

# Mental Health among Automobile industry workers in Chennai - A Cross-sectional Study from a Single Industrial Unit

Vinoth J<sup>1</sup>, Balaji S<sup>2</sup>, Dinesh Kumar G<sup>3</sup>, Jain T<sup>4</sup>

<sup>1</sup>AFIH student, Saveetha Medical College and Hospital, Chennai 602 105, India

<sup>2</sup>Post graduate, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai 602 105, India

<sup>3</sup>Associate Professor, Department of Community Medicine, Saveetha Medical College and Hospital, Chennai 602 105, India

<sup>4</sup>Professor, Department of Community Medicine, Sree Balaji Medical College and Hospital, Chennai 600 044, India

## ABSTRACT

### Corresponding author:

Dinesh Kumar Ganesan  
Associate Professor,  
Department of Community Medicine,  
Saveetha Medical College and Hospital,  
Chennai 602 105, India  
Email: [drgdineshkumar@gmail.com](mailto:drgdineshkumar@gmail.com)  
ORCID ID: <https://orcid.org/0000-0002-5066-0133>

Date of submission: 05.08.2022

Date of acceptance: 23.05.2023

Date of publication: 01.07.2023

Conflicts of interest: None

Supporting agencies: Nil

DOI: <https://doi.org/10.3126/ijosh.v13i3.47093>



Copyright: This work is licensed under a  
[Creative Commons Attribution-NonCommercial 4.0 International License](https://creativecommons.org/licenses/by-nc/4.0/)

**Introduction:** Working in a mentally healthy place is necessary for people. Adverse mental health conditions can lead to disruption in work which in turn causes absenteeism, low productivity, and financial constraints. This study intends to assess the levels of depression, anxiety and stress and to determine its associated factors among the workers in the automobile industry in Chennai.

**Methods:** A cross-sectional study was conducted among 227 Automobile industry workers in Chennai, India. A semi-structured questionnaire was used to collect information about the socio-demographic and working details of the study subjects, while the Depression Anxiety Stress Scale (DASS -21) was used to assess mental health status. Descriptive variables were expressed as proportions, while Pearson's Chi-square test was used to study the association between dependent and independent variables.

**Results:** A total number of 227 participants were included in the study. More than 80 % of the workers were permanent employees. The prevalence of Depression, anxiety and stress among the study subjects are 38.8%, 43.6 % and 26.9 %, respectively. Workers in the middle age group of 30- 39 years had a higher risk of developing depression, anxiety, and stress than those in the other age groups. For Depression, age, type of family, employment status, and working experience were statistically significant ( $p < 0.05$ ). The sleeping hours, comorbidities, substance use, co-worker support, and supervisor support of the workers were the factors that showed no association with Depression, anxiety, and stress.

**Conclusion:** There is a need for attention to be paid to the development of a healthy psychosocial workplace climate which should be supported by stronger workplace support.

**Keywords:** Anxiety; Automobile industry workers; Depression; Mental health; Stress.

## Introduction

Mental health is a state of mental well-being that enables people to cope with the stresses of life, realize their abilities, learn well and work well, and contribute to their community. It is an integral component of health and well-being that underpins our individual and collective abilities to make decisions, build relationships and shape

our world.<sup>1</sup> Anxiety disorders and depressive disorders are the two most common mental disorders in the world, and in 2019, 301 million people globally were living with anxiety disorders; and 280 million were living with depressive disorders (including both major depressive disorder and dysthymia). These

numbers rose significantly as a result of the pandemic.<sup>2</sup>

Working in a mentally healthy place is necessary to attain high productivity levels. Work-life balance is essential nowadays as a healthy mind leads to a healthy life. In contrast, the adverse mental health conditions of people can lead to disruption in work which in turn causes absenteeism, low productivity and financial constraints.<sup>3</sup> Moreover, workplace stress can have psychological effects such as anxiety, depression, decreased concentration, and impaired decision-making skills, which can potentially lead to an increase in accidents caused by human error.<sup>4</sup> In addition, workers employed in asbestos-based industries like cement and automobile parts are at risk of malignant and non-malignant diseases affecting the lungs and others, such as gastrointestinal and laryngeal cancer.<sup>5,6</sup>

While the physical hazards of automobile workers are well-studied, studies associated with mental health are limited.<sup>6-8</sup> Thus, this study was conducted to assess the levels of Depression, anxiety and stress among the automobile industry workers in Chennai and their associated factors.

## Methods

A cross-sectional study was conducted in an Automobile industry situated near Chennai, India. This factory consisted of both an asbestos manufacturing unit and a non-asbestos manufacturing unit. The study participants were workers in the factory who were placed in the asbestos-based unit. The management-level workers and workers in the non-asbestos unit were excluded from the study. The study period was from November 2021 to June 2022. The minimum sample size for the study was 180, calculated using Epi info software with a design effect of 1, absolute precision of 10 % and assumed prevalence of anxiety as 46 % in a study conducted by Edimansyah et al.<sup>9</sup> Simple random was used for sampling purposes, and the Institutional review board B(IRB) of our institution approved the study( IRB NUMBER -SMC/IEC/2022/01/007 dated 4.1.22).

Data was collected using a Semi-structured questionnaire which consisted of 2 parts. The first part asked about the participant's socio-demographic data, work, and other relevant information. Depression Anxiety Stress Scale (DASS) 21 was used for the second part. It is based on three subscales of Depression, stress, and anxiety, and each subscale consists of seven questions. The scoring system is of the Likert type, and the total score for each subscale gives the severity of that same symptom, ranging from 0 to

21 in each subscale.<sup>10</sup> The DASS is not a diagnostic test for mental health disorders, and the technical quality of the DASS in an occupational health setting has been studied and validated.<sup>10,11</sup> The questionnaires used were in Tamil, the local language. The forward-backward translation method was employed using two different translators for the same.

The data was collected in person from the workers at the industrial workplace site after getting permission from the factory's Human Resources (HR) department after explaining the study, its objectives, and methodology. In addition, the list of all the workers in the asbestos-based unit was received from them. Participation in the study was entirely voluntary, and employees received no benefit for the same. The confidentiality of the study subjects was maintained, and informed consent was also obtained. Those workers who have been identified with symptomatic Depression, anxiety, and stress were notified to the company, and individuals were counseled and referred to the psychiatric department of our hospital for further management.

Data collected were entered in Microsoft Excel (2010) and were analyzed using IBM Statistical Package for the Social Sciences (SPSS) v.20. Descriptive statistics were done, and Pearson's Chi-square test studied associations between dependent and independent variables. A P value of less than < 0.05 (two-tailed) was taken to be statistically significant.

## Results

A total number of 227 participants were included in the study. Most of the study participants were 18-29 years (43.2%), followed by 30-39 years of age group (30.4%). Gender-wise, it was observed that the majority were males (63.4%). Most of the study participants were unmarried (62.6%), and nearly half of the study participants had a monthly family income of more than 30,000 INR. Most of the participants had no smoking or drinking habits (70%), and most of the study participants had no comorbidities (73.6%) (Table 1).

Nearly 61% of the study participants have working experience of more than five years. More than 4/5th of the workers were permanent employees, while 43.2% of the study subjects had a working shift of more than 8 hours. Nearly 66 % of the workers were traveling less than 1 km (Table 2)

**Table 1:** Socio-demographic characteristics of study subjects (Total N=227)

Variable	Characterization	Frequency	Percentage (%)
Age	18-29	98	43.2
	30-39	69	30.4
	>40	60	26.4
Gender	Male	144	63.4
	Female	83	36.6
Education	Higher Secondary & below	72	31.7
	Graduate & above	155	68.3
Marital status	Married	85	37.4
	Unmarried	152	62.6
Type of family	Nuclear	103	45.3
	Joint	121	54.7

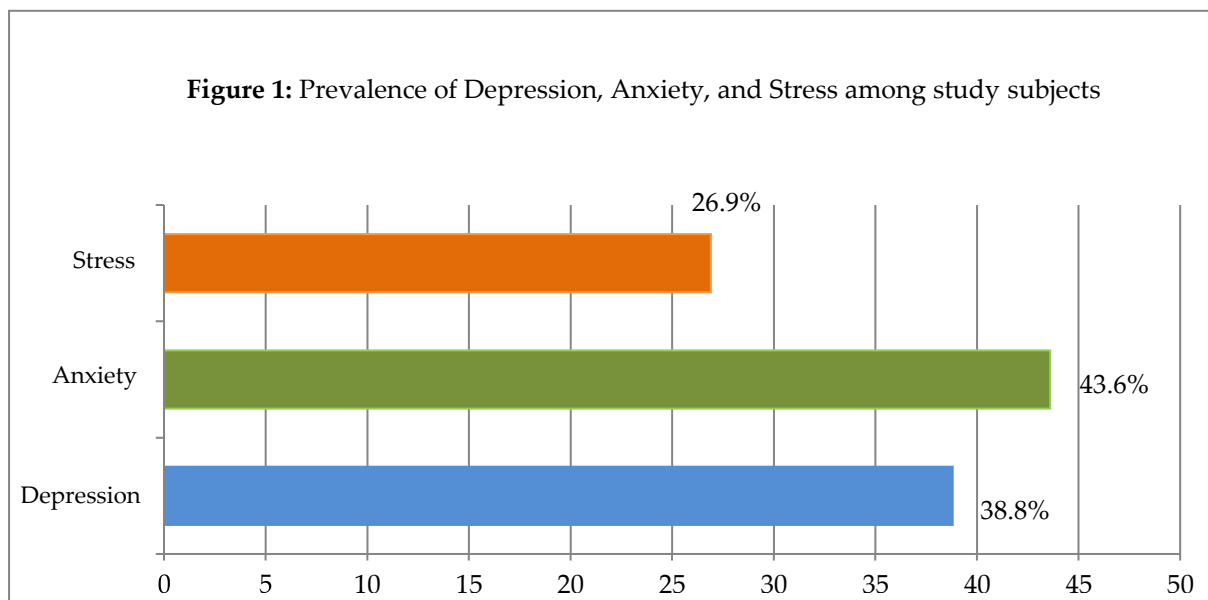
**Table 2:** Working details of study subjects (Total N=227)

Variable	Characterization	Frequency	Percentage (%)
Working experience	<3	52	23
	3-5	89	39.2
	>5	86	37.8
Working hours per day	<8 hrs.	129	56.8
	>8 hrs.	98	43.2
Working Status	Contract	44	19.4
	Permanent	183	80.6
Travel time to work	< 1hr	149	65.6
	>1hr	78	34.4
Co-workers support	Yes	183	80.6
	No	44	19.4

The prevalence of Depression, anxiety and stress among the study subjects are found to be 38.8%, 43.6 % and 26.9 %, respectively, according to the DASS scale. (Fig1)

In the study, participants who have been identified with Depression, anxiety and stress were most in the category of mild and moderate. A significantly less proportion of the participants was in the highly severe category and were subsequently referred for treatment. The association of study variables with Depression, anxiety and stress was observed, and it was found that for Depression, their age, type of family, employment status, and working experience were

found to be statistically significant ( $p < 0.05$ ). Among the factors associated with anxiety, age, education, working hours, employment status and traveling time were found to be statistically significant ( $p < 0.05$ ). Among factors associated with stress among study participants, educational level, marital status, working hours and employment status were considered statistically significant ( $p < 0.05$ ). The sleeping hours, comorbidities, substance use, co-worker support, and supervisor support of the workers were the factors that showed no association with Depression, anxiety, and stress using the pearson's Chi-squared test (Table 3).



**Table 3: Association between Study variables and Depression, anxiety, and stress (N=227)**

Study variables	Characterization	Depression (n=88)	Anxiety (n=99)	Stress (n=61)
Age (yrs)	<30	29 (29.6)	44(44.8)	26(26.5)
	>30	59 (25)	55(50.4)	35(32.1)
	p-value	p- 0.01*	p- 0.005*	p-0.91
Gender	Male	60 (41.6)	64(44.4)	38(26.4)
	Female	28(33.7)	35(42.2)	23(27.7)
	p value	p- 0.237	p- 0.739	p- 0.829
Education	Higher Secondary & Below	29 (40.3)	23(32)	11(15.3)
	Graduate & above	59(38.1)	76(49)	50(32.3)
	p-value	p- 0.750	p- 0.016*	p- 0.07
Marital status	Married	31(36.5)	39(45.8)	30(35.3)
	Unmarried	57 (37.5)	60(39.5)	31(20.4)
	p-value	p- 0.582	p- 0.593	p- 0.026 *
Type of family	Nuclear	28(21.5)	42(40.7)	25(24.3)
	Joint	60(49.6)	57(47)	36(29.8)
	p-value	p- <0.001*	p- 0.256	p- 0.295
Working experience	<3yrs	26 (50)	27(52)	19(36.5)
	>3 yrs	62 (35.4)	72(41.1)	42(24)
	p-value	p- 0.007*	p- 0.167	p- 0.073
Working hours per day	<8 hrs	57 (44.2)	71(55)	43(33.3)
	>8 hrs.	31(31.6)	28(28.6)	18(18.3)
	p-value	p- 0.054	p- <0.001*	p- 0.01*
Employment status	Contract	23(52.3)	26(59)	18(41)
	Permanent	65(35.5)	73(39.8)	43(23.5)
	p-value	p- 0.041*	p- 0.021*	p- 0.019*
Traveling time	< 1hr	55(37)	58(39)	39(35.4)
	>1hr	33(42.3)	41(52.6)	22(28.2)
	p-value	p- 0.428	p- 0.049*	p- 0.220

\*Statistically significant  $p < 0.05$

## Discussion

This study was done among 227 subjects employed in the asbestos unit of an automobile factory to assess the levels of Depression, anxiety, and stress using the DASS 21 scale. The present study revealed that the prevalence of depression among workers was 38.8%. Similar levels of depression (35.4%) were reported in a study done in Malaysia.<sup>9</sup> In contrast, a study done among the French cohort showed the levels of depression to be around 10%. and among Chinese workers, depression levels were found to be around 20.6% in those with past exposure to asbestos dust.<sup>6,8</sup> The overall prevalence of depression in the present study was double the times reported in the Indian general population, which is 18.5 %.<sup>12</sup> This depicts that the level of depression varies according to the occupation and the workload.

The prevalence of anxiety in our study was around 43.6%, and these findings were similar to the study done by Edimansyah et al.<sup>9</sup> Lower levels of anxiety were reported in France and China.<sup>6,8</sup> The overall prevalence of anxiety among the workers in the current study is much higher than in the general adult population in India, which is 24.4%.<sup>12</sup> These differences might be due to the high level of operating machines by the workers in the asbestos industry and the fear of injuries due to them. Hence the risk of anxiety disorders was found to be high in the industries than in the general population. The prevalence of stress among the study subjects was found to be around 26.9%, whereas lower levels of stress were reported in Malaysia.<sup>9</sup> Clemente et al.<sup>5</sup> said that there was an association between asbestos exposure and stress among workers in Spain. This correlation was also reported among Chinese industrial workers.<sup>8</sup>

A study conducted among petrochemical industrial workers in Iran showed the presence of depression, anxiety, and stress at 38.92%, 44.31 %, and 29.34%, respectively.<sup>13</sup> These findings were consistent with the results of the present study, though the study population was different. A similar study conducted among Australian industrial workers showed that 28.3 %, 22.3%, and 19.4 % had depression, anxiety, and stress, respectively, which is relatively lesser than the findings of the present day, which could be due to the varying levels of physical work among the different industries.<sup>14</sup>

In the present study, those workers in the middle age group of 30- 39 years were found to have a high risk of developing depression, anxiety, and stress than those in the other age groups, which is consistent with the study conducted in Delhi.<sup>15</sup> In contrast, a survey conducted among industrial

workers in Bangalore showed no associations between age and mental disorders.<sup>16</sup> There was no influence of marital status and gender on developing depression, anxiety, and stress in the present study, which is consistent with the previous research conducted among the industrial population in India.<sup>17</sup> However, a study conducted on small and medium enterprise workers showed a significant association between these factors and psychiatric disorders.<sup>18</sup> The differences in these findings may be due to the different working circumstances prevailing in other areas.

Those workers with a habit of smoking and alcohol drinking have no risk of developing depression, anxiety, and stress. This finding is consistent with the study conducted by Ratanasiripong P et al. among small and medium enterprise workers.<sup>18</sup> But similar studies undertaken in the general population showed a significant association between smoking and alcohol habits and any psychiatric disorders.<sup>19,20</sup> These distinct findings may be due to the fewer numbers of workers with smoking and alcohol drinking habits.

Concerning the working conditions, it was found that Depression, anxiety, and stress were significantly associated with employment status. This shows that job security is an essential factor related to mental health. This was further seen by Kim et al. in South Korea.<sup>21</sup> Job security was also found to be a significant factor in developing stress and anxiety in our study. This was consistent with the findings from Malaysia.<sup>9</sup> There was no significant association found between the element of support given by the co-workers and the supervisors in the company and psychiatric morbidities. This is because those workers with help from their co-workers and supervisors were in a much higher percentage than those without their support. However, this was in contrast to studies done in Malaysia and India.<sup>9,16</sup> Finally, working experience (years) in a large automobile factory like the current one has been associated with the development of stress.<sup>22</sup> Similar findings were reported in our study.

Overall, our study tried to report Depression, anxiety and stress among Automobile industry workers. Many studies were exploring physical morbidity, but to the best of our knowledge, we found only a few studies done in this sector exploring mental health.

## Limitations

The Limitations of our study include the use of the DASS-21 scale; though validated, it's only a screening tool, but still, the study subjects who



reported severe symptoms were promptly referred for further evaluation. The other limitation of our study is the cross-sectional design, which limits establishing the temporal association and having been done only in one unit of the factory, the external validity of our research is also limited. Further exploratory and longitudinal studies are required to address this grey area in occupational health.

### Conclusion

The present study was done to estimate the levels of Depression, anxiety and stress among Automobile industry workers. The levels reported in the study are higher compared to the general population. There is a need for attention to be paid to the development of a healthy psychosocial workplace climate. Employers should prioritize preventing work-related stress and promoting employee well-being through resources for stress management, mental health support, and work-life balance. Addressing work-related stress can improve employee health, increase productivity, and reduce accidents and errors in the workplace.

### Acknowledgment

The research team would like to thank all the participants for their valuable time and contribution to the conduct of the research.

### References

1. World Health Organization Mental health: strengthening our response [Internet]. Geneva: World Health Organization; 2022 [cited 2022 Jul 26]. Available from: <https://www.who.int/news-room/factsheets/detail/mental-health-strengthening-our-response>
2. World Health Organization. World mental health report: transforming mental health for all [Internet]. Geneva: World Health Organization; 2022 [cited 2022 Nov 6]. Available from: <https://apps.who.int/iris/handle/10665/356119>
3. Harnois G, Gabriel P. Mental health and work: impact, issues and good practices. Geneva: World Health Organization; 2000. [cited 2022 Nov 6]. Available from: <https://apps.who.int/iris/handle/10665/42346>
4. Rajgopal T. Mental well-being at the workplace. *Indian Journal of Occupational and Environmental Medicine*. 2010;14(3):63–5. Available from: <https://www.lww.com/pages/default.aspx>
5. Clemente M, Reig-Botella A, Prados JC. Alterations in psychosocial health of people affected by asbestos poisoning. *Revista de Saúde Pública*. 2015;49: 24. Available from: <https://doi.org/10.1590/S0034-8910.2015049005445>.
6. Mouchetrou Njoya I, Paris C, Dinot J, Luc A, Lighezzolo-Alnot J, Pairon JC, et al. Anxious and depressive symptoms in the French Asbestos-Related Diseases Cohort: risk factors and self-perception of risk. *European Journal of Public Health*. 2017;27(2): 359–66. Available from: <https://doi.org/10.1093/eurpub/ckw106>.
7. Philip M, Alex RG, Sunny SS, Alwan A, Guzzula D, Srinivasan R. A study on morbidity among automobile service and repair workers in an urban area of South India. *Indian Journal of Occupational and Environmental Medicine*. 2014;18(1): 9–12. Available from: <https://doi.org/10.4103/0019-5278.134946>.
8. Lin QH, Jiang CQ, Lam TH, Xu L, Jin YL, Cheng KK. Past Occupational Dust Exposure, Depressive Symptoms and Anxiety in Retired Chinese Factory Workers: The Guangzhou Biobank Cohort Study. *Journal of Occupational Health*. 2014;56(6): 444–52. Available from: <https://doi.org/10.1539/joh.14-0100-OA>.
9. Edimansyah BA, Rusli BN, Naing L, Rusli BAM, Winn T, Ariff BRHTM. Self-perceived Depression, Anxiety, Stress and Their Relationships with Psychosocial Job Factors in Male Automotive Assembly Workers. *Industrial Health*. 2008;46(1): 90–100 Available from: <https://doi.org/10.2486/indhealth.46.90>.
10. Sharma MK, Hallford DJ, Anand N. Confirmatory factor analysis of the Depression, Anxiety, and Stress Scale among Indian adults. *Indian Journal of Psychiatry*. 2020;62(4):379–83. Available from: [https://journals.lww.com/indianjpsychiatry/Fulltext/2020/62040/Confirmatory\\_factor\\_analyses\\_of\\_the\\_Depression.6.aspx](https://journals.lww.com/indianjpsychiatry/Fulltext/2020/62040/Confirmatory_factor_analyses_of_the_Depression.6.aspx)

11. Ahmed O, Faisal RA, Alim SMAHM, Sharker T, Hiramoni FA. The psychometric properties of the Depression Anxiety Stress Scale-21 (DASS-21) Bangla version. *Acta Psychologica*. 2022;223: 103509. Available from: <https://doi.org/10.1016/j.actpsy.2022.103509>
12. Sahoo S, Khess CRJ. Prevalence of depression, anxiety, and stress among young male adults in India: a dimensional and categorical diagnoses-based study. *The Journal of Nervous and Mental Disease*. 2010;198(12): 901–4. Available from: <https://doi.org/10.1097/NMD.0b013e3181fe75dc>.
13. Ali MORROWATISHARIFABAD M, Servat F, Sotoudeh A, Assadian A, Eisapareh K, Ghasemie R, et al. Depression, Anxiety, Stress, Workers, Petrochemical Industry. *Occupational Hygiene and Health Promotion Journal*. 2018;2(3): 234–44. Available from: <https://doi.org/10.18502/ohhp.v2i3.149>.
14. Vojnovic P, Bahn S. Depression, anxiety and stress symptoms among Fly-In Fly-Out Australian resource industry workers. *Journal of Occupational Health and Safety - Australia and New Zealand*. 2015;31(3): 207–23. Available from: <http://www.scopus.com/inward/record.url?scp=84948783359&partnerID=8YFLogxK>
15. Garg P, Kumar R. Study of depression, anxiety, and stress among Class IV workers in a medical college in Delhi. *Indian Journal of Social Psychiatry*. 2019 Jan 1;35(1):57. Available from : [https://doi.org/10.4103/ijsp.ijsp\\_85\\_17](https://doi.org/10.4103/ijsp.ijsp_85_17)
16. Rao S, Ramesh N. Depression, anxiety and stress levels in industrial workers: A pilot study in Bangalore, India. *Industrial Psychiatry Journal*. 2015;24(1): 23–8. Available from: <https://doi.org/10.4103/0972-6748.160927>
17. Dutta S, Kar N, Thirthalli J, Nair S. Prevalence and risk factors of psychiatric disorders in an industrial population in India. *Indian Journal of Psychiatry*. 2007;49(2): 103–8. Available from: <https://doi.org/10.4103/0019-5545.33256>.
18. Ratanasiripong P, Kaewboonchoo O, Bell E, Susilowati I, Isahak M, Harncharoen K, et al. Depression, Anxiety and Stress among Small and Medium Enterprise Workers in Indonesia, Malaysia, Thailand, and Vietnam. *International Journal of Occupational Health and Public Health Nursing*. 2016;3(2):13-29. Available from: [https://www.scienpress.com/Upload/IJOHPHN/Vol\\_3\\_2\\_3.pdf](https://www.scienpress.com/Upload/IJOHPHN/Vol_3_2_3.pdf)
19. Ferreira VR, Jardim TV, Sousa ALL, Rosa BMC, Jardim PCV. Smoking, alcohol consumption and mental health: Data from the Brazilian study of Cardiovascular Risks in Adolescents (ERICA). *Addictive Behaviors Reports*. 2019;9: 100147. Available from: <https://doi.org/10.1016/j.abrep.2018.100147>.
20. Darchini-Maragheh E, Salehi M, Payandeh A, Behdani F, Ghasemzadeh Kolagar H. Evaluation of the correlations between depression, anxiety, and stress as DASS-21 subscales and high-risk behaviors in the adolescents in Torghabeh and Shandiz Towns, Iran. *Journal of Patient Safety & Quality Improvement*. 2017;5(3): 584–90. Available from: <https://dx.doi.org/10.22038/psj.2017.9479>
21. Kim Y, Kim SS. Job insecurity and depression among automobile sales workers: A longitudinal study in South Korea. *American Journal of Industrial Medicine*. 2018;61(2): 140–7. Available from: <https://doi.org/10.1002/ajim.22805>
22. Mulugeta H, Tamene A, Ashenafi T, Thygerson SM, Baxter ND. Workplace stress and associated factors among vehicle repair workers in Hawassa City, Southern Ethiopia. *PloS One*. 2021;16(4): e0249640. Available from: <https://doi.org/10.1371/journal.pone.0249640>.