

Ergonomics in Management of Stress Amongst the Night Shift Workers: A Preliminary Review

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Abstract

Working on night shift is basically going against the circadian rhythm. Biological clock inside the human insists to fixed working status on daytime and rest/sleep at night. Ergonomics deals with providing a healthy relation between man machine and environment, where man fits to the job generates ultimate productivity. People in the east who are compromised to adjust in low to middle income are the main sufferers of not having optimum sleep. The population of security services, drivers, loco-pilots, nurses, telesales, IT professionals, various millworkers etc. often have shift based jobs and tries to accustom in it by compromising the biological clock. Many research evidences have been showed that alterations in biological clock lead to cause severe insomnia & shift work sleep disorder leading in disturbing occupational health as well as safety. Even sudden alterations in the biological clock lead cause accident, injuries alike from common health distresses. Alteration in the work rest cycle, taking sufficient rest in between the works, getting sufficient scopes in changing postures by arrangements of refreshments in the work place can help in optimizing productivity in the work place. Rotational shift with dynamic posture based work may lower the tendencies of accident and risk associated with night shift based work.

Keywords: ergonomics, circadian rhythm, insomnia, risk, accident



Fig 1: Human circadian rhythm

Introduction

Fitting to the work pattern in shifting manner is very common now these days. People working in organized and unorganized sectors are more tend to exposed in various shift based work patterns, where their work-rest cycles are exceptionally disturbed. It has been observed that countries like India, Bangladesh, Pakistan and Afghanistan along with many of the other developing countries in the eastern part of the globe have faced lot of economic troubles since freedom. Several ways to reduce this burden had been planned, executed and failed as well. Countries like India where population is one of the major concerns for economic stringency and getting required job is a challenge for the population to survive can be enough to restrict financial growth, as a result poverty breaks out. In case of some other facts poor rate of literacy is also by default a major concern for creating & getting a job. Now at this circumstance when fit man to a fit job is a genuine issue so people at every part of the society tries to their earnest in surviving with whatever facilities for earnings they get. There are various types of jobs are available now these days in organized as well as unorganized sectors out of which some are fixed time bound jobs, some are rotational jobs and many are seasonal too(1). So as the work rest cycles vary from sector to sector & organization to organization as well. In many studies it has been showed that kind of jobs determine the basis of education whether the person is having primary or secondary type of education (2). People with extreme job crisis fail to choose right job rather opt for jobs which ever they get. In India many branded as well as non-branded companies/organizations provide better wedges to the workers who work at night shift (3). Workers with their utmost eager and desire work for better remuneration by sacrificing their inbuilt biological clock. Biological clock or circadian clock is the fine tune that used to adjust the physiological functions considering the solar timing (4). It also speaks about the alteration of physiological processes if any changes happen to the system the bio chemical pathways alter their actions as a result no acute response to be observed. The workers who work on the basis of rotation for example like: morning shift or evening shift, their biological clock has been adapted accordingly. Especially the workers who are working for the night or evening shifts face severe hazards in managing their physiological homeostasis (5). Shift workers often face extreme stress and anxiety due to their unusual work patterns and sleeplessness, which grow stress among them leads to release of cortisol in a normal phenomenon. However, the stress marker among them leads to develop chronic anxiety followed by depression (6). There are many therapeutic interventions have been made in controlling this stress among night shift workers, whereas the human factor method namely ergonomics is one of the potential ones.

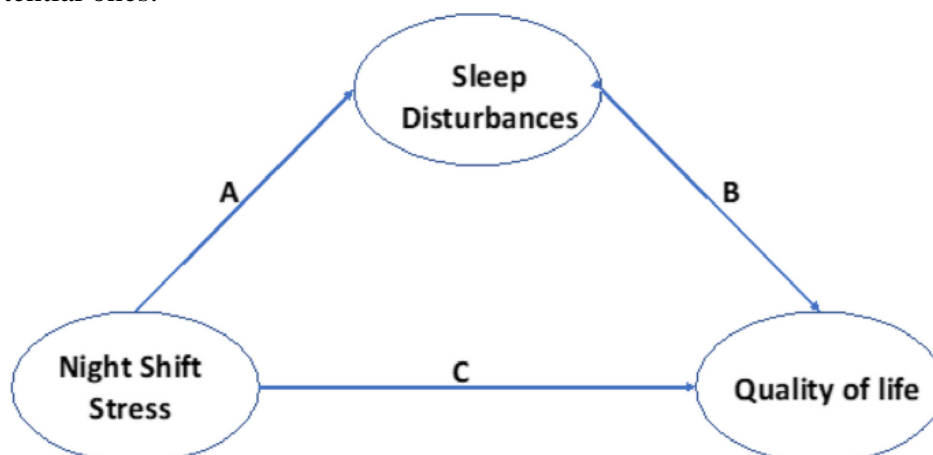


Fig 2: The impact of night shift work based stress & sleepless ness (28).

Gap analysis among the population of night shift workers

There are many job profiles suggest night based work for Indian population, for e.g.: Health workers like doctors, clinicians, nurses, lab technicians etc., IT workers, workers at the call centers, loco pilots, defense personals, airport staffs and many more in the organized sectors. On the other hand, many people who work in the unorganized sectors like watchman, people of security services, mine workers, storekeepers and medicine shop workers are also serving the same timings for job. It has been observed that the workers in the organized sectors are found to be in comparatively lower state of stress and anxiety comparing the people who work for the un-organized sector. There are multiple reasons pointed behind this grown stress parameters among the workers of unorganized sector, out of which the major one is job security and financial security. It has been often observed that the workers working at unorganized sector are financially under privileged, so they have to choose other options irrespective of their major income sources. This hamper their regular work rest patterns consequently stress ignites. Poor infrastructure in the work-station can be also identified for increasing risk for the job based stress amongst both in organized as well as unorganized sector (7). There are several studies which have showed evidences that lack of risk management in the workstation is another major reasons for both organized and unorganized sector (8). Gender constraints are the major constraints in countries like India women population are still believed to be potential as home makers, many industries have put down choices for not selecting women in the shift based work due to lack of consistency and security (9). Even many studies have emerged that prolong period of work engagements raised many issues among the care giving women in healthcare sectors of the age of 30 to 45 years as they have to make severe adjustments with the domestic purposes, traveling during night shift from far creates safety issues as well as family issues and lack of improvisation with the advance technologies also develop chances of infections among them (10). Another study have showed that abdominal obesity grows among the workers who work for night shift and this is considered as one of the basic risk for this population (11). The workers who work in unorganized sectors face risks for working at night. Due to the abnormal sleep pattern chances of accidents enhance and the management system for the accident is still poor & required to be strengthened more (12). So the gap between the society and the population dealing with night shift work are required to be analyzed and implementation of ergonomics in dealing with the circumstances is highly required.

Ergonomics in ail management of night shift workers

Though it was already established fact that there are many physiological and biochemical changes are dominant amongst the nightshift workers but due to the increased demand in the productivity and comparatively better wages attract people to choice for the night shift works. Ignoring health and work based risk factors people become more economy orientated to earn their livelihoods. Ergonomics can make the job easy for them as it includes the three primary components of man, machine and environment. As it has been reviewed that there is a gap between understandings of the population about their occupation, on the greed of getting better salary they always ignore the health risks as well as occupational risks. All these parameters used to develop imbalance of mental health amongst the night shift workers. As a result this has become a potential stressor for them leads to anxiety and depression. Now implementation of better organizational infrastructure engaging ergonomics can reduce their health issues to some extent. It may also enhance the productivity, & lead to cause lower psychological stress and anxiety. A study showed that psychosocial risk factor assessment workshop can lower the job based

anxiety amongst the workers and this may also lower the tendency of pain in the upper and lower extremities for the corporate workers so as the risks for musculoskeletal disorders (13). Another set of research showed that the women tele-callers working at night for a prolong period of days may often face digestion issues, family noncooperation, pain in upper extremities and there pattern for sleep are also disturbed so implementation of ergonomics checklist for workstation analysis, operator-VDT engagement and telecommunication equipment interactions lower the physiological strain and musculo-skeletal challenges and organizational environment by lowering work based stress(14). In a cross sectional study on eastern population show positive effects upon the main sleep duration and the workers found it as a “power nap” for them to be given more energy and encouragement to work further (15). Ergonomics in assessment of this duration for sleep mainly by recognizing work rest cycle and also as main driven force for the performing more work (16). Identification of psychological factors in assessment of low back injury for the drivers who drive at night are of immense importance in prevention of their low back pain. Though the duration for their work pattern are not fixed at all times but the kind of response observed for the long distance drivers are wrenching. So push back seats with adjustable heights, heat protection devices for usage while driving lowering vibration based engines application and lastly proper management of work rest cycles can lower their posture difficulties and so as lower the scope of low back injury (17, 18). Health sector in this nation has to work for 24 multiplied by 7 so in most of the cases shift based works are pre-dominant. So in many of the organizations the shift has been rotational and by implementation of ergonomics the duration or period of night shift has been regulated, rewards are implemented & additional benefits are given to encourage workers from every part of the society (19). In corporate hubs safety trainings at mandatory order and psychological counseling at regular intervals are very useful to increase the workers dedication towards the job. Statistical figures justify that night shift workers often face demotivation as they occupationally suffers from sleeplessness. Clinically it has been called as insomnia followed by ischemic heart disease (20). In a research job rotation was made to be mandatory to reduce boredom, tendencies of musculo-skeletal disorders, pain and also induce task abilities along with positive competencies amongst the worker which shows an ability enhancement tendencies and psychological upliftment amongst the workers (21). Even organizational improvisation and other ergonomic interventions in the workstation designing, as well as psychometric tool of cognitive ergonomics enhance the organizational health even reduce work stress and musculo-skeletal disorder in the workers population (22).

Discussion

The definition of work rest cycle says about a total amount of rest in minutes required to be taken after every 30 minutes of work shown in a formulae i.e. $R(w) = 30(w-4) / (w-1.5)$ (as per Murrell’s Formula) (24). The formula depicts with “w” as work, “R” as rest and the unit for the work expenditure value after work done. So in terms of calculating the work rest cycle it is extremely important to recognize the class of work they are performing and at sequential intervals of resting duration to be taken with priority. Statistical evidences showed that due to lack of maintenance in work rest cycle by the organizations whether it is organized or unorganized sector workers often face fatigue, boredom and sleepy which leads to grow chances of accident, reduce productivity, grow anxiety among them and other patho-physiological symptoms arrive. Proper ergonomic interventions may include regular breaks or work intervals after every thirty minutes of work, may be some refreshments can be arranged for them, posture change said to be compulsory as static posture leads to pain in numerous extremities within the

body, many tool relating cognitive ergonomics can be implemented to gain feedbacks from the night shift workers in a different way to analyze their psychological challenges. Cognitive ergonomics evaluation (CEE) methods can be implemented to analyze job based stressors and stress (25). On the other hand organization specific semi structured questionnaire can be applied upon the workers to get an update about the facts and loopholes off the infrastructural barriers which they worker working at night face on regular basis. Tendencies of fear grown about the risk factors can also be analyzed and reduced with multiple safety as well as risk management workshops. The cognitive epicenters for the stress among the night shift workers depending upon the type of workstation can be easily identified with the questionnaire and various activities to reduce their work stress within workstation. The clinical conditions like- musculo skeletal disorder, hypertension, diabetes mellitus, chest pain & other, initiate with the work stress can be also reduced. Assurance regarding safety inhouse and out house for every employee may develop dedication towards the organization or may be towards the work for the workers of nigh shift. Many appropriate models for the shift workers like Dose-response models, two resting day’s model, models for increasing deep sleep amongst the workers are the scalable ones for cognitive ergonomics in lowering stress and anxiety amongst the night shift workers(26). The tolerance of taking the shift based work can be also identified by assessing for factors like somatic health, ratio between actual sleep and required sleep, flexibility as well as fatigue-ness, because these are the markersfor negative mood controls(27).

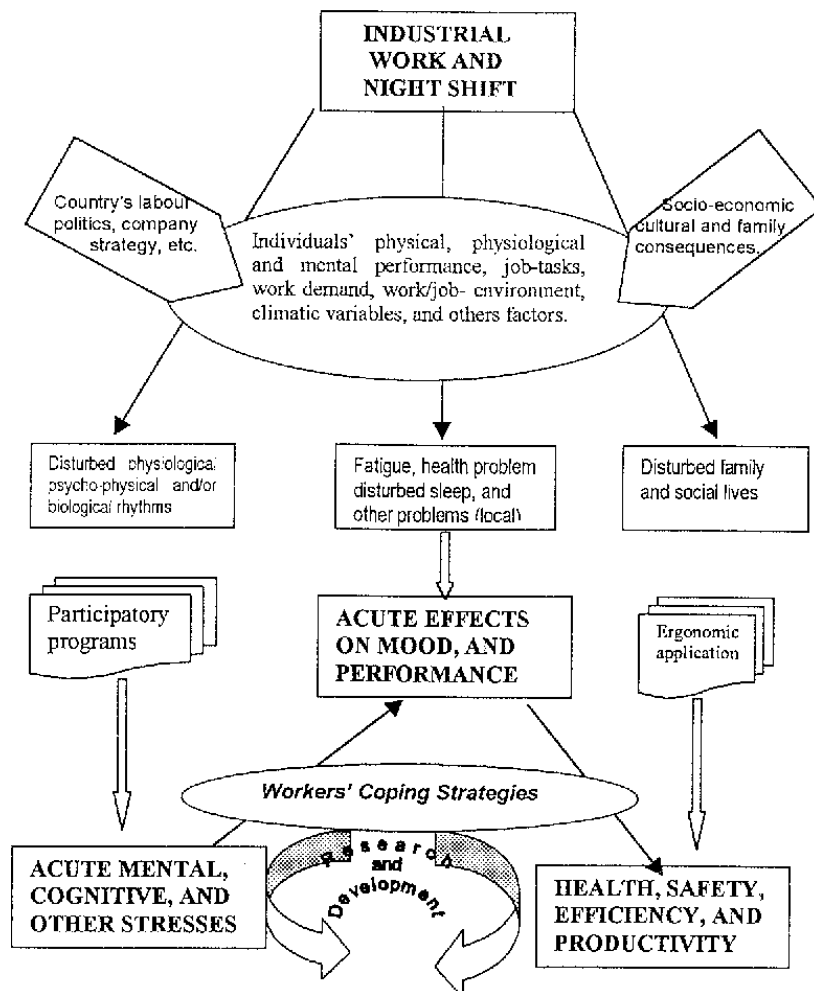


Fig 3: Physiological synchronization process adapted amongst the night shift workers (29).

The acute stress can be checked and rectified with implementation of various models for the night shift workers, where the physiological, psychological and emotional well-being developed due to sleeplessness take time to get adjusted with inert biological clock till then health practices reduce its tendencies. Multiple effects of sleeplessness have been observed in a broader spectrum like compromised endocrine activities, unhealthy reproductive life, emotional derangements, and negative impacts upon life styles like initiation of addictive intensions and lastly draw a huge negative longitudinal impact upon the systems engaged in the body. So to develop proper synchronization within mental, physical, spiritual and environmental health positive ergonomic practices to be involved whether it is an organized sector or unorganized.

Conclusion

Ergonomics is an extension of physiology, improving work-based health and apart from physiological health; mental health is also significant to be addressed by it. Anxiety and stress both are sometimes synonyms but many times can be the reason for either or. Mostly the stress factor here has been addressed to the night shift work and its environment where the work has been going on. More strategic innovation in lowering monotony and also better reward with risk free atmosphere may help them to be motivated mentally and this will ensure partial to complete improvement of physiological health.

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