Factors underlying denial of and disbelief in COVID-19

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ABSTRACT

Objective: To investigate factors that influence or promote disbelief and negative attitudes toward COVID-19. **Methods:** This was cross-sectional study involving 544 males and females ≥ 18 years of age in Greece between December of 2020 and January of 2021. All participants were informed about the purpose of the study, protection of anonymity, and volunteer participation. Participants completed an online anonymous 40-item questionnaire. Analysis of data included the identification of correlations and use of t-tests and ANOVA. **Results:** The level of knowledge regarding COVID-19 transmission routes, manifestations, and prevention was high in our sample. Women appeared to have a more positive attitude toward COVID-19 prevention and management than did men (p = 0.032 and p = 0.018, respectively). Younger people (18-30 years of age) seemed to deny the validity of scientific data and mass media reports about ways to deal with the pandemic more commonly than did those > 30 years of age (p = 0.003 and p = 0.001, respectively). People who resided in cities more commonly believed in scientific announcements than did those living in villages (p = 0.029). **Conclusions:** In order to minimize cases of denial of and disbelief in COVID-19 and to promote vaccination, a series of actions are required. Governments should implement a series of measures to contain the disease, taking into consideration the psychological and social aspects of those policies.

Keywords: Vaccination; COVID-19; Health knowledge, attitudes, practice.

INTRODUCTION

In December of 2019, several cases of lower respiratory tract infections of unknown cause were reported in the city of Wuhan, province of Hubei, China. On January 7, 2020, a new coronavirus strain was identified as the cause of these infections and received a temporary name: 2019-nCoV. The continuous rise in the number of new cases worldwide forced the WHO to announce the characterization of the disease as a pandemic about two months after the identification of the infectious strain.[1]

Recently, scientists have faced threatening pandemic situations caused by different strains of the Coronavirus family, which they have successfully managed to contain. Specifically, Middle East respiratory syndrome was first reported in Saudi Arabia in September of 2012, and, according to the WHO, 2,519 cases and 866 deaths were reported worldwide by January of 2020. Severe acute respiratory syndrome was first reported in Asia in February of 2003 and rapidly spread across 26 countries before it was contained after approximately four months. During this period, more than 8,000 people were ill and 774 died. Since 2004, no cases of this syndrome have been reported.[2]

From the beginning of the COVID-19 pandemic to this writing, an attitude of denial of and disbelief in the disease has been observed, along with extreme questioning of preventive measures, disease manifestations, and management of suspected and confirmed cases all over the world. According to the results of a global study,[3] 13% of Americans disbelieved that COVID-19 was real, the highest rates of disbelieving the disease being found in Turkey and Poland (22% of the population), in Egypt and Saudi Arabia (19%), followed by Nigeria and Greece (17%).

The analysis of factors and reasons behind the adoption of a negative attitude toward COVID-19 is a complicated and tedious task. Reasons that have driven people to deny or downplay the existence and progression of the pandemic are mostly related to psychological, personal, social, and political factors. The first phase of this phenomenon started with the publication of epidemiological data, creating a feeling of imminent threat. A portion of people took a denialist stance as an innate survival mechanism against future difficulties in order to cope with the overload of information and the constant bombardment with medical terminology.[4-6]

Another important parameter that contributes to the spiraling of this phenomenon is the obligatory use of personal protective equipment (PPE) and the restriction of personal and social activities. The introduction of preventive PPE caused feelings of restraint, distress, and anxiety which translated into disbelief, possible

violations of human rights, and outbursts of reactive behaviors. The mandatory use of PPE was exploited by many as an instrument of political opposition against government initiatives, resulting in an opportunity to promote political interests.[7,8]

Constant restrictions, long periods of social isolation, and consecutive large-scale pandemic waves caused the postponement or cancellation of important activities such as trips, excursions, athletic events, and celebrations, generating feelings of sorrow and indignation in the population, which in turn led people to downplay the disease and take a denialist viewpoint on the severity of the pandemic and the usefulness of restrictive measures.[9,10]

The aim of the present study was to investigate the factors that influence or promote disbelief and negative attitudes toward COVID-19.

METHODS

The present study had a cross-sectional design. The reason behind this choice was the credibility of the results produced, because this design is considered to be the most appropriate for collecting data from many participants. The study comprised a convenience sample of 544 adult participants (≥ 18 years of age). Initially, 600 participants expressed an interest in taking part of the study, yielding a response rate of 90.67%. Participants were initially informed about the purpose of the research, protection of anonymity, and volunteer participation. Then, the participants were asked to complete an online anonymous self-administered questionnaire. This study was conducted between December 1, 2020 and January 31, 2021.

In order to ensure the validity of the questionnaire content, relevant Greek and international literature was reviewed. After meticulous critical reading of the relevant literature, no measurement tools evaluating people's knowledge on and belief/disbelief in COVID-19 were found. As a result, we developed a questionnaire in Greek and pilot tested it with 15 people in order to assess the validity and reliability of the questionnaire.[11]

The internal consistency (reliability) of a questionnaire represents the extent to which subparts of the questionnaire measure the same characteristic. Reliability assessment is extremely useful because it evaluates the consistency of the questions and, by extension, that of the answers.

The validity of a questionnaire represents the extent to which the questionnaire measures what it was designed to measure. The measurements need to be relevant to the characteristics that the researcher wants to study. The different aspects of validity examined in our questionnaire were face validity and content validity.

The present study complied with national and institutional research ethics committee standards, as well as with the 1964 Helsinki Declaration and subsequent amendments or equivalent ethical standards. The study was designed and conducted in accordance with the ethical principles established by the University of Thessaly, Greece (no. 77 acceptance statement).

The final structure of the questionnaire included 8 questions on knowledge about the transmission, manifestations, and prevention of COVID-19; 10 questions on information sources; 10 questions on the trust in and acceptance of scientific data related to the disease; 10 questions on the influence of social environment on believing/disbelieving in the disease; and 10 questions on the attitudes and preferences regarding vaccination. Answers to the latter 30 questions were scored on a five-point Likert scale ranging from 1 (not at all/totally disagree) to 5 (absolutely/totally agree). Cronbach's alpha coefficient was 0.68, showing borderline internal consistency.

In the present study, descriptive and inferential statistics were employed. Descriptive variables were expressed as absolute and relative frequencies or as means and standard deviations. Inferential statistics were utilized considering the importance of the results; for that reason, independent tests were conducted together with parametric tests, since the results had a normal distribution. More specifically, the Student's t-test was applied for binary variables because larger samples are assumed to have normal distribution; for variables with three or more values, ANOVA was chosen in order to control for the impact of two or more independent variables on the dependent variable. Two-tailed statistical significance was set at $p \leq 0.05$. Data analysis was performed with the IBM SPSS Statistics software package, version 25.0 (IBM Corporation, Armonk, NY, USA).

RESULTS

The proportions of men and women in the sample were 17.8% and 82.0%, respectively. With regard to age distribution, 50.6% were in the > 30-year age group, whereas 49.4% were in the ≤ 30-year age group. The nationality of the majority of the participants was Greek (97.6%). Regarding the level of education, most participants were college undergraduates/graduates (43.0%); among these, 17.5% and 2.2% held a master's degree and a PhD degree, respectively. Most participants were employed (90.3%), and 39.0% reported working in the private sector. The unemployment rate was 9.7%. Regarding marital status, 30.7% were married, 65.1% were single, 3.3% were divorced, and 0.9% was widowed. Lastly, 82.4% lived in a city, 9.7% lived in a small town, and 7.9% lived in a village.

Regarding the knowledge of COVID-19, the overall proportion of correct answers was 89.1%. Specifically, questions on COVID-19 symptoms were correctly responded by 93.9% of the participants, as were those on, as follows: transmission routes, by 97.4%; clinical features of asymptomatic patients, by 97.6%; incubation period, by 93.6%; treatment, by 66.7%; prevention, by 68.2%; recognition of alarming symptoms, by 99.1%; and disease diagnosis, by

96.3%. A statistically significant difference was found regarding the question about whether there was a specific treatment for the disease: 68.6% of women and 57.7% of men correctly answered that there was no specific treatment. In addition, we noted that the higher the education level of the respondents was, the more likely they were to answer this question correctly, that is, there is no specific treatment. Regarding the question about the mean number of days between exposure to a confirmed COVID-19 case and symptom onset, we noticed a statistically significant correlation with age, since 96.3% of respondents > 30 years of age correctly answered that symptoms would start, on average, 5-6 days after a contact, compared with 3.7% of those ≤ 30 years of age, who answered 22-23 days after a contact. In the question about COVID-19 symptoms, "living in a city" or "living in a small town" correlated positively with the answer "weight loss is not one of the clinical signs of the disease" (in 94.6% and 96.2%, respectively). However, "living in a village" showed no correlation.

Table 1 shows statistically significant differences regarding opinions and attitudes toward COVID-19 between males and females. In general, women more often obtained information about the disease from mass media and more often believed in scientific announcements, although they believed that the guidelines for the treatment of and recovery from the disease were unclear. In addition, women more commonly followed protective recommendations during restrictive measures and were more concerned about side effects of vaccines. As for men, they were more prone to accepting data from scientific studies conducted abroad, because they considered them to be of greater validity.

Table 2 shows statistically significant differences regarding opinions and attitudes toward COVID-19 between the two age groups studied (18-30 years and > 30 years). In general, the participants in the > 30-year age group more frequently obtained information about the disease from mass media, supported the validity of published data, and believed that scientific studies were moving in the right direction toward the end of the pandemic. Furthermore, they more commonly followed protective recommendations during restrictive measures. As for those in the ≤ 30-year age group, they more often had negative opinions and attitudes toward information provided by mass media and scientific announcements, disregarding scientific studies conducted in Greece. They were more careless about following protective recommendations and restrictive measures, and their social environment more often influenced on their denial of and disbelief in the severity of COVID-19.

Regarding the level of education, we found that the higher that level is, the greater the variation in trust rates; people with tertiary education, except those with doctoral degrees, claimed that they trust the scientific community in relation to disease prevention guidelines, that they believe that scientific studies are moving in the right direction toward the end of the pandemic, that scientific announcements are greatly exaggerated, and that most of the scientific data cannot be implemented in Greece. They also comply with regulations and do not accept visitors or visit friends and relatives.

People who lived in a city or in a small town showed greater receptiveness toward scientific announcements by specialists regarding disease management when compared with people residing in a village. Conversely, people who lived in rural areas were more often influenced by their social environment regarding disease severity (Table 3).

DISCUSSION

The present study attempts to define factors that drive people within the community toward rejection of and disbelief in COVID-19. People's attitude toward health issues is related to their knowledge of the infectious

Table 1. Statistically significant differences between male (n = 97) and female (n = 446) participants regarding opinions and attitudes about COVID-19.

Parameter	Sex		p
	Male	Female	
Constant reference to and demonstration of protective measures by mass media has helped me protect myself from the disease.	2.24 ± 1.13	2.52 ± 1.16	0.032
I believe in scientific announcements of specialists regarding disease management.	3.52 ± 1.07	3.77 ± 0.93	0.018
Guidelines for the treatment of and recovery from the disease are unclear.	2.76 ± 0.94	3.10 ± 1.03	0.003
Scientific studies that are conducted abroad have greater validity than do those conducted by Greek scientists.	2.70 ± 1.25	2.40 ± 1.17	0.026
Due to the pandemic, I do not accept visitors or visit friends and relatives.	2.89 ± 1.28	3.26 ± 1.32	0.013
People I interact with take all necessary protective measures in order not to contract or transmit the disease.	3.56 ± 1.08	3.83 ± 0.86	0.007
I feel more comfortable when the people with whom I interact wear a mask.	3.34 ± 1.36	3.74 ± 1.20	0.004
I am worried about possible side effects of the vaccine.	3.25 ± 1.41	3.55 ± 1.37	0.05

agent, level of education, psychoemotional state, and sources of information, as well as the way facts are being disseminated and their previous personal experiences. In order to investigate the research hypothesis and the abovementioned reasons thoroughly, we examined the participants' knowledge, information sources, and attitudes related to COVID-19, as well as the influence of their social environment on their beliefs about COVID-19.

The level of knowledge on COVID-19 among the respondents was very high with 89.1% of them correctly answering questions on transmission routes, prevention, and clinical features of the disease. A similar study by Chen et al.[12] reported high rates of correct responses regarding disease symptoms such as cough (99.5%), fever (96.0%), droplet transmission (99.5%), airborne transmission (81.1%), and transmission through direct contact (92.3%). A high level of knowledge of COVID-19 protection was also documented by Siddiqui et al.,[7] who reported that 84% of their sample knew the correct hand washing technique, 82% knew that the disease can be transmitted through handshaking, and 79% knew that they should maintain a distance of at least one meter from others.

The present study and those by Chen et al.[12] and Siddiqui et al.[7] all concluded that people's

Table 2. Statistically significant differences between respondents in the < 30-year age group (n = 275) and those in the ≥ 30-year age group (n = 269) regarding opinions and attitudes about COVID-19.

Parameter	Age group, years		p
	≤ 30	> 30	
I understand disease progression better from TV.	2.21 ± 1.03	2.41 ± 1.06	0.034
I feel safer getting informed on the course of the disease from the Internet.	2.93 ± 1.07	3.18 ± 1.02	0.005
Constant reference to and demonstration of preventive measures by mass media has helped me protect myself from the disease.	2.31 ± 1.12	2.63 ± 1.17	0.001
I am satisfied with the information that I get from mass media.	1.92 ± 0.97	2.27 ± 1.11	0.001
I support the validity of published data on the pandemic.	2.41 ± 1.06	2.66 ± 1.20	0.011
I believe that mass media overestimates COVID-19.	3.43 ± 1.23	3.15 ± 1.32	0.012
Reporters and TV presenters explain the pandemic progression in a comprehensible manner.	2.35 ± 0.92	2.53 ± 1.00	0.024
I think scientific studies are moving in the right direction toward the end of the pandemic.	3.31 ± 1.07	3.57 ± 1.00	0.003
Scientific studies that are conducted abroad have greater validity than do those by Greek scientists.	2.71 ± 1.16	2.20 ± 1.17	0.001
Due to the pandemic, I do not accept visitors or visit friends and relatives.	2.85 ± 1.19	3.54 ± 1.36	0.001
People with whom I interact take all necessary protective measures in order not to contract or transmit the disease.	3.68 ± 0.94	3.89 ± 0.87	0.007
I feel more comfortable when the people with whom I interact wear a mask.	3.39 ± 1.24	3.95 ± 1.18	0.001
Scientific announcements often show elements of exaggeration.	3.02 ± 1.26	2.64 ± 1.31	0.001
Much of the scientific data cannot be implemented in Greece.	2.89 ± 1.14	2.53 ± 1.18	0.001
When I am around friends or relatives, we do not wear a mask because we are not afraid of one another.	3.09 ± 1.41	2.53 ± 1.35	0.001
People from my social environment believe that the disease is much milder than what has been presented.	2.89 ± 1.22	2.65 ± 1.27	0.023
People from my social environment consider that State measures and policies to limit disease transmission are exaggerated.	3.25 ± 1.23	2.94 ± 1.36	0.006

Table 3. Statistically significant differences regarding opinions and attitudes about COVID-19 by area of residence of the respondents.

Area of residence	I believe in scientific announcements by specialists regarding disease management.	People from my social environment question the severity of the disease
City (n = 448)	3.75 ± 0.94	2.48 ± 1.11
Small town (n = 53)	3.75 ± 0.94	2.43 ± 1.14
Village (n = 44)	3.34 ± 1.13	2.98 ± 1.17
p	0.029	0.023

level of knowledge on prevention, clinical signs, and transmission routes of COVID-19 is particularly high. This increase in knowledge is most likely due to the efforts of health care workers to provide people with valid and scientific information, such as the high levels of COVID-19 morbidity and mortality globally and the people's need for protection.

Today, it is very easy to access and disseminate information. Mass media and the Internet seem to play an important role in informing the public about health issues. Their dynamic features vastly contribute to shaping people's opinions and attitudes regarding several diseases and their prevention.[13-15]

With regard to sources of information, women believed that the constant reference and demonstration of preventive measures by mass media has considerably helped them protect themselves from the disease, in contrast with men. At the same time, people > 30 years of age seemed to understand the disease progression better from television and feel safer getting informed on the course of the disease from the Internet, in contrast to those ≤ 30 years of age, who believed that mass media overestimate COVID-19.

In most countries, television is the most popular means of information, because the mean TV viewing time is two hours.[16] Over the last years, rapid advancement of technology has brought important changes in the way that children and adolescents live and get informed. Ownership of a computer and access to the Internet are now easier than ever and, along with the widespread use of smart devices, people have the opportunity to receive validated information rapidly.

The extensive use of the Internet as a major source for information about COVID-19 has been observed. According to the present study, knowledge obtained from mass media is more accepted by people > 30 years of age than those ≤ 30 years of age. A study by Dkhar et al.[17] on people's knowledge about COVID-19 mentions that 89% of the sample population used the Internet as their source of information. The interest of young people in searching medical information online is probably associated with the fact that they are more familiar with the Internet and, at the same time, they use it as a tool for most, if not all, daily activities such as education, shopping, and entertainment.

Various scientists believe that the rapid spread of information and, particularly, the publication of research protocols about prevention, treatment, and diagnostic approaches of the disease contributed to the immediate preparation of health care professionals and the faster acceptance of the disease in populations all over the world.[18] However, the large volume of information during the course of the pandemic seems to drive people to confusion and dead ends. A portion of medical evidence is ambiguous, promoting mixed messages. Unclear and not scientifically proven studies and practices are accepted by a group of people who encourage negative impressions, downplay the disease,

and cultivate doubts in order to fulfill personal, political, and economic goals.[19]

The present study shows that the level of knowledge regarding COVID-19 transmission routes, manifestations and prevention was high in our sample. Women appeared to place more trust in information about preventing and managing COVID-19 than did men. Younger people were less likely to believe in the validity of scientific data and mass media reports about ways to deal with the pandemic, and people residing in cities were more likely to believe in scientific announcements when compared with those living in villages.

In order to minimize the number of cases of denial and disbelief regarding COVID-19, a series of actions are required. Governments should implement a series of measures to contain the disease, taking into consideration the psychological and social aspects of those policies. Scientific announcements and broadcastings should be simple, clear, and precise to avoid promotion of mixed messages. Mass media should inform people about current public health issues without any bias, personal opinions, or practices of persuasion.

investigation (equal), methodology (equal), project administration (equal), resources (equal), software use (equal), supervision (equal), validation (equal), visualization (equal), writing of original draft (equal), and review & editing of the manuscript (equal). TP: conceptualization (equal), data curation (equal), formal analysis (equal), funding acquisition (equal), investigation (equal), methodology (equal), project administration (equal), resources (equal), software use (equal), supervision (equal), validation (equal), visualization (equal), writing of original draft (equal), and review & editing of the manuscript (equal). EK: conceptualization (equal), data curation (equal), formal analysis (support), funding acquisition (equal), investigation (equal), methodology (equal), project

administration (support), resources (support), software use (support), supervision (equal), validation (equal), visualization (equal), writing of original draft (support), and review & editing of the manuscript (equal). DM: conceptualization (equal), data curation (equal), formal analysis (equal), funding acquisition (support), investigation (support), methodology (equal), project administration (support), resources (support), software use (support), supervision (equal), validation (equal), visualization (equal), writing of original draft (equal), and review & editing of the manuscript (equal). All authors approved the final version of the manuscript.

CONFLICTS OF INTEREST

None declared.

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