

# Importance of schedule exercise programme for night shift workers of Kolkata: A validated operational attempt

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## Abstract

**Background:** Shift work is work that takes place on a schedule outside the traditional time. It is linked to additional problems with physical and mental health, performance, and safety.

**Objectives:** To formulate the exercise programme for shift workers, to identify the effect of formulated protocol on shift workers and to establish a validated exercise protocol for better future of shift workers.

**Material & Methods:** 94 IT shift workers were chosen (50 only night shift workers; Group A & 44 rotational shift workers; Group B), all are involved to frequent sport exposure. General physical and some related agility test were measured by standard protocol and again agility was measured after 6-week introduction of specific exercise protocol.

**Result:** Agility was measured by Quadrant Jump Test (QJT), Stark balance Test (SBT) and Vertical jump Test (VJT). Group A showed their better agility power than Group B in all 3 tests. New exercise protocol had a significant effect ( $p < 0.05$ ) on group A despite doing only night shift work.

**Conclusion:** Specific Yoga practise can help night shift workers to heal their physiological damage due to night shift work.

**Keywords:** Shift workers, Agility, Yoga. Exercise

## I. INTRODUCTION

Night shift work is work that takes place on a schedule outside the traditional 9 am – 5 pm duty. It can involve evening or night shifts, early morning shifts, and rotating shifts. Many industries rely heavily on shift work, and millions of people work in jobs that require shift schedules. Shift work has its own demands that set it apart from jobs with traditional working hours. According to an article published in 2000 by the Bureau of Labour Statistics (BLS), over 15 million (16.8 %) full-time wage and salary workers are employed in working alternative shifts. Of these, the most common alternative shifts are evening shifts, with working hours usually between 2 pm and midnight, and irregular shifts with a constantly changing schedule [1].

The working time arrangement is a key issue in work organization as it is the basic condition bridge between human capacities with production means. This issue has acquired a growing importance in recent decades in relation to the development of new technologies and the extension of basic services to general populations, requiring continuous human assistance and control over the work processes during the 24-hour day. This issue is also associated with the increasing economic competition among companies and countries, due to the progressive globalization of the labour market and productive strategies, which entail an increasingly intensive and extensive exploitation of productive systems [2].

The most recent statistics indicate that the majority of the working population is engaged in irregular or "non-standard" working hours, including shift and night work, week-end work, split shifts, on-call work, compressed weeks, telework, part time work, variable/flexible working time, and prolonged duty periods i.e. 12-h shifts; thus, the classical working day, 7-8 a.m. to 5-6 p.m., Monday to Friday, is nowadays a condition affecting a minority of workers, that is 27% of employed and 8% of self-employed people according to the 3<sup>rd</sup> European survey on working conditions [3]. Not all shift workers suffer from sleep issues. But, approximately 10% of night and rotating shift workers are thought to have a sleep disorder known as shift work disorder. Between roughly 25-30% of shift workers experience symptoms of the disorder such as excessive sleepiness or insomnia. Shift work is also linked to additional problems with physical and mental health, performance, and safety. It is important that shift workers should learn specific techniques for improving sleep and managing schedules, to allow for the best sleep and health possible [4].

Agility training was once thought to be exclusive to shift workers. Agility is a skill that is difficult to measure. This agility training gives a tremendous power to enhance. It gives strength and flexibility to agility and focus, along with flexibility, and can be one of the most important factors in health disorder prevention. Agility is the ability to accelerate, stop and quickly change direction while maintaining proper postural alignment. This requires high levels of neuromuscular efficiency. All of these elements are very common in human and will be important to train for fit body. The large increase of epidemiological and clinical studies on this issue document the severity of this risk factor on human health and wellbeing, at both social and psychophysical levels, starting from a disruption of biological circadian rhythms and sleep/wake cycle and ending in several psychosomatic troubles and disorders, likely also including cancer, and extending to impairment of performance efficiency as well as family and social life. Appropriate interventions should be taken by the organization as well as workers of shift schedules according to ergonomic criteria and careful health surveillance and social support for shift workers are important preventive and corrective measures that allow people to keep working without significant health impairment [5].

Therefore, it seems clear that the physical fitness, strength and power are important for good performance and that can be influenced by the agility tests.

## II. OBJECTIVES

So, under these circumstances, the purpose of this study is

- To formulate the exercise programme for night shift workers.
- To identify the effect of formulated protocol on night shift workers.
- To establish a validated exercise protocol for better future of shift workers.

## III. RESEARCH METHODOLOGY

### Selection of the site and sample for the study

The study was a single-blind study conducted in IT offices of Salt Lake and Newtown area of Kolkata. The sample comprised of 94 (N) shift workers from the selected office. The selection criteria for the subjects were based on a questionnaire. The questionnaire covered standard demographic questions and occupational questions (years of exposure) and experience of regular sports exposure. 50 workers were chosen as Group A (n1), who were solely involved in night shift work for a couple of years. Remaining 44 workers were chosen as Group B (n2), who was exposed to rotational shift work. All shift workers belonged to same socio-economic group. All the players had minimum 2 years uninterrupted experience in regular sport exposure. Experiments were continued for 6 weeks (1.5 months) conducted 7 days a week.

### Ethical Consideration

This study was performed following the ethical guidelines for biomedical research on human participants as directed by ICMR, Govt. of India and due permission was taken from the Institutional Ethical Committee (IEC) for research on human participant – of Hooghly Mohsin College.

### Inclusion Criteria

1. Age range 25-38 years.
2. Healthy male who are involved in sports.

### Exclusion Criteria

1. History of any cardiovascular, musculoskeletal, respiratory health problem.
2. Subjects with no athletic activity.

All the following parameters were assessed between two groups and tabulated in following table.

**Table 1: Assessments of different Anthropometric parameters**

Serial no	Parameters assessed	Testing method
1.	Age	According to Certificate
2.	Height	Anthropometric rod
3.	Weight	Weighing machine
4.	Body Mass Index (BMI)	Calculated by the formula(height/weight <sup>2</sup> )
5.	Ponderal Index (PI)	Calculated by the formula(height/weight <sup>3</sup> )
6.	Waist & Hip circumference	Measuring Tape

**Table 2: Assessment of different agility testing parameters**

Serial no	Parameters assessed	Testing method
1.	Moving ability	Quadrant Jump Test (QJT)
2.	Standing ability	Stark balance Test (SBT)
3.	Measuring lower limb explosive power	Vertical jump Test (VJT)

### Exercise Protocol

**Table 3: Formulated training protocol for night shift workers (Group A)**

Contents of Training	1 <sup>st</sup> week	2 <sup>nd</sup> week	3 <sup>rd</sup> week	4 <sup>th</sup> week	5 <sup>th</sup> week	6 <sup>th</sup> week
<b>Warming up exercises</b>	10min	10min	10min	10min	10min	10min
<b>Yoga practice</b>						
1. <b>Pigeon-</b> Eka-Pada-Rajakapotasana	10min	10min	10min	10min	10min	10min
2. <b>Plank-</b> Kumbhakasana,	10min	10min	10min	10min	10min	10min
3. <b>Warrior II-</b> Virabhadrasana 2,	10min	10min	10min	10min	10min	10min
4. <b>Standing Forward Bend-</b> Uttanasana,	10min	10min	10min	10min	10min	10min
5. <b>Extended Side Angle Pose-</b> Parsvakonasana	10min	10min	10min	10min	10min	10min

### Data collection procedure:

Data were collected at two phases.

**Phase I:** All the arbitrarily selected 94 shift workers were not involved in specific training procedure. They all were involved in frequent sport exposure as they represent their office for sports tournament.

In the beginning of experiments, experimenters measured their agility by Quadrant Jump Test (QJT), Stark balance Test (SBT) and Vertical jump Test (VJT).

**Phase II:** After measuring their agility by standard test, only Group A were asked to expose on formulated training session for 6-week schedule. Group B were exposed only frequent sports practising lifestyle.

After 6 weeks, again Group A and Group B were measured their agility by previous standard test protocol.

### Statistical Analyses:

Statistical analyses were done by Minitab 16 software. Quantitative variables were expressed as mean±SD. P-values<0.05 were considered to be significant.

#### IV. RESULT

Though all group members belong to same socioeconomic group, so they have not any significant difference between anthropometric parameters like height, weight, Body Mass Index (BMI), Ponderal Index (PI) and Waist/Hip Ratio (W/H Ratio). Addition of training protocol causes increment of anaerobic capacity, improvement of moving, standing power and increment of lower limb explosive power as well as energy. Following line diagrams showed power of endurance exercise programme that significantly increases the agility power of selected group members (night shift workers). Mean values with SD of different phase agility assessment were tabulated in following table.

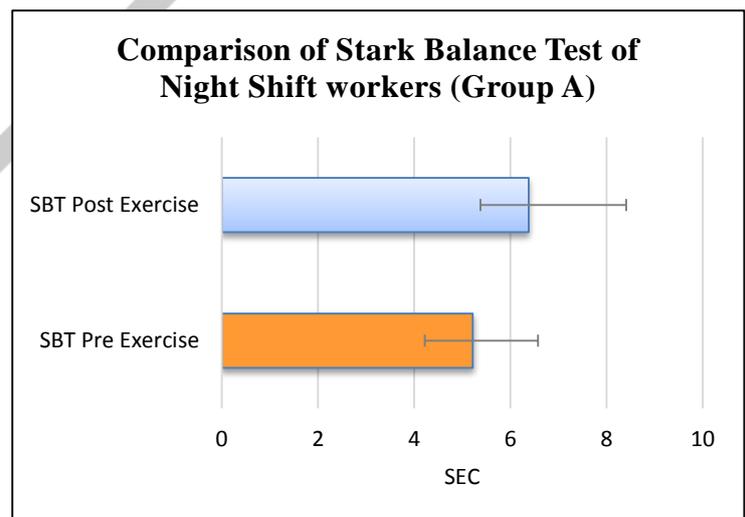
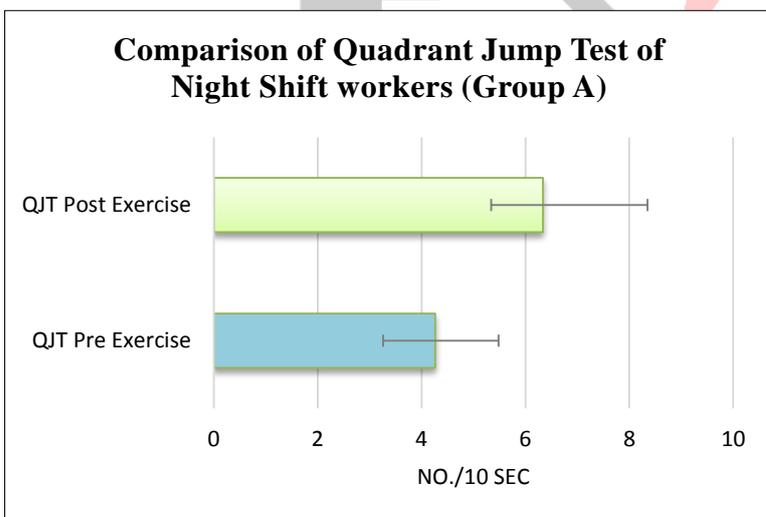
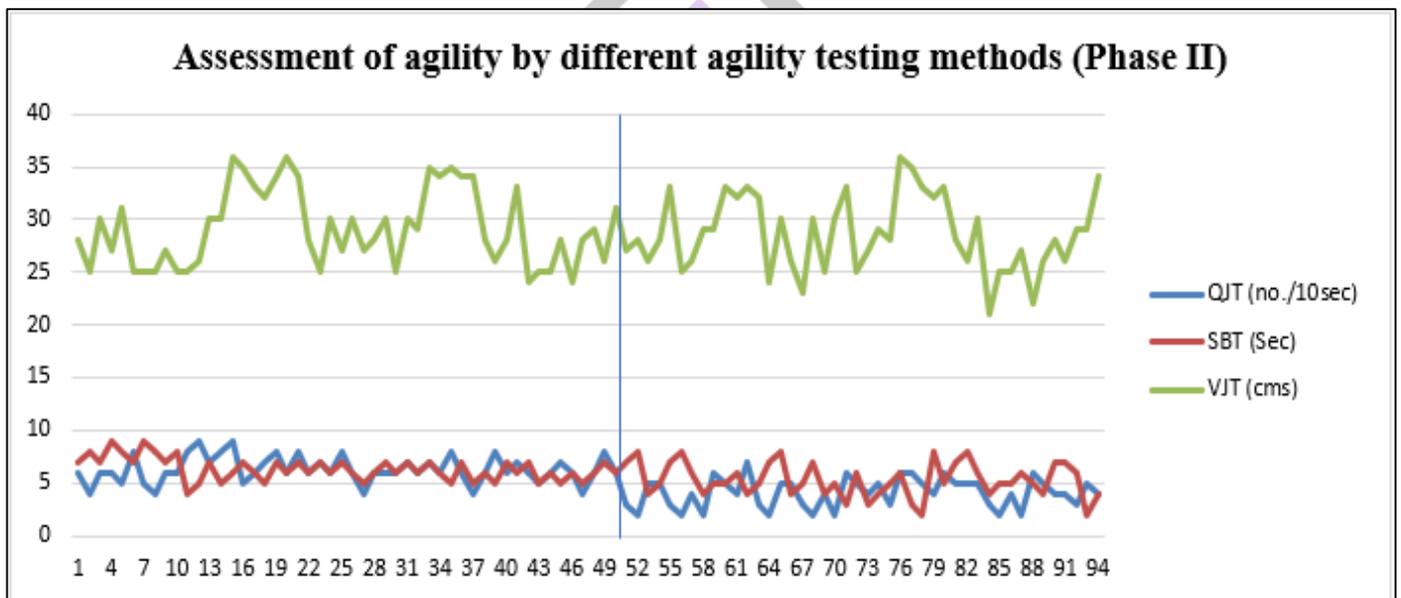
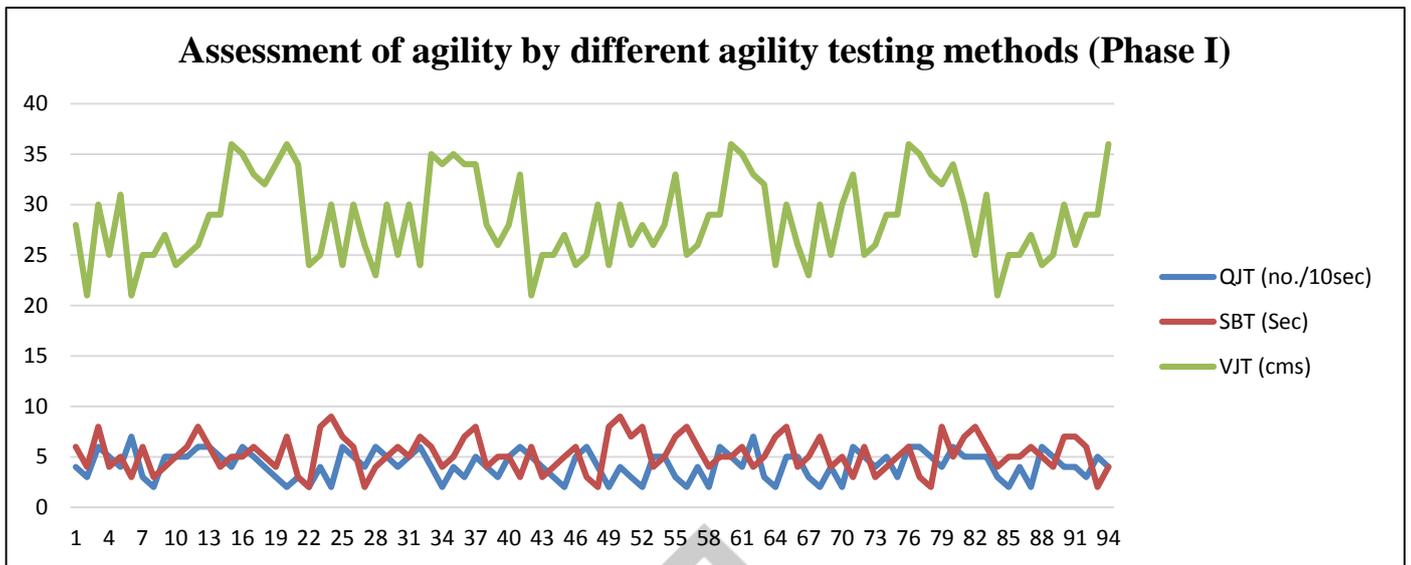
**Table 4: Assessment of agility parameters for phase I (N=94)**

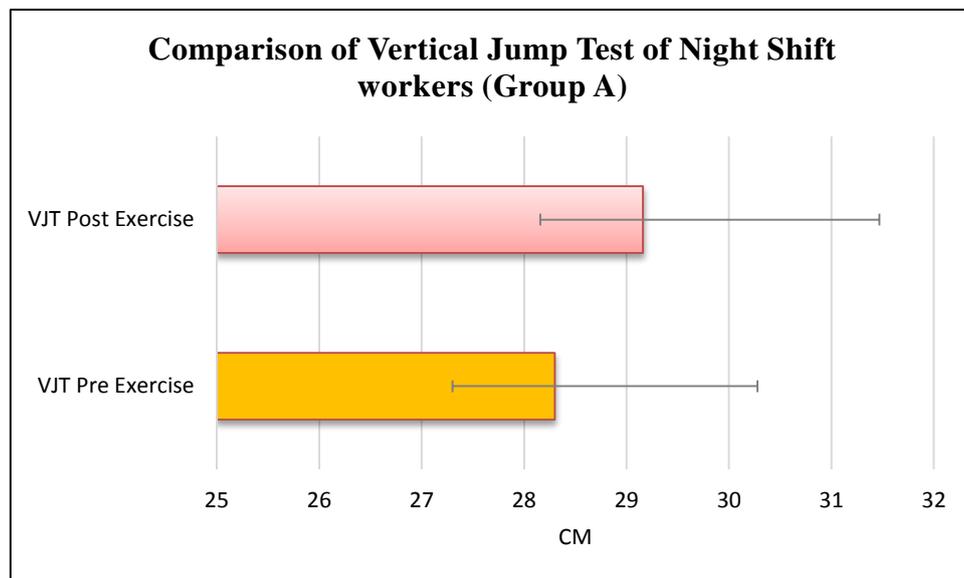
<i>Agility parameters</i>	<i>Mean values (n1=50)</i>	<i>SD</i>	<i>Mean values (n2=44)</i>	<i>SD</i>
<i>Quadrant Jump Test (QJT)</i>	4.18	2.3	4.13	1.32
<i>Stark balance Test (SBT)</i>	5.27	1.4	5.35	2.01
<i>Vertical jump Test (VJT)</i>	28.62	2.4	28.51	2.36

**Table 5: Assessment of agility parameters for phase II (N=n1+n2)**

<i>Agility parameters</i>	<i>Mean values (n1=50)</i>	<i>SD</i>	<i>Mean values (n2=44)</i>	<i>SD</i>
<i>Quadrant Jump Test (QJT)</i>	6.34	2.6	4.11	3.4
<i>Stark balance Test (SBT)</i>	6.38	3.12	5.34	3.6
<i>Vertical jump Test (VJT)</i>	29.13	2.9	28.53	3.4

Following diagram is assessment of agility of all 94 shift workers after starting of experiment.





## DISCUSSION

The main purpose of this study was to identify the effects of formulated new exercise protocol for night shift workers for their better health. New exercise protocol was set to assess their power index, speed, skill, endurance, and anaerobic capacity despite their night shift working effect on their health. The results suggest that the exercise protocol was able to maintain initial values of speed and power, anaerobic capacity, and skill of the night shift workers compared to rotational shift workers. A primary observation of this study showed that power increment occurred in the night shift workers group (Group A) when they were involved in warming up and some yoga practise, which indicates that these 2 types of exercise protocol increases their speed, skill, capacity than pre exercise condition. This increase in power was greater in Group A as compared to Group B. But, initially, both groups showed almost same capacity as they were both represented their company in internal sports tournament.

When experimenters involved Group A into new exercise protocol, then result reflect a drastic change in their performance level and all changes were significant at 0.05 level. This sequential time bound model might help to adapt their physiological demand despite of bad effect of night shift work. These better adaptations improve performance level of Group A, they are less fatigue.

The significant improvement was seen in the agility test that emphasise a higher muscular strength outcome than pre-exercise time that could depend on improvement in the intra- and inter-muscular coordination of the knee extensors as well as improve muscle strength [6].

Shift work has been linked to certain chronic diseases and illnesses. Long-term night shift work is associated with an increased risk of certain cancers, as well as metabolic problems, heart disease, ulcers, gastrointestinal problems, and obesity. People who work night shifts or rotating shifts also often do not sleep enough, and long-term sleep deprivation is known to be bad for health. Shift-work also disrupts the body's circadian rhythms and causes them to become out of sync with the external environment and behavioural cycles. In spite of that, if shift workers especially night shift workers are practise this new exercise protocol along with their regular lifestyle, it would have better effect on their health. Improvement in 6 weeks is a fruit for combination of exercise with yoga. Combinations of exercise with proper yoga should be instrumental for the shift workers of Kolkata, which can be claimed particularly here for night shift workers. Shift workers are less likely to sleep the full amount their bodies require, and this can accumulate into a large "sleep debt" over time. Exercise with proper yoga can enhance their physiological system activity and might help in personal, professional, and social life. Fit body helps them to cope up with the current professional situation.

Many literatures revealed that higher rates of on-the-job injuries for shift workers in factory settings. One research study of nurses showed that those who worked nights or rotating shifts were more likely to report poor sleep quality, drowsy driving to and from work, and reporting any accident, error, or "near miss" error. Practising of regular exercise with yoga can improve their sleep quality and keep away them from accident prone tendency due to sleep debt. This study proves that, regular 20 min exercise and yoga practise improve their agility power. If agility improves, man can move faster than they did. Night shift workers improve their productivity as well.

## CONCLUSION

From this study it may be concluded that new exercise protocol was beneficial for night shift workers. Exercise were helping to improve speed, skill, power and have significant effect on their health that might improves their physiological, mental, and social health as well as productivity. Statistical analysis further indicated that additional yoga session could be effective in ameliorating

physical and physiological stress condition. Furthermore, this study claims that sequential time bound yoga protocol helps to enhance speed, power, skill, and anaerobic capacity of night shift workers.

## V. ACKNOWLEDGEMENTS

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