PREVALENCE OF STRESS IN SUBURBAN COMMUTERS AND ASSOCIATION OF STRESS WITH DURATION OF COMMUTE - A CROSS-SECTIONAL STUDY

Latha Sannasi∗,1, Ahamed Basha Abdul Bari∗∗ and Siva Priya D V∗ ∗ ∗

∗Assistant Professor, Department of Physiology, Panimalar Medical College Hospital & Research Institute., ∗∗Professor, Department of Physiology, Chettinad Hospital and Research Institute., ∗ ∗ ∗Professor , Department of Physiology, Panimalar Medical College Hospital & Research Institute.

ABSTRACT Introduction: A large proportion of the urban population commute long hours for their daily work. Commute associated stress, and their symptoms were not addressed in the population of Chennai.

Methods: 148 commuters who commute for work by car for greater than one hour to the workplace and greater than one hour back home (Long commuters) and 104 persons who travel for less than one hour (short commuters) were considered as control. The stress symptom score questionnaire was used to assess the symptoms of stress, and the perceived stress scale (PSS) was used to grade the stress levels as mild-moderate and severe.

Results: In long commuters, the symptoms of stress were significantly increased than short commuters. 20%, 40%, and 40% of mild, moderate and severe stress were reported in long commutes. In short commuters, the prevalence of mild, moderate and severe stress was 45.5%, 50%, and 4.5%.

Conclusion: Long hours of commute for work was associated with severe stress and a higher prevalence of stress symptoms than short hours of commute.

KEYWORDS Stress, mild stress, moderate stress, severe stress, PSS, Stress symptom score

Introduction

Urban metropolitan cities need a large workforce of the human population for their development [1]. Commute to work was considered a source of recreation and a source of stress. However, the effects of long commute on individual well-being and social life are surprisingly little known. Perceived stress while or immediately after commuting has been found to increase with the duration of commuting time [2]. Commuting by car or public transport was considered a more stressful means of a commute than walking, which was an active mode of transport. Variability in commuting time, lack of predictability, lack of control of traffic and crowding were the factors considered for negative health impact on the commuters. Commuting was associated with poor social participation and lack of time for self-care [3]. Long hours of commute would have produced stressed conditions in the body, which caused increased heart rate and epinephrine levels [4]. Commuting for work resulted in positive health when it was an active mode of transport like walking and cycling [5]. The passive mode of commute resulted in negative health due to lack of time for social participation and lack of time for health promotion activities [6]. Long commuters' physical health and mental health problems may result in increased absenteeism in the workplace, greater than two weeks duration [2]. Long hours of commute was associated with conflict in the family. Long commute hours were associated with an increased probability of working on holidays [7]. The term “stress”, as it is currently used, was coined by Hans Selye in 1936, who defined it as “the non-specific response of the body to any demand for change”. Stress has been shown to increase blood pressure by increasing cardiac output and the heart rate without affecting total peripheral resistance. Acute stress was found to increase catecholamine, cortisol, vasopressin, endorphins and aldosterone [4]. Acute stress reduced renal sodium excretion, which contributed to increased blood pressure. This study addressed the symptoms of stress and level of stress in long commuters.

Methods

The cross-sectional study started after the ethical committee permission of the institute. 148 people who commute a long distance daily greater than one hour in the morning and one hour in the evening by driving the car to work for 5 days a week were the study participants. On the other hand, 104 who commute by car daily less than thirty and thirty minutes in the morning and evening participated as control. The participants included both males and females. The age group was 25-55 years. People with a history of gastrointestinal disease, neuromuscular or psychological disease were excluded. Participants on antipsychotic medications were also excluded. The place of study was a suburban medical college about 40 kilometres away from the city. The participants were employees...
Table 1 Long and short Commuters PSS scores

| Parameters   | Long commuters | Short Commuters | P<0.05* |
|--------------|----------------|-----------------|---------|
| Age          | 41.7±8.6       | 34.2±8.8        | .004    |
| PSS          | 32.1±2.5       | 24.8±2.8        | .000    |

All the data given are mean ± SD. (P<0.05).* - denotes significant difference PSS - Perceived stress scale

Table 2 Person’s chi square test - level of significance of symptoms of stress

| Stress Symptoms | Value | P<0.05* |
|-----------------|-------|---------|
| Restlessness    | 4.14  | .529    |
| Diarrhea        | 4.370 | .497    |
| Eating disorder | 1.551 | .041    |
| Depression      | 21.050| .002*   |
| Anger           | 24.463| .000*   |
| insomnia        | 4.910 | .555    |
| Irritability    | 23.948| .000*   |
| Sleep defect    | 7.555 | .182    |
| Anxiety         | 14.725| .023    |
| Fatigue         | 21.224| .001*   |
| Tense muscle    | 17.250| .008    |
| Headache        | 21.578| .001*   |

All the data given are mean ± SD. (P<0.05).* - denotes significant difference

Results

The stress symptom score was high in long commuters than in short commuters, and it was a statistically significant difference, as shown in table 1. The neurological symptoms of stress like depression, anger, irritability, fatigue, and headache were statistically significantly increased in the long commuters group than short commuters group.

Discussion

Long commuters had more prevalence of severe stress than short commuters. The prevalence of mild-moderate and severe stress due to long working hours in doctors was 19.51%, 14.63% and 2.44%[10]. In the present study, the prevalence of mild, moderate and severe stress was 40% 40% 20% in long commuters, and In short commuters, the prevalence was 45.5%,50%, and 4.5%. Thus, long commuting hours were associated with a high degree of stress than work. The perceived stress was high in the urban rail commuters who commuted for long hours in America [11]. This study proved that commute duration was directly associated with stress levels. In a two year follow up study on commuters, it was found that with an increased duration of exposure to stressors, the scores of PSS increased. However, positive psychological characteristics decreased[12]. The stress symptom score provided various symptoms of stress, categorized as gastrointestinal symptoms like diarrhoea and eating disorder; these symptoms were considerably less in long and short commuters. However, costa et al. demonstrated gastrointestinal symptoms of stress in long commuters [13]. The category of neuropsychiatric system symptoms was more reported, including irritability, anger and depression. Anger reported in long commuters may affect the general health of these people. Depression as a symptom of stress was reported in a study. In his study, Ding et al. reported the worst physical and mental health in long commuters [6]. Sleep-related symptoms of stress like insomnia and sleep defect were reported more in long commuters than in long-short commuters. Sleep disorders as a symptom of stress were proved in a study with a group of teachers with long working hours [14]. Neuromuscular symptoms of stress like fatigue, tense muscle and headache were reported more in long commuters than short commuters as it was proved in a study done in Tokyo were long commuters had sympathetic dominance, which resulted in these complaints [15]. Fatigue related to long hours of commute was long.
associated with the posture of commute as it was proved by electromyo-
graphic studies[16] Tense muscle was also reported in weavers were it was proved that psychological factors were the cause [17]. The long commuters were aged population when compared to short commuters this can be explained due to decreased risk-taking behaviour of aged people and age was also considered as a factor for stress perception in long commuters [13] Long hours of commute was associated with increased risk for cardiovascular disease as it was proved that commute for one hour or more was associated with increased cardiometabolic risk markers in Australian population [18]. As long hours of commute was associated with various stress symptoms and other risk factors, measures to reduce the stress should be planned as providing accommodation for employees near the workplace and improving the transport system. In a study, it was proved that active means of transport like walking and bicycling to work decrease the risk of diabetes mellitus and cardiovascular risk in commuters[5]

Conclusion
Long hours of commute was associated with severe stress and neuropsy-
chiatric symptoms of stress. The government should plan for actions to reduce the stress levels in long commuters by improving transport, providing accommodation near industries and promoting active commute.

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Conflict of interest
There are no conflicts of interest to declare by any of the authors of this study.

References
1. G. Costa, L. Pickup, and V. Di Martino, “Commuting—a further stress factor for working people: evidence from the European Community. I. A review,” Int. Arch. Occup. Environ. Health, vol. 60, no. 5, pp. 371–376, 1988.

2. E. Hansson, K. Mattisson, J. Björk, P. O. Stergren, and K. Jakobsson, “Relationship between commuting and health outcomes in a cross-sectional population survey in southern Sweden,” BMC Public Health, vol. 11, 2011.

3. K. Mattisson, C. Hakansson, and K. Jakobsson, “Relationships Between Commuting and Social Capital Among Men and Women in Southern Sweden,” Environ. Behav., vol. 47, no. 7, pp. 734–753, Aug. 2015.

4. E. A. Anderson, C. A. Sinkey, and A. L. Mark. “Mental stress increases sympathetic nerve activity during sustained baroreceptor stimulation in humans,” Hypertension, vol. 17, no. 4 SUPPL., 1991.

5. C. Millett et al., “Associations between Active Travel to Work and Overweight, Hypertension, and Diabetes in India: A Cross-Sectional Study,” PLoS Med., 2013.

6. D. Ding, K. Gebel, P. Phongsavan, A. E. Bauman, and D. Merom, “Driving: A road to unhealthy lifestyles and poor health outcomes,” PLoS One, 2014.

7. M. Nomoto, A. Hara, and K. Kikuchi, “Effects of long-time commuting and long-hour working on lifestyle and mental health among school teachers in Tokyo, Japan,” J. Hum. Ergol. (Tokyo), vol. 44, no. 1, pp. 1–9, Jun. 2015.

8. S. Cohen, T. Kamarck, and R. Mermelstein, “A global measure of perceived stress,” J. Health Soc. Behav., vol. 24, no. 4, pp. 385–396, Dec. 1983.

9. M. S. Ortiz and J. Sapunar, “Longitudinal association between chronic psychological stress and metabolic syndrome,” Rev. Med. Chil., vol. 146, no. 11, pp. 1278–1285, Nov. 2018.

10. A. Kumar, P. Pere, S. Gupta, and A. O. Wani, “Level of stress and its determinants among Intensive Care Unit staff.,” Indian J. Occup. Environ. Med., vol. 20, no. 3, pp. 129–132, 2016.

11. G. W. Evans and R. E. Wener, “Rail commuting duration and passenger stress.,” Health Psychol., vol. 25, no. 3, pp. 408–412, May 2006.

12. C. Barbosa-Leiker et al., “Measurement invariance of the perceived stress scale and latent mean differences across gender and time.,” Stress Health, vol. 29, no. 3, pp. 253–260, Aug. 2013.

13. G. Costa, “[Stress of driving: general overview].,” G. Ital. Med. Lav. Ergon., vol. 34, no. 3, pp. 348–51.

14. A. Bannai, S. Ukawa, and A. Tamakoshi, “Long working hours and sleep problems among public junior high school teachers in Japan.,” J. Occup. Health, vol. 57, no. 5, pp. 457–464, 2015.

15. T. Kageyama, N. Nishikido, T. Kobayashi, Y. Kurokawa, T. Kaneko, and M. Kabuto, “Long commuting time, extensive overtime, and sympathodominant state assessed in terms of short-term heart rate variability among male white-collar workers in the Tokyo megalopolis.,” Ind. Health, vol. 36, no. 3, pp. 209–217, Jul. 1998.

16. N. Michida, H. Okiyama, K. Nishikawa, and T. Nouzawa, “A Study of Drivers’ Fatigue Mechanisms During Long Hour Driving,” SAE Transactions, vol. 110. SAE International, pp. 284–292, 2001.

17. R. Chaman et al., “Psychosocial Factors and Musculoskeletal Pain Among Rural Hand-woven Carpet Weavers in Iran.,” Saf. Health Work, vol. 6, no. 2, pp. 120–127, Jun. 2015.

18. T. Sugiyama, K. Wijndaele, M. J. Koolsari, S. K. Tanamas, D. W. Dunstan, and N. Owen, “Adverse associations of car time with markers of cardio-metabolic risk.,” Prev. Med. (Baltim.), vol. 83, pp. 26–30, Feb. 2016.