

COVID-19 Misinformation Impact on the Level of Anxiety and Depression among University Students

Mona A. Hefny*, Mohamed A. Foda, Ghada M. Salem, and Hebatallah M Fawzy

Public Health and Community Medicine Department, Faculty of Medicine, Zagazig University, Zagazig, Egypt

***Corresponding author:**

Mona A. Hefny

E-mail address:

monahefni20@gmail.com

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ABSTRACT

Background: The global community faced a public health emergency in 2019 due to the spread of the coronavirus disease 2019 (COVID-19). This study aims to assess the level of COVID-19 misinformation and to determine its impact on the level of anxiety and depression amongst university students. **Methods:** A cross-sectional study was performed on 358 undergraduate university students, using an Arabic-structured self-administrated questionnaire. **Results:** We found that 20.4% of students had misinformation about COVID-19, while 30.2% had misinformation about COVID-19 vaccination. As for the sources of information, social media, family and friends and online news took the highest percentage by 86% ,84.9% and 83.2% respectively. 35.8% of students suffered a moderate degree of anxiety, nearly one quarter suffered from a severe degree of anxiety, 33.5% of the studied students experienced moderately severe depression, and moderate depression was detected among 20.9% of them. There was also a significant difference between medical and non-medical groups who had true information about COVID-19 and its vaccination regarding levels of anxiety and depression.

Conclusions: Misinformation was primarily communicated amongst medical as well as non-medical students via social media. There was a significant difference in the degrees of anxiety and depression between those with true information and those with misinformation, and in the medical and non-medical groups who had true information.

Keywords: COVID-19; Vaccine, misinformation; sources, anxiety; depression; Medical Students

INTRODUCTION

The World Health Organization (WHO) officially classified the COVID-19 coronavirus outbreak as a pandemic in March of 2020 [1]. A lot of social and anti-social behavior has been amplified by COVID-19, making it more than just a viral epidemic. One difficulty facing COVID-19 control efforts is the enormous misinformation that is spreading quickly [2]. The term infodemic is defined as “an overabundance of information—some accurate and some not—that makes it hard for people to find trustworthy sources and reliable guidance when they need it,” [2]. Contrary to

accurate reporting, misinformation can quickly arouse unpleasant feelings like anger and anxiety and persists in influencing public opinion even after corrected information has been made public [3].

Understanding the factors that lead individuals to trust and spread misleading (and true) information about COVID-19 is essential for creating treatments that will improve the accuracy of information shared online [4].

That’s why we performed this work to assess the level of COVID-19 misinformation and to determine its impact on the level of anxiety and depression amongst university students.

METHODS

A cross-sectional study was conducted on 358 students at Zagazig University during the period from October 2022 to July 2023. A multistage sampling method was used to conduct the study by dividing Zagazig University into practical and theoretical faculties', by random selection, two faculties were chosen (the practical one was Faculty of Medicine and the theoretical one was Faculty of Arts). Each faculty was divided into grades, third and fourth grades were our target. Each grade was then divided into subgroups. In Faculty of Arts, taking a subgroup from each grade as a cluster sample was done. However, in Faculty of Medicine, a random selection of certain number of medical students was taken from each subgroup in each grade.

As the number of the students during the academic year 2022-2023 at the third and fourth grades in the faculty of Arts was nearly 9000, and those in the Faculty of Medicine was nearly 3000, so, proportional allocation of 3:1 was considered during choosing the number of students from each faculty. So, 251 and 107 students from Faculty of Arts and Faculty of Medicine were chosen respectively.

Meeting the students was done during their academic day after finishing their tutorial classes. After clarifying the purpose of the study, filling out the questionnaire by each of them took almost 10-15 minutes. The whole data was collected in almost three weeks.

Sample size:

Finding that the mean score of anxiety symptoms among students exposed to misinformation is 3.6 ± 1.66 and among those not exposed to misinformation is 3.1 ± 1.58 [7], so, sample size was calculated by OpenEpi program to be 358 students at confidence level of 95% and power of test 80%.

Inclusion criteria:

University students in third and fourth grades from both sexes agreed to participate in the study and completed the questionnaire.

Exclusion criteria:

Students outside the selected faculties and grades, and those who refused to participate in the study.

Tools of the study:

The data were collected using an Arabic structured self-administrated questionnaire including five sections.

The first section: included questions to assess sociodemographic characteristics of the studied population using the Sawsan-Fahmy questionnaire (family members number, residence, sex, age, mother's and father's education, mother's and father's work as well as their income, use of computer, sewage and refuse disposal) [5].

The second section: consisted of three questions. The first one asked if you heard of information about COVID-19 or not. The second one asked where it was formal or in formal sources. The third question asked about the types of sources like social media, TV, official governmental websites such as the Ministry of Health website and health education posters [6].

The third section: consisted of three questions to assess knowledge about COVID-19 and myths around it [7].

The fourth section: consisted of three questions to assess knowledge about COVID-19 vaccines and their sources [8].

The fifth section: Section consisted of questions to detect the impact of misinformation on the level of anxiety and depression among the studied population. It included two sections, the first one used to detect anxiety using the Generalized Anxiety Disorder 7-item (GAD-7) Anxiety scale and the second one to detect depression using the Patient Health Questionnaire-9 (PHQ-9) Depression scale [9].

Ethical considerations:

An informed consent was taken from the studied participants. The ethics of the current research as put by the Institutional Research Board (IRB) of Zagazig Faculty of Medicine, Zagazig University were followed up thoroughly with IRB number 9594 on 15/6/2022. The Declaration of Helsinki, issued

by the World Medical Association to ensure the protection of people participating in medical research, was strictly followed during this study.

STATISTICAL ANALYSIS

The collected data were computerized and statistically analyzed using SPSS program (Statistical Package for Social Science) version 25. Qualitative data were presented as absolute frequencies (numbers) and relative frequencies (percentages). Quantitative data were expressed as mean (\bar{x}) \pm SD (Standard deviation) and range. Chi square test (χ^2) was used to test the significant difference in qualitative variables. The results considered significant when P value was less than 0.05 ($p < 0.05$), highly significant if it was less than 0.001 ($p < 0.001$) and non-significant (NS) when P value was equal or more than 0.05 ($p \geq 0.05$).

RESULTS

The average age of the 358 participants was 21 years old, and their ages ranged from 18 to 24. More than half of them were males (53.6%). More than two-thirds of them were non-medical students. As regards the grade, 55.3% of the students were in the fourth grade while the remaining 44.7% were in the third grade. We found that 57.8% of the individuals lived in rural areas, while the remaining 42.2% lived in urban areas (**Table 1**).

The highest frequency of both mother's and father's education was the university degree (43.3% for each). As regards work, it was found that 51.4% of the student's mothers and 93.9% of their fathers were working. More than half of them (54.5%) expressed that their families had enough income and 36% of them were saving from the income. According to the whole items collectively, it was found that most of the students were of high social class (77.7%), 21.8% were of moderate social class and only 0.5% of them were of low class (**Table 2**).

All students heard some pieces of information about COVID-19. More than three-quarters of them (82.1%) obtained the news via official sources; however, the remaining (17.9%) received the information from informal sources.

As for the sources of information, social media, family, and friends, took the highest percentage (92.7% and 87.7 respectively), followed by online news and television (84.1% and 82.1% respectively) while scientific journals recorded the lowest frequency as a source for COVID-19 information by (35.8%) (**Table 3**).

Nearly one-third of students suffered a moderate degree of anxiety (35.8%), and nearly one-quarter suffered from a severe degree of anxiety (26.8%), however mild and minimal degrees of anxiety were detected among (21.2% and 16.2% respectively) of the students (table 4). This study showed that nearly one-third of the studied students experienced moderately severe depression (33.5%). Moderate depression was detected among (20.9%) of them. Only (10.6%) of the students were suffering from minimal depression (**Table 4**).

Nearly 79.6 % of the students had true information about COVID-19, while the remaining students were misinformed. About 69.8% of the students had true information about COVID-19 vaccination, while the remaining 30.2% had misinformation about COVID-19 vaccination (**Table 5**).

The results showed that students who had been misinformed about COVID-19 were less likely to get their knowledge from reliable sources including schools, government websites like MOHP, social media, and friends and family. Also, Medical professionals and the general public differed significantly in their exposure to information on COVID-19 from various authoritative sources, including government websites like MOHP, health education posters, social media, and scientific journals (**Table 6**).

There was a statistically significant difference between both groups regarding high degrees of anxiety and depression which were found to be significantly higher among those with COVID-19 misinformation compared to without misinformation. There was also a significant difference between medical and non-medical groups without misinformation about COVID-19 as regards levels of anxiety and depression (**Table 7**).

Table (1): Basic characteristics of the studied group

Variable	Studied group (No=358)	
	No	%
Age (years) Mean ± SD Range	20.94± .927 (18 – 24)	
Sex Female Male	166 192	46.4 53.6
Faculty Medical Nonmedical	107 251	29.9 70.1
Grades: Grade 3 Grade 4	160 198	44.7 55.3
Residence: Urban Rural	151 207	42.2 57.8
GPA at the year of COVID-19 pandemic Failed Accepted Good Very good Excellent	10 25 96 146 81	2.8 7.0 26.8 40.8 22.6

Table (2): Socio-demographic Characteristics distribution of the studied group

Variable	Studied group (No=358)	
	No	%
Father education: Illiterate / read and write Literate certificate primary Preparatory Secondary University Postgraduate	8 7 16 31 85 155 56	2.2 2.0 4.5 8.7 23.7 43.3 15.6
Mother’s work Not working Working	174 184	48.6 51.4
Father’s work Not working Working	22 336	6.1 93.9
Computer use: Never Sometimes Lot of times	3 63 292	0.8 17.6 81.6
Per-capita income: Not enough + loan not repaid Not enough + big loan	3 4	0.8 1.1

Not enough + small loan	27	7.5
Enough only	195	54.5
Enough and saving	129	36.0
Family size:		
≥seven persons	42	11.7
Six persons	85	23.7
Five persons	121	33.8
Less than 5 persons	110	30.7
Crowding index		
<5	0	0.0
≥4	68	19
2and above	98	81
Sewage disposal:		
No	18	5
Yes	340	95
Refuse disposal:		
No	34	9.5
Yes	324	90.5
Social class:		
Low social class	2	0.5
Moderate social class	78	21.8
High social class	278	77.7

Table (3): Sources of information about COVID-19 among the studied group

Variable	Studied group (No=358)	
	No	%
Hearing health information about COVID-19: Yes	358	100
Sources of the information:		
Formal	294	82.1
Informal	64	17.9
Types of sources:		
Governmental websites as MOHP	290	81.0
Health education posters	196	54.7
Physicians	254	70.9
Scientific journals	128	35.8
Online news	301	84.1
Social media	332	92.7
Television	294	82.1
Print media	164	45.8
Family and friends	314	87.7

Table 4: Anxiety and depression level among the studied group

Variable	Studied group (No=358)	
	No	%
Anxiety score:		
Median	11	
Range	(0-21)	
Levels of anxiety:		
Minimal	58	16.2
Mild	76	21.2
Moderate	128	35.8
Severe	96	26.8

Variable	Studied group (No=358)	
Depression score: Median Range	14 (0-27)	
	No	%
Levels of depression: None or Minimal	38	10.6
Mild	68	19.1
Moderate	75	20.9
Moderately severe	120	33.5
Severe	57	15.9

Table 5: Frequency distribution of COVID-19 misinformation and COVID-19 vaccination misinformation among the studied group

Variable	Studied group (No=358)	
	No	%
True information about COVID-19 with misinformation about COVID-19	285 73	79.6 20.4
Variable	Studied group (No=358)	
	No	%
Without misinformation about COVID-19 vaccination With misinformation about COVID-19 vaccination	250 108	69.8 30.2

Table 6: Relationship between misinformation about COVID-19 and different types of sources of health information about COVID-19

Variable	Without misinformation (n=285)		With misinformation (n=73)		P-value
	Medical n=96(%)	Non-medical n=189(%)	Medical n=11(%)	Non-medical n=62(%)	
Types of sources					
Formal	90(93.8)	153(81)	11(100)	40(64.5)	0.002*
Informal	6(6.2)	36(19)	0(0.0)	22(35.5)	
p-value	0.004*		0.01*		
Governmental websites as MOHP:					
No	9(9.4)	36(19)	0(0)	23(37.1)	0.002*
Yes	87(90.6)	153(81)	11(100)	39(62.9)	
p-value	0.03*		0.01*		
Health education posters					
No	23(24)	110(58.2)	1(9.1)	28(45.2)	0.28
Yes	73(76)	79(41.8)	10(90.1)	34(54.8)	
p-value	<0.001*		0.02*		

Doctors No Yes	13(13.5) 83(86.5)	66(34.9) 123(65.1)	2(18.2) 9(81.8)	23(37.1) 39(62.9)	0.27
p-value	<0.001*		0.22		
Scientific journals No Yes	45(46.9) 51(53.1)	151(79.9) 38(20.1)	2 (18.2) 9(81.8)	32(51.6) 30(48.4)	<0.001*
p-value	<0.001*		0.04*		
Online news No Yes	4(4.2) 92(95.8)	42(22.2) 147(77.8)	2(18.2) 9(81.8)	9(14.5) 53(85.5)	0.82
P-value	<0.001*		0.75		
Social media No Yes	5(5.2) 91(94.8)	10(5.3) 179(94.7)	3(27.3) 8(72.7)	8(12.9) 54(87.1)	0.004*
p-value	0.98		0.22		
Television No Yes	16(16.7) 80(83.3)	38(20.1) 151(79.9)	3(27.3) 8(72.7)	7(11.3) 55(88.7)	0.29
P-value	0.49		0.16		
Print media No Yes	47(49) 49(51)	120(63.5) 69(36.5)	2(18.2) 9(81.8)	25(40.3) 37(59.7)	0.001*
P-value	0.02 *		0.16		
Family and friends No Yes	11(11.5) 85(88.5)	19(10.1) 170(89.9)	3(27.3) 8(72.7)	11(17.7) 51(82.3)	0.04*
P-value	0.72		0.46		

Table 7: Relationship between misinformation about COVID-19 and the level of anxiety and depression among the studied group

Variable	Without misinformation (n=285)		With misinformation (n=73)		P-value
	Medical n=96(%)	Non-medical n=189(%)	Medical n=11(%)	Non-medical n=62(%)	
Levels of anxiety: Minimal Mild Moderate severe	31(32.3) 13(13.5) 25(26.0) 27(28.1)	25(13.2) 53(28.0) 69(36.5) 42(22.2)	0(0.0) 2(18.2) 5(45.5) 4(36.4)	2(3.2) 8(12.9) 29(46.8) 23(37.1)	<0.001*
p-value	<0.001*		0.91		

Levels of depression:					
Minimal	20(20.8)	16(8.5)	0(0.0)	2(3.2)	0.002*
Mild	19(19.8)	43(22.8)	2(18.2)	4(6.5)	
Moderate	11(11.5)	47(24.9)	0(0.0)	17(27.4)	
Moderately severe	29(30.2)	58(30.7)	7(63.6)	26(41.9)	
severe	17(17.7)	25(13.2)	2(18.2)	13(21.0)	
p-value	0.006*		0.21		

DISCUSSION

The present study shows that all students heard health information about COVID-19. In terms of where people got their news, the most popular choices were social media, friends and family (92.7% and 87.7% respectively), followed by online news and television (84.1% and 82.1% respectively) while scientific journals recorded the lowest frequency as a source for COVID-19 information by (35.8%). This is because all participants were university students and they commonly used social media networks (**Table 3**). In agreement with the finding of Prasad et al. [10] they discovered that 99.6% of people involved were familiar with COVID-19. More than eight in ten people learned about COVID-19 from social media platforms and over three quarters from television. Friends, family, and WhatsApp were cited by 52.8% of respondents as the most common way they learned about COVID-19. More than a third of students cited health units/healthcare workers/outreach frontline employees as the origin of their information (34.2%). Leaders in the community were cited by 20% of respondents, and so was the radio (17%). Conversely, Baker et al. [11] found that the WHO was the most trusted information source (56.2%), followed by scientific papers (18.1%) and MoH briefings (15.2%)

The results showed that nearly (35.8%) suffered a moderate degree of anxiety, (26.8%) suffered from a severe degree of anxiety, however mild and minimal degrees of anxiety were detected among (21.2% and 16.2% respectively) of the students (Table 4). In contrast, the results of another study found that (1.24%) suffered a moderate degree of anxiety, and (0.3%) suffered from a severe degree of anxiety, however mild and minimal degrees of

anxiety were detected among (13.2%) of the students [12], while in Korea Lee et al. [7] mentioned that (18.6%) of participants expressed anxiety symptoms. May this difference is due to that level of anxiety is increased with times spent focusing on information about COVID-19 (Coronavirus Disease 2019), social media sites are a fertile environment for spreading rumors, especially those related to the Corona virus, due to the rapid circulation of "false information" and its wide sharing, without any attempt to verify or investigate the validity of that information. The dissemination of these rumors and misinformation through channels and websites helps in spreading anxiety among population.

The current study showed that nearly one third of the studied students experienced moderately severe depression (33.5%). Moderate depression was detected among (20.9%) of them. (Table 4). On the contrary Choi et al. [13] found that the prevalence rate of mild depression was 29%, 12.8% experienced moderate depression, 6.2% for moderately severe depression, and 0.8% for severe depression. It is reported that prolonged and frequent use of social media throughout the ongoing pandemic increases exposure to misinformation along with accurate information. The mixture of accurate and false information can inversely deliver conflicting messages and amplify uncertainties regarding COVID-19 and its perceived health risks. As shown, depression can also motivate people to seek out more information, which in turn can lead to increased depression, creating a vicious cycle.

From the present study, more than three-quarters of the students had almost the right information about COVID-19 (79.6%) while

the rest had COVID-19 misinformation (Table 5). This agrees with another study that reported that 82.5% of the students had good information about COVID-19 as in Baker et al. [11]. In contrast to our study, in Korea, only 58% of the studied group had good information about COVID-19 as reported by Lee et al. [7]. The high level of good information in our study is because of the efforts of state agencies and the various media outlets to deny these rumors and to show that they are not true.

We found that 30.2% had misinformation about COVID-19 vaccination (table 5), This agrees with results of another study that included medical field workers from Jordan University Hospital (JUH) which reported that 43.8% of the studied population had misinformation about COVID-19 vaccination [14]. This is because there is a problem with how social media sites are monitored for potentially dangerous content, and internal procedures did not successfully identify, limit, or remove critical comments as regarding COVID-19 vaccinations.

There was a significant difference between medical and non-medical groups those with and those without misinformation regarding receiving information about COVID-19 from formal sources, governmental websites such as MOHP, health education posters, social media, and scientific journals (Table 6), Another study that found comparable outcomes was done by Baker et al. [11] who stated that Misinformation about COVID-19 varied significantly between individuals with and without medical training, and between those who got their information from MoH briefings, healthcare workers, social media platforms, research journals, and the WHO.

The current study shows that there was a statistically significant difference between both groups regarding high degrees of anxiety and depression which were found to be significantly higher among those with COVID-19 misinformation compared to those without misinformation (Table 7) which is consistent with findings by Lee et al. [7], who reported that exposure to misinformation was strongly

linked to emotional discomfort, such as anxiety and depression.

There was also a significant difference between medical and non-medical groups those without misinformation about COVID-19 regarding levels of depression as well as anxiety (Table 7) This finding corresponds to that of Xie et al. [12] who reported that there were significant differences regarding comparing Medical and Non-Medical Students' anxiety as well as depression (The scores of medical students were lower than those of non-medical students). Therefore, understanding the nature of the infectious agent may play a significant role in mitigating the emotional toll of an epidemic. It's commonly held that medical students know more about epidemics than their college-aged peers. The current study found that when comparing medical and non-medical students, the former group had a lesser impact of events and lower levels of anxiety and depression. In contrast to our study, Xiong et al [15] stated that Despite that medical students showed a higher level of knowledge about COVID-19 than non-medical students, knowledge did not exert any significant effect on the mental health of University students.

The strength point of our study is up to our knowledge. It is considered the first work to be done at Zagazig University to assess the level of COVID-19 misinformation, and to determine its impact on the psychological status among university students.

One of the limitations of our study is that it was subjected to the memory bias of students and time effect which was a threat to the internal validity. The other one relied on self-reported data as the students reported their symptoms subjectively, and some other confounders may affect the psychological status of students and other than COVID-19 misinformation.

CONCLUSION AND RECOMMENDATION

Misinformation about COVID-19 was primarily communicated among medical and non-medical students mainly via social media. There was a significant difference in the degrees of anxiety

and depression between those with and those without misinformation, and between the medical and non-medical groups without misinformation about COVID-19 and COVID-19 vaccination.

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