



Title : Silent effects of night shift on worker's health of greater Kolkata: An ergonomic - biochemical interface

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Introduction: There are conflicting epidemiologic evidences on the association between shift work and cardiovascular disease. These are primarily mediated by the disruption of circadian rhythms since most body functions are circadian rhythmic. Shift work is a form of work-scheduling involving a process in which a group of workers succeed each other at the same workstation in shifts. At present nearly one-fifth of the total global work force works in shifts. It retards human performance and increases the chances of occurrence of major industrial accidents. In this study we attempt to identify the earliest possible cardiovascular risk factor that may be identifiable in a precision biochemical analysis which will direct some preventive measure against any occupational damage before its establishment. Recently many scientific studies have proved that Lipoprotein (a) acts as a marker of cardiovascular risk factors. Lp(a) levels have been associated with cardiovascular disease in numerous studies. Further, there is emerging evidence of interaction between Lp(a) and other established and potential cardiovascular risk factors, such as low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and homocysteine (6). The purpose of the study was to investigate whether the reported increased disease risk in night shift workers of Kolkata could be explained by changes in cardiovascular risk factors. The study thus aims to find out the risk assessment protocol for night shift workers exclusively in order of sensitivity so as to find out some of the early detecting parameters related to fatal cardiovascular damages, in particular so that the damage may be preventable before its establishment.

Methodology: 24 male security personnel working in housing complexes as night guard and 24 male control subjects of comparable profile working the same status only in day time, were arbitrarily chosen from Kolkata with an age range of 40-47 years. A total of 48 workers (39.8) completed questionnaires about socio demographics, job content, work environment, health, and lifestyle. This double blind study was performed following the ethical guidelines for biomedical research on human participants as directed by ICMR, Govt. of India. Various physiological parameters like height, weight, heart rate, blood pressure, BMI, muscle strength and electrocardiography ; anthropometric parameters like waist: hip circumference, lean body mass and % body fat and biochemical parameters like lipoprotein (a), serum creatinine, spot urinary creatinine, serum LDL-C, cholesterol levels, serum cortisol and serum testosterone levels were assessed by standardized protocols. Statistical analysis was performed using a two tail t-test by difference method among all the comparable groups by a modified statistical software minitab-15 for windows version 2009 where probability (p) values of less than 0.05 were considered statistically significant.

Results: Night Shift workers had higher cortisol levels compared to day-shift workers, suggesting a prolonged stress response in the irregular-shift group. Both waist to hip ratio and lipoprotein (a) value increased significantly in the shift workers compared with daytime workers. Lipoprotein (a) is found to bear significant correlation with Waist to Height ratio. Spot urinary creatinine concentration is found to bear high correlation with percentage of body fat and Lipoprotein (a). Serum cortisol was correlated negatively with body mass index and waist-hip ratio and positively with Lp (a) of night shift workers significantly. Serum Testosterone level was not found to deviate and correlate significantly. ECG Corrected QT Interval was found to bear significant correlation with Heart rate of the Experimental group, though there was no significant difference in the QT intervals of the experimental and control groups.

Conclusion: Since Lp (a) is a proven atherogenic substance, its silent rising concentration is becoming an unpleasant reminder for shift workers Endogenous glucocorticoid levels correlated with Lipoprotein(a) levels and body fat% as well as waist to hip ratio may be instrumental in assessing early markers of CHD amongst night shift workers.