Egyptian Society and COVID-19 Pandemic: Evaluating Awareness and Preventive Practices of Egyptians towards the Disease in the Socio-cultural Context

المجتمع المصري ووباء كوفيد-19: تقييم وعي المصريين والممارسات الوقائية تجاه المرض في السياق الاجتماعي والثقافي

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Abstract:
At the early period of COVID-19 outbreak in Egypt, participants asked about their information about this new disease and whether they made changes to their routines recently. The data collected from 350 participants using an online survey and statistically analyzed. Well- educated Egyptians, particularly women were relatively knowledgeable about the disease. They have an optimistic attitude towards disease and most of them had taken adequate preventive measures. The study demonstrates the importance of health education programs aimed at improving COVID-19 knowledge in encouraging optimistic attitudes and maintaining safe practices.
Keywords: COVID-19, SARS-coV-2, Egypt, knowledge, practices.

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ملخص:

خلال الفترات المبكرة من انتشار وباء كورونا سئل المشاركون عن معلوماتهم عن هذا الوباء الجديد وما إذا كانوا قد أجروا بعض التغييرات على نمط حياتهم في الآونة الأخيرة. وقد تم جمع البيانات من (350) مشاركًا باستخدام الاستبيان الالكتروني، وتم تحليل البيانات احصائيًا. ومن أهم النتائج التي تم التوصل لها؛ كان المتعلمون وخاصة النساء على دراية جيدة بشأن المرض ولديهم موقف متفائل تجاهه، كما اتّخذن تدابير وقائية كافية. تؤكد الدراسة على أهمية دور برامج التثقيف الصحي الرامية إلى تحسين المعرفة ورفع الوعي بوباء الكورونا في التزام الأفراد التدابير الوقائية وارتفاع مستوى التفائل لديهم تجاه الوباء.

الكلمات المفتاحية: كوفيد-19، سارس، مصر، المعرفة، الممارسات.

Introduction

World Health Organization (WHO) has declared the outbreak of COVID-19 a public Health Emergency of International Concern on January 30, 2020 ("Statement on the second meeting" 2020), and a global pandemic on 11 March ("WHO Director-General's" 2020). According to the WHO (2020, May 31), the total confirmed cases were more than 5 million cases and more than 3000 deaths globally. COVID-19, initially called nCoV-2019 or SARS-CoV-2, is a novel β-coronavirus caused unknown acute respiratory syndrome (Lu et. al. 2020) in 12 December 2019. It broke out first in a local fresh

seafood market in Wuhan, Hubei province, central China (Zhou et. al. 2020).

Two large-scale pandemics caused by other β-CoVs (SARS-CoV and MERS-CoV) in the past two decades (Yin and Wunderink 2018).It was believed that SARS-coronaviruses, especially those found in bats, might cause future disease outbreak (Cui et. al. 2019). Although modes of transmission of COVID-19 are thought to be the same mechanism as SARS, the spread of infection for the current outbreak is occurring more rapidly than in the SARS epidemic. Among several challenges facing control of COVID-19 spreading, is that many cases may have been asymptomatic, so it is difficult to predict when the epidemic will peak, introducing difficulty in the detection of cases (Peeri et. al. 2020). This, in addition to, the absence of approved antiviral therapy or vaccine to eradicate COVID-19 till now (Rabby 2020) prioritize the importance of increased people awareness as well as adequacy of their preventive practices.

Stopping this pandemic, therefore, is not just excused by the public health professionals. This global health problem cannot be solved by any discipline alone and interdisciplinary cooperation between the social sciences and medicine is needed. In the emergency public health efforts, particularly disease outbreak, anthropologists have been recognized as important players alongside epidemiologists, clinicians and public health professionals in health crises because of their ability to assess social, economic and political factors in the local context. Outbreaks of Ebola virus disease (2013-2016) and Zika virus (2015-2016) highlighted the need to understand the social

pathways of disease transmission and barriers to care, and its role in accelerated planning and design of health programs of a public health emergency response (Stellmach et.al. 2018).

Anthropologists conventionally conduct extensive field research to contextualize human behavior and specific beliefs and values (Manderson 1998) using ethnographic methods including focus group discussions, in-depth interviews, participant observation, and various participatory methods (Launiala 2009). However, in extreme crisis (Williams 2001) and in situations of very high insecurity (Kovats-Bernat 2002), it is unsafe for health personnel and hence not safer for anthropologists to do that.

The most popular and widely used survey in gaining adequate understanding of the socio-cultural and economic aspects of the context being the knowledge, Attitude, and Practice (KAP) survey (Green 2001; Hausmann-Muela et al. 2003; Manderson and Aaby 1992). Understanding of community KAP has been instrumental in revealing the level of knowledge, and misconceptions or misunderstandings that could present obstacles to intervention activities and behavior change (Rimal and Lapinski 2009). Intervention strategies suggested by KAP surveys reflect specific local circumstances and cultural factors that influence them and plan activities that are suited to the respective population involved (Médecins du monde 2017).

By February 15th, 2020, WHO reported the first confirmed case of COVID-19 in Egypt (WHO, 2020February 15), and byMay 31th, 2020, the total confirmed cases reaches to 23449 and 913 deaths in Egypt (WHO, 2020 May 31). The current study

aimed to assess knowledge, Attitude and Practices of Egyptians towards COVID-19 during the early period of the outbreak (1 to 10 March 2020) using an online KAP survey and interpreted it within the socio-cultural context. The total confirmed cases in Egypt byMarch 1St, 2020 was only one case with no deaths reported (WHO, 2020 March 1), and by March 10th, 2020, the total confirmed cases was 59 cases and only one death (WHO, 2020 March 10).

1- Material and Method

The data is collected during the early period of COVID-19 outbreak in Egypt (1 March to 10 March 2020). Because it was not feasible to do a community-based national sampling survey during this critical period, the study based on collecting data through an electronic questionnaire. Relying on the author's networks with local people in Egypt, a link to an electronic questionnaire was posted to several groups through Facebook. The questionnaire started with a brief introduction on the background, objective, and voluntary nature of participation, declarations of anonymity and confidentiality.The submission of the answered survey was considered as consent to participate in the survey.

The questionnaire consisted of 100 questions organized in four main sections to measure different parameters: demography, knowledge, attitude, and practices. Four questions designed for demographic characteristics (e.g., sex, age, marital status, and educational level), and one question asking about the source of

information of COVID-19 knowledge (Table 1). The knowledge section include 57 questions developed by the authors, according to the guidelines for clinical and community management of COVID-19 by of the World Health Organization 'WHO', for COVID-19 knowledge ("Q & A on coronaviruses (COVID-19)" 2020; "Novel coronavirus (COVID-19)" 2020). In order to have better assessment of overall knowledge regarding COVID-19, questions covering disease source, categories that at high risk of infection, clinical symptoms, complications of the disease, incubation period, mode of transmission, clinical diagnosis, preventive actions, and vaccines have been asked. These questions were answered on a true/false basis, with an additional 'I don't know' option. Practices towards COVID-19 determined by 37 questions regarding their preventive measures against infection. These questions were answered on a true/false basis, in addition to 'not following' option. Attitude towards COVID-19 measured by one question asking about whether they have confidence that the disease could be finally cured (Table 2). The questionnaire required 30 minutes for participants to complete.

Data analyses were conducted using SPSS 'statistical package for social science', version 18.0 and version 22.0 (SPSS Inc, Chicago IL). Initially, all information gathered via questionnaire coded into variables. Normality of the data tested using Kolmogorov-Smirnov test. Descriptive statistics, such as percentages, mean scores, and standard deviations were calculated. Spearman's correlation is used to assess the relationship between mean knowledge, practice, and attitude scores.

In order to evaluate knowledge level and various practices towards a disease it is important to conclude where the study population stands in terms of how good or bad knowledge or practices were. Therefore, each correct answer in relation to the knowledge of COVID-19 assigned 1 point while an incorrect/don't know answer assigned 0 point. This gave a total knowledge score ranged from 0 (with no correct answers) to 57 (for all correct answers). The scores in the knowledge domain are then categorized as poor (0 - 36) and good (37 - 57) knowledge. Each correct practice assigned 1 point while an incorrect/not-following practice assigned 0 point. This gave a total practice score ranged from 0 (with no correct answers) to 37 (for all correct answers). The scores in the practice domain then categorized as appropriate (0 - 25) or inappropriate (26 - 37) practices.

Comparing score of each domain (dependent variable) with various demographic characteristics (independent variables) performed using Mann-Whitney U test, Kruskal Wallis H test and Chi-square test. Using Chi-square test, each domain scores of the participants were categorized into 2 categories: good/poor, appropriate/inappropriate and positive/negative. The difference of estimated variables in all analyses were considered statistically significant if p-value < 0.05.

The study adopted two behavioral theories relevant to changing behaviors in order to identify the determinants of health behavior as well as causal mechanisms responsible for improved knowledge, attitude, and preventive practices. The health belief model is one of the oldest theories seeking to explain human

health behavior. It suggests that preventive behavior of an individual resulted from individual believes that he/she is vulnerable to disease, that the after-effects of the disease are serious, that the prescribed actions to deal with the problem is helpful, and that actions have more advantages than costs (Glanz, Rimer, and Lewis 2002). Social cognitive theory states that health behavior is influenced by environmental influence, social norms, cues, and self-efficacy. The theory suggests that health can be promoted by modifying the social environment and encouraging skills that permit individuals to make healthy behavioral changes (Baranowski , Perry, and Parcel 2002).

2- Results

A total of 350 participants completed the survey questionnaire. The majority of them (72.9%) were females, about half of them (54.9%) were married, 96.8% held the bachelor's degree or above. Other demographic characteristics and the sources of COVID-19 information are shown in Table1.

Frequencies and percentages of correct answers of the questionnaire questions on COVID-19 were given in Table 2. The mean COVID-19 knowledge score was 38.7 (SD: 5.2, range 0-57), suggesting an overall 67.9 % (38.7/57*100) correct rate on knowledge test. In the knowledge section, the majority of participants had aware about the mode of disease transmission, incubation period, lack of vaccine (92.6%, 84.9%, and 81.4%, respectively). About two-thirds of participants (68% and 74.3%) had known that the main source of COVID-19 virus and categories vulnerable to infection respectively. However, only

15.7% of participants had known that elderly people and those suffering from chronic diseases are more vulnerable to develop serious illness than others are.

As for incorrect routes of transmission of COVID-19, the majority of participants (84%, 85.7%, and 88%) had known that the disease could not be transmitted through feces or blood of an infected person or through mosquito bites respectively. However, about half of participants (56%, 50%) had believed that the disease could be transmitted through banknotes and metal coins or air respectively. About one-third of participants (28.9%) had also believed that COVID-19 could be transmitted through animals and pets.

Most participants had known the main clinical symptoms of the disease including fever, dry cough, difficulty breathing, and tiredness (79.4%, 54%, 58.6%, 37.4% respectively), as well as the less common one including sore throat, nasal congestion, and diarrhea (39,7%, 20.6%, 12.9% respectively). However, about half of the participants (46%) believed that COVID-19 symptoms are the same as seasonal flu one. Moreover, about two-thirds of the participants had aware of disease complications except for kidney failure (16.9% only). As for clinical diagnosis, about half of participants (51.7%) had informed of nasal or throat swap analysis.

The majority of the participants were familiar with most preventive actions recommended by WHO against COVID-19. These include to avoid close contacts with people who show flu-like symptoms; avoid kissing and shaking hands; avoid touching nose, eyes, and mouth; avoid crowded poorly ventilated places;

and regular washing hands with soap and water or cleaning it with alcohol-based hand sanitizer (85.7%, 87.4%,82%, 93.1%, 94%, respectively). However, about two-thirds of the participants (74.3%) had believed that wearing medical masks is essential by the general public as preventive action against disease.

Most participants also agreed that actions related to maintaining personal hygiene and person's immunity against virus are good preventive measures against COVID-19 (see Table 2). However, only 40% and 36% of participants had known that avoid direct unprotected contact with live farm animals; and avoid consuming raw or undercooked animal products are important protective actions respectively.

As for the myths about COVID-19, the majority of participants agreed that actions like using children's urine, hand dryer, using ultraviolet lamp as well as cold/low temperatures are not effective preventive actions against COVID-19 (95.4%, 86.6%, 81.7%, and 94.3%, respectively). While, about one-quarter of participants (39.7%) had believed that high temperatures would kill the virus.

The majority of participants had also understand that behaviors like taking antibiotics, putting natural oils on the face, and spraying alcohol or chlorine all over the body are not effective preventive actions against COVID-19 (80.9%, 96%, and 87.7%, respectively). However, about one-third of the participants (31.7%) had thought that regular rinsing nose with saline solution would prevent infection; and about one-quarter of the participants (38.6%) had viewed that frequent consumption of garlic will protect from infection.

The mean COVID-19 practice score was 27.7 (SD: 4.6, range: 0-37), suggesting an overall 74.5% (27.6/37*100) correct practices. The majority of the participants (>90%) had recently followed several preventive actions recommended by WHO against COVID-19. Most participants had kept a distance between them and who is coughing or sneezing; had avoided kissing and shaking hands; had avoided touching nose, eyes, and mouth; had avoided crowded poorly ventilated places; and had regularly washed their hands with soap and water or cleaning it with alcohol-based hand sanitizer (82%, 75.7%, 76%, 85.7%, and 92.9% respectively). While, less than half of the participants avoided direct unprotected contact with live farm animals; and had worn medical masks in the public places (42%; 41.4%, respectively). Most participants had also followed other actions that would maintain personal hygiene and person's immunity (Table 2). While only about one third of the participants (34.9%) had avoided consuming raw or undercooked animal products.

The majority of the participants had not used children's urine, hand dryer, or ultraviolet lamp to prevent infection (96.3%, 88.9%, and 92% respectively). Although the majority (94.6%) is not situated in cold places, about one-third of participants (27.4%) lives in sunny places recently based on inability of the virus to tolerate high temperatures. The majority of the participants had also not taken antibiotics, or put natural oils on the face or sprayed alcohol/chlorine all over the body to kill virus (83.4%; 99.1%; 91.1%, respectively). While, less than one third of the participants had rinsed nose with saline solution frequently, and

consumed garlic based on its antibiotic properties (22.9% and 29.1%, respectively).

In case of infection with COVID-19, 96.5% of the participants will follow different preventive actions recommended by WHO in such condition ranging from staying home in a separate room when symptoms were mild to calling the hotline when symptoms become severe. Virtually all participants (95.4%) had agreed that COVID-19 disease could be finally cured, while 4.6% had no such attitude.

Using spearman's analysis, a significant positive correlation was observed between the mean knowledge and practice scores (r= 0.506, p< 0.001), between mean knowledge and attitude scores (r= 0.183, p< 0.001), and between the practice and attitude scores (r= 0.191, p< 0.001).

Mann-Whitney U and Kruskal Wallis H tests showed that Knowledge score are significantly different across sex, age, marital status, and educational levels, while practice score significantly differed across sex, and marital status (Table 3). On the other hand, the attitude score is not significantly different across categories of sex, age, marital status, or educational levels. Females and married people have significantly higher knowledge and practice mean scores than other categories. The age group (31-45) and people held master degree/above educational level hassignificantly higher knowledge mean scores than other categories.

Using Chi-square, females have significantly good knowledge and doing appropriate preventive practices against COVID-19 than males. The age group (31-45) 'middle aged

adults' has significantly good knowledge than other age categories. Married people have significantly good knowledge and doing appropriate preventive practices than other marital status. Master degree or above educational level has significantly good knowledge than other levels (Table 4).

3- Discussion

COVID-19 is a serious infectious disease declared by WHO as global pandemic. Its prevention and control is a major public health concern currently prioritized by the governments. The effective continuous communication with essential, accurate, updated and sufficient information regarding COVID-19 will help in controlling the outbreak. WHO in its meeting held at February 11-12-2020 improved the knowledge regarding COVID-19 particularly with respect to care and diagnosis at the community level, and optimized the use of protective measures in health care and community settings (WHO, 2020 February 14).

The knowledge, attitude and practices toward COVID-19 had evaluated in different settings (Wolf et. al. 2020; Srichan et al. 2020; Zhong et. al. 2020; Hospital et. al. 2020). However, no data have been published assessed knowledge, attitude, and practices toward COVID-19 among Egyptians at the early period of the outbreak and interpreted it within socio-cultural context. Therefore, there is an urgent need to do this at that critical period based on gender, age, marital status, and educational level. Secondly, to categorize and correlate knowledge, attitude, and practices of the study population.

The current study, in which females and well-educated categories predominate, showed an overall correct rate on the knowledge and practice questionnaire (67.9 %, 74.5% respectively). This indicates that most respondents had relatively good knowledge and performed relatively appropriate preventive practices against COVID-19. However, they had defect in some aspects of knowledge about COVID-19 and in some preventive actions against COVID-19. This suggest that media campaign should focus on these defects in their knowledge, which certainly will be reflected on their preventive actions and hence on disease control.

The defect in knowledge was obvious in; categories more vulnerable to develop serious illness (15.7%), clinical diagnosis (51.7%), as well as clinical symptoms where 46% of participants recognized COVID-19 symptoms the same as seasonal flu symptoms. Some preventive actions were also unknown to all participants and hence reflected on their practices (i.e, unprotected contact with live farm animals and consumption of raw/undercooked animal products).

Believing that disease could be transmitted through banknotes/metal coins, air, or pets was by 56%, 50%, and 28.9% of the participants respectively. According to the WHO guidelines available at the time of the questionnaire survey, the risk of infection through touching coins, banknotes, or credit cards is very weak if the rules of hand hygiene are properly followed, and there were still no evidences supporting the spread of virus through air or companion animals/pets. This is because the virus is a respiratory one, transmitted mainly through

respiratory droplets expelled from an infected person through sneezing or coughing and these droplets are heavy in weight and cannot be transmitted through air. There was also still no evidence to support that companion animals/pets can be infected with COVID-19 (“Novel coronavirus (COVID-19)” 2020).

Most participants (74.3%) had believed that wearing medical masks is essential by the general public as preventive action against disease and 41.4% of the participants had recently worn medical masks in public places. According to WHO guidelines at the time of the questionnaire survey wearing medical masks only recommended if the person has respiratory symptoms, has suspected COVID-19 infection with mild symptoms, or is caring for someone with suspected COVID-19 infection to avoid unnecessary wastage of precious resources and mis-use of masks.

About one-quarter of the participants (39.7%) had believed that high temperatures would kill the virus and 27.4% of the participants recently existed in sunny/hot climate places. The fact that sun is the primary germicide in the environment is embedded in the general knowledge of Egyptians. The sun, more specifically solar UV radiation (UV) acts as the principle natural virucide in the environment (Lytle and Sagripanti 2005). However, the ability of the sun and high temperature to kill the virus was still unconfirmed.

Believing in and practicing regular rinsing nose with saline solution by 31.7% and 22.9% of the participants respectively, may be attributed to the knowledge of the Egyptians about the general role of saline solution in treating infections. Saline nasal

irrigation, a therapy with roots in Ayurvedic medicine that bathes the nasal cavity with a liquid saline. It has been known as adjunctive therapy for upper respiratory conditions, including acute and chronic rhinosinusitis, viral upper respiratory infection and allergic rhinitis (Rabago and Zgierska 2009). Rinsing the mouth with sodium chloride solution is also believed to promote healthy gum and improve oral ulcer healing (Huynh et. al. 2016).

Similarly, believing in and practicing frequent consumption of garlic to protect from COVID-19 infection by 38.6% and 29.1% of the participants respectively perhaps attributable to the knowledge of the Egyptians about the antibiotic properties of garlic. Garlic was an important healing agent in ancient Egypt as it still is to the modern Egyptians and to most of the peoples in the Mediterranean area. Egyptians thought garlic and onions aided endurance, and consumed large quantities of them since ancient time. Raw garlic was routinely given to asthmatics and to those suffering with bronchial-pulmonary complaints (Aboelsoud 2010).

Based on difficulty of measuring attitudes and substantial risk of falsely generalizing the opinions and attitudes of a particular group (Hausmann-Muela et al. 2003), in addition to, the very limited time for developing the questionnaire, the current study asked only one attitude question. The vast majority of the participants (95.4%) held an optimistic attitude towards the COVID-19 in respect of disease recovery. Egyptian population is a religious population and faith provide them a control feeling towards hard situations such as diseases. Religious beliefs seem to maximize the capacity to coping with

negative events giving the feeling that everything is going to be all right and God will provide them with protection (Monico 2012). Their positive attitude towards COVID-19 enhances their confidence in winning the battle against virus leading them to cope with this serious disease.

Despite their positive attitude towards disease, most participants took several precautionary actions against COVID-19. According to the health belief model, if an individual's susceptibility of suffering from a disease is high, it would result in adoption of healthy behavior (Hayden 2014). The participant's good knowledge (92.6%) regarding the high infectivity of the COVID-19 virus as virus easily transmitted between people via invisible respiratory droplets leading them to took the disease as serious one that may cause death and hence performed appropriate preventive practices.

The significant positive correlation between knowledge, practice and attitude scores reveal that good knowledge about COVID-19 directly associated with correct preventive practices against disease as well as positive attitudes towards it. Nevertheless, despite knowledge is a key component in promoting self-care, knowledge alone still cannot result in complete appropriate preventive behaviors. Existing beliefs have the potential of influencing their health seeking behavior, which is consistent with social cognitive theory. The inappropriate preventive actions of some participants against COVID-19 comes from their knowledge about the power of sun as natural germicide, and from their conviction of alternative medicine (i.e., rinsing nose with saline solution, and consumption of garlic).

The resulted association between some demographic factors and the knowledge, attitude and practice will be useful for the public health policy-makers to recognize target populations for COVID-19 prevention. Females were more concerned about suffering from COVID-19 disease than men. The significantly greater knowledge about COVID-19 could be attributed to the normal role of women as the main caretakers of the household and hence they play critical role with regard to families' hygiene and health behavior. Women are more interested in and more active seekers of health-related information, and paid more attention to potential worldwide pandemics than men are. Women are more attentive as to how the goods they purchase in everyday life affect their health than men did (EK 2015). Women also value the enjoyment of internet health information searching to a higher degree than men do (Bidmon and Terlutter 2015). Similarly, the significantly appropriate preventive practices against COVID-19 of females compared to males may be owed to the more likely engagement of men in risk behaviors than women do as suggested earlier in literature (Pawlowski et. al. 2008).

Parenthood as an important trigger for growing health awareness and protective health behaviors (EK 2015) could explain the significantly good knowledge about COVID-19 and appropriate preventive practices of married people than other marital status. The result is consistent with Asfaw et. al. (2018) studies in which divorced and widowed participants had low health-seeking behavior compared to the married one. Being married is predictive of better health status, while unmarried

individuals may engage in riskier health-related behaviors (Coombs 1991).

The serious situation of the epidemic, in addition to, the overwhelming news and reports on this public health emergency led the participants to learn knowledge of this infectious disease from various channels of information. Social medial (75.7%) followed by official website of WHO and/or ministry of Health (47.1%) were the most preferred channels of information to participants. This is important for the Egyptian government to know the great dependence of Egyptian people on social media and consider a variety of channel to update knowledge about disease.

It should be noted that the relatively good knowledge of the participants about COVID-19 may be overestimated attributable to sample characteristics (i.e, over-representative of women (72.8%) and well-educated people (96.8% held bachelor's degree/above)). The study findings, therefore, can only be generalized to well- educated Egyptians, particularly women. The current study tried to avoid limitations of KAP survey, paying more attention to interpretation and taking account of the research context.

Conclusion

The well-educated Egyptians, particularly women were relatively knowledgeable about the disease, had an optimistic attitude towards disease and most of them had taken adequate preventive measures against COVID-19. More studies investigating knowledge of males and low educated/non-literate categories towards COVID-19 and analyzing practices that can

serve as a risk factor for future development of COVID-19 disease are recommended. Assessing the KAP towards COVID-19 among Egyptians at later periods of disease outbreak is also recommended to see if their knowledge increased and their preventive practices improved or not.

Declaration of interest:

- The authors declare that they have no conflict of interest.
- Respondent's anonymity and confidentiality were ensured. The submission of the answered survey was considered as consent to participate in the survey.

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Appendices

Table 1. Baseline characteristics of the participants [n (%)].

Characteristics	**Male (N=95)**	**Female (N=255)**	**Total (350)**
Age (years)			
< 18	1 (1.05)	2 (0.78)	3 (0.9)
18 - 30	41 (43.2)	105 (41.2)	146 (41.7)
31 - 45	38 (40.0)	125 (49.02)	163 (46.6)
≥ 46	15 (15.8)	23 (9.02)	38 (10.9)
Marital status			
Single	49 (51.6)	92 (36.1)	141 (40.3)
Married	46 (48.4)	146 (57.3)	192 (54.9)
Divorced	-	12 (4.7)	12 (3.4)
Widower	-	5 (1.9)	5 (1.4)
Highest level of Education attained			
Preparatory education	-	1 (0.4)	1 (0.3)
Secondary education	5 (5.3)	5 (1.9)	10 (2.9)
Bachelor's degree	58 (61.1)	116 (45.5)	174 (49.7)
Master degree or above	32 (33.7)	133 (52.2)	165 (47.1)
Source of COVID-19 information:			
Television			145 (41.4)
Social media			265 (75.7)
Newspapers and magazines			47 (13.4)
Medical scientific reports			101 (28.9)
Websites of Egyptian health Ministry and/or World Health Organization			165 (47.1)
Others			6 (1.7)

Table 2. Frequency of correct answers of the questionnaire of knowledge and practices towards COVID-19

Questions	Number (% of the total sample)
Knowledge	
K1. The main source of COVID-19 is from animals, then transmitted to humans	238 (68.0)
K2. The mode of transmission of COVID-19 to humans is from an infected person to a healthy one	310 (88.6)
K3. Children are not only the age-category that are vulnerable to infection	325 (92.9)
K4. Adolescents are not only the age-category that are vulnerable to infection	329 (94.0)
K5. Young adults (18-34 years old) are not only the age-category that are vulnerable to infection	313 (89.4)
K6. Middle aged adults (35-50 years old) are not only the age-category that are vulnerable to infection	303 (86.6)
K7. Old adults (+50 years old) are not only the age-category that are vulnerable to infection	274 (78.3)
K8. All age-categories are vulnerable to infection	260 (74.3)
K9. Individuals that are more vulnerable to develop serious illness are elderly and those suffering from chronic diseases (e.g., high blood pressure, diabetes, heart diseases)	55 (15.7)
K10. The clinical symptoms of COVID-19 are different from the seasonal flu symptoms	161 (46.0)
K11. Dry cough is one of clinical symptoms of COVID-19	189 (54.0)
K12. Difficulty breathing is one of clinical symptoms of COVID-19	205 (58.6)
K13. Fever is one of clinical symptoms of COVID-19	278 (79.4)
K14. Severe headache is not one of clinical symptoms of COVID-19	242 (69.1)
K15. Runny nose is not one of clinical symptoms of COVID-19	245 (70.0)
K16. Sore throat is one of clinical symptoms of COVID-19	139 (39.7)
K17. Nasal congestion is one of clinical symptoms of COVID-19	72 (20.6)
K18. Tiredness is one of clinical symptoms of COVID-19	131 (37.4)
K19. Diarrhea is one of clinical symptoms of COVID-19	45 (12.9)

K20. Pneumonia is one of the complications of COVID-19	235 (67.1)
K21. Kidney failure is one of the complications of COVID-19	59 (16.9)
K22. Death is one of the complications of COVID-19	265 (75.7)
K23. Clinical symptoms of COVID-19 appear within several days after infection	297 (84.9)
K24. COVID-19 can be transmitted from a person to another through contact with respiratory droplets expelled by an infected individual during coughing or sneezing	324 (92.6)
K25. COVID-19 cannot be transmitted to a healthy person through urine or feces of an infected individual.	294 (84.0)
K26. COVID-19 cannot be transmitted to a healthy person through blood of an infected individual	300 (85.7%)
K27. COVID-19 cannot be transmitted from a person to another through banknotes and metal coins	196 (56.0)
K28. COVID-19 cannot be transmitted to humans through animals and pets	249 (71.1)
K29. COVID-19 cannot transmitted to humans through mosquito bites	308 (88.0)
K30. COVID-19 cannot transmitted to humans through air over long distances	175 (50.0)
K31. Clinical diagnosis of COVID-19 is via nasal or throat swab analysis	181 (51.7)
K32. Avoid close contact with people who show cold or flu-like symptoms is an effective preventive action against COVID-19	300 (85.7)
K33. Avoid using personal stuff of others (e.g., toothbrush, ect.) is an effective preventive action against COVID-19	270 (77.1)
K34. Avoid kissing and shaking hands is an effective preventive action against COVID-19	306 (87.4)
K35. Avoid touching nose, eyes, and mouth is an effective preventive action against COVID-19	287 (82.0)
K36. Avoid direct unprotected contact with live farm animals as well as surfaces in contact with animals is an effective preventive action against COVID-19	140 (40.0)
K37. Using children's urine in washing hands and cleaning surfaces is not an effective preventive action against COVID-19	334 (95.4%)
K38. Using hand dryers in killing COVID-19 virus is not an effective preventive action against COVID-19	303 (86.6)
K39. Using ultraviolet disinfection lamp in sterilizing hands is not an effective preventive action against COVID-19	286 (81.7)

K40. Avoiding crowded, poorly ventilated places is an effective preventive action against COVID-19	326 (93.1)
K41. Existing in cold climate places based on inability of virus to tolerate low temperatures is not an effective preventive action against COVID-19	330 (94.3)
K42. Existing in sunny and hot climate places based on inability of virus to tolerate high temperatures is not an effective preventive measure against COVID-19	211 (60.3)
K43. Good ventilation of rooms constantly is an effective preventive action against COVID-19	268 (76.6)
K44. Wearing medical mask is not recommended preventive action against COVID-19 by the general public	90 (25.7)
K45. Avoid touching surfaces in the public places and in public transportation is an effective preventive measure against COVID-19	268 (76.6)
K46. Taking antibiotics to prevent disease infection is not an effective preventive action against COVID-19	283 (80.9)
K47. Putting on natural oils (e.g., olive oil, seasam oil, aragan oil) on the face to block virus from entering the body is not an effective preventive action against COVID-19	336 (96.0)
K48. Spraying alcohol or chlorine all over the body to kill the virus is not an effective preventive action against COVID-19	307 (87.7)
K49. Regular rinsing the nose with saline solution to preventinfection is not an effective preventive action against COVID-19	239 (68.3)
K50. Avoid consuming raw or undercooked animal products (e.g., meat, egg, milk) is an effective preventive action against COVID-19	126 (36.0)
K51. Frequent consumption of garlic based on its antibiotic properties is not an effective preventive action against COVID-19	215 (61.4)
K52. Regular washing hands with soap and water, or clean hands with alcohol-based hand sanitizer is an effective preventive action against COVID-19	329 (94.0)
K53. Maintaining personal hygiene is an effective preventive action against COVID-19	269 (76.9)
K54. Eating healthy, balanced foods is an effective preventive action against COVID-19	212 (60.6)
K55. Performing physical Exercise is an effective preventive action against COVID-19	141 (40.3)
K56. Getting enough sleeping time is an effective preventive action against COVID-19	136 (38.9)
K57. There are no vaccines available to protect from COVID-19 infection	285 (81.4)
Recent Practices	
P1. You have followed any preventive actions against COVID-19 generally	332 (94.8)

P2. You have maintained a distance between yourself and anyone who is coughing or sneezing	287 (82.0)
P3. You have avoided using personal stuff of others (e.g., toothbrush, ect.)	276 (78.9)
P4. You have avoided kissing and shaking hands	265 (75.7)
P5. You have avoided touching nose, eyes, and mouth	266 (76.0)
P6. You have avoided direct unprotected contact with live farm animals as well as surfaces in contact with animals	147 (42.0)
P7. You have not used children's urine in washing your hands and cleaning surfaces	337 (96.3)
P8. You have not used hand dryers in killing COVID-19 virus	311 (88.9)
P9. You have not used ultraviolet disinfection lamp in sterilizing your hands	322 (92.0)
P10. You have followed any preventive actions against COVID-19 at the spatial level	331 (94.5)
P11. You have avoided crowded, poorly ventilated places	300 (85.7)
P12. You have not existed in cold climate places based on inability of virus to tolerate low temperatures	331 (94.6)
P13. You have not existed in sunny and hot climate places based on inability of virus to tolerate high temperatures	254 (72.6)
P14. You have ventilated your rooms constantly	243 (69.4)
P15. You have not worn medical mask in the public places as a preventive action against COVID-19	205 (58.6)
P16. You have avoided touching surfaces in the public places and in public transportation	207 (59.1)
P17. You have followed any preventive actions against COVID-19 at the consumption level	216 (61.7)
P18. You have not taken antibiotics to protect yourself from COVID-19 infection	292 (83.4)
P19. You have not put on natural oils (e.g., olive oil, seasam oil, aragan oil) on your face to block virus from entering your body	347 (99.1)
P20. You have not sprayed alcohol or chlorine all over your body to kill the virus	319 (91.1)
P21. You have not rinsed your nose with saline solution regularly to prevent COVID-19 infection	270 (77.1)
P22. You have avoided consuming raw or undercooked animal products (e.g., meat, egg, milk)	122 (34.9)
P23. You have not consumed garlic Frequently based on its antibiotic properties	284 (70.9)
P24. You have followed any preventive actions against COVID-19 at the personal level	341 (97.4)

P25. You have washed your hands with soap and water, or clean hands with alcohol-based hand sanitizer regularly	325 (92.9)
P26. You have maintained your personal hygiene	266 (76.0)
P27. You have eaten healthy, balanced food	187 (53.4)
P28. You have performed physical Exercise	102 (29.1)
P29. You have get enough sleeping time	138 (39.4)
P30. In case you infected, you will follow any preventive actions against COVID-19	338 (96.5)
P31. In case you infected, you will stay home in a separate room	244 (69.7)
P32. In case you infected, you will not share your personal stuff with others	242 (69.1)
P33. In case you infected, you will cover your nose and mouth with your bent elbow or a tissue when you cough or sneeze, and dispose of the used tissue immediately	251 (71.7)
P34. In case you infected, you will wash your hands with soap and water, or clean them with alcohol-based hand sanitizer regularly	242 (69.1)
P35. In case you infected, you will wear medical masks to protect others from infection	258 (73.7)
P36. In case you infected, you will seek medical intervention in case of increasing symptoms	276 (78.9)
P37. In case you infected, you will call the hotline and emergency services	245 (70.0)
Attitude	
A. In your opinion, COVID-19 disease would be finally cured	334 (95.4%)

Table 3. Mean score of knowledge, practices, attitude toward COVID-19 by demographic variables

Male	144.21	**0.000***	155.22	**0.022***	172.45	**0.341**
Female	187.16		183.05		176.64	
Age						
< 18	10.17		54.00		125.17	
18- 30	155.33		166.18		173.91	
31- 45	193.72	**0.000***	181.28	**0.052**	177.06	**0.087**
≥ 46	187.91		196.11		178.89	
Marital status						
Single	150.22		155.92		171.09	
Married	197.08		194.29		178.94	
Divorced	128.63	**0.000***	99.88	**0.000***	168.92	**0.224**
widower	172.10		187.50		183.50	
Highest level of Education attained						
Preparatory education	22.00		140.50		183.50	
Secondary education	62.85		111.65		148.50	
Bachelor's degree	164.88	**0.000***	177.43	**0.235**	171.43	**.008**
Master degree or above	194.46		177.55		181.38	

* *p*-value < 0.05 is statistically significant