Rayat Shikshan Sanstha's

Yashavantrao Chavan Institute of Science, Satara

NAAC Reaccredited at A++ Grade with CGPA: 3.61, UGC-CPE-II, DBT-STAR, DST-FIST, RUSA Excellence, UGC-PARAMARSH, ISO:9001-2015

Constituent College of

Karmaveer Bhaurao Patil University

Department of Statistics, Department of Data Science & Department of Artificial Intelligence

Jointly Organized

TWO DAYS NATIONAL CONFERENCE

On

'EMERGING TRENDS OF STATISTICAL THINKING IN THE ERA OF DATA SCIENCE AND ARTIFICIAL INTELLIGENCE'

(NCSDA-2026)

Certificate

This is to certify that Prof./Dr./Mr./Ms. Devendra D. Patil has participated & presented paper (oral/poster) entitled A statistical study on health & job satisfaction among textile workers in Ichalkaranji has secured ---- Rank in Two Days National Conference on "Emerging Trends of Statistical Thinking in the Era of Data Science and Artificial Intelligence" (NCSDA-2026) during 20th & 21st February 2026.

Dr. D. S. Jadhav
CONVENER, NCSDA-2026

Dr. H.P. Umap
CHAIRMAN, NCSDA-2026

Prin. (Dr.) S.T. Salunkhe
PRESIDENT, NCSDA-2026

A STATISTICAL STUDY ON HEALTH AND JOB SATISFACTION AMONG TEXTILE WORKERS IN ICHALKARANJI

Mr. Devendra D. Patil [1*], Mrs. Varsha C. Shinde[2*].

Department of Statistics, Vivekanand College (An Empowered Autonomous Institute), Kolhapur, India

Abstract:

A cross-sectional study was conducted to identify occupational health problems and assess job satisfaction among textile industry workers in Ichalkaranji, Kolhapur district, Maharashtra. Data were collected through a structured questionnaire from 403 self-reporting textile workers. The study primarily investigates the impact of shift work on workers' health and job satisfaction. The majority of respondents were male and over 45 years of age (54.8%), with educational attainment comprising primary education (10.2%), secondary education (33.46%), and higher education (36.2%). In terms of occupational engagement, 22% of workers were employed in Rapier operations, 37% in power loom, and 41% in air jet units. Results indicated significant associations between shift type, gender, and job satisfaction. Moreover, health risks including back pain, respiratory issues, and psychological stress were found to be more prevalent among night shift workers. These findings provide critical insights into the occupational health landscape and offer guidance for improving workplace policies in the textile sector. The results of the current study showed that, among personal aspects, only age significantly impacted the respondents' overall job satisfaction. The respondents' overall job satisfaction was also significantly influenced by all professional factors. Between the personal and professional facets, the importance of professional factors as determinants of job satisfaction is greater than that of personal factors. The results of the present study suggest that since professional aspects are the main components of job satisfaction, it is necessary to ensure the proper presence of these components. Factors such as pay, job security, and adequate and appropriate amount are indicators of job satisfaction. All parties involved in the garments industry such as employer– worker, regulatory body, policy-making body, government, and factory authorities can take into account the results of this study and determine future course of action to increase workers' job satisfaction.

Keywords:

Shift Work, Job Satisfaction, Textile Industry, Health Impact.

1. Introduction:

The textile industry plays a significant role in India's industrial landscape, employing a large segment of the workforce, particularly in semi-urban areas such as Ichalkaranji, Maharashtra. To meet increasing demand and maintain round-the-clock productivity, many textile factories operate on shift work schedules. While these schedules may enhance industrial efficiency, they often come at a considerable cost to workers' health and overall job satisfaction. In the context of textile factory work, these challenges are further compounded by physically demanding tasks, repetitive motions, long working hours, and occupational hazards such as excessive noise, cotton dust exposure, and poor ergonomic conditions. These factors can lead to musculoskeletal disorders, respiratory illnesses, and other long-term health complications. The resulting physical strain and psychological stress may contribute to low job satisfaction, increased absenteeism, reduced productivity, and higher employee turnover. This study employs both classical statistical techniques (Chi-square tests, Kruskal-Wallis test, correlation analysis) and modern machine learning models (Random Forest and Logistic Regression) to analyze primary data collected from over 400 textile workers. The insights generated aim to enhance the understanding of occupational well-being in the textile sector and to inform evidence-based policy recommendations for improving working conditions.

Background And Related Literature:

The different activities in the textile industry involve repetitive monotonous high-speed activities in awkward postures. Exposure to these hazards places the workers at high risk for developing many musculoskeletal problems. Moreover, the workers are exposed to cotton dust, noise, and chemicals. An exploratory cross-sectional study was conducted among the textile workers (n=114), and employees ((n=96) within a plant north of the Democratic Republic of Congo (DRC). The endings showed high frequencies and exposure rates for workers compared to employees for many health problems. The odds ratio was 5.1, 2.9, 2.6,2.4, 4.8, 3.8, 2.2, and 2.5 for cough, respiratory difficulty, thoracic pain, fever, upper limb pain, neck-shoulder pain, ocular diseases, and cutaneous diseases respectively. The study concluded that these differences could be due to the working conditions (Panda &Brouwer, 2010, p. 513-20.).

A cross-sectional study was conducted to assess the effect of cotton dust exposure on the health of the textile workers in the southern part of Benin, West Africa. The study was done with 656 textile workers, exposed to cotton dust and 113 non-exposed subjects. The study endings showed that subjects exposed to cotton dust had more (36.9%) respiratory symptoms than unexposed subjects (21.2%). The prevalence of chronic cough (16.8%), expectorations (9.8%), dyspnoea (17.3%), asthma (2.6%), and chronic bronchitis (5.9%), were high among textile workers compared to the unexposed subjects. Only 2.5% of unexposed subjects had a chronic cough, 0.8% had expectorations, 16.8% had dyspnoea, 0.8% had chronic bronchitis and none of them have asthma (Hinson et al.,2016, p. 895).

The findings of another study done to evaluate the prevalence of low back pain among the handloom weavers in West Bengal, India reported that the workers suffer from pain in different body parts such as lower back (68%) arm (49.7%), upper back (44%), knee (38%), shoulder (39.4%), wrist (35.4%) and neck (35.4%). Severe disabilities were

reported by 2% of the participants, 46% reported moderate disabilities and 52% of the participants reported minimal disabilities. A significant positive association (p=0.02) was reported between the intensity of the low back pain and an increase in the years of work experience. There are different

issues. faced by the workers in the textile industry such as exposure to cotton dust, exposure to chemicals, noise, and ergonomic issues (Singh, 2016,p.38-40). Many studies have been conducted in different parts of the world regarding the health issues of textile workers but few in India and none in Kerala. The present study focused on the occupational health problems and the associated factors of the textile workers at Kannur district Kerala.

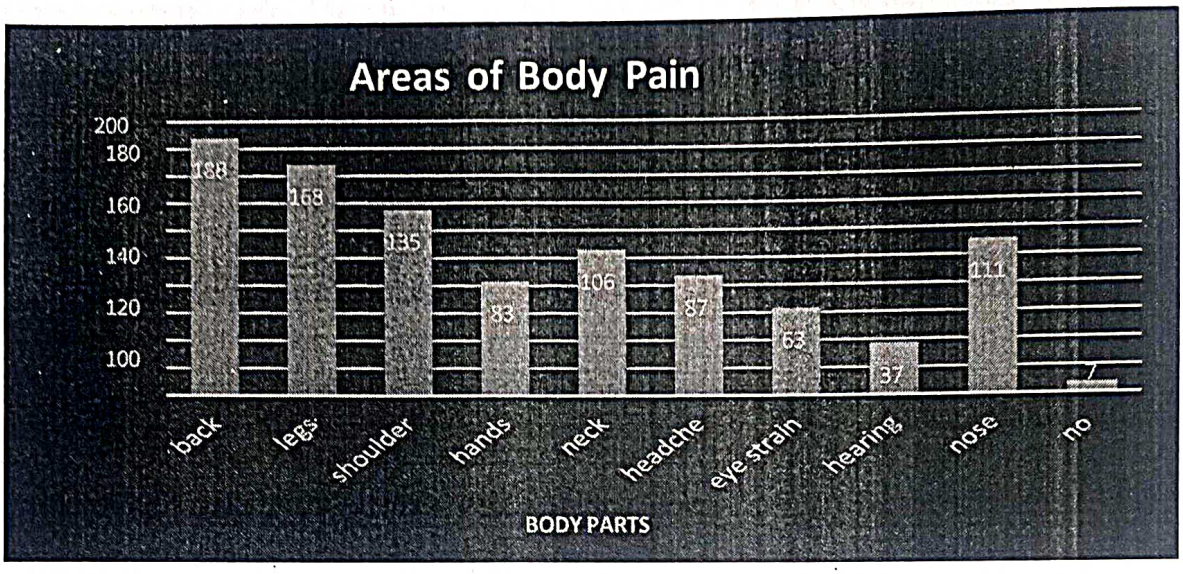
One of the more complicated topics, job satisfaction includes a wide range of emotions and circumstances. One of the workplace behaviors is job satisfaction, which is a sense of fulfillment derived from job experience. Job satisfaction was described by Nduati and Wanyoike as having positive and emotional views regarding one's work. Job satisfaction, according to Abdulkhaliq and Mohammadali, is one of the elements of a professional viewpoint and might be useful in keeping managing employees. The amount of happiness a person experiences as a result of their work is referred to as their level of job satisfaction. As a result, one of the subjects that organizational psychology researchers

4. Methodology:

A descriptive cross-sectional study was done among the workers of the cotton textile industries in Ichalkaranji district Sangli. A total of 403 workers from 4 cotton textile industries were selected randomly for the study. Data Source: - We collects primary data through google forms & by hand. Data Source Link :- https://forms.gle/LHqEVDkthpgwcff96 Data description: Data Contains 403 samples.404 rows and 31 columns. Dependent Variables: 1. Physical Health: The physical health of workers (example: sleep quality, disorders.) 2. Mental Health: The mental health of workers (example: stress, depression.) 3. Job Satisfaction: The job satisfaction of workers related to their work. Independent Variable:1. Shift Type: (Day, night, rotating.) 2. Work Hours: (8 hrs., 12 hrs.) 3. Demographic Variables (Age, gender, marital status) This study employs a quantitative research design to examine the health conditions and job satisfaction levels among textile factory workers in Ichalkaranji. The methodology outlines the data sources, sampling techniques, variable selection, and the statistical and machine learning techniques used for analysis. Questionnaire was used to collect data regarding the demographic and workplace variables Statistical analysis included Chi-square tests, Kruskal-Wallis test, correlation analysis, logistic regression, and machine learning techniques such as the Random Forest classifier. Results indicated significant associations between shift type, gender, and job satisfaction. Moreover, health risks including back pain, respiratory issues, and psychological stress were found to be more prevalent among night shift workers. These findings provide critical insights into the occupational health landscape and offer guidance for improving workplace policies in the textile sector. exact were used for the study using the statistical software R, Python.

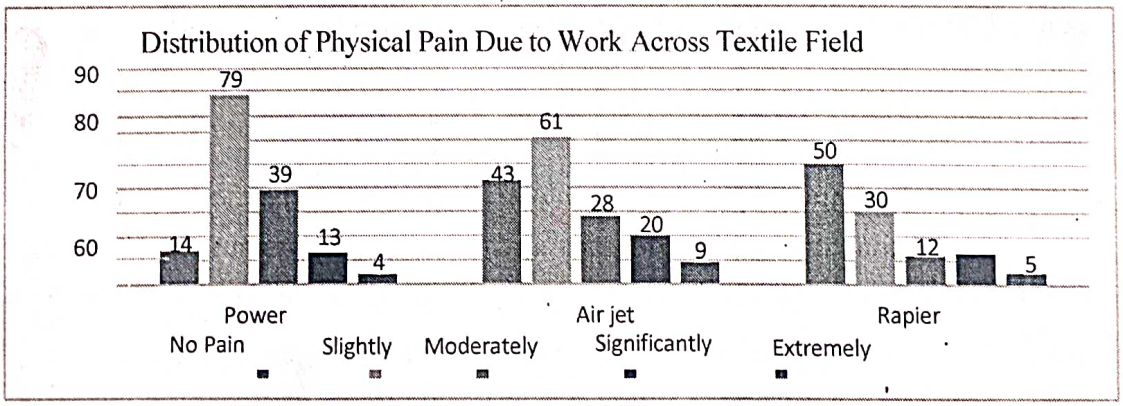
5. Result and Discussion:

Fig:1: Graphical representation of number of workers suffering from different body pain.



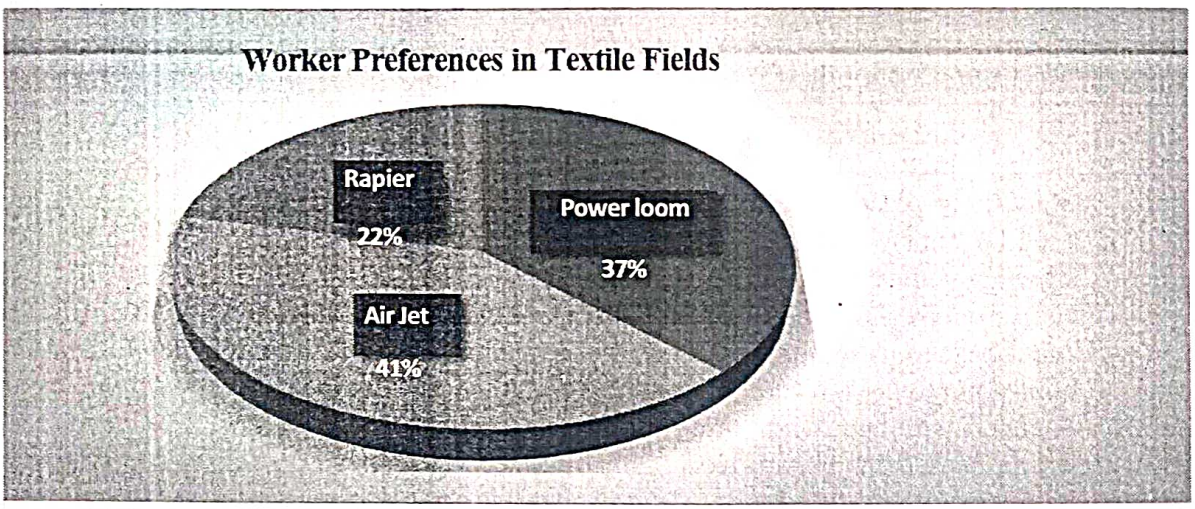
The bar chart illustrates the distribution of reported body pain among textile industry workers. The most commonly affected areas are the back (188 workers) and legs (168 workers), followed by the shoulders (135workers). Neck pain (106) and headaches (87) are also prevalent, while hand pain (83) and nasal discomfort (111) show moderate occurrence. Less frequently reported issues include eye strain (63), hearing problems (37), and other unspecified complaints (7). Overall, musculoskeletal pain particularly in the back and legs appears to be the most significant occupational health concern in this workforce.

Fig.2.**Distribution of Physical Pain Due to Work Across Textile Field**



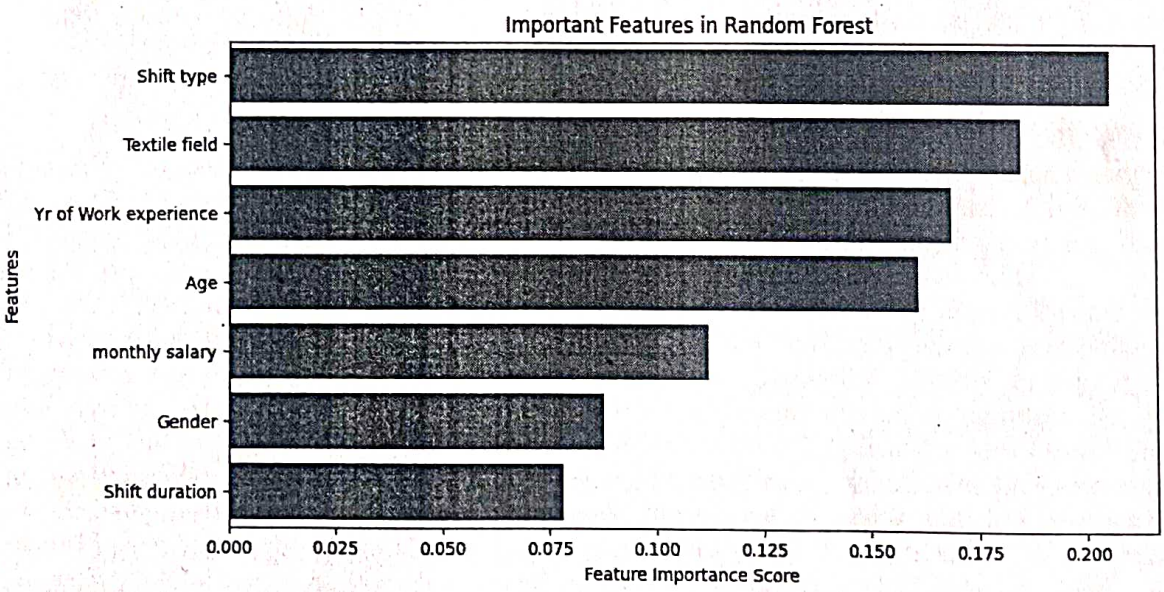
The distribution of physical pain among textile workers varies across different sections of the industry. In the **Power** section, most workers reported either no pain (78) or moderate pain (78), with fewer experiencing slight (28) or extreme pain (7). In the **Air Jet** section, no pain (71) and moderate pain (47) were most common, while slight (28), significant (25), and extreme pain (8) were less frequent. In contrast, the **Repair** section showed a higher prevalence of discomfort, with moderate pain (56) being most common, followed by slight pain (29), no pain (20), significant pain (12), and extreme pain (5). Overall, the data suggests that while many workers in the Power and Air Jet sections experience minimal or moderate discomfort, those in the Repair section tend to face more physically demanding conditions, leading to higher pain levels.

Shift Preference:



We refer to this diagram to understand the distribution of worker preferences across different textile fields, which can help identify the most fevered work areas and guide workforce allocation or policy planning. The pie chart shows that the highest proportion of workers prefer Air Jet operations (41%), followed by Power Loom work (37%). The least preferred section is Rapier, chosen by only 22% of workers. This distribution indicates that modern or relatively less physically strenuous operations like Air Jet may be more appealing to workers, while Rapier, possibly involving more manual effort or less comfort, is less fevered. Such insights can assist in improving working conditions in less preferred sections or in aligning recruitment and training strategies with worker preferences.

Identifying key factors affecting job satisfaction in shift workers.



The Random Forest model shows which factors most affect job satisfaction in shift workers. The most important factor was shift type – night and rotating shifts reduce satisfaction the most. The department (textile field) also matters because some areas have harder or riskier work. Experience and age were also important – long years of work and older age bring more health issues. Salary has some effect, but it is less important than working conditions. Gender and shift duration were the least important factors. This means that where and when people work matters more than how much they earn. The results match with statistical analysis that also showed night shifts and work conditions cause health problems. Better shift planning, safer workplaces, and support for older workers can improve satisfaction. So, improving work environment is more helpful than just increasing pay.

Outcome	Significant Predictor	Odds Ratio	p-value
Headache	Night Shift	1.29	0.027
Back Pain	Age	1.32	0.016
Respiratory	Years of Experience	3.59	<0.001
Stress	Education	2.29	<0.001

The results of this study clearly demonstrate that health outcomes among textile workers are strongly influenced by both workplace conditions and personal characteristics. Night shift work emerged as a significant determinant of headaches, with workers on night duty showing 29% higher odds of experiencing headache compared to those working during the day. This finding suggests that irregular sleep patterns, disruption of circadian rhythms, and fatigue caused by late-night work schedules may play a central role in triggering headaches. Back pain was found to be significantly associated with age, where each increase in age corresponded to a 32% increase in the odds of reporting back pain. This reflects the natural decline in musculoskeletal strength with aging, as well as the cumulative effect of prolonged physical strain and repetitive tasks performed in textile factories. Such issues highlight the importance of ergonomic adjustments and preventive health measures for older workers. Respiratory problems were strongly linked to years of experience in the textile industry, with long-tenured workers having 3.6 times higher odds of respiratory illnesses. This is likely due to extended exposure to dust, fibres, and other airborne particles commonly present in textile environments, suggesting a cumulative occupational hazard. Preventive strategies such as improved ventilation, protective equipment, and periodic medical check-ups could significantly mitigate these risks. Interestingly, education level was positively associated with stress, with more educated workers being more than twice as likely to report stress compared to their less educated counterparts. This may be explained by a mismatch between workers' educational attainment and their job roles, higher expectations, or dissatisfaction with career growth opportunities in the textile sector. It indicates that psychological and social dimensions of work are equally important alongside physical health risks. Taken together, these findings emphasize that the health of textile workers is shaped by a combination of workplace exposures (night shifts, dust, repetitive work) and personal factors (age, education, years of service).

CONCLUSION:

This study examined occupational health problems among textile industry workers in Ichalkaranji, Kolhapur district, Maharashtra. Findings revealed a high prevalence of musculoskeletal and other health issues, with back pain being most common (188 cases), followed by leg pain (168) and shoulder pain (135). The power loom sector reported the highest discomfort levels, especially in slight and moderate pain categories, while the rapier sector recorded the lowest. Workers showed a marked preference for the air jet sector, possibly due to better perceived working conditions. shift type is the most influential variable in predicting the job satisfaction, followed by textile field and years of work experience. Age and monthly salary also contribute moderately to the prediction, while gender and shift duration have relatively lower importance scores. This indicates that work schedule patterns and the specific section of the textile field where employees work play the most significant role in determining the job satisfaction, while demographic factors like gender and shift length are less critical. Odds ratio analysis demonstrated that night shift work increased the risk of headaches by 29% and back pain by 32%, highlighting the adverse effects of irregular hours. Older workers were 3.59 times more likely to experience respiratory problems, while greater work experience was linked to 2.29 times higher odds of chronic diseases. Education level also influenced health, with less-educated workers having 2.35 times higher risk of stress. These findings call for targeted interventions, including ergonomic improvements, better shift scheduling, preventive health check-ups, and occupational health education. Awareness programs must inform workers about workplace risks and encourage adherence to safety practices. Preventive health services, infrastructural upgrades, and effective implementation of existing welfare schemes are crucial. Government action is necessary to establish and enforce occupational health and safety standards, ensuring sustained improvement in worker well-being, productivity, and quality of life.

REFERENCES:

1) Perera, G. D. N., Khatibi, A., Navaratna, N., & Chinna, K. (2014). Job satisfaction and job performance among factory employees in apparel sector. *Asian journal of management sciences & education*, *3*(1), 96-104.
2) Islam, T. (2022). Health concerns of textile workers and associated community. *INQUIRY: The Journal of Health Care Organization, Provision, and Financing*, *59*, 00469580221088626.
3) Kitronza, P. L. (2014). Identification of occupational hazards in the textile industry in the Democratic Republic of Congo. *The Pan African Medical Journal*, *19*, 373-373.
4) Hinson, A. V., Lokossou, V. K., Schlünssen, V., Agodokpessi, G., Sigsgaard, T., & Fayomi, B. (2016). Cotton dust exposure and respiratory disorders among textile workers at a textile company in the southern part of Benin. *International journal of environmental research and public health*, *13*(9), 895.
5) Singh, Z. (2015). Health status of textile industry workers: prevalence and socioeconomic correlates of different health problems. *Public Heal Prev Med*, *1*, 137-43.
6) Goel, A. L. K. A., & Tyagi, I. S. H. A. (2012). Occupational health hazards related to weaving. *Int J Appl Math Stat Sci*, *1*(1), 22-8.
7) Durlov, S., Chakrabarty, S., Chatterjee, A., Das, T., Dev, S., Gangopadhyay, S., ... & Sahu, S. (2014). Prevalence of low back pain among handloom weavers in West Bengal, India. *International journal of occupational and environmental health*, *20*(4), 333-339
8) Godagampala, G. D. N. M. (2020). Factors affecting to the employee satisfaction in textile industries: An empirical study based on thulhiriya boi area.
Yuan, D., Gazi, M. A. I., & Rahman, M. A. (2022). Assessment of both personal and professional aspects to measure job satisfaction levels among garment workers: Empirical evidence from a developing country. *International journal of environmental research and public health*, *19*(24), 16868.
9) Ministry of textiles, Government of India (2019 Oct.). Annual report 2019-20 [Internet]. Available from: http://texmin.nic.in/sites/default/files/AR_MoT_2019-20_English.pdf
10) Panda Lukongo Kitronza J, Brouwer C. (2010) Health problems in the textile industry in the Democratic Republic of Congo. Rev Med Brux, 31(6), 513–20.
11) Hinson A, Lokossou V, Schlünssen V, Agodokpessi G, Sigsgaard T, Fayomi B. (2016) Cotton dust exposure and respiratory disorders among textile workers at a textile company in the southern part of Benin. Int J Environ Res Public Health, 13(9), 895.
12) Sing Z. (2015) Health Status of Textile Industry Workers: Prevalence and Socioeconomic Correlates of Different Health Problems. Public Health and Preventive Medicine, 1(3), 137-143.
13) Goel, A., Tyagi, I. (2012) Occupational health hazards related to weaving. International Journal of Mathematics and Statistics, 1 (1), 22-28.
14) Durlov, S., Chakrabarty, S., Chatterjee, A., Das, T., Dev, S., Gangopadhyay, S., Haldar, P., l Maity, S. G., Sarka, K., & Sahu, S. (2014) Prevalence of low back pain among handloom weavers in West Bengal, India. International Journal of Occupational and Environmental Health, 20(04), 333–339.
15) Singh N. (2016) Safety and health issues in workers in clothing and textile industries. Int J Of Home Science, 2(3), 38-40.
16) Parida, R. (2019, October 5). Health Hazards Faced by Handloom Weavers in Odisha Need Urgent Attention. *Economic and Political Weekly*, *54*(40). https://www.epw.in/engage/article/weavers-handloom-odisha-muscle-disorder