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Construction Occupations And Work-Related Musculoskeletal Disorders In Indian Workers

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Abstract
Background: ***A*** *physical risk factor, psychosocial risk factor and individual risk factors have shown a high prevalence of work-related musculoskeletal disorders among construction workers. The individual risk factors like age, gender, height, weight, BMI, types of work, duration of work, physical load and exertion and per day working hours are responsible for work-related musculoskeletal disorders.*
Materials and Methods: *Total 465 manual construction workers participated in this study in which 414 male and 51 female. Out of 465, 385 workers responded that they have pain in different body parts, pain at different time zone from which 334 male and 51 female. It requires finding of the relation between influence of incidence and prevalence of work-related musculoskeletal disorders. The objective of this study is to assess the prevalence and paradigm of musculoskeletal disorders in the different body parts and at different time in a day for different age group of construction workers. Another objective is to find which age group and which type of construction occupation has more impact of WRMSD. A self-reported questionnaire was used for response of pain and other problems. The relation between pain and WRMSD obtained using odds ratio and 95% confidence intervals with respect to age and BMI using logistic regression. The more prevalence has been found in the lower back (88.05%), Shoulder (60.00%) and Arms (54.81%).*
Results: *It found that almost all age group workers are suffering from pain and/or WRMSD that increases with age and BMI. All age group workers experienced pain in the lower back. A symptoms of the work-related musculoskeletal disorder start at an early age and have a high prevalence with increasing age and BMI. This prevalence in construction workers will lead them to the disability in future.*
Keywords: *Construction, Ergonomics, WRMSDs, Regression.*

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I. Introduction

Work-related musculoskeletal disorders (WRMSDs) are an increasing problem across the globe in construction workers. According to Punnett et al., 2004, nearly 77% of the population working in construction are suffering from WRMSD whereas 33% of the general population suffering from occupational illness. WRMSDs are the main problem facing construction workers which starts at an early age[1, 2]. The main cause of work-related disability, injuries and work lost due to sickness are WRMSDs which not only hampers productivity but also the efficiency of the workers. The construction is the most important industry that incorporates a large number of populations that plays a vital role in the construction of buildings, roads, bridges[3].

The construction work varies with a working condition like a residential, commercial, working at multiple sites, geographical location, work under different employers, weather condition etc. This variability in construction work makes it impossible to find the relation between work, working situation and W RMSD. The factors which play role in finding relation is poor working condition, lack of proper training, prolong working, poor working posture, poor health condition, improper break, timely completion of the task, and monotonous work. Work-related musculoskeletal disorders influences on health with repetitive work injuries, physical injuries, sick absentees, healing delay, lost workdays which affect the productivity of work and increased economic burden due to health care cost, insurance and compensation[1, 4]. The working technique related to WRMSD comprises of working in an awkward posture, repetition of movements, working in static body positions, lifting and carrying of heavy materials, application of heavy force on different body parts, using of vibrating tools and equipment, temperature, speed of work, less recovery time. The risk of WRMSD increases with an increase in job demands, stress, low job satisfaction, less support from employee, co-workers and supervisors, poor diet and supplements etc[5]. According to Chang et al., 2009, the workers who perform heavy

physical work have a high prevalence of WRMSD in different body parts[6]. The construction work is strongly allied with human factor exposure and these exposures exist in their regular job works.

In India, most of the houses (in rural areas) are individually constructed by hiring skilled and unskilled workers manually called 'Mistries' and 'Coolies'. Only in urban areas, the people are forced to live in apartments/flats constructed by builder, contractors and promoters. In both cases, most of the construction works are being carried out manually; however, there exist dully sophisticated equipment and machinery. The manual work consists of material handling, working in an awkward pose, repetition of work, lifting and pushing/pulling of heavy materials and workplace etc. The workers working in construction work are found from the age of 20 to more than 60 carrying out different construction work. These workers are suffering from work-related musculoskeletal disorders unknowingly and have a high prevalence of the same. As the construction work is carried out manually has an adverse effect and high prevalent work-related symptoms on workers body. Although construction work has a high prevalence and adverse effect, the literature shows that the study which highlighted the impact of WRMSD is inadequate in India. Rahman et al., 2018 states that lower and upper back MSD problems found same for all gender categories and occupations. Age has mild effect of WRMSD for lifting and lowering tasks in the construction industry[7].

The objective of this study is to assess the prevalence and paradigm of pain in different body parts, pain at different time zone, working in awkward postures, working with pace, doing pervasive jobs, meet with traumatic incidents, and consumption of alcohol/tobacco/smoke which leads to the development of work-related musculoskeletal disorders among the manual construction workers. Another objective is to find which age group and which type of construction occupation has more impact of WRMSD.

II. Materials and Methods

Self-reported questionnaires were given to construction workers consisting of general questions which are to be responded in 'Yes' or 'No'. The pain in different body parts, pain occurred in different time zone, meet with traumatic incident and addiction to alcohol/tobacco/smoke was recorded using questionnaire, discussion and interview with workers while working in awkward posture, working with pace and doing pervasive jobs were physically observed and recorded. During discussion symptoms and exposure conditions respect to their work recorded.

Four hundred and forty -one male and fifty-one female construction workers doing various manual construction work were randomly observed, interviewed and video recorded at various construction sites. The workers participated in this survey was above 20 years and grouped in four age group viz. 21-30, 31-40, 41-50 and > 50. Prior consent was taken from house owners, contractor and individual workers to carry out the study. The worker works for 7-8 hours per day including a recess for 7 working days in a week.

III. Result and Data Analysis

Statistical analysis:

Prevalence for each parameter was analysed by considering the response of "Yes" to the questions. The mean age, height, weight, BMI and experience were calculated for demographic and other characteristics. The demographic characteristics data expressed as a mean ± standard deviation [SD]. Logistic regression analysis carried out using Minitab 17 software to evaluate pain amongst the construction workers compared covariates between "Yes" and "No" response for pain. An analysis carried out for maximum feeling of pain in different body parts (head, neck, shoulders, chest, elbows, arms, hands, wrists, fingers, thumbs, upper back, lower back, thigh/hip/buttocks, legs, knees, ankle/feet/toe), maximum feeling of pain at different time in a day (during working, after working, during sleeping and in the morning), working in awkward postures, working with pace, doing pervasive jobs, meet with traumatic incidents, and consumption of alcohol/tobacco /smoke by evaluating Chi-square value, p-value ($p<0.05$), odds ratio and 95% confidence intervals for the feeling of pain using logistic regression analysis for multivariate modeling.

Total 465 manual construction workers participated in this study in which 414 was male and 51 was female. Out of 465, 385 workers responded that they have pain in different body parts, pain at different time zone from which 334 was male and 51 was female. From observation, interview and recording, 356 workers found working in awkward postures, 152 workers working with pace, 294 workers doing pervasive jobs, 61 met with traumatic incidents, and 289 workers consume alcohol/tobacco /smoke. In this study, maximum numbers of worker belonged to the age group of 41-50 (35.71%) and 31-40 (31.61%) and having more than 20 years of experience. The percentage of male (89.03%) workers found more than female (10.97%). From total 54 workers was engaged in excavation work, 107 workers work as unskilled workers (called as "coolie"), 38 Form workers, 48 Rebarers, 64 Masons, 23 Electricians, 31 Plumbers, 30 Tilers, 28 Carpenters and 42 Painter/Fall ceilling workers that are the most common type of work occupation in construction. BMI found normal in the majority of worker 404 (86.88%). Detailed demographic information of the workers is shown in Table 1.

Table 1: Demographic and other characteristics of construction workers (n=465)

			(Mean ± SD)				
Parameter	No. of worker	Percentage	Age	Height	Weight	BMI	Experience
Age							
21-30	75	16.12	26.49 ± 2.76	162.45 ± 5.99	56.40 ± 6.58	21.34 ± 1.96	4.55 ± 2.64
31-40	147	31.61	35.42 ±3.08	162.68 ± 5.69	59.53 ± 6.71	22.47 ± 1.98	12.06 ± 3.81
41-50	166	35.71	45.67 ± 3.04	162.44 ± 5.17	62.25 ± 5.71	23.57 ± 1.58	21.37 ± 4.38
≥ 51	77	16.56	54.71± 2.78	163.84 ± 5.57	62.87 ± 6.83	23.39 ± 1.96	29.69 ± 6.01
Gender							
Male	414	89.03	41.39 ± 9.53	163.46 ± 5.07	61.82 ± 5.82	23.13 ± 1.86	17.59 ± 9.12
Female	51	10.97	36.37 ± 8.87	157.02 ± 5.99	50.27 ± 4.46	20.38 ± 1.31	13.06 ± 8.98
Types of work							
Excavation work	54	11.61	39.67 ± 9.43	161.52 ± 5.75	58.81 ± 6.91	22.52± 2.11	16.22 ± 9.71
Labour work	107	23.01	40.29 ± 9.37	160.97 ± 6.10	57.56 ± 7.73	22.15 ± 2.15	16.43 ± 9.18
Form work	38	8.17	41.16 ± 7.89	164.45 ± 4.03	62.92 ± 5.55	23.27 ± 1.96	17.89 ± 8.04
Rebar work	48	10.32	43.46 ± 8.63	163.75 ± 5.81	61.73 ± 6.51	23.02 ± 2.10	19.35 ± 8.08
Masonry work	64	13.76	42.59 ± 9.09	163.75 ± 4.47	62.39 ± 6.20	23.23 ± 1.69	18.53 ± 9.19
Electrical work	23	4.95	44.57 ± 10.50	164.22 ± 5.18	62.91 ± 5.56	23.32 ± 1.67	21.04 ± 9.97
Plumbing work	31	6.67	40.10 ± 12.41	163.65 ± 5.45	61.62 ± 7.14	22.98 ± 2.13	16.94 ±
Flooring/Tiling work	30	6.45	46.27 ± 6.64	161.67 ± 5.28	61.32 ± 5.27	23.50 ± 2.04	21.30 ± 6.91
Carpentry work	28	6.02	37.61 ± 9.86	163.54 ± 5.56	61.85 ± 4.50	23.14 ± 1.48	14.39 ± 9.39
Painting / Fall-ceiling work	42	9.03	34.55 ± 8.13	163.45 ± 5.47	60.61 ± 5.48	22.69 ± 1.76	11.17 ± 6.61
Working experience							
00 - 10	139	29.89	29.81 ± 4.71	162.74 ± 5.82	57.06 ± 6.47	21.53 ± 2.00	6.32 ± 3.00
11 - 20	168	36.13	40.58 ± 4.71	162.49 ± 5.30	61.59 ± 6.12	23.29 ± 1.62	16.23 ± 2.65
20 - 30	118	25.38	48.85 ± 3.10	163.10 ± 5.67	63.09 ± 5.97	23.69 ± 1.56	25.18 ± 2.73
≥ 30	40	8.60	56.60 ± 2.35	162.85 ± 5.39	60.79 ± 7.53	22.91 ± 2.40	34.35 ± 1.86
BMI							
≤ 18	08	1.72	41.38 ± 13.93	165.00 ± 2.32	46.21 ± 1.30	16.99 ± 0.78	17.75 ±
18 - 25	404	86.88	40.24 ± 9.69	162.67 ± 5.64	59.86 ± 6.13	22.59 ± 1.69	16.40 ± 9.16
≥ 25	53	11.40	45.30 ± 6.38	163.02 ± 5.12	67.98 ± 4.65	25.55 ± 0.54	22.28 ± 6.86

Table 2: Number of workers feeling pain

Parameter	Total number of workers	No. of workers feel pain	Percentage of workers feel pain
Age			
21-30	75	63	84.00
31-40	147	126	85.71
41-50	166	134	80.72
≥ 51	77	62	80.52
Gender			
Male	414	334	80.68
Female	51	51	100.00
Types of work			
Excavation work	54	50	92.59
Labour work	107	100	93.46
Form work	38	34	89.47
Rebar work	48	39	81.25
Masonry work	64	56	87.50
Electrical work	23	14	60.87

Plumbing work	31	23	74.19
Flooring/Tiling work	30	23	76.67
Carpentry work	28	18	64.29
Painting /Fall-ceiling	42	28	66.67
Working experience			
00 - 10	139	117	84.17
11 - 20	168	137	81.55
20 - 30	118	95	80.51
≥ 30	40	36	90.00
BMI			
≤ 18	8	8	100.00
18 - 25	404	336	83.17
≥ 25	53	41	77.36

Table 3: Total number of workers in different construction occupation at different age group

	Age:21-30 (n=75) (male= 60) (female=15)		Age:31-40 (n=147) (male= 125) (female=22)		Age:41-50 (n=166) (male= 156) (female=10)		Age≥51 (n=77) (male= 73) (female=4)	
	n	%	n	%	n	%	n	%
Excavation work	8	10.67	23	15.65	19	11.45	4	5.19
Labour work	23	30.67	36	24.49	35	21.08	13	16.89
Form work	6	8	9	6.12	23	13.86	0	0
Rebar work	5	6.67	13	8.84	19	11.45	11	14.29
Masonry work	8	10.67	19	12.93	23	13.86	14	18.18
Electrical work	2	2.67	5	3.40	7	4.22	9	11.69
Plumbing work	8	10.67	5	3.40	9	5.42	9	11.69
Flooring/Tiling work	0	0	5	3.40	15	9.04	10	12.99
Carpentry work	7	9.33	11	7.48	6	3.61	4	5.19
Painting /Fall-ceiling work	8	10.67	21	14.29	10	6.02	3	3.90

Table 4: Number of workers feeling pain in different construction occupation at different age group

	Age:21-30 (n=75) (male= 60) (female=15)		Age:31-40 (n=147) (male= 125) (female=22)		Age:41-50 (n=166) (male= 156) (female=10)		Age≥51 (n=77) (male= 73) (female=4)	
	n	Percentage of workers between age 21-30	n	Percentage of workers between age 31-40	n	Percentage of workers between age 41-50	n	Percentage of workers age above 50
Excavation work	5	6.67	22	14.97	19	11.45	4	5.19
Labour work	23	30.67	34	23.13	35	21.08	8	10.39
Form work	6	8.00	9	6.12	19	11.45	0	0.00
Rebar work	5	6.67	13	8.84	10	6.02	11	14.29
Masonry work	8	10.67	17	11.56	20	12.05	11	14.29
Electrical work	2	2.67	0	0.00	5	3.01	7	9.09
Plumbing work	5	6.67	5	3.40	4	2.41	9	11.69
Flooring/Tiling	0	0.00	5	3.40	11	6.63	7	9.09
Carpentry work	5	6.67	7	4.76	4	2.41	2	2.60
Painting /Fall-ceiling work	4	5.33	14	9.52	7	4.22	3	3.90

Table 2 shows number of workers experiencing pain in body part. Amongst age 85.71 % workers belonging to 31-40 ages feels pain in different body parts and at different time followed by 21-30 age group workers (84.00%). The 80.72 % and 80.52 % workers feel pain that is belongings to the age group 41-50 and

more than 50 ages. All female workers that interviewed recorded and observed complaints about pain while 80.68% male workers complaints about pain. Among the occupation, 93.46% unskilled workers, 92.59% workers engaged in excavation work, 89.47 % form workers, 87.50 % masons, 81.25 % rebar workers, 76.67 % Tilers, 74.19 % plumbers, 66.67 % painters, 64.29 % carpenters and 60.87 electricians complaints pain in body parts. 90 % workers having experience more than 30 years complaint pain in body parts followed by the 84.17 % workers having experience between 00-10 years. Table 3 shows total numbers of workers belongs to different age group in different occupational group of construction work.

Table 3 and Table 4 shows total number of workers and number of workers feeling pain in different age group at different construction occupations. From Table 6, it is found that higher aged workers are suffering from pain or WRMSD. Masons and unskilled workers or "Coolies" of all age group are suffering from pain or WRMSD. The percentage of pain claimed by Rebarers, Masons, Pplumbers, Tilers and electrician are more in the age group more than 50 followed by other occupational workers. Complaint of pain by the workers engaged in excavation work found in the age group of 31-40 and 41-50. Carpenters and painter in the age group of 31-40 and 21-30 are suffering from pain or WRMSD.

Table 5 (a) and 5 (b) shows number and percentage of workers feel pain in different body parts, at different time respectively. From Table 5 (a), it is found that 72.90% workers complaint about pain in lower back, 49.68 workers in shoulders, 47.31 % workers in arms/hands, 30.75 % workers in wrists, 26.67% workers in legs, 24.09 % in neck, 23.23% workers in fingers/thumbs and 16.13 % in knees. Table 5 (b) reveals that 41.94 % workers complaint about pain after working while 20.86%, 11.40% and 8.60% in the morning, during working and during sleeping respectively. From Table 5 (c), it is found that 76.56 % workers working in awkward postures, 63.23% worker carry out pervasive jobs, 62.15% workers addicted toalcohol/tobacco/smoke, 32.69% workers do work in pace and 13.19 % workers experience traumatic incidences.

Table 5 (a): Feeling Pain in different body parts by all workers

Body Parts	Total	Percentage
Head	26	5.59
Neck	112	24.09
Shoulders	231	49.68
Chest	46	9.89
Elbow	44	9.46
Arms/Hands	220	47.31
Wrists	143	30.75
Fingers/Thumbs	108	23.23
Upper back	17	3.66
Lower back	339	72.90
Thigh/ hip/ buttocks	25	5.38
Legs	124	26.67
Knees	75	16.13
Ankle/ feet/toe	27	5.81

Table 5(b): Pain at different time zone by all workers

Time zones	Total	%
During working	53	11.40
After working	195	41.94
During Sleeping	40	8.60
In the morning	97	20.86

Table 5(c): Details of pain while working in awkward postures, doing work with pace, doing pervasive jobs, after traumatic incidents and when consume alcohol/ chewing tobacco/smoke by all workers

Parameters	Total	Percentage
Working in Awkward Posture	356	76.56
Pace of work	152	32.69
Pervasive jobs	294	63.23
Traumatic Incidents	61	13.19
Addiction to Alcohol/chewing tobacco/smoke	289	62.15

Table 6 (a) and 6 (b) shows number and percentage of workers feel pain in different body parts, at different time respectively in age group. From Table 6 (a), 54.67% worker of the age group 21-30 complaint about pain in arms/hands, 45.33% in wrist, 42.67% in neck, 36% in fingers/thumbs and 20.00% in chest followed by the age group 31-40. 58.50% workers complaints pain in shoulders belongs to the age group 31-40 followed by 21-30 age group workers (56%). Maximum pain in lower back complained by the age group 31-40 (81.63%) followed by the age group more than 50 (72.73%), age group 41-50 (69.28%) and age group 21-30 (64%). The complaint of pain in legs and knees claimed by more than 50 age group workers followed by other age group workers. Less than 10% workers belongings to all aged group workers complained about pain in head, upper back, thigh/hip/buttocks and ankle/feet/toes. From Table 6(b), it is found that maximum number of workers complaints about pain after working belongs to all age group. Complained about morning pain claimed by the workers belongs to more than 50 aged group workers followed by 41-50 age group. Table 6 (c) shows that all aged group workers are working in awkward postures but more in 31-40 age groups. At the same time all age group workers are addicted to alcohol/tobacco/smoke but more in the age group of 41-50. Pervasive jobs are carried out by the workers belongs to 31-40 age group while higher numbers of workers in the age group of more than 50, carry out work with pace and met with traumatic incidences.

Table 6(a): Percentage of construction worker feel pain in different body parts of different age group

Body part and other parameters	Age:21-30 (n=75) (male= 60) (female=15)		Age:31-40 (n=147) (male= 125) (female=22)		Age:41-50 (n=166) (male= 156) (female=10)		Age≥51 (n=77) (male= 73) (female=4)	
	n	%	n	%	n	%	n	%
Head	7	9.33	8	5.44	5	3.01	6	7.79
Neck	32	42.67	45	30.61	17	10.24	18	23.38
Shoulders	42	56.00	86	58.50	83	50.00	20	25.97
Chest	15	20.00	19	12.93	10	6.02	2	2.60
Elbow	6	8.00	19	12.93	14	8.43	5	6.49
Arms/Hands	41	54.67	80	54.42	66	39.76	33	42.86
Wrists	34	45.33	46	31.29	45	27.11	18	23.38
Fingers/Thumbs	27	36.00	37	25.17	32	19.28	12	15.58
Upper back	6	8.00	4	2.72	3	1.81	4	5.19
Lower back	48	64.00	120	81.63	115	69.28	56	72.73
Thigh/ hip/ buttocks	4	5.33	5	3.40	10	6.02	6	7.79
Legs	11	14.67	44	29.93	39	23.49	30	38.96
Knees	3	4.00	15	10.20	31	18.67	26	33.77
Ankle/ feet/toe	2	2.67	8	5.44	7	4.22	10	12.99

Table 6(b): Percentage of worker feel pain at different time zone by different age group construction workers

Time zones	Age:21-30 (n=75) (male= 60) (female=15)		Age:31-40 (n=147) (male= 125) (female=22)		Age:41-50 (n=166) (male= 156) (female=10)		Age≥51 (n=77) (male= 73) (female=4)	
	n	%	n	%	n	%	n	%
During working	22	29.33	19	12.93	11	6.63	1	1.30
After working	26	34.67	84	57.14	62	37.35	23	29.87
During Sleeping	8	10.67	13	8.84	13	7.83	6	7.79
In the morning	3	4.00	8	5.44	51	30.72	35	45.45

Table 6(c): Percentage of construction workers working in awkward posture, work with pace, doing pervasive jobs, meet with traumatic incidents and consume alcohol

Body part	Age:21-30 (n=75) (male= 60) (female=15)		Age:31-40 (n=147) (male= 125) (female=22)		Age:41-50 (n=166) (male= 156) (female=10)		Age≥51 (n=77) (male= 73) (female=4)	
	n	%	n	%	n	%	n	%
Working in Awkward	50	66.67	122	82.99	126	75.90	58	75.32
Pace of work	28	37.33	52	35.37	43	25.90	29	37.66
Pervasive jobs	50	66.67	102	69.39	92	55.42	50	64.94
Traumatic Incidents	7	9.33	14	9.52	27	16.27	13	16.88

Addiction to Alcohol	33	44.00	96	65.31	115	69.28	45	58.44

Logistic regression for association of pain in body parts and age, year of experience, BMI, awkward posture, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for different age group:

Table 7, 8,9,10 shows the association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for different age group. Table 7-10 shows that there is a correlation of pain/ WRMSD due to age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking factor to all body parts of all age group workers. Each independent variable affecting all body parts of all aged group worker. However the most affecting independent variable is working in awkward postures, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking.

The values of odds ratio shows that the most vulnerable body parts are lower back, shoulders, arms/hands, legs followed by other body parts. The possibility of pain/ WRMSD in these body parts are more in all aged group workers but more risk in lower back (OD = 4.8566, 95% CI 1.1165 - 21.1249) for 21-30, (OD=101.5000, 95%CI 26.3700 - 390.6807) for 31-40, (OD=98.6667, 95% CI 26.8588 - 362.4545) for 41-50 and (OD=32.5000, 95% CI 8.0994 - 130.4113) for the workers age more than 50. The workers whose age is in between 31-40 is (OD=101.5000, 95%CI 26.3700 - 390.6807) times more vulnerable to WRMSD followed by the workers age 41-50, more than 50 and age 21-30. The other factors like pace of work, pervasive jobs, traumatic incidences and addiction is also affecting lower back of all aged group workers. Working in pace, multi tasking works, accidents and addiction affecting arms/hands, thigh/hip/buttocks, shoulders of all age group.

In the age group of 21-30, the chance of WRMSD all body parts are found due to age factor. WRMSD is possible due to year of experience factor found in elbows, lower back, thigh/hip/buttocks and knees. Possibility of WRMSD due to BMI found in chest, arms/hands, neck, head and knees. The chance of WRMSD because of working in awkward posture found in lower back, head, shoulders, wrists, arms/hands, elbow, upper back, neck, chest and knees. Chance of WRMSD due to working with pace found in thigh/hip/buttocks, arms/hands, upper back, shoulders, wrists and lower back.

Excessive work on arms/hands, lower back, fingers/thumbs, legs, neck, shoulders and wrists can lead to WRMSD. The chance of WRMSD due to traumatic incidences found in thigh/hip/buttocks, ankle/feet/toe, knees, legs, neck, head, fingers/thumbs, shoulders, chest and lower back. Addiction is more likely to cause WRMSD in shoulders, lower back, arms/hands, chest, neck, fingers/thumbs, legs, head and upper back and thigh/hip/buttocks.

In age group of 31-40, the chance of WRMSD due to age found in ankle/feet/toe, lower back, shoulders, elbows, neck and arms/hands. With years of experience in thighs/hips/buttocks, legs, knees, head and wrists, WRMSD is more likely to occur. The WRMSD due to BMI found in thighs/hips/buttocks, knees, wrists, fingers/thumbs and ankle/feet/toe. The WRMSD due to working in awkward postures is found in lower back, shoulders, neck and legs. The chance of WRMSD due to working with pace found in lower back, shoulders, arms/hands, head, fingers/thumbs, neck, legs, wrist and thigh/hip/buttocks. The WRMSD due to pervasive jobs found in arms/hands, lower back, head, neck, shoulders, fingers/thumbs, legs and wrists. The chance of WRMSD due to traumatic incidences found in ankle/feet/toe, lower back, shoulders, fingers/thumbs, arms/hands and wrists. The chance of WRMSD due to addiction found in lower back, shoulders, fingers/thumbs, elbow, chest, arms/hands and neck.

In age group of 41-50, the chance of WRMSD due to age factor found in lower back, shoulders, neck, knees, legs, arms/hands, elbow, ankle/feet/toe. The WRMSD due to year of experience factor is found in chest, and legs only. The WRMSD due to BMI is found in chest, elbow, thigh/hip/buttocks, legs, head, lower back, arms/hands and knees. The chance of WRMSD due to working in awkward postures found in lower back, shoulders, knees, neck, arms/hands, legs, wrists and fingers/thumbs. The chance of WRMSD due to work with pace found in thigh/hip/buttocks, lower back, fingers/thumbs, shoulders, wrists, arms/hands, knees, legs, chest and elbow. The chance of WRMSD due to pervasive jobs found in ankle/feet/toe, chest, lower back, arms/hands, wrist, shoulders, knees, upper back, elbows, fingers/thumbs, legs and thigh/hip/buttocks. The chance of WRMSD traumatic incidences found in neck, lower back, shoulders, legs, wrists, chest, head and arms/hands. the chance of WRMSD due to addiction found in lower back, shoulders, chest, arms/hands, legs, fingers/thumbs, knees, wrists and ankle/feet/toe.

In the age group more than 50, the chance of WRMSD due to age factor found in all body parts except upper back and head. The chance of WRMSD due to year of experience found in fingers/thumbs and wrists. The chance of WRMSD due to working in awkward postures found in lower back, legs, arms/hands, fingers/thumbs and shoulders. The chance of WRMSD due to work with pace found in lower back, thigh/hip/buttocks, shoulders, neck, upper back, arms/hands and ankle/feet/toe. The chance of WRMSD due to

pervasive jobs found in lower back, wrists, arms/hands, fingers/thumbs, shoulders, legs, neck and knees. The chance of WRMSD due to traumatic incidence found in head, fingers/thumbs, chest, ankle/feet/toe, knees, legs, shoulders, elbows and arms/hands. The chance of WRMSD due to addiction found in legs, knees, ankle/feet/toes, lower back, upper back, shoulders, fingers/thumbs, arms/hands, neck and elbows.

Table 7: Logistic regression for association of pain in body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group 21-30

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
Head	**1.5554 (0.8486, 2.8509)**	0.3300 (0.1301, 0.8369)**	**1.8264 (0.0009, 3692.8654)**	**3.7610 (0.3105, 45.5540)**	0.7907 (0.1262, 4.9545)	**1.3325 (0.1739, 10.2086)**	**4.1812 (0.0735, 237.7762)**	**1.4069 (0.2175, 9.1011)**
Neck	**1.3606 (0.9929, 1.8646)***	0.7374 (0.5325, 1.0211)	**5.6468 (0.1331, 239.5713)**	**1.9336 (0.5626, 6.6461)**	0.8247 (0.2696, 2.5226)	**2.3368 (0.6647, 8.2157)**	**5.1348 (0.6023, 43.7764)**	**3.2005 (1.0309, 9.9366)***
Shoulders	**1.6415 (1.1403, 2.3630)****	0.6426 (0.4390, 0.9408)*	0.1423 (0.0015, 13.5807)	**3.4510 (1.2637, 9.4243)***	**1.7250 (0.6594, 4.5123)**	**1.6250 (0.6177, 4.2753)**	**2.0946 (0.3797, 11.5561)**	**8.1000 (2.7324, 24.0120)****
Chest	**1.8849 (1.0610, 3.3486)**	0.8369 (0.5351, 1.3089)	1040.1737 (1.0480, 1.03244E+06)	1.4808 (0.4195, 5.2274)	0.8043 (0.2440, 2.6519)		1.6923 (0.2948, 9.7159)	**3.2174 (0.9759, 10.6077)***
Elbow	0.9103 (0.3657, 2.2660)	**2.1830 (0.9812, 4.8569)***	0.0005 (0.0000, 25.3546)	**2.6667 (0.2945, 24.1498)**				0.6129 (0.1052, 3.5710)
Arms/ Hands	**1.4395 (1.0304, 2.0110)***	0.8232 (0.5847, 1.1590)	**8.9379 (0.1930, 413.9007)**	**2.7986 (0.6870, 11.4006)**	**3.5904 (0.9162, 14.0695)**	**10.1204 (2.2757, 45.0073)****	0.5405 (0.0426, 6.8543)	**4.2294 (1.1055, 16.1809)***
Wrists	**1.2295 (0.8775, 1.7229)**	0.7583 (0.5217, 1.1022)	0.0727 (0.0008, 6.7687)	**3.0186 (1.0722, 8.4989)***	**1.7004 (0.6616, 4.3701)**	**1.3846 (0.5230, 3.6660)**		**1.2549 (0.5020, 3.1372)**
Fingers/ Thumbs	**1.1121 (0.8182, 1.5116)**	0.7825 (0.5626, 1.0883)	0.7845 (0.0190, 32.3330)	**1.9344 (0.5194, 7.2047)**	0.7063 (0.2181, 2.2869)	5.0434 (1.2097, 21.0261)*	**2.2410 (0.2354, 21.3352)**	**1.7467 (0.5270, 5.7889)**
Upper back	**2.4711 (1.0108, 6.0413)***	0.2610 (0.0800, 0.8517)**	0.0000 (0.0000, 3.2881)*	**2.6667 (0.2945, 24.1498)**	**1.7600 (0.3300, 9.3859)**	0.0816 (0.0090, 0.7435)**		**1.3000 (0.2448, 6.9030)**
Lower back	**1.4789 (0.9931, 2.2024)***	**1.1873 (0.7555, 1.8659)**	0.0225 (0.0001, 4.3673)	**4.8566 (1.1165, 21.1249)***	**1.6073 (0.3835, 6.7356)**	**6.7351 (1.6095, 28.1836)**	**1.1401 (0.1086, 11.9687)**	**6.1820 (1.5223, 25.1051)****
Thigh/ hip/ buttocks	**1.0009 (0.6933, 1.4451)**	**1.1162 (0.7531, 1.6542)**	0.7403 (0.4265, 1.2851)	0.4792 (0.0634, 3.6194)	**5.5200 (0.5452, 55.8882)**		**13.2000 (1.5215, 114.5212)***	**1.2903 (0.1720, 9.6812)**
Legs	**1.4441 (0.9079, 2.2972)**	0.8659 (0.5854, 1.2809)	0.0070 (0.0000, 5.8230)	0.8468 (0.1672, 4.2894)	0.4664 (0.0928, 2.3432)	**4.0718 (0.6176, 26.8471)**	**5.1967 (0.4457, 60.5941)**	**1.5516 (0.3650, 6.5965)**
Knees	**2.3882 (0.7632, 7.4732)***	**1.7977 (0.8731, 3.7013)***	**1.3030 (0.6022, 2.8196)**	**1.0000 (0.0863, 11.5878)**	0.8333 (0.0721, 9.6320)		**5.5000 (0.4330, 69.8622)**	
Ankle/ feet/toe	**1.8299 (0.6441, 5.1986)**		0.6687 (0.3075, 1.4542)	0.4898 (0.0294, 8.1721)			**11.1667 (0.6176, 201.9139)**	

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 8: Logistic regression for association of pain in body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group 31-40

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
Head	0.8515 (0.5758, 1.2592)	**1.0848 (0.8138, 1.4460)**	0.3254 (0.0017, 61.1927)		**3.2624 (0.7472, 14.2439)**	**3.2421 (0.3870, 27.1595)**		0.8791 (0.2014, 3.8367)
Neck	**1.1642 (0.9770, 1.3871)**	0.8742 (0.7598, 1.0059)	0.0282 (0.0010, 0.8233)*	**13.5385 (1.7706, 103.5195)****	**1.7500 (0.8505, 3.6009)**	**3.2232 (1.3097, 7.9322)****	0.5909 (0.1566, 2.2296)	**2.3525 (1.0501, 5.2701)***
Shoulders	**1.1771 (1.0002, 1.3853)***	0.9535 (0.8323, 1.0923)	0.0619 (0.0034, 1.1429)*	**25.4211 (5.7015, 113.3438)****	**3.5507 (1.6600, 7.5948)****	**3.0000 (1.4534, 6.1922)****	**2.8356 (0.7561, 10.6338)**	**10.9318 (4.8963, 24.4074)****

Chest	0.9360 (0.7491, 1.1696)	0.9985 (0.8322, 1.1981)	0.9872 (0.0281, 34.6844)		0.6155 (0.2085, 1.8170)		0.4915 (0.0606, 3.9883)	**3.2000 (0.8862, 11.5551)***
Elbow	**1.1665 (0.9337, 1.4574)**	0.9584 (0.8059, 1.1399)	0.7360 (0.0193, 28.0321)		0.4444 (0.1394, 1.4171)	0.3387 (0.1270, 0.9032)*	0.4915 (0.0606, 3.9883)	**3.2000 (0.8862, 11.5551)**
Arms/ Hands	**1.1336 (0.9674, 1.3283)**	0.9143 (0.8018, 1.0426)	0.7045 (0.0628, 7.9049)	**12.5481 (3.5555, 44.2854)****	**3.4252 (1.6433, 7.1392)****	**17.1786 (6.5562, 45.0112)****	**1.5718 (0.5002, 4.9397)**	**2.9353 (1.4525, 5.9320)****
Wrists	0.9609 (0.8166, 1.1307)	**1.0010 (0.8743, 1.1460)**	**5.5953 (0.2553, 122.6323)**		**1.2668 (0.6155, 2.6071)**	**1.1773 (0.5470, 2.5339)**	**1.2466 (0.3933, 3.9509)**	**6.8582 (2.5038, 18.7855)****
Fingers/ Thumbs	0.9425 (0.7926, 1.1207)	0.9835 (0.8536, 1.1332)	**3.5841 (0.1644, 78.1337)**		**2.1176 (0.9894, 4.5327)**	**2.8380 (1.0894, 7.3934)***	1.7535 (0.5479, 5.6118)	**3.5769 (1.3789, 9.2786)****
Upper back	0.8038 (0.4598, 1.4051)	0.7776 (0.5193, 1.1644)	0.9432 (0.0006, 1559.741		0.6013 (0.0610, 5.9313)	0.4300 (0.0586, 3.1529)		0.5213 (0.0712, 3.8140)
Lower back	**1.5593 (1.2095, 2.0103)****	0.9138 (0.7435, 1.1232)	0.7007 (0.0236, 20.8268)	**101.5000 (26.3700, 390.6807)****	**8.9286 (2.0218, 39.4309)****	**14.0000 (5.0912, 38.4980)****	**3.1589 (0.3952, 25.2499)**	**45.1923 (10.0402, 203.4164)****
Thigh/ hip/ buttocks	0.8061 (0.4719, 1.3770)	**1.2412 (0.7642, 2.0159)**	**154.2350 (0.2835, 83924.34**		**1.2267 (0.1983, 7.5862)**	0.1015 (0.0110, 0.9355)		0.1237 (0.0134, 1.1377)*
Legs	0.8840 (0.7308, 1.0693)	**1.1162 (0.9448, 1.3186)**	0.0074 (0.0002, 0.3119)**	**3.7119 (1.0493, 13.1308)***	**1.6121 (0.7800, 3.3320)**	**1.7500 (0.7750, 3.9515)**	0.1610 (0.0204, 1.2710)*	0.9007 (0.4309, 1.8827)
Knees	**1.1657 (0.8757, 1.5517)**	**1.1028 (0.8713, 1.3959)**	46.7016 (0.4334, 5032.241		0.4235 (0.1139, 1.5749)	0.8696 (0.2793, 2.7078)		0.5714 (0.1946, 1.6776)
Ankle/ feet/toe	**2.5730 (1.2979, 5.1006)****	0.8768 (0.6916, 1.1117)	1.7410 (0.0041, 747.5456)		**3.2624 (0.7472, 14.2439)**	**1.3437 (0.2606, 6.9288)**	**3.5278 (0.6404, 19.4322)**	

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 9: Logistic regression for association of pain in body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group 41-50

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
Head	0.7090 (0.4315, 1.1650)	0.9762 (0.6544, 1.4562)	**1.8398 (0.0011, 3202.9922)**	0.4634 (0.0747, 2.8767)	0.7083 (0.0770, 6.5175)		**1.2981 (0.1394, 12.0858)**	
Neck	**1.2455 (0.9660, 1.6060)****	0.9984 (0.8603, 1.1585)	0.1629 (0.0025, 10.8113)	**5.6727 (0.7281, 44.1984)***	0.5839 (0.1594, 2.1394)	0.3996 (0.1403, 1.1378)	**4.5150 (1.5416, 13.2237)****	
Shoulders	**1.2694 (1.0971, 1.4688)**	0.9857 (0.8934, 1.0875)	0.5905 (0.0324, 10.7680)	**11.3750 (4.1694, 31.0336)****	**2.6468 (1.2749, 5.4953)****	**2.4421 (1.3032, 4.5761)****	**2.7832 (1.1420, 6.7832)**	**8.4228 (3.7290, 19.0247)****
Chest	**0.9657 (0.6964, 1.3393)**	**1.1096 (0.8746, 1.4079)**	**2.9228 (0.0164, 522.1200)**	**1.2881 (0.2622, 6.3295)**	**1.2429 (0.3067, 5.0372)**	**3.4286 (0.7054, 16.6644)**	**1.3100 (0.2625, 6.5370)**	**4.2453 (0.5234, 34.4317)**
Elbow	**1.0538 (0.8351, 1.3297)**	0.9542 (0.8155, 1.1166)	**2.5085 (0.0147, 429.2904)**		**1.1590 (0.3438, 3.9073)**	**1.4964 (0.4791, 4.6737)**	0.3728 (0.0467, 2.9759)	
Arms/ Hands	**1.1341 (0.9845, 1.3063)**	0.9051 (0.8204, 0.9985)*	**1.2433 (0.0750, 20.6173)**	**5.1515 (2.0211, 13.1306)****	**2.1395 (1.0576, 4.3283)***	**3.0234 (1.5585, 5.8652)****	**1.2593 (0.5479, 2.8942)**	**3.3333 (1.5573, 7.1348)****
Wrists	0.9714 (0.8387, 1.1251)	0.9063 (0.8159, 1.0067)	0.1763 (0.0091, 3.4221)	**3.2558 (1.1866, 8.9332)***	**2.5600 (1.2200, 5.3720)***	**2.8898 (1.3641, 6.1222)****	**1.7479 (0.7323, 4.1719)**	**1.3079 (0.6100, 2.8046)**
Fingers/ Thumbs	0.9087 (0.7694, 1.0732)	0.9568 (0.8496, 1.0775)	0.1799 (0.0071, 4.5669)	**2.5714 (0.8431, 7.8426)***	**2.8161 (1.2522, 6.3333)**	1.2213 (0.5581, 2.6725)	**2.0175 (0.7914, 5.1435)**	**1.7460 (0.7012, 4.3480)**
Upper back				0.6290 (0.0555, 7.1257)		**1.6222 (0.1442, 18.2474)**		
Lower back	**1.7146 (1.3958, 2.1062)****	0.9057 (0.7840, 1.0463)	**1.4113 (0.0379, 52.4947)**	**98.6667 (26.8588, 362.4545)****	**2.8644 (1.1767, 6.9725)***	**3.3089 (1.6605, 6.5939)****	**2.9375 (0.9600, 8.9888)***	**22.9349 (9.7611, 53.8882)****

Thigh/ hip/ buttocks	**1.0867 (0.8349, 1.4143)**	0.9234 (0.7751, 1.1000)	**2.4222 (0.0078, 753.8676)**		**3.1053 (0.8528, 11.3076)**	0.1833 (0.0377, 0.8916)		0.4182 (0.1155, 1.5138)
Legs	**1.1593 (0.9759, 1.3772)**	**1.0221 (0.9127, 1.1447)**	**1.9252 (0.0735, 50.3963)**	**4.9333 (1.4299, 17.0209)****	**1.6167 (0.7399, 3.5324)**	**1.2083 (0.5839, 2.5007)**	**2.2312 (0.9239, 5.3888)**	**3.0183 (1.1757, 7.7483)***
Knees	**1.1904 (0.9944, 1.4251)**	0.9645 (0.8603, 1.0813)	**1.1939 (0.0424, 33.6367)**	**12.1875 (1.6058, 92.5007)****	**2.1188 (0.9271, 4.8424)**	**1.8930 (0.8293, 4.3210)**	0.4955 (0.1392, 1.7641)	**1.6578 (0.6636, 4.1416)**
Ankle/ feet/toe	**1.0348 (0.7116, 1.5048)**	0.9346 (0.7363, 1.1864)	0.0001 (0.0000, 0.0757)**	0.7851 (0.1464, 4.2119)	0.4643 (0.0543, 3.9704)	**5.0930 (0.5993, 43.2817)**		**1.1136 (0.2088, 5.9396)**

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 10: Logistic regression for association of pain in body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group > 50

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
Head							**13.7778 (2.1975, 86.3820)****	
Neck	**1.1595 (0.8278, 1.6243)**	0.9971 (0.8631, 1.1519)	0.0023 (0.0000, 2.1650)*		**2.6316 (0.8953, 7.7353)**	**2.2361 (0.6548, 7.6365)**	0.9800 (0.2383, 4.0297)	**1.1555 (0.3927, 3.3997)**
Shoulders	**1.4920 (0.9806, 2.2703)***	0.9952 (0.8441, 1.1735)	0.0003 (0.0000, 0.3184)**	**3.8250 (0.7980, 18.3342)***	**2.6481 (0.9331, 7.5151)**	**4.1212 (1.0842, 15.6647)***	**2.0417 (0.5802, 7.1845)**	**1.9570 (0.6585, 5.8158)**
Chest	**1.2519 (0.4024, 3.8950)**	0.8072 (0.5995, 1.0868)	0.0473 (0.0000, 52.8664)				**5.2500 (0.3068, 89.8327)**	0.7045 (0.0424, 11.6984)
Elbow	**1.4145 (0.7375, 2.7128)**	0.9177 (0.7329, 1.1492)	0.0189 (0.0001, 2.4773)		0.3929 (0.0417, 3.6974)		**1.2500 (0.1282, 12.1875)**	**1.0714 (0.1686, 6.8108)**
Arms/ Hands	**1.1591 (0.9102, 1.4762)**	0.9795 (0.8800, 1.0902)	0.0373 (0.0007, 1.9867)	**5.7143 (1.5018, 21.7432)****	**1.1375 (0.4488, 2.8829)**	**7.9405 (2.3889, 26.3938)****	**1.1746 (0.3545, 3.8919)**	**1.4583 (0.5784, 3.6768)**
Wrists	**1.0823 (0.8067, 1.4520)**	**1.0086 (0.8830, 1.1521)**	0.2673 (0.0088, 8.1178)	1.8605 (0.4746, 7.2925)	0.7826 (0.2577, 2.3768)	**13.3939 (1.6712, 107.3450)***	0.9800 (0.2383, 4.0297)	0.4757 (0.1633, 1.3854)
Fingers/ Thumbs	**1.3732 (0.7993, 2.3591)**	**1.0299 (0.8215, 1.2911)**	0.0001 (0.0000, 0.4428)**	**4.2128 (0.5067, 35.0240)**	0.5000 (0.1236, 2.0229)	**7.3333 (0.8923, 60.2698)***	**8.2857 (2.0912, 32.8287)****	**1.5135 (0.4138, 5.5355)**
Upper back					**1.7037 (0.2267, 12.8013)**		**1.6944 (0.1622, 17.7013)**	**2.2143 (0.2197, 22.3135)**
Lower back	**1.4948 (1.1215, 1.9923)****	0.9839 (0.8732, 1.1086)	**2.1618 (0.0241, 193.7071)**	**32.5000 (8.0994, 130.4113)***	**5.2000 (1.3749, 19.6673)****	**19.5500 (5.4027, 70.7427)****		**5.7353 (1.8998, 17.3144)****
Thigh/ hip/ buttocks	**1.1185 (0.6816, 1.8355)**	0.9514 (0.7596, 1.1917)	**4643.7166 (0.1622, 1.32927E+**		**3.6800 (0.6294, 21.5155)**	0.0898 (0.0099, 0.8146)*	0.9833 (0.1052, 9.1902)	
Legs	**1.0442 (0.8160, 1.3361)**	0.9963 (0.8920, 1.1128)	0.4042 (0.0164, 9.9889)	**7.9333 (1.6787, 37.4916)****	0.5786 (0.2190, 1.5288)	**2.4339 (0.8735, 6.7818)**	**2.0797 (0.6239, 6.9329)**	**24.7059 (5.2279, 116.7547)***
Knees	**1.0804 (0.8240, 1.4166)**	0.9444 (0.8418, 1.0597)	0.0820 (0.0013, 5.1382)		0.6349 (0.2330, 1.7298)	1.7512 (0.6233, 4.9195)	**2.7632 (0.8197, 9.3140)**	**17.1429 (3.6512, 80.4879)****
Ankle/ feet/toe	**1.3029 (0.8419, 2.0163)**	0.8857 (0.7608, 1.0311)	0.3311 (0.0040, 27.6973)		**1.1200 (0.2879, 4.3575)**	0.7841 (0.2009, 3.0609)	**4.2963 (1.0109, 18.2599)**	**7.7500 (0.9293, 64.6349)***

*** P VALUE < 0.05, ** P ALUE <0.01**

Logistic regression for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for different age group:

The result of regression analysis shows that different age group workers feel pain or discomfort at different time in a day. These times are divided into four zones as mentioned above. The result shows correlation of effect of age, year of experience, BMI, working in awkward postures, work with pace, doing

pervasive jobs, traumatic incidence and addiction to alcohol, tobacco and smoke with the pain in different time of the day. The result of the same in presented in Table 11 to 14 for four age group. From Table 11 to 14, it is found that someway all independent variables causing pain/discomfort in the body parts of the workers.

When the pain compares with during working pain, after working pain, during sleeping pain and in the morning pain with age, the odds ratio shows that as the age increases pain/discomfort during sleeping and in the morning is more. The age factor mostly affecting the workers in the age group of 41-50 and >50 age and the workers whose age is in between 21-30 or who is newer, they are experiencing pain or discomfort after working. The factor year of experience is also shows the same result that the young and older workers experiencing pain or discomfort during working and in the morning.

The result shows that if the BMI is more the worker in the age group of 21-30 experiencing pain during sleeping and in the morning, during working and during sleeping to the age group of 31-40. However if the BMI is more the workers in the age group of 41-50 experienced pain or discomfort during working, after working and during sleeping. Pain during working and in the morning experienced by the worker whose age is more than 50. Among all if the BMI is more the pain occurs in the morning (OD: 79.3677, 95% CI 0.0014 - 4.63975E+06) to the 21-30 age group workers, during sleeping (OD: 64.1402, 95% CI 0.0099 - 414446.7046) to the age group of 31-40 and during working (OD: 43.7925, 95% CI 0.0000 - 1.30356E+13) and in the morning (OD: 2.3698, 95% CI 0.0418 - 134.2462) to the age group of more than 50.

The working in awkward postures results shows that if young worker work in awkward postures they experience and chance of pain during working (OD: 1.5816, 95%CI 0.3847 - 6.5024) , after working (OD: 2.1111, 95%CI 0.7182 - 6.2055) and during sleeping (OD:1.5682, 95%CI 0.2929 - 8.3964) but workers of the age group 31-40 experience and possibility of pain after working (OD: 14.4878, 95%CI 4.0956 - 51.2499) and during sleeping (OD: 2.6182, 95%CI 0.3247 - 21.1094). The worker of the age group 41-50 and more than 50, experiencing pain and possibility of pain or WRMSD after working (OD: 17.2727, 95%CI 3.9943 - 74.6930), (OD: 11.0000, 95%CI 1.3711, 88.2508) and in the morning (OD: 12.0909, 95%CI 2.7902 - 52.3933), (OD: 6.5641, 95%CI 1.7234 - 25.0010) respectively.

If workers of the age group 21-30 works with pace they experience and possibility of pain by after working (OD: 2.2667, 95%CI 0.8508 - 6.0384) and in the morning (OD: 3.5385, 95%CI 0.3059 - 40.9292) times , but the worker of the age group 31-40 experiencing and possibility of pain throughout the day, by during working (OD: 1.3884, 95%CI 0.5206 - 3.7033), after working (OD: 1.7000, 95%CI 0.8450 - 3.4199), during sleeping (OD: 1.1569, 95%CI 0.3582 - 3.7363) and in the morning (OD: 1.8958, 95%CI 0.4540 - 7.9168) times. If the workers in the age group of 41-50 works with pace they experiencing and possibility of pain by after working (OD: 1.1333, 95%CI 0.5555 - 2.3121), during sleeping (OD: 2.6873, 95% CI 0.8496 - 8.4997) and in the morning (OD: 1.9636, 95% CI 0.9507 - 4.0559) times. If the worker whose age is more than 50, work with pace, they experience and possibility of pain or WRMSD by after working (OD: 1.4170, 95%CI 0.5235 - 3.8356) and in the morning (OD: 3.8000, 95%CI 1.4364 - 10.0529) times. Result of the analysis shown that, if workers do pervasive jobs the body parts arms/hand, lower back, fingers/thumbs, legs, neck, shoulders, wrists of the age group 21-30

Table 11: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group 21-30

Time Zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
During working	0.8962 (0.5978, 1.3434)	**1.5397 (1.0013, 2.3677)***	0.0074 (0.0000, 8.2718)	**1.5816 (0.3847, 6.5024)**	0.6963 (0.2021, 2.3993)	**2.9282 (0.6619, 12.9545)**	0.4764 (0.0380, 5.9678)	**1.2388 (0.3799, 4.0399)**
After working	**1.1148 (0.8039, 1.5459)**	0.8856 (0.6226, 1.2598)	0.0067 (0.0001, 0.8209)	**2.1111 (0.7182, 6.2055)**	**2.2667 (0.8508, 6.0384)**	**2.1111 (0.7182, 6.2055)**	0.2867 (0.0326, 2.5199)	**1.1429 (0.4392, 2.9740)**
During Sleeping	**1.8822 (0.9749, 3.6338)***	0.5857 (0.3152, 1.0881)	**4.03764E+07 (13.8284, 1.17891E+14)**	**1.5682 (0.2929, 8.3964)**	0.5256 (0.0986, 2.8036)	0.4565 (0.1040, 2.0033)	**1.4524 (0.1520, 13.8748)**	**11.0385 (1.2831, 94.9633)****
In the morning	**2.0264 (0.7200, 5.7028)**	0.5624 (0.2389, 1.3240)	**79.3677 (0.0014, 4.63975E+06)**	-	**3.5385 (0.3059, 40.9292)**	-	**5.5000 (0.4330, 69.8622)**	0.6250 (0.0542, 7.2069)

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 12: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group 31-40

Time Zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
During working	**1.4384 (1.1320, 1.8277)***	0.8277 (0.7007, 0.9777)*	**2.4317 (0.0479, 123.5379)**	-	**1.3884 (0.5206, 3.7033)**	**1.2727 (0.4290, 3.7755)**	**1.9943 (0.5020, 7.9221)**	**3.2000 (0.8862, 11.5551)***
After working	0.9716 (0.8314, 1.1354)	0.9241 (0.8105, 1.0536)	0.4941 (0.0369, 6.6107)	**14.4878 (4.0956, 51.2499)***	**1.7000 (0.8450, 3.4199)**	**5.6377 (2.6092, 12.1814)****	**1.9932 (0.5950, 6.6772)**	**2.4037 (1.2005, 4.8129)***
During Sleeping	0.8707 (0.5429, 1.3966)	**1.7745 (1.0854, 2.9010)****	**64.1402 (0.0099, 414446.7046)**	**2.6182 (0.3247, 21.1094)**	**1.1569 (0.3582, 3.7363)**	**2.5989 (0.5518, 12.2407)**		**1.2155 (0.3553, 4.1589)**
In the morning	0.7033 (0.3372, 1.4672)	**2.0660 (0.8809, 4.8455)***	0.0008 (0.0000, 1.8515)	-	**1.8958 (0.4540, 7.9168)**	0.4184 (0.0998, 1.7536)	**1.3846 (0.1578, 12.1473)**	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 13: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group 41-50

Time Zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
During working	0.5273 (0.3174, 0.8758)*	0.5985 (0.4042, 0.8863)**	**1.9552 (0.0039, 990.1763)**	0.5294 (0.1466, 1.9113)	0.6179 (0.1281, 2.9795)	**2.2540 (0.5762, 8.8171)**	**1.1556 (0.2355, 5.6713)**	**4.7619 (0.5931, 38.2322)**
After working	0.9912 (0.8627, 1.1389)	0.9502 (0.8623, 1.0471)	**1.0271 (0.0584, 18.0734)**	**17.2727 (3.9943, 74.6930)****	**1.1333 (0.5555, 2.3121)**	**2.2680 (1.1759, 4.3745)***	0.8113 (0.3398, 1.9371)	**3.3841 (1.5471, 7.4027)****
During Sleeping	**1.5061 (0.9183, 2.4699)**	**1.1773 (0.9220, 1.5033)**	**1.1501 (0.0014, 928.8661)**	-	**2.6873 (0.8496, 8.4997)**	**4.8889 (1.0484, 22.7981)***	**3.7216 (1.1152, 12.4200)***	**1.5238 (0.4012, 5.7883)**
In the morning	**1.8463 (1.4622, 2.3313)***	0.9199 (0.8245, 1.0264)	0.0925 (0.0024, 3.4981)	**12.0909 (2.7902, 52.3933)****	**1.9636 (0.9507, 4.0559)**	**1.7401 (0.8808, 3.4376)**	**1.7016 (0.7266, 3.9849)**	**6.1333 (2.2665, 16.5970)****

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 14: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for age group > 50

Time Zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
During working	0.5548 (0.1196, 2.5731)	**1.1667 (0.5239, 2.5983)**	**43.7925 (0.0000, 1.30356E+**	-	-	-	-	-
After working	0.9188 (0.7156, 1.1796)	0.9661 (0.8673, 1.0761)	0.1794 (0.0050, 6.4414)	**11.0000 (1.3711, 88.2508)****	**1.4170 (0.5235, 3.8356)**	**1.8030 (0.6125, 5.3072)**	0.3723 (0.0756, 1.8337)	**13.1250 (2.7955, 61.6235)****
During Sleeping	**5.8377 (0.8728, 39.0452)****	0.6221 (0.3872, 0.9998)**	0.0003 (0.0000, 41.8655)	-	0.8148 (0.1397, 4.7537)	**2.8889 (0.3199, 26.0892)**	**13.7778 (2.1975, 86.3820)****	**3.8750 (0.4304, 34.8901)**
In the morning	**1.4039 (1.0043, 1.9625)***	**1.1367 (0.9555, 1.3523)**	**2.3698 (0.0418, 134.2462)**	**6.5641 (1.7234, 25.0010)****	**3.8000 (1.4364, 10.0529)****	**3.6364 (1.3034, 10.1449)***	**5.2000 (1.3024, 20.7623)***	1.3980 (0.5593, 3.4945)

*** P VALUE < 0.05, ** P ALUE <0.01**

Logistic regression for association of pain in body parts and during different time of the day with age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/ alcohol/smoking for various construction occupations:

Table 15-34 shows the result of logistic regression analysis for the various construction occupation i.e. excavation, labour work (coolie), form workers/centering, rebar work, masonry , electrification, plumbing, tilling, carpentry, painting. The association of pain in the body of construction workers as mentioned above with age, year of experience, BMI, pace of work, pervasive jobs, traumatic incidences, and personal addiction are carried out. Also the association of pain at different time zone of the day are also carried out. The detail results are shown in Table 15-34.

Excavators / Workers engaged in excavation work:

Table 15 and Table 16 shows regression analysis result of association of body pain and pain in the different time zone with age, year of experience, BMI, pace of work, pervasive jobs, traumatic incidences, and addiction to alcohol/tobacco/smoking respectively.

From Table 15, it is found that the more possibilities of pain or WRMSD in excavators are due to working in awkward posture and addiction to tobacco/smoke/alcohol. The possibility of pain due to awkward postures are found in chest by (OD: 5.9088, 95% CI 0.5111 - 68.1497), shoulders (OD: 3.9731, 95% CI 0.5650 - 27.9402), lower back (OD: 3.5501, 95% CI 0.3279 - 38.4370), head (OD: 3.5236, 95% CI 0.2158 - 57.5236), arms/hands(OD: 1.3295, 95% CI 0.2308 - 7.6579), legs (OD: 1.1808, 95% CI 0.1954 - 7.1352)─and fingers/thumbs (OD: 1.0542, 95% CI 0.1493 - 7.4440) times. Whereas the more possibilities of pain or WRMSD due to addiction to tobacco/smoke/alcohol are found in neck (OD: 33.4129, 95% CI 0.9830 - 1135.7735), lower back (OD:13.2525, 95% CI 1.2240 - 143.4848), shoulders (OD: 8.5176, 95% CI 1.2305 - 58.9610), fingers/thumbs (OD: 6.8084, 95% CI 0.5873 - 78.9350), wrists (OD: 6.7338, 95% CI 0.5796 - 78.2350), arms/hands (OD: 5.0476, 95% CI 0.9770 - 26.0770) and chest (OD: 2.8901, 95% CI 0.2860 - 29.2024) times. In others, only traumatic incidence is seem to affect the wrists only by (OD: 2.6667, 95% CI 0.6537 - 10.8786).

From Table 16, it is revealed that when working in awkward postures the more possibility of pain or WRMSD will occurs after work by (OD: 5.4012, 95% CI 0.9016 - 32.3578) times and due to addiction during working by (OD: 14.8601, 95% CI 0.6963 - 317.1387) times. Possibility of more pain in the morning is due to pace of work by (OD: 2.7143, 95% CI 0.5462 - 13.4885) times and traumatic incidence by (OD: 4.2222, 95% CI 0.9140 - 19.5056) times.

Table 15: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for the workers engaged in excavation work

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
Head	0.9841 (0.6996 ,	0.8846 (0.6198, 1.2626)	**1.1547 (0.7240, 1.8418)**	**3.5236 (0.2158, 57.5236)**			0.7037 (0.0750, 6.5984)	0.6046 (0.0589, 6.2074)
Neck	0.7354 (0.4805 ,	**1.1561 (0.7691, 1.7380)**	0.4732 (0.2529, 0.8854)**	0.4790 (0.0508, 4.5132)	**1.3214 (0.2302, 7.5848)**		0.4321 (0.0483, 3.8686)	**33.4129 (0.9830, 1135.7735)***
Shoulders	**1.1272 (0.6825 ,**	0.8968 (0.5466, 1.4716)	0.8493 (0.5377, 1.3414)	**3.9731 (0.5650, 27.9402)**				**8.5176 (1.2305, 58.9610)***
Chest	0.7380 (0.5138 ,	**1.0588 (0.7535, 1.4877)**	0.9228 (0.5967, 1.4270)	**5.9018 (0.5111, 68.1497)**	0.3077 (0.0349, 2.7123)			**2.8901 (0.2860, 29.2024)**
Elbow								
Arms/ Hands	**1.1161 (0.8077 , 1.5421)**	0.9204 (0.6688, 1.2667)	0.8344 (0.5797, 1.2011)	**1.3295 (0.2308, 7.6579)**	**1.2727 (0.2314, 6.9997)**		0.7778 (0.1710, 3.5381)	**5.0476 (0.9770, 26.0770)***
Wrists	**1.0677 (0.8387 ,**	0.8740 (0.6863, 1.1131)	**1.3500 (0.9205, 1.9798)**	0.9837 (0.1330, 7.2744)	**1.1071 (0.2415, 5.0765)**		**2.6667 (0.6537, 10.8786)**	**6.7338 (0.5796, 78.2350)**
Fingers/ Thumbs	0.7211 (0.4967 ,	**1.3241 (0.9180, 1.9098)**	0.9684 (0.6657, 1.4088)	**1.0542 (0.1493, 7.4440)**	**3.2000 (0.7111, 14.3997)**		**1.4571 (0.3170, 6.6975)**	**6.8084 (0.5873, 78.9350)**
Upper back								

Lower back	0.8201 (0.5727 ,	**1.3994 (0.9306, 2.1043)**	0.6124 (0.3454, 1.0857)	**3.5501 (0.3279, 38.4370)**			**1.7027 (0.1852, 15.6508)**	**13.2525 (1.2240, 143.4848)***
Thigh/ hip/ buttocks								
Legs	**1.1831 (0.9238 ,**	0.9337 (0.7395, 1.1789)	0.7427 (0.5138, 1.0737)	**1.1808 (0.1954, 7.1352)**	**1.9692 (0.4554, 8.5160)**		**1.5897 (0.3838, 6.5854)**	0.8236 (0.1471, 4.6112)
Knees								
Ankle/ feet/toe								

*** p value < 0.05, ** p value <0.01**

Table 16: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for the workers engaged in excavation work

Time zone	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
During working	**1.0001 (0.7257, 1.3784)**	0.9081 (0.6555, 1.2579)	0.8246 (0.5281, 1.2876)	0.1527 (0.0169, 1.3832)			**1.5833 (0.2690, 9.3201)**	**14.8601 (0.6963, 317.1387)**
After working	0.9513 (0.7552, 1.1983)	**1.0692 (0.8523, 1.3413)**	0.8432 (0.6059, 1.1735)	**5.4012 (0.9016, 32.3578)***	**1.4286 (0.3387, 6.0255)**		0.6667 (0.1650, 2.6937)	**1.3916 (0.2736, 7.0778)**
During Sleeping					**1.0000 (0.1026, 9.7500)**			
In the morning					**2.7143 (0.5462, 13.4885)**		**4.2222 (0.9140, 19.5056)**	

*** p value < 0.05, ** p value <0.01**

Labourers (Coolie) / unskilled workers:

The detailed result of the regression analysis for labourers (Coolie) / unskilled workers are shown in Table 17 and 18. From the result it is revealed that high possibilities of pain/WRMSD are found because of working in awkward postures in the lower back by (OD: 5.9068, 95% CI 1.4739 - 23.6717), shoulders (OD: 4.6377, 95% CI 1.0897 - 19.7382), knees (OD: 3.1076, 95% CI 0.4650 - 20.7684), neck (OD: 2.8068, 95% CI 0.5231 - 15.0611), arms/hands (OD: 2.0987, 95% CI 0.5810 - 7.5810) times. Due to addiction to tobacco/ smoking/ alcohol, the high possibility of pain /WRMSD are found in lower back by (OD: 13.6955, 95% CI 4.0518 - 46.2917), ankle/feet/toes (OD: 7.8285, 95% CI 0.8729 - 70.2118), wrists (OD: 2.0179, 95% CI 0.3323 - 12.2554) times. Possibility of Pain or WRMSD in the lower back is also due to the pace of work (OD: 2.0928, 95% CI 0.5871 - 7.4596) and traumatic incidences by (OD: 3.2164, 95% CI 0.8813 - 11.7389) times. Traumatic incidences also trigger more possibilities of pain in the knees by (OD: 2.2857, 95% CI 0.8256 - 6.3283) times.

From Table 18, it is proved that the probability of high pain or WRMSD occurred after working by (OD: 4.6070, 95% CI 0.8996 - 23.5937) times and in the morning by (OD: 3.8282, 95% CI 0.5138 - 28.5250) times is due working in awkward postures. Similarly, addiction triggers more pain or WRMSD during working by (OD: 4.4012, 95% CI 0.9592 - 20.1953) and after working by (OD: 2.5543, 95% CI 0.8022 - 8.1332) times. Also, high pain triggers by (OD: 10.0000, 95% CI 1.8060 - 55.3698) and (OD: 3.2411, 95% CI 1.2408 - 8.4661) times during sleeping and in the morning respectively when workers went through traumatic incidences on construction sites.

Form Workers / Centering:

The regression analysis results for form workers or centering workers are shown in Table 19 and 20. From the result it is found that different parameters impose different effect on different body parts. The high probability of pain or WRMSD due to working in awkward postures are found in shoulders by (OD: 23.2087, 95% CI 0.3528 - 1526.8089), neck (OD: 13.4742, 95% CI 0.3836 - 473.2938) and arms/hands (OD: 7.2436, 95% CI 0.0096 - 5438.9494) times. Due to addiction to tobacco/smoke/ alcohol , the probability of pain /WRMSD are found more in arms/hands by (OD: 31.1150, 95% CI 0.2259 - 28025.9021), shoulders by (OD: 14.8476, 95% CI 0.3136 - 702.9695), neck by (OD: 6.6198, 95% CI 0.2259 - 194.0151) and legs by (OD: 2.4050, 95% CI 0.0899 - 64.3581) whereas due to traumatic incidences it is found more in fingers/thumbs by (OD: 4.0000, 95% CI 0.7685 - 20.8187), legs by (OD: 3.6061, 95% CI 0.7649 - 17.0006) and shoulders by (OD: 3.0000, 95% CI 0.3206 - 28.0694) times. Doing pervasive jobs are also shows more probability pain in wrists

by (OD: 4.2000, 95% CI 0.9429 - 18.7084), shoulders by (OD: 3.5000, 95% CI 0.3769 - 32.5025) and lower back by (OD: 2.2727, 95% CI 0.2340 - 22.0743).

Probability of high pain after working is found because of doing pervasive tasks by (OD: 2.4000, 95% CI 0.5736 - 10.0425), traumatic incidence by (OD: 1.8000, 95% CI 0.4177 - 7.7575) and addiction to tobacco/smoking/alcohol by (OD: 2.8130, 95% CI 0.1198 - 66.0675) times. Probability of high pain during sleeping is found due to pervasive jobs by (OD: 2.7778, 95% CI 0.3392 - 22.7484) times. Also probability found more when pain occurs in the morning due to traumatic incidences by (OD: 2.4444, 95% CI 0.5167 - 11.5651) times.

Table 17: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for unskilled workers "Coolie"

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
Head	0.9109 (0.6927, 1.1978)	**1.2196 (0.9272, 1.6043)**	0.5699 (0.3974, 0.8172)**	**1.0196 (0.1711, 6.0748)**	**1.5192 (0.4030, 5.7267)**		**1.8000 (0.5518, 5.8714)**	0.9257 (0.1844, 4.6477)
Neck	**1.0525 (0.9065, 1.2220)**	0.9192 (0.7932, 1.0651)	0.5717 (0.4271, 0.7653)**	**2.8068 (0.5231, 15.0611)**	**1.3397 (0.4866, 3.6887)**		0.5385 (0.1820, 1.5932)	**1.3707 (0.3971, 4.7310)**
Shoulders	0.8642 (0.7459, 1.0014)*	**1.0269 (0.8946, 1.1786)**	**1.2404 (0.9610, 1.6010)**	**4.6377 (1.0897, 19.7382)***	**1.8374 (0.6414, 5.2635)**		0.5266 (0.2095, 1.3240)	**1.5271 (0.4297, 5.4268)**
Chest	0.8863 (0.7339, 1.0704)	**1.0821 (0.8924, 1.3122)**	**1.1802 (0.9004, 1.5468)**	0.8283 (0.1871, 3.6677)	0.8843 (0.2951, 2.6500)		**1.6761 (0.5621, 4.9978)**	0.9455 (0.2740, 3.2629)
Elbow							0.8125 (0.0866	
Arms/ Hands	**1.0005 (0.8823, 1.1345)**	0.9639 (0.8510, 1.0917)	0.9974 (0.8167, 1.2180)	**2.0987 (0.5810, 7.5810)**	**1.2521 (0.5426, 2.8895)**		0.8663 (0.3519, 2.1325)	**1.6753 (0.6019, 4.6629)**
Wrists	0.8170 (0.6010, 1.1105)	**1.2596 (0.9182, 1.7279)**	0.6229 (0.4364, 0.8893)**	0.1877 (0.0383, 0.9207)*	**1.0078 (0.2360, 4.3030)**		0.2689 (0.0330, 2.1935)	**2.0179 (0.3323, 12.2554)**
Fingers/ Thumbs	0.7392 (0.5672, 0.9634)*	**1.3428 (1.0268, 1.7560)***	0.7135 (0.5425, 0.9385)*	**1.0243 (0.2322, 4.5193)**	0.3681 (0.1053, 1.2867)		**1.6761 (0.5621, 4.9978)**	0.5026 (0.1418, 1.7808)
Upper back	0.5994 (0.3249, 1.1061)	**1.7851 (0.9397, 3.3913)***	0.4875 (0.2516, 0.9444)*	0.0946 (0.0056, 1.6058)	0.1718 (0.0082, 3.5791)		0.8125 (0.0866, 7.6211)	0.0372 (0.0012, 1.1947)*
Lower back	**1.2016 (0.9637, 1.4981)**	0.8496 (0.6777, 1.0651)	**1.1068 (0.8337, 1.4694)**	**5.9068 (1.4739, 23.6717)***	**2.0928 (0.5871, 7.4596)**		**3.2164 (0.8813, 11.7389)***	**13.6955 (4.0518, 46.2917)****
Thigh/ hip/ buttocks	0.7976 (0.5421, 1.1737)	**1.2091 (0.8102, 1.8044)**	0.7551 (0.4911, 1.1612)	0.3252 (0.0476, 2.2199)	**1.4798 (0.2599, 8.4257)**		**1.3391 (0.2435, 7.3647)**	0.5940 (0.0939, 3.7579)
Legs	**1.0611 (0.8720, 1.2912)**	**1.0708 (0.8847, 1.2960)**	0.3910 (0.2624, 0.5826)**	**1.9589 (0.3660, 10.4841)**	**1.4667 (0.4658, 4.6186)**		0.8101 (0.2873, 2.2841)	0.9598 (0.2465, 3.7374)
Knees	**1.0374 (0.8271, 1.3011)**	**1.1778 (0.9474, 1.4643)**	0.6627 (0.4784, 0.9180)**	**3.1076 (0.4650, 20.7684)**	**1.1511 (0.3217, 4.1197)**		**2.2857 (0.8256, 6.3283)**	**1.1055 (0.2137, 5.7185)**
Ankle/ feet/toe	**1.0435 (0.8677, 1.2550)**	**1.0523 (0.8828, 1.2544)**	0.7016 (0.5148, 0.9562)*	0.6135 (0.1185, 3.1768)	0.6776 (0.2017, 2.2757)		**1.6761 (0.5621, 4.9978)**	**7.8285 (0.8729, 70.2118)***

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 18: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for unskilled workers "Coolie"

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
During working	0.7531 (0.5919, 0.9580)*	**1.1421 (0.8995, 1.4501)**	0.9363 (0.6963, 1.2589)	0.8637 (0.1432, 5.2087)	**1.1640 (0.3648, 3.7144)**		**1.1167 (0.3612, 3.4521)**	**4.4012 (0.9592, 20.1953)***

After working	**1.0106 (0.8829, 1.1567)**	0.9214 (0.8065, 1.0526)	0.9442 (0.7637, 1.1672)	**4.6070 (0.8996, 23.5937)***	0.6874 (0.2843, 1.6621)		0.3657 (0.1325, 1.0093)*	**2.5543 (0.8022, 8.1332)**
During Sleeping							**10.0000 (1.8060, 55.3698)**	
In the morning	**1.1660 (0.9937, 1.3683)**	**1.0028 (0.8701, 1.1558)**	0.9985 (0.7768, 1.2835)	**3.8282 (0.5138, 28.5250)**	**1.5861 (0.5152, 4.8825)**		**3.2411 (1.2408, 8.4661)***	**1.5435 (0.2910, 8.1875)**

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 19: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for form workers

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
Head	-	-	-	-	-	-	-	-
Neck	0.8807 (0.6965, 1.1137)	**1.0219 (0.8301, 1.2581)**	**1.5885 (0.9935, 2.5399)***	**13.4742 (0.3836, 473.2938)**	**3.6240 (0.5775, 22.7413)**	**1.8333 (0.3958, 8.4918)**	0.8333 (0.1892, 3.6704)	**6.6198 (0.2259, 194.0151)**
Shoulders	0.8749 (0.6415, 1.1933)	**1.0367 (0.7923, 1.3565)**	**1.4271 (0.7644, 2.6645)**	**23.2087 (0.3528, 1526.8089)**	-	**3.5000 (0.3769, 32.5025)**	**3.0000 (0.3206, 28.0694)**	**14.8476 (0.3136, 702.9695)**
Chest	-	-	-	-	-	-	-	-
Elbow	-	-	-	-	-	-	-	-
Arms/ Hands	0.8928 (0.6306, 1.2639)	0.8976 (0.6788, 1.1869)	0.9566 (0.5306, 1.7245)	**7.2436 (0.0096, 5438.9494)**	-	-	0.9333 (0.1919, 4.5386)	**31.1150 (0.0345, 28025.9021)**
Wrists	-	-	-	-	-	**4.2000 (0.9429, 18.7084)**	0.9048 (0.1886, 4.3397)	-
Fingers/ Thumbs	-	-	-	-	-	0.7778 (0.1311, 4.6151)	**4.0000 (0.7685, 20.8187)**	-
Upper	-	-	-	-	-	-	-	-
Lower back	-	-	-	-	-	**2.2727 (0.2340, 22.0743)**	-	-
Thigh/ hip/ buttocks	-	-	-	-	-	-	-	-
Legs	0.9701 (0.7925, 1.1875)	**1.0553 (0.8657, 1.2866)**	0.8385 (0.5658, 1.2424)	**1.6610 (0.0562, 49.0484)**	-	**1.5000 (0.3666, 6.1366)**	**3.6061 (0.7649, 17.0006)**	**2.4050 (0.0899, 64.3581)**
Knees	-	-	-	-	-	-	-	-
Ankle/ feet/toe	-	-	-	-	-	-	-	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 20: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for form workers

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
During working	-	-	-	-	-	0.5750 (0.0569, 5.8140)	-	-
After working	0.9044 (0.7316, 1.1180)	**1.0523 (0.8573, 1.2916)**	0.8559 (0.5693, 1.2866)	**1.3301 (0.0517, 34.2269)**	-	**2.4000 (0.5736, 10.0425)**	**1.8000 (0.4177, 7.7575)**	**2.8130 (0.1198, 66.0675)**
During Sleeping	-	-	-	-	-	**2.7778 (0.3392, 22.7484)**	0.9259 (0.0850, 10.0847)	-

In the morning	-	-	-	-	-	0.5278 (0.0926, 3.0089)	**2.4444 (0.5167, 11.5651)**	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Rebar workers:

The results are shown in Table 21 and Table 22 for the regression analysis of rebar workers. From the result, the parameters associated with pain in different body parts are working in awkward postures, addiction to tobacco/smoking/alcohol, the pace of work and carrying out pervasive jobs. Working in awkward posture imposed more probability of pain or WRMSD in fingers/thumbs by (OD: 1510.8159, 95% CI 1.3334 - 1.7118E+06), knees by (OD: 380.1901, 95% CI 11.3566 - 12727.7911), lower back by (OD: 326.2001, 95% CI 8.6888 - 12246.3735), arms/hands by (OD: 19.0386, 95% CI 2.0553 - 176.3572), elbows by (OD: 10.7914, 95% CI 1.1985 - 97.1673), legs by (OD: 9.8278, 95% CI 1.7132 - 56.3759) and chest by (OD: 7.0838, 95% CI 0.4244 - 87.2094) times. The probability is found more in lower back by (OD: 36.5714, 95% CI 3.9170 - 341.4494), knees by (OD: 10.2143, 95% CI 2.4779 - 42.1048), legs by (OD: 6.3250, 95% CI 1.6167 - 24.7445), chest by (OD: 2.4375, 95% CI 0.4569- 13.0035), arms/hands by (OD: 2.0357, 95% CI 0.5877 - 7.0518) and elbows by (OD: 2.0263, 95% CI 0.5325 - 7.7113) times due to addiction to tobacco/smoking/alcohol. A very high possibility is found in the lower back by (OD: 304.0000, 95% CI 17.1550 - 5387.1229) and in knees by (OD: 23.2000, 95% CI 2.5718 - 209.2871) times due to pervasive jobs and in arms/hands by (OD: 8.5556, 95% CI 0.9614 - 76.1342), chest by (OD: 4.7143, 95% CI 0.9441 - 23.5394), wrist by (OD: 2.0769, 95% CI 0.4472 - 9.6468) and fingers/thumbs by (OD: 2.0667, 95% CI 0.4122 - 10.3630) due to pace of work. The probability of pain after working is found due to working in awkward postures by (OD: 4.0942, 95% CI 0.6223 - 26.9377), addiction to tobacco/smoking/alcohol by (OD: 2.9474, 95% CI 0.6974 - 12.4554) and pace of work by (OD: 2.0769, 95% CI 0.4472 - 9.6468) times whereas more pain occurred during sleeping due to traumatic incidences by (OD: 5.5714, 95% CI 0.3108 - 99.8690) times and addiction by (OD: 3.7692, 95% CI 0.4203 - 33.8040) times.

Masons:

The result of odds for masons shows the relation of body parts and different set parameters. The details of results are shown in Table 23 and Table 24 in which it is found that a high probability of pain and WRMSD are found in the lower back, shoulders and wrists due to working in awkward postures. There are (OD: 39.0000, 95% CI 5.8559 - 259.7358), (OD: 21.0000, 95% CI 3.5218 - 125.2183) and (OD: 2.6000, 95% CI 0.4825 - 14.0101) time chance of pain or WRMSD in the lower back, shoulders and wrists respectively. Due to addition possibility of pain or WRMSD in lower back (OD: 26.8571, 95% CI 4.7088 - 153.1826), shoulders (OD: 10.0571, 95% CI 2.5485 - 39.6891), elbows (OD: 8.1290, 95% CI 0.9853 - 67.0607) and arms/hands (OD: 2.1081, 95% CI 0.4152 - 10.7043) are times more. The probability of pain is more in ankle/feet/toes by (OD: 61.0000, 95% CI 2.0276 - 1835.1723) and elbows by (OD: 2.4444, 95% CI 0.1449 - 41.2376) times due to traumatic incidences on construction sites. Pervasive job affects the arms/hands by (OD: 4.5556, 95% CI 1.2767 - 16.2548), lower back by (OD: 3.4615, 95% CI 0.4032 - 29.7191), shoulders by (OD: 2.0811, 95% CI 0.4088 - 10.5931), whereas pace of work affects shoulders by (OD: 8.4000, 95% CI 1.0135 - 69.6215), lower back by(OD: 5.7273, 95% CI 0.6757 - 48.5425) and head by (OD: 2.000o, 95% CI 0.2621 - 15.2607) consecutively. Pain arises after working when working with some bad habits by (OD: 5.6719, 95% CI 1.5601 - 20.6206) and working in awkward postures by (OD: 5.0000, 95% CI 0.9233 - 27.0778) and times. The more pain experienced by the masons when carried out pervasive jobs by (OD: 3.8889, 95% CI 1.1190 - 13.5156), faced traumatic incidences by (OD: 3.4286, 95% CI 0.2013 - 58.3911), work with pace by (OD: 2.8571, 95% CI 0.8703 - 9.3799) and addicted to tobacco/smoking/alcohol by (OD: 2.3472, 95% CI 0.4654 - 11.8389) times.

Table 21: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Rebarers'

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
Head	-	-	-	-	-	-	-	-
Neck	**1.0335 (0.7793, 1.3705)**	0.6400 (0.4080, 1.0039)*	**1.2083 (0.6362, 2.2946)**	**1.1850 (0.0605, 23.2103)**	**1.3333 (0.2253, 7.8905)**	-	-	**1.0769 (0.2366, 4.9025)**
Shoulders	-	-	-	-	-	-	-	-

Chest	0.9384 (0.7251, 1.2145)	0.9217 (0.6957, 1.2211)	0.7339 (0.4873, 1.1054)	**6.0838 (0.4244, 87.2094)**	**4.7143 (0.9441, 23.5394)**	-	-	**2.4375 (0.4569, 13.0035)**
Elbow	0.9140 (0.7633, 1.0944)	**1.0691 (0.8823, 1.2954)**	**1.2456 (0.8703, 1.7827)**	**10.7914 (1.1985, 97.1673)****	**1.0000 (0.2085, 4.7969)**	-	**1.7059 (0.1001, 29.0730)**	**2.0263 (0.5325, 7.7113)**
Arms/ Hands	0.9249 (0.7628, 1.1215)	0.9075 (0.7391, 1.1144)	0.9021 (0.6100, 1.3340)	**19.0386 (2.0553, 176.3572)****	**8.5556 (0.9614, 76.1342)**	-	-	**2.0357 (0.5877, 7.0518)**
Wrists	-	-	-	-	**2.0769 (0.4472, 9.6468)**	-	-	**1.1429 (0.3156, 4.1379)**
Fingers/ Thumbs	0.6725 (0.3881, 1.1652)	0.5736 (0.3079, 1.0687)*	**3.3319 (1.0428, 10.6458)**	**1510.8159 (1.3334, 1.71185E+06)**	**2.0667 (0.4122, 10.3630)**	-	-	**1.5000 (0.3418, 6.5830)**
Upper back	-	-	-	-	-	-	-	-
Lower back	0.8766 (0.5802, 1.3244)	**1.0343 (0.6919, 1.5462)**	**1.4672 (0.8362, 2.5741)**	**326.2001 (8.6888, 12246.3735)****	-	**304.0000 (17.1550, 5387.1229)***	-	**36.5714 (3.9170, 341.4494)****
Thigh/ hip/ buttocks	-	-	-	-	-	-	-	-
Legs	**1.0818 (0.8877, 1.3184)**	0.9929 (0.8028, 1.2280)	**1.0796 (0.7760, 1.5019)**	**9.8278 (1.7132, 56.3759)****	**1.3636 (0.2863, 6.4960)**	-	-	**6.3250 (1.6167, 24.7445)**
Knees	**1.1056 (0.7959, 1.5360)**	**1.2948 (0.8689,1.9 294)**	**1.1683 (0.6301, 2.1660)**	**380.1901 (11.3566, 12727.7911)****	0.5385 (0.1165, 2.4883)	**23.2000 (2.5718, 209.2871)****	-	**10.2143 (2.4779, 42.1048)****
Ankle/ feet/toe	-	-	-	-	-	-	-	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 22: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Rebarers'

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident	Addiction to tobacco/ smoking/
During working	-	-	-	-	-	-	-	**1.4000 (0.1335, 14.6856)**
After working	0.9328 (0.7644, 1.1383)	0.9672 (0.7813, 1.1974)	0.8225 (0.5894, 1.1478)	**4.0942 (0.6223, 26.9377)**	**2.0769 (0.4472, 9.6468)**	-	**1.8750 (0.1098, 32.0100)**	**2.9474 (0.6974, 12.4554)**
During Sleeping	-	-	-	-	**1.8889 (0.3059, 11.6637)**	-	**5.5714 (0.3108, 99.8690)**	**3.7692 (0.4203, 33.8040)**
In the morning	-	-	-	-	**1.2857 (0.1243, 13.2952)**	-	-	**1.9310 (0.1971, 18.9216)**

*** P VALUE < 0.05, ** P ALUE <0.01**

Electricians:

Electricians had complaint pain only in neck, shoulders, wrists, finger/thumbs and lower back. The odds of pain or WRMSD amongst the electricians are found more in shoulders (OD: 2.41026E+07, 95% CI 0.7139 - 8.13741E+14), fingers/thumbs (OD: 464.9783, 95% CI 1.1216 - 192766.5990), wrists (OD: 120.1344, 95% CI 1.3979 - 10324.2331), lower back (OD: 30.4432, 95% CI 0.8805 - 1052.5271) and neck (OD: 5.7009, 95% CI 0.2289 - 142.0106) due to working in awkward postures while in shoulders (OD: 7.1429, 95% CI 0.6783 - 75.2188), neck (OD: 4.8000, 95% CI 0.6546 - 35.1976), fingers/thumbs (OD: 3.6667, 95% CI 0.5127 - 26.2235), lower back (OD: 2.8571, 95% CI 0.4053 - 20.1413) and wrist (OD: 2.2500, 95% CI 0.3213 - 15.7562) due to pace of work. High probability of pain in shoulders and wrist (OD: 20.0000, 95% CI 1.8503 - 216.1776) (OD: 3.3333, 95% CI 0.2918 - 38.0815), are found more due to pervasive jobs and traumatic incidences respectively. Pain in neck (OD: 7.3333, 95% CI 1.1142 - 48.2642), (OD: 6.5000, 95% CI 0.5546 - 76.1753) is also occurred due to pervasive jobs and traumatic incidences respectively. In electrician, the high possibility of pain or WRMSD is also found in lower back (OD: 6.2857, 95% CI 0.5774 - 68.4231), wrist (OD: 5.0000, 95% CI 0.4626 - 54.0444), neck (OD: 3.0000, 95% CI 0.3901 - 23.0717) and fingers/thumbs (OD: 2.3571, 95% CI

0.3112 - 17.8518) times. Pain after working can arise if work in awkward postures (OD: 370.3067, 95% CI 0.6135 - 223519.1092) and with some pace (OD: 16.0000, 95% CI 1.2157 - 210.5828). Addicted workers (OD: 4.2500, 95% CI 0.2163 - 83.5168) will experience pain during sleeping and pain in the morning can experience by the workers working in awkward postures (OD: 30.0723, 95% CI 0.0569 - 15890.1758) and perform pervasive jobs (OD: 4.5833, 95% CI 0.7333 - 28.6459). Table 25 and Table 26 shows detail result of regression analysis of electricians' pain.

Plumbers:

The results of the regression analysis of plumbers are shown in Table 27 and 28. From the survey, the plumbers have no pain in the head, neck, chest, elbows, upper back, thigh/hip/buttocks, knees and ankle/feet/toes. Similarly, No traumatic incidences occur amongst the plumbers and nobody found addicted to tobacco/smoking/alcohol for the selected sample size. From the result, probability of high pain or WRMSD due to working in awkward postures are found in the lower back (OD: 57.6403, 95% CI 2.9175 - 1138.7740), wrists (OD: 7.8265, 95% CI 1.1050 - 55.4329) and arms/hands (OD: 6.4500, 95% CI 0.8324 - 49.9771). Also probability of high pain or WRMSD is found in arms / hands (OD: 3.8095, 95% CI 0.7068 - 20.5331) and shoulders (OD: 3.1429, 95% CI 0.1730 - 57.0824). Pervasive jobs also influences more in lower back (OD: 33.2500, 95% CI 3.1507 - 350.8934), wrists (OD: 9.1000, 95% CI 0.9576 - 86.4794) and arms/hands (OD: 6.4167, 95% CI 0.6768 - 60.8397). The result shows that more pain occurs after working when plumbers work in awkward postures (OD: 47.7873, 95% CI 1.9461 - 1173.4504) and carried out pervasive jobs (OD: 7.6364, 95% CI 0.8054 - 72.4043). Also, when works with pace or repetitive motions, the probability of more pain occurs during sleeping (OD: 3.1429, 95% CI 0.1730 - 57.0824) and in the morning (OD: 10.5000, 95% CI 1.4124 - 78.0588). (Table 28)

Table 23: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Masons'

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/
Head	0.7002 (0.3223, 1.5209)	**1.0167 (0.5599, 1.8461)**	0.6490 (0.3517, 1.1976)	-	**2.0000 (0.2621, 15.2607)**	**1.0000 (0.0966, 10.3541)**	-	0.2766 (0.0355, 2.1571)
Neck	0.8361 (0.6177, 1.1318)	**1.1801 (0.8759, 1.5900)**	0.5419 (0.3372, 0.8710)**	**1.9091 (0.2136, 17.0641)**	**1.8750 (0.5423, 6.4826)**	0.8769 (0.2087, 3.6853)	-	0.6187 (0.1598, 2.3956)
Shoulders	**1.0382 (0.8382, 1.2860)**	0.9461 (0.7645, 1.1707)	0.6979 (0.4391, 1.1094)	**21.0000 (3.5218, 125.2183)***	**8.4000 (1.0135, 69.6215)***	**2.0811 (0.4088, 10.5931)**	0.2400 (0.0140, 4.1181)	**10.0571 (2.5485, 39.6891)**
Chest	0.8499 (0.4448, 1.6241)	**1.1656 (0.6113, 2.2226)**	**1.0102 (0.4168, 2.4483)**	-	-	-	-	-
Elbow	**1.0056 (0.8510, 1.1882)**	0.9399 (0.7935, 1.1134)	**1.0384 (0.7431, 1.4510)**	-	0.8365 (0.2665, 2.6256)	0.7333 (0.2027, 2.6526)	**2.4444 (0.1449, 41.2376)**	**8.1290 (0.9853, 67.0670)***
Arms/ Hands	**1.1735 (0.9771, 1.4094)**	0.8550 (0.7147, 1.0229)	0.8181 (0.5573, 1.2012)	-	**1.5938 (0.4734, 5.3654)**	**4.5556 (1.2767, 16.2548)***	-	**2.1081 (0.4152, 10.7043)**
Wrists	0.8284 (0.6678, 1.0276)	0.9136 (0.7247, 1.1518)	**1.0506 (0.6031, 1.8303)**	**2.6000 (0.4825, 14.0101)**	0.6286 (0.2180, 1.8123)	0.3333 (0.0941, 1.1812)	**1.2963 (0.0775, 21.6805)**	**1.7692 (0.5269, 5.9407)**
Fingers/ Thumbs	0.9961 (0.8304, 1.1948)	0.9710 (0.8095, 1.1647)	0.6572 (0.4450, 0.9707)**	-	**1.6104 (0.5318, 4.8768)**	**1.1039 (0.3237, 3.7644)**	-	**1.9394 (0.4787, 7.8565)**
Upper back	**1.1532 (0.9441, 1.4087)**	0.6838 (0.5251, 0.8906)*	**1.3616 (0.8269, 2.2422)**	**1.7111 (0.1903, 15.3895)**	**1.4706 (0.4066, 5.3189)**	**1.6667 (0.4267, 6.5106)**	-	0.9000 (0.2096, 3.8646)
Lower back	**1.0783 (0.8151, 1.4266)**	0.8773 (0.6657, 1.1561)	0.8905 (0.5401, 1.4680)	**39.0000 (5.8559, 259.7358)***	**5.7273 (0.6757, 48.5425)**	**3.4615 (0.4032, 29.7191)**	-	**26.8571 (4.7088, 153.1826)****
Thigh/ hip/ buttocks	-	-	-	-	-	-	-	-
Legs	0.5573 (0.3187, 0.9745)*	**1.5313 (0.9058, 2.5888)**	0.6365 (0.3584, 1.1304)	-	0.6000 (0.1106, 3.2552)	**1.0000 (0.1807, 5.5333)**	-	0.9070 (0.1630, 5.0465)
Knees	-	-	-	-	-	-	-	-

Ankle/ feet/toe	**1.0213 (0.6893, 1.5133)**	0.9206 (0.6061, 1.3985)	**1.4550 (0.6199, 3.4150)**	-	**1.9524 (0.1162, 32.7956)**	-	**61.0000 (2.0276, 1835.1723)**	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Tilers:

From the study, it is found that Tilers have no pain head, neck, shoulders, chest, elbows, fingers/thumbs, upper back and there is no association of pain in body parts with a pervasive job and no traumatic incidences reported by the Tilers. Amongst Tilers working in awkward postures influences pain in lower back (OD: 8235.8361, 95% CI 0.6713 - 1.01048E+08), thigh/hip/buttock (OD: 32.0287, 95% CI 2.4774 - 414.0794), legs (OD: 12.1368, 95% CI 1.0842 - 135.8590), knees (OD: 8235.8361, 95% CI 0.6713 - 1.01048E+08) and arms/hands (OD: 7.1519, 95% CI 0.6125 - 83.5044). Pace of work (OD: 6.2500, 95% CI 1.0538 - 37.0700) and addiction (OD: 3.7500, 95% CI 0.7544 - 18.6415) also influences more pain in thigh/hip/buttocks and legs respectively. More pain may occur in ankle/feet/toes due to addiction (OD: 3.3333, 95% CI 0.5047 - 22.0171). The result revealed that more pain persist after working when Tilers work in awkward postures (OD: 6.2500, 95% CI 1.0538 - 37.0700) and in the morning when Tilers work with pace (OD: 6.2500, 95% CI 1.0538 - 37.0700) and addicted to tobacco/smoking/alcohol (OD: 6.2500, 95% CI 1.0538 - 37.0700).

Table 24: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Masons'

Time zones	**Age**	**Experience**	**BMI**	**Awkward posture**	**Pace of work/ repetitive motion**	**Pervasive jobs**	**Traumatic Incident on site`**	**Addiction to tobacco/ smoking/ Alcohol**
During working	**1.1084 (0.8889, 1.3820)**	0.8131 (0.6321, 1.0459)	0.8877 (0.5471, 1.4403)	-	0.9500 (0.1599, 5.6426)	0.5733 (0.0619, 5.3107)	-	**1.5909 (0.1711, 14.7903)**
After working	0.9499 (0.8102, 1.1137)	**1.0522 (0.8989, 1.2316)**	**1.0413 (0.7617, 1.4235)**	**5.0000 (0.9233, 27.0778)***	**1.4457 (0.5008, 4.1730)**	**1.8615 (0.5607, 6.1802)**	0.7222 (0.0432, 12.0844)	**5.6719 (1.5601, 20.6206)****
During Sleeping	0.9655 (0.6905, 1.3500)	**1.0115 (0.7271, 1.4070)**	0.7124 (0.4155, 1.2217)	-	0.4524 (0.0474, 4.3144)	0.7333 (0.0759, 7.0862)	-	-
In the morning	**1.1160 (0.8861, 1.4054)**	**1.1028 (0.8939, 1.3605)**	0.8140 (0.4719, 1.4040)	-	**2.8571 (0.8703, 9.3799)**	**3.8889 (1.1190, 13.5156)***	**3.4286 (0.2013, 58.3911)**	**2.3472 (0.4654, 11.8389)**

*** P VALUE < 0.05, ** P ALUE <0.01**

Carpenters:

Like plumbers and Tilers, carpenters have not registered any pain in the head, neck, shoulders, chest, elbows, fingers/thumbs, upper back, thigh/hip/buttocks, legs, knees and ankle/feet/toes and no traumatic incidences reported by the carpenters. Working in awkward posture (OD: 31.5000, 95% CI 3.0166 - 328.9278, pace of work (OD: 23.4000, 95% CI 2.3247 - 235.5357) and pervasive jobs (OD: 153.0000, 95% CI 8.5273 - 2745.1793) influence pain in lower back and arms/hands while in wrist it is due to awkward postures (OD: 3.6667, 95% CI 0.5901 - 22.7835), pace of work (OD: 4.5000, 95% CI 0.7194 - 28.1474) and addiction to tobacco/smoking/alcohol (OD: 3.000, 95% CI 0.3436 - 26.1915). The result shows that more pain occurs after working when carpenters work in awkward postures (OD: 6.2857, 95% CI 1.0222 - 38.6509) and work at pace (OD: 8.0000, 95% CI 1.2790 - 50.0399). Similarly, during sleeping when works with pace (OD: 2.1667, 95% CI 0.1734 - 27.0752) and when intoxicated (OD: 3.6667, 95% CI 0.2498 - 53.8275) while working. When BMI (OD: 2.8114, 95% CI 0.3940 - 20.0621) found more and addiction (OD: 23.0000, 95% CI 1.3962 - 378.8984) more pain occurs in the morning. Details are shown in Table 31 and Table 32.

Painters:

The regression analysis results of the painters are shown in Table 33 and Table 34. From the survey, it is brought to the notice that painters have no pain in the head, chest, elbows, thigh/hip/buttocks, legs, knees and ankle/feet/toes. The painters registered their pain in the neck, lower back, arms/hands, wrist, fingers/thumbs, and shoulders. The regression analysis result shows that the probability of pain or WRMSD amongst painters is found in the neck (OD: 20.3636, 95% CI 2.3271 - 178.1929), lower back (OD: 11.2500, 95% CI 2.1001 - 60.2659), arms/hands (OD: 8.2963, 95% CI 1.8687 - 36.8324), wrist (OD: 8.2963, 95% CI 1.8687 - 36.8324), fingers/ thumbs (OD: 8.2963, 95% CI 1.8687 - 36.8324) and shoulders (OD: 7.0000, 95% CI 1.5909 - 30.7997)

due to working in awkward postures. The probability of pain or WRMSD are found in arms/hands (OD: 89.2500, 95% CI 11.3566 - 701.4011), wrist (OD: 89.2500, 95% CI 11.3566 - 701.4011), fingers/thumbs (OD: 89.2500, 95% CI 11.3566 - 701.4011), shoulders (OD: 56.0000, 95% CI 8.3446 - 375.8137), and lower back (OD: 3.8958, 95% CI 1.0594 - 14.3259) due to work with pace. Pervasive jobs influence pain in lower back (OD: 20.3636, 95% CI 2.3271 - 178.1959) and neck (OD: 6.0357, 95% CI 1.1372 - 32.0359) while traumatic incidences on lower back (OD: 5.1429, 95% CI 0.4870 - 54.3154), shoulders (OD: 4.6000, 95% CI 0.4366 - 48.4654) and arms/hand (OD: 4.1250, 95% CI 0.3922 - 43.3832), wrists (OD: 4.1250, 95% CI 0.3922 - 43.3832) and fingers/thumbs (OD: 4.1250, 95% CI 0.3922 - 43.3832). Those painters who are addicted to tobacco/smoke/alcohol will experience more pain in shoulders (OD: 15.0000, 95% CI 3.1964 - 70.3927), arms/hands (OD: 10.6250, 95% CI 2.5094 - 44.9862), wrists (OD: 10.6250, 95% CI 2.5094 - 44.9862), fingers/thumbs (OD: 10.6250, 95% CI 2.5094 - 44.9862) and lower back (OD: 2.7500, 95% CI 0.7672 - 9.8572).

From Table 34, it is found that those painters who work in awkward postures (OD: 64.0000, 95% CI 6.7767 - 604.4276), perform pervasive jobs (OD: 40.0000, 95% CI 4.4154 - 362.3700), addicted to tobacco/smoking/ alcohol (OD: 18.0625, 95% CI 3.8709 - 84.2833) experienced pain after working and those work with pace (OD: 4.1250, 95% CI 0.3922 - 43.3833) experienced pain during working. Those painters gone through traumatic incidences experience pain during working (OD: 3.8889, 95% CI 0.3031 - 49.9001) and also after working (OD: 3.3333, 95% CI 0.3176 - 34.9885). There is no pain during the sleeping experience by the painters.

Table 25: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Electricians'

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
Head	-	-	-	-	-	-	-	-
Neck	**1.1609 (0.8307, 1.6225)**	0.9412 (0.6831, 1.2968)	0.5139 (0.1997,1. 3229)	**5.7009 (0.2289, 142.0106)**	**4.8000 (0.6546, 35.1976)**	**7.3333 (1.1142, 48.2642)***	**6.5000 (0.5546, 76.1753)**	**3.0000 (0.3901, 23.0717)**
Shoulders	0.6029 (0.2518, 1.4436)	**1.0322 (0.6489, 1.6419)**	0.3291 (0.0462, 2.3444)	**2.41026E+07 (0.7139, 8.13741E+14)***	**7.1429 (0.6783, 75.2188)**	**20.0000 (1.8503, 216.1776)***	**3.3333 (0.2918, 38.0815)**	
Chest	-	-	-	-	-	-	-	-
Elbow	-	-	-	-	-	-	-	-
Arms/ Hands	-	-	-	-	-	-	-	-
Wrists	0.8859 (0.5665, 1.3852)	**1.1554 (0.7407, 1.8021)**	0.9434 (0.3527, 2.5238)	**120.1344 (1.3979, 10324.2331)****	**2.2500 (0.3213, 15.7562)**	**20.0000 (1.8503, 216.1776)***	**3.3333 (0.2918, 38.0815)**	**5.0000 (0.4626, 54.0444)**
Fingers/ Thumbs	0.9445 (0.6604,1. 3509)	0.9402 (0.6761, 1.3074)	0.2842 (0.0752, 1.0747)*	**464.9783 (1.1216, 192766.5990)***	**3.6667 (0.5127, 26.2235)**	**1.0667 (0.1972, 5.7688)**	-	**2.3571 (0.3112, 17.8518)**
Upper back	-	-	-	-	-	-	-	-
Lower back	**1.3688 (0.7614, 2.4609)**	0.7475 (0.4039, 1.3832)	**1.5531 (0.4871, 4.9519)**	**30.4432 (0.8805, 1052.5271)****	**2.8571 (0.4053, 20.1413)**		**1.1111 (0.1285, 9.6053)**	**6.2857 (0.5774, 68.4231)**
Thigh/ hip/ buttocks	-	-	-	-	-	-	-	-
Legs	-	-	-	-	-	-	-	-
Knees	-	-	-	-	-	-	-	-
Ankle/ feet/toe	-	-	-	-	-	-	-	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 26: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Electricians'

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
During working	-	-	-	-	-	-	-	-
After working	0.7404 (0.4264, 1.2855)	**1.0106 (0.6428,1.5889)**	**1.5455 (0.5237, 4.5609)**	**370.3067 (0.6135, 223519.1092)***	**16.0000 (1.2157, 210.5828)**	**1.7143 (0.1957, 15.0192)**	**1.7778 (0.1351, 23.3985)**	**1.2500 (0.1008, 15.4988)**
During Sleeping	-	-	-	-	-	**1.6250 (0.0887, 29.7811)**	-	**4.2500 (0.2163, 83.5168)**
In the morning	0.8163 (0.4622, 1.4416)	**1.5556 (0.8733, 2.7712)***	0.2368 (0.0270, 2.0742)*	**30.0723 (0.0569, 15890.1758)**	0.9167 (0.1282, 6.5559)	**4.5833 (0.7333, 28.6459)**	0.5714 (0.0494, 6.6062)	**1.3333 (0.1734, 10.2541)**

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 27: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Plumbers'

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
Head	-	-	-	-	-	-	-	-
Neck	-	-	-	-	-	-	-	-
Shoulders	**1.4269 (0.9117, 2.2333)**	0.7019 (0.4397, 1.1205)	0.5021 (0.1743, 1.4460)	0.3721 (0.0058, 23.9809)	**3.1429 (0.1730, 57.0824)**			
Chest	-	-	-	-	-	-	-	-
Elbow	-	-	-	-	-	-	-	-
Arms/ Hands	**1.0215 (0.8077, 1.2919)**	**1.0863 (0.8537, 1.3824)**	0.9077 (0.5009, 1.6448)	**6.4500 (0.8324, 49.9771)***	**3.8095 (0.7068, 20.5331)**	**6.4167 (0.6768, 60.8397)**		
Wrists	**1.0769 (0.8160, 1.4212)**	0.9561 (0.7198, 1.2698)	**1.2459 (0.6980, 2.2239)**	**7.8265 (1.1050, 55.4329)***	**1.3000 (0.2592, 6.5204)**	**9.1000 (0.9576, 86.4794)***		
Fingers/ Thumbs	-	-	-	-	0.3265 (0.0335, 3.1789)	-	-	-
Upper back	-	-	-	-	-	-	-	-
Lower back	0.9842 (0.7480, 1.2951)	**1.2467 (0.9260, 1.6784)**	0.3797 (0.1424, 1.0124)*	**57.6403 (2.9175, 1138.7740)****	-	**33.2500 (3.1507, 350.8934)**	-	-
Thigh/ hip/ buttocks	-	-	-	-	-	-	-	-
Legs	0.7640 (0.4989, 1.1699)	**1.2809 (0.8270, 1.9841)**	1.3859 (0.7472, 2.5704)	**1.0909 (0.1783, 6.6748)**	**1.2000 (0.1827, 7.8815)**	-	-	-
Knees	-	-	-	-	-	-	-	-
Ankle/ feet/toe	-	-	-	-	-	-	-	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 28: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Plumbers'

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
During working	-	-	-	-	-	-	-	-
After working	**1.4660 (0.8578, 2.5055)**	0.5909 (0.3283, 1.0638)**	0.8318 (0.4147, 1.6685)	**47.7873 (1.9461, 1173.4504)****	0.7800 (0.1495, 4.0687)	**7.6364 (0.8054, 72.4043)***	-	-
During Sleeping	0.8011 (0.4212, 1.5235)	**1.1685 (0.5978, 2.2841)**	**1.7503 (0.5416, 5.6566)**	0.7154 (0.0353, 14.4946)	**3.1429 (0.1730, 57.0824)**	-	-	-
In the morning	-	-	-	-	**10.5000 (1.4124, 78.0588)***	-	-	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 29: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Tilers'

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident	Addiction to tobacco/
Head	-	-	-	-	-	-	-	-
Neck	-	-	-	-	-	-	-	-
Shoulders	-	-	-	-	-	-	-	-
Chest	-	-	-	-	-	-	-	-
Elbow	-	-	-	-	-	-	-	-
Arms/ Hands	0.9708 (0.7956, 1.1846)	0.9249 (0.7708, 1.1097)	0.9021 (0.5880, 1.3839)	**7.1519 (0.6125, 83.5044)**	0.8929 (0.2039, 3.9104)			**1.2245 (0.2853, 5.2552)**
Wrists	-	-	-	-	**1.6000 (0.1934, 13.2397)**			**1.3636 (0.1655, 11.2333)**
Fingers/ Thumbs	-	-	-	-	-	-	-	-
Upper back	-	-	-	-	-	-	-	-
Lower back	0.6651 (0.3290, 1.3445)	0.9858 (0.6983, 1.3918)	0.5786 (0.1240, 2.7007)	**8235.8361 (0.6713, 1.01048E+08)***	-	-	-	-
Thigh/ hip/ buttocks	0.8435 (0.6687, 1.0639)	**1.1726 (0.9449, 1.4551)**	0.9823 (0.6006, 1.6067)	**32.0287 (2.4774, 414.0794)****	**6.2500 (1.0538, 37.0700)***	-	-	**3.7500 (0.7544, 18.6415)**
Legs	**1.1165 (0.8769, 1.4215)**	0.9640 (0.7637, 1.2167)	0.8049 (0.4603, 1.4075)	**12.1368 (1.0842, 135.8590)***	**6.2500 (1.0538, 37.0700)***	-	-	**3.7500 (0.7544, 18.6415)**
Knees	0.6651 (0.3290, 1.3445)	0.9858 (0.6983, 1.3918)	0.5786 (0.1240, 2.7007)	**8235.8361 (0.6713, 1.01048E+08)***	-	-	-	-
Ankle/ feet/toe	-	-	-	-	**1.6667 (0.2752, 10.0937)**	-	-	**3.3333 (0.5047, 22.0171)**

*** P VALUE < 0.05, ** P VALUE <0.01**

Table 30: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Tilers'

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
During working	-	-	-	-	**1.5455 (0.0873, 27.3580)**	-	-	**1.3333 (0.0755, 23.5411)**
After working	0.9800 (0.8046, 1.1936)	0.9061 (0.7457, 1.1011)	**1.4621 (0.7556, 2.8291)**	**3.1768 (0.2661, 37.9308)**	0.4000 (0.0657, 2.4369)	-	-	**1.4444 (0.2842, 7.3410)**
During Sleeping	-	-	-	-	-	-	-	**1.3333 (0.0755, 23.5411)**
In the morning	-	-	-	-	**4.9000 (0.9918, 24.2079)***	-	-	**3.7917 (0.7939, 18.1092)**

*** P VALUE < 0.05, ** P VALUE <0.01**

Table 31: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Carpenters'

Body Parts	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
Head	-	-	-	-	-	-	-	-
Neck	-	-	-	-	-	-	-	-
Shoulders	-	-	-	-	-	-	-	-
Chest	-	-	-	-	-	-	-	-
Elbow	-	-	-	-	-	-	-	-
Arms/ Hands	**1.2423 (0.8639, 1.7864)**	0.8012 (0.5541, 1.1586)	**1.0413 (0.5606, 1.9341)**	**31.5000 (3.0166, 328.9278)***	**23.4000 (2.3247, 235.5357)***	**153.0000 (8.5273, 2745.1793)***	-	-
Wrists	**1.4593 (0.9927, 2.1451)***	0.6452 (0.4265, 0.9761)*	0.9087 (0.4391, 1.8804)	**3.6667 (0.5901, 22.7835)**	**4.5000 (0.7194, 28.1474)**	-	-	**3.0000 (0.3436, 26.1915)**
Fingers/ Thumbs	-	-	-	-	-	-	-	-
Upper back	-	-	-	-	-	-	-	-
Lower back	**1.2423 (0.8639, 1.7864)**	0.8012 (0.5541, 1.1586)	**1.0413 (0.5606, 1.9341)**	**31.5000 (3.0166, 328.9278)***	**23.4000 (2.3247, 235.5357)***	**153.0000 (8.5273, 2745.1793)***	-	-
Thigh/ hip/ buttocks	-	-	-	-	-	-	-	-
Legs	-	-	-	-	-	-	-	-
Knees	-	-	-	-	-	-	-	-
Ankle/ feet/toe	-	-	-	-	-	-	-	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 32: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Carpenters'

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive	Pervasive jobs	Traumatic Incident	Addiction to tobacco/ smoking/

During working	0.7393 (0.2795, 1.9556)	**1.2247 (0.4549, 3.2968)**	0.5854 (0.1374, 2.4949)	-	-	-	-	-
After working	**1.6559 (1.0255, 2.6739)***	0.5463 (0.3238, 0.9218)**	**1.1913 (0.5779, 2.4557)**	**6.2857 (1.0222, 38.6509)***	**8.0000 (1.2790, 50.0399)***	-	-	0.5556 (0.0499, 6.1814)
During Sleeping	0.6548 (0.2965, 1.4461)	**1.5110 (0.6679, 3.4187)**	0.7181 (0.2486, 2.0746)	**1.8462 (0.1477, 23.0701)**	**2.1667 (0.1734, 27.0752)**	-	-	**3.6667 (0.2498, 53.8275)**
In the morning	**1.2165 (0.4865, 3.0419)**	**1.0599 (0.5101, 2.2022)**	**2.8114 (0.3940, 20.0621)**	-	-	-	-	**23.0000 (1.3962, 378.8984)***

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 33: Logistic regression analysis result for association of pain in different body parts and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Painters' and Fall Ceiling workers'

Body Parts	**Age**	**Experience**	**BMI**	**Awkward posture**	**Pace of work/ repetitive motion**	**Pervasive jobs**	**Traumatic Incident on site`**	**Addiction to tobacco/ smoking/ Alcohol**
Head	-	-	-	-	-	-	-	-
Neck	**1.1860 (0.9445, 1.4893)**	0.8340 (0.6206, 1.1209)	0.7278 (0.4761, 1.1126)	**20.3636 (2.3271, 178.1929)***	0.7179 (0.1997, 2.5807)	**6.0357 (1.1372, 32.0359)***	**1.9231 (0.2423, 15.2611)**	**1.2308 (0.3476, 4.3584)**
Shoulders	0.9871 (0.7983, 1.2204)	**1.0191 (0.7792, 1.3329)**	**1.0499 (0.7130, 1.5459)**	**7.0000 (1.5909, 30.7997)****	**56.0000 (8.3446, 375.8137)****		**4.6000 (0.4366, 48.4654)**	**15.0000 (3.1964, 70.3927)****
Chest	-	-	-	-	-	-	-	-
Elbow	-	-	-	-	-	-	-	-
Arms/Hands	0.9601 (0.7762, 1.1876)	**1.0370 (0.7933, 1.3557)**	0.9648 (0.6580, 1.4146)	**8.2963 (1.8687, 36.8324)****	**89.2500 (11.3566, 701.4011)****	-	**4.1250 (0.3922, 43.3832)**	**10.6250 (2.5094, 44.9862)**
Wrists	0.9601 (0.7762, 1.1876)	**1.0370 (0.7933, 1.3557)**	0.9648 (0.6580, 1.4146)	**8.2963 (1.8687, 36.8324)****	**89.2500 (11.3566, 701.4011)****	-	**4.1250 (0.3922, 43.3832)**	**10.6250 (2.5094, 44.9862)**
Fingers/ Thumbs	0.9601 (0.7762, 1.1876)	**1.0370 (0.7933, 1.3557)**	0.9648 (0.6580, 1.4146)	**8.2963 (1.8687, 36.8324)****	**89.2500 (11.3566, 701.4011)****	-	**4.1250 (0.3922, 43.3832)**	**10.6250 (2.5094, 44.9862)**
Upper back	-	-	-	-	-	-	-	-
Lower back	0.9185 (0.7069, 1.1935)	0.9655 (0.7001, 1.3316)	0.6767 (0.4325, 1.0588)	**11.2500 (2.1001, 60.2659)****	**3.8958 (1.0594, 14.3259)***	**20.3636 (2.3271, 178.1959)***	**5.1429 (0.4870, 54.3154)**	**2.7500 (0.7672, 9.8572)**
Thigh/ hip/ buttocks	-	-	-	-	-	-	-	-
Legs	-	-	-	-	-	-	-	-
Knees	-	-	-	-	-	-	-	-
Ankle/ feet/toe	-	-	-	-	-	-	-	-

*** P VALUE < 0.05, ** P ALUE <0.01**

Table 34: Logistic regression analysis result for association of pain during different time of the day and age, year of experience, BMI, Pace of work, Pervasive jobs, Traumatic incident and addiction to tobacco/alcohol/smoking for Painters' and Fall Ceiling workers'

Time zones	Age	Experience	BMI	Awkward posture	Pace of work/ repetitive motion	Pervasive jobs	Traumatic Incident on site`	Addiction to tobacco/ smoking/ Alcohol
During working	**1.2742 (0.9161, 1.7724)**	0.7203 (0.4616, 1.1239)	0.8300 (0.4098, 1.6809)	0.6522 (0.0827, 5.1430)	**4.1250 (0.3922, 43.3833)**	-	**3.8889 (0.3031, 49.9001)**	0.3000 (0.0286, 3.1490)
After working	**1.0322 (0.8231, 1.2945)**	**1.1015 (0.8270, 1.4673)**	0.6722 (0.4287, 1.0539)	**64.0000 (6.7767, 604.4276)***		**40.0000 (4.4154, 362.3700)**	**3.3333 (0.3176, 34.9885)**	**18.0625 (3.8709, 84.2833)****
During Sleeping	-	-	-	-	-	-	-	-
In the morning	**1.2778 (0.8040, 2.0308)**	0.7530 (0.4021, 1.4100)	**1.8179 (0.4849, 6.8159)**	-	-	-	-	-

*** P VALUE < 0.05 , ** P VALUE <0.01**

IV. Discussion

The individual factor like age, gender, height, weight, BMI, types of work, duration of work, physical load and exertion and per day working hours are required to study to obtain the relation between influence of incidence and prevalence of Work-related musculoskeletal disorders. In a previous study, it is revealed that all these factors are responsible for WRMSD however height will not change after a certain age. Also, the physical strength of a male is more than female hence female have more chance of pain and WRMSD than male and is found in the previous study. In this study, body parts, maximum feeling of pain at different time in a day and types of work have been considered for this study purpose and effect of age and BMI on these factors. The age group 21-30, 31-40, 41-50 and ≥ 51 and 11 different types of construction works have been studied associated with age and BMI.

The majority of construction workers have been reported high pain and symptoms in neck, shoulders, arms, wrists, lower back, legs and knees while some has reported about chest, elbows, fingers and thumbs, which are also reported in previous studied[8,9,10]. The most common body parts to which workers experiencing pain and risk of WRMSD included lower back (88.05%), Shoulder (60.00%) and Arms (54.81%) followed by wrists, legs and neck. The study revealed that the pain in upper extremities has been most frequently reported by 21-30 age group workers and lower extremities have been frequently reported by the workers who are ≥ 51 of age group. Increasing age and increase in BMI (weight) are found to be significant for the cause of WRMSD[11]. Nevertheless, the study shows that percentage of tingling is more in the older aged group but the risk has been started from an early age. Basically from the age group 31-40 due to working in awkward posture and poor nutrition.

The physical risk factors, psychosocial factor and individual factors are related to construction workers in India those works for a prolonged period with undue loads in awkward posture without unknown threat[12]. The study also revealed that those workers who works in an awkward posture, working for prolonged hours, take inadequate rests, carried out repetitive motions with high frequency, lift heavy materials showed a high prevalence of WRMSD.

It is also found that as the age increases the pain and symptoms of WRMSD found increasing in sleeping time and in the morning time. All age group workers were suffering from pain and/or WRMSD except age group 21-30 due to age but odds ratio shows that there is a high risk of getting pain and/or WRMSD to the exempting group.

In the recent study, the percentage of male (86.75%) were more feeling of pain than female (13.25%) as the female only carried out only excavation and labour work (manual material handling work). The number and percentage of a worker in the age group 31-40 (32.72%) and 41-50 (34.81%) were more than 21-30 (16.37%) and ≥ 51 (16.10%). The active age group of the construction worker is seemed to be 31-50 (67.53%) and found that they are experiencing low pain. However, the risk rate of pain and WRMSD is found more and this increases with age[13]. From previously studied work at a different construction site, it is revealed that almost all manual construction workers experiencing pain and suffering from WRMSD symptoms[14]. WRMSD is one of the current health problems facing by construction workers throughout the globe. The incidence of WRMSD symptoms involves pain in a different body region and is different in different time in a day[15]. Awkward working posture and material handling can cause the WRMSD and disorders to construction workers which are associated with the physical workload at construction work[16]. The study also showed that the construction workers experiencing pain in almost all body parts[17] but high prevalence of complaints about pain is found in

Lower back[18,19,20] and lower back pain found significant where the load carried at the workplace is too heavy[21]. The odds ratio of this study shows that almost all age group workers are having pain and suffering from WRMSD but younger (21-30) and older (≥ 50) are more sufferers. The work-related musculoskeletal disorders in construction workers are extensive and initiated at an early age[2]. Consistent with the age the workers doing labour work recorded the highest prevalence followed by workers doing masonry work, excavation work, rebar work and form work. The most common aspect of all construction workers including all types of work are the extreme use of repetitive and forceful exertion of muscles and other structure of the body that uses poorly and uninterruptedly. This showed a high prevalence of work-related musculoskeletal disorders due to stress on different body joints.

Amongst the construction workers mentioned above, the result of the regression analysis for the individual occupational workers revealed that age, year of experience and BMI is not showing much more correlation WRMSD amongst the construction workers. Working in awkward postures, addiction to tobacco /smoking /alcohol, traumatic incidences, pervasive jobs and working with pace are showing more resemblance WRMSD amongst the construction workers.

V. Conclusion

Several cases were responsible for the prevalence of work-related musculoskeletal disorders among construction workers. Physical risk factor, psychosocial risk factor and individual risk factors as well as working in an awkward posture, prolong working time, inadequate break time, repetition of motions with high frequency, lift heavy materials shows a high prevalence of WRMSD. From the study, it can be concluded that the construction workers always works in unacceptable, unavoidable, uncomfortable and uncooperative conditions.

The prevalence of WRMSD is more in construction workers at different time in a day, in different body parts and due to different types of work owing to age and BMI. The prevalence of work-related musculoskeletal disorders increases with age, but in some body parts, maximum feeling of pain at different time in a day and types of work it increases with BMI rapidly. The more prevalence found in the lower back (88.05%), Shoulder (60.00%) and Arms (54.81%) and almost all age group workers are suffering from some sort of pain. The pain after working and in the morning is found in workers age 31-40 (62.70%) and older (48.39%) workers respectively. Pain in the lower back has been experiencing by all age group workers. The workers doing labour work has been recorded the highest prevalence followed by workers doing masonry work, excavation work, rebar work and form work with age and BMI. The symptoms of the work-related musculoskeletal disorders start at an early age and have a high prevalence with age. This prevalence in construction workers will lead them to the disability in future.

The efforts are needed to be taken to reduce the prevalence and severity of work-related musculoskeletal disorders in construction work by introducing some training programs, prevention from working in an awkward posture, minimizing repetitive movements, avoiding lifting heavy materials, providing material handling devices, proper tools and medical facilities.

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