

Description of Mercury Poison Clinical Symptoms in Workers and Communities Around the Small-Scale Gold Processing Area

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ABSTRACT

The traditional gold processing process in Paya Seumantok Village, Krueng Sabee District, Aceh Jaya Regency, Aceh Province, is carried out using the amalgamation method which still uses mercury in the process, so it poses a risk to the health of workers and the surrounding community. This study aims to obtain an overview of the clinical symptoms experienced by workers and the community around the gold processing area. This study uses qualitative research methods with the number of community respondents were 90 respondents, and the number of worker respondents were 10 workers. Based on the results, the common acute clinical symptoms experienced by the community were headache (48.6%), cough (39.6%), abdominal pain (37.8%), diarrhea (29.7%), and hip pain (25.2%). While the chronic clinical symptoms experienced by the majority of community respondents were headaches (47.7%), irritability (27.9%), insomnia (26.1%), muscle cramps (23.4%), and weight loss (20.7%). Moreover, the most common acute clinical symptoms experienced by workers were cough (8 respondents), pelvic pain, diarrhea, abdominal pain, vomiting, nausea, and headaches were experienced by 7 respondents respectively. While for chronic clinical symptoms, the majority of workers experienced headaches and insomnia (8 respondents), irritability (6 respondents), anxiety (6 respondents), muscle cramps (5 respondents), and tremors (4 respondents). Based on the result, it can be concluded that the clinical symptoms encountered by the community and workers in the gold processing area have not shown clinical signs that are quite dangerous.

1. INTRODUCTION

Mercury (Hg) is a toxic material that can have harmful effects on humans and the environment. It is widely used in the gold mining process which serves to purify precious metals. Gold processing using amalgamation techniques is known to damage the environment and cause human health risks [1]. Mercury is released into the atmosphere in the form of mercury vapor resulting from the amalgam combustion process [2,3]. It can be in the atmosphere for long periods and can travel considerable distances by air [4]. Mercury poisoning is the result of mercury compounds exposure from various toxic effects depending on the type and chemical form and the route of exposure [5].

Mercury can cause serious health problems in the community when exposed to these heavy metals. In this case, the most dangerous is methyl mercury (MeHg) [6]. The production of MeHg is from an amalgamation process released into the environment in the form of metal and steam. The release can harm the population or workers and communities who are lived near the mining site and can penetrate the nervous system as the main target, causing acute or chronic neurological disorders. In addition, symptoms of acute and chronic poisoning can also appear in the form of headaches, muscle cramps, coughs, and aphthous ulcers. Acute toxicity includes mood swings, headache, hearing loss, speech disturbance (dysarthria), while chronic toxicity is detected, for example, tremor, cerebral ataxia, decreased hearing and vision, tingling mouth to hand, impaired memory, impaired sensation, and insomnia [7,8].

From the observations, it is known that gold processing activities carried out in Paya Seumantok Village are still traditional and use amalgamation technique which is using mercury in the processing process, besides that the workers in this traditional gold processing area do not use Personal Protective Equipment (PPE) when working, thereby it multiplies the risk of exposure to mercury.

2. MATERIAL AND METHODS

2.1. Location of Research

This research was conducted in Paya Seumantok Village, Krueng Sabee District, Aceh Jaya Regency, Aceh Province, Indonesia. This location was chosen based on the consideration that the gold processing has been running for more than 10 years. The workers put mercury dissociated with gold ore into a tube to extract the gold by amalgamation technique. After extracting the gold from the ore as amalgam, the mercury is evaporated by burning it in a simple oil stove. Therefore, some of the mercury used in this technique is released directly into the environment. This research was focused on analyzing the clinical symptoms experienced by workers and the public due to mercury exposure.

2.2. Health Impact Survey

The research was conducted in March 2021, involving 90 people as respondents and 10 gold processing workers. Respondents from the selected community are the people who live around the gold processing area and are believed to have frequent interactions with the processing activities. Moreover, the respondents from workers are selected from people who are directly at the processing site as workers and are constantly exposed to mercury. All respondents were observed, interviewed, and had their vital signs checked. The questionnaire was distributed. Each participant completed the questionnaire of assessing health outcomes for the identification of acute and chronic toxicity symptoms. The measured clinical symptoms were neurological disorder symptoms. Neurological disorders are grouped into acute and chronic neurological disorders. Acute neurological disorders consist of headache, hearing loss, loss of smell sense, somatosensory disturbances, dysarthria, and sometimes unstable emotions. In addition, chronic neurological disorders consist of tremor, cerebral ataxia, numbness from lips, hands, and fingers, memory loss, somatosensory disturbances, visual disturbances, and insomnia [8]. The questionnaire lists the symptoms commonly associated with mercury exposure.

3. RESULTS AND DISCUSSIONS

3.1. Characteristics of Respondents

Community respondents were categorized into gender, age, education, occupation, and length of stay. Furthermore, the characteristics of worker respondents were categorized into gender, age, education, and length of working time. Table 1 shows the results of the majority of community respondents being female (43.3%), aged 17-25 years (27.8%) and working as farmers (26.7%).

Table 1. Characteristics of Respondents

Characteristics	Community		Workers	
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)
Gender				
Man	39	43.3	9	90
Women	51	56.7	1	10
Age				
12-16	11	12.2	2	20
17-25	25	27.8	1	10
26-35	7	7.8	0	0
36-45	18	20.0	2	20
46-55	11	12.2	2	20
56-64	12	13.3	3	30
>64	6	6.7	0	0

Occupation	Count	Percentage	Length of working time	Count	Percentage
Farmer	24	27	1-5 year	4	40
Trader	10	11	6-10 year	1	10
Student	28	32	11-15 year	5	50
House wife	19	21			
Gold miner	4	4			
Private	3	3			
Civil Servant	2	2			

Characteristics of workers who become respondents are categorized into gender, age, and length of working time. Table 1 shows that all workers are male (90%), the majority are aged 50-55 years (30%), and have worked for 10-15 years (50%).

3.2. Symptoms of Disease of the Community Around the Gold Processing Area

Based on the results of analysis data, there are several clinical symptoms of acute and chronic toxicity experienced by many people. Figures 1 and 2 show an overview of acute and chronic clinical symptoms experienced by the community around small-scale traditional gold processing areas.

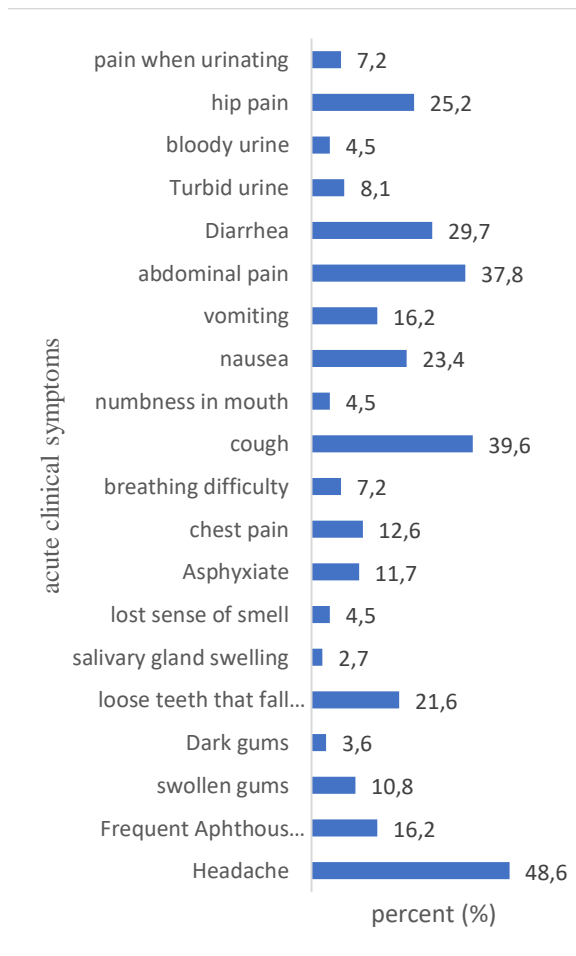


Figure 1 Community's Acute Clinical Symptoms (n = 90)

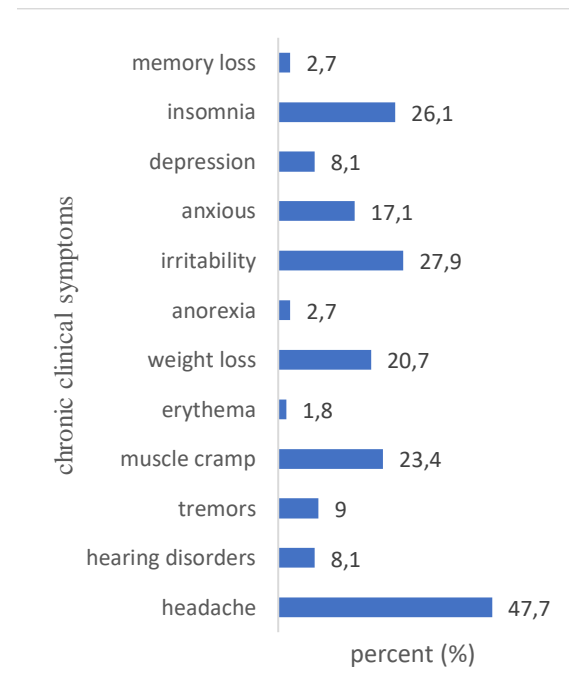


Figure 2. Community's Chronic Clinical Symptoms (n = 90)

Figure 1 shows the symptoms experienced by the community. There are 5 acute clinical symptoms experienced by the majority of the community, namely headache (48.6%), cough (39.6%) abdominal pain (37.8%), diarrhea (29.7%), and hip pain (25.2%). Furthermore, Figure 2 shows the clinical symptoms of chronic toxicity. There are 5 symptoms experienced by the majority of the community, namely headaches (47.7%), irritability (27.9%), insomnia (26.1%), muscle cramps (23.4%), and weight

loss (20.7%). The research results related to symptoms of disease in the community due to mercury exposure have also been reported by other researchers. The results showed that the vision problems had the highest prevalence (43.3%) among health problems and symptoms of Hg poisoning, followed by complaints/symptoms of memory loss (42.9%), weakness (35.1%), fatigue (34, 3%), mood swings (28.7%) and difficulty in concentration (27.2%) were most commonly reported [9].

3.1. Symptoms of Disease of Gold Processing Workers

Based on Figure 3, it can be seen that the majority of respondents experienced cough symptoms (8 respondents), and symptoms of pelvic pain, diarrhea, abdominal pain, vomiting, nausea, and headaches were experienced by 7 respondents respectively.

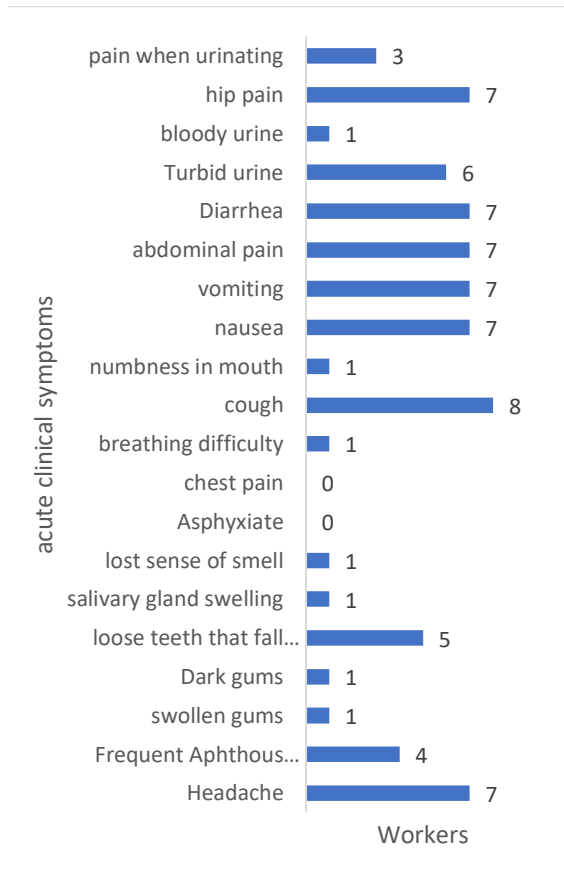


Figure 3 Workers' Acute Clinical Symptoms (n = 10)

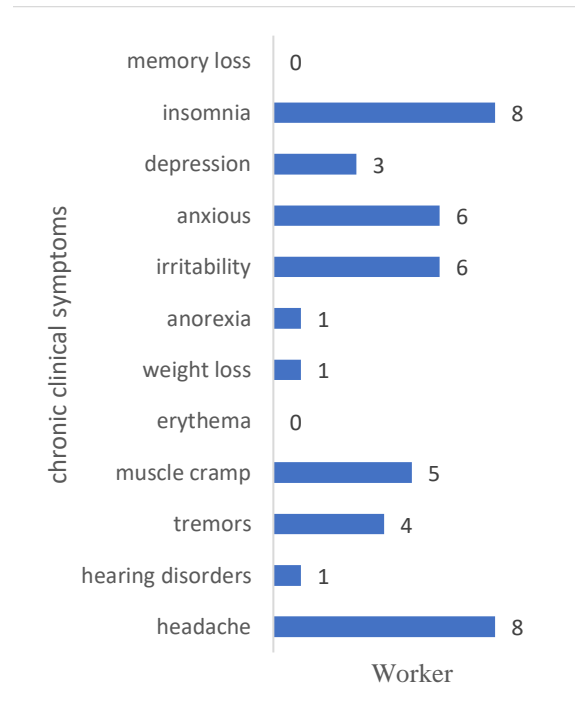


Figure 4 Workers' Chronic Clinical Symptoms (n = 10)

Figure 4 shows an overview of the results of the analysis. Symptoms of chronic toxicity recorded include somatosensory disturbances in gold processing workers. The majority of workers experienced headaches and insomnia (8 respondents), irritability (6 respondents), anxiety (6 respondents), muscle cramps (5 respondents), and tremors (4 respondents). The prior research results related to disease symptoms experienced by amalgamated gold processing workers have also been previously reported by other researchers. The results of the study stated that the community's gold milling operation had an impact on the health of workers. Almost half of the workers reported experiencing acute symptoms such as fatigue (41.7%), headaches (39.6%), and numbness in the mouth (39.6%). While chronic clinical symptoms are muscle cramps (43.8%); headache (41.7%); irritability (39.6%); and easily sad (33.3%) [7].

4. CONCLUSIONS

Based on the results of research that have been carried out, for community respondents, 5 acute clinical symptoms are experienced by the majority of the community, namely headache (48.6%), cough (39.6%), abdominal pain (37.8%), diarrhea (29.7%), and hip pain (25.2%). While the clinical symptoms of chronic toxicity, there are 5

symptoms experienced by the majority of them, namely headaches (47.7%), irritability (27.9%), insomnia (26.1%), muscle cramps (23.4%), and weight loss (20.7%). For worker respondents, the majority of acute clinical symptoms experienced by them were cough (8 respondents), and pelvic pain, diarrhea, abdominal pain, vomiting, nausea, and headache were experienced by 7 respondents. Meanwhile, the main clinical symptoms of the workers experienced headaches and insomnia (8 respondents), irritability (6 respondents), anxiety (6 respondents), cramps (5 respondents), and tremors (4 respondents).

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