

## Contamination of Total Mercury in Cosmetics at Kalasin, Thailand

Theeranat Suwanaruang

Faculty of Science and Health Technology, Kalasin University, Kalasin, Thailand

---

**Abstract:** Mercury is high toxic effects on human's organs such as on lungs, kidneys, skin, eyes, nervous, digestive and immune system. It is widely distributed in the environment by natural and anthropogenic sources. The aim of this research was detection of total mercury contain in cosmetic products at Kalasin shops. About 35 samples were whitening creams, night creams, day creams, sunscreen creams, serum, BB creams (Beauty Balm creams), CC creams (Color Correcting creams) and DD creams (Double Duty creams). The samples analyzed total mercury by test kit of Department of Medical Sciences, Ministry of Public Health. The results found that 14 samples were contaminated with total mercury. The conclusion for total mercury is concern. Though some samples analyzed in this study toxic levels of mercury their continuous use may pose health threat, since, mercury accumulate in the liver and kidneys which can cause damage to these organs.

**Key words:** Total mercury, cosmetics and Kalasin, samples, whitening, research, detection

---

### INTRODUCTION

In Thailand mercury and mercury compounds prohibited use in cosmetic products (Anonymous, 2015, 2016). Mercury expenditure in cosmetics has two chemical forms inorganic and organic. Inorganic mercury which occurs as salts of mono and divalent mercury and ammoniated mercury is an example. The second form which organic mercury compounds is basically used as cosmetic preservatives, e.g., phenyl mercuric salts (WHO., 1991, 2007). Mercury is high toxic heavy metal which is a heavily health effects on kidney damage, anxiety depression and peripheral neuropathy. Many sources of mercury examples in natural, industry and in cosmetic products such as whitening cream, day cream, night cream and whitening products (Elhag *et al.*, 2015). Total mercury is a noxious metal but originate usefulness in numerous aesthetic planning beleaguered at skin lightening by suppression of melanin creation by the skin. Aesthetic foodstuffs containing mercury in the structure of dead mercury are essentially second-hand by brown painful colonize as a rule in on the increase countries. Decorative planning containing mercury for bleaching intention is long-standing practice. Mercury is a capricious facet and is risky to the skin what time old in an energy to darken the skin. However, never-ending exposure of the essence to mercury at awfully depleted concentration be capable of affect long-lasting neurological and kidney hurt (Agorku *et al.*, 2016; Anonymous, 2008).

Total mercury toxic effect such as mercury has respiratory, cardiovascular, gastrointestinal, hepatic, renal impairment and reproductive effects. Moreover, mercury was associated with elevated white blood cells, changes into auto-immune response, drop in vision and genotoxic

effects (Chan, 2011). Skin cosmetics such as whitening cream, whitening lotion, sunscreen cream. There is inorganic mercury that used to suppress melanin production. Over the counter bleaching products recommended for fading discolorations due to melasma (hyperpigmentation), burns and acne scars have been reportedly used in the whole face with the purpose of fading skin tone (Copan *et al.*, 2015).

Mercury is interested from people and scientists all over the world to investigate its effects on the environment and human health. Many research works focused on its biogeochemical cycling in which water, soil, air, biota was directly involved (Horvat, 2005). However, in environments, low attention has been paid to cosmetic products. Cosmetics are immediately expose into human gastrointestinal system and cosmetics are directly put on skin body (Liang *et al.*, 2013).

In nearly everyone communities across the globe, fairness is branded as beauty, elegance and exalted public status. This perception encourages mainly women to engage in skin bleaching. Skin-lightening or bleaching has reached craze levels in a lot of nations across the world. Several women need to shield their skin toned and good-looking by indulging in skin attention crop that peroxide the skin for the most part of these bleaching decorative goods keeps in check separate kinds of injurious chemicals such as hydroquinone, mercury, kojic acid and vitamin C which container have emotional impact their health (Yoshimura *et al.*, 2001; Amponsah *et al.*, 2014). Mercury in bleaching measures tin be absorbed through the skin and accumulates in federation organs benevolent slope to dangerous toxicity (Sah, 2012). Then the purpose of this study was to analyze total mercury content in cosmetic products at Kalasin shops.

## MATERIALS AND METHODS

About 35 samples were in Kalasin shops such as whitening creams, night creams, day creams, sunscreen creams, serum, BB creams (Beauty Balm creams), CC creams (Color Correcting creams) and DD creams (Double Duty Creams). The samples analyzed mercury and hydroquinone by test kit of Department of Medical Sciences, Ministry of Public Health. Mercury Test Kit Department of Medical Sciences, Ministry of Public Health. The test kit is for screening ammoniated mercury in face cream. Limit of detection is 0.15% w/w. The samples contaminated with mercury had yellow, orange or pink color, the samples not contaminated with mercury had green color (Tantanawat *et al.*, 2011; Boonprachom *et al.*, 2013; Prasongkool and Ruengorn, 2017).

## RESULTS AND DISCUSSION

The results found that 14 samples were contaminated with total mercury from 35 samples (Table 1). All samples were collection at Kalasin cosmetics shops such as whitening creams, night creams, day creams, sunscreen creams, serum, BB creams (Beauty Balm creams), CC creams (Color Correcting creams) and DD creams (Double Duty creams).

The cosmetic samples analyzed total mercury by test kit of Department of Medical Sciences, Ministry of Public Health. The results found that total mercury in 14 cosmetic samples in toxic levels. These some creams do not pose any health risk to women, so far as total mercury levels are concern. Though some samples analyzed in this study do not contain high levels of total mercury, their continuous use may pose health threat, since, hydroquinone and mercury can accumulate in the liver and kidneys which can cause damage to these organs. Mercury is a toxic heavy metal which is widely dispersed in nature (Engler, 2005). Human being toxicity varies with the develop of mercury, the dose and the grade of exposure. The goal organ for inhaled mercury haze is primarily the brain. Mercurous and mercuric salts mostly smash up the gut lining and kidney at the same time as methyl mercury is commonly spread throughout the body.

Toxicity varies with dosage not inconsiderable acute exposures to essential mercury spray induce ruthless pneumonitis which in excessive gear be capable of be fatal. Low-grade inveterate exposure to basic or other forms of mercury induces subtler symptoms and clinical findings as discussed hereinafter (Bernhoft, 2012).

In Thailand mercury and mercury compounds prohibited use in cosmetic products (Anonymous, 2015, 2016). Other supplementary significant health risks consist of hypertension, diabetes, infertility, leukemia, skin cancer, toxicity, immunosuppression, renal and liver impairment and failure, Cushing's syndrome (hormonal disorder), insomnia, recall loss, tremors, discourse and earshot impairment. These tribulations expand from the acute or inveterate long-term exposure to the frequently perilous compound agents that are hand over in bleaching products. The smash up from bleaching food is repeatedly exacerbated once user's assortment bleaching harvest with household chemicals such as toothpaste, laundry bleach, detergents and similar automotive run acid, awfully ordinary tradition in certain settings to endeavor to enhance their effect. However, this residue really understudied attempt. Mercury is exceedingly unstable ingredient with elongated atmospheric half-life. As effect of these substantial properties, it is everywhere in the environment and exposure is not an cut off matter but more accurately a universal danger to creature health. In fresh years, follow a line of investigation has exposed that steady normal exposure to fantastically at a low-level concentration of mercury has the facility to grounds long-lasting neurological and kidney hurt being health risks from mercury exposure enclose been far and wide documented and comprise neurological effects, impaired fetal and infant growth and achievable hand-outs to cardiovascular disease (Agorku *et al.*, 2016).

Mercury be inflicted with resulted in the buildup of mercury in the main part after assimilation through the skin above all in the kidney everywhere it is predominantly accumulated in the tubular region, openhanded begin to the occurrence of dangerous reactions (Davids *et al.*, 2016). Health special effects and how to gauge exposure. The major adverse end product of the lifeless mercury enclosed in skin lightening soaps

Table 1: Location and the number of detection total mercury

Location	Type of cosmetics	Price per piece (Thai-Bath)	Number of detection Total mercury (sample)
Open 24 h shop (Cosmetics zone)	Whitening creams, night creams, day creams, sunscreen creams,	10-300	1
The flea markets	Whitening creams, night creams, day creams,	10-500	3
Small shops in villages	Whitening creams, sunscreen creams, serum, BB creams (Beauty Balm creams)	10-30	10

and creams is kidney damage. About 9 Mercury in skin lightening foodstuffs may besides grounds skin rashes, skin streak and scarring as correctly as a cut in the skin's resistance to bacterial and fungal infections (Ladizinski *et al.*, 2011). Mercury is a frequent ingredient set up in skin lightening soaps and creams. It is besides into being in other cosmetics such as judgment frame refining harvest and mascara (UNEP., 2008). Mercury salts inhibit the formation of melanin, follow-on in a lighter skin tone. Mercury in makeup exists in two forms lifeless and organic lifeless mercury (e.g., ammoniated mercury) is old in skin lightening soaps and creams. Organic mercury compounds (thiomersal [ethyl mercury] and phenyl mercuric salts) (WHO., 2007). Beauty preservatives in sense composition refinement go.

### CONCLUSION

The fourteen samples were contaminated with mercury. The 21 samples were not detection contaminated with mercury. The conclusion for mercury levels in some cosmetic samples are concern. Though some samples analyzed in this study toxic levels of mercury, their continuous use may pose health threat, since, mercury accumulate in the liver and kidneys which can cause damage to these organs.

Protection and awareness raising between consumers and health practitioners on the potential health hazards of cosmetic products may decrease the risk of total mercury poisoning and accommodate adverse health effects in addition to, improve estimation and exposure assessments perfume (WHO., 2007).

### REFERENCES

- Agorku, E.S., E.E. Kwaansa-Ansah, R.B. Voegborlo, P. Amegbletor and F. Opoku, 2016. Mercury and hydroquinone content of skin toning creams and cosmetic soaps and the potential risks to the health of Ghanaian women. SpringerPlus, 5: 1-5.
- Amponsah, D., G.E. Sebiawu and R. Voegborlo, 2014. Determination of amount of mercury in some selected skin-lightening creams sold in the Ghanaian market. Intl. J. Eng. Res., 3: 344-350.
- Anonymous, 2008. Mercury in products and wastes. Division of Technology, Industry and Economics, Chemicals Branch, United Nations Environment Programme, Geneva, Switzerland.
- Anonymous, 2015. Annual report of bureau of cosmetics and hazardous substances in 2015. Department of Medical Sciences, Ministry of Public Health Thailand, Mueang Nonthaburi District, Thailand.
- Anonymous, 2016. Annual report of bureau of cosmetics and hazardous substances in 2016. Department of Medical Sciences, Ministry of Public Health Thailand, Mueang Nonthaburi District, Thailand.
- Bernhoft, R.A., 2012. Mercury toxicity and treatment: A review of the literature. J. Environ. Public Health, Vol. 2012. 10.1155/2012/460508.
- Boonprachom, B., N. Yukittichai, N. Ekkabut, N. Pongnimitprasert and N. Nuntharatanapong, 2013. Investigation of ammoniated mercury and hydroquinone in whitening creams distributed in amphur Muang Nakon Pathom province. Thai Bull. Pharm. Sci., 8: 1-8.
- Chan, T.Y.K., 2011. Inorganic Mercury poisoning associated with skin-lightening cosmetic products. Clini. Toxicol., 49: 886-891.
- Copan, L., J. Fowles, T. Barreau and N. McGee, 2015. Mercury toxicity and contamination of households from the use of skin creams adulterated with mercurous chloride (Calomel). Intl. J. Environ. Res. Publ. Health, 12: 10943-10954.
- Davids, L.M., J. Van Wyk, N.P. Khumalo and N.G. Jablonski, 2016. The phenomenon of skin lightening: Is it right to be light?. South Afr. J. Sci., 112: 1-5.
- Elhag, D.E., H.O. Osman and A.A. Dahab, 2015. Investigation of mercury content in cosmetic products by using direct mercury analyzer. Am. J. PharmTech Res., 5: 1-8.
- Engler, D.E., 2005. Mercury bleaching creams. J. Am. Acade. Dermatol., 52: 1113-1111.
- Horvat, M., 2005. Determination of Mercury and its Compounds in Water, Sediment, Soil and Biological Samples. In: Dynamics of Mercury Pollution on Regional and Global Scales, Pirrone, N. and K.R. Mahaffey (Eds.). Springer, Boston, Massachusetts, USA., ISBN:978-0-387-24493-8, pp: 153-190.
- Ladizinski, B., N. Mistry and R.V. Kundu, 2011. Widespread use of toxic skin lightening compounds: Medical and psychosocial aspects. Dermatol. Clin., 29: 111-123.
- Liang, L., J. Gilkeson, E. Bennett, M. Li and M. Denget *et al.*, 2013. A pilot survey of Mercury in drugs, cosmetics and household products using reliable analytical methods. J. Cosmet. Dermatol. Sci. Appl., 3: 256-262.
- Prasongkool, K. and C. Ruengorn, 2017. Analysis of the situation on contamination of prohibited harmful substances in facial cosmetics in Amphur Nangrong, Buri Ram Province during 2013-2016. Thai J. Pharm. Pract., 9: 361-369.

- Sah, R.C., 2012. Poisonous cosmetics: The problem of mercury in skin whitening creams in Nepal. Center for Public Health and Environmental Development (CEPHED), Nepal. <http://webcache.googleusercontent.com/search?q=cache:IY6N930JbRQJ:library.nhrc.gov.np:8080/nhrc/handle/123456789/505+&cd=1&hl=en&ct=clnk&gl=pkSi>
- yaka, L., A.E. Joda, H.B. Yesufu and M.O. Akinleye, 2016. Determination of hydroquinone content in skin-lightening creams in Lagos, Nigeria. *Pharma Innovation J.*, 5: 101-105.
- Tantanawat, A., T. Panpadung and P. Niyomkam, 2011. Hydroquinone retinoic acid and Mercury compounds in Acne-melasma cosmetics distributed in five provinces in lower Southern part of Thailand. *Bull. Department Med. Sci.*, 51: 224-230.
- UNEP., 2008. Guidance for Identifying Populations at Risk from Mercury Exposure. United Nations Environment Programme, Nairobi, Kenya, Pages: 117.
- WHO., 1991. Inorganic Mercury: Environmental Health Criteria 118. 1st Edn., World Health Organization, Geneva, Switzerland, ISBN-13:978-9241571180, Pages: 172.
- WHO., 2007. Exposure to mercury: A major public health concern. Preventing Disease Through Healthy Environments, World Health Organization, Geneva, Switzerland. <https://www.who.int/phe/news/Mercury-flyer.pdf>
- Yoshimura, K., K. Tsukamoto, M. Okazaki, V.M. Virador and T.C. Leiet *al.*, 2001. Effects of all-trans retinoic acid on melanogenesis in pigmented skin equivalents and monolayer culture of melanocytes. *J. Dermatol. Sci.*, 27: 68-75.