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Occupational health hazards and associated risk of injuries among workers involved in stone masonry work at high hills of Uttarakhand

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Abstract

Uttarakhand, is the land of snow peaks, glorious green hill-slopes and mountains. There are many ancient temples and buildings in the region which were constructed over a period of time under the influence of the local culture, geo-climatic conditions, topography and locally available materials. For the human comfort, buildings are designed using locally available materials and construction technology according to the climate and topography of the hilly areas. Acute and prolonged jobless condition of the local people has easily attracted by the employment opportunities offered by the stone masonry work in hills. Therefore, stone masonry work become an important sector in hilly areas and flourishing rapidly due to increasing demand of the infrastructure. Stone masonry work is one of the most dangerous informal sectors to work because of the enormous health hazards associated with this work. Occupational health hazards and associated injuries, pain and discomfort are more pronounced in manual stone operations. Therefore the present study was planned with the objective; to assess the occupational health hazards, common injuries, pain and discomfort faced by stone masonry workers. The present study was purposively conducted in Kumaon Region of Uttarakhand in Nainital district under Dhari block. A total of 120 male stone masonry workers were randomly selected for the study. Checklist was adopted by researcher for assessing occupational health hazards, common injuries, pain and discomfort among workers. The results revealed that workers were suffering from ergonomic, physical, psychosocial, biological and environmental hazards. They also experienced crushing injuries from tools and stones, cuts; wounds were also reported by workers. Pain and discomfort was felt by workers while doing activities. A significant relationship was found between musculoskeletal discomfort and occupational hazards.

Keywords: masonry work, occupational hazards, pain, injuries, musculoskeletal discomfort

Introduction

Uttarakhand, is the land of snow peaks, glorious green hill-slopes and mountains. It is full of hilly resorts, pilgrimages and adventure sports destinations that attract a wide range of tourist traffic. There are many ancient temples and buildings in the region which were constructed over a period of time under the influence of the local culture, geo-climatic conditions, topography and locally available materials. For the human comfort, buildings are designed using locally available materials and construction technology according to the climate and topography of the area (Tiwari and Bansal, 2017) [8]. Architecture of the region follows a vernacular traditions and techniques using locally available materials such as timber, soil and stone. Hills are susceptible to different types of natural hazards like landslides, earthquakes and cloudburst. Therefore in hilly regions of Uttarakhand, stones are widely used material for construction of houses, buildings, roads and walls because of its suitability and easy availability by local people for construction purpose. It is widely used material as it resists the impact of earthquake and landslide tremors. As we know that, agriculture is main occupation at high hills for livelihood of local people but Some of the factors like, unemployment, illiteracy, job uncertainty, changes in climatic conditions and access to agricultural land become a challenge for local people, that force them to switch into another occupation for sustain their life. Acute and prolonged jobless condition of the local people has easily attracted by the employment opportunities offered by the stone masonry work (Giyasuddin and Arindam, 2018) [4]. Therefore, stone masonry work become an important sector in hilly areas and flourishing rapidly due to increasing demand of the infrastructure. Basically masonry stone, as a building material, play a vital role in rural and urban households in hill ecosystem in India.

One side if we see the positive aspect of stone masonry work, it has become a source of income for hilly people. But on the other side stone masonry work is one of the most dangerous informal sectors to work because of the enormous health hazards associated with this work.

Occupational health hazards and associated injuries, pain and discomfort are more pronounced in manual stone operations. Workers who are involved in stone masonry work and engaged in various activities like extraction, breaking, loading and unloading, crushing shaping and layering are suffering from several occupational health hazards varying from accidental to physical, ergonomic, environmental, biological, psychosocial and respiratory hazards.

The workers are unaware about the ill effects of this work on their health while performing these operations manually. Workers are experiencing ergonomic hazards such as musculoskeletal disorders which is the result of awkward working postures for long period of time and poorly designed tools, which is end with severe pain and discomfort in upper and lower extremities specially in neck, back, shoulders, hands, wrist and knees.

Lower and upper back pain and muscles pain could be due to incorrect working posture, improper material handling and load carrying practices which also affects the cervical spine and neck muscles and end with severe pain (Sulainman *et al.*, 2015) [7].

Continuous and repetitive work, place excessive force on joints, put pressure on muscles and tendon that increase the risk of musculoskeletal discomfort. It is usually occur when there is mismatch between the requirement of the job and the physical capacity of the human body (Ahmad and Alvi, 2017) [2]. During lifting or carrying heavy stones on head, shoulder and hands manually workers are at high risk of pain or discomfort in head, neck, shoulder, and problem in disk, vertebral and spinal Colum. Carrying the load on head leads to accelerative degenerative changes, which involve degenerative changes in the upper cervical spine, reduction in disc height and changes in the vertebrae.

The injuries resulting from accidental hazards includes being hit by stones or tools, injury of hands, fingers, toes, cuts, bleedings, and eye injury resulting from penetration of small dust particles into the eyes.

The other type of hazards these workers have to tackle are the physical, environmental, psychosocial and biological hazards like (repetitive lifting, loading and unloading, vibration, low temperature, fog, rain, long working hours, stress, burden, fatigue, skin problem, allergic reaction due to direct contact of dust, dirt etc). Machines are not utilized by them for extraction, breaking, loading and unloading, crushing and shaping of stones. It causes direct injurious effects on their health. The present study was planned with the following objectives

1. To assess the occupational health hazards faced stone masonry workers.
2. To assess common injuries sustained by stone masonry workers.
3. To assess pain and discomfort felt by stone masonry workers.

Hypothesis

H₀: There is no significant relationship between musculoskeletal discomfort and occupational hazards.

Material and Method

The present study was purposively conducted in Kumaon Region of Uttarakhand in Nainital district under Dhari block and 5 villages were purposively selected from it. A total of 120 male stone masonry workers were randomly selected from the respective villages. Checklist was adopted by researcher for collecting information regarding, occupational health hazards faced by workers, common injuries, pain and discomfort felt by workers at workplace. All possible information was gathered by asking direct questions to the workers at worksite.

Results and Discussion

Personal profile of workers

The age of the stone masonry workers ranged from 25 to above 55 years. The mean age of stone masonry workers was 56.39 ± 14 . On the whole maximum 40 percent workers were fall under the age group of 25-35 years of age followed by 39.16 percent in the age group of 35-45 years. While 12.5 percent comes under the age group of 45-55 years and minimum 8.33 percent workers were fall under the age group of 55 and above. Literacy level among stone masonry workers was very low and more than half, 55 percent were illiterate. The mean income of the workers was 7424 ± 2531 Rs /month.

Occupational health hazards faced by workers

Figure1, presenting data regarding occupational health hazards faced by stone masonry workers. On the whole, it was found that various types of hazards were found in the present study and ergonomic hazard was one of them. It was found that all of the workers involved in various activities were performing repetitive task whole day. Out of which majority, 95 percent of the workers were adopting awkward postures during task. Therefore they were suffering from pain in various body parts especially in lower back, shoulders, neck, hands and knees. Maximum, 84.16 percent workers were working in forceful motion of hands and shoulders. Around 39 percent of the workers stated that the tools were poorly designed and they were not feeling comfortable while handling them. They felt pain in hands and palm portion due to direct contact with the hard surface of the tool. Majority, 88.33 percent of the workers felt musculoskeletal discomfort in upper and lower extremities. Repetitive task with forceful motion, working in awkward postures with poorly designed tools were found to be the main reasons for musculoskeletal discomfort among workers. The results are in line with the study conducted by Wambui (2015) [9] on occupational health and safety hazards associated with quarrying activities in Kenya. The results revealed that during manual handling of heavy load, respondents suffered with pain and discomfort in neck, back, hands/wrist and shoulder during performing the activities. It was also found that 74.8% of the respondents did not use.

Protective clothing at work

Figure 2 stated that, all workers were also facing physical hazards in work. It was observed that more than half i.e 53.33 percent of the workers were at risk of physical hazards while lifting, followed by more than half, i.e 54.16 percent workers experienced vibration in hands during activity. Nearly 40 percent workers at risk during loading and unloading, 30.83 percent were facing problem of noise and 20.83 percent reported that they met with the accident of slip in past, but none of them shared their experience about falling while working.

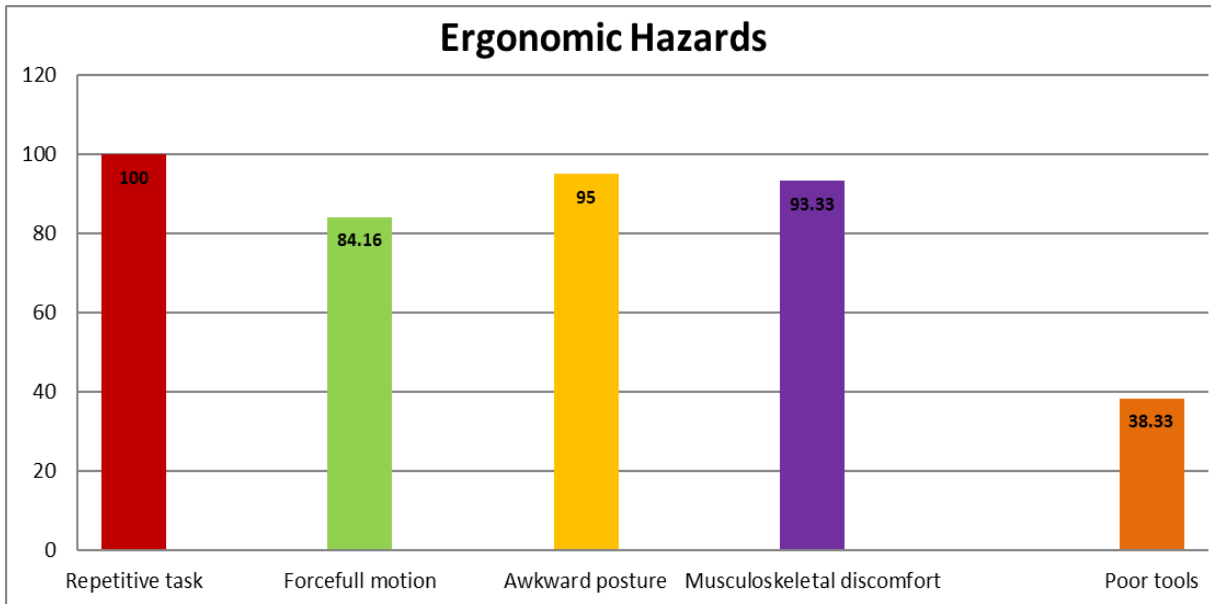


Fig 1: Percentage distribution of workers with respect to ergonomic hazards

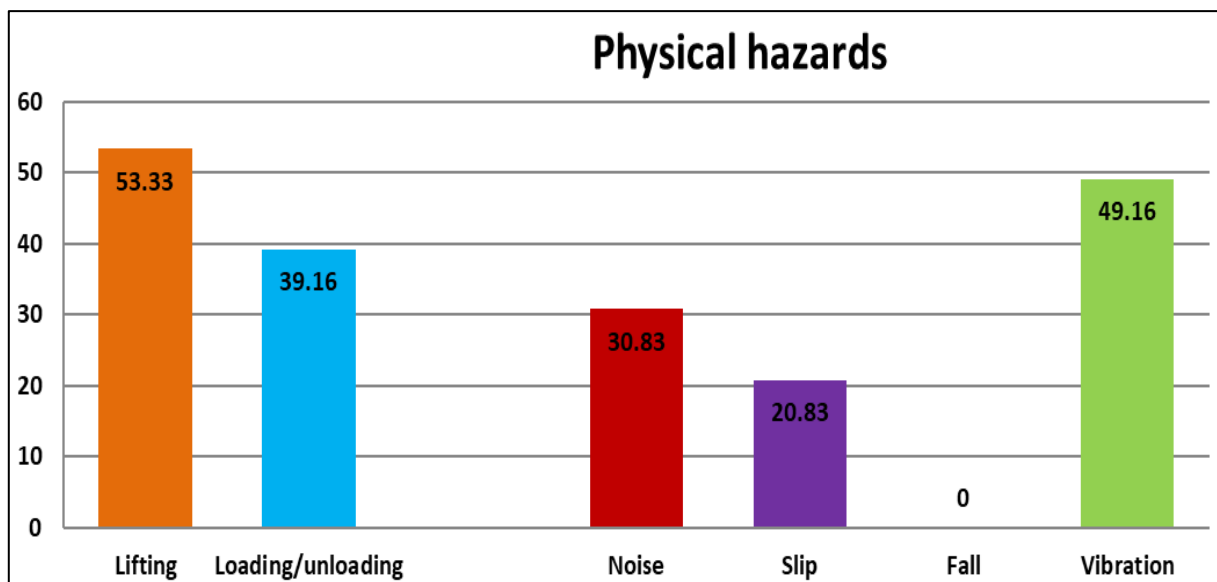


Fig 2: Percentage distribution of workers with respect to physical hazards

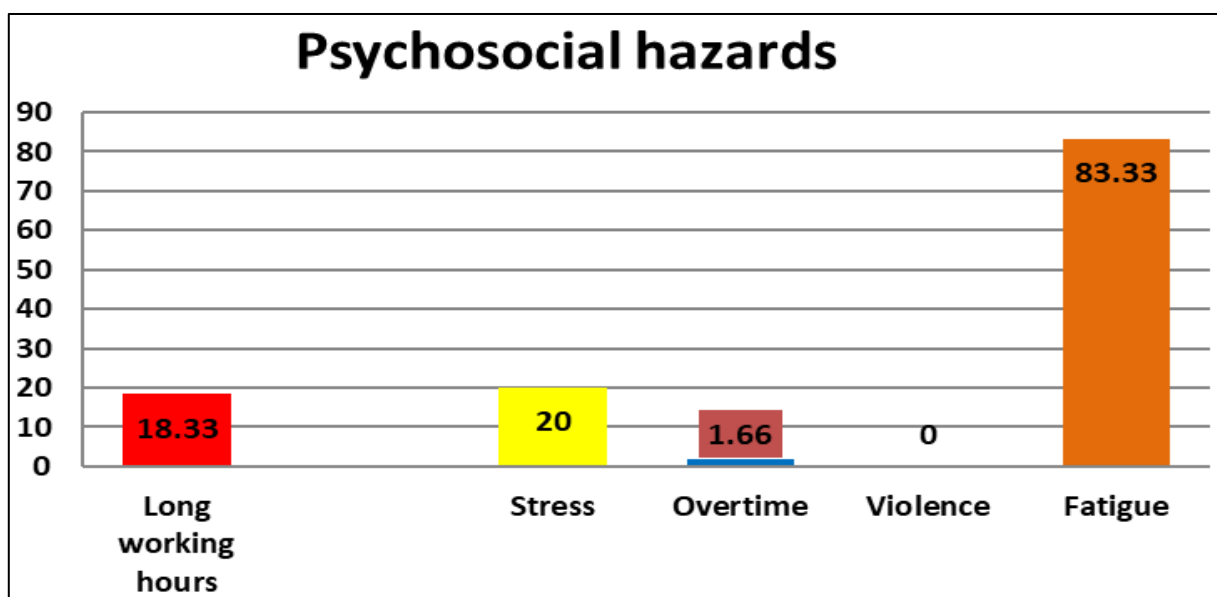


Fig 3: Percentage distribution of workers with respect to psychosocial hazards

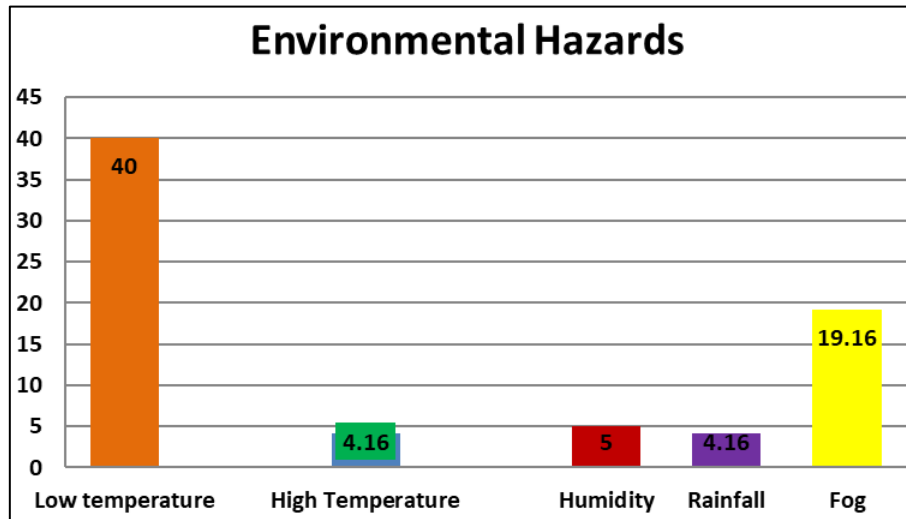


Fig 4: Percentage distribution of workers with respect to environmental hazards

Fig.3 depicted that psychosocial hazards were also found in this study. Majority 83.33 percent workers felt fatigue during activities, followed by 20 percent workers reported stressed because of high workload. Around 18.33 percent of the workers reported about long working hours and 1.66 percent reported work pressure and over time.

Fig 4 revealed that environmental hazards were also found in the present study. On the whole 40 percent of the workers said that because of low temperature their work got affected, it was hard for them to work when temperature goes down. Their hands become cold and stiff to perform the activity. Due to unavailability and unawareness about usage of personal protective equipments like gloves while work, force them to work in this condition. Followed by 19.16 percent of the workers reported that in fog their work got affected. While 4.16 percent of the total workers said it was hard to work in rainy season. Stone masonry workers work under bad weather, which was quite unfavourable for them. Working under drizzling rain and low temperature was very common among the workers. They stop working only when there was heavy rain excepting the rest hours in the noon time. They pay much endurance in their work to earn for their livelihood. Workers were also experienced biological and respiratory hazards at work. Out of total workers 27.5 percent of the workers were bitten by insects and nearly 6 percent workers said they were suffering from hand allergies. Around 11 percent and 7.5 percent of the total workers were suffering

from cough and chest pain respectively.

The statistical results of the present hypothesis predicted that musculoskeletal discomfort was positively and significantly related to occupational hazards.

Common injuries sustained by workers

Figure 5 presenting data regarding common injuries sustained by workers. On the whole it was found that out of total workers, 45 percent of the workers experienced injuries. Around 19 percent of the workers had cuts from sharp edges of stones and 15 percent workers had wounds because of cuts. A similar study was conducted by Ramesh and Joseph (2015) [6] on stone crushing unit workers. The results revealed that cuts and wounds were most common injuries faced by workers. Similar finding is reported in the present study. Further it was also found that 18.33 percent of the total workers said that their finger was damaged or ruptured while performing activities. While 9.16 percent of the workers toes were damaged. About 14 percent workers reported that bleeding was also happed. Nearly 20 percent of the workers said that they had crushing injuries from tools while 21 percent workers had crushing injury from stones. Similar study was conducted by Bharara *et al.*, (2012) [3] on 80 female construction workers, to assess the injuries and diseases among them. It was found that women workers were suffering from abrasion of skin, slip, trip, and fall, cuts, bleeding and eye injury during work.

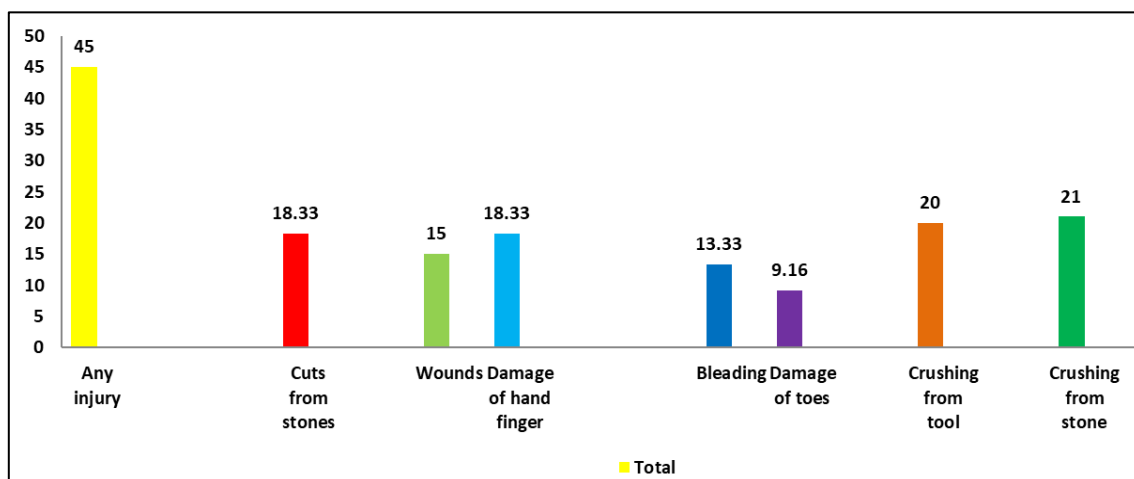


Fig 5: Common injuries sustained by workers

Figure 6 presenting data regarding preventive actions taken by workers when they got injured. The results revealed that a small proportion i.e only 1 percent of the total workers applied local cream when they got injured, 3.33 percent of the

workers went to chemist. Nearly 26 percent never go to chemist for proper treatment and 10 percent workers used local available natural plant or homemade remedy for healing the wound.

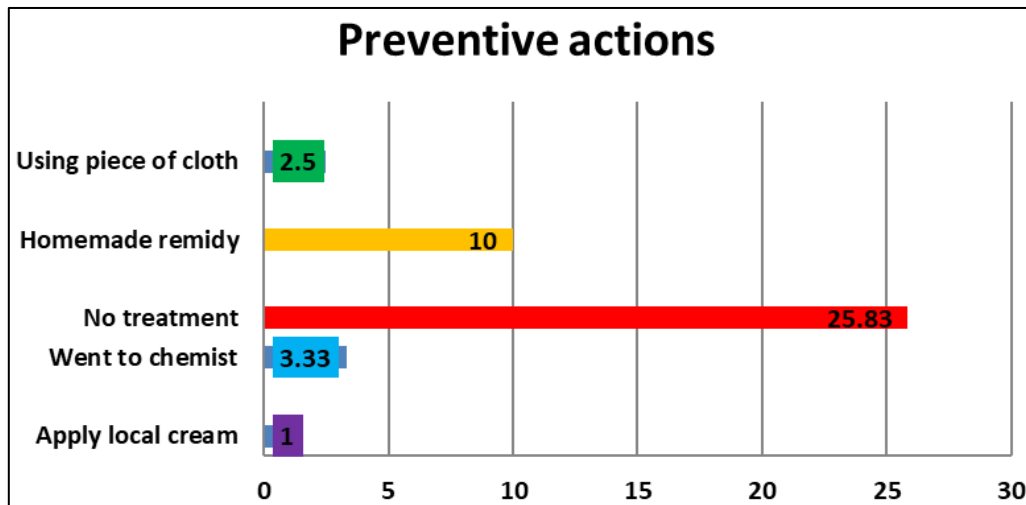


Fig 6: Preventive actions taken by workers

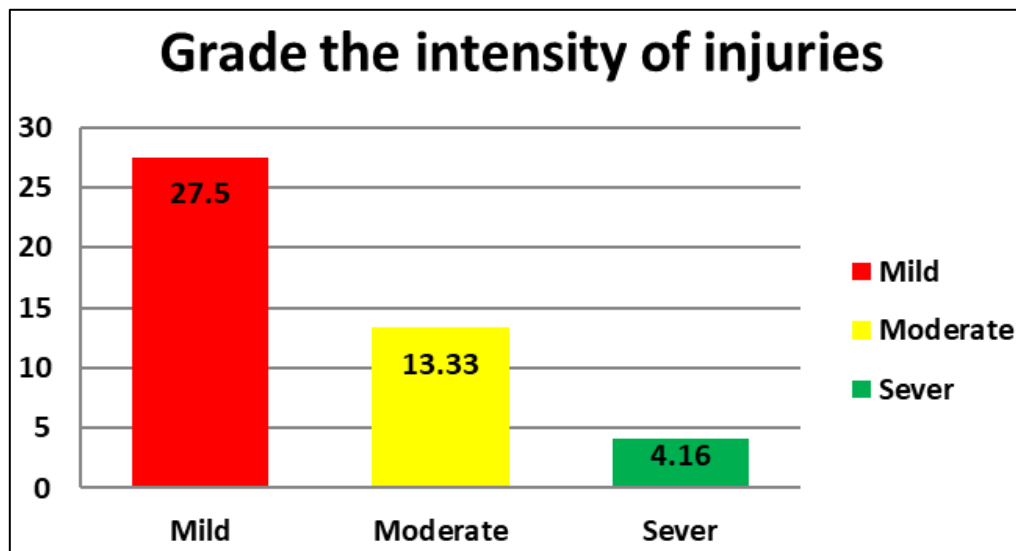


Fig 7: Intensity of injuries experienced by workers

Figure 7 explained that, when grades were given to the intensity of injuries, it was found that around 28 percent workers graded the injury as mild, while 13.33 percent graded their injury as moderate and only 4.16 percent workers stated that, their injury as being severe.

Unavailability and unawareness about of safety practices and its usage with casual attitude of workers regarding injuries was the main reason for injuries. Similar study was conducted by (Aminu *et al.*, 2018) [1] on manual stone crushing workers. The results revealed that, more than half of the workers sustained injuries including, cuts from sharp stones, and crushing injury from working tools or stones.

Two thirds graded the injury as mild, while 25 percent graded their injury as severe. Only 9 percent of them went to chemist for treatment.

Pain and discomfort felt by workers

Table 1 revealed data regarding pain and discomfort felt by stone masonry workers while performing various activities. On the whole, it was found that none of the workers had any knowledge about the musculoskeletal discomfort. They never heard this name and never know that when some activities are performed they lead to musculoskeletal discomfort. Majority, 84.16 percent of the workers stated that their pain started form their current job. But no one kept themselves away from normal activities. Maximum 84.16 percent of the workers reported that activities they were performing cause pain. Whereas 31.66 percent said that their pain was getting worse. More than half i.e 63.33 percent of the total workers said that the severity of pain strongly varying. Nearly 45.83 percent of the workers pain was started suddenly, while 54.16 percent worker’s pain was not started sudden

Table 1: Pain and discomfort felt by stone masonry workers n=120

Pain in various body parts	Yes	No
Do you know about musculoskeletal discomfort and pain	-	120 (100)
Pain starts during your current job?	101 (84.16)	19 (15.83)
Do you stay away from normal activity because of pain and discomfort	-	120 (100)
Activities cause pain and discomfort	101 (84.16)	19 (15.83)
Is pain getting worse?	38 (31.66)	89 (74.16)
Is the severity of pain strongly varying?	76 (63.33)	44 (36.66)
Pain start suddenly?	55 (45.83)	65 (54.16)
Pain hinder your sleep?	40 (33.33)	80 (66.666)
Getting up in the morning with a stiff feeling	58 (48.33)	62 (51)
Numbness or twinkling feeling in your arms or hands?	38 (31.66)	82 (68.33)
Did you ever had		
A frozen shoulder	24 (20)	96 (80)
A herniated cervical disc	1 (0.83)	119(99.16)
medical treatment due to your pain	9 (7.5)	111 (92.5)
A hospitalization due to your pain?	-	120 (100)
How many days were you on sick leave during the past 6 months due to your neck and shoulder pain?		
None	-	55 (45.83)
1-7 days	11 (9.16)	109 (90.83)
8-14 days	-	-
Above 14-28 days	-	--
Have you received any type of the following services in your site		
Health insurance	-	120 (100)
Health check up if yes	-	120 (100)
Medical allowance	-	120 (100)

Note: Values in parenthesis indicates percentage

Also 33.33 percent of the total workers said that pain hindered their sleep. Around 48.33 percent of the workers reported that they wake up with stiff feeling and 31.66 percent workers had numbness or twinkling feelings in arms or hands. About 20 percent of the workers stated that they sometimes experienced a frozen shoulder while wakeup in the morning. No one had cervical disc problem. Only 7.5 percent of the workers took medical treatment for pain.

None of the worker was hospitalized because of pain. On the whole, 45.83 percent of the workers did not take any sick leave in last 6 months. While a small proportion, i.e 9.16 percent of the workers were taken sick leave under 1-7 days. But none of the workers took sick leave for 8-14 days and 14 days to above. It was also found that none of the worker got benefited by health insurance, health check up and medical allowance in this work.

A similar study was conducted by Goldshyder (2002) [5] to determine the magnitude and musculoskeletal disorders among mason tenders and assess work-related activities perceived by them as contributing to their disorders. The results revealed that 82% of the mason tenders experienced at least one musculoskeletal symptom in the last year and Low back pain was the most frequently reported symptom (65%).

Conclusion

On the basis of findings the following conclusion were drawn

- The workers, who were involved in stone masonry work performed various activities were at high risk of occupational hazards, injuries, pain and discomfort. The workers were unaware about the risk associated with these work, they were vulnerable to be affected by wide range of hazards like ergonomic, physical, biological, environmental and psychosocial hazards. The injuries resulting from accidental hazards includes cuts and crushing injury from tool or stones, slip, trip and fall, eye injury resulting from penetration of small dust particles

into the eyes. They also experienced pain and discomfort in body parts while performing activities. Therefore, kind attention should be given in this sector for preventing workers from this hazards and immediate actions are needed for eliminating the risk of injuries and occupational hazards at work place for safety of the workers.

Suggestions to optimize comfort

- Personal protective equipment specially head support, gloves, helmet, eye goggles, face mask must be provided to the workers during activities that may reduce the risk of hazards and injuries at work.
- The findings of this study suggest the need for educating the workers about occupational hazards and utilization of safety measures.
- They must be motivated to adopt safety measures to protect themselves from occupational hazards. It should be compulsory to wear personal protective equipments, as it was observed that in many cases the workers do not prefer to use them, as they feel uncomfortable while working with these PPEs.

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