

# Statistical Analysis of Anxiety and Self-Perceived Stress Level among People during COVID-19 Pandemic

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**Abstract:** In this paper, a survey was conducted online to analyze anxiety and perceived stress level among the people living in Delhi-NCR. A questionnaire was developed on the web, and its link was distributed via the internet to the people of Delhi NCR, which consists of students, professionals, nonprofessional's, etc. The results confirm that between the two groups, female shows more anxiety level, whereas males have more perceived stress during the COVID-19 outbreak. Alternatively, the level of anxiety is high among the people aged 36-45 years, whereas perceived stress rate was higher among older people.

**Keywords:** COVID-19, Anxiety, Perceived Stress, Likert, Mann-Whitney U Test, Kruskal Wallis Test, R.

## 1 Introduction

Extreme intense respiratory disorder coronavirus 2 (SARS-CoV-2) - from now on alluded to as COVID-19 - was first emerged in Wuhan, China, on December 31, 2019. India witnessed the first coronavirus case on January 30, 2020. On March 11, 2020, the WHO announced the worldwide spread of COVID-19 as a pandemic. From that point forward, there have been quickly expanding cases and passing related to the infection all around. In India, a 14-hour intended community curfew has been imposed on March 22, 2020, followed by a declaration of broad limitations on the opportunity of development, the conclusion of unnecessary organizations, and the prerequisite to remain at home besides constrained purposes in COVID-19 hot spots and all major cities. After that, the countrywide lockdown was declared on 24 March for 21 days. On April 14, India stretched the countrywide lockdown until 3 May, which was further extended by two-week starting 3rd and 17th May with substantial relaxation.

Developing discoveries from China recommend that greater than 25% of the all-inclusive community experienced mild to severe levels of stress-or anxiety-related manifestations considering COVID-19 ([1]). These discoveries are like those announced during the SARS episode ([2]) and in the 2009 H1N1 pandemic ([3]; [4]). Investigations of past pestilences and pandemic show that uneasiness, or the scarcity in that department, is a significant driver of conduct ([5]). Individuals having least awareness about a viral infection are more in opposition to take part in cleanliness practices (e.g., hand washing), less liable to hold fast to physical removing commands, and are less inclined to get immunized if an antibody is accessible ([5]). However, individuals with extreme anxiety are bound to take part in socially problematic practices; for example, alarm purchasing for flooding superfluously into emergency clinics and centers when they misconstrue their minor diseases as indications of a specific illness ([6]; [7]).

Natural fear of COVID-19 develops with the enormously high infection rate and comparatively high mortality. It has been reported that encountering persons who are possibly infected with COVID-19 creates fear ([8]). Sadly, anxiety may intensify the harm of the illness itself. The beginning of COVID-19 ([9]) and its pandemic nature has intensified anxiety globally, leading to humiliation ([10]; [8]). One typical nature of contagious illness contrasted with other situations is anxiety. Anxiety is directly correlated with its spread rate and moderate (rapidly and invisibly), as well as its sickness and death. Due to anxiety of a high level, persons may not feel well when responding to COVID-19.

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Although the priority is given to the medication of COVID-19, its disease management, effective vaccine, and medication remedy rate ([11]; [12]), the psychosocial part has not been considered yet. However, as countries must work on lowering the spread of COVID-19, they should also work on anxiety and perceived stress level of the persons to attain the complete goal of having a society free of COVID-19. There is a squeezing need to create an observationally stable proportion of COVID-19-related pressure and anxiety-related indications.

Research and clinical perceptions (e.g., [5]) recommend that during times of pandemic, numerous individuals display dread and anxiety-related trouble reactions that incorporate the accompanying: Fear of getting tainted, a suspicion of coming into contact with potentially sullied items or surfaces, a terror of outsiders who may be conveying contamination (i.e., sickness-related xenophobia), fear of the financial results of the pandemic (e.g., work misfortune), regular checking and consolation chasing concerning pandemic-related dangers, and awful pressure side effects about the epidemic (e.g., bad dreams and meddling contemplations). Not only people but healthcare workers are affected by the pandemic, and about 10% are reported to show the symptoms of stress during and after the previous pandemics ([13]). A study from Taiwan during the epidemic SARS explored stress responses among hospital staff and reported 5% suffered from an acute stress disorder, 20% felt stigmatized, and 9% reported reluctance to work or had considered resignation ([14]).

This study aims to test anxiety and self-perceived stress levels among the citizens of India during this pandemic. Between groups, a comparison was made based on gender and age in the areas of Delhi NCR during the epidemic. The remainder of the paper covers a detailed section of materials and methods followed by results, discussion, and implications. Eventually, relevant references are presented.

## 2 Materials and Methods

This paper is designed to analyze the impact of COVID-19 on anxiety and perceived stress. Therefore, for conducting the study of anxiety and perceived stress level from mid April 2020 to mid July 2020 a cross-sectional research design has been followed and a structured questionnaire has been developed online. The questionnaire was divided into three parts: The first part was dedicated to demographic characteristics of respondents such as gender, age, education level, employment status; the second part involved anxiety level consisting of 20 questions taken from Zung's self-rating anxiety scale ([15]) to be scored on a scale of 1-to-4 criteria (A little of the time—1, Some of the time—2, Good part of the time—3, and Most of the time—4); and the third part had 20 questions on perceived stress scored on a scale of 1-to-6 (Not at all—1, Normal—2, Mild—3, Moderate—4, Severe—5, and Extremely Severe—6). An anonymous survey was conducted using the questionnaire of different citizens living in Delhi NCR. The link of the web-based questionnaire was distributed to a sample of 1050 respondents around Delhi, Faridabad, Greater Noida, Noida, Gurugram, and Ghaziabad through e-mail using purposive and snowball sampling techniques. The questionnaire requested/urged the participants to fill the responses online. After receiving the responses, the data were stored in the database. Incomplete responses and ambiguous answers were removed from the sample. Finally, a sample of 882 responses was included in the study, and data were cleaned and processed using R-Programming software for further analysis. The data were divided based on gender and age groups, then gender- and age group-wise comparison of anxiety and perceived stress level was made using the Mann-Whitney U test and Kruskal-Wallis test, respectively. All the analysis was conducted and performed using R-Programming software.

## 3 Results

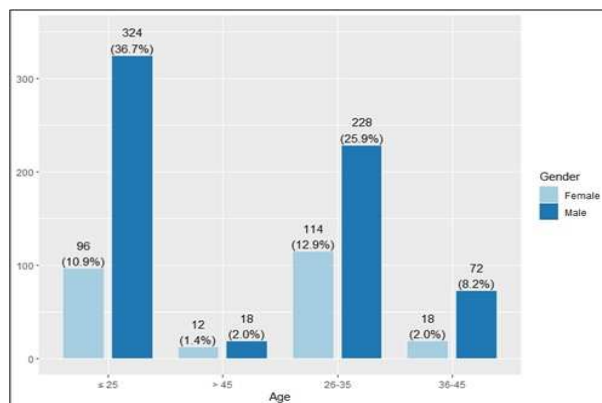
A total sample of eight hundred and eighty-two filled questionnaires were received between 15-April and 15-July 2020, 240 (27.21 percent) from females and 642 (72.79 percent) from males. In this study, males' response rates were higher than females. Other demographic details are provided in Table (1). The distribution of the average ages of the groups by gender is shown in Figure (1), whereas the distribution of groups at the educational level by gender is shown in Figure (2). The respondents aged over 45 years are less than 5 percent in the two groups. The graphical representation of Likert items indicating the percentage of respondents for each item of anxiety and perceived stress can be seen respectively in Figure (3) and Figure (4).

Table (2) presents the mean scores with a standard deviation of the 20 anxiety items for the groups of males and females. Out of 20 anxiety items, twelve shows significant differences between the two groups. There were also significant differences among the two groups in the summary anxiety scores of the 15 direct questions and the five reverse questions, as well as the total scores (after recoding the reverse questions). The highest values were found for females, followed by males. Table (3) shows the results for the 20 items of the peoples' perceived sources of stress from COVID-19. Twelve of 20 items show significant differences in their response.

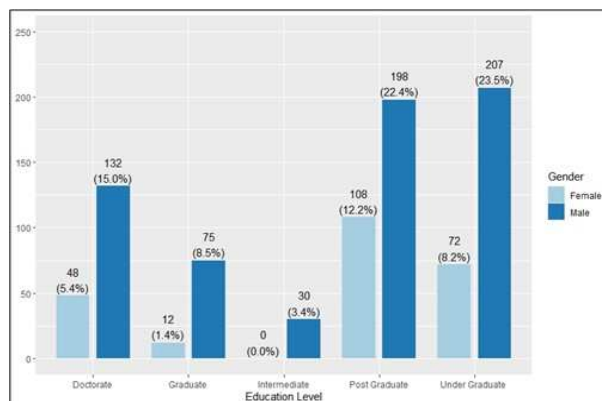
Furthermore, anxiety level and perceived stress levels are also analyzed and checked for different age groups. Table (4) represents the mean anxiety score for four age groups. The highest level of mean anxiety score was found among the

**Table 1:** Demographic characteristics of respondents (N=882)

Demographic Variable		Total	Percentage (%)
Gender	Female	240	0.27
	Male	642	0.73
Age	25 and Under	420	0.48
	26 - 35	342	0.39
	36 - 45	90	0.10
	46 and above	30	0.03
Education Level	Intermediate	30	0.03
	Undergraduate	279	0.32
	Graduate	87	0.10
	Postgraduate	306	0.35
	Doctorate	180	0.20
Employment Status	Job in a private sector	278	0.32
	Job in a public sector	106	0.12
	Student	450	0.51
	Business owner	18	0.02
	Other	30	0.03



**Fig. 1:** Age distribution of respondents by gender



**Fig. 2:** Distribution of education level of respondents by gender

**Table 2:** Gender wise anxiety level measured using Zung's self-rating anxiety scale

		Female	Male	Overall
1	I feel more nervous and anxious than usual**	2.50(1.40)	2.41(1.45)	2.44(1.44)
2	I feel afraid for no reason at all**	1.98(1.28)	1.90(1.31)	1.92(1.30)
3	I get upset easily or feel panicky	1.70(1.21)	1.72(1.21)	1.71(1.21)
4	I feel like I'm falling apart and going to pieces**	2.62(1.24)	2.21(1.39)	2.32(1.37)
5 $\mathfrak{R}$	I feel that everything is all right and nothing bad will happen	2.55(1.05)	2.37(1.03)	2.42(1.04)
6	My arms and legs shake and tremble*	1.23(0.69)	1.44(0.99)	1.38(0.92)
7	I am bothered by headaches and back pain**	2.30(1.31)	1.79(1.27)	1.93(1.30)
8	I feel weak and get tired easily**	2.42(1.25)	1.90(1.30)	2.04(1.31)
9 $\mathfrak{R}$	I feel calm and can sit still easily**	2.17(1.07)	2.50(1.02)	2.41(1.04)
10	I can feel my heart beating fast**	1.98(1.30)	1.88(1.35)	1.90(1.33)
11	I am bothered by dizzy spells	1.80(1.25)	1.75(1.27)	1.76(1.26)
12	I have fainting spells or feel like it**	1.60(1.09)	1.47(1.05)	1.50(1.07)
13 $\mathfrak{R}$	I can breathe in and out easily	2.73(0.81)	2.58(0.85)	2.62(0.84)
14	I get feelings of numbness and tingling in my fingers and toes**	1.68(1.11)	1.55(1.10)	1.59(1.10)
15	I am bothered by stomachache or indigestion	1.57(1.07)	1.61(1.16)	1.60(1.14)
16	I have to empty my bladder often	2.17(1.34)	2.07(1.33)	2.10(1.33)
17 $\mathfrak{R}$	My hands are usually dry and warm	2.10(1.22)	2.00(1.22)	2.03(1.22)
18	My face gets hot and blushes*	1.82(1.23)	1.64(1.14)	1.69(1.17)
19 $\mathfrak{R}$	I fall asleep easily and get a good night's rest	2.30(1.19)	2.40(1.14)	2.37(1.15)
20	I have nightmares**	1.82(1.18)	1.71(1.23)	1.74(1.22)
Sum of direct questions**		29.19(7.38)	27.05(5.51)	27.62(6.29)
Sum of reverse questions		11.85(3.66)	11.85(3.03)	11.85(3.21)
Total anxiety score **		41.04(7.96)	38.90(5.94)	39.47(6.71)
Total anxiety score (reverse question recorded)**		37.38(8.51)	34.43(6.60)	35.40(7.38)

\*P-value of Mann-Whitney U test  $p < 0.05$  \*\* P-value of Mann-Whitney U test  $p < 0.01$   $\mathfrak{R}$  - Reverse question

people of age group 36 to 45 years, which is slightly higher than the limit of the normal range 20-34 ([16]). Whereas the mean score for the people aged 46 and above was just above the normal range, followed by the age group 25 years and under. The lowest mean score was found in the age group of 26 to 35 years, which is under the normal limit. Sixteen of 20 shows the significant differences between the four groups. Next, the mean score of self-perceived stress for the different age groups is reported in Table (5). The high level of perceived stress was found among the older people, and its value decreases as the age group decreases.

## 4 Discussion and Implications

An online study led to survey anxiety level and perceived stress level among residents during COVID-19 episode in India. This methodology has a few points of interest, i.e., high effectiveness and minimal effort. A much-recognized problem with web-based surveys has coverage error. It is of less apprehension because a thorough list of e-mail addresses was available for students, professionals, and others on different sources (i.e., University websites, Companies website, etc.), and it was used to contact the respondents. The low response rate and lack of information of the non-respondents were one of the significant limitations of the survey. The choice inclination can be generous. However, precise contrasts among respondents and non-respondents cannot be precisely discovered.

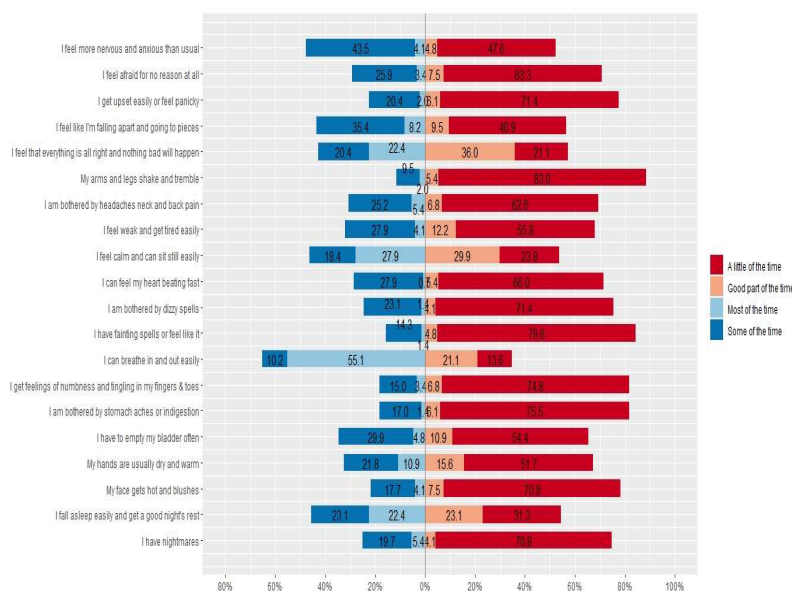
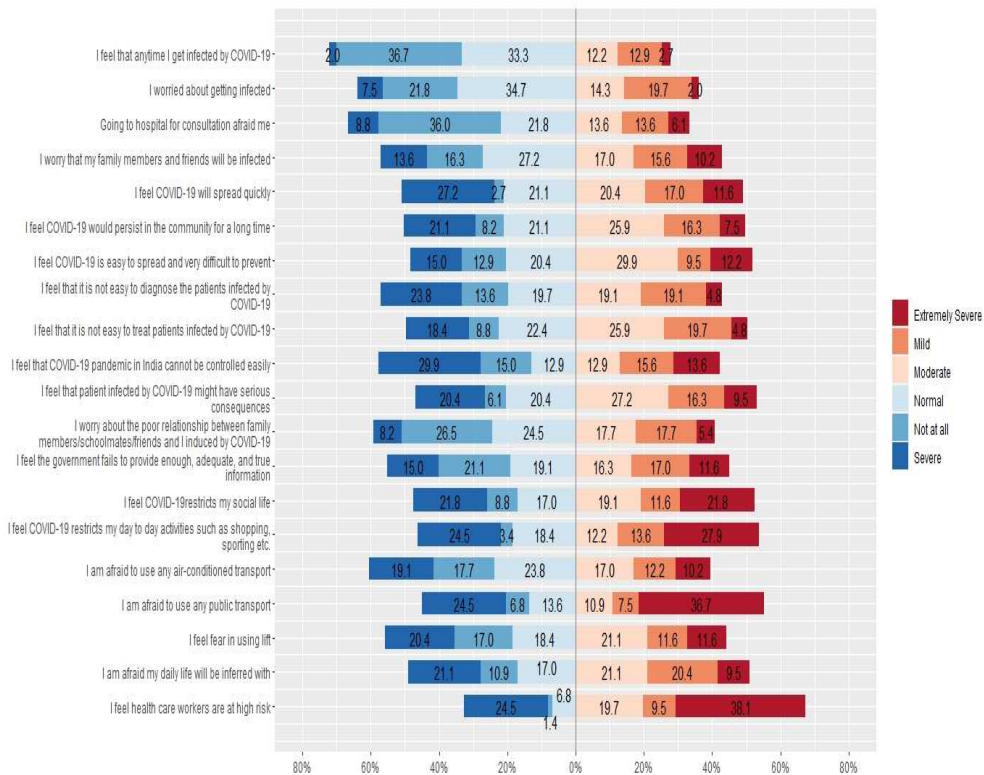


Fig. 3: The diverging stacked bar chart indicating the percentage of respondents for each anxiety scale

Table 3: Gender wise self-perceived stress level among respondents

#	Perceived source of stress	Female	Male	Overall
1	I feel that anytime I get infected by COVID-19**	3.83(1.20)	3.99(1.13)	3.95(1.15)
2	I worried about getting infected**	3.52(1.34)	3.86(1.21)	3.77(1.26)
3	Going to the hospital for consultation afraid me**	3.80(1.52)	4.00(1.34)	3.95(1.39)
4	I worry that my family members and friends will be infected**	3.92(1.78)	3.54(1.39)	3.65(1.52)
5	I feel COVID-19 will spread quickly	3.73(1.86)	3.66(1.66)	3.68(1.72)
6	I feel COVID-19 would persist in the community for a long time	3.65(1.51)	3.71(1.57)	3.69(1.56)
7	I feel COVID-19 is easy to spread and very difficult to prevent**	3.35(1.64)	3.65(1.47)	3.57(1.53)
8	I feel that it is not easy to diagnose the patients infected by COVID-19**	4.12(1.75)	3.81(1.49)	3.90(1.57)
9	I feel that it is not easy to treat patients infected with COVID-19**	3.92(1.68)	3.56(1.38)	3.66(1.48)
10	I feel that COVID-19 pandemic in India cannot be controlled easily	3.90(1.79)	3.90(1.84)	3.90(1.82)
11	I feel that patient infected with COVID-19 might have serious consequences*	3.15(1.61)	3.75(1.54)	3.59(1.58)
12	I worry about the poor relationship between family members/schoolmates/friends and I induced by COVID-19**	3.50(1.47)	3.82(1.33)	3.73(1.38)
13	I feel the Government fails to provide enough, adequate, and correct information	3.55(1.54)	3.70(1.63)	3.66(1.61)
14	I feel COVID-19 restricts my social life	3.65(1.81)	3.37(1.80)	3.45(1.81)
15	I feel COVID-19 restricts my day to day activities such as shopping, sporting, etc.**	3.58(1.80)	3.19(1.95)	3.29(1.92)
16	I am afraid of using any air-conditioned transport	3.75(1.56)	3.87(1.58)	3.84(1.58)
17	I am afraid of using any public transport	3.25(1.96)	3.18(2.06)	3.20(2.03)
18	I feel afraid of using lift**	3.65(1.75)	3.84(1.60)	3.79(1.63)
19	I am afraid that my daily life will be disturbed**	3.73(1.71)	3.59(1.62)	3.63(1.64)
20	I feel health care workers are at high risk	2.98(2.08)	2.97(1.95)	2.97(1.99)

\*P-value of Mann-Whitney U test  $p < 0.05$  \*\* P-value of Mann-Whitney U test  $p < 0.01$



**Fig. 4:** The diverging stacked bar chart indicating the percentage of respondents for each perceived stress scale

Due to these limitations, the results of the study are interpreted in limits. In this survey, two groups of citizens based on gender were studied. Non-respondents do not participate in the study as they are not much concerned about COVID-19 outbreak compared to respondents who took the trouble to respond to the survey. Therefore, anxiety scores of the respondents could be higher than those of the non-respondents. Though, this bias would differ between the groups appears doubtful but since ages, the comparison between male and female has been made. Several researchers have addressed the behavior of males and females in different situations and learned the difference or change of behavior age-wise. Hence, between-group comparisons during this pandemic is still required.

According to the analysis, the mean anxiety scores are a little bit high for females than males. Symptoms of anxiety such as nervousness, anxiety, panic, headaches, quickly getting tired, feeling weakness, etc. are more significant among females. However, as the sampling units belong to different locations, it can be assumed that one of the possible explanations for the observed differences between the two groups could be the distance of the respondents from the epicenter of the COVID-19 outbreak. Males also suffer from anxiety, but still, they are calm and stable compared to females, especially the females who are working from home as well. However, if we talk about getting sound sleep-in night or feeling of dizzy spells, there is no significant difference between the two groups. Traditionally, it was a perception that males are more responsible for running the home, so they feel more stressed than females. Maybe that is the reason why the results of perceived stress are the opposite. The two groups under study, have different perceived stress level. Males are more stressed about getting infected by COVID-19. They are more afraid of going to the hospital for consultation. They are stressed about the spread of COVID-19 and perceive that infection has serious consequences. Also, they are more cautious when using lifts.

Alternatively, females are naturally concerned about their family and friends, so females are more stressed about the spread of infection among the family members and friends. Also, females perceived that treatment is difficult. They are worried about the changes in their day-to-day life, such as shopping, social gatherings, etc. Moreover, there was a significant difference in anxiety level and perceived stress between the groups. Peoples aged 36 to 45 are more anxious than the younger and older generation, whereas older peoples are more stressed due to the outbreak of the pandemic. Similar studies have been conducted but mostly in specific areas like health care ([17], [18]), etc., and outside India. In the context of India, no previous study has been conducted as per the review of the literature.

**Table 4:** Age group-wise anxiety level measured using Zung’s self-rating anxiety scale

		Age Group (in year)			
		25 & Under	26 - 35	36 - 45	46 & above
1	I feel more nervous and anxious than usual**	2.27(1.45)	2.42(1.43)	3.13(1.21)	2.80(1.49)
2	I feel afraid for no reason at all**	1.74(1.20)	1.91(1.30)	2.87(1.38)	1.60(1.22)
3	I get upset easily or feel panicky**	1.80(1.26)	1.44(0.99)	2.53(1.46)	1.20(0.41)
4	I feel like I’m falling apart and going to pieces**	2.21(1.36)	2.40(1.39)	2.67(1.25)	1.80(1.19)
5 $\mathfrak{R}$	I feel that everything is all right and nothing bad will happen**	2.51(1.03)	2.30(1.06)	2.27(1.00)	3.00(0.64)
6	My arms and legs shake and tremble	1.40(0.93)	1.37(0.91)	1.40(1.03)	1.20(0.41)
7	I am bothered by headaches and back pain**	1.81(1.26)	1.98(1.35)	2.33(1.25)	1.80(1.19)
8	I feel weak and get tired easily	2.07(1.33)	1.88(1.23)	2.60(1.41)	1.80(1.19)
9 $\mathfrak{R}$	I feel calm and can sit still easily**	2.57(0.98)	2.30(1.08)	2.33(1.08)	1.60(0.81)
10	I can feel my heart beating fast**	2.00(1.37)	1.72(1.23)	2.00(1.42)	2.40(1.38)
11	I am bothered by dizzy spells	1.76(1.26)	1.75(1.26)	1.67(1.20)	2.20(1.49)
12	I have fainting spells or feel like it**	1.44(1.02)	1.46(1.01)	1.87(1.32)	1.80(1.19)
13 $\mathfrak{R}$	I can breathe in and out easily**	2.63(0.87)	2.61(0.72)	2.40(1.09)	3.20(0.76)
14	I get feelings of numbness and tingling in my fingers & toes	1.57(1.10)	1.60(1.12)	1.73(1.13)	1.20(0.41)
15	I am bothered by stomachache or indigestion*	1.57(1.10)	1.67(1.19)	1.67(1.20)	1.00(0.00)
16	I have to empty my bladder often**	2.16(1.32)	2.07(1.38)	2.07(1.30)	1.80(1.19)
17 $\mathfrak{R}$	My hands are usually dry and warm**	1.79(1.10)	2.32(1.26)	2.13(1.42)	1.80(1.19)
18	My face gets hot and blushes*	1.81(1.26)	1.60(1.09)	1.47(1.03)	1.60(1.22)
19 $\mathfrak{R}$	I fall asleep easily and get a good night’s rest**	2.43(1.19)	2.39(1.04)	2.40(1.36)	1.40(0.50)
20	I have nightmares**	1.73(1.24)	1.65(1.12)	2.33(1.45)	1.20(0.41)
	Sum of direct questions**	27.34(6.17)	26.92(6.17)	32.34(6.47)	25.40(7.12)
	Sum of reverse questions	11.93(3.33)	11.92(3.02)	11.53(3.15)	11.00(2.44)
	Total anxiety score **	39.27(6.87)	38.84(6.05)	43.87(7.44)	36.40(9.11)
	Total anxiety score (reverse question recoded)**	34.10(7.16)	33.90(7.59)	38.57(6.95)	35.00(5.50)

\*P-value of Kruskal-Wallis test  $p < 0.05$  \*\*P-value of Kruskal-Wallis test  $p < 0.01$   $\mathfrak{R}$  -Reverse question

#### 4.1 Suggestions and Future Implications

There are some limitations of this study, such as a low response rate, limited sample size, geographical area, and possible selection bias. However, this study has a scope of learning. Any kind of pandemic or other situations like this can cause anxiety and stress among the peoples and affect health as well as life quality. Therefore, intensified preparing in disease control measures and the arrangement of clear rules ought to be given to all in such cases. Likewise, training of stress management, which has been demonstrated to be viable in lessening stress and anxiety, ought to be given to all as a preventive measure during future outbreaks ([19]). Researchers can extend this research by expanding the geographical area and compare the level of anxiety and stress with the people of other countries. The study can also be extended to analyze the impact of pandemic occupation wise. Policymakers and the government can have an idea about anxiety and stress levels and work on the measures which will reduce the impact of these disorders on the health of the peoples and subsequently improves life quality.

**Table 5:** Age group-wise self-perceived stress level among respondents

#	Perceived source of stress	Age Group			
		25 & Under	26 - 35	36 - 45	46 & above
1	I feel that anytime I get infected by COVID-19	4.10(1.07)	3.91(1.19)	3.27(1.24)	4.20(0.76)
2	I worried about getting infected**	3.81(1.19)	3.68(1.25)	3.87(1.60)	3.80(1.19)
3	Going to the hospital for consultation afraid me**	3.86(1.31)	4.07(1.51)	3.53(1.27)	5.00(0.64)
4	I worry that my family members and friends will be infected**	3.86(1.49)	3.56(1.58)	3.00(1.27)	3.60(1.38)
5	I feel COVID-19 will spread quickly	3.63(1.69)	3.70(1.82)	3.73(1.53)	4.00(1.29)
6	I feel COVID-19 would persist in the community for a long time	3.40(1.49)	3.81(1.63)	4.53(1.21)	4.00(1.49)
7	I feel COVID-19 is easy to spread and very difficult to prevent	3.61(1.37)	3.58(1.72)	3.60(1.59)	2.80(0.76)
8	I feel that it is not easy to diagnose the patients infected by COVID-19**	4.03(1.50)	3.82(1.74)	3.53(1.32)	4.00(0.91)
9	I feel that it is not easy to treat patients infected with COVID-19**	3.50(1.41)	3.91(1.58)	3.60(1.41)	3.20(0.76)
10	I feel that COVID-19 pandemic in India cannot be controlled easily	3.77(1.82)	3.93(1.84)	4.33(1.75)	4.00(1.71)
11	I feel that patient infected with COVID-19 might have serious consequences	3.46(1.50)	3.72(1.66)	3.73(1.49)	3.40(1.77)
12	I worry about the poor relationship between family members/schoolmates/friends and I induced by COVID-19**	3.70(1.28)	3.75(1.53)	4.00(1.27)	3.20(1.00)
13	I feel the Government fails to provide enough, adequate, and correct information	3.53(1.50)	3.58(1.75)	4.47(1.32)	4.00(1.44)
14	I feel COVID-19 restricts my social life	3.60(1.68)	3.20(1.92)	3.73(1.92)	3.40(1.65)
15	I feel COVID-19 restricts my day to day activities such as shopping, sporting, etc.*	3.30(1.83)	3.35(2.02)	2.93(2.06)	3.60(1.65)
16	I am afraid of using any air-conditioned transport	3.71(1.44)	3.89(1.76)	4.33(1.63)	3.40(0.50)
17	I am afraid of using any public transport	3.21(1.96)	3.16(2.12)	3.07(2.09)	3.80(1.75)
18	I feel afraid of using lift**	3.86(1.49)	3.82(1.69)	3.40(2.04)	3.60(1.38)
19	I am afraid my daily life will be interfered with**	3.44(1.61)	3.63(1.63)	4.33(1.71)	4.00(1.44)
20	I feel health care workers are at high risk	3.17(2.00)	2.91(1.98)	2.40(1.90)	2.60(1.89)
Total perceived stress score		72.55(13.28)	72.98(17.66)	73.38(17.60)	73.60(9.54)

\*P-value of Mann-Whitney U test  $p < 0.05$  \*\*P-value of Mann-Whitney U test  $p < 0.01$

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## Conflict of Interest

The authors declare that they have no conflict of interest.

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