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Urban medical geology of mercury pollution on traditional gold smelting in Makassar City, Indonesia

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Introduction

Medical geology is a scientific field which corresponds between natural geological factors and health problem in human, animal, and plants (Komatina 2010). The concept of an urban medical geology perspective is an effect on anthropogenic sources in urban pollution and human health problems. In Makassar, South Sulawesi, Indonesia traditional gold smelting has been run as private enterprises over the last 40 years, with fabricating gold bars to produce gold jewelry as the core business activities. Stages of making gold jewelry include smelting, burning, and panning using mercury (Hg). Therefore, a potential source of mercury exposure and health problems is released in the smelters during their works. This research aims to assess mercury pollution on traditional gold smelters in Makassar City, Indonesia.

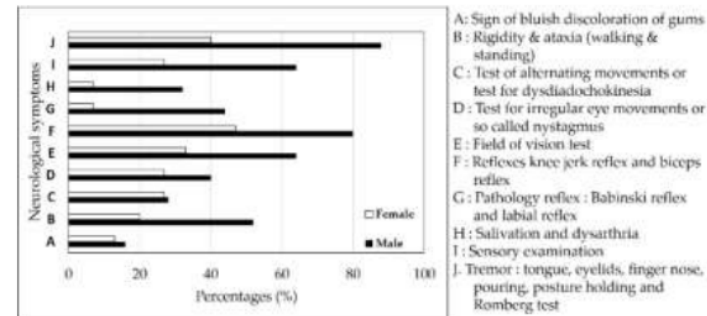
Material and Method

Human scalp hair samples were taken from 105 gold smelters comprised of 54 males and 51 females. The control group consists of 16 males and 16 females. Elemental analysis of the scalp hair samples was performed by particle-induced X-ray emission (PIXE). Through a comparison of mercury levels to the reference values published by the German Human Biomonitoring (HBM) Commission (Schulz et al. 2007) toxicological evaluation was examined. To study the neurological symptoms suffered from mercury pollution, a standardized examination (Bose-O'Reilly et al. 2010) was performed and examined by medical doctors.

Results and Discussion

Traditional gold smelters in Makassar City, Indonesia can be categorized into two groups:

goldsmith who designs and manufactures jewelry, and urban artisanal gold miner (UAGM) who recovers fine gold particles incorporated in the waste from goldsmith work. The result shows that the mean mercury level of goldsmith and UAGM workers are 11.1, 16.3 μ g/g, respectively. Comparing to the control group and reference value of HBM, the mean mercury level of goldsmith and UAGM workers can be considered as a high level. The majority of the gold smelters suffer symptoms of tremor in the tongue, eyelids, finger nose, pouring, and posture holdings. The Romberg test of these symptoms is reaching 88% of samples, followed by unstable rigidity, lack of vision field, slow reflexes, and weak sensory with range 60–67% of the samples (Fig.1). Male smelters experience more symptoms than female smelters. It is probably because male smelters are engaged more actively in the work than female smelters.



And also, it is important to consider that the lifestyle of gold smelters probably affects their health.

Fig.1. Neurological assessment of traditional gold smelters.

References

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