



## Original Article

# COVID 19-related infodemic and its effects during COVID-19 outbreak among medical students in North India



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### ARTICLE INFO

#### Article History:

Received 5 June 2020

Revised 14 August 2020

Accepted 7 October 2020

#### Keywords:

COVID-19

Infodemic

Information overload

SARS-CoV-2

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### ABSTRACT

**Introduction:** Outbreak of novel disease COVID-19 led to rapid and instantaneous spread of information internationally through the growing popular use of internet and social media. Infodemic leads to stress-related health effects like headache, sleeplessness, anxiety. Our study was conducted to assess the perceived information overload related to COVID-19, its associated factors and its effects among medical students of a medical college.

**Methods:** A cross sectional analytical study was conducted in a medical college in Delhi among the 240 medical undergraduates during March-April 2020. The data related to perceived information overload, socio-demographic details, platforms in which Infodemic is felt and health and academic effects of Infodemic were collected using semi-structured self-administered questionnaire. Data was collected in EpiCollect and analysed using STATA statistical software version 14. A p value less than 0.05 is considered significant.

**Results:** Out of 240 students included in the study, 68.3% (95% CI:61.9-74.1) perceived the presence of Infodemic. Female gender (OR=3.9, 95% CI:2.1-7.3) and upper socio-economic status (OR=14.2, 95% CI: 4.4-45.2) were significantly associated with the perceived presence of Infodemic. Television (73.1%) was the most common platform in which Infodemic is perceived followed by WhatsApp (53.6%). Stress related health effects were there in 84(51.2%) students and Infodemic had affected the academic learning processes in 104(63.4%) students.

**Conclusion:** In conclusion, our study observed that Infodemic was perceived in two third of the study participants with television and WhatsApp being the most common platforms. Half of the students who perceived Infodemic had stress-related health effects and two third of them reported that Infodemic affected their learning processes.

### Introduction

COVID-19 is the disease caused by the 2019-novel coronavirus which initially reported from China then spread to many countries all over the world. Infodemic is defined by WHO as an over-abundance of information, some accurate and some not that makes it hard for people to find trustworthy sources and reliable guidance when they need it (1). Outbreak of any disease leads to rapid and instantaneous spread of information internationally through the growing popular use of mobile phones, internet and social media (2). COVID-19-related information were being flooded in all the social media and mass media which lead to information overload. Since COVID-19 is a novel disease to the people these information were being shared rapidly and became a viral in the internet. So, like epidemic of any other diseases, COVID-19 pandemic is also accompanied by a massive infodemic (3). Newspapers, social media and other digital platform data contributed to the occurrence of COVID-19 related infodemic (4).

Information over load/infodemic affects individual's socio-affective and socio-cognitive processes and leads to cognitive fatigue (5). Cognitive fatigue due to media also known as media fatigue is defined as a user's tendency to back away from media when s/he becomes overwhelmed with information (6, 7). Infodemic leads to confusion, anxiety and panic during the time of epidemic especially it is more for false or misleading information. Infodemic could also lead to stress related health effects like headache, sleeplessness, anxiety. Infodemic also leads to public negligence towards accepting any instructions and awareness messages given by health authorities (2). Among medical students, Infodemic could also impede their academic learning processes in many ways like confusion about trustworthiness of information, wasting time in unnecessary and unimportant information.

Infodemic-related complications can be prevented through effective management of Infodemic by identifying, analysing and monitoring them after which control measures can be taken mainly through risk communication (2, 8). The first step in management of any infodemic is identification of the presence of Infodemic. For a newly identified disease COVID-19 there are very limited literatures available on Infodemic especially in Indian setting. With this background this study was conducted to assess the perceived information overload related to COVID-19 and its effects among MBBS students of a medical college. We also attempted to assess the factors associated with Infodemic among the study participants.

## Methods

### Design

A cross sectional analytical study was conducted in the Department of Community Medicine, Maulana Azad Medical College (MAMC) during March-April 2020 among second and third year medical students. The second and third year MBBS students who were willing to participate in the study and received training in EpiCollect were included. MAMC is a premiere medical college in Delhi which recruits 250 medical students per year. All available second and third year MBBS students who were willing to participate in the study were included in the study.

### Ethics

Ethical clearance certificate was obtained from Institutional Ethical Committee of Maulana Azad Medical College. Informed consent was obtained from study participants before data collection. Data collection was anonymous and data confidentiality was maintained.

### Study instrument

Perceived information overload on instant messaging (PIOIM) questionnaire was used to assess perceived information overload. PIOIM is a validated scale in English language with a Cronbach's alpha of 0.915 (9, 10). PIOIM is a 5 item questionnaire with responses given in five point Likert scale.<sup>9</sup> The higher the score the higher the perceived information overload. Overall PIOIM score is the mean score which is calculated by summing up the scores of the 5 items of questionnaire and dividing it by 5. The minimum score is 1 and maximum score is 5

### Sample size

Since this is a new study related to the novel disease COVID-19, after extensive literature search no previous studies were found for the prevalence of COVID-19 related infodemic in the selected study population. So, the sample size was calculated to be 166 with an expected prevalence of perceived information overload to be 50%, 20% relative precision and 97% confidence level. To adjust for the non-response rate we inflated the sample size with 50% non-response rate and the sample size was calculated to be 249.

### Primary outcomes

The primary outcomes of the study are the prevalence of perceived Infodemic and its effect on health and academic learning among medical undergraduates.

### Study procedure

A pre-tested semi- structured self-administered questionnaire was made in EpiCollect and circulated among the second and third

year undergraduate medical students of MAMC. EpiCollect is mobile based application used to collect data in android/iOS based mobile phones. These MBBS students were trained in using EpiCollect as a part of their family health advisory program in their third and fourth semesters. The details collected include basic socio-demographic details like age, sex, native area, socioeconomic status. The details related to perceived information overload, PIOIM questions, possible reasons for information overload and the platforms in which information overload is perceived was collected. Finally the effects of perceived information overload on health and learning processes were also collected.

### Statistical analysis

Data was collected in Epicollect and analysed using STATA statistical software version 14, StataCorp LCC, Lakeway Drive College Station, Texas, USA. Continuous variables were summarized as mean with standard deviation (SD) or median with interquartile range (IQR) based on the distribution of data. Categorical variables were summarized as frequencies and proportions. The strength and statistical significance of association between two categorical variables was done univariate logistic regression. The association between various socio-demographic characteristics and the perceived presence of Infodemic was assessed using bivariate logistic regression and expressed as odds ratio (OR) with 95% confidence interval. A P value less than 0.05 was considered significant. Socio-economic status classes 3, 4 and 5 were clubbed to single category for purpose of analysing the association.

### Results

In total, 240 participants were included in the study whose mean (SD) age was 20.4 (1.3) years. Fifty eight percent of the study participants were males, 91.6% were native from a urban area and 68.3% belonged to class 1 socioeconomic status. Infodemic was perceived by 164 of the study participants with a prevalence of 68.3% (95% CI: 61.9 - 74.1). Age was not significantly associated with perceived Infodemic (p value=0.672). Female students had 3.9 times (OR=3.9, 95% CI: 2.1-7.3) higher odds of having perceived the presence of Infodemic as compared to male students and this association was statistically significant. Students whose native is a urban area had 1.4 times (OR=1.4, 95% CI: 0.6-3.8) higher odds of having perceived the presence of Infodemic as compared to those from rural native. Students belonging to socio-economic classes 2 and 1 had 5.3 (OR=5.3, 95% CI: 1.5-18.0) and 14.2 (OR=14.2, 95% CI: 4.4-45.2) times higher odds of having perceived the presence of Infodemic respectively as compared to classes 3,4, and 5 and this association was statistically significant (Table 1). The mean (SD) scores for the PIOIM questionnaire is given in Table 2.

When questioned about the possible reasons for infodemic, out of 164 students who perceived infodemic, 75.6% responded that the disease COVID-19 is affecting people's routine lives and 60.9% responded that COVID-19 is killing a lot of people across the world. Fifty eight percent of the study participants responded that Infodemic is because of rapid spread of SARS-CoV-2 virus and 46.3% responded that it is because there is no cure for COVID-19 outbreak. Thirty nine percent of the students felt that because of novelty of the virus it is gaining more attention, and 36.5% felt it is due to the Government enforcement measures. Television (73.1%) was the most common platform in which infodemic is perceived followed by WhatsApp (53.6%), Newsletters (41.4%), Facebook (34%), Instagram (34%), and Twitter (9.7%) (Table 3).

**Table 1.** Socio-demographic characteristics of the study participants and its association with perceived presence of infodemic

Characteristics	Categories	Total N=240 Frequency (%)	Perceived presence of infodemic n=164 Frequency (%)	Odds Ratio (95% CI)*	p value <sup>#</sup>
Gender	Male	140 (58.3)	80 (57.1)	1	-
	Female	100 (41.7)	84 (84)	3.9 (2.1-7.3)	<0.001
Native area	Urban	220 (91.6)	152 (69.0)	1.4 (0.6-3.8)	0.403
	Rural	20 (8.4)	12 (60.0)	1	-
Socio-economic status <sup>†</sup>	Class 1	164 (68.3)	128 (78.0)	14.2 (4.4-45.2)	<0.001
	Class 2	56 (23.3)	32 (57.1)	5.3 (1.5-18.0)	-
	Class 3	8 (3.3)	0	1	-
	Class 4	8 (3.3)	4 (50.0)		-
	Class 5	4 (1.6)	0		-

\*95% CI: 95% Confidence Interval

<sup>†</sup> Socioeconomic status assessed using Modified BG Prasad Scale 2019

<sup>#</sup> p value from the univariate logistic regression is mentioned

**Table 2.** Perceived information overload among MBBS students

Perceived information overload on instant messaging (PIOIM) questionnaire	Mean (SD)
1. A flood of messages related to COVID-19 online prevents me from sending messages easily.	3.0 (1.1)
2. A flood of messages related to COVID-19 online makes me overlook important messages.	2.5 (1.1)
3. I often receive too many unwanted messages related to COVID-19 online.	2.5 (0.9)
4. A flood of messages related to COVID-19 online causes me to make mistakes	3.5 (1.0)
5. A flood of messages related to COVID-19 online makes me misunderstand some messages.	3.5 (1.0)
Overall PIOIM score	3.0 (0.8)

**Table 3.** Platforms, reasons and effects of infodemic among the medical undergraduate students

Characteristic	Categories	Frequency (%)
Possible reason for infodemic	COVID-19 is killing a lot of people across the world	100 (60.9)
	It is affecting our routine lives	124 (75.6)
	Country is in a lockdown because of this disease	108 (65.8)
	Rapid spread of SARS-CoV-2 virus	96 (58.5)
	There is no cure for it	76 (46.3)
	New virus gaining more attention	64 (39)
	Government enforcement measures	60 (36.5)
The platform in which Infodemic is felt	Television	120 (73.1)
	WhatsApp	88 (53.6)
	Newsletter	68 (41.4)
	Facebook	56 (34.1)
	Instagram	56 (34.1)
	Twitter	16 (9.7)
Infodemic affecting health	Yes	84 (51.2)
	No	80 (48.8)
Health effects due to Infodemic*	Anxiety/panic	52 (61.9)
	Feeling of low	48 (57.1)
	Irritation	44 (52.3)
	Headache	20 (23.8)
	Sleeplessness	16 (19.0)
Infodemic affecting general learning process	Yes	104 (63.4)
	No	60 (36.6)
Ways of infodemic affecting learning process*	Authenticity of information is not sure	116 (70.7)
	Confusion about trustworthiness of information	112 (68.2)
	Waste of time	88 (53.6)

\*Multiple options are possible

Infodemic has reportedly affected the health of 84 (51.2%) students out of which 61.9% reported they had anxiety/panic attacks, 57% felt low, 52.3% felt irritated, 23.8% had headache and 19% had sleeplessness. Out of 164 student who perceived information overload, 104 (63.4%) reported that it has affected their general learning processes. Out of the students whose general learning process was affected with information overload, the reasons quoted were the authenticity of the information was

not sure (70.7%), confusion about trustworthiness of information (68.2%), wastage of time (53.6%) (Table 3).

**Discussion**

Our study attempted to assess the prevalence of perceived Infodemic among medical undergraduates which was 68.3% (95% CI: 61.9 - 74.1). Mean (SD) PIOIM score was 3.0 (0.8) which indicates the presence of perceived information overload

in online platforms in a student's perspective. The increasing use of smart mobile phones, internet, social media, and other communication technologies during the pandemic is causing the invisible disaster which is Infodemic (11-13). Infodemic and its effects are more common among the literate population. Female sex and upper socioeconomic status was significantly associated with perception of Infodemic which is similar to other studies (11-14). Increased access to smart phones and internet for students from their affordable parents of upper socioeconomic status might be reason for the increased information overload among students of upper socio-economic status (15). The perceived information overload score during COVID-19 pandemic among medical undergraduates is higher than the score before the pandemic (9). This might be because of the effect of mass media focus on the infectious disease during the pandemic (16) which is even more with a novel disease like COVID-19.

Half of the medical students who perceived Infodemic had health effects with the most common effect being anxiety followed by feeling of low, irritation, headache and sleeplessness. These health effects are mainly caused by the mental health crisis during the pandemic (17, 18). Increased social media exposure aggravates the mental health problems like anxiety, depression, during COVID-19 outbreak (19). Lock down and closure of medical schools in India leads to decreased social support from peers and friends among the students which might have worsen the situation (20). To prevent the stress-related health effects of Infodemic, psychosocial support needs to be provided for MBBS students with counsellors and psychiatrists.

Infodemic has reportedly affected the learning process in 63% of the students with perceived Infodemic with authenticity of the information received in social media being the most common cause followed by wastage of time. During Infodemic, fake information which could be classified as disinformation, misinformation and mal-information exploits the cognitive weakness of the medical students and affects the learning processes (21). Medical students need to be educated about the authentic sources of information related to pandemic updates at global and national levels (22). To prevent and manage these complications of Infodemic, the source of information should be traced, the common platform that causes Infodemic should be identified and legislative measures needs to be implemented strictly to prevent the spread of fake news (22). Our study observed that television was the most common platform for Infodemic followed by WhatsApp. Surveillance needs to be done on these platforms to identify and manage fake information (23).

This is a first study to explore the prevalence of COVID-19 related Infodemic and its effect among medical undergraduates in India. Appropriate statistical analysis techniques are used to estimate the prevalence and its associated factors. Study participants were trained to use the EpiCollect where we shared the questionnaire, which would have minimised the bias that arises in online survey. Limitations: Since this is a cross-sectional study, the causal association needs to be interpreted cautiously because temporality of association cannot be concluded. The study was conducted online and only participants who entered the details online were included in the study which might have led to respondent bias. However this is an efficient technique for rapid assessment.

### Conclusion

our study observed that Infodemic was perceived in two third of the study participants with television and WhatsApp being the most common platforms. Half of the students who

perceived Infodemic had stress-related health effects and two third of them reported that Infodemic affected their learning processes. The complications of Infodemic need to be managed with immediate effect by tracing the source of fake information, identifying the common platforms that lead to Infodemic and strict implementation of legislative measures.

### Ethical disclosure

Ethical clearance certificate was obtained from Institutional Ethical Committee of Maulana Azad Medical College. Informed consent was obtained from study participants before data collection.

### Acknowledgements

Nothing to declare.

### Author contributions

YM designed the study design concepts, literature search, data acquisition, data analysis, manuscript preparation, editing and review. MMS and SG have defined the intellectual content, manuscript editing and review. BN has contributed in the design, concept of the study, literature search, data analysis, manuscript preparation, editing and review. KE has contributed in the literature search, data acquisition, manuscript editing and review.

### Conflict of interest

No conflict of interest has been declared by the authors.

### Funding/Support

No support funding.

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