, Alsairafi, Al Rajeh, et al. (2020)** concluded their multination cross-sectional study concerning knowledge and practice regarding COVID-19 and discovered that older participants from all the countries under study adopt inappropriate protective behaviors in comparison to younger participants. **Zhong et al. (2020)** also discovered that older adults

were more likely to adopt ineffective COVID-19 preventative measures.

On the other hand, **Khaled et al. (2020)** discovered no significant variation in adopting precautionary measures against COVID-19 across various age groups. This could be because the majority of the older adults were retired and had low socioeconomic status in our study, which discouraged them from adopting COVID-19 protective behaviors.

Regarding the association between middle-aged and older adults' demographic variables and their knowledge, protective behaviors, and fear of COVID-19. The study's findings showed that, for both the middle-aged and older adult groups, the studied subjects' scores of COVID-19 knowledge, protective behaviors, and fear varied significantly with respect to gender, income, residence, and educational level. Males obtained higher mean scores of COVID-19 knowledge and protective behaviors, as well as lower levels of fear of COVID-19 compared to females.

Also, in both age groups, studied subjects with insufficient income had lower scores of COVID-19 knowledge, protective behaviors, and higher fear of COVID-19 than those with enough income. Additionally, studied subjects residing in urban areas had a higher COVID-19 knowledge and protective behavior scores, with a lower fear of COVID-19 than others living in rural areas. Moreover, illiterate studied subjects had both lower scores of COVID-19 knowledge protective behaviors and higher fear of COVID-19 than others.

Similar results were published by **Alyami et al. (2020),** who found that Participants' scores differed significantly by educational level, as individuals with university or at least secondary school education had a higher COVID-19 knowledge score than others. Furthermore, **Hezima et al. (2020)** noted that participants without a formal education were the least knowledgeable and that female participants were more knowledgeable than male participants. Also, **Hossain, Jahid, Hossain, Walton, Uddin, et al. (2020)** reported that fear of COVID-19 is more prevalent in females than males, which may be connected to their intrinsic dread of losing their families.

Moreover, **Salman, Mustafa, Asif, Zaidi, Hussain, et al. (2020)** noted that there would be a higher likelihood of inadequate awareness and protective behaviors toward COVID-19 among rural communities.

Additionally, **Zhong et al. (2020)** discovered that low-income rural residents were more likely to have inadequate information and use the wrong protective measures against COVID-19. Moreover, **Azlan, Hamzah, Sern, Ayub, and Mohamad (2020)** found that participants in the higher income category scored higher on knowledge because these subjects could afford to buy gloves, masks, and other protective equipment.

Regarding the correlation between overall COVID-19 knowledge and self-reported protective behaviors, the study found that among middle-aged and older adult groups, there was a strong positive correlation between both factors, which is statistically significant. Similar outcomes were reported by **Peng, Pei, Zheng, Wang, Zhang, et al. (2020),** who discovered a significant positive correlation between COVID-19 knowledge and practice scores. **Rahman & Sathi (2020)** also found a positive correlation between COVID-19 knowledge and preventive practice scores. Furthermore, according to **Hamza, Badary, and Elmazar (2020),** knowledge is a requirement for encouraging positive behaviors. This could be because people with a strong understanding of COVID-19 are more aware of the disease's complications and serious effects, which leads them to adopt protective behaviors than people with inadequate knowledge.

The current study also discovered a statistically significant strong negative correlation between fear of COVID-19 scores and overall COVID-19 knowledge and self-reported protective behaviors mean scores among middle-aged and older adults. According to **Hossain et al. (2020),** fear plays a significant role in both positive and negative aspects of life. So, people's inadequate protective behaviors and lack of knowledge could raise their fear of the COVID-19 pandemic.

Conclusion

The present study came to the conclusion that social media was regarded as the most

popular source of information about COVID-19 among both middle-aged and older adult groups. Both age groups had poor knowledge, unsatisfactory health behaviors, and fears related to COVID-19. At the same time, the older adult group had lower mean scores of knowledge and health behaviors and higher levels of fear related to COVID-19 when compared with the middle-aged group. Furthermore, across the middle-aged and older adult groups, there was a strong positive correlation between protective behaviors and overall COVID-19 knowledge, which is statistically significant. On the other hand, there was a strong negative correlation between COVID-19 fear, knowledge, and protective behaviors among both groups.

Recommendations

In light of the current study findings, the following recommendations are suggested:

- Public health education through an instructional program for different age groups in Egypt is recommended to correct misconceptions and improve their knowledge and protective behaviors regarding COVID-19, as well as alleviate distressing feelings and fear.

- Future studies should be conducted to evaluate the effect of nurses' education on middle-aged and older adults' knowledge, health behaviors, and fears related to COVID-19.

- Further research should be conducted on positive COVID-19 patients to examine the relationship between the prevalence of COVID-19 and patients related knowledge and protective behaviors.

Acknowledgments

Conflict of interest:

No

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