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Original Research Article

Depression among COVID positive and negative cases-An analytical study in Mumbai City, India

Mohsin A Jujara[1], Omprakash Jatashankar Yadav[1], Rushikesh Madhukar Jadhav[1], Subasri Dhanusu[2], Yogashree Vinod Sonawane[3]*, Priyansha Amirchand Yadav[3]

[1] *Parul Institute of Public Health, Parul University, Vadodara, Gujarat, India*
[2] *Dept. of Community Medicine, Seth GS Medical College and KEM Hospital, Mumbai, Maharashtra, India*
[3] *Public Health Practitioner, India*

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ABSTRACT

Background: The coronavirus pandemic (COVID-19) started in December 2019 and the first case was detected in India in March 2020. It has caused extensive morbidity in India as of August 2022. Various socioeconomic impact of COVID-19 has aroused over time which has affected human behavioral changes. It also has a huge impact on the mental health of people including depression.
Objectives: 1. To estimate the prevalence of depression among COVID-19-positive and negative patients. 2. To explicate the relationship between factors causing depression among COVID-19-positive and negative patients in Mumbai.
Materials and Methods: The prevalence of depression was studied among 156 individuals having COVID-19 RTPCR reports with 78 positive and 78 negative cases of COVID-19 from September 2020 to October 2020. Consecutive sampling was done till the sample size is met. The DSM 5(Diagnostic and Statistical Manual for Mental disorders- 5) scale was used to find out the prevalence of depression among the study subjects. The prevalence of depression was analyzed in both groups and the Odds ratio was calculated. Further, the cause for depression in COVID -19 positive and negative cases was analyzed by applying Logistic Regression.
Results: The study conducted among 156 subjects shows that among those who were COVID-positive (n=78), people who fear stepping out of the house for their daily activities such as buying groceries or essentials are more likely to develop depression than their counterparts with an Odds ratio of 3.95 at 95% CI (1.26, 12.33) with p=0.0178. Among those who were COVID-negative (n=78), people who live in a joint or extended family are more likely to develop depression than those who live in a nuclear family with an Odds ratio of 44.58 at 95% CI (4.35, 456.14) with p=0.0014.
Conclusion: Social interactions for day-to-day living such as stepping out to buy the essentials have caused significant fear and depression among people. The family type also is associated with the increased presence of depression among the people (P<0.05). Thus COVID-19 has caused a higher impact on the mental health of the public despite rigorous risk communication interventions.

1. Introduction

The Kerala govt announced a lockdown on 23rd march and the rest of the state declared a lockdown on 25^{th} march 2020.[1] Following that, the number of cases increased, and a nationwide lockdown was enforced in India. The socio-

* *Corresponding author.*
E-mail address: yogashree11thedentist@gmail.com (Y. V. Sonawane).

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economic damage has affected people who were poor and had no proper shelter or roof. Metropolitan cities like Mumbai which has a huge migratory population living in the slums and chawls have faced difficulty in daily earnings. Residential mobility increased during the lockdown at the least in Northeastern states while extreme in the Northern state of India.[2] The mental health of people had also been affected due to high death tolls, unemployment, financial crisis, family and socialization, business, and lack of opportunity. Mental health was affected in various dimensions as parent-child interaction and stigma and isolation of COVID-positive family members especially elderly persons with comorbidities.

During COVID-19 Pandemic there were Human Behavior Changes which has caused depression among Humans.[3] About 14% of the global burden of disease has been attributed to neuropsychiatric disorders, mostly due to the chronically disabling nature of depression and other common mental disorders.[4] Mental health during the pandemic has been long neglected even though it causes substantial loss of disability-adjusted life years. India spends <2% of its annual health budget on mental health.[5] Resilience to poor mental health varies across demographics, most notably by age, gender, employment status, financial situation, and socioeconomic status. Young people, those living alone, those with lower socioeconomic status, and those who were unemployed were more likely to be in mental distress. The previous study showed the behavior changes in the Covid-19 pandemic situation towards the local people and their work like close contact mask-wearing has resulted in depression among humans which accounts for 15.97% to 20.86% prevalence.[6–21]

2. Objectives

1. To estimate the prevalence of depression among COVID-19 positive and negative patients
2. To explicate the relationship between factors causing depression among COVID-19 positive and negative patients in Mumbai.

3. Materials and Methods

It is a cross-sectional analytical study with a sample size of 156. All COVID-19 RTPCR positive and negative patients of a containment zone during the period of 18 days (12^{th} September 2020 to 1^{st} October 2020). Through consecutive sampling 78 individuals having COVID-19 RTPCR reported Positive were included as cases and 78 detected negative for COVID-19 RTPCR as a comparative group in the ratio of 1:1. The prevalence of depression was studied in both positive and negative cases of COVID-19 by applying the DSM 5 scale (Fifth edition of Diagnostic and Statistical Manual of Mental Disorders used). Cognitive, emotional, behavioural and physiological processes are far more complex than what can be described in forms. The general convention in DSM-5 is to allow multiple diagnoses to be assigned to meet the criteria for more than one DSM-5 disorder. As per the DSM-5 scale questionnaire was formed with responses graded as 'Not at all=0', 'Rare, less than a day or two=1', 'More than half a day=2', 'several days=3'and 'nearly every day=4'. The total score of each question was calculated with a scoring scale. A score equal to or less than 8 is concluded as a depressive state.[22] A significant cause for depression in COVID -19 positive and negative cases was further analysed with Logistic Regression. After getting consent, a questionnaire was used as a tool for data collection and responses collected. Due to COVID appropriate precaution was taken while interacting with study subjects.

4. Results

As per the data analyzed, 42.95% (n=67) of the respondents were females while 57.05% (n=89) were males.Equal set (n=78) of COVID positive and negative respondents were selected under the study. The population under study were analyzed for indicators like social behavior changes noticed by family members, effects of urbanization on mental health, fear of survival, fear if anyone visits home, fear of going outside for basic necessities like groceries, decreased social-interaction and its impact on mental health,any financial crisis arising in the family or increased expenditure due to pandemic situation. The respondents belonged to varied age groups.The lowest aged respondents in both the groups, namely the covid positive and covid negative group were of 19 years while the respondent aged 80 years was highest in covid negative group and 87 years in the covid positive group. The average in covid positive group was 44.79 years while in covid negative group it was 40.37 years. All the major findings of the study are enlisted in depth in form of tables (Tables 1, 2, 3 and 4) and figures (Figures 1 and 2) at the end of the article.

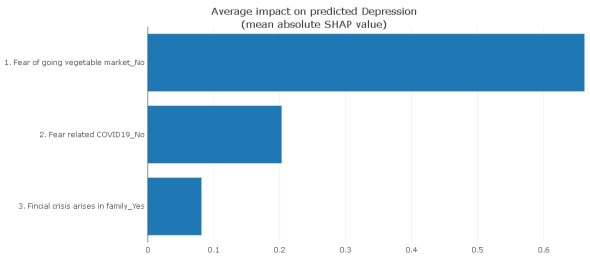

Figure 1: COVID 19 positive and depression causes SHAP value

5. Discussion

The present study aimed at identifying the prevalence of depression and associated causes leading to depression

Table 1: Depression status and socio-demographic variables

S.No	Variables (n=156)	Yes/No	Depression status as per DSM5		Total	Mid-p exact	Odds Ratio	95% Confidence Interval	
			Yes	No				Lower	Upper
1	Gender	Female	42(54.55%)	25(31.65%)	67(42.95%)	0.002*	2.575	1.343	5.004
		Male	35(45.45%)	54(68.35%)	89(57.05%)				
2	COVID19	Positive	39(50.65%)	39(49.37%)	78(50.00%)	0.437	1.052	0.559	1.98
		Negative	38(49.35%)	40(50.63%)	78(50.00%)				
3	social behaviour changes noticed by society members	Yes	30(38.96%)	21(26.58%)	51(32.69%)	0.051	1.756	0.891	3.498
		No	47(61.04%)	58(73.42%)	105(67.31%)				
4	Happy with Urbanization	Yes	50(64.94%)	61(77.22%)	111(71.15%)	0.047*	0.548	0.267	1.109
		No	27(35.06%)	18(22.78%)	45(28.85%)				
5	Fear of survival is in danger	Yes	24(31.17%)	14(17.72%)	38(24.36%)	0.026*	2.092	0.988	4.539
		No	53(68.83%)	65(82.28%)	118(75.64%)				
6	Fear of going to vegetable market or grocery store	Yes	27(35.06%)	19(24.05%)	46(29.49%)	0.068	1.699	0.845	3.455
		No	50(64.94%)	60(75.95%)	110(70.51%)				
7	fear of when someone visits home or you visit someone	Yes	21(27.27%)	12(15.19%)	33(21.15%)	0.034*	2.083	0.945	4.734
		No	56(72.73%)	67(84.81%)	123(78.85%)				
8	less interacting with people even on the phone or online	Yes	35(45.45%)	27(34.18%)	62(39.74%)	0.077	1.600	0.837	3.078
		No	42(54.55%)	52(65.82%)	94(60.26%)				
9	Affects you mentally most of the time	Yes	24(31.17%)	16(20.25%)	40(25.64%)	0.062	1.776	0.855	3.751
		No	53(68.83%)	63(79.75%)	116(74.36%)				
10	The financial crisis arises in family	Yes	33(42.86%)	43(54.43%)	76(48.72%)	0.076	0.629	0.332	1.186
		No	44(57.14%)	36(45.57%)	80(51.28%)				
11	Pandemic increases expenditure of family	Yes	68(88.31%)	76(96.20%)	144(92.31%)	0.036*	0.300	0.063	1.111
		No	9(11.69%)	3(3.80%)	12(7.69%)				
12	Type of Family	Extended	15(19.48%)	29(36.71%)	44(28.21%)	P-Value		Chi-square	
		Joint	16(20.78%)	9(11.39%)	25(16.03%)	0.035*	6.6774		
		Nuclear	46(59.74%)	41(51.9%)	87(55.77%)				

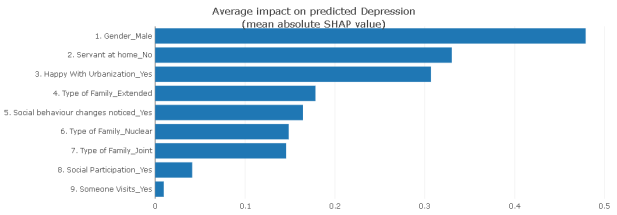

Figure 2: COVID 19 positive and depression causes SHAP value

among the common public in a metropolitan city like Mumbai during the period of the COVID-19 pandemic. The prevalence of depression in the study was observed to be 49.35% which was higher compared to the previous studies which were ranging from 15.95% to 20.86%.[6–10] High economic burden, urbanization and expanded small-scale industries and a good number of the migratory population might attribute to this variation in prevalence in Mumbai. This also indicates various factors such as socio-demographic state, health-related risk, community and interpersonal factors also have a significant influence on the mental health of the people including depression.

The socio-demographic variables associated with depression status showed some interesting results. Taking gender into consideration, the prevalence of depression is more among females (63%) than males (39%) and this difference in prevalence is statistically significant when the chi-square test is applied (p= 0.002). The same variation is seen in COVID positive and negative participants. Attitude towards urbanization stays an important factor in mental health as people tend to adapt to their urban living setup

Table 2: Depression status and socio-demographic variables in COVID 19 Positive and Negative Cases

S.No	Variables (n=78)	Yes/No	Depression status as per DSM5		Total	Mid-p exact	Odds Ratio	95% Confidence Interval	
	COVID 19 Positive		Yes	No				Lower	Upper
1	Gender	Female	19(48.72%)	13(33.33%)	32(41.03%)	0.089	1.884	0.751	4.815
		Male	20(51.28%)	26(66.67%)	46(58.97%)				
2	Fear of going to vegetable market or grocery store	Yes	13(33.33%)	6(15.38%)	19(24.36%)	0.036*	2.714	0.915	8.723
		No	26(66.67%)	33(84.62%)	59(75.64%)				
3	Education of children affected	Yes	14(35.90%)	21(53.85%)	35(44.87%)	0.059	0.484	0.191	1.204
		No	25(64.10%)	18(46.15%)	43(55.13%)				
4	Fear related COVID19	Yes	25(64.10%)	32(82.05%)	57(73.08%)	0.041*	0.395	0.131	1.121
		No	14(35.90%)	7(17.95%)	21(26.92%)				
5	The financial crisis arises in family	Yes	12(30.77%)	21(53.85%)	33(42.31%)	0.021*	0.385	0.148	0.973
		No	27(69.23%)	18(46.15%)	45(57.69%)				
6	Regular Physical activity affected	Yes	26(66.67%)	32(82.05%)	58(74.36%)	0.065	0.442	0.145	1.267
		No	13(33.33%)	7(17.95%)	20(25.64%)				
	Covid 19 negative								
7	Gender	Female	23(60.53%)	12(30.00%)	35(44.87%)	0.003*	3.515	1.382	9.275
		Male	15(39.47%)	28(70.00%)	43(55.13%)				
8	social behaviour changes noticed by society members	Yes	18(47.37%)	10(25.00%)	28(35.90%)	0.022*	2.664	1.024	7.189
		No	20(52.63%)	30(75.00%)	50(64.10%)				
9	Happy with Urbanization	Yes	22(57.89%)	33(82.50%)	55(70.51%)	0.009*	0.296	0.098	0.829
		No	16(42.11%)	7(17.50%)	23(29.49%)				
10	Fear of survival is in danger	Yes	14(36.84%)	8(20.00%)	22(28.21%)	0.054	2.307	0.834	6.677
		No	24(63.16%)	32(80.00%)	56(71.79%)				
11	fear of when someone visits you or you visit someone	Yes	16(42.11%)	7(17.50%)	23(29.49%)	0.009*	3.373	1.204	10.111
		No	22(57.89%)	33(82.50%)	55(70.51%)				
12	affect mentally most of the time	Yes	16(42.11%)	10(25.00%)	26(33.33%)	0.059	2.159	0.823	5.843
		No	22(57.89%)	30(75.00%)	52(66.67%)				
13	Education of children affected	Yes	24(63.16%)	19(47.50%)	43(55.13%)	0.087	1.879	0.757	4.748
		No	14(36.84%)	21(52.50%)	35(44.87%)				
14	Having a servant at home for daily housework	Yes	9(23.68%)	18(45.00%)	27(34.62%)	0.026*	0.384	0.139	1.012
		No	29(76.32%)	22(55.00%)	51(65.38%)				
15	Social Participation	Yes	22(57.89%)	33(82.50%)	55(70.51%)	0.009*	0.296	0.098	0.829
		No	16(42.11%)	7(17.50%)	23(29.49%)				
16	Type of Family	Extended	10(26.32%)	18(45.00%)	28(35.90%)	P-Value	Chi-square		
		Joint	10(26.32%)	1(2.50%)	11(14.10%)	0.007*	9.835		
		Nuclear	18(47.37%)	21(52.50%)	39(50.00%)				

Table 3: Logistic regression COVID 19 positive and depression causes

Term (n=78)	Odds Ratio	95% C.I. Lower	95% C.I. Upper	Coefficient	S.E.	Z-Statistic	P-Value
Fear of going to vegetable market or grocery store (Yes/No)	3.9548	1.2681	12.3337	1.3749	0.5803	2.3693	0.0178
Fear related COVID19 (Yes/No)	0.515	0.2706	0.9803	-0.6635	0.3284	-2.0204	0.0433
Final -2*Log-Likelihood:				101.172			
Test	**Statistic**	**D.F.**			**P-Value**		
Score	6.7884	2			0.0336		
Likelihood Ratio	6.959	2			0.0308		

Table 4: Logistic regression COVID 19 negative and depression causes

Term	Odds Ratio	95% C.I.		Coefficient	S.E.	Z-Statistic	P-Value
		Lower	Upper				
Gender (Male/Female)	0.3901	0.143	1.0627	-0.9413	0.511	-1.841	0.0656
Type of Family (Joint/Extended)	44.5819	4.357	456.149	3.7973	1.187	3.2005	0.0014
Type of Family (Nuclear/Extended)	3.3218	1.099	10.0391	1.2005	0.564	2.1275	0.0334
Social Participation (Yes/No)	0.3431	0.11	1.068	-1.0699	0.579	-1.8464	0.0648
Final -2*Log-Likelihood:				85.1458			
Test	**Statistic**	**D.F.**			**P-Value**		
Score	19.8377	4			0.0005		
Likelihood Ratio	22.9851	4			0.0001		

in a metropolitan city like Mumbai. While analysing the attitude toward urbanization, the prevalence of depression is more among those who feel unhappy about urbanization (60%) than those who are happy with urbanization and this difference is statistically significant (p=0.047). The COVID-19 pandemic has left a greater impact on the economic survival of people especially, those who work for daily wages, small roadside shops, restaurants and labourers of small and middle-scale industries. Thus there existed a fear of survival and such participants who feared that their survival is in danger showed a higher prevalence of depression (63%) than others (45%) with a p-value of 0.026. social distancing is one of the well-intended interventions in breaking the chain of transmission which restricts people's mobility in highly crowded places and family celebrations. It was observed that people who fear visiting someone or being visited had a higher prevalence of depression (63%) with p=0.034. Also, joint families and families with higher budget expenditures also showed a higher prevalence of depression (Table 1).

6. Conclusion

As it is clearly evident from the foregoing discussion, the COVID-19 pandemic has brought havoc on both the physical and mental health of common people. The physical illness has led to significant fear among the public due to higher infectivity rate, lack of adequate admission facilities higher death tolls at peaks of the pandemic. While, the mental state has been disturbed due to fear of acquiring infection, poor neighbour interaction, and economic loss that affects daily living. But unfortunately, mental illness has not acquired as much attention and effort to combat it as the physical illness of COVID-19. The pandemic has brought out the pressing necessity of paying more attention to mental disorders which have been normally ignored in India, the fact which is substantiated by less than 2 per cent allocation of the national health budget to mental disorders altogether. Further analysis shows that people who stay alone, those with limited or no socialization, poor and unsettled and uneducated people have had to bear the brunt of the disease the most. The pandemic has also deeply and adversely affected the relationship of all hues resulting in the worsening of mental health prominently depression. Now the hour demands to pay more attention to mental disorders, particularly depression. Appropriate interventions and behaviour change communication between medical professionals and the common public has to be improvised. Policymakers should consider giving special attention to identifying mental health disorders in the community.

7. Source of Funding

None.

8. Conflict of Interest

None.

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Author biography

Mohsin A Jujara, Scholar

Omprakash Jatashankar Yadav, Scholar https://orcid.org/0000-0002-1505-3733

Rushikesh Madhukar Jadhav, Scholar

Subasri Dhanusu, Scholar

Yogashree Vinod Sonawane, Professional

Priyansha Amirchand Yadav, Professional

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