



MUSCULOSKELETAL DISORDER AMONG THE WORKERS OF GOLD JEWELLERY FACTORY

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ABSTRACT

Background: Jewellery has always been part of the culture of the Indian subcontinent. One of the most popular small-scale industries in Bangladesh is the production of gold ornaments. These industries belong to the unorganized sector of the country. The purpose of the study was also to find out the musculoskeletal symptoms and determine associated risk factors and their socio-demographic characteristics. **Methods:** A cross sectional study was carried out from 1st January to 31st December, 2021. Some gold jewellery factories were selected purposively in Tanti Bazar Old Dhaka City and study participants were selected conveniently. Data were collected by face-to-face interview using pretested and semi-structured questionnaire based on Standardised Nordic Musculoskeletal Questionnaire (NMQ). The statistical analysis was done by using the SPSS software version 25. There were a total 374 male respondents with age ranged from 20 to 58 years. **Results:** The study revealed that, most of the respondents (94.12%) suffered ache, pain, and discomfort in the hip or thigh in last 12 months. Mean working experience of the respondents was 13.64 ± 8.17 years. Musculoskeletal symptoms were significantly associated with age, working experience and not having good working station design. **Conclusion:** This study may help to reduce the musculoskeletal symptoms among the gold jewellery workers by taking proper educational programs on prevention and coping strategies for musculoskeletal disorder which is very much essential now a days.

KEYWORDS: *Musculoskeletal disorder, Gold jewellery workers.*

INTRODUCTION

Gold is significant as luxury all over the world. Gold is the most popular and historical symbol of wealth in the world in all its forms. The rich history and cultural heritage of gems and jewellery, along with the enduring allure of gold, have contributed to the growth of the jewellery industry. The gold jewellery workers already have the capacity to produce handmade and machined jewellery in both traditional and modern designs (Chellam, 2018).

According to our tradition, handmade gold jewellery signifies the cultural heritage of Bangladesh. At least one family of jewelers lives in every village in the Indian subcontinent to produce custom gold jewellery for the locals and their livelihood. Because gold is by nature highly portable and acts as an inflation hedge in any country, gold is considered an important material for saving and investing. This is the second preferred investment after bank deposits. (Sikder et al., 2017).

The production of handmade gold jewellery is a collective procedure. To complete a piece of gold

jewellery in a proper way requires the touch of skilled craftsmen, starting with melting, refining and alloying the gold in the frame and finally fine hand polishing of the jewellery.

To successfully carry out the whole some of these processes, the gold jewellery employees should face such a lot of troubles. Musculoskeletal issues are the not unusual fitness danger amongst them (Hossain et al., 2015).

Musculoskeletal disorders (MSDs) are injuries or disorders to the muscles, nerves, tendons, joints, cartilage and supporting structures of the upper and lower extremities, neck and lowerback that cause, precipitate or worsen aggravated by sudden exertion or prolonged body contact factors such as repetition, force, vibration or uncomfortable posture. All these are accounted during handmade gold jewellery process.

To increase productivity and make more profit, they have to work for a long time and they also work from time to time for a long period of time to meet the demand.

Goldsmiths do their work for a long time in the same posture. Perform repetitive movements of different body parts (Sumeetha et al., 2015).

Symptoms of MSDs range from muscle discomfort, aches, pain to numbness and restricted movement of the musculoskeletal system. MSD can come on suddenly or develop over time. Several factors such as uncomfortable posture, repetitive actions, heavy lifting, vibration, fatigue, working long hours without rest can lead to work-related musculoskeletal disorders. (WMSDs) (Jukariya and Singh, 2018).

Musculoskeletal disorders continue to be a major cause of disability and lost work time. Understanding their causes, and especially work-related ones, remains key to primary prevention.

Traditional Indian jewellery making requires a sitting position. The worker works in asquatting position on the floor, keeping the trunk tilted forward with the neck twisted. This posture increases the risk of developing various WRMSD diseases (Salve and De, 2018).

The prevalence rates of various MSDs are underreported in the literature for workers in the jewellery manufacturing sector. Therefore, a research need arose to evaluate the prevalence of musculoskeletal discomforts among jewellery workers.

RESULTS

Following findings were found in this study

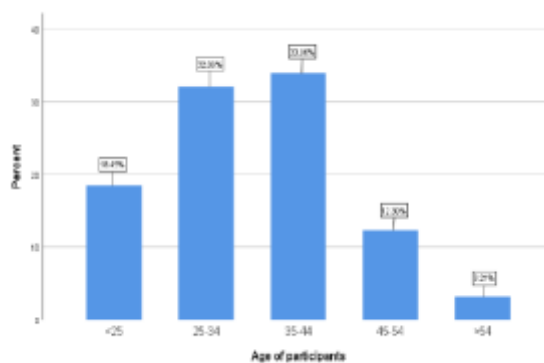


Figure 1: Distribution of the respondents according to their age group (n=374).

Figure 1 shows respondents' ages were between 20 to 58 years. The mean age of study participants was 34.37 ± 9.286 years. Majority (33.96%) of the respondents

Therefore, a cross-sectional study was conducted to investigate musculoskeletal disorder in workers at the gold jewellery factory in the former Dhaka City Tanti Bazaar. The results of this study can be used by policy makers to take the necessary steps to improve the situation for gold jewellery workers.

METHODS

This cross sectional study was carried out in gold jewellery factory of Tantibazar, belong to the Kotwali Thana of Old Dhaka city, Bangladesh among 374 adult male gold jewellery workers (age 18 years and above) were the study population by convenient sampling technique. Data were collected by face to face interview using Standardized Nordic Musculoskeletal Questionnaire and Semi structured questionnaire.

Workers with history of any co-existing diseases that might cause soft tissue or joint pain and history of musculoskeletal problem that has been diagnosed before working as a gold jewellery worker were excluded from the study.

Prior to the commencement of this study, the protocol was approved by the Intuitional Review Board of NIPSOM, Mohakhali, Dhaka.

was in the age group of 35-44 years and 32.09% were in the age group between 25-34 years.

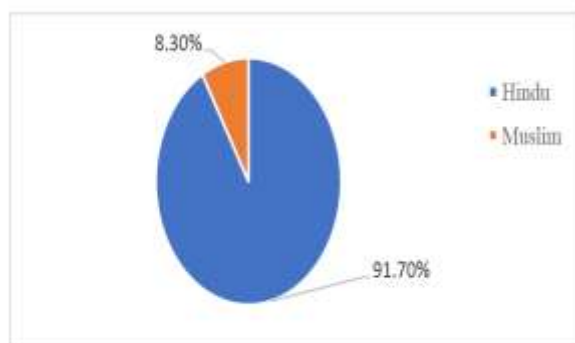


Figure 2: Distribution of respondents by their religion (n=374).

Figure 2 shows the distribution of respondents by their religion. Among 374 respondents mostly (91.70%) were Hindu and 8.30 % were Muslim.

Table 1: Distribution of respondents by their working experience (n=374).

Working experience	Frequency*	Mean \pm SD MinimumMaximum
≤ 10 years	162 (43.32)	13.64 \pm 8.17 years 2 years 30 years
11-20 years	146 (39.03)	
21-30 years	66 (17.65)	

*Percentages in parentheses

Table 1 shows the distribution of the respondents by their working experience category. Their minimum working experience was 2 years and maximum working experience was 30 years. The mean working experience

was 13.64 \pm 8.17 years. Among 374 respondents about 43.32% (162) had working experience for less than or equal to 10 years, 39.03% (146) had 11-20 years and 17.65 % (66) had 21-30 years of working experience.

Table 2: Distribution of working experience of the respondents with presence of musculoskeletal symptoms in last 12 months.

Body region	Working experience			Test of significance
	≤ 10 years n=162 F (%)	11-20 years n=146 F (%)	21-30 years n=66 F (%)	
Neck	89 (54.9)	105 (71.9)	54 (81.8)	$\chi^2= 18.538$, df=2, p=0.000 *
Shoulder	49 (30.2)	73 (50.0)	39 (59.1)	$\chi^2= 20.635$, df=2, p=0.000 *
Elbow	9 (5.6)	19 (13.0)	18 (27.3)	$\chi^2= 20.617$, df=2, p=0.000 *
Wrist/Hands	41 (25.3)	64 (43.8)	32 (48.5)	$\chi^2= 16.207$, df=2, p=0.000 *
Upper back	64 (39.5)	111 (76.0)	58 (87.9)	$\chi^2= 65.935$, df=2, p=0.000 *
Lower back	94 (58.0)	129 (88.4)	64 (97.0)	$\chi^2= 57.954$, df=2, p=0.000 *
Hip/Thigh	146 (90.1)	141 (96.6)	65 (98.5)	$\chi^2= 8.535$, df=2, p=0.014 *
Knee	103 (63.6)	106 (72.6)	54 (81.8)	$\chi^2= 8.071$, df=2, p=0.018 *
Ankle/Feet	17 (10.5)	38 (26.0)	23 (34.8)	$\chi^2= 20.733$, df=2, p=0.000 *

*Statistically significant ($p < 0.05$)

*Percentages in parentheses

The above table shows hip/thigh symptoms were most prevalent 90.1% (146) among the participants who were

working for less than or equal to 10 years, 96.6% (141) among 11-20 years working experience and

98.5% (65) among those who were working for 21-30 years. According to the table, all of the above

associations were statistically significant as the value was <0.05.

Table 3: Distribution of age of the respondents with presence of musculoskeletal symptoms in last 12 months.

Body region	Age					Test of significance
	<25	25-34	35-44	45-54	>54	
MSDs	n=69	n=120	n=127	n=46	n=12	
	F (%)	F(%)	F(%)	F(%)	F(%)	
Neck	37 (53.6)	70 (58.3)	94 (74.0)	36 (78.3)	11 (91.7)	$\chi^2=18.159$, df=4, p=0.001 *
Shoulder	11 (15.9)	45 (37.5)	68 (53.5)	30 (65.2)	7 (58.3)	$\chi^2=38.256$, df=4, p=0.000 *
Elbow	3 (4.3)	9 (7.5)	17 (13.4)	11 (23.9)	6 (50.0)	$\chi^2=28.310$, df=4, p=0.000 *
Wrist/Hands	14 (20.3)	33 (27.5)	59 (46.5)	22 (47.8)	9 (75.0)	$\chi^2=27.624$, df=4, p=0.000*
Upper back	18 (26.1)	66 (55.0)	99 (78.0)	39 (84.8)	11 (91.7)	$\chi^2=68.802$, df=4, p=0.000 *
Lower back	31 (44.9)	86 (71.7)	115 (90.6)	43 (93.5)	12 (100.0)	$\chi^2=65.277$, df=4, p=0.000 *
Hip/Thigh	61 (88.4)	111 (92.5)	123 (96.9)	45 (97.8)	12 (100.0)	$\chi^2=8.239$, df=4, p=0.083
Knee	42 (60.9)	81 (67.5)	92 (72.4)	36 (78.3)	12 (100.0)	$\chi^2=10.138$, df=4, p=0.038 *
Ankle/Feet	4 (5.8)	15 (12.5)	37 (29.1)	14 (30.4)	8 (66.7)	$\chi^2=37.642$, df=4, 0.000 *

*Statistically significant (p<0.05)

*Percentages in parentheses

Table 3 represents that, musculoskeletal symptoms in neck region was higher (91.7%) in age group of more than 54 years, 78.3% in 45-54 years, 74.0% in 35-44 years.

In shoulder region was higher(65.2%) in age group of 45-54 years, more than 54 years 58.3%, 35-44 years 53.5%, in elbow region was higher in age group of more than 54 years 50%, 45-54 years 23.9%, 35-44 years 13.4%, in wrist/hands region was higher in age group of more than 54 years 75%, 45-54 years 47.8%, 35-44 years 46.5%, in upper back region was higher in age group of more than 54 years 91.7%, 45-54 years 84.8%, 35-44 years 78.0%, in lower back region was higher in age group of more than 54 years 100%, 45-54 years 93.5%, 35-44 years 90.6%, in knee region was higher in age group of more than 54 years 100%, 45-54 years 78.3%, 35-44 years 72.4% and in ankle/feet region was higher in age group of more than 54 years 66.7%. All these associations are statistically significant as the p value was less than 0.05. There was no statistically significant association between musculoskeletal symptoms in hip/thigh region with age group, as the p value was more than 0.05.

DISCUSSION

In this present study, respondents' ages were between 20 to 58 years. The mean age of study participants was 34.37±9.286 years. Majority (33.96%) of the respondents were in the age group of 35-44 years, 32.09% were in

the age group between 25-34 years. In another study, (Ghosh, Das and Gangopadhyay, 2010), which was conducted in Davangere district in Karnataka, India with 120 randomly selected male gold jewellery workers. The objective of the study was to identify occupational disorder of the goldsmiths of India. The mean age of the respondents in this study was 31 ± 6.38 years, which was nearly similar to the present study of Bangladesh.

In this present study, according to religious view, mostly 91.7% (343) respondents are Hindu and the rest 8.3% (31) respondents are Muslim. In the study (Sumeetha, 2015) which was aimed to give importance to the informal manufacturing in the country and presence of social security provisions and labour laws in the gold jewellery making industry in Kerala. A total 320 workers were taken by purposive sampling technique.

All the workers were Hindu. So, in comparison to present study in Bangladesh, Hindu workers were higher in India.

Regarding the educational qualification, in the current study majority of the respondents 48.7% (182) were educated up to primary level, 45.7% (171) up to secondary or higher secondary level and rest 5.6% (21) were illiterate (never went to school) or only could signature their name. According to the study (Sumeetha, 2015) which was aimed to give importance to the informal manufacturing in the country and presence of

social security provisions and labour laws in the gold jewellery making industry in Kerala. A total 320 workers were taken by purposive sampling technique. In that study, most of the workers were illiterate. So, according to that study educational qualification is lower than the present study of Bangladesh.

Regarding the prevalence of musculoskeletal disorder (ache, pain, discomfort) in individual body region, this study result found that most of the respondents suffered ache, pain, discomfort in the hip or thigh (94.12%) followed by lower back (76.7%), Neck (66.3%), upper back (62.3%), shoulder (43.0%), Wrist (36.6%), knee (29.7%), ankle/foot (20.59%), elbow (12.3%). In the study (Abedin et al., 2018), which was aimed to find out the prevalence of neck pain in gold jewellery workers in the view of most of them work with their leg crossed or with a faulty posture which could cause neck pain. Data from 200 subjects were collected from different gold markets in Lahore, Pakistan. According to this study 62% gold jewellery workers had pain in their neck. In comparison to the present study, the prevalence of neck pain was 66.3% which is higher than that study in Lahore, Pakistan.

According to present study, the minimum working experience of the respondents was 2 years and maximum working experience was 30 years. The mean working experience was 13.64 ± 8.17 years. Among 374 respondents about 43.32% (162) had the working experience for less than or equal to 10 years, 39.03% (146) had 11-20 years and 17.65% (66) had 21-30 years of working experience. In the study (Ghosh, 2015) which was conducted with the objective of assessment of postural effect on work related musculoskeletal disorder and back muscle fatigue among the gold jewellery workers. The study was conducted on 100 male jewellery workers. Among them the mean years of working experience was 13.2 years, which was similar to the present study.

Regarding the present study, among 374 respondents, all of them (100%) had to bend or twist of their neck, lower back, and repetitive movement of their wrists or hands, work in same posture for long period, work in awkward posture and sit for a long period of time. About 36.9% of all the respondents had to bend or twist their wrist or hands and 40.4% respondents often had to hold their arms at or above shoulder level. In the study (Ghosh, 2015) which was conducted in India with the objective of assessment of postural effect on work related musculoskeletal disorder and back muscle fatigue among the gold jewellery workers. The study was conducted on 100 male jewellery workers. In this study almost all (100%) workers had to do repetitive movements of hands, sit or stand for prolonged period time with bending or twisting of body posture and work in awkward posture. It was almost similar in comparison to present study of Bangladesh.

In the present study, among all the participants there was statistically significant association between age and musculoskeletal symptoms in neck ($p=0.001$), shoulder ($p=0.000$), elbow ($p=0.000$), wrist/hands ($p=0.000$), upper back ($p=0.000$), lower back ($p=0.000$), knee ($p=0.038$) and ankle/feet ($p=0.000$) in last 12 months.

In the present study, among all the participants there was statistically significant association between working experience and musculoskeletal symptoms in neck ($p=0.000$), shoulder ($p=0.000$), elbow ($p=0.000$), wrist/hands ($p=0.000$), upper back ($p=0.000$), lower back ($p=0.000$), hip/thigh ($p=0.014$), knee ($p=0.018$) and ankle/feet ($p=0.000$) in last 12 months.

All these associations were statistically significant as the p value was less than 0.05.

CONCLUSION

About half of the total respondents had primary education. About two third of the respondents reported ache, pain, discomfort in multiple sites of the body. More than ninety percent of the respondents suffered ache, pain, discomfort in the hip or thigh followed by lower back, knee, neck, upper back, shoulder, wrist/hands, ankle/foot, elbow in last 12 months. The study revealed that, there was significant association between ages, working experience with musculoskeletal symptoms. So, improvement of working conditions and control of risk factors for musculoskeletal symptoms are very essential.

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