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Analysis of Risk Factors for Work-related Musculoskeletal Disorders: A Survey Research

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Abstract: In the world ergonomics is involved everywhere, where is work there is a risk factor. Musculoskeletal disorder (MSDs) is a major risk factor in human life because it affects bones, joints, muscles, and connective tissues of whole human body parts such as the neck, shoulder, arms, wrists, hips, legs, thigh, knee, ankles, etc. so mainly our study focus on musculoskeletal disorders. This study there has used questionnaires in four factors those are socio-demographic, psychological, occupational, and biomechanical. In these factors number of questions were included in the data has been collected. In addition, there was the Nordic section in questions from that we analyzed the pain in different parts of the human body. The study concentrated on the business, education, industry, and healthcare sectors in Hyderabad, Kotri, and Jamshoro. University students and teachers, retail salespeople, manufacturing industry workers, nurses, doctors, nursing assistants, and other health professionals comprised the sample group. The questionnaires were fully completed by 50% of the respondents, resulting in a sample of 116 workers. The majority of the participants were private employees with one to fifteen years of experience in teaching or caring. In this study data has been analyzed through Co-relation between four factors with the Nordic section and ANOVA test through excel and it gives the value of p is also less than 0.05 so we cannot reject the null hypothesis. Over this study it has been analyzed that population is evolving in problems and there should be the proper implementation of ergonomics and safety rules. Test gives the values are not significant and null hypothesis should not reject and it should be improving.

Index Terms: Ergonomics, Musculoskeletal Disorder (MSDs), Health, Problems, Students, Doctors, Dentist, Employees.

1. Introduction

Ergonomics is the study of how to operate in a way that minimizes physical and mental strain, as well as the risk of disease and injury, which can result from repetitive motions, poor posture, or overuse of muscles. An ergonomics programmer in the workplace might strive to prevent or deal with accidents and illness by removing or reducing workers' exposure to the risk factors associated with WMSD.

Musculoskeletal diseases, often known as MSDs, are a significant issue in the workplace. Despite the abundance of information, there is still a great deal of conjecture and argument over the nature of MSDs[1]. Even though MSDs

seldom have an accurate clinical pathology diagnosis, the body is nonetheless harmed and rendered unable to function properly as a result of having them[2,3]. In 1997, the NIOSH, which is part of the Centers of CDC, conducted a review of the evidence on MSDs that are associated with the workplace[2,4].

Table 1. Ergonomic Definition

Author	Definition of Ergonomics
Te-Hsin & Kleiner	The term "ergonomics" may have originated from the Greek terms "ergo" and "nomics," which both imply "work" or "labor." Ergonomics is a branch of research that focuses on adapting instruments, procedures, and physical workplaces to the abilities and requirements of employees.
Tayyari & Smith	A branch of science that deals with the achievement of the optimal relationships between workers and their working environment
Lee	To promote compatibility between humans and systems
Fernandez	To design the workplace, equipment, tool, machine, product, system and environment and taking into consideration the human's

People who suffered from MSDs missed an average of 8 days of work, whereas those who suffered from non-fatal accidents and illnesses missed an average of 6 days of work. MSDs are a group of painful and inflammatory conditions that affect muscles, ligaments, and joint peripheral nerves[5]. Lack of compression disorders, and osteoarthritis, MSDs are common in many countries, and they cost a lot of money and lower the quality of life[6,7]. Still, MSDs are the most common type of work-related illness, making up a large number of registered work-related illnesses in the US, Nordic countries, and Japan.

1.1. Musculoskeletal Disorders

It focuses on musculoskeletal disorders that are caused or made worse by work, as well as the conditions in which the work is done. Musculoskeletal disorders like these are thought to be caused or made worse by work, but other things like housework or sports may also be to blame. Irritation at the point where the muscles and tendons join the bone is yet another typical ailment. There is also a possibility of harm to the muscles and tendons.[8] The total burden imposed on the apparatus. The entirety of the mechanical load affects the musculoskeletal systems.

1.2. Problem Statement

It was noticed in the literature and also confirmed during the preliminary survey that many of the professionals in our study area are suffering from musculoskeletal symptoms such as pain in the body mainly in the lower limb and upper limb of body parts due to the several risk factors such as socio-demographic, occupational, biomechanical and psychosocial, etc. that may also have deleterious effects on quality of Physical working life and efficiency of employees in the organizations.

In light of above mentioned sustainable goal the aim of our study is to analyze the prevalence of musculoskeletal symptoms associated with risk factors". The purpose of this study is to identify risk factors for work-related musculoskeletal disorders. To analyze the prevalence of musculoskeletal symptoms in professionals. And To investigate the association of risk factors & develop a regression model.

1.3. Scope of Study

The prevalence of musculoskeletal symptoms among workers/ officials /professionals is a significant issue in all service/manufacturing sectors worldwide. Many research studies are reported on this issue but unfortunately, very few of them are from our country. Nowadays most of the researchers in our country have turned their attention to this issue and have carried out research studies by using different research approaches but the population focused in our study and the consideration of risk factors regarding this issue has not remained their subject of studies. Thus our study addresses this gap in the literature and contributes to discoveries on this topic and area for improving the quality of life and environment at the work.

This study has four main limitations; This research is consisting of limited number of participants. Sample size is limited i.e. couldn't achieved. Some of the results of this study are significant while others are not. The study is descriptive and analytical.

2. Literature Review

2.1. Background of Ergonomics

Ergonomics may be a key part of getting and keeping workers at high levels of productivity. Workers in different sectors such as the textile industry have to twist their knees, neck, back, and shoulder joints to do their jobs[9,10]. This is because the ergonomic design makes it easier for workers to do their jobs. Muscle pain can be caused by specific actions or activities and can be affected by ergonomic risk factors.

Muscles in the shoulders, upper back, lower back, hands, wrists, thighs, and knees are all affected. Muscles that have been hurt for a long time can cause both illnesses and injuries that affect the bones, joints, and muscles.[11]

Concrete workers should be asked to report any injuries or problems with their muscles and joints, as well as how much pain they are in[12].

2.2. Evaluation of MSDS Research

It was found that the chances of having neck/shoulder pain with pressure sensitivity went up when all of the basic physical risk factors were present, as well as when they were present together with repetitiveness[13]. Biomechanical stress is caused by things at work called ergonomic risk factors. Musculoskeletal problems can be caused or made worse by one or more risk factors in the workplace[14]. Some of the most dangerous factors include working in very cold or very hot temperatures or doing the same thing over and over again without giving your muscles a chance to rest.[15]

MSD is caused not only by the fact that risk factors are present but also by how bad they are. In the same way, when an MSD is linked to a risk factor, it is usually a combination of several risk factors, not just one, that cause or contribute to the MSD[16]. In the last few decades, many ergonomic risk assessment methods have been created to measure exposure to WMSD risk factors. Because of this, QEC and REBA are recommended for assessing risk factors for musculoskeletal diseases at work in similar industries[17].

Schneider says that strains and sprains are caused by work that is hard on the body[18], positions that are uncomfortable or stay the same, vibration, the harsh weather outside, and other related risk factors.[19]

2.3. Research Approaches Related to MSDs

Methods have been developed for assessing exposure to risk factors for MSDs, most for assessment of the upper regions of the body such as the back, neck, shoulder, arms, and wrists. Any attempt to quantify exposure should therefore include all the three dimensions for a worker being assessed. Data should also be recorded for the other important exposure factors, such as postural variation, rate of movement, and vibration, as well as the measurement of psychosocial and organizational factors that may be present in the workplace concerned.

2.4. Exposure Assessment Techniques

A wide range of methods has been identified and categorized under the three headings that have conventionally been used by earlier reviewers and they are listed below in order of increasing precision of the data gathered from and invasiveness to the worker(s) being assessed: Self-reports, Observational methods, and direct measurements.

2.5. Factors that leads to MSDS

a) Repetition

Repetition is using the same muscles over and over again without giving them a chance to rest or heal. This is good for both big and little muscles. When you hit something hard, your muscles and tendons tend to get overworked.

b) Vibration

Vibrations happen when an object moves quickly back and forth around a fixed point, like a pendulum swinging back and forth. Vibration is also a simple way to explain any movement of a body concerning a fixed point. It has been found that tools that vibrate between 20 and 80 Hz are an etiological factor in the workplace.

c) Awkward Posture

Posture is how the different parts of your body are set up. When you are in an unnatural position, your muscles, tendons, and ligaments have to work harder and may become stressed. When a joint bends or twists too much, beyond its normal range of motion, this is called an awkward posture.

d) Contact Stress

When pressed against the sharp edge, the muscles and tendons are crushed. When the hand is used as a hammer to close a lid tightly, mechanical forces are created, especially if the lid has raised surfaces or sharp edges. When a hard or sharp object comes into contact with the skin, this is called local contact stress. The pressure hurts the nerves, which hurts the tissues under the skin.

e) Extreme Temperatures

Cold temperatures, which are sometimes called «coffee temperatures, »slow people down and make it easier to see signs of nerve-end damage. When the body is exposed to cold, it may go through cold stress, which lowers the deep core temperature. A worker who is exposed to cold may shiver, have trouble thinking, feel pain in their limbs, have dilated pupils, and have an irregular heartbeat, among other systemic symptoms.

f) Permanent Loading

Musculoskeletal diseases caused by work have become a major cause of illness among workers in both developed and developing countries. Compared to other types of workers, construction workers have the second-highest risk of getting musculoskeletal illnesses at work. Especially for construction workers, these conditions will cause both short-term and long-term harm. Musculoskeletal injuries are a very big risk for all types of construction workers[20].

It depends on what the construction workers are doing since each task needs a different range of body movements. A lot of the work that construction workers do is repetitive and hard on their bodies.[21] Body posture is an important part of how the work process and workplace are set up because it affects how easily and well workers can reach, grip, and use equipment. Muscle pain makes it hard for development workers to do their jobs regularly, and they can only stay in good shape for a very short time.

3. Research Methodology

3.1. Methodology Adopted in the Research

Objectives of this study analyzed by this methodology, frame-work, correlation and ANOVA test. This methodology is showing that how this study has been done, from where data has been collected, from which sources literature has been combines, how data has been analyzed, etc. from conceptual frame-work the objectives will be identified that what are those risk factors which effects on human body, how musculoskeletal disorders (MSDs) occurs in body, how MSDs impacts on biomechanically, physical, psychologically and mental ability of human. Correlation and Test analyzed that what is the relation between given factors psychological, occupation, biomechanical and socio-demographic; that whether it is strong or weak and positive or negative. ANOVA test also identify the impact factor that how much MSDs effect on body, shows the results significant or not and whether the null hypothesis should be rejected or not.

Fig.1. shows Over there for research, there has been used multiple types of questioners have different sections which are already explained in the research methodology section. After making questionnaires, adding literature reviews from different sources such as books, research papers, conference papers, etc., and then studying that theory, these are included in the exploration of the study there is a research design in this portion that used sapling strategy through using different research methods. In the research execution portion, there is pivot testing which means a small scale-study conducted before conducting an actual experiment; designed to test and refine the procedure. So our study is based on pivot testing after that there has been collecting data through questionnaires and then analyze and finally submitted a report.

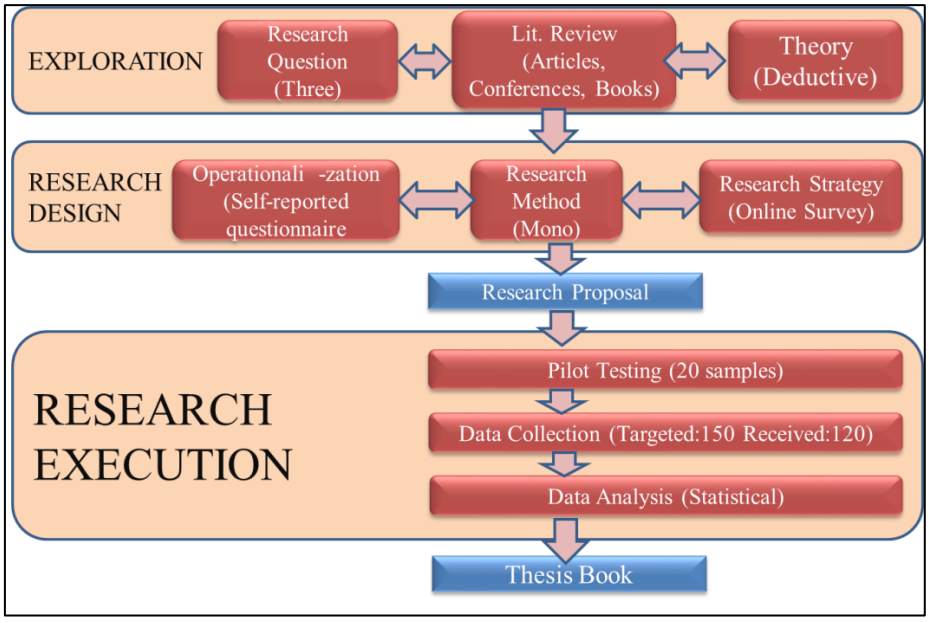

Fig. 1. Adopted Research methodology

4. Data Collection and Analysis

4.1. Conceptual framework

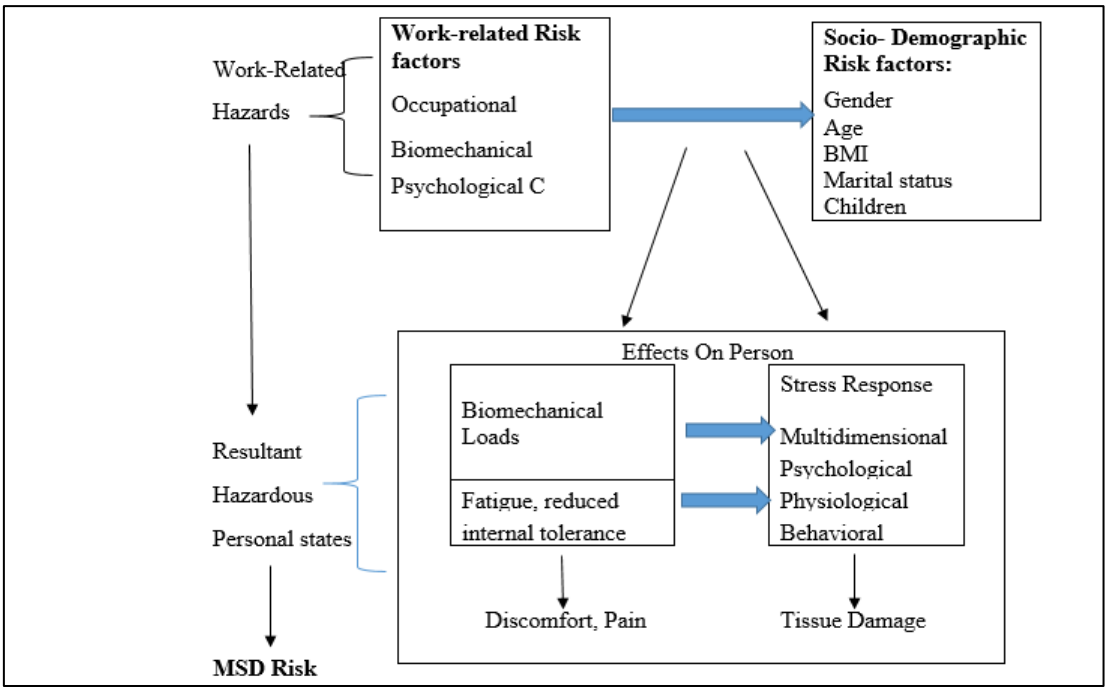

Fig. 2. Revised Model of Risk factors for work-related MSDs [22]

Fig.2. shows conceptual frame-work of MSDs risk factors that what are those risk factors which effects on human body, how musculoskeletal disorders (MSDs) occurs in body, how MSDs impacts on biomechanically, physical, psychologically and mental ability of human.

4.2. Risk Factors

Several risk factors that lead MSDs such as Socio-demographic factors such as:

1. Socio-demographic
2. Biomechanical
3. Psychosocial, and
4. Occupational factors.

Socio-demographic factors included sex, age, BMI, education, marital status, and the presence of children. **Occupational/organizational factors** included the following variables: professional category, work environment, duration of service in the company, working hours per week, the interval between work breaks, and engagement in other employments. **Psychosocial factors** such as the perceived meaning of work, commitment to the workplace, job satisfaction, and work-family conflict were evaluated using items from the Copenhagen Psychosocial Questionnaire II by Pejtersen et al.; psychological demands, job control, job insecurity, supervisor support, and support from co-workers were assessed using items from the JCQ. And reward and over-commitment were assessed using items from the ERI. However, it is unclear whether these factors contribute to specific regional MSP or multisite pain.

Several studies have reported many male-female differences in the prevalence of certain symptoms of work-related musculoskeletal disorders. Work-related risk factors may also differ according to gender.

The study concentrated on the business, education, industry, and healthcare sectors in Hyderabad, Kotri, and Jamshoro. These areas have been chosen because there are so many Workers working and we can study easily. The study was divided into four Stages: (I) site selection, (ii) sampling (iii) design questionnaire (IV) statistical analysis.

4.3. Site Selection for the Study

The first stage of the investigation attempted to map and outline the locations where the research was conducted by the four selected skilled sectors. Three cities were chosen: Kotri, Jamshoro, and Hyderabad. Despite having demographics and populations that are broadly comparable to those of other cities in the region, each designated city is the largest in its respective area. The accessible situation choices for each skilled sector were approached by various businesses/institutions from the public and private Sectors. Companies, clinics, and universities were all classified as part of the Education sector in Jamshoro Town, while other business establishments were classified as part of the commerce sector. Hyderabad has a textile industry as well. Kotri was home to a variety of public and private companies, hospitals, and healthcare institutions, as well as the railway.

4.4. Sampling of Targeted Population

The targeted population of University teachers, retail salespeople, manufacturing industry workers, nurses, doctors, nursing assistants, and other health professionals comprised the sample group. The sampling of the targeted population is given hereunder.

$$n = \frac{N*Z_{\alpha}^{2}*p*q}{Z_{\alpha}^{2}*p*q+d^{2}*(N-1)} \quad (1)$$

Where:
N=Population Size=1500
p=Expected frequency=50%=0.5
q=1-p==50%=0.5
d=acceptable error = 5.55% = 0.055
α=confidence level = 95%
n=150(approx.)

4.5. Data Collection Tool: Online Questionnaire

The data collection tool was designed to collect data on both dependent and independent elements. The dependent variables were pain complaints in the lower limbs from the previous days (thighs, knees, legs, ankles, and feet). To quantify pain, the modified Nordic Questionnaire was utilized, which was supported by (Yes &No). Four groups were formed from the socio-demographic, biomechanical, psychological, and occupational characteristics. Socio-demographic characteristics included gender, age, BMI, education, legal status, and thus the presence of children. BMI was classified into three categories by the World Health Organization: normal weight (BMI 18.5-24.9 kg/m2), overweight (BMI 25-29.9 kg/m2), and low weight (BMI 18.5 kg/m2). Among the organizational and Occupational factors were the professional category, work environment, period of Employment with the company, several hours worked per week, the time between work Breaks, and participation in other jobs. This study, like Widanarko et al. The study evaluated biomechanical parameters by taking into account the number of Hours spent each day performing or holding the following tasks or positions: (1) Standing, (2) sitting, (3) squatting, (4) holding the upper limbs in Awkward positions, (5) holding the lower limbs in awkward positions, (6) having A curved trunk, (7) having a twisted trunk, (8) using hands and fingers, and (9) lifting loads Weighing up to six kg, (10) Lifting loads weighing between 6 and 15 kg, (11) lifting loads Weighing over 15 kg, (12) performing repetitive movements, and (13) the utilization of hand tools. The variables were grouped using the frequency Categories shown below: infrequently (6 h per day). Pejtersen et al. (Pejtersen et al., 2010) employed items from the Copenhagen Psychosocial Questionnaire II (COPSOQ II) to examine psychosocial aspects such as the perceived significance of Work, dedication to the workplace, job satisfaction, and work-family conflict. The JCQ (Karasek et al., 1998) items were used to assess psychological demands, Computer programming, job insecurity, supervisor support, and colleague support (Siegrist, 1996).

4.6. Prevalence of Musculoskeletal Symptoms and their Relationship with Risk Factors

Table 2. Prevalence of WMSDs and their Relationship with Socio demographic factors

Sex		**Percent**
Male	94	78%
Female	26	22%
Age		
18-35	118	98%
more than 35	2	2%
BMI		
Low weight	19	16%
Normal Weight	94	78%
Over Weight	7	6%
Education		
Incomplete Elementary Education	2	2%
Complete Elementary Education	3	3%
Incomplete High School	1	1%
Complete High School	34	28%
Other	80	67%
Marital Status		
Single	99	83%
Married	21	18%
Presence Of Children		
Yes	19	16%
No	101	84%

Table 2. shows the socio-demographics data of populations, through this table it can be analyzed that age, sex, body mass index, education, marital status and availability of children to the married population. 78% respondents were male and 22% were female, most of population were between 18-35 years' age, 78% population have normal weight, 16% have low weight and only 6% were overweight, only 6% of the participant were done less than high school education, 28% of respondents done high school and 67% populations done other educations means College and universities. 83% were single due that 84% have no any children.

Table 3. Prevalence of WMSDs and their Relationship with Occupational factors

Professional category		
Railway	8	7%
University	89	74%
Dentist clinic	10	8%
Hospital	13	11%
Work Environment		
Private	41	34%
Public	79	66%
Duration of services in the company(year)		
No	45	38%
Less than one	31	26%
1_5	26	22%
16-30	8	7%
Other	0	0%
Working hours per week		
Less than 15	54	45%
16-40	50	42%
41-60	15	13%
60	1	1%
Interval between work break(in month)		
Less than 6	85	71%
6_11	28	23%
11	7	6%
Engaging in other employments		
yes	44	37%
no	76	63%

Table 2 shows occupation factors, means those factors which come during working or at working place. This table has been arranged as per questioners those are professional category means what is the profession of that individual respondents, what is the work environment where they are working, how much duration of services he or she is giving, means all others just like that.

Table 4. Prevalence of WMSDs and their Relationship with Biomechanical factors

Work Standing up?		
< 1	51	43%
1-6	60	50%
> 6	9	8%
Work Sitting down?		
< 1	42	35%
1-6	55	46%
> 6	23	19%
Work Squatting?		
< 1	56	47%
1-6	48	40%
> 6	16	13%
Upper Limbs in uncomfortable position?		
< 1	55	46%
1-6	51	43%
> 6	14	12%
Lower Limbs in uncomfortable position?		
< 1	59	49%
1-6	45	38%

> 6	16	13%
Curved Trunk?		
< 1	58	48%
1-6	45	38%
> 6	17	14%
Twisted Trunk?		
< 1	69	58%
1-6	35	29%
> 6	16	13%
Lifting Load up to 6Kg?		
< 1	69	58%
1-6	33	28%
> 6	18	15%
Lifting loads between 6 and 15 Kg?		
< 1	69	58%
1-6	35	29%
> 6	16	13%
Lifting loads over 15 Kg?		
< 1	73	61%
1-6	25	21%
> 6	22	18%
Recitative Movements?		
< 1	42	35%
1-6	50	42%
> 6	28	23%
Use of Hands and Fingers?		
< 1	34	28%
1-6	53	44%
> 6	33	28%
Use of hand tools?		
< 1	44	37%
1-6	47	39%
> 6	29	24%
Efforts?		
Low	38	32%
High	82	68%
Physical Demands?		
Low	38	32%
High	82	68%

Table 4 shows biomechanical factors that risk factors influence on the body of human and it is basis on research questioners those are standing, sitting, knees, fingers, hand tool usage, efforts, demands, lifting, repetitive task etc.

Table 5. Prevalence of WMSDs and their Relationship with Psychological factors

Meaning of work		
Low Significance	29	24%
High Significance	91	76%
Commitment to the Work place		
Low	28	23%
High	92	77%
Psychological Demand		
Low	35	29%
High	85	71%
Job Control		
Low	35	29%
High	85	71%
Motivation		
Low	31	26%
High	89	74%
Job Satisfaction		
Low	36	30%
High	84	70%
Job Insecurity		
Low	60	50%
High	60	50%
Supervisor Support		
Low	46	38%
High	74	62%
Support From Co-Worker		
Low	47	39%
High	73	61%
Reward		

Low	50	42%
High	70	58%
Over Commitment		
Low	71	59%
High	49	41%
Work Family Conflict		
Low	83	69%
High	37	31%

Table 5 show psychological factors that means how factors are effecting on psychological behavior and how much those. The different percentage is given above in table according research survey that how much these are effecting.

4.7. Correlation Between Risk Factors & Regression Model

Table 6. ANNOVA Test

ANOVA						
Source of Variation	**SS**	**df**	**MS**	**F**	**P-value**	**Fcrit**
Between Groups	7692.457	3	2564.152	3.586744	0.016474	2.697423
Within Groups	70059.9	98	714.8969			
Total	77752.35	101				

Table 6 shows ANOVA test that gives the F is greater than F critical and p value is less than 0.05 so null hypothesis cannot reject.

Table 7. Male and Female having health issues

		Male	**Female**	**Total**
Neck	Yes	45	21	**66**
	No	49	5	**54**
Shoulder	Yes	47	22	**69**
	No	47	4	**51**
elbows	Yes	40	13	**53**
	No	54	13	**67**
Wrists/Hands	Yes	51	16	**67**
	No	43	10	**53**
Upper Back	Yes	48	17	**65**
	No	46	9	**55**
Lower back	Yes	48	17	**65**
	No	46	9	**55**
hips/thighs/buttocks	Yes	43	11	**54**
	No	51	15	**66**
knees	Yes	44	13	**57**
	No	50	13	**63**
ankles/feet	Yes	40	11	**51**
	No	54	15	**69**
	Total	**846**	**234**	**1080**

Table 7 shows the effect of risk factors on different part of human body, that is basis on Nordic section questions and from this table it can be analyzed that how much male and female having problems of neck, shoulder, elbows, wrists, back, hips, thigh, knees and feet.

Table 8. Co-relation between socio demographic, psychological, occupational and biomechanical factors

Co-Relation				
	Socio demographic Factors	Psychological Factors	Occupational Factor	Biomechanical Factors
Socio demographic Factors	1			
Psychological Factors	-0.424645553	1		
Occupational Factor	-0.372807776	0.405303441	1	
Biomechanical Factors	-0.33797446	0.022525078	0.239634133	1

Table 8 shows correlations between four risk factors, the relation between socio-demographic and psychological, occupational and biomechanical is negative that is moderate negative. The relation between psychological and occupational is positive and its moderate. Relation between biomechanical and psychological is positive weak and relation between biomechanical and occupational factors is weak positive.

5. Statistical Analysis

A concise descriptive Statistic was developed to represent the samples' socio-demographic, occupational, Biomechanical, and psychosocial risk exposure. The symptoms of pain in the Lower limbs were described similarly. By the ANOVA test value, we got that is F = 3.58 and Fcrit = 2.69. The value of F is greater than F critical value so we cannot reject the null hypothesis. The generalized variance inflation factor was used to investigate numerous risk factor correlations. Ordinal supplying regression Models with Bonferroni correction were used to (1) identify the Socio-demographic, occupational, biomechanical, and psychosocial risk variables for WMSDS; and (2) categorize the likelihood of obtaining WMSDS in the presence of several risk factors.

6. Results

Table 2 shows socio-demographic information and its Association with the risk of WMSD symptoms in the lower limbs the sample was discovered to be predominantly made up of unmarried men and women between the ages of 18 And 45. The majority of the participants had normal BMIS, with 14.04% having extra body fat. The majority of them had completed High school and attended college. Table 3 depicts the associations between Activity factors and WMSD symptoms in the lower limbs. The majority of the participants were private employees with one to fifteen years of experience in teaching or caring. The majority of people (60%) reported working at least 16 hours per week, with average employment breaks lasting less than 6 months. Table 4 depicts the relationship between WMSD symptoms in the lower limbs and Biomechanical measures. The participants indicated that they spent one to Six hours working while standing and abusing their hands and fingers. The Majority of those doing work sitting for more than six hours, carrying objects weighing less than 50% takes sixteen kilograms with their lower limbs. Unnatural positions and Trunks bowed. Table 6 shows the ANOVA test score of all respondents over four factors that test gives the value of F is 3.386 and F critical is 2.697, from this analysis we can imagine that value of f is greater than F critical so the null hypothesis will be rejected. And the value of p is also less than 0.05 so we can reject the null hypothesis. Table 7 shows how many males and females have a problem with the neck, shoulder, wrist, ankle, knee, etc. This table directly show percentages of male and female having problems in different parts of body. By using table 7 and with expected got chi test that is table 8. From the Chi test, we got the value of P separately male and female and together as well. The Chi test gave an overall value of p 0.1387 and the individual value of p of a male is 0.997 and a female is 0.371. So finally these all values are more than 0.05 so it is not statistically significant and indicates strong evidence for the null hypothesis. This means we retain the null hypothesis and reject the alternative hypothesis. Table 5 depicts the link between psychosocial factors and the Likelihood of WMSD symptoms in the lower limbs. Employees exhibited low Perceptions of most of the researched criteria, except Supervisor support and work satisfaction, which showed a comparable percentage. The final word model, as well as all risk classes (Table 4), indicated that Biomechanical variables had a significant impact on reported symptoms. High Motivation was discovered to be the most influential factor (74.2%). Furthermore, practically all psychosocial factors were found to reduce the chance of developing WMD symptoms. Male sex, age, BMI, and vacation time all Enhanced the exaggerated risk of symptoms, while participation in another job reduced that risk. As a result, the final regression model included socio-demographic factors such as gender, age, BMI, and the presence of Children (Table 2): organizational and occupational factors such as working hours per week, the time between work breaks, and participation in alternative Employment (Table 3); and biomechanical factors such as holding lower limbs in uncomfortable positions, performing repetitive motions, using hands and Fingers, using manual tools, and exerting physical effort (Table 4). Table 6 gives an analysis of the variance of all respondents over four factors. Table 8 gives a correlation between these four factors Socio-demographic, psychological, occupational, and biomedical. And that shows the relationship is not good because all values are less than 0.5 in positive and negative both. So between these also not good relations. Displays the odds ratios for the association between the identified risk Factors and the occurrence of WMSD symptoms in the lower limbs Biomechanical Variables have been shown to influence lower limb WMSD symptoms. Numerous psychosocial Factors have been discovered to indirectly contribute to the avoidance of lower Limb WMSD symptoms. Employees with positive perceptions of the means of labor had a 15%-25% OR= [0.75; 0.85]) decreased risk of WMSD symptoms in the Thighs, ankles, and feet. Individual and activity characteristics may influence WMSD Symptoms in the lower limbs. All over the collinearity of the Variables in the logistical regression models was minimal.

7. Discussion

This study is the first to think about the influence of risk factors of various natures on WMSDs within the lower limb regions of workers in remote areas of Hyderabad, Kotri, and Jamshoro Sindh, Pakistan. This study is significant because it demonstrates how musculoskeletal disorders and risk factors are related in many locations. As each area was individually evaluated, an important level of accuracy was reached in evaluating the correlations between these risk variables and the reported symptoms. A variety of factors, including socio-demographic factors occupational factors,

biomechanical factors, and psychosocial factors, were discovered to have an impact on how employees experienced their WMSD symptoms.

These findings are consistent with prior research that has found risk factors for musculoskeletal in members of the general public, healthcare workers, educators, vine workers, and mining workers' lower Limbs. A weak relationship has been analyzed between psychosocial and occupational factors and individuals with lower limb musculoskeletal issues, according to Systematic analyses. The issue of «lower Limbs in uncomfortable positions» was substantially associated with thigh Pain symptoms, showing that certain components of particular job obligations May lead employees' limbs to be positioned unpleasantly. Many Characteristics, such as operating with the back in a very bent or twisted Posture and thus the kneeling position, leg posture, and seating type, operating In standing and bending positions, machine style, and ergonomics stress, are tested to contribute to the perception of pain symptoms among the thighs.

Who discovered that a lack of labor control and a lack of coworker support increased the risk of feeling symptoms of thigh pain by 17% and 23%, respectively? Pain has been linked to posture, ergonomic stress, machine design, and type and squatting, which may result in unnatural positions and worsen WMSD symptoms. The use of manual instruments, painful lower limb positions, and the usage of hands and fingers were all significant risk factors in Biomechanics. Completing repetitive tasks did not cause symptoms in the three inner cities because they required more physical effort and strength than speed and repetition.

Effort and improper working postures, rather than repetitive motion, were the main risk factors for lower limb WMSDS. Only in the foot region did this study find a link between work effort and symptoms. WMSD foot symptoms were similarly correlated with BMI. In our investigation, five lower limb regions were examined to see whether working with the lower limbs in unpleasant positions was connected to WMSD symptoms.

In terms of occupational factors, our study revealed that not having several jobs had a good impact on leg pain. The study is the first to identify factors that influence the occurrence of WMSD in different employees 'lower limbs, and it confirms previous research on the relationship between psychosocial factors and WMSDS. Our data were collected transversally; longitudinal studies may be able to reach more valid findings on the risk factors for WMSDS. Most risk factors evaluated supported the perception of the workers and in the limited area, there may be another issue if we cover a lot of areas for data and many responses. The phenomenon cannot be fully comprehended by focusing on lower limb MSDS, particularly considering the links to psychological disorders that may influence upper neck/back pain and lower back pain, among other symptoms.

8. Conclusion

The present study was carried out to evaluate the ergonomics examines ways in which working conditions and requirements of job may be tailors to abilities of the individual worker. The study concentrated on the business, education, industry, and healthcare sectors in Hyderabad, Kotri, and Jamshoro. The ergonomics is the study of how to operate in a way that minimizes physical and mental strain. There are two methods were applied for analyzed the data, one is primary data in which data was collected directly by interviews, surveys and experiments. Other is secondary data which is already collected from primary sources and also reported by many researchers. The data was analyzed by qualitative and quantitative methodology. Participants in present study had to be at least 18 years old, those are temporary employment, those who had lost their jobs due to WMSDS or workplace accidents, and those who were hypertensive, pregnant, or had other health difficulties were all excluded from this study. University teachers, retail salespeople, manufacturing industry workers, nurses, doctors, nursing assistants, and other health professionals comprised the sample group. The questionnaires were fully completed by 50% of the respondents, resulting in a sample of 116 workers. 81% was calculated for this sample size.

The socio-demographic information and its association with the risk of WMSD symptoms in the lower limbs the sample was discovered to be predominantly made up of unmarried men and women between the ages of 18 and 45. The majority of the participants had normal BMIS, with 14. The majority of them had completed high school and attended college. The majority of the participants were private employees with one to fifteen years of experience in teaching or caring. The ANOVA test score of all respondents over four factors that test gives the value of f is 3. And value of p is also less than 0.5. Moreover, practically all psychosocial factors were found to reduce the chance of developing WMDS symptoms. Male sex, age, BMI, and vacation time all enhanced the exaggerated risk of symptoms, while participation in another job reduced that risk 15-25%, decreased risk of WMDS symptoms in the thighs, ankles, and feet.

9. Recommendations

The user's workstation should be set up differently to allow the user to continue working while leaning back against the chair.

To access the second and third molars in the upper jaw, the upper jaw plane needs to be tilted at an angle of 25 degrees concerning the vertical. Lower the chin of the patient until the maxillary plane for the patient's mandibular front teeth is 8 degrees ahead of the vertical.

The dentist ought to be stationary in the area surrounding the operating table and should move their hands, arms, and body as little as is practicable.

The helper needs to be near the tools and equipment.

10. Future Direction

To make models of occupational MSDs that are more realistic and accurate, it is important to first understand the MSD research that has already been done and then find the research gaps. This work by a group of researchers will help improve the design of workplaces, the parameters of exposure, the diagnosis of injuries, and the assessment of workers' ability to return to work. This will lead to fewer risks, lower medical costs, and healthier workers.

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