



Risk Perceptions, Attitude and Preventive Practices toward COVID-19 During the First Wave, Egypt

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ABSTRACT

Background: COVID-19 disease is the latest emerging global pandemic. Applying preventive measures to contain this crisis are the most critical intervention. Since, perceived risk and attitude of populations determine their reaction to any problem. **Aim:** The current study aimed at determining risk perceptions, attitude and practices among a sample of Egyptian population during the first wave of COVID-19 pandemic. **Methods:** The study was cross-sectional using a nonrandom sample from Egyptian population. The participants were asked to fulfill a predesigned online questionnaire that was available on Google format from 16th to 24th March 2020. **Results:** The study included 1663 participants. More than half of them were at age group 21-30 years, 64.3% were females and 85.1% were students. Social media was the main source of their information. Most of participants had positive attitude and moderate degree of fear. Vast majority of the participants believed that they are susceptible to infection and 61% of them believed in seriousness of the disease. Less than one quarter (23.5%) of participants had acceptable practice level. The majority of the participants were believed in effectiveness of preventive precautions in varying degrees. Binary logistic regression identified that significant predictors of unacceptable practice level were male sex, not believing in susceptibility, seriousness of the disease, and effectiveness of preventive precautions. **Conclusion:** Obligatory wearing of masks was an important governmental necessary step. **Recommendations:** Risk perceptions and effective attitudes are essential factors for good adherence to preventive practices and control of COVID-19 crisis.

Keywords: COVID-19, Risk Perception, Attitude & Preventive Practices

Introduction

COVID-19 is the latest emerging infectious disease confronting the world. It was first discovered in December 2019, in Wuhan city, Hubei Province, China (Wu et al., 2020). COVID-19 is a respiratory disease, caused by SARS-Cov2 (n Cov) virus and rapidly transmitted among people directly via respiratory droplets and secretions and indirectly through contaminated surfaces. Its incubation period is on average 5-6 days and can range from 1-14 days (Shereen et al., 2020, Parry, 2020).

The most commonly reported symptoms in laboratory-confirmed cases were fever, followed by dry cough, fatigue, sputum production, dyspnea, sore throat, headache, myalgia or arthralgia, diarrhea and vomiting (Wang et al., 2020). COVID-19 disease is highly contagious and it has overcome geographical barriers achieving a remarkable proliferation and affection of large population causing most devastating effects globally (Guo et al., 2019).

So, on the 11th of March 2020, the world Health Organization (WHO) has declared COVID-19 as a

global pandemic where most of the countries worldwide have registered COVID-19 cases and deaths (WHO, 2020a, WHO, 2020b). At the beginning of June 2020, over 6.1 million cases and 165,000 deaths have been reported globally (WHO, 2020c).

In Egypt, the first confirmed case of COVID-19 was detected in 14 February 2020 in non-Egyptian (<https://medicalxpress.com/news/2020-02-egypt-case-virus.html>). From 3 January 2020 to 12 March 2021, there have been 189,639 confirmed cases of COVID-19 in Egypt with 11,214 deaths (<https://covid19.who.int/region/emero/country/eg>). In different countries, including Egypt, global action plans have been put in place and public health protocols including the required preventive precautions started to control the spread of the virus.

Many of these precautions were related to staying at home, proper hand washing, avoid shaking and kissing, social distancing, limiting public vehicle traffic, locking down public places that do not dispense essential services, and reducing traffic hours to certain daily hours (<https://plan-international.org/egypt/covid-19-response-egypt>).

To date no specific antiviral treatment has been recommended and the duration of effectiveness of different vaccines is questionable so, management of this crisis depends mainly on adherence to preventive precautions recommended by the WHO (WHO 2020d, Koo et al., 2020). The commitment with preventive precautions is greatly influenced by knowledge and attitudes of the population (Tachfouti et al., 2012). A recent study in Egypt showed good level of knowledge among its participants (Abdelhafiz et al., 2020). Although knowledge is important for awareness of any problem, risk perception is a key factor that would contribute to attitudes and change public behavior

during outbreaks of global epidemics to prevent their spread (Smith, 2006).

Significance of the study:

The novel corona virus respiratory disease 2019 (COVID-19) impressing the world since it started in Wuhan (China) in December 2019. It was escalating rapidly and spread globally so; the World Health

Organization (WHO) declared it as a new pandemic representing a devastating threat to livelihoods and human lives. Early during the first wave of the pandemic, there was no specific vaccine or antiviral therapy even the complete epidemiological nature of the disease was not known. So, the WHO declared global action plans and public health protocols to prevent infection with the virus and control spread of the disease in communities.

These protocols included preventive precautions which restrict movement of people and raised the slogan of stay at home all over the world, locking down educational institutions and public places except that dispensing essential community services, social distance, proper hand washing, avoid shaking hands and kissing and wearing masks in overcrowded places. Many of these precautions were not easily be followed as it interferes with social behaviors and norms but adherence of the population to them was essential to contain the crises.

Risk perception is a key factor that would contribute to attitudes and change public behavior during outbreaks of global epidemics to prevent their spread (Smith, 2006). So, identification of population practices and their degree of adherence to these preventive measures together with the underlying risk perceptions and attitude toward the problem were essential for policy makers in planning to overcome the crises

Aim of the study:

Identify risk perceptions, attitude and practices among a sample of Egyptian population during the first wave of COVID-19 pandemic.

Research questions:

- 1- What are the risk perceptions and attitude of Egyptians toward COVID-19 pandemic?
- 2- What are the preventive practices undertaken by Egyptians to prevent COVID-19 infection and control its spread in the community?
- 3- What is the degree of acceptability of these practices to prevent and control COVID-19 disease?

Subjects and methods:**Study design:**

A Cross sectional design, using a convenient nonrandom sampling technique.

Study setting:

Due to the current situations of the epidemic that need social distancing and inability of direct interview of study participants, online survey was applied.

Subjects:

All Egyptian population who were > 18 years of both sexes and had the ability of internet manipulation were recruited through the available social media (mainly Facebook and WhatsApp groups). The respondents who complete the questionnaire and submit it were 1663 Egyptians

Tools of data collection:

Four tools were used for data collection to fulfill the aim of the study:

First tool: sheet for identification of participant's personal characteristics source of information about COVID-19 prevention and control. It was developed by the researches and included: sociodemographic data mainly: age, sex, governorate residents, occupation and

main source of information about preventive precautions of COVID-19

Second, third and fourth tools were developed by the researchers for this study after reviewing related published literatures on previous viral epidemics (SARS or MERS disease) and available data on COVID-19 (Brug et al., 2004, Lau et al., 2005, Smith, 2006, Lau et al., 2007a, Lau et al., 2007b, Abbag et al., 2018)

Second tool: To identify risk perceptions of participants: A questionnaire was developed to determine the risk perceptions and included: belief in susceptibility to infection personally or family members, belief in seriousness of the disease, and belief in effectiveness of precaution procedures in prevention of the disease.

Third tool: to identify the attitudes and predictions toward COVID-19 infection in Egypt: It included questions related to level of worry about (afraid of) COVID infection of themselves and their family members and why, their predictions of the future of the disease in Egypt and its harmful effects.

Fourth tool: assessment sheet for preventive practices: This sheet was designed to assess the preventive practices implemented by the participants to avoid infection with COVID-19 and control its spread into the community and these were divided into three parts:

- **Part 1:** practices related to staying at home and avoiding crowded places (6 questions)
- **Part 2:** practices related to personal behaviour and hygienic measures (5 questions)
- **Part 3:** Practices related to increasing immunity (3 questions)

Scoring system:

At all practice questions participants select one of 3 possible answers (yes, to some degree and no). Yes was given 2 score, to some degree 1 score and no was scored zero with a total score ranged 0-28. The obtained overall total score of practice was then classified using mean and standard deviation (20.2 ± 4.37) as “unacceptable practice level” (score ≥ 16), “relatively acceptable practice level” (score of 17–23), and “acceptable practice level” (score of 24–28).

Validity and Reliability of the study tools:

For this purpose the tools of the study which were initially structured in English translated into Arabic and reviewed by three experts from Public Health and Community Medicine departments, Faculty of Medicine, Tanta University. These experts were selected to test the content and face validity of the questionnaires. All their notes were taken in consideration in final versions of the tools.

Reliability:

Cronbach's alpha coefficient method was used to test the reliability of data collection tools. The internal consistency were measured. Cronbach's alpha coefficient was 0.85 for identification of risk perception tool, $\alpha = 0.75$ for attitudes and predictions toward COVID-19 infection in Egypt and $\alpha = 0.80$ for preventive practices tool indicating a high reliability of the study tools.

Pilot Study:

After the development of the tools and before starting the actual collection of data a pilot sample of 15 individuals used to pretest the tools of the study. To identify obstacles that might be faced during data collection and to ascertain the applicability and clarity of the study tools. They were not included in the study and the needed modifications were performed.

Data collection:

An online self-reported Arabic questionnaire was developed by using Google format with a consent attached to it. Google format was preferred for its convenience, efficiency and high popularity especially in the current situations of the epidemic that need social distancing. The questionnaire link was published through Facebook and WhatsApp. The participants were asked to roll out the link of questionnaire to their contacts and as many people as possible. Respondents received a message on the purpose of the study and its benefits. Information privacy and confidentiality were ensured. After acceptance to participate they were asked to fill the questionnaire anonymously. The questionnaire was available on the web site from 16th to 24th March 2020.

Statistical analysis:

The collected data was encoded and statistically analyzed using statistical package for social sciences (SPSS) version 22 created by IBM, Chicago, Illinois, USA. Categorical data were presented as number and percentage. Chi-square test was used to find the association between different categories of practice and the independent variables. To get bivariate association and the independent variables; relatively acceptable and acceptable practice columns were merged in one column and odds ratio was used as a first order analysis followed by Binary logistic regression for independent variables that had significant association. The level of significance was P-value $< 5\%$ with 95% confidence interval to identify significant predictors of unacceptable practice.

Ethical considerations:

Participants were informed of the procedures and purpose of the study, and how they will benefit from the study. Data was collected anonymously and

voluntary with respect to privacy and confidentiality of participants and formal consent was obtained.

Results

The study included 1663 participants who completed the questionnaire. They were distributed along all governorates of the country as shown at the figure (1)

Table (1): Shows that more than half of participants (58.9%) at the age group 21-30 years, about two thirds of them (64.3%) were females, 85.1% of them were students and the majority was from Delta region of the Nile River. Their main sources of information and advice were social media (46.4%) followed by mass media and internet (44.6%).

Table (2) Points out that the majority of the participants thought that they were susceptible to infection either absolute (41.4%) or relatively (44.2%) and only 14.4% were not; nearly the same percentages thought that someone in their families could be infected. The main cause of fear of infection was that the disease may cause death (61%). Meanwhile, 11.3% of the participants were not afraid at all of infection. The vast majority of participants believed in effectiveness of precautions against COVID-19 to prevent spread of the disease in varying degrees (ranging from average 46.6% to very strong 10.3%)

As regards attitude towards COVID-19; **Table (3)** shows that about three quarters of the participants moderate degree of fear (those who expressed their attitude as just feel anxious and afraid to some degree (36.9% and 37.5% respectively). Also, more than half of the respondents expected that the disease either spread to small degree (31.6%) or it will be controlled (26.6%) and 41.8% of them predicted spread of the disease in Egypt to a large extent. Meanwhile, on enquiring about the predicted harmful effects due to

COVID-19 spread; More than one third of respondents (37.9 %) expressed psychological effect only, 40.2% of participants reported more than one harmful effect and 14.2% expressed that no harm would affect them.

On enquiring participant students about agreement and satisfaction with distance learning only about 25.4% of them were either agree or strongly agree, 60.4% were disagree and 14.3% were do not know.

Table(4): reveals the self-reported participants' practices to prevent infection by COVID- 19: As regards practices related to staying at home and avoiding crowded places; more than two thirds of the participants (69.7%) stayed at home as long as possible, 46.8% of their family members tried not to leave home to some degree .The majority of them (83.3%) did not go to their school, college or work, 74.7% of them avoided eating in restaurants or other carting places, 64.6% of them reduced public transport travel and 71.8% of participants avoided large gathering places. Meanwhile, **Practices related to personal behavior and hygienic measures table (4)** indicates that 84.8% of the participants were washing their hands frequently with soap and water /or using hand rubs for 20 second, only 46.8% of them were using antiseptics to sterilize surfaces and handles, 51.4% were trying to reduce touching nose and eyes with hands to some degree, 54.4% were avoiding shaking hands and kissing but only 17.1% were wearing protective masks currently in crowded places. On the other hand, **regarding participants' practices to increase their immunity,** about two thirds (reported that they drink enough water and liquids at least 2 liters/day, 60.8% were trying to eat balanced diet of differing kinds of foods in certain quantities and balanced proportions, and more than half of them (59.7%) got enough night sleeping hours at least 7-9 hours/day.

Figure (2) shows the frequency of practice levels of preventive precautions applied against COVID-19 by the studied participants. Only 23.5% had acceptable level, 58.4% had a relatively acceptable level and 18.1% of respondents had unacceptable practice level.

Table (5) shows factors affecting practice level of following preventive precautions against COVID-19 infection among the studied participants. There was significant association with high level of acceptability and female sex ($P<0.001$), belief in susceptibility to infection ($P<0.001$), belief in seriousness of the disease ($P<0.001$), belief in effectiveness of preventive measures ($P<0.001$) and expectation of presence of harmful effect ($P=0.012$).

Table (6) shows risk estimate of the factors associated with unacceptable practice of preventive precautions against COVID-19 infection among the studied participants : it revealed that male sex [Odds Ratio(OR) 1.632;95% confidence interval (CI) ,1.267-2.103, $p< 0.001$] , not believing in susceptibility to infection (OR: 2.307; 95% CI,1.673-3.144, $P<0.001$), not believing in seriousness of the disease(OR: 2.043; 95% CI: 1.568-2.663, $P<0.001$), not believing in effectiveness of preventive measures (OR: 3.359; 95% CI: 2.330-4.84, $P<0.001$) and didn't perceive harmful effect of the disease (OR: 1.632; 95% CI: 1.179-2.260, $P=0.003$).

By binary logistic regression **table (7)** points that male sex (AOR=1.421, 95% CI: 1.092- 1.857, $P=0.009$), not believing in susceptibility to infection (AOR=1.645, 95% CI: 1.174- 2.307 $P=0.004$), not believing in seriousness of the disease (AOR=1.568, 95% CI: 1.175- 2.093, $P=0.002$) and not believing in effectiveness of preventive precautions (AOR=3.04, 95% CI: 2.86- 4.043, $P<0.001$) were the significant predictors of poor score practice level. Didn't perceive

harmful effect of the disease (AOR: 1.374; 95% CI: 0.977-1.933, $p= 0.068$) was not significant.

Table (1): Socio-demographic characteristics and main source of information of the studied participants

Variables	Total	
	N=1663	%
Age:		
≤20 years	593	35.7
21-30 years	979	58.9
31-40 years	47	2.8
41-60 years	44	2.6
Sex:		
Male	593	35.7
Female	1070	64.3
Residence:		
Delta	1566	94.2
Greater Cairo	70	4.2
Upper Egypt	27	1.6
Occupation:		
Student	1415	85.1
Employee	168	10.1
Don't work	80	4.8
Source of information and advice:		
- Social media	771	46.4
- Internet and mass media	742	44.4
- TV only	80	4.8
- others	70	4.4

Table (2): Perceptions of susceptibility, seriousness of the disease, effectiveness of preventive precautions in control of COVID-19 and adherence to preventive measures among the studied participants

Variables	Total	
	N=1663	%
Do you think that you are susceptible to infection with corona (COVID-19)?		
Yes	689	41.4
To some degree	735	44.2
No	239	14.4
Do you think that someone in your family might get sick with Corona (COVID-19)?		
Yes	711	42.8
To some degree	737	44.3
No	215	12.9
Do you think that it is a serious disease?	188	11.3
- No		
- Yes		
Why?		
-May cause death	1015	61.0
- Its symptoms are serious	221	13.3
- Prevents me from performing my duties	194	11.7
-I suffer from a chronic disease	45	2.7
To what degree you may predict that precautions be able to prevent the disease:		
- Weak	140	8.4
- Average	775	46.6

Variables	Total	
	N=1663	%
- Strong	577	34.7
- Very strong	171	10.3
Do you believe that you follow precautions that are needed to protect you and prevent spread of COVID-19 disease?		
- Yes	821	49.4
- To some degree	750	45.1
- No	92	5.5

Table (3): Attitudes and expectations toward COVID-19 among the studied participants

Attitude and expectations	N=1663	%
How often do you get afraid of corona (COVID-19) infection?		
- I don't feel afraid at all	148	8.9
- I just feel anxious	614	36.9
- Afraid to some degree	624	37.5
- Very afraid	277	16.7
Do you predict that Corona (COVID-19) disease spread in Egypt to a large degree? (attitude)		
- Yes, it will spread to a large extent	695	41.8
- It will spread but to a small degree	525	31.6
- It will be controlled	443	26.6
What kind of harm could affect you by spread of Corona (COVID-19) disease?		
-Physical only	34	2.0
-Psychological only	630	37.9
-Economic only	94	5.7
-More than one harm	669	40.2
-There is no harm	236	14.2
For students (1415) Do you agree (satisfied) with distance learning:		
- Disagree	854	60.4
- Agree	263	18.6
- Strongly agree	96	6.8
- I don't Know	202	14.3

Table (4): Self-reported participants' practices to prevent infection by COVID-19

	Total (n=1663)					
	Yes		No		To some degree	
	No.	%	No.	%	No.	%
Practices related to staying at home and avoiding crowded places:						
1- stay at home as long as possible	1159	69.7	180	10.8	324	19.5
2- Family members families tries not to leave home as possible	706	42.5	178	10.7	779	46.8

	Total (n=1663)					
	Yes		No		To some degree	
	No.	%	No.	%	No.	%
3-Reducing public transport travel	1075	64.6	302	18.1	287	17.3
4-Not going to school, college or work	1385	83.3	140	8.4	138	8.3
5- Avoid large gathering places	1194	71.8	70	4.2	399	24.0
6-Avoid eating in restaurants or other carting places	1242	74.7	116	7.0	305	18.3
Practices related to personal behavior and hygienic measures						
1-Wash hands with soap and water frequently / or using hand rubs for 20 seconds	1410	84.8	20	1.2	233	14.0
2- Use antiseptics to sterilize surfaces and handles	778	46.8	362	21.8	523	31.4
3- Trying to reduce touching nose and eyes with hands	612	36.8	197	11.8	854	51.4
4-Avoid shaking hands and kissing	905	54.4	154	9.3	604	36.3
5-Wearing protective masks currently in crowded places	285	17.1	1090	65.6	288	17.3
Practices related to increasing immunity						
1- Be sure to drink enough water and liquids	1087	65.3	121	7.3	455	27.4
2- Trying to eat balanced diet	1011	60.8	462	27.8	190	11.4
3-Get enough night sleep (7-9 hours)	993	59.7	137	8.2	533	32.1
Total score mean ± SD	20.2± 4.37					

Table (5): Factors affecting practice level of following preventive precautions against COVID-19 infection among the studied participants

	Practice level			Chi-square test p- value
	Unacceptable (score ≥16) no=301 (18.1%)	relatively Acceptable (score 17-23) no=972 (58.4%)	Acceptable (score 24-28) no=390 (23.5%)	
Age/ year:				
≤ 20	105(17.7%)	349(58.9%)	139(23.4%)	X ² =4.292 P=0.637
21-30	186(19.0%)	563(57.5%)	230(23.5%)	
31-40	5 (10.6%)	32(68.1%)	10(21.3%)	
41-60	5 (11.4%)	28(63.6%)	11(25.0%)	
Sex				
Male	136(22.9%)	333 (56.2%)	124(20.9%)	X ² =15.268 P<001*
Female	165 (15.4%)	639 (59.7%)	266(24.9%)	
Residence				
Delta region	281 (17.9%)	917 (58.6%)	368(23.5%)	X ² =0.441 P=0.802
others	20 (20.6 %)	55 (56.7%)	22(22.7%)	
Occupation				
student	248(17.5%)	829(58.6%)	338(23.9%)	X ² =2.521 P=0.284
others	53(21.3%)	143(57.7%)	52(21.0%)	
Belief in susceptibility to infection				
Not susceptible	73(30.5%)	121 (50.6%)	45(18.8%)	X ² =29.345 P<001*
Susceptible	228(16.0%)	851 (59.8%)	345(24.2%)	

	Practice level			Chi-square test p- value
	Unacceptable (score ≥16) no=301 (18.1%)	relatively Acceptable (score 17-23) no=972 (58.4%)	Acceptable (score 24-28) no=390 (23.5%)	
Belief in seriousness of infection				
Not serious	114(26.7%)	219(51.3%)	94(22.0%)	X ² =29.012 P <0.001*
Serious	187(15.1%)	753 (60.9%)	296(23.6%)	
Belief in effectiveness of precautions				
Not effective	55(39.3%)	69 (49.3%)	16 (11.4%)	X ² =49.527 P <0.001*
Effective in various degrees	246 (16.2%)	903 (59.3%)	374(24.5%)	
Harmful effect:				
Absent	59(25.0%)	126 (53.5%)	51(21.6%)	X ² =8.837 P=0.012*
Present	242(17.0%)	846(59.2%)	339(23.8%)	

*significant

Table (6): Risk estimate of factors associated with poor practice of preventive precautions against COVID-19 infection among the participants

	Practice level		Chi-square	OR (95%CI)
	Unacceptable practice no=301 (18.1%)	Acceptable & relatively acceptable no=1362 (81.9%)	p- value	
Sex				
Male	136 (22.9%)	457 (77.1%)	X ² =14.531 P<001*	1.632(1.267-2.103)
Female	165 (15.4%)	905 (84.6%)		
Residence				
Delta region	281 (17.9%)	1285 (82.1%)	X ² =0.441 P=0.507	0.842(0.506-1.400)
others	20 (20.6 %)	77 (79.4%)		
Occupation				
student	248 (17.5%)	1167 (82.5%)	X ² =2.104 P=0.147	0.783(0.56-1.091)
others	53 (21.3%)	195 (78.7%)		
Belief in susceptibility to infection				
Not susceptible	73 (30.5%)	166 (69.5%)	X ² =29.157 P<001*	2.307(1.673-3.144)
Susceptible	228 (16.0%)	1196 (84.0%)		
Belief in seriousness of infection				
Not serious	114 (26.7%)	313 (73.3%)	X ² =28.651 P<001*	2.043(1.568-2.663)
Serious	187 (15.1%)	1049 (84.9%)		
Belief in effectiveness of precautions				
Not effective	55 (39.3%)	85 (60.7%)	X ² =46.287 P<001*	3.359(2.33-4.841)
Effective in various degrees	246 (16.2%)	1277 (93.8%)		
Harmful effect:				
Absent	59 (25.0%)	177 (75.0%)	X ² =8.834 P=0.003*	1.632(1.179-2.260)
Present	242 (17.0%)	1185 (83.0%)		

*significant

Table (7): Binary logistic regression for factors associated with unacceptable practice level of the studied participants

Factors associated with unacceptable practice level	Wald	p	Adjusted odds ratio (AOR)	95% CI Lower	Upper
Male sex	6.824	0.009*	1.424	1.092	1.857
Not believing in susceptibility to infection	8.347	0.004*	1.645	1.174	2.307
Not believing in seriousness of COVID-19 disease	9.317	0.002*	1.568	1.175	2.093
Not believing in harmful effect of the disease	3.323	0.068	1.374	0.977	1.933
Not believing in effectiveness of precautions against COVID-19	33.489	<0.001*	3.040	2.860	4.430

*significant

Figure 1: Geographical distribution of participants' study

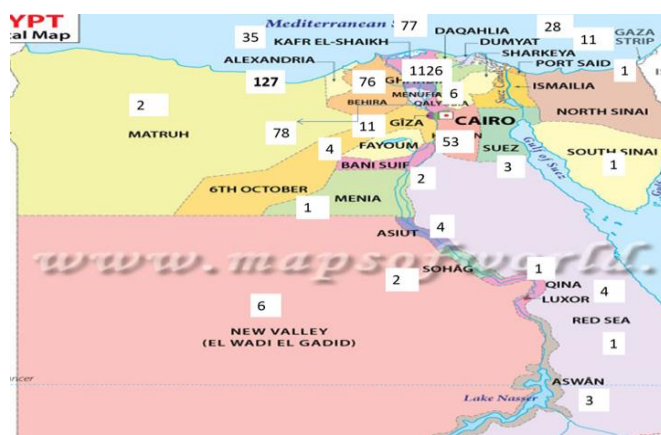
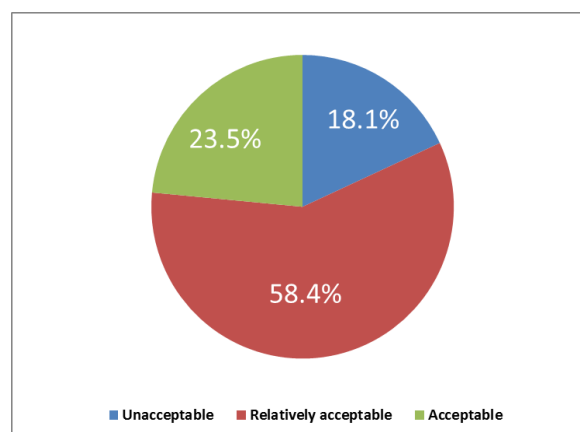


Figure (2): Frequency of practice levels of preventive precautions applied against COVID-19 by the studied participants



Discussion:

A rapidly infectious disease emerged in Wuhan city in China in December 2019 but since 11th March 2020 the WHO declared COVID-19 disease as a new pandemic so, all countries have imposed strict control measures to prevent massive spread and reduce mortality. To date the

degree of effectiveness of vaccines is questionable and no recommended specific antiviral treatment for COVID-19.

So, adherence to preventive precautions is mandatory to contain the crisis. Various degrees of adherence were reported among different populations, some show strict adherence as China and Saudi Arabia (Zhong et al., 2020, Bazaid et al., 2020) and others were not as in Bangladesh and Ethiopia (Ferdous et al., 2020, Bante et al., 2021).

Egypt is the most populous country in the Middle East and about 95% of the population lives along banks of the Nile river and its Delta, which lies north of Cairo (capital of Egypt); and along the Suez Canal. These regions are considered as one of the most densely populated regions in the world (The Central Agency for Public Mobilization and Statistics Website, 2020), so, adherence to preventive precautions is essential to contain the crisis in Egypt which needs a mitigation effort to reduce community spread and the overwhelming of the country's health system.

To get the required level of adherence, it is important to evaluate perception and attitude of the population so their behavior can be interpreted (Rogers et al., 1983) and the health policy makers can implement the required plans to contain the crisis. In the current study the majority of respondents were students, females, age group less than 30 years and from delta region of Egypt. This could be explained by the online nature of the survey.

Also, students' predominance and the less than 30 years age group were reported on an online based cross-sectional study carried out in Bangladesh (Ferdous et al., 2020). Besides, many studies reported female predominance (Roya et al., 2020, Azlan et al., 2020, Al-Hanawi et al., 2020). In nearly all previous studies (including Egypt) about COVID-19, the novel methods of communications; social media (commonly Facebook and

WhatsApp) were the main source of information, and the same was for the participants of this study.

Social media and internet attract youth and young adult (Sannusi et al., 2019). So, policy makers should pay great effort to reach this wide sector of the population which could affect other categories.

Understanding the people's perception of risk is important to ensure efficient health protection practices during virus outbreaks (Roya et al., 2020). In the present study, only 14.4% of respondents believed that they are not susceptible to infection with COVID-19 and the majority believed in their susceptibility either absolute (41.4%) or to some degree (44.2%) and nearly the same percentages for members of their families. Moreover, about three quarters believed in seriousness of the disease. Giving that, people make judgments based on their own perception of risk (Smith, 2006) together with frequent exposure to worldwide news about infection and deaths from social media and TV channels, our findings could be explained. Also, this was in consistence with a previous study carried out in Egypt (Abdelhafiz et al., 2020) and Venezuela (Zegarra-Valdivia et al., 2020).

On the other hand, the vast majority of participant at the current study believed in effectiveness of preventive precautions, and this was reflected on their attitude where about three quarters of them were just feel anxious or just worry.

A moderate degree of fear is good and could push individuals towards commitment with preventive precautions. Previous studies revealed that both reluctance (Zegarra-Valdivia et al., 2020) and sever fear and anxiety (Roya et al., 2020, Shigemura et al., 2020, Zipprich et al., 2020) were not good for mental health and compliance with preventive measures.

Moreover, the positive attitude of our participants reflected on their perception on adherence to the needed precautions to protected themselves from infection and

prevent the spread of the disease in the community, where the majority of them perceived their adherence as either satisfactory (49.4%) or relatively satisfactory (45.1%).

In the present study, more than half of participants were optimistic and predicted that, COVID-19 will spread either to a small degree or will be controlled. This means that most of participants in current study expected that this disease will be contained in Egypt. This was in line with the findings in previous studies carried out in, China, Malaysia and Saudi Arabia (Zhong et al., 2020, Azlan et al., 2020, Al-Hanawi et al., 2020). However, participants expected that spread of the infection will have a bad impact on their health due to its psychological, economic and physical harmful effects.

Although participants' students staying at home due to closure of their learning institutions only one quarter of them were satisfied of the distance e-learning more study is needed to evaluate this point.

Regarding self-reported participants' practices to prevent infection by COVID- 19: Practices related to staying at home and avoidance of crowded places; most of our respondents stayed at home , they were not going to their educational institutions, and avoided eating in restaurants or any other caterings including takeaways, confectionaries, and cafes.

Also they avoided crowded places, and reduced public transport travel. This may be due to the nature of the sample where most of respondents were students and females together with the early governmental control measures that lead to closure of the governmental and special educational institutions.

In our Egyptian community students spends long hours at university or educational institutions, they mostly eat outside homes in restaurants and some other caterings where food mostly delicious but unhealthy so, it was expected that when they stayed at home this was a good

chance for eating more healthful diets and drinking adequate amount of water at least 2 liters/day and this could increase their immunity.

Iddir et al., (2020) reported in their review that an optimal immune response depends on nutrition and an adequate diet in order to combat infection risk, particularly during the COVID-19 crisis. On the other hand, poor nutrient status is frequently associated with inflammation and oxidative stress, which in turn can impact the immune system (Iddir et al., 2020).

In previous studies washing hands, personal hygiene and clean environment were reported by high proportions of respondents (Azlan et al., 2020, Zegarra-Valdivia et al., 2020, Zipprich et al., 2020). In the meantime limited use of face masks was manifested among the Ethiopian and Peruvian populations (Zegarra-Valdivia et al., 2020, Bante et al., 2021) like Egyptians in the current study.

Defect in awareness of when, how, where and why to wear face masks may be the cause. Also, this was in agreement with the findings of a study carried out in Bangladesh where most of its participants showed reluctance on use facemasks (Ferdous et al., 2020). The condition was the reverse among Chinese people who had experience in SARS epidemic (Zhong et al., 2020).

Prather et al., (2015) reported that short sleep duration and poor sleep continuity have been implicated in the susceptibility to infectious illness (Prather et al., 2015) and results of our study showed that about half of participants didn't have enough sleeping hours (7-9 hours/day) which is important for increasing immunity. This may be due to spending long hours with internet and social media which is common among students nowadays.

On assessment of the overall total score practice of our participants the majority were had relatively satisfactory practice to most preventive precautions and the poor practice showed statistically significant

association with male sex, not believing in susceptibility, not believing in seriousness of the disease, not believing in effectiveness of preventive precautions and not expecting harmful effects due to spread of the disease.

On the other hand, with binary logistic regression, only harmful effect was insignificant while not believing in effectiveness of precautions showed marked weight of association. This could explain the relatively high level of compliance among our participants globally; female showed more compliance, a finding that may be of great importance as targeting of women in health education dissemination may ultimately yield improved implementation of preventive precautions among all members of the community.

Also, it was documented that lack of people's confidence in health national authorities and effectiveness of measures to deal with COVID-19 outbreak led to limited response of the population (Zegarra-Valdivia et al., 2020).

Strengths and Limitation:

The strength of this study lies on its large sample recruited from all governorates of Egypt during a critical period at the initial stage of the COVID-19 epidemic where the data were collected during the third week of March 2020 (from 16th to 24th March 2020) and few days after WHO declaration)

Limitations of the study focus mainly on type of the sample and method of data collection that were used with their consequences. Due to the limited time and urgency of the survey, the study used non-random sampling starting from students who had access to internet and social media. So, this study mostly represents the young educated population and could not be generalized to the whole Egyptians.

The study used self-reported questionnaire so it is possible that participants may have answered practice

questions positively based on what they perceive to be expected of them.

Conclusion:

- Obligatory wearing of masks was an important governmental necessary step and to improve population reaction to control COVID-19. Risk perceptions and effective attitudes are important for adherence to preventive practices and control of COVID-19 crises. Students' satisfaction with distance learning needs more investigation.

-A more systematic, inclusive sampling method is recommended to improve representation and generalizability of the findings and assess the degree of adherence to preventive procedures among the general population in Egypt.

Declarations:

Ethics and consent to participate:

“Ethical approval: “All procedures performed in this study were in accordance with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Also, it was in accordance with the ethical standards of the Ethical Committee of Scientific Research of Faculty of Medicine, Tanta University, Federal Wide Assurance (FWA 00022834), IRB 0010038) and approved (reference number 34086)”

Informed consent:

“Informed consent was obtained from all individual participants included in the study. The participants were told about the aim of the study, and they were informed that the data would be used for scientific purposes only. They were also given the right to refuse or participate in the study. Submission of the questionnaire after completing it considered as more confirmation for acceptance of participation.

Availability of data and material:

- Available from the corresponding author on reasonable request

Competing interest:

The authors declare that they had no competing interests

Authors' contribution

Nadira Mansour Hassan: Conceptualization, writing methodology, work in the analysis and interpretation of data, writing original draft, editing.

Safynaz El Saied Shalaby: take part in designing the questionnaire, reviewing the final manuscript for important intellectual content, editing

Asmaa Ali EL-Feky: data collection, take part in data curation, writing original draft

Eman Ali Younis: take part in: data collection, take part in data curation, writing original draft

Asmaa Omar Atalla: data collection, take part in data curation and writing original draft

All authors read and approved the final manuscript to be published

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