BRIEF ARTICLE

Mortality causes in goldsmiths of Bangladesh: Findings from verbal autopsy

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ABSTRACT

Background: Information on the mortality causes of goldsmiths in Bangladesh is limited. This study aimed to find out the mortality causes in a selected group of goldsmiths.

Methods: A World Health Organization recommended questionnaire was adapted to conduct verbal autopsy of 20 deceased goldsmiths. Death-related information was gathered from the family members present during deceased's illness preceding death. The mortality causes were determined by the interview outcomes and medical records-review.

Results: The mean age of the goldsmiths at death was 59.2± 9.3 years. Among then, 70.0% were smokers and 50.0% were alcohol consumers. Cardiovascular diseases (CVD) were the most common immediate and underlying cause of death (60.0% and 45.0%, respectively).

Conclusion: The life expectancy of goldsmiths was much lower than the average life expectancy of Bangladeshi population, where CVD was the primary cause of death. Smoking and alcohol consumption were prevalent among them. Awareness about healthy lifestyles should be prioritized for highly CVD prevention among the goldsmiths.

INTRODUCTION

Jewelry-making is one of the world's oldest manufacturing industries.[1] Goldsmith workers working in these industries are exposed to various hazardous chemicals, e.g., cyanide, lead, zinc, cadmium, palladium, iridium, sulphuric acid, nitric acid and silica.[2] Long-time exposure to these hazardous chemicals and particles puts their lives at risk of various particle toxicity.[1] Goldsmith workers' cause-specific mortality showed an excess proportion of pancreatic cancer, stomach cancer and liver cancer.[3, 4] Among the non-malignant causes of death, kidney disease, arteriosclerotic heart disease and rheumatic heart disease were high among the jewelry workers in the United States of America.[5]

In Bangladesh, thus are about 200-300 thousand goldsmiths.[6] The artisans rely primarily on manual labor and the precarious work environment puts their life at risk of various particle toxicity which is a major occupational health concern.[1]

There is limited information on the specific health risks and causes of death among goldsmiths in Bangladesh because a large proportion of their deaths occur outside of medical care. In such settings, verbal autopsy (VA) remains the best source of information to identify the causes of death.[7] Therefore, the current study aimed to find out the causes of death in this population using VA.

METHODS

Study participants

To ascertain the causes of death, VA was conducted among the deceased goldsmiths of Bangladesh. Before commencing the study, a list of 70 goldsmiths of Dhaka, Bangladesh, who died within the last four years of the data collection, was collected from a locally recognized welfare club for the goldsmiths (*Dhaka Swarna Shilpi*

HIGHLIGHTS

1. Majority of the goldsmith died prematurely where CVD was the common cause.

2. Smoking and alcohol consumption were highly prevalent.

3. Awareness about healthy lifestyles should be prioritized for the goldsmiths.

Sromik Shongho). From that list, the family members of the deceased were traced following the mentioned addresses. After approaching 35 deceased goldsmiths' addresses, a total of 20 VA could be completed. Data of the rest of the workers could not be collected because of incorrect address and migration of the families.

Study sites

All the deceased goldsmiths' workplace was Dhaka. Most of the subjects (n=12) resided in Tanti Bazar of Kotoali thana, Dhaka, which occupies one of the largest goldsmith clusters in Bangladesh.[8] Other areas in Dhaka from where the deceased information was gathered are Hazaribagh (n=1), Mohammadpur (n=1), Lalbagh (n=2), etc. Besides Dhaka, Shivalaya (n=3) of Manikganj district, and Nagarpur (n=1) of Tangail district were also included, as those were the deceased's permanent addresses.

Data collection

Starting with the most recent death, data were collected from the deceased goldsmiths' family members who were present during the deceased's illness preceding death. A data collection team consisting of trained enumerators and a local coordinators, and two physicians for the outcome assessment.

A pretested semi-structured questionnaire used in the face-to-face interviews for data collection was adapted from the existing VA instrument of the World Health Organization (WHO).[7] To make it culturally acceptable, an expert translated the questionnaire into Bangla. Then the Bangla version was back-translated into English by a different person and was compared for consistency.

The VA questionnaire included information on education and religions, age in years at death, specific sections on suffering from non-communicable diseases (NCD), signs, symptoms, injury, personal habits (smoking and alcohol consumption) and available health records including the deceased's death

certificates. Cardiovascular disease (CVD), cancer, diabetes mellitus, and chronic obstructive pulmonary disease (COPD)/bronchial asthma were considered as major NCDs.[9] Hypertension, heart disease, and stroke were included in the CVD.[9] An open-ended section for additional information on the deceased's terminal illness was also included. Medical records and death certificates were also collected, if available.

Outcome assessment

Identification of the underlying and immediate causes of death were considered as the outcome. The underlying cause was termed as "the disease or injury which initiated the train of morbid events leading directly to death, or the circumstances of the accident or violence which produced the fatal injury".[10] "The final disease or injury causing the death" was termed as immediate cause of death.[11] The causes of death were then coded according to the International Classification of Diseases, 10th Revision (ICD-10).[12] For determination of the causes of death, initially, two physicians reviewed the outcome of all the interviews (combinations of the reported illness, signs, and symptoms) and assigned a cause of death for each case. As suggested by WHO,[7] for a discrepancy in finalizing the cause of deaths, a third physician adjudicated the result.

Statistical analysis

Descriptive analysis of all the continuous variables is presented as frequency and percentages. The mean and standard deviation of the age of the subjects was calculated and categorized into two groups as ≤70 years and >70 years, where death before <70 years is considered as premature.[13] Smoking was categorized into current smokers and nonsmokers.[14, 15]

RESULTS

All the deceased (n=20) were male. Respondents were son, daughter, daughter-in-law, spouse, brother or sister of the deceased. Five could produce the medical records during the interview.

The background characteristics of the deceased goldsmiths are given in **TABLE 1.** The mean age at death was 59.2±9.3 years. The majority (85.0%) of the deceased goldsmiths were in ≤70 years age group. More than half (60.0%) of them were educated up to the primary level. Most (70.0%) of the deceased goldsmiths

TABLE 1 Socio-demographic characteristics and personal habits of the deceased goldsmith workers (n=20)

Characteristics	Number (%)
Age at death	
≤ 70 years	18 (85.0)
> 70 years	2 (10.0)
Religion	
Islam	1 (5.0)
Hinduism	19 (95.0)
Education	
No formal education	4 (20.0)
Any primary or above	16 (80.0)
Smoker	14 (70.0)
Alcohol consumer	10 (50.0)

were smokers, and 50% were alcohol consumers for long time.

Majority (65.0%) of the deceased were suffering from hypertension (**TABLE 2**). More than two-thirds (70.0%) of the deceased suffered from at least two major NCDs (data not shown).

CVD (I00-I99) was the immediate cause of death for 60.0% of the deceased (**TABLE 3**). Also, for the underlying causes of death, CVD (I00-I99) was the most prominent (45.0%) cause, followed by cancer (C00-C97) (20.0%).

TABLE 2 Major NCDs among the deceased goldsmiths* (n=20)

Disease name	Number (%)
CVD	
Hypertension	13 (65.0)
Heart disease	7 (35.0)
Stroke	3 (15.0)
Cancer	3 (15.0)
Diabetes mellitus	10 (50.0)
Chronic obstructive pulmonary disease/ bronchial asthma	3 (15.0)

*Multiple responses

DISCUSSION

The mean age of the deceased goldsmiths was nearly 60 years, which is about 13 years less than the national life expectancy (72.6 years) of the population in Bangladesh.[16] The proportion of premature death in this study, was very high (85.0%) compared to 23% premature death in general male population of Bangladesh.[13] High proportion of goldsmiths having two or more NCDs concurrently might be the reason behind this higher proportion of premature deaths.

In the current study, CVD was found to be the most common immediate cause of death as well as the underlying cause of death (60.0% and 45.0%, respectively). Although this finding is consistent with Bangladesh's overall mortality profile, where CVD is the leading cause of all deaths,[9] the proportion of deaths due to CVD in the current study, was higher among the goldsmiths. Similarly arteriosclerotic heart disease, a subgroup of CVD was reported as the non-malignant prime cause of death among jewelry workers by Hayes, et al.[5] In contrast, some previous studies claimed malignancy as the major mortality cause among jewelry workers.[3–5] The common NCD risk behaviors identified in this study smoking (70.0%) and alcohol consumption (50.0%). Another study in Bangladesh also reported a higher proportion (58.3%) of smokers among the goldsmiths.[17] Similar scenario of death by CVD (60.0%) among the deceased goldsmiths in the present study may be explained by the existence of NCD risk behaviors, which are the established risk factors for CVD.[18, 19]

Some limitations need to be considered before interpreting the results of this study. Although it has been reported that recall bias of an event like a death is not affected up to five years,[20] there might be a small chance of recall bias. The absence of proper medical records hindered the process of adjudication of the causes of death. We could recruit 20 people out of targeted 70 goldsmiths, which might have compromised the generalizability of our findings.

TABLE 3 Immediate and underlying causes of death among the goldsmiths (n=20)

Causes of death (ICD-10 code)	n (%)
Immediate causes	
Certain infectious and parasitic diseases (A00-B99)	2 (10.0)
Endocrine, nutritional and metabolic diseases (E00–E90)	1 (5.0)
Cardiovascular diseases (I00-I99)	12 (60.0)
Diseases of digestive system (K00-K93)	2 (10.0)
Diseases of genitourinary system (N00-N99)	1 (5.0)
Symptoms, signs and abnormal clinical and laboratory findings, not elsewhere classified (R00–R99)	1 (5.0)
Injury, poisoning and certain other consequences of external causes (S00–T98)	1 (5.0)
Underlying causes	
Certain infectious and parasitic diseases (A00–B99)	1 (5.0)
Cancer (C00-C97)	4 (20.0)
Diseases of the blood and blood-forming organs and certain disorders involving the immune mechanism (D50–D89)	1 (5.0)
Endocrine, nutritional and metabolic diseases (E00–E90)	2 (10.0)
Cardiovascular diseases (I00-I99)	9 (45.0)
Disease of respiratory system (J00-J99)	1 (5.0)
Disease of digestive system (K00-K93)	1 (5.0)
Diseases of the genitourinary system (N00–N99)	1 (5.0)

Conclusion

Majority of the goldsmiths died prematurely where CVD was the common cause. NCD risk behaviors like smoking and alcohol consumption were highly prevalent. Awareness about healthy lifestyles should be prioritized for a prevention of CVD in this profession.

Author Contributions

Conception and design: FAK, MK, SSI. Acquisition, analysis, and interpretation of data: MTI, AR. Manuscript drafting and revising it critically: MK, SER, KMTR, SSI. Approval of the final version: FAK, MK, MTI, AR, SER, KMTR, SSI. Guarantor accuracy and integrity of the work: FAK, SSI.

Conflict of Interest

The authors declare that there are no competing interests.

Ethical Approval

This study was conducted according to the Declaration of Helsinki and performed after getting official clearance from the Institutional Review Board of Bangabandhu Sheikh Mujib Medical University. During data collection, family members of the deceased goldsmiths were contacted by the interviewers ensuring confidentiality and anonymity. An informed consent form was provided to them with the details of the research, rights regarding participation, recording the medical reports and death certificates of the deceased workers, and the respondent's withdrawal from the study at any stage. Written informed consent was obtained from the respond.

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