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Postural Discomfort and Musculoskeletal Disorders among Painters - An Analytical Study

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Abstract

Aim: The current investigation was to examine the intensity of body discomfort and various musculoskeletal disorders experienced by painter community due to their occupational habitat. **Methods:** A questionnaire was developed systematically with high competence with the current standard, which includes general profile sheet, occupational profile sheet and a modified Kromers body discomfort scale (Kroemer *et al.,* 1987). These tools were used to gather information from the respondents. A sample of fifty two male painters aged between 19-75 years were interviewed randomly and mined various socio-demographic, socio-economic and health information. Data on occupational history, accidents, and leisure time activities were also collected. This paper focused on the intensity of pain due to prolonged standing and other postures during painting activities. **Result:** The prevalence of occupational health hazards has been reported to be high among painter community in India. The study revealed that the painters were engaged in rigorous hand-intensive jobs for many years, this subsistence activity led to rigorous and permanent discomforts in different parts of their body as an occupational health hazards. **Conclusion:** From the findings of the study, it can be concluded that painters faced many occupational health hazards. The current study focused on musculoskeletal disorder and uncertainties due to the nature of high risk associated painting jobs. The study revealed that the painter's communities were highly susceptible to musculoskeletal disorders, especially severe leg pain. Most of the interviewed painters were highly concerned about high risk areas (activities on scaffoldings). So for safeguarding the painter communities from high potential professional, physical and physiological health risk, the government must entrust contractors for providing standard and modernized safe working environment, safeguarding tools and risk incentives.

Keywords: Body Discomfort, Construction Workers, Ergonomics, Postural Disorders

1. Introduction

The prevalence of occupational health hazards has been reported to be high among the painter community in India. The high potential professional, physical and physiological health risk is inborn in nature with painting jobs. The jobs in high threat areas like risky statues, platforms, scaffolds make this painter community highly vulnerable to bone, eye, muscle and other type of injuries. The intensity of injuries varied from low to extreme high degrees.

The risks of falls, working in confined areas, risks of eye injury, slips, trips and falls and risk of injury from objects, working in awkward positions or acting tedious physical tasks, standing for long periods of time, lifting significant or awkward objects. Pain on elevation of the arm could be a typical side effect of assorted shoulder disorders, and consequently, work higher than shoulder level may incite torment. Working with elevated arm has been hypothesized to cause incessant changes within the complex body part and therefore incline to tears[1]. A vocation plan and interventions that address a worker's work vogue when confronted with enhanced work demands might facilitate reduce the probability of musculoskeletal manifestations and additionally their intensity[2]. Posture has an impact on the use of back muscles and some postures might isolate certain muscle groups; this muscle group's isolation may expand the chance of injury inside the back[3]. About 40% outcome from leave in view of back pain from work[4]. Workers who leave work due to low back pain are inactive for more than half year and 75% of people who were out for a year never recuperate to continue their past positions[5]. A perplexing arrangement of the human back having muscles, bones and bone circles, nerves and ligaments[3]. With at least a large portion of the working population experiencing prolonged standing at work[6], it's imperative to know how this posture relates to

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the chance of injury and investigate methods to reduce this hazard[6]. Findings of the scientific research have identified physical, organizational and individual occupational hazard factors for the development of work related musculoskeletal disorders. Literature revealed risk involved in various occupations and paints whose occupation was found to come under high risk are thought to be investigated and henceforth the current investigation was undertaken to assess the work-related musculoskeletal issue among painters.

A study about occupational hazard factors and back injury reported statistically significant relationships between the factors and the emergence of occupational back injury[3]. This survey provided a summary of the range of strategies that have been produced for the assessment of exposure to risk factors for work-related musculoskeletal disorders. The ways have been categorized under: 1. Self-reports from workers may be used to gather data on work exposure to each physical and psychosocial factors by using strategies that embrace worker diaries, interviews and questionnaires; 2, Observational strategies, 3. Direct measurements using monitoring instruments that consider sensors connected on to the topic for the measurement of exposure variables at work[7]. Ovako Working Posture Analysis System (OWAS), which observed that worked continuously in awkward postures may experience the ill effects of discomfort in different parts of their body, specifically in the lower back, knees and shoulders, which mainly prevented them from continuing work[8]. Quantitative exposure-response relations were established between current work with highly elevated arms and clinically verified shoulder disorders[9].

2. Materials and Methods

2.1 Selection of Subjects

The respondents for the study are chosen from two different locations of Lucknow. The sample consists of fifty two respondents. The respondents were divided into four groups based on their age (19-32, 33-46, 47-60 and 61-75 years). The respondents from each location were interviewed based on a pre tested survey schedule.

2.2 Data Collection

The survey was conducted during July-August in 2019. All the respondents were represented throughout the information assortment in their working days. Information on the subsequent factors was gathered: Working day and duration, no. of breaks and period of breaks, musculoskeletal issues and furthermore the intensity of body pain and working postures. The information on occupational profile, within which years of working, days of working, duration of working, posture of working etc. were also included. Body discomfort scale by Kroemer *et al.*, 1987[10] was utilized for the estimation of pain in various body parts. Score ranged from 4 for strongly agree to 1 for strongly disagree.

2.3 Statistical Analysis

SPSS 20.0 software was used for statistical analysis. The degree of musculoskeletal pain in various body segments were additionally determined with the help of frequency percentage, mean, standard deviation and the significance was tested using ANOVA and X^2 tests.

2.4 Analysis of Working Posture

The different working postures of the painters were analyzed on the basis of interview schedules. The most frequent posture adopted by the workers was found to be standing posture.

3. Results

Prolonged occupational standing is having a negative impact on the body, with a high prevalence of MSD in working conditions is the found to be the prominent factor among painters.

Table 1 represents the demographic data and general information of painters. The table clearly indicates that the

Table 1. Demographic characteristics of painters

Demographic Characteristics		Frequency (N = 52)	Percentage (%)
Age (in years)			
1.	19-32	13	25
2.	33-46	26	50
3.	47-60	7	13.5
4.	61-75	6	11.5
Total		52	100.0
Education			
1.	Primary	14	26.9
2.	Junior	10	19.2
3.	High school	10	19.2
4.	Intermediate	18	34.6
Total		52	100.0
Marital status			
1.	Married	42	80.8
2.	Unmarried	10	19.2
	Total	52	100.0
Family type			
1.	Nuclear	36	69.2
2.	Joint	16	30.8
	Total	52	100.0

dominant part (50%) of the painters belonging to the age group of 33-46 years, whereas only 11.5% of the painters belong to 61-75 years. It is also evident from the data that 34.6% of the sample has studied only up to Intermediate. The (table 1) also indicates the majority of the total respondents (80.8%) were married and the greater part (69.2%) was living in a nuclear family and the remaining 30.8% belongs to the joint family.

The above (table 2) represents the occupational profile of painters. The (table 2 and figure 1) clearly indicates that majority of the respondents (34.6%) were having a work experience of 10-15 years, whereas only 15.4% were with a work experience of 0-5 years. The (table 2) also indicates majority (92.3%) of them were working all the 7 days in a week, whereas only (7.7%) go to work for 6 days.

Table 2. Occupational profile of painters

	Occupational profile	Frequency (N = 52)	Percentage (%)
Years of working			
1.	0-5 years	8	15.4
2.	5-10years	8	15.4
3.	10-15years	18	34.6
4.	more than 15 years	18	34.6
	Total	52	100.0
No. of working days in a week			
1.	6 days	4	7.7
2.	7 days	48	92.3
	Total	52	100.0
Working duration of respondent			
1.	**Less than 5 hours**	**2**	**3.8**
2.	5-7 hours	6	11.5
3.	7-9 hours	44	84.6
	Total	52	100.0
No. of breaks in a day			
1.	**One**	**4**	**7.7**
2.	Two	24	46.2
3.	Three	22	42.3
4.	Four	2	3.8
	Total	52	100.0
Duration of breaks			
1.	**30 min**	**24**	**46.2**
2.	45 min	21	40.4
3.	1 hours	7	13.5
	Total	52	100.0

Figure 1. Work experience

Figure 2. Working duration of the respondent.

It can also be deduced from the data (Figure 2), that majority of the respondents (84.6%) were working for 7-9 hours/day. Majority of the painters take 2-3 breaks for 30-45 minutes in a day.

The above (table 3) explains the information of any body pain or discomfort caused due to their occupation that lasted for two or more days in the most recent year. Among a wide range of body pain or discomfort faced by painters, 76.92% reported lower back pain, 69.23% detailed neck pain and shoulder pain 57.6% were found to be faced by majority of painters, while foot pain, wrist pain, elbow pain and hand pain were accounted for by least level of the respondents.

The association between the intensity of body pain and the age of the respondent has been examined. The (table 4) indicates that neck pain is expressed maximum ($\mu = 2.67$) in the age group of 61-75 years followed by 47-60 year, 33-45 year and 19-32 years (minimum) age groups, although it has no significant differences yet it clearly indicates that intensity of neck pain seems to increase with age.

It is obvious from the data that the intensity of pain in the right shoulder was expressed significantly ($\mu = 2.33$) in the 61-75

years age groups, and least (μ = 1.56) in 19-32 years age groups. The intensity of left shoulder pain was high (μ = 2.83) in the 61-75 years age group and least (μ = 1.71) in the 47-60 years age group. Pain in the left shoulder have significant difference among all the four age group and it is about 90% significant in the right shoulder. In both cases, the intensity of pain is increasing with age which may be due to muscles get weekend with age.

The (table 4) demonstrates that the greater part (μ = 2.17) of upper back pain occurs in the age group 61-75 years followed by the other three age groups. The intensity of pain in the lower back shows the significant differences up to 90% which increment with age majorly (μ = 2.67) influenced the 61–75 age group.

Table 3. Pain or discomfort caused during occupation that lasted two or more days in last year

S. No	Body Pain	Number of respondents
	Neck pain	36 (69.23)
	Shoulder pain	30 (57.6)
	Elbow pain	10 (19.23)
	Wrist pain	16 (30.76)
	Hand pain	22 (42.23)
	Upper back pain	26 (50.0)
	Lower back pain	40 (76.92)
	Foot pain	24 (46.15)

(Figures in parenthesis indicates percentage)

It is evident from the data that intensity of both leg pain was high (μ = 2.67) in 61-75 years age groups whereas least (μ = 1.71) in 47-60 years. The (table 4) shows that a statistically significant feeling of discomfort was found in all groups of painters in the neck, shoulders, lower back, legs and other parts. In this way, it is clear that these were the regions of the body which mainly affected grater part of the painters.

It is also evident from the data that as age increases, the pain in various body parts also increases and this may be due to the reason that the persisting pain was not taken care of during initial stages and this may have got transformed into chronic pain as age increased.

It can be deduced from the data in (Table 5) and (Figure 3) that the intensity of the body pain in various body parts over the long periods of experience fluctuates. In spite of the fact that non-significant differences were observed in the intensity of pain, it is certain that an expansion in work experience increased the pain and it was clear that experience of over 10 years expressed high pain in comparison to less than 10 years of experience. It can also be observed that across all the groups' moderate pain was expressed by the majority (57.7%), followed by high pain (26.9%). A clear indication of negligence and lack of proper facilities, poor working conditions can be noted from the data.

4. Discussion

In this study among all kind of body pain or discomfort faced by painters, lower back pain, neck pain and shoulder pain

Table 4. Intensity of pain according to the age of painters

S. No	Intensity of pain or discomfort due to posture	Age of the respondent				F value	P value
		19-32 years	33-46 years	47-60 years	61-75 years		
		Mean ± S.D	Mean ± S.D	Mean ± S.D	Mean ± S.D		
	Neck	1.69 ± 0.855	1.85 ± 1.008	1.86 ± 0.900	2.67 ± 0.816	1.576	0.207
	Right shoulder	1.54 ± 0.877	2.08 ± 0.796	2.14 ± 0.378	2.33 ± 1.033	1.900	0.142
	Left shoulder	1.77 ± 0.927	1.96 ± 0.824	1.71 ± 0.951	2.83 ± 0.408	2.600	0.063
	Upper back	1.62 ± 0.961	1.77 ± 0.992	1.71 ± 0.951	2.17 ± 0.983	0.444	0.722
	Right upper arm	1.62 ± 0.870	2.08 ± 0.796	2.14 ± 0.378	1.83 ± 0.983	1.157	0.336
	Left upper arm	1.54 ± 0.877	1.92 ± 0.796	1.71 ± 0.951	2.50 ± 0.838	1.906	0.141
	Mid back	1.77 ± 0.927	1.81 ± 1.021	1.71 ± 0.756	2.67 ± 0.816	1.559	0.212
	Right lower arm	1.85 ± 0.899	1.92 ± 1.017	1.86± 0.900	2.67 ± 0.816	1.190	0.324
	Left lower arm	1.54 ± 0.877	1.92 ± 0.845	2.14 ± 0.378	2.17 ± 1.329	1.105	0.324
	Lower back pain	1.77 ± 0.927	1.96 ± 0.824	1.71 ± 0.951	2.67 ± 0.516	1.830	0.154
	Buttocks	1.62 ± 0.961	1.77 ± 0.992	1.71 ± 0.951	2.17± 0.983	0.444	0.722
	Right thigh	1.62 ± 0.870	1.81 ± 0.939	2.00 ± 0.577	1.83 ± 0.983	0.305	0.821
	Left thigh	1.54 ± 0.877	1.69 ± 0.838	1.43 ± 1.134	2.50 ± 0.837	1.975	0.130
	Right leg	1.85 ± 0.899	1.92 ± 1.017	1.71 ± 0.756	2.67 ± 0.816	1.370	0.263
	Left leg	1.92 ± 0.954	2.00 ± 0.980	1.71 ± 0.756	2.67 ± 0.816	1.265	0.297

Table 5. Work experience and intensity of body pain

Work experiences Low		Intensity of body pain			
		Moderate	High	Total	
1.	0-5 years	2 (3.8)	4 (7.7)	2 (3.8)	8 (15.4)
2.	5-10 years	0 (0.0)	5(9.6)	3(5.8)	8 (15.4)
3.	10-15 years	3 (5.8)	11 (21.2)	4(7.7)	18 (34.6)
4.	More than 15 years	3 (5.8)	10 (19.2)	5 (9.6)	18 (34.6)
	Total	8 (15.4)	30 (57.7)	14 (26.9)	52 (100)

Chi-square (X^2) = 2.411 NS, (Figures in parenthesis indicates percentage).

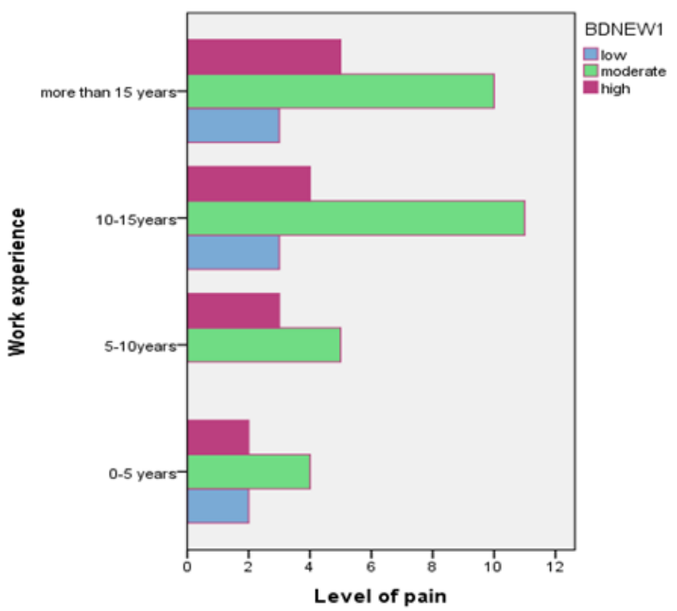

Figure 3. Work experience and level of pain.

were accounted for majority of the respondent. This study revealed that painters are engaged in prolonged forward and upward bending posture[11] in there working condition so they suffer from upper back pain and lower back pain is higher. The lower back pain is due to the bending position while working for long hours. The bending position put significant pressure on the lower back, causing the muscles and ligaments to stretch excessively. A study revealed a comparative outcome in goldsmith who works in continuous bending posture so they have to face lower back pain[8]. Another study on back pain and heavy physical work had shown that during their lifetime 77% of the painters had experienced back pain[12]. They justify their outcome with the conclusion of a back accident that had happened earlier in life increased the risk of sciatic pain[12]. This study did not find any significant relationship with thigh and buttock pain.

The hardest part of the this job is having to constantly crane the neck upwards while painting, it puts a great deal of stress on the spinal cord and nerve structures in the back of neck. Painters additionally take a shot at hanging with rope while painting on frameworks and they need to move with rope thus rise neck torment is the after effect of working on scaffoldings without support.

The other most significant body part pain is in shoulder due to the repetitive working pattern. Repetitive movements or overuse of the hands, shoulders and wrists cause the muscles, tendons and nerves to become painful, sore or tense. Pain and tension from muscles in the arm and shoulders can also radiate down to the hands. This type of pain typically results from carrying out very repetitive or high intensity activities for long periods of time. Holding the hands in awkward positions for too long can also lead to overuse injuries. The musculoskeletal discomfort causes mainly due to two reasons, i.e. the unsafe working condition and posture demands of the working environment prompting musculoskeletal issues[13].

The intensity of pain was found to be increasing with age. This is due to the reason that with the increasing age of workers, muscles get weekend and the stamina to work reduce.

The consequence of the current study shows that discomfort due to occupational posture is related to age. Results demonstrate that neck pain is increasing with age. A comparative outcome had been found in a study that the feeling of discomfort among workers was the most part identified with Musculoskeletal as genuine annoyance in neck (80%), low back pain (75%), wrist pain (45%) and shoulder pain (20%)[8], they also revealed that age significantly affects the intensity of pain. Another study on painters and two other groups of worker studies and shows the significant relation with age and sciatic pain, back pain, stress, and different MSDs[14]. Musculoskeletal pain comprises a major health issue for the general population, affecting their quality of life, demanding increased health care and organization[15,16].

The findings of the present study are that the intensity of the body pain in various body parts across the years of experience varies. Though no significant differences were observed in intensity of pain shows that as the work experience increases, intensity of pain also is found to be increase and this may be due to long duration of adopting awkward postures and chronic pain.

5. Conclusion

It can be concluded from the study that painters are compelled to work in awkward positions for long hours, which prompts postural discomfort and various musculoskeletal issue. A number of other factors could be relevant to the occurrence of postural discomfort to the painters. Change in lifestyles, including food habits and proper training of work could be a part in preventing discomforts and MSD. This study analyzed the association between age and occupational body discomfort, age and intensity of pain, working period and intensity of the discomfort. A substantial majority of these participants had to be in standing positions per day that causes pain or discomfort. Work periods and years of working, however, incontestable a major association with the result of intensity of body discomfort within the painters. In conclusion, this study gave further evidence that the different work posture and repeated working pattern increases the risk of musculoskeletal disorders. It tends to be recommended that in working hours take some rest after each one or couple of hours for relaxing the body muscles. Research has shown that regular exercise can ease pain long term by improving muscle tone, strength and flexibility. Additionally exercise may cause a release of endorphins, the body's natural painkillers. Some exercises are easier for certain chronic pain sufferers to do than others. One of the most effective approaches to prevent back pain from returning is to keep up a regular exercise routine. A 2016 review found that performing moderate aerobic exercises and strengthening deep abdominal muscles can reduce back pain significantly.

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