

## A survey from India to study the prevalence of depression and its severity among different professions during COVID-19 pandemic.

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### Abstract:

**Introduction:** COVID-19 pandemic has caused significant mental health problems resulting in extensive adverse economic and societal consequences. There is paucity of data on mental health issues during COVID-19 in India and so the present survey was conducted to document the prevalence of depression among different professions using Patient Health Questionnaire (PHQ-9) scale.

**Aims:** To study the prevalence of depression and its severity among different professions during COVID-19 pandemic.

**Material and methods:** Survey was conducted among Indian people from 1st October, 2020 to 20th February, 2021 at Kishori Ram Hospital and Diabetes Care Centre, Bathinda, Punjab during COVID-19 pandemic using E-copies and hard copies of anonymous completely voluntary survey proforma and a validated pretested structured PHQ-9 questionnaire distributed physically and by social media platforms to people  $\geq 20$  years of age from all over India. Valid responses were analysed according to the five broad professional categories of medical professionals, business people, teachers, students and non-medical professionals. 4333 responses from Indian subjects were found eligible for analysis including 2246 from medical professionals, 692 business people, 322 teachers, 567 students and 506 non-medical professionals.

**Results:** 4333 responses from Indian population were found to be valid including 2246 from medical professionals, 692 business people, 322 teachers, 567 students and 506 from non-medical professionals. Prevalence of depression in study population was 73.3%. According to gender groups prevalence of depression was 69.7% in males and 79.3% in females. Prevalence of depression in age group of 20-40 years was 73.3%, 75.8% in age group of 41-60 years and 66.4% in  $>60$  years age group. Among profession groups prevalence of depression was 74.7% among medical professionals, 75.1% business people, 65.8% teachers, 67.9% students and 75.1% non-medical professionals. Results showed maximum mean score in medical profession group and minimum mean score in teachers group.

**Conclusion:** COVID-19 pandemic has adversely affected mental health of population and the present survey has document increased prevalence of depression among various profession groups necessitating increasing need to provide universal mental health care. Urgent need to generate Indian data on mental issues and present study is a small contribution in this effort.

**Key words:** Depression, PHQ-9, Mental health, venerable population.

**Key Message:** Present survey documents high prevalence of depression and its severity among various profession groups highlights adverse effects of COVID-19 on people's mental health necessitating strengthening the public and mental health care with special focus on venerable populations.

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## **I. Introduction:**

Globally, COVID-19 pandemic has become a major stressor with significant mental health problems besides catastrophic physical health morbidity, mortality and extensive adverse economic and societal consequences because normal people were exposed to extraordinary situations of complete global lockdown, suspension of usual human activities especially with increased exposure to adverse social media misinformation. Since times immemorial pandemics like plague outbreaks have been known and so are several others pandemics, but COVID-19 pandemic has shaken the entire world ravaging country after country creating a global panic affecting the mental health of population.[1] Pre-COVID-19 data suggested that one in seven Indians experienced variable severity of mental disorders in 2017 and accounted for 26.6% of global suicide deaths in 2016 along with severe deficiency of mental health care facilities has complicated the mental health issues during COVID-19 pandemic. [2, 3]

A systematic review and meta-analysis on the prevalence of psychological morbidities reported that about half of the population faced psychological impacts of the COVID-19 pandemic.[4] The current COVID-19 pandemic has led to rapidly increasing general health and mental health problems among community and individuals with direct and indirect consequences necessitate an urgent need for appropriate intervention.[5, 6] Moreover because of India's diverse culture and traditions people routinely indulge in much more social interactions and religious activities celebrating festivals together thorough out the year as compared to western population making the Indian population more venerable to adverse psychological effects of restriction of almost all human activities during COVID-19 pandemic.[7, 8]

Depression is reported to be the most common psychiatric disorder and one of the most common psychiatric disorder in outpatient department (OPD).[9] The Patient Health Questionnaire (PHQ) is a version of the PRIME-MD diagnostic instrument which uses DSM-IV criteria to assess common mental disorders and PHQ-9 is a brief self-administered questionnaire, simple to score and understand and have strong performance characteristics which has been developed as depression screener and grade depressive symptom severity. PHQ-9 has been found to have excellent validity, reliability with sensitivity and specificity of 88% for major depression and comparable sensitivity and specificity to other longer measures of depression. [10, 11, 12] Since there is paucity of national wide data in India on psychological impact during COVID-19 especially among different professional groups and data is essential for planning and policy making therefore present survey was initiated to study the prevalence of depression among different professions using PHQ-9 scale during COVID-19 pandemic in India.

**Aims:** To study the prevalence of depression and its severity among different professions during COVID-19 pandemic.

## **II. Material And Methods:**

This Survey was conducted among Indian population from 1st October, 2020 to 20th February, 2021 at Kishori Ram Hospital and Diabetes Care Centre, Bathinda, Punjab during COVID-19 pandemic in India using E-copies and hard copies of anonymous completely voluntary survey proforma including socio-demography variables and a validated pretested structured PHQ-9 questionnaire distributed physically and by social media platforms to people of  $\geq 20$  years of age from all over India. Pretested structured and validated PHQ-9 questionnaire comprised of nine questions rated on four-point Likert scale ranging from 0 (not at all) to 3 (nearly every day) in the last 2 weeks. Grading of depressive symptom severity was indicated by PHQ-9 score that was score of 0 indicated no depression, score of 1–4 minimal depression, score of 5–9 mild depression, score of 10–14 moderate depression and a score of  $\geq 15$  indicated severe depression.[10]

Specifically no sample size was determined before the survey and of all the responses received, 4333 valid responses were included in the survey analysis according to the five broad professional categories of medical professionals, business people, teachers, students and non-medical professionals in relation to prevalence of depression, its severity, age and gender after approval from Institutional Ethics Committee.

**Inclusion Criteria:** Participants of age 20 years and above, residing in India, able to read and understand English, willing to participate in survey.

**Exclusion Criteria:** Participants under the age of 20 years, residing outside of India, unable to read and understand English and unwilling to participate in survey.

**Sampling Technique:** Hard and e-copies of completely voluntary anonymous PHQ-9 questionnaire survey proforma including socio-demographic details was physically distributed and were sent via email, whatsapp, SMS and other social media platforms to Indian population. Valid responses received were analysed.

**Study Procedure:** The survey was initiated after approval from Institutional Ethics Committee vide letter no. 16/2021 dated 13.0.2021.

**Statistical Analysis:** Data was represented as frequency, percentage Mean, Standard deviation, Median etc. Chi-Square Test was used to compare the frequency among different sub-groups. Mann-Whitney Test was used to compare the PHQ-9 score among different sub-groups of professions. P value  $< 0.05$  was taken as statistically

significant whereas  $p < 0.001$  was taken as highly significant. All the analysis was done using 'IBM SPSS Statistics for Windows, version 23.0 (IBM Corp., Armonk, N.Y., USA)'.

### III. Results:

**Socio- demographic characteristics:** 4333 subjects were found eligible for the survey analysis including 2246 (51.8%) medical professionals, 692 (16.0%) business people, 322 (7.4%) teachers, 567 (13.1%) students and 506 (11.7%) non-medical professionals. According to age, 2080 (48%) subjects were in age group of 20 to 40 years including 972 (46.7%) medical professionals, 277 (13.3%) business people, 106 (5.1%) teachers, 567 (27.3%) students and 158 (7.6%) non-medical professionals. 1854 (42.8%) subjects were in age group of 41 to 60 years including 1027 (55.4%) medical professionals, 332 (17.9%) business people, 200 (10.8%) teachers, 0 (0.0%) students and 295 (15.9%) non-medical professionals whereas 399 (9.2%) subjects were in age group of >60 years including 247 (61.9%) medical professionals, 83 (20.8%) business people, 16 (4.0%) teachers, 0 (0.0%) students and 53 (13.3%) non-medical professionals. Study population comprised of 2741 (63.3%) males including 1513 (55.2%) medical professionals, 469 (17.1%) business people, 164 (6.0%) teachers, 299 (9.7%) students and 329 (12.0%) non-medical professionals. 1592 (36.7%) constitute females group including 733 (46.0%) medical professionals, 223 (14.0%) business people, 158 (9.9%) teachers, 301 (18.9%) students and 177 (11.1%) non-medical professionals.

Table-1 shows comparative prevalence of depression among different profession groups in study population and among gender groups. Prevalence of depression in study population was 73.3% including 69.7% males and 79.3% females. The results showed that the overall prevalence of depression was significantly associated with profession groups ( $p < 0.001$ ) and the overall severity of depression was also significantly associated with the profession groups ( $p < 0.001$ ). Similar association between depression, severity of depression and profession groups was found in males as well as females separately also. Highest prevalence of depression (75.1%) was observed in business and non-medical profession groups. Highest prevalence of depression (74.1%) among males was observed in medical profession groups and among females (85.2%) in business group.

**Table 1: Prevalence of depression and its severity according to study population and gender in different profession groups. % (N)**

| Table 1: Prevalence of depression and its severity according to study population and gender in different profession groups. % (N) |                              |                         |            |            |            |              |             |          |          |
|---|------------------------------|-------------------------|------------|------------|------------|--------------|-------------|----------|----------|
| Variables   | Severity of Dep <sup>§</sup> | Profession <sup>‡</sup> |            |            |            |              | Total       | x2 value | P Value  |
|   |                              | Med Prof                | Business   | Teachers   | Students   | Non-Med Prof |             |          |          |
| Total number of subjects (N)  |                              | 2246                    | 692        | 322        | 567        | 506          | 4333        |          |          |
| Subjects with dep.  | Total Dep                    | 74.7 (1677)             | 75.1 (520) | 65.8 (212) | 67.9 (385) | 75.1 (380)   | 73.3 (3174) | 21.755   | <0.001** |
|   | Minimal Dep                  | 39.8 (895)              | 36.0 (249) | 39.4 (127) | 34.0 (193) | 42.9 (217)   | 38.8 (1681) | 57.356   | <0.001** |
|   | Mild Dep                     | 27.6 (621)              | 34.5 (239) | 23.3 (75)  | 25.7 (146) | 27.1 (137)   | 28.1 (1218) |          |          |
|   | Moderate Dep                 | 5.8 (130)               | 4.2 (29)   | 2.5 (8)    | 6.5 (37)   | 4.9 (25)     | 5.3 (229)   |          |          |
|   | Severe Dep                   | 1.4 (31)                | 0.4 (3)    | 0.6 (2)    | 1.6 (9)    | 0.2 (1)      | 1.1 (46)    |          |          |
| Total number of males (N)   |                              | 1513                    | 469        | 164        | 266        | 329          | 2741        |          |          |
| Males with dep.   | Total Dep                    | 74.1 (1121)             | 70.4 (330) | 57.3 (94)  | 51.1 (136) | 69.9 (230)   | 69.7 (1911) | 69.294   | <0.001** |
|   | Minimal Dep                  | 43.5 (658)              | 39.0 (183) | 50.6 (83)  | 30.8 (82)  | 51.1 (168)   | 42.8 (1174) | 150.618  | <0.001** |
|   | Mild Dep                     | 24.8 (375)              | 30.1 (141) | 6.7 (11)   | 13.5 (36)  | 14.3 (47)    | 22.3 (610)  |          |          |
|   | Moderate Dep                 | 5.0 (75)                | 0.6 (3)    | 0.0 (0)    | 6.0 (16)   | 4.6 (15)     | 4.0 (109)   |          |          |
|   | Severe Dep                   | 0.9 (13)                | 0.6 (3)    | 0.0 (0)    | 0.8 (2)    | 0.0 (0)      | 0.7 (18)    |          |          |
| Total number of females (N)   |                              | 733                     | 223        | 158        | 301        | 177          | 1592        |          |          |
| Females with dep.   | Total Dep                    | 75.9 (556)              | 85.2 (190) | 74.7 (118) | 82.7 (249) | 84.7 (150)   | 79.3 (1263) | 17.458   | 0.002*   |
|   | Minimal Dep                  | 32.3 (237)              | 29.6 (66)  | 27.8 (44)  | 36.9 (111) | 27.7 (49)    | 31.8 (507)  | 47.737   | <0.001** |
|   | Mild Dep                     | 33.6 (246)              | 43.9 (98)  | 40.5 (64)  | 36.5 (110) | 50.8 (90)    | 38.2 (608)  |          |          |

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|  |                     |          |           |         |          |          |           |  |
|--|---------------------|----------|-----------|---------|----------|----------|-----------|--|
|  | <b>Dep</b>          |          |           |         |          |          |           |  |
|  | <b>Moderate Dep</b> | 7.5 (55) | 11.7 (26) | 5.1 (8) | 7.0 (21) | 5.6 (10) | 7.5 (120) |  |
|  | <b>Severe Dep</b>   | 2.5 (18) | 0.0 (0)   | 1.3 (2) | 2.3 (7)  | 0.6 (1)  | 1.8 (28)  |  |

**Profession\$** : Med Prof= Medical Professionals, Non-Med Prof= Non-Medical Professional  
 Dep\$=Depression  
**P Value**: \*\* Statistically highly significant ( $p < 0.001$ ), \* Statistically significant ( $p < 0.05$ ), Statistically non- significant ( $p > 0.05$ ) (NS)  
**PHQ-9 Scale**: Score 0 no Depression, 1-4: Minimal depression, 5-9: Mild depression, 10-14: Moderate depression,  $\geq 15$ ; severe depression.

Table-2 shows comparative prevalence of depression among different profession groups in relation to age. Prevalence of depression in age group of 20-40 years was 73.3%, 75.8% in age group of 41-60 years and 66.4% in >60 years age group. The results showed highly significant association of prevalence of severity of depression with the profession groups among age groups of 20-40 years and > 60 years ( $p < 0.001$ ). Prevalence of severity of depression was significantly associated with profession groups among 40-60 years group ( $p 0.018$ ) and with over all prevalence of depression in > 60 years group ( $p 0.040$ ). The association of overall prevalence of depression among profession groups was statistical not significant in relation to age group of 41-60 years ( $p 0.128$ ).

**Table 2: Prevalence of depression and its severity according to age in different profession groups. % (N)**

| Table 2: Prevalence of depression and its severity according to age in different profession groups. % (N) |                     |              |            |            |            |              |             |          |           |
|---|---------------------|--------------|------------|------------|------------|--------------|-------------|----------|-----------|
| Age Groups  | Severity of Dep\$   | Profession\$ |            |            |            |              | Total       | x2 value | P Value   |
|   |                     | Medi Prof    | Business   | Teachers   | Students   | Non-Med Prof |             |          |           |
| <b>Total number of subjects 20-40 years (N)</b>   |                     | <b>972</b>   | <b>277</b> | <b>106</b> | <b>567</b> | <b>158</b>   | <b>2080</b> |          |           |
| <b>Dep in 20-40 years age group</b>   | <b>Total Dep</b>    | 76.5 (744)   | 71.8 (199) | 55.7 (59)  | 67.9 (385) | 74.1 (117)   | 72.3 (1504) | 29.147   | <0.001**  |
|   | <b>Minimal Dep</b>  | 37.1 (361)   | 43.3 (120) | 30.2 (32)  | 34.0 (193) | 38.6 (61)    | 36.9 (767)  | 45.967   | <0.001**  |
|   | <b>Mild Dep</b>     | 29.9 (291)   | 25.6 (71)  | 20.8 (22)  | 25.7 (146) | 28.5 (45)    | 27.6 (575)  |          |           |
|   | <b>Moderate Dep</b> | 7.7 (75)     | 2.2 (6)    | 3.8 (4)    | 6.5 (37)   | 6.3 (10)     | 6.3 (132)   |          |           |
|   | <b>Severe Dep</b>   | 1.7 (17)     | 0.7 (2)    | 0.9 (1)    | 1.6 (9)    | 0.6 (1)      | 1.4 (30)    |          |           |
| <b>Total number of subjects 41-60 years (N)</b>   |                     | <b>1027</b>  | <b>332</b> | <b>200</b> | <b>00</b>  | <b>295</b>   | <b>1854</b> |          |           |
| <b>Dep in 41-60 years age group</b>   | <b>Total Dep</b>    | 75.3 (773)   | 77.4 (257) | 70.5 (141) | 0.0 (0)    | 79.3 (234)   | 75.8 (1405) | 5.682    | 0.128; NS |
|   | <b>Minimal Dep</b>  | 42.3 (434)   | 37.0 (123) | 44.5 (89)  | 0.0 (0)    | 47.5 (140)   | 42.4 (786)  | 24.413   | 0.018*    |
|   | <b>Mild Dep</b>     | 27.6 (283)   | 34.3 (114) | 24.5 (49)  | 0.0 (0)    | 21.5 (81)    | 28.4 (527)  |          |           |
|   | <b>Moderate Dep</b> | 4.6 (47)     | 5.7 (19)   | 1.0 (2)    | 0.0 (0)    | 4.4 (13)     | 4.4 (81)    |          |           |
|   | <b>Severe Dep</b>   | 0.9 (9)      | 0.3 (1)    | 0.5 (1)    | 0.0 (0)    | 0.0 (0)      | 0.6 (11)    |          |           |
| <b>Total number of subjects &gt;60 years (N)</b>  |                     | <b>247</b>   | <b>83</b>  | <b>16</b>  | <b>00</b>  | <b>53</b>    | <b>399</b>  |          |           |
| <b>Dep in &gt;60 years age group</b>  | <b>Total Dep</b>    | 64.8 (160)   | 77.1 (64)  | 75.0 (12)  | 0.0 (0)    | 54.7 (29)    | 66.4 (265)  | 8.332    | 0.040*    |
|   | <b>Minimal Dep</b>  | 40.5 (100)   | 7.2 (6)    | 37.5 (6)   | 0.0 (0)    | 30.2 (16)    | 32.1 (128)  | 80.519   | <0.001**  |
|   | <b>Mild Dep</b>     | 19.0 (47)    | 65.1 (54)  | 25.0 (4)   | 0.0 (0)    | 20.8 (11)    | 29.1 (116)  |          |           |
|   | <b>Moderate Dep</b> | 3.2 (8)      | 4.8 (4)    | 12.5 (2)   | 0.0 (0)    | 3.8 (2)      | 4.0 (16)    |          |           |
|   | <b>Severe Dep</b>   | 2.0 (5)      | 0.0 (0)    | 0.0 (0)    | 0.0 (0)    | 0.0 (0)      | 1.3 (5)     |          |           |

**Profession\$** : Med Prof= Medical Professionals, Non-Med Prof= Non-Medical Professional  
 Dep\$=Depression  
**P Value**: \*\* Statistically highly significant ( $p < 0.001$ ), \* Statistically significant ( $p < 0.05$ ), Statistically non- significant ( $p > 0.05$ ) (NS)  
**PHQ-9 Scale**: Score 0 no Depression, 1-4: Minimal depression, 5-9: Mild depression, 10-14: Moderate depression,  $\geq 15$ ; severe depression.

Table 3 shows the results of response of study population and different profession groups to the questions other than PHQ-9 questionnaire about difficulties to do work, takes care of things at home, or get

along with other people and need for treatment. Results show statistical significant association between the different profession groups in relation questions related to difficulty for work as well as need for treatment ( $p < 0.001$ ).

**Table 3: Response to the question other than PHQ-9 questionnaire about difficulties to do work, takes care of things at home, or get along with other people and need for treatment? % (N)**

| Questions   |                      | Professions £ |            |            |            |              | Total       | x2 value | P Value  |
|---|----------------------|---------------|------------|------------|------------|--------------|-------------|----------|----------|
|   |                      | Medi Prof     | Busin      | Teach      | Stds       | Non-Med Prof |             |          |          |
| If you checked off any problems, how difficult have these made it for you to do your work, take care of things at home, or get along with other people? | Not difficult at all | 63.7 (1431)   | 43.9 (304) | 58.7 (189) | 58.0 (329) | 50.8 (257)   | 57.9 (2510) | 151.848  | <0.001** |
|   | Somewhat difficult   | 32.4 (728)    | 52.5 (363) | 41.0 (132) | 34.7 (197) | 47.0 (238)   | 38.3 (1658) |          |          |
|   | Very difficult       | 3.1 (69)      | 3.6 (25)   | 0.3 (1)    | 5.3 (30)   | 1.2 (6)      | 3.0 (131)   |          |          |
|   | Extremely difficult  | 0.8 (18)      | 0.0 (0)    | 0.0 (0)    | 1.9 (11)   | 1.0 (5)      | 0.8 (34)    |          |          |
| Whether you needed some medicine  | No                   | 66.7 (1497)   | 69.8 (483) | 75.8 (244) | 73.0 (414) | 77.5 (392)   | 69.9 (3030) | 42.085   | <0.001** |
|   | Occasionally         | 30.6 (684)    | 25.7 (178) | 22.7 (73)  | 24.0 (136) | 20.9 (106)   | 27.2 (1177) |          |          |
|   | Regularly            | 2.9 (65)      | 4.5 (31)   | 1.6 (5)    | 3.0 (170)  | 1.6 (8)      | 2.9 (126)   |          |          |

*Profession£: Med Prof= Medical Profession, Busin=Business, Teach=Teachers, Stds= Students, Non-Med Prof= Non- medical profession. Popu = Population*  
*P Value: \*\* Statistically highly significant (p < 0.001).*

Table 4 shows the comparison of mean values of depression assessed by PHQ-9 scale among different profession groups showing maximum mean score in business group and minimum mean score in teachers group. Further multiple comparisons of the mean PHQ-9 scores among different profession groups was done using Mann-Whitney Test shown in table 5.

**Table 4: Comparison of mean values of depression assessed by PHQ-9 among different professions.**

| Prof £       | N    | Mean Score | ± SD    | Median | Inter-Quartile Range | Mean Rank | Standard error of mean | 95% CI |        | Minimum | Maximum |
|--------------|------|------------|---------|--------|----------------------|-----------|------------------------|--------|--------|---------|---------|
| Med Prof     | 2246 | 3.6318     | 3.63382 | 3.000  | 6.000                | 2177.61   | 0.07668                | 3.4814 | 3.7822 | 0.00    | 20.00   |
| Busin        | 692  | 3.7355     | 3.19293 | 4.000  | 5.000                | 2287.74   | 0.12138                | 3.4972 | 3.9739 | 0.00    | 16.00   |
| Teach        | 322  | 2.8354     | 2.98192 | 2.000  | 5.000                | 1920.86   | 0.16618                | 2.5085 | 3.1623 | 0.00    | 17.00   |
| Stds         | 567  | 3.5785     | 3.74644 | 3.000  | 6.000                | 2127.84   | 0.15734                | 3.2695 | 3.8875 | 0.00    | 19.00   |
| Non-med Prof | 506  | 3.3538     | 3.00088 | 3.000  | 4.250                | 2155.31   | 0.13341                | 3.0917 | 3.6159 | 0.00    | 17.00   |
| Total        | 4333 | 3.5497     | 3.47324 | 3.000  | 6.000                | -         | 0.05276                | 3.4463 | 3.6532 | 0.00    | 20.00   |

Prof£ = Profession, Med Prof= Medical Profession, Busin=Business, Teach=Teachers, Stds= Students, Non-Med Prof= Non- medical profession. Popu = Population

Table 5 shows multiple comparisons of PHQ-9 score among different professional groups using Mann-Whitney Test. Results show Statistically significant relationship of medical profession group with business and teachers group, business group with teachers, students and non-medical profession group, teachers group with students and non-medical profession group where as statistically non- significant relationship of medical profession was observed with students and non-medical profession group and students with non-medical profession group.

**Table 5: Multiple comparison of PHQ-9 score among professions using Mann-Whitney Test.**

| Table 5: Multiple comparison of PHQ-9 score among professions using Mann-Whitney Test |                           |         |           |
|---|---------------------------|---------|-----------|
| Professions   | Professions               | Z value | P value   |
| Medical Professionals   | Business                  | 1.998   | 0.046*    |
|   | Teachers                  | 3.442   | 0.001*    |
|   | Students                  | 0.923   | 0.356; NS |
|   | Non-medical Professionals | 0.270   | 0.787; NS |
| Business  | Teachers                  | 4.496   | <0.001**  |
|   | Students                  | 2.091   | 0.037*    |
|   | Non-medical Professionals | 2.138   | 0.032*    |
| Teachers  | Students                  | 2.288   | 0.022*    |
|   | Non-medical Professionals | 2.862   | 0.004*    |
| Students  | Non-medical Professionals | 0.292   | 0.770; NS |

**P Value:** \*\*Statistically highly significant ( $p < 0.001$ ), \*Statistically significant ( $p < 0.05$ ), Statistically non-significant ( $p > 0.05$ ) (NS)

#### IV. Discussion:

In the contemporary world, COVID-19 pandemic has become the most challenging and devastating public health crises spiking the excruciating psychological and mental health problems like anxiety and depression globally and India is no exception. Depression is considered as major public health issue and has been a focus of attention for researchers and is more common in women than men. [9] But because of paucity of studies on prevalence of depression present survey was conducted to investigate the prevalence of depression using PHQ-9 scale among different professions during COVID-19 pandemic. A number of case-finding methods ranging from 2 to 28 items exist for detecting depression in primary care.[13, 14] But PHQ-9 is a reliable and valid measure serving dual purpose for diagnosis of depression as well as grade its severity.[10]

Results of present survey show 73.3% (IQR 6.0, 95% CI 3.44-3.65) prevalence of depression in study population including 38.8% minimal depression, 28.1% mild depression, 5.3% moderate depression and 1.1% had severe depression. An online survey by Grover et al using PHQ-9 scale documented 71.0% minimal depressive symptoms, 18.5% mild depressive symptoms, 5.8% moderate depressive symptoms, 3.0% moderate-to-severe depression and 1.7% reported severe depressive symptoms.[15] Results of above mentioned survey was comparable to the present survey except that minimal depression was much more in survey by Grover et al.

A systematic review and meta-analysis of 31 studies documented 45% pooled prevalence of depression including 52% by nine studies using PHQ-9  $\geq 5$  criteria which is comparable to results of our study considering  $\geq 5$  PHQ-9 score cut-off.[16] Similarly a meta-analysis of twelve studies during COVID-19 pandemic documented 25% pooled prevalence of depression in general population including 16% among studies using the PHQ-9 scale.[17] However, a meta-analysis of only community studies from 1994 and 2014 from 30 countries using self-reported instruments documented 17.30% prevalence of depression.[18] The Global Burden of Disease Study 1990–2017 reported that total disease burden of mental disorders has almost doubled since 1990 in India.[2] Thus inspite of methodological differences and past data, results of present study suggest increased prevalence of depression during COVID-19 pandemic.

Prevalence of depression among different profession groups in present survey showed that 74.7% (IQR 6.0, 95% CI 3.48-3.78) among medical profession group had depression, 75.1% (IQR 5.0, 95% CI 3.49-3.97) among business group, 65.8% (IQR 5.0, 95% CI 2.50-3.16) among teachers group, 67.9% (IQR 6.0, 95% CI 3.26-3.88) among students and 75.1% (IQR 3.0, 95% CI 3.09-3.61) had depression among non-medical profession group. A survey using PHQ-9 scale on severity of depression among health care workers (HCWs) documented 68.8% minimal depression, 19.4% mild, 6.2% moderate, 4.0% moderately severe and 1.6% severe depression whereas among non health care workers (non-HCWs) 73.6% had minimal depression, 17.4% mild, 5.4% moderate, 1.8% moderately severe and 1.9% severe depression.[15] Results of this survey were comparable to present survey except that minimal depression was more than our survey. A study from China during COVID-19 pandemic using PHQ-9 scale suggests 36.9% HCWs suffered from sub threshold mental health disturbances.[19] Results of present study are comparable to the results of above mentioned study among HCWs, if only mild depression is taken into account. Prevalence of depression according to severity among profession groups is shown in table 1. Prevalence of depression in present study among male group was 69.7% including 42.8% minimal depression, 22.3% mild depression, 4.0% moderate depression, and 0.7% severe depression. Prevalence of depression among females was 79.3% including 31.8% minimal depression, 38.2% mild depression 7.5% moderate depression and 1.8% had severe depression. Prevalence of depression according to severity and gender among profession groups is shown in table 1.

Gender subgroup analysis by systematic review and meta-analysis of nine studies using PHQ-9 scale documented 39% pooled prevalence of depression for male and 50% for females.[16] Results of meta-analysis are in line with results of the present study. A web-based survey using PHQ-9 scale showed 82.4% students had mild to severe depression including 67.3% males and 32.6% female. Whereas 11.8% males had none-minimal

depression, 21.6% mild, 17.6% moderate, 9.5% moderately severe and 9.5% had severe depression. Similarly 5.9% females had none-minimal depression, 6.9% mild, 10.3% moderate, 5.7% moderately severe and 4.0% had severe depression.[20] Results of above mentioned study are comparable to students group of present study except that in our study females reported more depression than males. A study based on the cut-off scores of 10 for PHQ-9 scale documented 22.1 % prevalence of depression observing no significant difference between males and females.[21] Another study using PHQ-9 scale found 17 % depressed subjects and observed significantly increased likelihood for depression among younger age and female gender.[22]

Prevalence of depression among 20-40 years age group in our study was 72.3%, including 36.9% minimal depression, 27.6% mild depression, 6.3% moderate depression and 1.4% had severe depression. Prevalence of depression among 41-60 years group was 75.8% including 42.4% minimal depression, 28.4% mild depression, 4.4% moderate depression and 0.6% had severe depression whereas prevalence of depression among >60 years was 66.4% including 32.1% minimal depression, 29.1% mild depression 4.0% moderate depression and 1.3% had severe depression. Prevalence of depression according to severity and age groups among profession groups is shown in table 2.

In present study the response of study population and different profession groups to the question about 'difficulties to do work, takes care of things at home, or get along with other people' showed that 57.9% did not face 'any difficulty' at all, 38.3% expressed 'somewhat difficulty', 3.0% expressed 'very difficult' and 0.8% expressed 'extremely difficult' response. The response by the study population and different profession groups was observed to be statistically highly significant ( $\chi^2 = 151.848$ ,  $p < 0.001$ ) as shown in table 3.

Response to the question, whether you needed some medicine was 'not needed' by 69.9%, 'occasional treatment' by 27.2%, 'regular need for treatment' was expressed by 2.9% of study population. Response by study population and different profession groups was observed to be statistically highly significant ( $\chi^2 = 42.085$ ,  $p < 0.001$ ) as shown in table 3.

Evidence suggests that prevalence of depression accessed by self-report instruments versus clinical interviews appeared to be significantly higher (17.3% vs. 8.5%).[18] So this can be the reason for higher prevalence of depression in the present study. Diagnostic interviews are labour intensive and time-consuming and if used alone, can under-detect depressive symptoms in the community setting. [23] So experts suggest multi-modal assessment approach for study of depression in epidemiological settings.[18]

Because of paucity of studies, present study was unable to compare all aspects of the results, but increased prevalence of depression in present study suggests need for increased focus on mental health issues and need for larger studies. Mental health scenario in India was grim even in pre-COVID-19 era and posed a greater public health problem during COVID-19 pandemic.[24] Results of present study suggest that mental health care should be universally available within provisions of national public health agenda. Government of India, Indian psychiatry society and institutions like NIMHANS has initiated several mental health initiatives, web portals and issued Psycho-Social toll-free helpline-08046110007 for information about stress coping strategies, videos, advices, yoga and meditation practices to help people cope with mental health issues especially the vulnerable section of society.

Suggestion for formation of 'Psychological intervention medical team' to formulate mental health care strategies for mental health issues during the COVID-19 pandemic was great initiative. [25]

## **V. Limitations:**

Present survey had major limitations of sample selection bias as study proforma was distributed physically and thorough social media platforms, but under the distressful COVID-19 situation, this was probably the best possible way to seek population response. Study used self reporting method only in English which may have resulted in bias for social desirability and generalisability of the survey sample. Strength of present survey was being one of the largest reported in the literature using easy well reproducible and validated PHQ-9 scale for assessment of depression in community settings.

## **VI. Conclusion:**

COVID-19 pandemic has caused extraordinary mental health problems by most insidious ways aggravating pre-existing issues and posing new challenges. Present survey has documented increased prevalence of depression among various profession groups across gender and age groups using PHQ-9 scale useful for assessment of prevalence of depression in community settings. Since depression is a disorder of public health importance, results of our study necessitates increased focus mental health issues including depression. India has done sufficiently good work initiating several mental health care initiatives, still India has to go a long way to provide universally available mental health care. Most importantly there is an urgent need to generate India specific data on mental issues and our study is a small contribution in this effort.

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