Shift work can be defined as work schedule where at least 50% of the work is required to be done outside of the hours of 8.00 am to 5.00 pm (Hedges & Sekscenskip, 1979). Working outside the “normal” hours either by extended days or shift rotation has increased recently to help economy to grow. Many view Shift work as driving society to overcome the challenges of the need for constant growth and prosperity. Apart from providing and maintaining the obvious demands of industrial growth, Shift work also improves employment opportunities and income, facilitates flexibility for couples for child care and household chores. However, the diverse, complex and profound implications of Shift work have been only recently acknowledged (Hossain & Shapiro, 1999). There are several professions which require Shift work e.g. emergency health care, public safety (police and fire service), transportation (aviation and rail etc.), military, industrial plants, business processing industries, night service workers etc. According to Dipboye, Smith and Howell (1994), human beings are day-oriented creatures. Our visual system is designed to operate better in day light than darkness. It is therefore not surprising that many other human functions are oriented towards day activity. The most well-known are physiological variables, such as body temperature, heart rate, and blood pressure, although

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nonphysiological variables, such as self-rated alertness and simple
performance measures, also follow this trend. Levels of these
variables in the body typically reach a peak during the day and a
trough or low point during the night. This cyclic activity repeats
itself every 24 hours and such cycles are called circadian cycles.
These cycles are extremely important because they shape human
physiological, psychological, and behavioral functioning.

The people who work at night and sleep during day often
report that they can not do either very well. Shift workers must
cope with changing work and sleep schedule and the problems this
type of lifestyle spawns. The shift workers’ inability to adapt to
shift work schedules can lead to loss or impairment of physical,
psychological and social well-being with impact on physiological
rhythms, sleep patterns, health and social interactions, family life,
job performance and safety (Oslon, 1984). For these reasons
organizations should be concerned about the potential effects of
Shift work on their employees. The need for better strategies in
shift work design and management of this complex bio-psycho-
social phenomenon is increasingly appreciated.

**Circadian/Sleep Cycles and Shift work**

Circadian regulation and brain restitution (by sleep) are among
the crucial factors by which the interindividual variability to tolerance
to shift work occurs. Circadian rhythms can be measured by putting
people in rooms where there are no external cues or “zeitgebers” to
go by, and observing the sleeping/waking times that they choose
for themselves. In normal life, it is the zeitgebers that help to
continually reset the bodily clock. In a typical “normal” person
(awake during the day and asleep during the night), a graph of the
core body temperature has two peaks (around 11.30 and 21 hours)
and two valleys peaks (around 3.30 and 17.00 hours) each day.
Human beings do not “just sleep”. Many distinct stages of sleep
have been detected and characterized by scientists (e.g. stages
1, 2, 3, and 4 and REM/Rapid Eye Movement). The stage of REM is
important for mental recovery and occurs mainly in the latter half
of a normal person’s sleep time and steps 3 and 4 (also called slow
wave and delta sleep) are important for physical recovery, occurs mainly in the earlier half of a normal sleep period. Slow wave sleep seems to be absolute physical necessity as during this period the body produces growth hormone. Circadian desynchronization may occur with rapidly rotating shift schedules, rapid time-zone changes, or unorganized sleep-wake cycles, which displaces sleep to the rising phase of the circadian rhythm. Similarly, if wakefulness is displaced to the circadian trough, where the sleep-promoting properties of the circadian rhythm are at their maximum, decreased vigilance and psychomotor performance, increased fatigue and errors during a biological low time will occur.

All shift work disrupts and de-synchronizes circadian rhythm and de-stabilizes and fragments sleep cycles. Shift workers often complain they have problems obtaining the sleep they need, both in quantity and quality and hence experience chronic fatigue. In a study Samata et al. (2007) studied the relationships amongst chronic fatigue and psychological variables including anxiety, mood and locus of control; the relationships amongst chronic fatigue and number of life style factors such as shift work, sleep and exercise; various coping behaviours that best predict chronic fatigue. Results showed that poor sleep quantity was the life style factor which most strongly contributed to fatigue. Other lifestyle predictors included higher workload perception, lack of exercise and the non-availability of support. Multiple regressions showed that mood disturbance, locus of control and trait anxiety are statistically significant predictors of chronic fatigue. Novak et al. (1992) concluded (based on a study of injuries among male and female shift and non-shift workers at chemical manufacturing plant) that the injury incidence rate for all shift workers had the highest, which was more than double the rate for non-shift workers and nearly triple the rate for female shift workers.

It had also been found that shift work, particularly night shift work does not adversely affect all work performance, but it is the complexity of the task which makes differences in performance. Complex mental tasks involving short term memory are performed fairly well at night whereas simple tasks such as monitoring inspection
reach to their lower level during the late night and early morning hours (Folkard, 1990; Monk, 1989).

Job Related Attitude and Shift work

Shift workers were found to report lower job satisfaction than day workers (Herbert, 1983). Lower need fulfillment and emotional well-being were also reported more frequently by shift workers as compared to day workers (Frost and Jamal, 1979). Rehman and Reddy (1996) examined whether the shift workers and day workers differ with respect to their perceived quality of life (QWL) and whether these differences were influenced by demographic variables like subjects’ age, job experience, level of education, marital status and income. The study revealed that workers’ perception of quality of life (QWL) differed significantly as a function of shift system and subjects’ level of education and income had bearing on their perception of quality of life. Burch et al. (2009) aimed to study shift work related attitudes, behaviours, symptoms and coping strategies among health care workers. The participants were grouped according to their work schedule (days, permanent evenings, rotating days plus evenings, permanent nights or relief and combined shifts). Indicators of lifestyle, work organization, sleep disruption, health and pressure management among workers on irregular shifts were compared with participants on day shifts, after adjustment for gender, age and marital status. Results revealed that night and relief/combined shift workers reported a greater ability to accommodate irregular schedules and disrupted sleep, and more work-related impacts than day workers, such as poorer health, more absenteeism and less job satisfaction than day workers.

Health Effects of Shift Work

Most health problems attributed to Shift work are believed to result from the fact that it requires people to invert the normal cycle of being awake and active during the day and sleeping at night. Living and working “out of synch” with circadian rhythms- as well as constantly shifting them (as needed in rotation shifts) produce health problems. If this cycle is disturbed for just one day, it will take five days for urinary electrolytes to adjust; eight days for the
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heart rate to adjust and six days for body temperature to adjust. The deleterious effects of rapid shift change can easily be imagined. Angersbach et al. (1980) found that gastrointestinal disease was more prevalent after prolonged exposure to Shift work. Several research studies showed a connection between shift work and cardiovascular disease (Koller, 1983; Knutsson et al., 1986). In the short term, adverse effects of shift work can manifest themselves as sleep disturbances, shift-lag syndrome, fatigue, errors, accidents and psychosomatic troubles. In the long term, there is an increased risk for chronic fatigue, gastrointestinal problems, depression, anxiety, and cardiovascular diseases, increased mortality and risks specific for women’s health. Female shift workers find that there is an impact on menstrual cycles as well.

Family and Social Life and Shift Work

The fact is that shift workers sometimes experience frustration with home and social life due to the nontraditional work hours. Shift workers commonly cite difficulty maintaining friendships, keeping the kids quiet during the day, accomplishing household duties, and finding time for a satisfying marriage. Partners of Shift workers may not like the feelings of being left alone at night. Shift workers were usually found to report various psychological and mental problems probably due to the social death that shift workers experience and family problems such as premature aging, higher number of spouse abuse, increased risk of having emotionally disturbed children and more reported mood swings, cases of depression, sexual and psychological problems.

With the change in the contemporary society and the advancement in technologies the role of women has changed a lot. They do not only take jobs, but they may have to run shifts in some of them. Night shifts have specially been identified by various researchers as stressful and may result in negative health effects by affecting their sleep, work performance, social and family lives of the female workers. In fact female night workers with children sleep on the average nine hours less per week than unmarried female day workers (Gadbois, 1981). Rotenberg et al. (2000)
compared the amount of diurnal sleep and complaints of fatigue and poor sleep of night shift working women who were caring for children with those who were not caring for children. Results showed that complaints about sleep did not differ between groups but female workers with children complained more difficulty in falling asleep, had greater dissatisfaction with the amount of sleep on work days and tended to show an increasing fatigue as the week progressed. It is concluded that there are social pressures in women who care for children that are in addition to those that are general consequences of night shift.

Another aspect of shift work and of particular concern to women is personal safety. Shift workers come and go at non-standard hours, which makes them more vulnerable to attacks. Safety at the workplace and on the way to the work place is of primary concern for the women night workers.

**Stress Coping Strategies**

In spite of the fact that shift work is found to be stressful by most shift workers the percentage of the working population on some type of shift work will undoubtedly grow as the modern industry aims to provide increased automation, and computerization, continuous manufacturing operations, and 24-hours facilities to the customers.

Shift work is not something one “just gets used to”. In most cases workers must make a conscious effort to adapt to the demands of shift work. A number of strategies, both organizational and personal, can ameliorate the stressful negative effects of shift work.

There are several types of shift work systems. A fixed shift allows the worker to adapt fully to his or her specific shift schedule, and as a result reduced problems are experienced by the workers. Permanent night shift workers should maintain a regular (day) sleep schedule seven days a week, even on days off work. Permanent shifts are effective for reducing the problems of shift work. There is increasing evidence that fixed shift systems are most cost effective than other types. The other type of shift is formal rotating shift system which is being increasingly popular because it does not
yoke workers permanently to any one shift. Now the question is which variation of the rotation shift is optimal. Monk (1989) advocates a rapidly rotating system, whereas Czeisler et al. (1982) favoring a slow rotating shift. Ehret (1981) concluded that individuals who must face critical decisions should not work rapid rotation shifts and perhaps the most disruptive type of Shift work is the rapid rotation shift. The slow rotation refers to changing shifts over an extended period of time. Ehret suggested that slow rotation is better than rapid rotation because it causes the least amount of disruption to one’s “biological clock”. The slow rotation shift is the choice when permanent shift are impossible. A flextime schedule may be an alternative to provide workers some autonomy in scheduling their working hours. Employees were found to generally prefer flextime programs over traditional work schedules. There is no evidence that flextime harms productivity rather it reduces absenteeism and tardiness (Dalton & Mesch, 1990). There are several jobs where flextime would be unsuitable but for many jobs employees’ perceived control was found to be increased with flextime schedules.

Napping can benefit shift workers in terms of both the sleep problems and the performance deficits associated with their schedules. Brief naps taken during a shift may only temporarily enhance alertness, since performance can be hindered briefly as a result of sleep inertia. Sleep inertia is the body’s tendency to want to remain at rest for 15 minutes to an hour after awakening.

Scientists have found that learning and practicing relaxation techniques improves sleep. These can range from the simple-deep, slow rhythmic breathing to advanced meditation. Twenty minutes per day practicing relaxation technique has been proven to improve the quantity and quality of sleep.

Along with the difficulty in sleeping during the day, the shift workers also face the problems of staying alert at night. One should take regular short breaks during the shift if possible. Get up and walk around during breaks. One should also plan to do more stimulating work at the time when one feels most drowsy.
It has been observed that shift workers to override the circadian rhythms in order to induce sleep, often use ‘sleeping pills’. The long term use of medication should be avoided as its effectiveness wears off overtime and dependency on the drugs may develop. Although, sleeping pills may provide relief and may be appropriate in difficulties, since sleeping pills can not reset the internal clock. Occasional use of stimulants such as caffeine can significantly reduce sleepiness and improve one’s ability to be alert on the night shift.

Current conceptual models propose that the impact of shift work increases with exposure; that is, at some point, the worker is said to reach a tolerance limit beyond which shift work is no longer safe (Tepas, Dunchon & Gersten, 1993). Older workers seem less able to adjust to shift work due to cumulative effect of sleep debt and gradual circadian desynchronization. Three main factors influence the ability to predict adjustment to shift work: rigidity/flexibility of sleeping habits; ability/inability to overcome drowsiness and morningness/eveningness; or individual traits of circadian rhythms or phase position. There are some people who feel best in the evening or night and prefer to go to bed and get up late and they are called owls or evening types. It is with the morning types that they often feel difficulty in coping successfully with night work and with changing shifts. Individuals differ in their short term and long term tolerance to shift work. Employees often complain of Shift work intolerance. It is only recently that the shift work intolerance is found to be more among those persons who possess a weak circadian time structure, or low amplitude bioperiodicities and those who endowed with strong or high-amplitude time structure are least prone to it.

In an exploratory analytical survey, aimed at identifying the effect of shift duty and the coping strategies used to adjust to the stress of shift work among nurses, Asuzu (2009) found that stress coping responses of nurses were largely based on planning and active coping. The findings of this study also indicated a need for establishment of counseling unit within the hospital where nurses or even other health workers could be guided and counseled on positive
coping strategies for effective delivery of nursing care to the patients. Gupta (2001) conducted a study to find out the effect of level of hierarchy and working shift on stress, strain and coping strategies of employees. The results showed that on Occupational Stress Inventory (Osipow & Spokane, 1987) the levels of stress and strain were found to be more among rotation shift workers as compared to those of general shift. Rotation shift employees were found to use more recreation and social support strategies as compared to general shift workers.

Human brain's natural production of melatonin also has a circadian rhythm that appears to affect the sleep/wake cycle. Melatonin is a chemical produced by the pineal gland in the brain at night during sleep. Research results suggest the possibility of administration of a synthetic form of melatonin to night workers in the morning to help shift their circadian rhythms so they can sleep during the day and be alert at night. Choosong, Arpron and Chaikittiporn (2006) conducted a study to measure the melatonin levels and stress in female shift workers. The findings show that melatonin levels in female shift workers adapted according to the shift worked, especially in the older group. They recommended that health surveillance programs should therefore, be established to prevent further negative health effects for female shift workers. The studies on melatonin use are still in progress and can not be recommended at present until there is more information about its long term safety.

Light is a powerful zeitgeber. If one wants one’s body to think that it is time to sleep, darkness is important. Timed exposure to bright light can help adjust the sleep cycle quickly. This artificial light therapy resynchronizes the biological clock by sleep-phase delay or advance.

Education and awareness programs are needed to develop mature mental attitude towards their careers among the shift workers. Development of a positive attitude towards shift work is essential. One should recognize and learn to appreciate that there are some positive aspects of Shift work such as sometimes higher wages, less supervision and ability to utilize services during less-busy hours
etc. Workers’ education on stress management, physical exercise, sleep hygiene, diet and nutrition are of utmost importance. The purpose of this type of education is to help decrease physiological, psychological and social implications related to shift work and ultimately to improve individual tolerance. Educational and counseling programs may be effective for improving social relations among family members of the shift workers. Wilson et al. (2007) examined the efficacy of family involvement in shift work training targeting both physiological and social coping strategies. It was found that social coping strategies combined with family involvement significantly reduced work-family conflict. Their reduction in work-family conflict was due to facilitation of joint problem solving approach by family members.

The demographics of the workforce have to be taken into consideration. Young workers are primarily concerned with their social lives. Workers with children often attach more importance to evening and weekends. Older workers are less able to adapt and desire even fewer consecutive night shifts and are not always as concerned with where the “day off” may fall.

Knauth (1997) suggest that a “tailor-made” shift system utilizing circadian principles should be a compromise between the employers’ goals, the wishes of the employees and ergonomic recommendations for the design of the shift systems, which may not correspond with the traditional ones.

Now the need of the day is to revise recruitment policies of shift workers, providing continuing education for better coping strategies, regular check-up for shift work intolerance and finally facilitating recovery from any clinical adversity caused by shift work.

REFERENCES
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