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Assessment of Occupational Health Issues in Chilli Processing and Suitable Interventions to Reduce Drudgery

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ABSTRACT: This experimental paper aims to assess the occupational health issues faced by workers involved in chilli processing and identify suitable interventions to reduce drudgery. The study focuses on the physical strain, ergonomic challenges, and potential health hazards encountered during various stages of chilli processing, including sorting, drying, grinding, and packaging. Data collection involved direct observations, interviews, and ergonomic measurements of workers in multiple chilli processing units. The findings highlight the prevalence of musculoskeletal disorders, respiratory issues, and eye irritation among workers due to prolonged exposure to dust, repetitive motions, and poor working postures. Based on the assessment, a range of interventions will be proposed, such as the introduction of mechanized equipment, improved ventilation systems, ergonomic workplace design, personal protective equipment (PPE) recommendations, and training programs. The study aims to enhance the occupational health and well-being of chilli processing workers and provide valuable insights for policymakers and stakeholders in the agricultural and food processing sectors.

KEYWORDS: Occupational health, Chilli processing, Drudgery, Musculoskeletal disorders, Personal protective equipment, symptoms

I. INTRODUCTION

The processing of chilli peppers is a labor-intensive activity that involves various tasks such as sorting, cutting, drying, and grinding. While this industry plays a crucial role in food production and spice manufacturing, it also poses significant occupational health risks to the workers involved. The repetitive and physically demanding nature of chilli processing tasks can lead to musculoskeletal disorders, respiratory issues, skin irritations, and other occupational health issues. Therefore, it becomes imperative to assess these health risks and develop suitable interventions to reduce drudgery and improve the working conditions for the workers.

This experimental paper aims to comprehensively evaluate the occupational health issues prevalent in the chilli processing industry and propose interventions that can effectively mitigate these risks. Working in the chilli processing industry can expose labourers to a significant amount of dust, which can cause respiratory problems, eye irritation, and skin irritation. Therefore, it is essential to implement dust protection measure to ensure the safety of workers. Protective Equipment (PPEs) as a type of clothing worn to protect themselves against hazards that may cause serious workplace injuries, illnesses, or exposure to potentially hazardous substances. The level of dust exposure should be taken into consideration while choosing a respirator, and it should be fitted and maintained properly. Due to the differences between the modes of production and the kind of operation, sufficient body protection is essential to ensure human safety at work. In order to provide safety for workers, our nation's industries are making a conscious effort to adopt a safe design for machinery and plants in order to ensure compliance with safety regulations in dangerous or potentially harmful processes.

II. RELATED WORK

The primary objectives of this study are:

Assessment of Occupational Health Issues: This study will identify and assess the occupational health issues faced by workers involved in chilli processing. This will involve a comprehensive evaluation of work-related injuries, illnesses, and discomfort experienced by the workers, along with an analysis of the root causes and contributing factors.

Evaluation of masks under breathe synchronize condition: This study will measure the filtration efficiency of different types of masks choose for the study. This condition is crucial in preventing the inhalation of spice dust and minimizing the risk of respiratory issues among workers. By adhering to this condition, the spices industry can effectively protect the health and well-being of its employees, ensuring a safe working environment in which synchronized tasks can be carried out.

Identification and assessment of dust protection gears for workers in the chilli processing industry: In this objective importance of dust protection gears for workers is studied. It emphasizes their role in safeguarding workers from harmful airborne particles and reducing the risk of respiratory illnesses. Different types of gears, their effectiveness, and the need for proper selection, fit, and usage. Overall, it serves as a concise resource for understanding the significance of dust protection gears in promoting worker safety and health.

III. METHODOLOGY

The present study was conducted in Udaipur city. Twenty (7 males and 13 females) chilli mill workers were selected deliberately for the study. These people worked for five to two decades in chilli mills. To generate information on self-reported health hazards, a survey questionnaire and interview procedure had been used. The workplace was also inspected throughly to understand the working environment. Data were analyzed utilizing weightage score and frequency.as shown in fig

For measuring filtration efficiency of different masks. A dust mask testing setup consisting of a dust chamber of size 65cm x 65cm x 65cm as per IS code 9473:2002 was fabricated. shown in fig 1 In the test rig manikin was fitted to mount the mask. Calibration syringe was used for the air sucked through the mouth and nose of manikin for measuring the accuracy of respiratory volume. The mask, which covers the mouth and nose area, was fixed on the face. For measuring the dust concentration (Fidas® Frog Fine Dust Monitoring Device) dust sampler was mounted sidewall of the dust chamber. Provisions were also made to take air samples after the mask for evaluation of dust concentration in filtered air. Pressure gauge was installed in the test setup to quantify the pressure decrease for the breathing resistance.

Personal protective equipment (PPE) was selected that is commonly accessible on the market. Four types of respirable protective equipment as a surgical face mask, cloth mask, agricultural dust mask 1, agricultural dust mask 2. Two types of skin protective equipment as disposable plastic polythene hand gloves, and rubber hand gloves. Two types of eye protective equipment are dust safety goggles and face shields. Respirable protective equipment was subjected to suitability checks for one hour each on 20 workers during the work duration and also an acceptability test was conducted on all PPEs to obtain a total acceptability score.

IV. EXPERIMENTAL RESULTS

From the all collecting data result found that the mean age of workers was 45 years (range 40 to 55 years), while the current industry average employment period was 13 years (range 5 to 25 years) and workers work duration was 8 hours per day. The level of education of subjects is 11 literate, 9 illiterates. There was no smoker in the female section and in the male section 2 present smokers, 1 was a former smoker, and 4 were no smokers. PPE (Personal Protective Equipment) was not used or accessible. In the small chilli processing industries, workers used damp towels instead of dust masks or other protection devices for the protection of face and hair. Face masks are strongly advised in the workplace because they help to protect workers' health from the dust that is emitted in the workplace environment. The workers in the chilli mill were not wearing masks and caps on their heads, and the mill was noisier but no earmuffs were used.

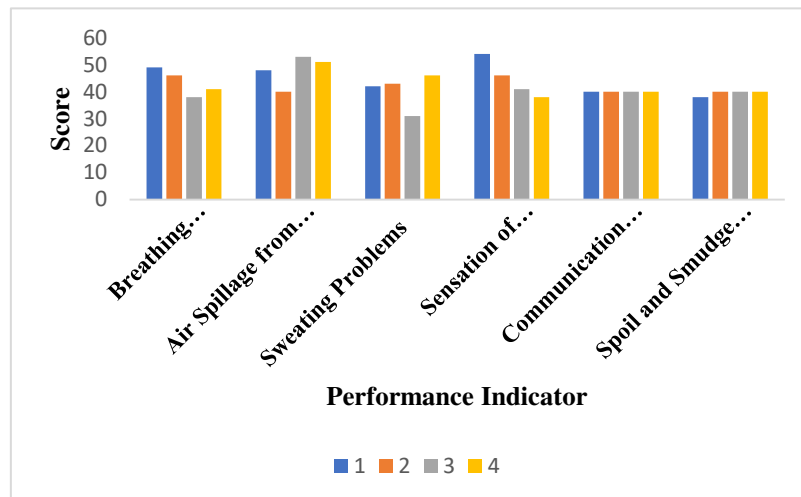
Evaluating the effectiveness of different masks under breathe synchronization conditions using a dust monitoring device can be a valuable approach to assess their performance. Choose a range of masks commonly used by individuals, such as cloth masks, surgical masks, agriculture mask 1 and agriculture mask 2. Each mask has a different level of filtration efficiency and material composition. Measure the concentration of airborne particulate matter (PM) with a dust monitoring device. In the absence of any masks, measure the background PM concentration. It provides a reference point for comparing mask effectiveness. Have individuals wear different types of masks and perform specific breathing patterns (breathe synchronization). Using the dust monitoring device to measure the PM concentration inside the mask during breathing. Ensure that each mask is worn by multiple individuals to account for variations in fit and user characteristics. Conduct multiple trials for each mask type to establish the statistical significance and reliability of the results. Consider using a sufficient sample size to enhance the validity of the evaluation. Agri Dust Mask 2

consistently shows the highest filtration efficiency across different particle sizes (PM₁, PM_{2.5}, PM₄, PM₁₀) and overall (PM_{total}) compared to the Cloth Mask, Surgical Mask, and Agri Dust Mask 1. Therefore, Agri dust Mask 2 is the most effective mask among the given options for filtering out particles.(fig.4)

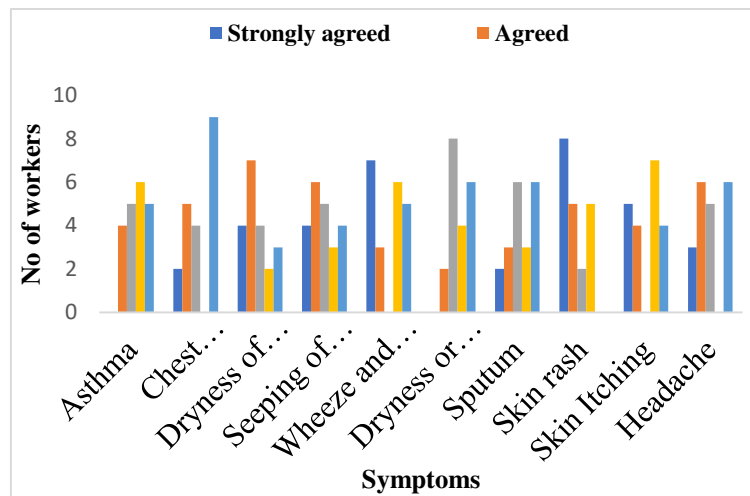
It is evident from the data that when working in the chilli processing industries agricultural dust mask 2, and surgical mask have the highest levels of acceptability (far exceeding all others). The agricultural dust mask 1 and the surgical mask were most acceptance during chilli work. It was discovered that disposable plastic polythene hand gloves are suitable for workers' use and are reasonably priced on the market for skin dust protection as compared to yellow rubber hand gloves. Yellow rubber hand gloves are also a suitable choice to employ in the sector. Disposable plastic polythene hand gloves and yellow rubber hand gloves are suggested for skin dust protection and, similarly, for the eye/vision dust protectors dust safety goggles have the highest acceptability testing score. Therefore, dust safety goggles are advised as a dust protector for eyewear; however, due to their potentially high market price, it is better if the owner of the industry gives eye protectors to those who experience burning or allergic reactions, particularly to their eyes in workers.



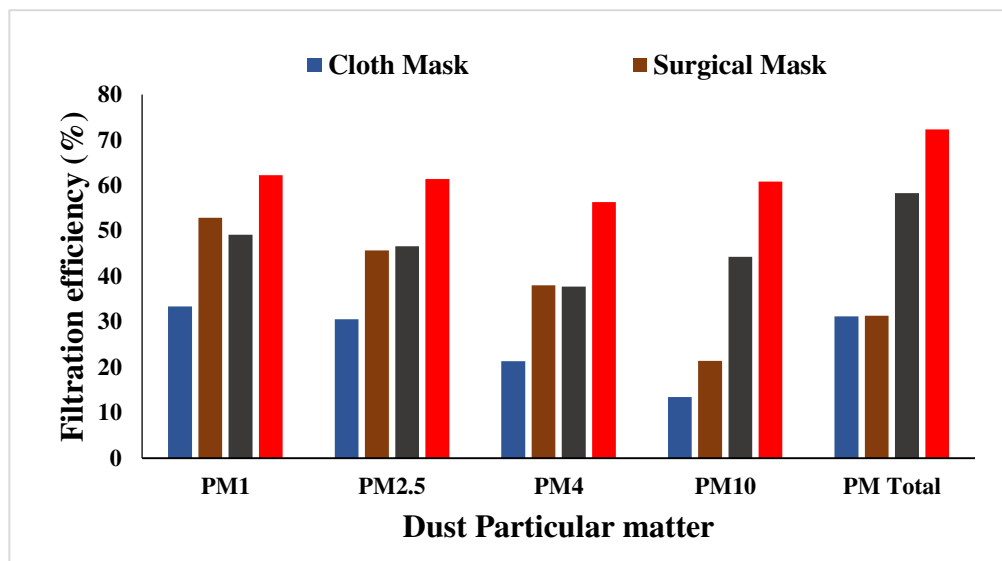
1. Dust mask test rig



2. Suitability score for selected dust protectors



3. Chilli mill workers health related symptoms



4. Filtration efficiency of various masks

V. CONCLUSION

The workers in the chilli mills typically utilized the damp towels. Skin itching, watery eyes, Asthma, sputum production were the health symptoms that were most prevalent in chilli industry workers. Average dust concentration was measured for different masks at PM₁, PM_{2.5}, PM₄, PM₁₀, and T.S.P. Agricultural dust mask 2 has highest level of effectiveness, indicating that it offers superior protection against dust particles compared to other masks evaluated. Agricultural dust mask 1 and surgical mask has moderate effectiveness, while cloth masks displayed the least reduction in dust concentration, but for the PM₄ surgical mask is more effective as compared to agricultural mask 2. Agricultural dust mask and surgical dust mask, as well as dust safety goggles, disposable plastic polythene hand gloves and industrial yellow rubber hand gloves, were regarded by the chilli mill workers to be best suited and acceptable.



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