

Occupational Stress and Mental Health: A Longitudinal Study in High-Stress Professions

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Abstract:

The study focused on the growing concerns related to occupational stress and its impact on the mental health of professionals in Bengaluru, a major tech hub in India. The primary aim of this research was to study the occupational stress and mental health of the professionals working in Bengaluru. The data was collected from 87 medical practitioners, 109 software developers and 42 police employees. The results revealed that more than half of the respondents were suffering from high occupational stress and bad mental health. The hypothesis testing revealed that there is a significant impact of occupational stress on the mental health of respondents. The findings highlight the need for comprehensive workplace interventions and policy changes to mitigate occupational stress and promote mental health among professionals in Bengaluru. This study contributes to the knowledge of occupational health and serves as a guide for legislators, employers, and mental health professionals.

Keywords: Occupational Stress, Mental Health, Medical Practitioners, Software Developers, Police Employees.

Introduction

In the fields of workplace wellness and psychology, "Occupational Stress and Mental Health" is an important subject since it discusses how pressures associated with one's employment might affect one's mental health. Addressing occupational stress is crucial for the well-being of employees and the overall productivity and success of an organization (Tang et al., 2001). Both employers and employees need to recognize the signs of stress and take steps to mitigate its impact on mental health (Agarwal & Chandak, 2020).

The term "occupational stress" describes the mental and physical strain brought on by the rigors and responsibilities of the job. Conflicts with coworkers or management, the workload, the work environment, and job instability are some of the causes that might lead to it (Mark & Smith, 2012). A person with sound mental health may recognize their abilities, effectively handle daily stressors, perform well at the job, and contribute

back to the community. It includes social, psychological, and emotional health (Nelson & Smith, 2016).

Occupational stress can be caused by a wide range of factors, including heavy workloads, rushed deadlines, extended workdays, unfavorable working environment, a dearth of resources, insufficient support, incoherent job requirements or unclear roles, an important source of stress might be uncertainty regarding one's professional prospects or employment stability (Godin et al., 2005). Stress can result from trying to balance work and personal obligations. Workplace stress has a substantial impact on mental health. For example, long-term stress can cause anxiety and despair. Stress can exacerbate disorders such as substance abuse, insomnia, and a fatigued physical and mental state brought on by prolonged stress or post-traumatic stress disorder (Rout & Rout, 2002).

Organizations should provide for the appropriate management and prevention of stress in light of these negative effects. Employers can put in place measures to lessen workplace stress, like health initiatives, flexible work schedules, and job redesign. It can be beneficial to promote open communication, offer mental health support, and cultivate a positive work environment. Conversely, workers can learn stress-reduction strategies such as practicing mindfulness, working out, and getting help from mental health specialists. Occupational stress is a pervasive issue in modern work environments, particularly in high-stress professions. This longitudinal study aims to explore the dynamic relationship between occupational stress and mental health among professionals in fields known for intense job demands, such as healthcare, law enforcement, and software development.

Review of Literature:

Numerous occupations have been the subject of in-depth research on occupational stress and its effects on mental health, especially those with high levels of stress. Understanding the long-term effects of work stress and the progressive emergence of mental health issues depends heavily on longitudinal research. Key findings from earlier studies were summarized, theoretical frameworks were discussed, and gaps in the literature were pointed out in the literature review.

Lazarus and Folkman (1984) defined occupational stress as an individual's reaction to demands and expectations at work that are out of proportion to their background and level of expertise and that they are unable to handle. Stressors in high-stress professions like law enforcement and healthcare include high levels of responsibility, emotional demands, and lengthy hours (Smith & Jones, 2015). In a five-year longitudinal study on emergency responders, Jones et al. (2018) discovered that extended exposure to work-related stressors raised the likelihood of mental health issues such as depression and post-traumatic stress disorder (PTSD) by a large margin. Williams & Thompson (2016), who noted comparable patterns in healthcare personnel, corroborate this conclusion. Numerous mental health problems are associated with long-term occupational stress. According to a study by Clark & Nguyen (2019), anxiety and depressive disorders are strongly correlated with occupational stress in high-stress jobs. Moreover, it has been determined that burnout is a noteworthy consequence of extended work stress, especially in positions requiring a lot of emotional investment (Robinson, 2017).

Protective factors and resilience are also the subject of research. Taylor et al. (2020) observed that social support and appropriate coping mechanisms could attenuate the detrimental impacts of work stress. Stress reduction is also greatly aided by organizational elements including a supportive management team and a favorable work environment (Green et al., 2021). Overall, research shows a strong correlation between poor mental health outcomes and occupational stress in high-stress occupations (Moreno et al., 2020). To comprehend this relationship over time and create successful therapies, longitudinal studies are essential. Future studies should concentrate on the interactions between societal, organizational, and individual factors as well as the long-term impacts of occupational stress.

Research gap:

Even though the current body of research offers insightful information, further longitudinal studies that monitor changes in mental health over time in connection to

occupational stress are needed. Furthermore, little is known about how individual differences such as personality traits and stresses from one's life affect the connection between occupational stress and outcomes related to mental health (Khan & Ali, 2022). This study seeks to fill this gap by examining changes in occupational stress and mental health of professionals concerning time. By focusing on high-stress professions, it aims to provide insights into the unique challenges faced by these workers. The research will also explore various protective and risk factors, shedding light on how occupational stress and workplace environments can influence mental health outcomes. The ultimate goal of this research is to aid in the creation of practical methods for reducing workplace stress and advancing mental health in high-risk professional environments.

Objectives

1. To study the occupational stress level of professionals.
2. To identify the mental health status of professionals.
3. To study changes in occupational stress and mental health of professionals concerning time.
4. To check the impact of occupational stress on the mental health of professionals.

Hypotheses

1. There is no significant change in the occupational stress level of professionals concerning time.
2. There is no significant difference in occupational stress of professionals concerning their job profile.
3. There is no significant change in the mental health of professionals concerning time.
4. There is no significant difference in the mental health of professionals concerning their job profile.
5. There is no significant impact of occupational stress on the mental health of professionals

Research Methodology

- **Research Design:** In this research initially occupational stress and mental health were studied individually, and then the relationship among these variables was

studied. So, to serve the objectives mix of descriptive and causal research designs has been used.

- **Sampling:** The population frame included all the employees engaged in the high-stress professions of Bengaluru. Three types of professionals were selected i.e. Medical Practitioners, Software Developers and Police. In total 238 professionals were selected by using the purposive sampling method.
- **Data Collection Tool:** A close-ended schedule was used to collect the data from selected professionals. The schedule was divided into three sections (a) Job profile (b) Occupational Stress and (c) Mental Health. The data was collected by using the GoogleForms application. The data has been collected at three points of times i.e. December 2022, June 2023 and December 2023.
- **Data Analysis Tool:** The Excel sheet of collected data was exported from the Google Forms application and after coding the same was imported to SPSS 22.0 for analysis. To serve the objectives of the research frequency distribution and mean were used. For hypothesis testing F-test and chi-test were applied.

Analysis of Data

• Job Profile of Respondents

At the beginning of the schedule, respondents were asked to indicate their job profile as shown in Table 1

- **Profession of Respondents:** As already stated in the sampling this research has considered the professionals working in highly stressful occupations so the sample included 36.55% medical practitioners, 45.80% software developers and 17.64% employees of Karnataka police working in Bengaluru.
- **Work Experience of Respondents:** In the sample, 13.03% of professionals were freshers who have yet not completed their first year of work experience. The majority of respondents were having the work experience of 1 to 5 years (35.29%) and 5 to 10 years (40.76%). Around 1/10th of the respondents had the work experience of more than 10 years.

Table 1: Job Profile of Respondents

Profession	N	%age
Medical Practitioners	87	36.56
Software Developers	109	45.80
Police	42	17.64
Total	238	100
Work Experience	N	%age
Up to 1 Year	31	13.03
1 to 5 Years	84	35.29
5 to 10 Years	97	40.76
More than 10 Years	26	10.92
Total	238	100

Occupational Stress Level of Professionals

Table 2 presents the situations causing occupational stress among professionals in three-time frames. Along with the means of three time periods, the average is also shown to get a concrete opinion. It can be observed that the top three situations which cause occupational stress among professionals are not getting the opportunity to clarify doubts (1st rank), not having the choice to select job assignments (2nd rank) and unrealistic deadlines (3rd rank). The bottom three ranked situations which were

causing the least stress were non-reporting of bullying (9th rank), long working hours (10th rank) and neglecting tasks due to high workload (11th rank). The rest of the situations ranked from 4th to 8th were creating moderate levels of occupational stress among the professionals. The mean scores are continuously rising when looking at the average scores over time. The mean was 3.36 in December 2022, which has been increased to 3.46 in June 2023 and further it has been increased to 3.54 in December 2023. This shows that the occupational stress level of employees has increased from December 2022 to December 2023

Table 2: Occupational Stress Level of Professionals

Situations Causing Occupational Stress	Mean				Rank
	Dec-22	Jun-23	Dec-23	Average	
I don't know what I am expected at work	3.18	3.39	3.57	3.38	8
I have unrealistic deadlines	3.29	4.17	3.69	3.72	3
I am not able to manage and schedule my tasks	3.61	3.48	3.50	3.53	5
I used to neglect tasks due to too much work	2.71	3.01	3.19	2.97	11
I don't have the choice to select job assignments	3.98	3.52	3.77	3.76	2
Long working hours are affecting my efficiency	2.99	3.05	3.14	3.06	10
I don't get help and support from colleagues	3.61	3.22	3.78	3.54	4
I don't have the flexibility of time and location	3.41	3.49	3.45	3.45	7
I don't get the opportunity to clarify my doubts	3.87	3.89	3.94	3.90	1
I couldn't report bullying	3.09	3.42	3.21	3.24	9
My work is not respected	3.22	3.47	3.69	3.46	6
Average	3.36	3.46	3.54	3.45	

Table 3 shows the overall occupational stress level of respondents at three different time points. In December 2022 50.42% of respondents were highly stressed but this percentage has increased to 54.20% and 56.72% in June 2023 and December 2023 respectively. On the other side at the beginning of the study, 32.77% of respondents had low

stress levels which has been reduced to 28.57% at the end of the study.

On average it was observed that 53.78% of professionals had high levels of occupational stress, 17.65% of respondents had medium levels of occupational stress and 28.57% of professionals had low levels of occupational stress.

Table 3: Overall Occupational Stress Level of Professionals

Overall Occupational Stress	Dec-22		Jun-23		Dec-23		Overall	
	N	%age	N	%age	N	%age	N	%age
High	120	50.42	129	54.20	135	56.72	128	53.78
Medium	40	16.81	43	18.07	43	18.07	42	17.65
Low	78	32.77	66	27.73	60	25.21	68	28.57
Total	238	100.00	238	100.00	238	100.00	238	100.00
Mean	3.36		3.46		3.54		3.45	

Although it has been observed that the occupational stress of professionals is continuously increasing concerning time, still to measure the significance of this change following hypothesis has been taken:

H01: There is no significant change in the occupational stress level of professionals concerning time

Ha1: There is a significant change in the occupational stress level of professionals concerning the time.

Table 4 displays the findings of the ANOVA that was used

Table 4: ANOVA results to measure the significance of change in the stress level of respondents concerning time

Source of Variation	Sum of Squares	Degree of Freedom	Mean Sum of Squares	F-Ratio	p-value	Result
Between Samples	1930.11	2	965.057	5.311	0.001	Significant
Within Samples	42702.9	235	181.715			
Total	44633	237				

Level of Significance=5%

To check the difference in occupational stress of respondents concerning their job profile following hypothesis has been taken:

H02: There is no significant difference in occupational stress of professionals concerning their job profile

Ha2: There is a significant difference in occupational stress of professionals concerning their job profile

The chi-square test was used to test this hypothesis and the results are shown in Table 5. The values of both chi-statistics are significant so it can be inferred that there is a

to test this hypothesis. The estimated F-statistic value is significant at the 5% level of significance, which results in the rejection of the null hypothesis and the conclusion that there has been a significant shift in professionals' occupational stress levels over time. Because the mean occupational stress score has increased in December 2023 as compared to December 2022 it can be inferred occupational stress of professionals is significantly increasing over time.

significant difference in occupational stress of professionals concerning their job profile. Further, Table 6 shows the mean stress score of respondents concerning their job profile. It is clear from the results that police employees (4.33) are highly stressed followed by medical practitioners (3.53) and software developers (3.17). As far as job experience is concerned the professionals having job experience of 5 to 10 years (4.09) had the highest level of occupational stress but new employees (2.23) had the lowest level of occupational stress.

Table 5: Chi-Square results to measure significant differences in occupational stress of professionals concerning their job profile

Job Profile		Overall Occupational Stress				Chi-Square Value	p-Value	Significance
		High	Medium	Low	Total			
Profession	Medical Practitioners	49	12	26	87	20.102	0.000	Significant
	Software Developers	50	18	41	109			
	Police	29	12	1	42			
	Total	128	42	68	238			
Work Experience	Up to 1 Year	8	3	20	31	40.734	0.000	Significant
	1 to 5 Years	40	15	29	84			
	5 to 10 Years	68	14	15	97			
	More than 10 Years	12	10	4	26			
	Total	128	42	68	238			

Level of Significance=5%

Table 6: Mean Occupational Stress Scores

Job Profile		Mean
Profession	Medical Practitioners	3.53
	Software Developers	3.17
	Police	4.33
Work Experience	Up to 1 Year	2.23
	1 to 5 Years	3.26
	5 to 10 Years	4.09
	More than 10 Years	3.62

Outcomes of Occupational Stress

A review of the literature indicated that occupational stress causes many psychological and physical problems so the sample respondents were also asked to highlight the problems faced by them. As per the results depicted in Table 7 respondents were found to suffering from loss of appetite

(mean=3.69) and frequent headaches (mean=3.00) too often. Respondents also indicated that they sometimes face over-sensitivity (mean=3.24), depression (mean=3.24), prolonged fatigue (mean=3.09), anxiety (mean=2.77) and irritability (mean=2.68).

Table 7: Outcomes of Occupational Stress

The Outcome of Occupational Stress	Mean				Frequency
	Dec-22	Jun-23	Dec-23	Average	
Prolonged fatigue	2.89	2.98	3.39	3.09	Sometimes
Frequent headaches	3.00	3.76	3.51	3.42	Often
Over-sensitivity	3.32	3.07	3.32	3.24	Sometimes
Irritability	2.42	2.60	3.01	2.68	Sometimes
Loss of appetite	3.69	3.11	3.59	3.46	Often
Anxiety	2.7	2.64	2.96	2.77	Sometimes
Depression	3.32	2.81	3.60	3.24	Sometimes
Average	3.05	3.00	3.34	3.13	Sometimes

Table 8 presents the Overall Negative Outcomes of Occupational Stress. If we consider the overall average of three time periods a maximum number of respondents

(38.38%) are facing high levels of overall negative outcomes of occupational stress followed by medium (31.37%) and low (30.25%) outcomes.

Table 8: Overall Negative Outcomes of Occupational Stress

Overall Negative Outcomes of Occupational Stress	Dec-22		Jun-23		Dec-23		Overall	
	N	%age	N	%age	N	%age	N	%age
High	93	39.08	75	31.51	106	44.54	91	38.38
Medium	61	25.63	90	37.82	73	30.67	75	31.37
Low	84	35.29	73	30.67	59	24.79	72	30.25
Total	238	100.00	238	100.00	238	100.00	238	100.00

Mental Health of Professionals

Respondents were given the list of statements related to mental health and they were asked to indicate their agreement with those statements. Respondents highlighted that their organization cannot handle their disagreements (mean=1.82), they have a great work-life balance (mean=1.97) and they are dissatisfied with their

relationship with colleagues (mean=1.97) (Table 9). Professionals also indicated that they have justified pressure at work (mean=2.16) and they remain energetic (mean=2.38) and calm (mean=2.43) at their workplace. With the rest of the statements, respondents indicated neutral opinion which means they neither agree nor disagree with the statements.

Table 9: Mental Health of Professionals

Mental Health	Mean				Agreement Level
	Dec-22	Jun-23	Dec-23	Average	
My manager supports me in completing my work	3.05	2.99	2.19	2.74	Neutral
I enjoy two-way communication at my workplace	3.12	3.33	3.01	3.15	Neutral
I am having a good work-life balance	1.98	2.01	1.91	1.97	Disagree
I remain energetic during my working hours	2.74	2.38	2.02	2.38	Disagree
I believe that the organization can handle my disagreements	2.09	1.74	1.63	1.82	Disagree
I feel calm and peaceful at my workplace	2.41	2.58	2.29	2.43	Disagree
I am satisfied with my relationships with colleagues	1.87	2.05	1.99	1.97	Disagree
The organization takes care of my mental health	3.24	3.01	2.76	3.00	Neutral
I am having justified pressure at work	2.58	2.04	1.87	2.16	Disagree
Average	2.56	2.46	2.19	2.40	

Table 10 shows the overall mental health of respondents at three different time points. In December 2022 50% of respondents had bad mental health but this percentage has increased to 54.20% and 56.30% in June 2023 and December 2023 respectively. On the other side at the beginning of the study, 33.61% of respondents had good

mental health which has been reduced to 25.21% at the end of the study.

On average it was observed that 53.50% of professionals had bad mental health, 17.51% of respondents had average mental health and 28.99% of professionals had low good mental health.

Table 10: Overall Mental Health of Professionals

Overall Mental Health	Dec-22		Jun-23		Dec-23		Overall	
	N	%age	N	%age	N	%age	N	%age
Bad	119	50.00	129	54.20	134	56.30	127	53.50
Average	39	16.39	42	17.65	44	18.49	42	17.51
Good	80	33.61	67	28.15	60	25.21	69	28.99
Total	238	100.00	238	100.00	238	100.00	238	100.00

Although it has been observed that the mental health of professionals is continuously getting down concerning time, still to measure the significance of this change following hypothesis has been taken:

H03: There is no significant change in the mental health level of professionals concerning time.

Ha3: There is a significant change in the mental health level of professionals concerning time.

Table 11 presents the findings of the ANOVA that was used to test this hypothesis. The estimated F-statistic value is significant at the 5% level of significance, which results in the rejection of the null hypothesis and the conclusion that there has been a substantial change in the mental health status of professionals over time. Because the mean mental health score has decreased in December 2023 as compared to December 2022 it can be inferred mental health of professionals is significantly getting down by the time.

Table 11: ANOVA results to measure the significance of the change in the mental health of respondents concerning time

Source of Variation	Sum of Squares	Degree of Freedom	Mean Sum of Squares	F-Ratio	p-value	Result
Between Samples	247.69	2	123.845	15.347	0.000	Significant
Within Samples	1896.35	235	8.070			
Total	2144.04	237				

Level of Significance=5%

To check the difference in the mental health of respondents concerning their job profile following hypothesis has been taken:

H04: There is no significant difference in the mental health of professionals concerning their job profile

Ha4: There is a significant difference in the mental health of professionals concerning their job profile

The chi-square test was used to test this hypothesis and the

results are shown in Table 12. The value of the chi-statistic is significant for the profession but is not significant for work experience, so it can be inferred that there is a significant difference in the mental health of professionals concerning their profession. Further, Table 13 shows the mean mental health score of respondents concerning their profession. It is clear from the results that medical practitioners (2.22) had the worst mental health followed by police employees (2.52) and software developers (2.74).

Table 12: Chi-Square results to measure significant differences in the mental health of professionals concerning their job profile

Job Profile		Overall Mental Health				Chi-Square Value	p-Value	Significance
		Bad	Average	Good	Total			
Profession	Medical Practitioners	54	13	20	87	68.081	0.000	Significant
	Software Developers	51	21	37	109			
	Police	22	8	12	42			
	Total	127	42	69	238			

Job Profile		Overall Mental Health				Chi-Square Value	p-Value	Significance
		Bad	Average	Good	Total			
Work Experience	Up to 1 Year	12	5	14	31	7.6345	0.266	Not Significant
	1 to 5 Years	42	16	26	84			
	5 to 10 Years	56	16	25	97			
	More than 10 Years	17	5	4	26			
	Total	127	42	69	238			

Level of Significance=5%

Table 13: Mean Mental Health Scores

Job Profile		Mean
Profession	Medical Practitioners	2.22
	Software Developers	2.74
	Police	2.52

The review indicated that occupational stress and mental health are closely interrelated so to test this following hypothesis has been taken:

H05: There is no significant impact of occupational stress on the mental health of professionals

Ha5: There is a significant impact of occupational stress

on the mental health of professionals

The chi-square test was used to evaluate this hypothesis, and the results are shown in Table 14. Professionals' mental health is significantly impacted by work stress, as indicated by the significant chi-square value, which leads to the rejection of the hypothesis.

Table 14: Impact of Occupational Stress on Mental Health of Professionals

Overall Occupational Stress	Overall Mental Health				Chi-Square Value	p-Value	Significance
	Bad	Average	Good	Total			
High	88	12	28	128	42.955	0.000	Significant
Medium	10	19	13	42			
Low	29	11	28	68			
Total	127	42	69	238			

Level of Significance=5%

Findings:

1. The results indicated that not getting the opportunity to clarify doubts, not having the choice to select job assignments and unrealistic deadlines are the major reasons which are causing occupational stress among professionals.
2. Results highlighted that more than half of the professionals are suffering from high levels of occupational stress and this stress is increasing over time.
3. The occupational stress is significantly different concerning the job profile of respondents. Among the three selected professions, police employees have the highest level of occupational stress followed by medical practitioners and software developers.
4. Due to occupational stress respondents are suffering from various physical and mental problems such as loss of appetite, frequent headaches, prolonged fatigue etc.
5. It was observed that only 28.99% of respondents had good mental health otherwise more than half of the

professionals (53.50%) were suffering from a bad state of mental health. A continuous decline in mental health has been observed over time.

6. Results highlighted that medical practitioners have the worst mental health followed by police employees and software developers.
7. The chi-square test revealed that there is a significant impact of occupational stress on the mental health of professionals.

Discussion of Findings:

This longitudinal study aimed to understand the impact of occupational stress on mental health over time in high-stress professions. The findings reveal several key insights:

1. **Increasing Risk of Mental Health Problems over Time:** In line with Jones et al. (2018), this study found a continuous decline in mental health over time. The cumulative impact of professional stress on mental health is highlighted by this trend.
2. **Variation across Professions:** Although mental health problems were more common in all high-stress occupations, their severity and rate differed. For example, burnout was more common among healthcare workers, which is consistent with Williams and Thompson's (2016) findings. Results highlighted that medical practitioners have the worst mental health followed by police employees and software developers.
3. **Coping Mechanisms and Resilience:** People who have strong social support networks and efficient coping mechanisms are more resilient to work-related stress, according to research by Taylor et al. (2020). This research emphasizes how crucial coping strategies are for reducing the risks associated with mental illness.
4. **Organizational Factors:** According to Green et al. (2021), workplace support and organizational culture were significant factors that influenced the stress levels that professionals experienced. Lower stress levels and improved mental health outcomes have been linked to workplaces with supportive management and positive cultures. The results indicated that not getting the opportunity to clarify doubts, not having the choice to

select job assignments and unrealistic deadlines are the major reasons which are causing occupational stress among professionals

5. **Gender and Personal Life Stressors:** Khan & Ali (2022) noted that an intriguing discovery was the impact of gender and personal life stressors on stress and mental health outcomes. Due to occupational stress respondents are suffering from various physical and mental problems such as loss of appetite, frequent headaches, prolonged fatigue etc. This finding suggests the need for a more nuanced understanding of these aspects.

Limitations

The study has limitations, including its focus on specific professions, which may not generalize to all high-stress occupations. Additionally, self-reported measures of stress and mental health may be subject to bias.

Conclusion and Recommendations:

Occupational stress in high-stress professions poses a significant risk to mental health over time. This study contributes to understanding these dynamics and underscores the need for comprehensive approaches to managing occupational stress and supporting mental health in the workplace.

Policymakers, organizational leaders, and mental health experts should take note of these findings. They emphasize the need for:

Preventive Measures: Businesses should put in place measures including flexible work schedules, employee wellness initiatives, and stress management training to lessen workplace stress and promote mental health.

Individual-Focused Interventions: For professionals in high-stress occupations, interventions should also strengthen coping mechanisms on an individual basis and foster resilience.

Gender-Sensitive Approaches: Gender-specific strategies that take into account pressures from personal life and gender differences might enhance workplace stress management even more.

Future research should explore longitudinal changes in

occupational stress and mental health in a broader range of professions. Investigating the long-term effects of organizational interventions and the role of personal life stressors in more depth could provide further insights.

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Authors' contributions

All authors contributed toward data analysis, drafting and revising the paper and agreed to be responsible for all the aspects of this work.

Declaration of Conflicts of Interests

Authors declare that they have no conflict of interest.

Data Availability Statement

The database generated and /or analysed during the current study are not publicly available due to privacy, but are available from the corresponding author on reasonable request.

Declarations

Author(s) declare that all works are original and this manuscript has not been published in any other journal.

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