DOI: 10.7860/JCDR/2026/87936.23660

Original Article

Community Section

Prevalence of Musculoskeletal Disorders, Stress and their Associated Risk Factors among Medical Representatives in Chennai, Tamil Nadu, India: A Cross-sectional Study

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ABSTRACT

Introduction: Medical Representatives (MRs) serve as the major interface between pharmaceutical companies and clinicians. Individuals in such positions typically work long hours, have to travel often, and face high-performance pressures. In addition to these challenges, they have to stand for extended periods, and they often adopt poor body postures, thus raising the probability of Musculoskeletal Disorders (MSD) and stress. The present study estimated the prevalence of MSDs and stress among MRs in Chennai and identified associated occupational and lifestyle risk factors.

Aim: To estimate the prevalence of musculoskeletal disorders and stress among MRs along with their associated risk factors.

Materials and Methods: A cross-sectional study was conducted among 290 MRs aged 18 years and above working in Chennai, Tamil Nadu, India from May 2025 to August 2025. Participants were selected from May 2025-August 2025, selected by two-stage cluster sampling from 20 pharmaceutical companies. Data were collected using a pretested semi-structured questionnaire incorporating the Standardised Nordic Musculoskeletal Questionnaire and Perceived Stress Scale-10. Descriptive statistics, Chi-square test, and multiple logistic regression were used to identify factors associated with MSDs and stress.

Results: The prevalence of MSDs and moderate stress were 78.6% and 72.4%, respectively. Lower back (42.5%) and neck (19.3%) were the most affected regions. MSDs showed associations with commuting by bike {Adjusted Odds Ratio (AOR) 4; p=0.023}, commuting by bus (AOR 2.62; p=0.007), working more than 10 hours/day (AOR 15.89; p=0.004), exercising only 1-3 days/week (AOR 9.39; p<0.001) and travelling more than 4 hours/day (AOR 1.84; p<0.001). Moderate stress was associated with married marital status (AOR 6.36; p<0.001) and working more than 10 hours/day (AOR 1.93; p=0.044). MRs with MSDs had 11.68 times higher odds of moderate stress than those without MSDs (p<0.001).

Conclusion: A high prevalence of MSDs and stress was observed among MRs, showed significant associations with prolonged working hours, travel duration, physical activity patterns, and marital status. Enforcing standard working hours, optimising travel schedules, promoting regular exercise, and instituting periodic screening with ergonomic and mental health interventions are recommended for this vulnerable workforce.

Keywords: Ergonomics, Low back pain, Occupational health, Perceived stress, Socio-economic factors

INTRODUCTION

Pharmaceutical sales representatives or MRs are sales people employed by pharmaceutical companies to advertise their products to medical practitioners [1]. They serve as an essential channel between pharmaceutical corporations and the medical community, influencing prescribing choices, fostering partnerships, and educating healthcare professionals about medicines [2,3]. In India, there are more than six lakh MRs [4].

MRs perform a wide variety of tasks, which include, but are not limited to, providing information to the doctors regarding pertinent drugs, updating the doctors about the new drugs in the market, new modalities of treatment, and providing the doctors with valuable literature on various drug-related studies.

The Indian Pharma industry is growing at a rapid pace with more multinational and local players entering the Pharma industry every passing day. Given the competitive scenario, MRs are given targets to be achieved every month, which puts them under mental pressure, leading to stress [5]. In addition to that, MRs have to endure long working hours with inadequate resting periods, long-distance travels, especially in motorbikes, improper eating patterns, all contributing to MSDs in them [6]. The prevalence of MSDs was high among MRs. The prevalence of low back pain and shoulder pain among MRs was found to be 55.4% and 41.1%, respectively, according to findings of the study done by Tander B et al., [7].

The prevalence of stress was found to be 55% among MRs [8]. It is to be noted that MRs who suffer from MSD due to work-related reasons could find it stressful to handle their daily responsibilities. This adds to the already existing morbidity, leading to a lower quality of life among MRs [8]. The factors that were found to be contributing to stress among MRs were job profile dissatisfaction, long work hours, constant pressure to perform better, conflict between work and home, role incompatibility, exhausting work environment, work overload, and low involvement [9-11].

Although there is a dearth of literature available on MSDs and stress among MRs in Tamil Nadu, there have been studies conducted elsewhere in India pointing out that there is a high level of health risk factors present in them. Studies conducted thus far have had geographical constraints, focusing more on the psychosocial factors involved than the dual combination of health effects on the body and mind. Considering that MRs are field-based in nature and operate under odd hours makes their inclusion in studies problematic. Moreover, studies concerning the occupational health status of Indian employees have traditionally concentrated more on the working conditions faced by industrial workers and healthcare

professionals rather than those occupying a middle ground, such as MRs [8,9]. Therefore, the present study were undertaken to estimate the prevalence of MSDs and stress among MRs along with their associated risk factors.

MATERIALS AND METHODS

A cross-sectional study was conducted among 290 MRs aged 18 years and above working in Chennai, Tamil Nadu, India from May 2025 to August 2025. Ethical approval was obtained from the Institutional Ethics Committee of Tertiary Medical College in Chengalpattu district. Ref.No.002/SBMCH/IHEC/2025/2395. Informed consent was obtained from all subjects involved in the study. Participation was entirely voluntary and all participants were informed about the objectives, procedures, and potential implications of the research prior to their inclusion.

Inclusion criteria: MRs aged 18 years and above residing in Chennai and who have work experience for a minimum period of 12 months were included in the study.

Exclusion criteria: Participants with prolonged absenteeism (> 2 weeks) were excluded. Employees with a history of trauma or surgery in the past year were excluded.

Sample size calculation: The prevalence of moderate stress among MRs in Maharashtra was 55% [8]. $N=Z^2pq/L^2$ where: Z=1.96 (confidence level of 95%), p=55%, q=45%, L=6% (allowable error) $N=(1.96)^2\times55\times45/6\times6=264$. After adjusting for non responses of 10%, the final sample size is 290 (N=290). Therefore, data collection was carried out from 290 participants. A 6% allowable error was selected because it offers a good balance between accuracy and practicality. Even though choosing an allowable error of a lower amount (5%) would offer more precision, it required a larger sample size, which was not practical given that MRs are mobile people who do not have a lot of time on hand. Allowable error of 6% is a standard one used in community studies, and it offers acceptable accuracy levels. The sampling technique that was used was a two-stage clustering method. In the first stage, 20 pharmaceutical companies were selected from a sampling frame of 120 companies using simple random sampling. In the second stage, 15 MRs from each selected company were recruited using simple random sampling. Among the 300, 290 participants gave informed consent and participated in the study. The data were gathered from the scheduled weekly review meetings to ensure feasibility and maximize the involvement of participants.

Study Procedure

Data was collected using a pretested, validated semi-structured questionnaire via face-to-face interview method after receiving informed consent. The questionnaire used for data collection was comprehensive, collecting details from various domains. It consisted of nine sections with

- Section A- socio-demographic information,
- Section B- behavioural risk factors,
- Section C- morbidity details,
- Section D- out of pocket expenditure,
- Section E- anthropometric and clinical details,
- Section F- MSDs,
- Section G- occupational health measures,
- Section H- occupational exposure and working conditions,
- Section I- mental health.

The Standardised Nordic scale [12] was used to measure MSD in section F. According to the current study design, an operational definition of MSD includes the experience of pain/discomfort in any part of the body (neck, shoulders, upper spine, lower spine, wrist/hand, hip/thigh, knee, or ankle/foot region) within the past seven days. The Perceived Stress Scale-10 (PSS-10) is a measure of the degree to which people perceive events in their lives as stressful was used to assess mental health status in Section I. The score ranges from 0 to 40. Higher scores indicate greater perceived stress. For analysis of the results, the scores are generally grouped into low stress levels (0-13), moderate stress levels (14-26), and high stress levels (27-40) [13]. Both scales are validated and available in the public domain for research purposes. They have been used in their original form without any modifications to their structure or scoring. Modified BG Prasad Scale 2025 was used to assess socio-economic status [14]. Section F and Section I used validated scales to assess MSD and stress, respectively. The validation of the questions from rest of the sections was done by face validity in which experts from the field of community medicine were consulted and they validated the questions based on their expertise. Internal consistency of the questions was checked by using Cronbach's alpha, with pilot sample of 20 participants, the results of which are not included in the present study. Cronbach's alpha was 0.81 suggesting good internal consistency.

STATISTICAL ANALYSIS

The data analysis was carried out using Microsoft Excel (V2510) and IBM Statistical package for Social Sciences (SPSS) statistics for windows version 25.0. The prevalence of MSDs and stress was measured using descriptive statistics. To find out the association between MSDs and various risk factors, and also to find out the association between stress and various risk factors, analytical statistical tests such as the Chi-square test and multiple logistic regression were used. A p-value <0.05 was considered to be significant. Variables which were found be statistically significant in univariate analysis (p<0.05) using Chi-square were included in the logistic regression model and AOR with 95% Confidence Interval (CI) were reported.

RESULTS

The total number of participants in the present study, among whom informed consent obtained, was 290 MRs. The majority of the MRs (81.4%) belonged to the age group 18-40 years. Almost all the participants were males (96.6%), with only 3.4% of them being females. Two-thirds of study participants (66.2%) were married. Nine out of ten participants (90.3%) belonged to the Hindu religion. Seven of ten (71.7%) study participants belonged to class-I (upper class) as per the modified BG Prasad scale 2025. Two-thirds of study participants (66.6%) were graduates. The prevalence of tobacco consumption and alcohol consumption were 11.7% and 26.9%, respectively. Only one-fifth of the study participants (20.7%) exercised daily for at least 30 minutes, as shown in [Table/Fig-1].

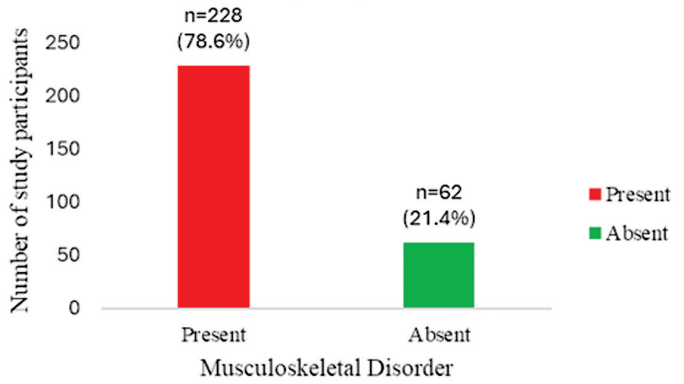
Average Body Mass Index (BMI) was 27.70±4.13 kg/m² (with 75% of individuals having overweight or obesity), and 19.0% and 12.8% of participants had diabetes and pre-diabetes, respectively.

Variables	Category	n (%)
Age		
	18-40 years	236 (81.4)
	>40 years	54 (18.6)
Gender		
	Male	280 (96.6)
	Female	10 (3.4)
Marital status		
	Single	98 (33.8)
	Married	192 (66.2)
Religion		
	Hindu	262 (90.3)
	Christian	21 (7.3)
	Muslim	7 (2.4)

Socio-economic status (According to Modified BG Prasad Scale 2025)		
	I	208 (71.7)
	II	72 (24.8)
	III	10 (3.5)
Educational qualification		
	Higher secondary school	8 (2.8)
	Graduate	193 (66.6)
	Postgraduate	89 (30.6)
Consumption of tobacco products		
	Yes	34 (11.7)
	No	256 (88.3)
Consumption of alcohol		
	Yes	78 (26.9)
	No	212 (73.1)
In a week how many days do you do exercise for atleast 30 minutes in any form?		
	Daily	60 (20.7)
	4-6 days/week	27 (9.3)
	1-3 days/week	203 (70.0)

[Table/Fig-1]: Socio-demographic profile and lifestyle characteristics of MRs (N=290).

The study showed a high prevalence of MSDs (78.6%) as shown in [Table/Fig-2], respectively.



[Table/Fig-2]: Prevalence of Musculoskeletal Disorders (MSD) among Medical Representatives (MRs).

The high prevalence of moderate level of perceived stress (72.4%) is depicted in [Table/Fig-3].

Stress level	n (%)	Mean±SD
Low	80 (27.6)	11.04±1.782
Moderate	210 (72.4)	19.27±2.610
High	0	0

[Table/Fig-3]: Prevalence of stress among MRs (N=290).

The distribution of MSDs by affected body region among MRs with MSD [Table/Fig-4]. The important regions to be affected were lower back (42.5%), neck (19.3%), ankles/feet (14.9%) followed by shoulder (11.4%).

Parts of the body	n (%)
Neck	44 (19.3)
Shoulder	26 (11.4)
Upper back	14 (6.1)
Lower back	97 (42.5)
Wrists/hands	4 (1.8)
Hips/thighs	1 (0.5)
Knees	8 (3.5)
Ankles/Feet	34 (14.9)

[Table/Fig-4]: Distribution of MSDs by affected body region among MRs (n=228).

The Nordic questionnaire assesses self-reported musculoskeletal symptoms over 12 months and seven days. To minimise recall bias, the present study considered symptoms reported in the past seven days only. So, the participants who reported any type of body pain in the past seven days were noted down [Table/Fig-5].

Variables	Musculoskeletal disorders		p-value	Adjusted OR (95% CI)	p-value
	Present (n=228)	Absent (n=62)			
Age (in years)					
18-40	193	43	0.006	1.356 (0.109-5.898)	0.204
>40	35	19		Ref.	
Gender					
Male	223	57	0.040	#	#
Female	5	5			
Work experience (in years)					
<10 years	143	46	0.093	-	-
>10 years	85	16			
Common mode of transport					
Bike	185	36	<0.001	4.00 (1.82-8.76)	0.023
Bus	25	12		2.62 (1.61-4.32)	0.007
Train	18	14		Ref.	
Average working hours/day					
>10 hours	147	27	0.003	15.896 (3.8-66.4)	0.004
8-10 hours	81	35		Ref.	
In a week how many days do you exercise for atleast 30 minutes a day					
4-6 days/week	12	15	0.0001	0.309 (0.076-1.254)	0.100
1-3 days/week	177	26		9.387 (3.315-26.582)	<0.001
Daily	39	21		Ref.	
On an average how many hours do you spend every day for travelling					
>4 hours/day	166	25	0.001	1.843 (1.594-6.247)	<0.001
2-4 hours/day	50	18		0.186 (0.172-4.760)	0.100
<2 hours/day	12	9		Ref.	
Do you carry a backpack/laptop bag while working					
Yes	209	50	0.013	0.129 (0.033-1.500)	0.093
No	19	12		Ref.	
Do you have rest breaks during your working hours					
Yes	35	12	0.448	-	-
No	193	50			

[Table/Fig-5]: Univariate and multiple logistic regression analyses of demographic and lifestyle characteristics variables associated with Musculoskeletal Disorders (MSD) among MRs.
#: Not reported due to insufficient female representation in the study

The study found a statistically significant association between the usage of a bike for transport and the development of MSDs (p-value= 0.023). The odds of developing MSD are four times higher among those who use a bike for transport than those using trains. There was a statistically significant association between travelling by bus and the development of MSDs (p-value=0.007). The odds of developing MSD are 2.6 times higher among those who use a bus for transport than those who use a train. There was a statistically significant association between working on average more than 10 hours per day and the development of MSDs (p-value=0.004).

Participants working >10 hours/day showed higher odds of MSD (15.896); however, the magnitude should be interpreted cautiously due to wide confidence intervals. There was a statistically significant association between exercising only 1-3 days/week and the development of MSDs (p-value <0.001). The odds of developing MSD are 9.3 times higher among those who exercise only 1-3 days/week than those who exercise daily. Statistical association was significant between travelling for more than 4 hours/day and the development of

MSDs (p-value <0.001) among MRs. The odds of developing MSDs are 1.8 times higher among MRs who travel for >4 hours/day than those who travel <2 hours per day as shown in [Table/Fig-5].

The univariate and multiple logistic regression analysis of socio-demographic and work-related factors associated with stress among the study participants are revealed in [Table/Fig-6]. There was a statistically significant association between marital status and the development of stress (p-value <0.001). The odds of developing stress are 6.3 times higher among those who are married than those who are not married. A statistically significant relationship was observed between working on an average of 10 hours/day and the development of stress (p-value <0.044). The odds of developing stress are 1.9 times higher among MRs working more than 10 hours/day compared with those working 8-10 hours/day.

Variables	Stress		p-value	Adjusted OR (95% CI)	p-value
	Moderate stress (n=210)	Low stress (n=80)			
Age (in years)					
18-40	167	69	0.188	-	-
41-60	43	11			
Gender					
Male	205	75	0.145	-	-
Female	5	5			
Marital status					
Married	177	15	<0.001	6.355 (1.071-9.157)	<0.001
Single	33	65		Ref.	
Work experience (in years)					
≤10 years	117	72	<0.001	0.569 (0.127-7.520)	0.117
>10 years	93	8		Ref.	
Socio-economic Status (SES)-Modified BG Prasad scale 2025					
I	101	48	0.6335	-	
II	67	15			
III	42	17			
Educational qualification					
Higher secondary	8	7	0.212	-	-
Graduate	135	51			
Postgraduate	67	22			
Common mode of transport					
Bike	181	40	<0.001	1.027 (0.246-4.155)	0.970
Bus	22	14		0.778 (0.246-2.463)	0.669
Train	7	26		Ref.	
Average working hours/day					
>10 hours	200	70	0.0250	1.925 (1.240-3.565)	0.044
8-10 hours	10	10		Ref.	
In a week how many days do you exercise					
Daily	42	18	0.209	-	-
4-6 days/week	16	11			
1-3 days/week	152	51			

[Table/Fig-6]: Univariate and multiple logistic regression analyses of demographic and lifestyle characteristics variables associated with stress among MRs.

There was a statistically significant association between MSDs and the development of moderate stress (p-value <0.001). The odds of developing moderate stress (according to the Perceived Stress Scale) were 11.683 times higher among the MRs who had MSDs than those who did not have MSDs, as shown in [Table/Fig-7].

The study participants predominantly reported long working hours, with the majority working 10-12 hours/day (43.8%), followed by 8-10 hours (40.0%) and 12-14 hours (16.2%), indicating a high workload pattern among MRs. Regarding tobacco use, only a subset of participants reported current usage, with cigarettes being the most commonly used product. Among smokers, the duration and intensity of smoking varied, with most individuals reporting a moderate duration of smoking and consuming a limited number of cigarettes per day.

Musculoskeletal Disorder (MSD)	Moderate stress	Low stress	OR (95% CI)	p-value
Present	191	37	11.683 (6.132-22.257)	<0.001
Absent	19	43		

[Table/Fig-7]: Association between Musculoskeletal Disorder (MSD) and stress among MRs (N=290).

With respect to alcohol consumption, 26.9% of participants reported consuming alcohol, while the majority (73.1%) were non users. Among alcohol users, the duration of consumption varied, reflecting both recent and long-term habits. In the past 12 months, alcohol consumption was generally infrequent, with most participants reporting intake 1-3 days per month, followed by less than once a month, and only a very small proportion reporting daily consumption. The quantity of alcohol consumed per day also varied among users, though overall patterns suggest predominantly low to moderate intake.

Dietary habits revealed variability in meal frequency, fast food consumption, salt intake, and fruit and vegetable consumption, indicating mixed dietary practices among participants. Morbidity-related data showed the presence of chronic conditions such as diabetes and hypertension among a subset of participants, along with varying levels of treatment-seeking behaviour and complications. Out-of-pocket expenditure details indicated differences in healthcare spending, insurance coverage, and preferred systems of medicine. Anthropometric and clinical measurements including BMI, blood pressure, and blood sugar levels, demonstrated a spectrum ranging from normal to elevated values, suggesting the presence of both normal and at-risk individuals within the study population.

DISCUSSION

In the present study, the prevalence of lower back pain and ankle pain among MRs was 42.5% and 14.9%, respectively, which is similar to the findings of the study done by Tander B et al., which showed the prevalence of lower back pain and ankle pain among MRs to be 55.4% and 14.3%, respectively [7].

The study showed a statistically significant association between commuting to work using a bike and the development of MSDs (AOR-4.00; p-value <0.023), which is similar to the findings of the study done by Chawathe V et al., which also showed that MRs who commute to work using bikes suffered from a higher prevalence of musculoskeletal pain when compared to those used train for commuting to work [15]. Riding bikes may contribute to MSDs due to a variety of factors, such as maintaining static posture for a prolonged period of time, vibrations from different parts of the vehicle can affect the joints and muscles, and engaging in repetitive motions that can also affect the joints.

The present study found that those who worked for a duration of more than 10 hours per day have an increased odds of suffering from MSDs. Though the AOR was high (15.896), the wide 95% confidence interval: 3.8-66.4, points to sparse data in the reference category which could result in unstable estimates in logistic regression. Though the direction of significance is consistent with existing literature [16] on increase in working hours and MSD outcomes, the point estimate could be inflated due to the limited number of events per cell [16]. In a study done by Kumaresan M et al., it has been postulated that long working hours are a significant risk factor for the development of MSDs. Similar findings were observed in a study done by McAtamney L and Nigel Corlett E. and Punnett L and Wengman DH [17,18]. Prolonged working hours can lead to MSDs due to extended periods of static posture, either sitting or standing, muscle fatiguability, increased pressure on the joints, and hampered venous circulation in the lower limbs [19-22].

The present study showed a statistically significant association between exercising only 1-3 days/week and the development of MSDs (AOR- 9.3; p-value- <0.001), which is similar to the findings of the study done by Holth HS et al., which showed that adults who exercised poorly had a higher risk of developing chronic MSDs [23]. Poor exercise can lead to the development of MSDs through weakening of muscles and joint stiffness. The high magnitude of AOR should be interpreted cautiously, given the cross-sectional design and potential residual confounding.

The present study showed a statistically significant association between travelling more than four hours per day and development of MSDs (p-value-<0.001; AOR-1.8), which is similar to the findings of the study done by Ryu H et al., which showed that adults who spent longer times in travelling had a higher risk of developing MSDs [24]. Long travelling time may contribute to MSDs through prolonged static sitting, adopting awkward posture during sitting, and restricted joint movements [25,26].

In the present study, the prevalence of stress (moderate level) among MRs was 72.4%, which is higher than the findings of the study done by Patil SB and Singh JM, which showed the prevalence of stress among MRs to be 55% [9]. The difference observed could be due to variation in study setting, place of the study, and the time period. Since the pharma industry is growing day by day, stiff competition between various stakeholders increases the burden on the MRs to meet their various targets. This could be one of their reasons for the comparatively higher prevalence of stress among MRs. The lack of people who belong to the high-stress group could possibly be attributed to a healthy worker selection effect, wherein highly stressed individuals could have been absent at work or were not available during the time of conducting the survey, thereby causing them to be underrepresented in the data set.

The study showed a statistically significant association between married marital status and development of stress (AOR- 6.3; p-value<0.001) among MRs, which is similar to the findings of the study done by Kalyanasundaram P which also reported a statistically significant association between married marital status and stress [27]. Married MRs experienced higher stress levels than unmarried representatives because of their family commitments and hampered work-life balance [28-30].

The present study showed a statistically significant association between working on an average of more than 10 hours per day and development of stress (AOR-1.925; p-value-0.044), which is similar to the findings of the study done by Lee K et al., which showed that adults who worked for longer hours had higher risk of developing stress [31]. Longer working hours can lead to stress through disrupted work-life balance, reduced leisure time, and sleep quality [32,33].

Since there is a strong association between MSDs and stress (AOR-11.68), it is possible to say that the physical and mental well-being of MRs is highly interconnected. Pain caused by MSDs can hinder the efficiency and cause job strain, thus increasing stress. On the other hand, the increased level of stress can lead to increased muscle tension and pain sensitivity. The increased odds might result from the interaction of several factors such as long hours of work and travelling, lack of time to recover. Similar findings were observed in a study done by Li X et al., and Basu D et al., [34,35].

The higher prevalence of musculoskeletal problems and stress reported in this study compared to other studies can be associated with the specific characteristics of MRs working in Chennai, which include extensive use of two-wheelers, long hours of work, and performance targets. In addition, unlike others, Chennai may experience more traffic in the city as well as difficult climate conditions that would enhance physical stress. The use of two parameters-musculoskeletal problems and stress- in one study sample would also provide a larger measure of morbidity. Although the existence of such conditions was anticipated based on the nature of work, it is remarkable that the results of the study show a higher degree of prevalence of these conditions.

Limitation(s)

The present study is limited by its cross-sectional design, which precludes causal inference and limits temporal inference between exposure and outcomes. Self-reported data may be subject to recall bias. Since only 20 companies were randomly chosen from a total of 120 companies, there may have been bias related to inclusion of participants from only these twenty companies leading to limitations in the external validity and generalisability of the findings. Considering that data were gathered from weekly review meetings, there is a possibility that those who missed their scheduled meetings, whether sick, tired, or stressed out, were not involved in the study, which may have introduced a bias into the results. Additionally, relatively small number of outcome events in certain categories may have affected the stability of regression estimates. Since only 3.4% participants are females, the results may not fully capture the gender specific stressors for female MRs. This limitation can be addressed by conducting a specific study focused on female MRs.

CONCLUSION(S)

The present study identified a high prevalence of MSDs (78.6%) and stress (72.4%) among MRs. MSDs were significantly associated with commuting by bike, prolonged working hours (>10 hours/day), extended travel time (>4 hours/day), and inadequate physical exercise. Stress was associated with married marital status and prolonged working hours. The findings highlight the need for adherence to the recommended 48 hours work week, promotion of regular physical activity, and improved travel planning. Pharmaceutical companies should also organise periodic health check-ups and provide appropriate medical care and stress management support to enhance the well-being of MRs.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Feb 22, 2026
- Manual Googling: Apr 27, 2026
- iThenticate Software: Apr 29, 2026 (9%)

ETYMOLOGY: Author Origin

EMENDATIONS: 10

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Feb 03, 2026**
Date of Peer Review: **Feb 27, 2026**
Date of Acceptance: **May 01, 2026**
Date of Publishing: **Jun 01, 2026**