

Construction, Validation and Pilot study of a Self-Administered Instrument to Determine Work-Related Musculoskeletal Disorders Among ArSRLM Employees

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Abstract:

➤ *Background and Objectives:*

Office workers are found to be at great risk in developing work-related musculoskeletal disorders leading to reduced performance. Existing instruments may not fully capture region-specific occupational exposures and contextual factors relevant to specific populations. Hence, this study was carried out to develop and validate a self-structured questionnaire to assess the prevalence of musculoskeletal disorders among employees of ArSRLM, based on their work culture. Furthermore, a pilot study was conducted to assess the feasibility and comprehensibility of the questionnaire.

➤ *Methods and Methodology:*

A comprehensive literature review was done to understand more on musculoskeletal disorders and roles and responsibilities of the employees of ArSRLM. Based on which a self-structured questionnaire was generated specifically to assess the prevalence of MSDs among employees of the ArSRLM. The questionnaire was distributed to experts for face validity and content validity. The accuracy of the items of the questionnaire was identified through the content validity index. The internal consistency of the questionnaire was assessed using the Cronbach's alpha method. The feasibility and comprehensibility of the questionnaire was determined by conducting a pilot study.

➤ *Result:*

The final questionnaire after validation and pilot testing consisted of 4 parts with 19 questions. Part I - the Demographic detail, Part II – Occupational Detail, Part III – Job description and Part IV consisted information on their Health Status. The I-CVI value for items showed that the items were highly relevant. The S-CVI (S-CVI average = $20.2/21 = 0.96$, S-CVI average proportion = $4.8/5 = 0.96$, S-CVI average universal agreement = $17/21 = 0.81$) value showed that the questionnaire had excellent content validity. The internal consistency calculated using the Cronbach's alpha was 0.78, interpreting good reliability.

➤ *Conclusion:*

The self-structured questionnaire is found to be a valid and reliable instrument for assessing prevalence of musculoskeletal disorders among the employees of ArSRLM. The scale can also determine the associated risk factors of MSDs in their occupational settings.

Keywords: *Musculoskeletal Disorder, Validation of Questionnaire, Reliability, ArSRLM, Occupational Health.*

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I. INTRODUCTION

Musculoskeletal Disorders are the leading cause of disability worldwide.¹ Work related musculoskeletal

disorders are the largest contributors to the occupational disease burden² due to lost productivity, reduced performance, and absence in job.^{2,3,4} Many factors like workplace stress, disrupted sleep patterns, increase fatigue,⁵

awkward position, inadequate work equipment⁶ can lead to the development of work-related musculoskeletal disorders. In reverse Musculoskeletal disorders can also have a negative impact in an individual's overall quality of life.⁶

Arunachal Pradesh state rural livelihood mission (ArSRLM), is the nodal agency for implementing the National Rural Livelihood mission in the state. It aims to eliminate poverty and improve the livelihood of people through means of self-employment and skilled wage employment opportunities. Structurally, ArSRLM comprises of staff at the state and block level to cater to the requirements of rural areas across the state.⁷ The Agency with its mission have not only addressed the grievances of the poor people of the state but also have employed many youths of the state under its umbrella. As described in their advertisement dated 27th July 2021 and based on the readers understanding, the work majorly includes enormous hours of dedication close to computer and laptops, Odd hours of work for effective client management, frequent travelling from place to place in order to address issues and assess quality of training, to facilitate financial inclusion etc.⁸ Long hours of office work, exposure to computers and frequent travelling are considered as cause that might lead to various kind of pain related to musculoskeletal disorder.

With this emerging opportunity of employment for the youths of the state, there is also the need to address the possibilities of developing musculoskeletal disorders among the employees under ArSRLM, so as to fulfill the mighty mission of the agency without any hindrance.

Many literatures among various workers have assessed the prevalence of Musculoskeletal disorders using various scales, most commonly being the Standardized Nordic Musculoskeletal Questionnaire^{9,10,11} and the Dutch Musculoskeletal Questionnaire¹¹. However, these instruments may not fully capture the specific occupational demands and work patterns of employees working under ArSRLM. Therefore, there is a need to develop a context-specific tool that can effectively assess musculoskeletal health issues while being concise and practical for use among these employees.

Hence, the present study aims to develop and validate a self-structured questionnaire to assess the prevalence and potential risk factors of MSDs among employees working under ArSRLM. Furthermore, the study intends to conduct pilot testing of the developed questionnaire to evaluate its feasibility, clarity and applicability among the target population.

II. METHODS AND METHODOLOGY

The questionnaire was developed and validated in 3 phases. Phase I consisted of developing a questionnaire keeping in view the objective of the research study. Phase II consisted of Statistical analysis for the validation of the Questionnaire. Phase III consisted of Pilot testing among the ArSRLM employees to test the feasibility of the Questionnaire.

➤ Phase I: Questionnaire Development

• Phase I a. Understanding the Roles and Responsibilities of ArSRLM Employees

The roles and responsibilities of ArSRLM employees was thoroughly studied as given in Advertisement no. ArSRLM/Estt-51/2018/Vol-I dated 27th July 2021 to understand the kind of work that the ArSRLM employees need to do in order to fulfill their duty. An on call discussion was done with one of the senior employee in order to understand their job better.

• Phase I b. Literature Review

A comprehensive review was performed in google scholar and Pubmed to gain an understanding on the existing evidence of identifying prevalence of musculoskeletal disorders among various occupations. The keywords included musculoskeletal disorder, Work-related musculoskeletal disorder, occupational health, Quality of Life, Musculoskeletal Disorder questionnaire. Full text articles that included the identification of musculoskeletal disorder and its risk factors where included in the study for the development of the questionnaire.

• Phase I c: Experts Evaluation for Face Validity and Content Validity

Based on the understanding of the roles and responsibilities of the ArSRLM employees and on the risk factors for the development of MSDs, an online questionnaire was developed to assess the Prevalence of Musculoskeletal Disorders among employees of the Arunachal State Rural Livelihoods Mission. Initially the Questionnaire contained of 5 domains with a total of 18 questions with both open ended as well as closed ended questions. The draft of the Questionnaire was distributed to 5 experts with background in PhD Physiotherapist, Project research Scientist and the Senior Employees of ArSRLM. After the experts' opinion, the domains were rephrased and shortened to 4 domains, with a total of 15 closed ended questions and 6 demographic details.

➤ Phase II: Statistical Analysis for the Validation of the Questionnaire

Validity determines the Quality of instruments and represents the extent to which specific items on a tool accurately assess the concept being measured in the research study. Face validity is an assessment of the level in measuring the clarity and purpose of a construct used to evaluate. Content validity refers to the content of the questions or items of the instrument being measured is truly representative and accurate.¹² Content Validity was evaluated using the content validity index. The experts rated each item on a 4-point Scale with the following description: 1-Not relevant, 2- Somewhat relevant, 3- Quite relevant, 4 – Highly relevant. The 4-point scales eliminate the neutral mid-point so as to take a clear stance on the topic under evaluation¹³ (Table 1).

Table 1 Statistical Analysis for the Validation of the Questionnaire

Section	Number of Items	Respond by Experts
Demographic Detail	6	Quite relevant, very relevant, highly relevant, indirectly relevant, marginally relevant, not relevant.
Occupation Detail	6	Essential, Relevant, Very Relevant, highly relevant, somewhat relevant.
Job Description	6	Very relevant, strongly relevant, quite relevant, Appropriate.
Health Status	3	Highly relevant, Necessary, Excellent, Important.

To estimate the content validity index, both CVIs were calculated, i.e. Item level CVI (I-CVI) and scale level CVI (S-CVI). I-CVI is defined as the proportion of raters who considered an item to be relevant for a given construct and can be calculated as *number of experts who endorsed the item as relevant / total number of experts*. To calculate the I-CVI the four point scale was classified as “Not relevant” for score 1 and 2 and “Relevant” for score 3 and 4. The items not relevant was valued as 0 and the item considered relevant was valued as 1. The S-CVI represents overall CVI of a scale and can be calculated in 3 methods, namely: S-CVI average method, average proportion relevance and average universal agreement method¹⁴. Generally an S-CVI average ≥ 0.90 and a value of ≥ 0.80 are considered acceptable for S-CVI universal agreement^{14, 16}. The internal consistency of the questionnaire was assessed using the Cronbach’s alpha. The internal consistency of a scale reflects extend of the correlations among the individual items included in the questionnaire¹⁵.

➤ *Phase III: Pilot Testing*

After Validating the Questionnaire, the pilot study was carried out in the month of January 2025 with the aim to assess the feasibility and comprehensibility of the self – structured questionnaire among the employees of ArSRLM. The ethical clearance was obtained from the Institutional ethical committee and permission was obtained from the CEO-cum-State mission Director ArSRLM prior to the study. Keeping in mind the general rule of thumb for pilot testing¹⁶

the questionnaire was distributed online through Google form via whatsapp to 30 ArSRLM employees from different district through convenient sampling based on inclusion and exclusion criteria. Inclusion criteria included: Employees under ArSRLM, both male and female Staff under ArSRLM, employees working both in rural as well as urban areas, employees who are willing to participate. The exclusion criteria included: Self - help groups under ArSRLM, employees who have left their job in ArSRLM, employees who do not wish to participate in the study. The beginning of the questionnaire contained the consent form to identify the willingness of the participants to participate in the study. To assess the feasibility and comprehensibility, feedback on the time taken to complete the questionnaire, ease of administration and simplicity of the questionnaire were noted. Initially some of the participants (5 to be precise) responded that they struggled to understand question number 4 of part-II i.e. “Is your work scheduled fixed?”, as it did not specifically mention fixed in what sense. The participant also found it difficult to rate the pain intensity in question number 2 of part - IV as some of them had more than one pain area. Keeping in view the feedback of the participants, slight changes were made to the questionnaire. One question that the participant struggled to answer was removed and the question that asked about the pain area and the intensity of the pain was merged so that the participants find it easy to respond to the question. The final questionnaire (Box 1) was re-distributed to the 30 participants again.

Box 1 Self –Structured Questionnaire

Online Questionnaire

Consent:

This Research survey is being done by Tage Sepi (PhD Scholar) in fulfilment of my PhD Thesis, under the guidance of Dr. Som Sankar Mukherjee (PhD, MIAP). The purpose of this study is to find the "Prevalence of musculoskeletal disorder among the employees under ArSRLM, Arunachal Pradesh". This survey will ask you about your demographic details, your work environment and if you are suffering from any musculoskeletal disorder. All of the information that may include your identification shall be kept confidential, to the degree permitted by the technology used. Should you have any queries about the study, you may reach to the scholar via email at tagesepi2019@gmail.com.

Please click the following indicating your choice to be in the study.

- Yes, I agree to participate in the study
- No, I do not wish to participate in the study.

Part I (Demographic detail)

- Name:
- Age:

- Gender:
 - Male
 - Female
 - Others
- Marital Status:
 - Married
 - Unmarried
 - Divorced/Separated
- Do you have any Children:
- Number of Children (If yes):

Part II (Occupational Detail)

1. Position within the Department:
2. Area of Posting: _____
3. Duration of Service in the Organization:
 - Less than 1 yr
 - 1-2yr
 - 2-3 yr
 - 3-4 yr
 - More than 4 yr
4. Working hour per week:
 - Less than 30 hr
 - 30-40 hr
 - 40 - 60 hr
 - More than 60 hr
5. Interval Between the Work Per Week:
 - Less than 5 hr
 - 5-6 hr
 - More than 6 hr

Part III (Job Description)

1. Does your job require you to sit in front of your desktop/laptop for a prolong period of time?
 - Always
 - Often
 - Sometimes
 - Never
2. Duration of screen exposure per day?
 - Less Than 5 Hr
 - 5-6 Hr
 - More Than 6 Hr
3. Does your job require you to travel from place to place?
 - Always
 - Often
 - Sometimes
 - Never
4. Mode of travelling?
 - Two-Wheeler
 - Four-Wheeler
 - Public Transport
 - On Foot

5. Does your work require you to work overtime?

- Always
- Often
- Sometimes
- Never

6. Duration of overtime per week?

Part IV (Health Status)

1. Do you suffer from pain in any of these areas of your body? Please rate the intensity of your pain.

	0-No Pain	1 - Mild Pain, Barely Noticeable	2 - Minor Pain, Annoying and Sharp	3 - Noticeable Pain, Distracting but Can be Gotten Used to.	4 - Moderate Pain, Distracting but can be Ignored on Activities	5 - Strong Pain, that Cannot be Ignored
Neck						
Upper Back						
Lower Back						
Shoulder						
Elbow						
Wrist or Hand						
Hip						
Knee						
Ankle						
Foot						

2. Did you suffer from any of these pains before joining ArSRLM?

- Always
- Often
- Sometimes
- Never

III. RESULTS

➤ *Phase I: Questionnaire Development*

Based on the literature review, the expert’s opinion and the Pilot study the final Questionnaire (refined in pilot study- post analysis) consisted of 6 demographics details and 13 questions divided into four parts. Part I - the Demographic detail, Part II – Occupational Detail, Part III – Job description and Part IV consisted information on their Health Status.

➤ *Phase II: Statistical Analysis for the Validation of the Original Questionnaire*

The I-CVI value for 17 items were equal to 1 and 4 items was equal to 0.80, representing that 80% for the raters found the items to be moderate to highly relevant. For raters involving 5 experts an I-CVI of 1 is considered acceptable¹⁴. Overall, the items were considered highly relevant.

The S-CVI average was calculated as *Total of I-CVI/Total Item*¹⁴, which gave a score of 0.96.

The S-CVI average proportion was calculated as *Proportion relevance of items by all expert / Total experts*. It resulted in a score of 0.96. Proportion relevance was calculated as *Sum of all relevant item valued as 1/ total items*¹⁴. The proportion relevance was calculated separately for all experts.

Before calculating the S-CVI average universal agreement score the items that scored 3-4 in the 4-point scale by all raters was were rated as 1 depicting Universal agreement, whereas item that scored 1-2 in the 4-point scale by any rater was rated a 0. Finally, the S-CVI average universal score was calculated as *Universal agreement among all raters / Total items*¹⁴.

The S-CVI average universal agreement score was found to be 0.81 (Table 2). Hence, with all the score calculated it can be said that the questionnaire has an excellent content validity.

Table 2 Content Validity Index of Questionnaire

Domain	Scale Items	Exp - 1	Exp - 2	Exp - 3	Exp - 4	Exp-5	I-CVI Score	Universal Agreement (1=yes), (0=No)
Demographic Detail	1.	1	0	1	1	1	0.80	0
	2.	1	1	1	1	1	1	1
	3.	1	1	1	1	1	1	1
	4.	1	1	1	1	1	1	1
	5.	1	0	1	1	1	0.80	0
	6.	1	0	1	1	1	0.80	0
Occupational Detail	7.	1	1	1	1	1	1	1
	8.	1	1	1	1	1	1	1
	9.	1	1	1	1	1	1	1
	10.	1	1	1	1	1	1	1
	11.	1	1	1	1	1	1	1
	12.	1	1	1	1	1	1	1
Job Description	13.	1	1	1	1	1	1	1
	14.	0	1	1	1	1	0.80	0
	15.	1	1	1	1	1	1	1
	16.	1	1	1	1	1	1	1
	17.	1	1	1	1	1	1	1
	18.	1	1	1	1	1	1	1
Health Status	19.	1	1	1	1	1	1	1
	20.	1	1	1	1	1	1	1
	21.	1	1	1	1	1	1	1
Proportion Relevance		0.95	0.85	1	1	1		

**S-CVI Average = $20.2/21 = 0.96$, S-CVI Average Proportion = $4.8/5 = 0.96$, S-CVI Average Universal Agreement = $17/21 = 0.81$.

The internal consistency calculated using the Cronbach’s alpha was 0.78 (Range of adequacy= 0.70-0.95)^{15,17}, interpreting good reliability.

➤ Phase III: Pilot Testing

Out of the 30 subject 21 gave the consent to participate in the study resulting in 70% respondent rate. The participants also stated that the final questionnaire was simple and easy to understand. Hence it took only 5-10 minutes of their time to complete the questionnaire.

• Part I - Demographic Detail

The mean age of the participants was found to be 29yrs ± 4.42 yrs (Graph 1) with majority male participants (M= 62%, F= 38%). Most of the participants were not married (Not married = 76.2%, Married = 23.8%) and only 3 married participants had children, of which only one is female.

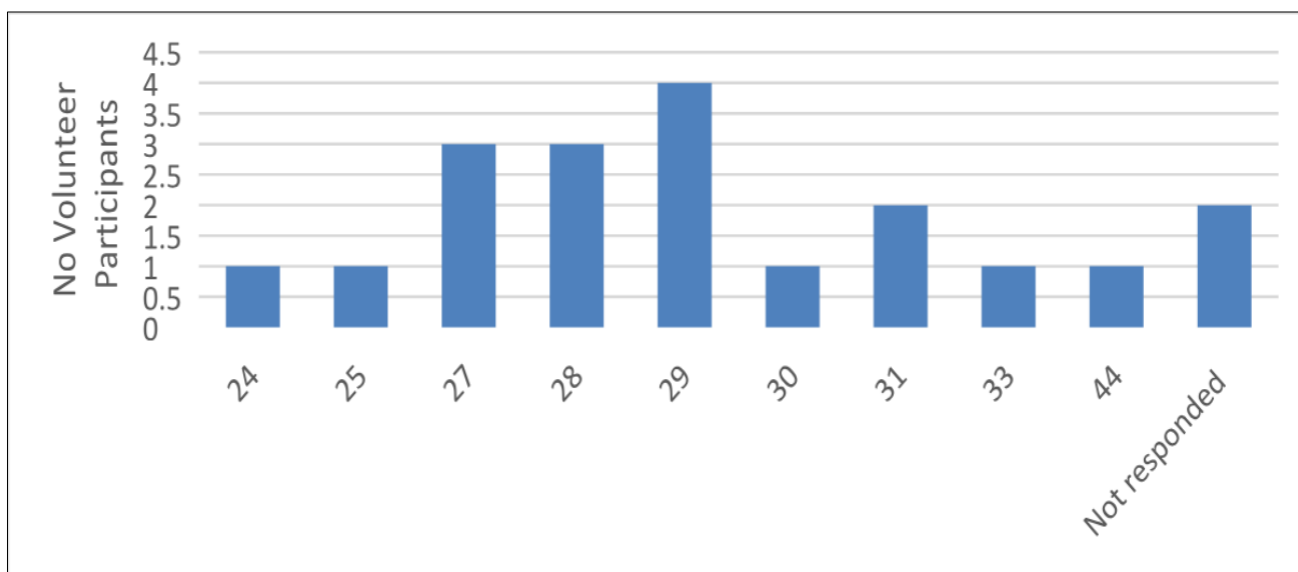


Fig 1 Age of the Participants

• *Part II - Occupational Detail*

The pilot study found 13 various positions in the ArSRLM (Graph 2), among which most of the participants held the position of cluster coordinator. Employees from 16 different state responded to the questionnaire (Table 3). Most

of the employees had served the agency for around 2-3 yrs (Chart 1). 57% of the employees worked more than 50hrs in a week, 29% worked 40-50hrs and 14% worked 30-40hr per week. When compared to their interval between works per week 43% had interval of more than 6hr, 33% had 5-6hr and 24% had an interval of less than 5hr per week.

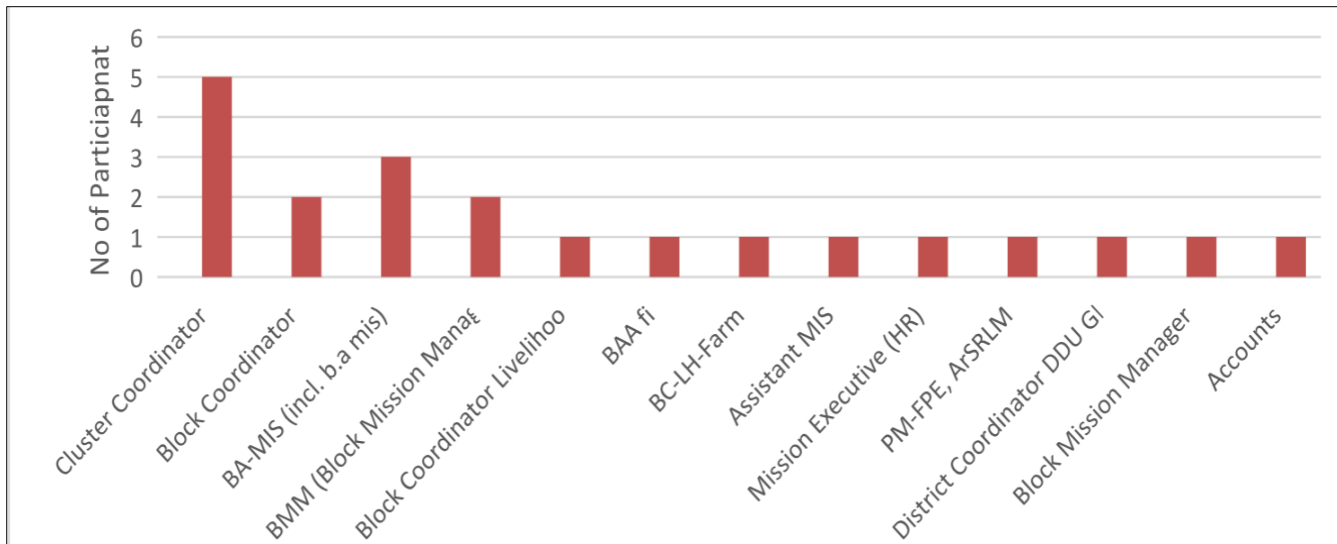


Fig 2 Position in the Department

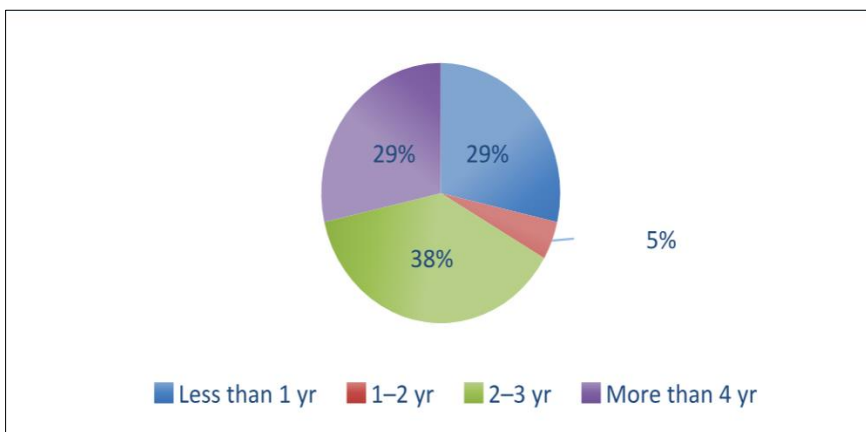


Fig 3 Duration of Service in the Agency

• *Part III - Job Description*

The employees also responded that most of them had to work near the desktop always for more than 6 hrs to complete their job (Chart 2). The Job also demanded the employees to

travel frequently and work overtime often. Most of the employees responded that they travel mostly in 2 wheelers (Chart 3) and worked overtime for more almost 10hrs per week (Chart 4).

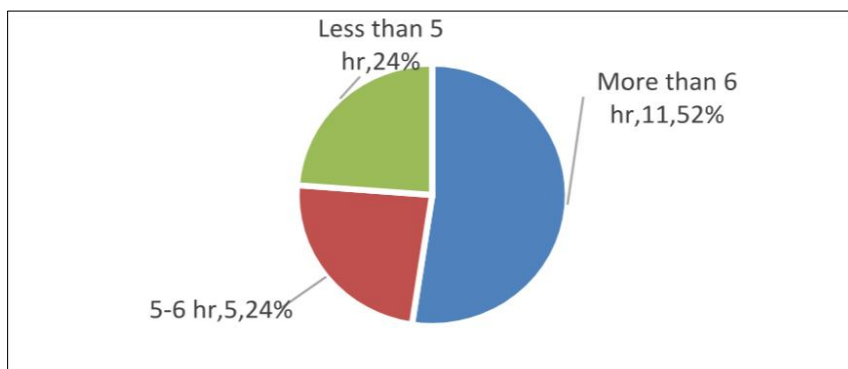


Fig 4 Duration of Screen Exposure Near Desktop/Laptop

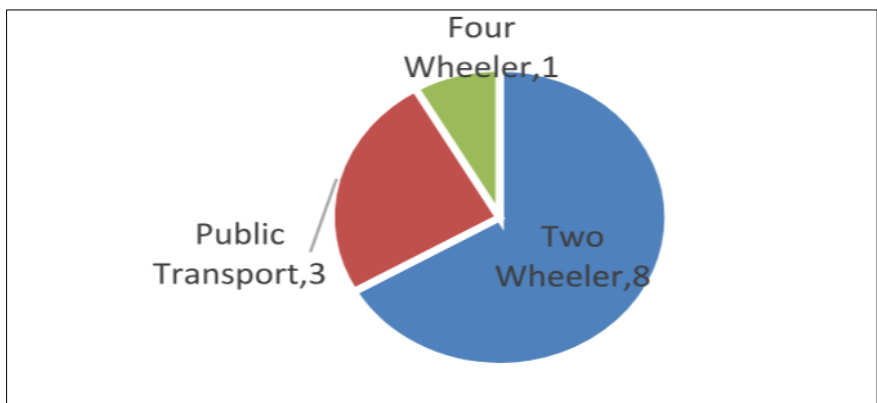


Fig 5 Mode of Travel

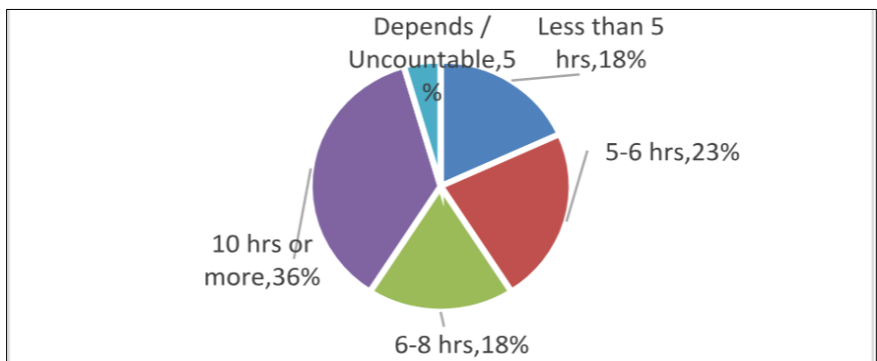


Fig 6 Duration of Overtime Per Week

• Part IV- Health Status

The result depicted that most of the participants suffered from low back pain, which had the highest mean pain score (7.5) compared to any other joints. The lowest mean pain score was observed in the elbow (1.5). It was concluded that

all participants reported pain in at least one body region (Graph 3). Among them 47.6% had reported having experienced such pain even before joining the organization and 52.4% of the participants had never suffered from any such pain prior to their employment.

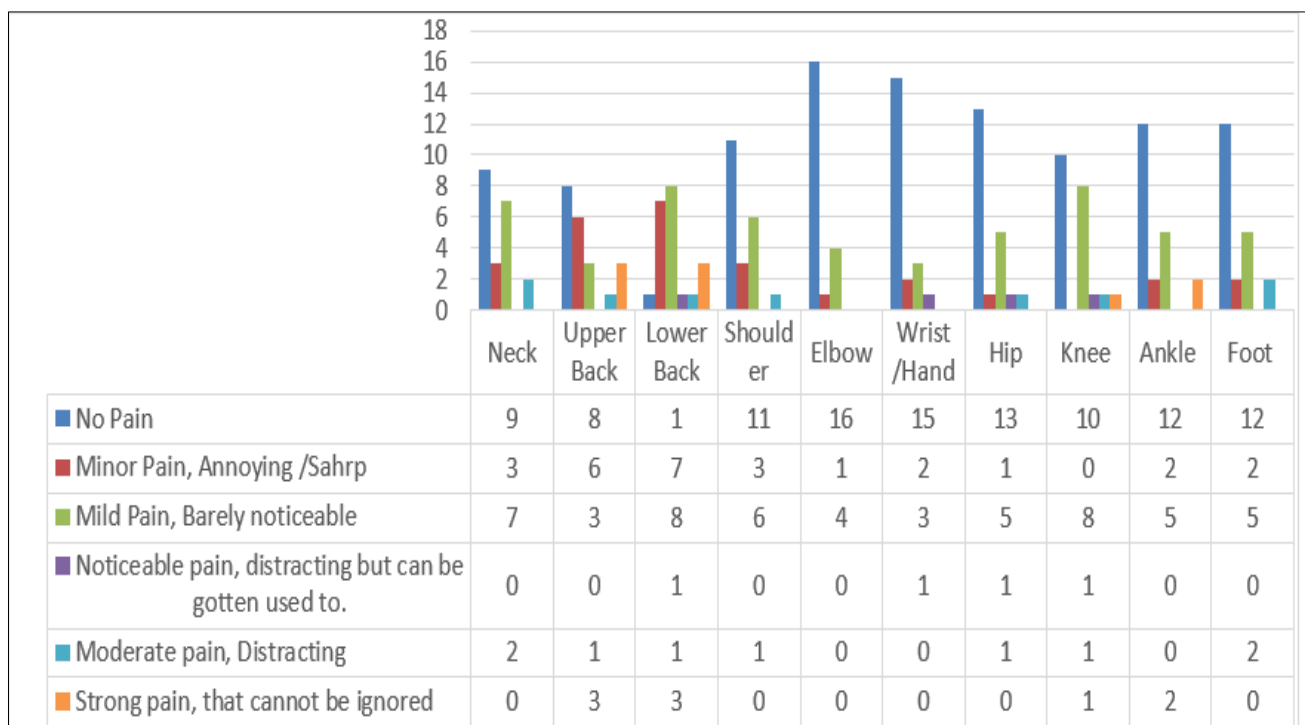


Fig 4 Pain Intensity According to the Joint Involved

IV. DISCUSSION

Development of musculoskeletal disorders is found to be prevalent in office worker¹⁸. Various scales are developed and available to assess the musculoskeletal disorders in various areas. However, they may not fully capture region-specific occupational exposures and contextual factors relevant to specific employees. In the Indian context, the burden of musculoskeletal disorders is increasingly recognized yet remains underreported, particularly in semi urban and rural occupational groups. Early identification of the condition in an untouched area may be beneficial for timely and successful treatment of the condition and also to prevent the various risks of developing MSDs. The present study aimed to develop, validate, and pilot test a self-structured questionnaire to assess the prevalence and risk factors of work-related musculoskeletal disorders (MSDs) among ArSRLM employees. The findings indicate that the instrument demonstrates good validity, reliability, and feasibility for use in this population. The questionnaire showed excellent content validity, with a high S-CVI (0.96), indicating that the items were relevant and representative of the construct. The involvement of experts from relevant fields further enhanced the contextual applicability of the questionnaire. The internal consistency was found to be good (Cronbach's $\alpha = 0.78$), suggesting that the items are adequately correlated and measure a consistent construct. Similar study on questionnaire development has suggested that the value of ICVI more than 0.75 and S-CVI more than 0.90 indicates good validity.¹⁹ The pilot study confirmed that the questionnaire is feasible and easy to administer, with a satisfactory response rate and completion time of 5–10 minutes. Feedback from participants led to minor modifications, improving clarity and comprehensibility, highlighting the importance of pilot testing in refining research instruments.

The findings also revealed that low back pain was the most commonly reported complaint. Various other studies have also revealed similar results indicating that work related low back pain is common among all other body parts involved in musculoskeletal disorders.²⁰ Prolonged sitting, extended screen exposure, and work-related demands may contribute to the high prevalence of MSDs observed in this population. Almost all participants reported pain in at least one body region, indicating a substantial burden of musculoskeletal issues among employees.

V. CONCLUSION

Development and pilot study of the self-structured questionnaire was proved to be a valuable step in identifying both the prevalence of musculoskeletal disorder as well as the risk factors associated specific to employees of ArSRLM. The questionnaire after statistical analysis was found to have satisfactory validity and was considered reliable to assess the prevalence of musculoskeletal disorders among employees of ArSRLM. Necessary modifications were made following the pilot study post-analysis to enhance the clarity and comprehensibility of the questionnaire before final administration.

Overall, the finalized questionnaire is a practical and context – specific tool that can be effectively utilized for large scale assessment of musculoskeletal disorders among the employees of ArSRLM as well as for similar occupational population.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest associated with this study. The research was conducted independently, and the findings presented are free from any commercial or financial influence that could have affected the results or interpretation.

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