S3 Ilmu Kesehatan
Fakultas Kesehatan Masyarakat
Universitas Airlangga

Proceeding of the 1st International Symposium of Public Health

"Emerging and Re-emerging Diseases"

Editors
Sri Sumarmi
Ika Yuni Widyawati
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Cetakan Pertama – Oktober 2017

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WELCOME MESSAGE

Assalamu'alaikum warahmatullahi wabaraqatuh

I wish you all a warm welcome to Surabaya Indonesia.

It is a great pleasure for me to invite you in the 1st International Symposium of Public Health, held by Faculty of Public Health, Universitas Airlangga. This remarkable event is conducted by Doctorate and undergraduate program of Faculty of Public Health, Universitas Airlangga in collaboration with Airlangga Health Science Institute and Smart FM Surabaya. It's an honor to present "Emerging and Re-emerging Diseases" focusing on Zika virus as the main theme of our Symposium, as Zika being a new emerging disease in asia region.

The aim of this symposium is to disseminate the strategic planning of Indonesian Government, particularly the Ministry of Health, to prevent the transmission of Zika virus as well as the global and regional regulation. In relation to this matter, we invite Minister of Health as keynote speaker and also foreign expert: Professor Cordia Chu from Griffith University, Australia, but, unfortunately in this opportunity Professor Chu with a great regret can not come physically to Surabaya, due to a combination of critical family and urgent business. Instead, she likes to nominate Mr. Febi Dwirahmadi, SKM, MSc.PH, PhD to share the scientific knowledge about managing and Handling Zika in Community Setting. We also invite Dr. Pang Junxiong Vincent from National University of Singapore, who are going to discuss about the epidemiology of Zika, as well as Professor Nasronudin to present the role of Universitas Airlangga in research development.

The committee also invite the audience to submit abstracts in several sub themes in public health areas. We are expecting of two hundreds (200) participants, with at least ten percent (10%) coming from foreign countries and ninety percent (90%) from local participant coming from various region in Indonesia. There are a hundred and seven (107) abstracts were submitted, and then eighty nine (89) abstracts were accepted. From the accepted abstracts, there are fifty two (52) abstracts were accepted as oral presentation, and thirty seven (37) are presented as poster. This symposium was devided into two sessions, the plennary session and panel oral presentation. It is designed in such way, so that the delegates from various countryies or provinces, could share their local experience and best practices and discover ideas for strong regional initiatives.

At last, we would like to ackowledge for all parties which are provide the valuable materials as well as financial support for the successful symposium. As chair of organizing committee, I would also like to say deep thank you for all committees; my colleagues, and also students in faculty of Public Health Universitas Airlangga, who have been working to be part of a solid team and amazing committee.

To all of audience, thank you very much for your participation in this symposium, I hope you enjoy not only the symposium but also the sparkling city of Surabaya.

Wassalamu'alaikum warahmatullahi wabaraqatuh

Sincerely,

Chair Person

Dr. Sri Sumarmi, SKM, M.Si

UNIVERSITAS AIRLANGGA

Rector's Official Address
in
INTERNATIONAL SYMPOSIUM OF PUBLIC HEALTH
"Emerging and Re-emerging Disease"
November 30, 2016

Assalamu'alaikum wa-rahmatullahi wa-barakatuh.

May the peace, mercy and blessings of Allah be upon you.

Alhamdulillah! Praise be to Allah and along with this gratefulness let us also send *shalawat* and *salam* to our Prophet Muhammad SAW (Praise Be Upon Him): *Allaahumma shalli 'alaa Muhammad wa 'alaa aali Muhammad.* May Allah give mercy and blessings upon Him.

Ladies and Gentlemen,

The world always advances along with its challenges including in medical field. There are emerging diseases which have just occured recently such as the one caused by Zika virus. There are also re-emerging diseases for the ones we assumed have been eradicated but they occured again such as measles and polio.

Special for diseases related to Zika virus, some countries have declared a state of emergency. WHO even declared Zika virus transmission in South America as international public health emergency. Regarding the matter, for the global Zika virus epidemiology development, we regret to learn that information on Zika virus is limited such as on the risks, diagnosis, and the transmission method of the virus. In short, Zika virus has continued to spread and become a global precedence.

Therefore, this "INTERNATIONAL SYMPOSIUM OF PUBLIC HEALTH" is very welcomed and I appreciated the theme, "Emerging and Re-emerging Disease". I believe the communities, academic or general public will achieve benefits from the symposium results.

Ladies and Gentlemen,

Through this symposium, we are expected to get explanation and updates on measures to handle the "Emerging and Re-emerging Disease". The explanation is expected to give new insights for us to improve the quality of life as the demand to better quality of life, free from diseases, is even higher.

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UNIVERSITAS AIRLANGGA

Hopefully, this event works as an effort to spread the knowledge and also functions as an input for the policy maker in medical field.

I would like to express my deepest gratitude to all participants, either domestic and from other countries, also to the committee and other parties who support this international symposium. I hope that our active participations can bring success to this seminar and they are regarded as act of kindness.

By saying grace: "*Bismillahirrahmanirrahim*", I officially open the "INTERNATIONAL SYMPHOSIUM OF PUBLIC HEALTH" on "Emerging and Re-emerging Disease".

May this symposium be a success, run well and all the objectives achieved. Let us advance together to a better life in all aspects, especially in Public Health.

Have a great symposium and continue success!

Wassalamu'alaikum wa-rahmatullahi wa-barakatuh.

Rector of Universitas Airlangga,

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TABLE OF CONTENT

CORRELATION BETWEEN BLOOD LEAD LEVEL (BLL) AND OSTEOPOROSIS IN POSTMENOPAUSAL WOMEN IN SURABAYA INDONESIA

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ABSTRACT

Lead (Pb) compounds indicate that some toxic effects influence our health such of osteoporosis. This research was to identify source of lead contamination and to analyze the association between blood lead level (BLL), symptom of osteoporosis and occurence of osteoporosis among post menopause women. A cross sectional study was conducted in Surabaya City Indonesia. The sample size was 60 persons, randomly selected from post menopause women age 50-65 years. The observed variables were lead blood level, assessed using atomic absorption spectrophotometry (AAS) and bone mineral density of spine and hip, assessed using Dual X-Ray Examination Absorbtiometry (DXA). The mean value of blood lead level was 11.135 µ/dL. Multiple regression showed that, there was significant correlation between the history of work and Blood lead level (p=0.037). There are significant association between fracture (p=0.027), bone fragility (p=0.008), spinal pain (p=0.016) with osteoporosis. Age (p=0.002), blood lead levell (p=0,055), calcium consumption (p=0.022) and exercise regularly (p=0.08) were together significant correlation with the occurence of osteoporosis. These variables increase the risk of osteoporosis, simultaneously. It implies that to prevent osteoporosis, the possible source of lead contamination should be avoided, meanwhile post menopause women shall improve calcium intake and doing exercise regularly.

Keywords: Blood lead level, Osteoporosis, Post Menopause Women

INTRODUCTION

All human being and environment could not be separated each other. The contaminated environment often cause detrimental impact on health. Otherwise, the human needs become more complex in accordance with the national development and industrialization in a country. The health problems will arise since the development and industrialization is regardless the environmental aspects. Eco-development and eco-Industrial absolutely must be applied to protect the environment and human health.

Lead (Pb) is a heavy metal that is still widely spread in the environment as hazardous substance or element. It is due to this element is still widely used both in industrial activities and household supplies. Sources of lead exposure are obtained from industrial proccess and fuel utilization, as well as derived from household activities suround us. Some household items were also identified containing lead, such as paint batteries, ceramics, and some cosmetics.

In Indonesia, lead is still used as a gasoline fuel mixture in a typical of fuel named "premium" from Marketing Unit V Surabaya which serves the most area of East Java, Bali, West Nusa Tenggara and East Nusa Tenggara is still using lead as an octane booster of 0.01 grams / liter (Tawafurrohim, 2008) The use of lead as a fuel mix as an octane booster actually has been banned by the world. This is due to the health effects caused by lead is very dangerous. There is one location with air lead contamination levels exceed the limit of Indonesian environmental law in Surabaya city (Prasasti, 2008).

Regularly contact between human and heavy metals was dangerous. Lead will cause a variety of health effects, because this element could not be degradable and persistent in human body. The inhaled or ingested lead will circulate through the blood flow, and reabsorbed in the kidney and brain, or stored in the bones and teeth.

Osteoporosis is widely spread through-out the world and still as a public health problem. Lead exposure will increase the risk of osteoporosis (Campbell and Auinger, 2007). Lead enter into the human body and then follow the blood circulation, to the tissues and several organs such as the liver, kidneys, lungs, brain, spleen, and heart. After a few weeks most of lead in tissues and organs will be mobilized into the bones and teeth. Lead present in the bones for decades but it can be mobilized back into the blood and organs under certain circumstances, especially during pregnancy, lactation, fractures, during osteoporosis, as well as during the growth spurt (ATSDR, 2007,2008,2009). In animal studies, it reveals that high exposure of lead were associated with reduced bone density (Escribano, 1997). It is also consistent with Grubber, *et al* (1996) who investigated the effects of lead exposure on rat's bone, that 3 months exposured of lead showed a significant relationship with decreasing of in bone density.

The high exposure of lead from high emission vehicles might as risk factor of osteoporosis in Surabaya. This research was to study whether lead exposure influences blood lead level in patients with osteoporosis.

METHOD

This is a cross-sectional study was conducted in Surabaya, Indonesia. The study sample were 60 postmenopausal women aged 50 to 65 years old, randomly selected from patients Mitra Keluarga Surabaya Hospital at july- december 2007. Blood samples and bone scan were collected from every respondents after signing the inform consent. About ± 3 cc of venous blood were collected by laborant, and then analyze Pb blood (whole blood) conducted by Atomic Absorption Spectrophotometry method in the Balai Besar Laboratorium Kesehatan Surabaya (Indonesia accredited laboratory).

Bone density was assessed by scaning the low spine and both of the hips. Osteoporosis examination conducted by Dual X-Ray Absorbtiometri (DXA) method for low spine and both of hip. DXA was analysis in the Mitra Keluarga Satelit Hospital Surabaya. Osteoporosis occure when the bone density $T< -2.5$, Osteopeni when $-2,5 \leq T \leq -1$, Normal $T>-1$. Data was analyzed using SPSS version 16. Statistical analisis using linear regression and multipe Logistic Regression test.

The ethics committe of the Airlangga University Surabaya Indonesia, approved this study (No. 075/PANEC/LPPM/2009). The blood lead level test was taken and analysis on April and May 2009.

The standard threshold of Pb content in blood according to the WHO is 20mg/dL in for adults and 10mg/Dl for children (KPPB, 2000)

RESULT

Characteristics of Respondents

There ware 14 respondents (23,3 %) in the 65 years old, 7 respondents (11,7%) in the 62 years old. The youngest age of the respondents was 50 years old and oldest was 65 years old, the mean age was 58,75 years old. There were 28 respondents (46,6%) finished their senior high school. The most of the respondents (88%) had their income > Rp.2000,000,00 per mounth and there were 46,6 % respondend had`t work anymmore.

Respondents in this study were postmenopausal women in the age group 50-65 years. Women have a higher risk of developing osteoporosis than men. Menopausal status was also closely associated with the incidence of osteoporosis. Age is increasingly found osteoporosis ($p<0.05$) (9). Most respondents were in the age group of 65 years (23.3%), with 4 respondents (28.6%) do not suffer from osteoporosis, 10 respondents (71.4%) with osteoporosis.

Most of respondent educational back-ground is senior high school or the equivalent, as many as 28 respondents (46.7%) with 15 persons (53.6%) did not have osteoporosis and 13 respondents (46.4%) had osteoporosis. Respondents in this study most of which 53 respondents (88.3%) have incomes of more than Rp. 2,000,000.00 per month. A total of 46.7% of respondents in this study had been retired.

Education can influence the under-standing of a variety of health problems. Statistical analysis showed no correlation between education ($p=0.461$), income ($p=0.752$), and the current work status ($p=0.323$) and the incidence of osteoporosis. Although respondents mostly high school educated, but they relatively have high level of income so that access to adequate healthcare can be met, while those who are still actively working may be more mobile, where moving is a good activity for bone health as well as their socialization allows them to have access to better health information.

The Relationship between the Source of Lead Exposure (Work History, History of residence, vehicle usage history, Canned Food Consuming Habits, Smoking Habit History, Calcium Consumption with Blood Lead Levels (BLL)

There were two groups in work history, they were indoor and out door. There were 76.6% of respondents work indoor. The history of residence, showed that 45% respondents stayed on 500-1000m from the source of pollution. The vehicle useage history from the respondents showed that 48.3% often use the car (closed vehicle). Canned food indentified as source of Pb. There were 53% respondents had canned food consuming habits more the once a years. All respondent werent the smoking habit history, because of they were a women and it didnt the culture. The data showed that there were 50% of respondents usually consume the calcium supplements or drink a calcium milk more than once in a years.

The mean blood lead level in the respondents are 11.135 µ/dL with a maximum lead content of 28.95 µ/dL. Regression test showed that work history significantly related to blood lead levels ($p=0.037<0.05$). Work outdoor allows respondents to get more contact with the sources of environmental lead pollution. Potential sectors in affecting air quality in Surabaya city in general is the transportation sector.

Respondents' residences were mostly in the range of 500-1000 meter distance from the pollution source, riding motorcycle not in the heavy traffic, rarely consumed canned food, no smoking. Althought Pb absorption will increase if there is a deficiency of calcium (10-12), thus Pb metabolism associated with hormones (13), but in this study the source

of calcium measured in the frequency. The result of BLL was completely see in table 1.

Table 1. Respondents Blood Lead Level (BLL)

Blood Lead Level (µg/dL)	n	%
≤ 20	8	13,3%
≥20	52	86,6%
Total	60	100%
Mean	11,135	
Min	1,932	
Max	28,95	

The Relationship between independent variables with the occurance of Osteoporosis

The results of Multiple Logistic Regresion test showed that blood lead levels (BLL) have a significant association with the occurrence of osteoporosis (p=0.055) along with variable of age (p=0.002), the consumption of milk or calcium supplement (p=0.022) and exercise habits (p=0.008).

The adult blood lead level standard of World Health Organization (WHO) was 20 µ/dL. There are several women that exceed from WHO regulation. The high of blood lead level showed that there are several risks for the health. The result of Dexa Bone Densitometer was completely seen in table 2, Fig 1 and Fig 2.

Table 2. The result of Dexa Bone Densitometer

Bone Mineral Dencity (T-Score hips and spine)	Status	n	%
T>-1	Not Osteoporosis (Normal and osteopenia)	35	58,3%
T <-2,50	Osteoporosis	25	41,6%
Total		60	100%

In which any increase in blood Pb 1g/dL, the risk of osteoporosis increased 0,848 with increasing age, did not take calcium and exercise (table 3). The blood lead level together with other variables such as age, calcium consumption and exercise habits had an association with the osteoporosis.

From the results of statistical analysis showed that each increase in age will increase the risk of osteoporosis by 1.5 times, people who never consume milk or calcium supplements had 1.6 times the risk of developing osteoporosis than those who frequently consume, and people who never do exercise have 30.8 times the risk of developing osteoporosis than people who exercise regularly three times a week.

Table 3. Result of Multiple Logistic Regression, Pearson and Spearman correlation test

Variabel	**Multiple Logistic Regression**		**Pearson and Spearman**
	P	**OR**	**P**
Age	0,002	1,5	0,38
Blood lead level	0,055	0,848	
Calcium consumption	0,022		0,021
Often		1,6	
Exercise habits	0,008		0,044
Rarely		30,8	
Body Mass Indeks	0,211		

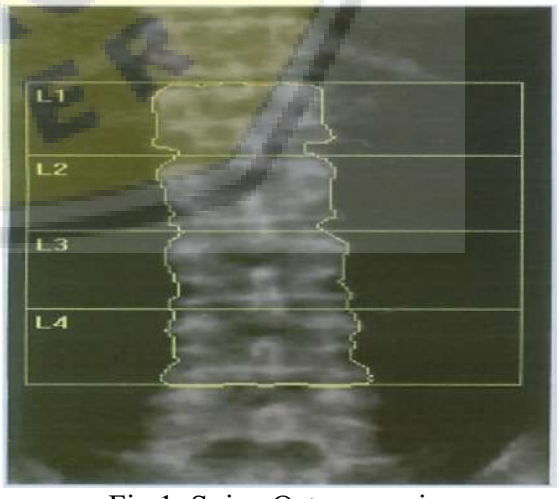

Fig 1. Spine Osteoporosis

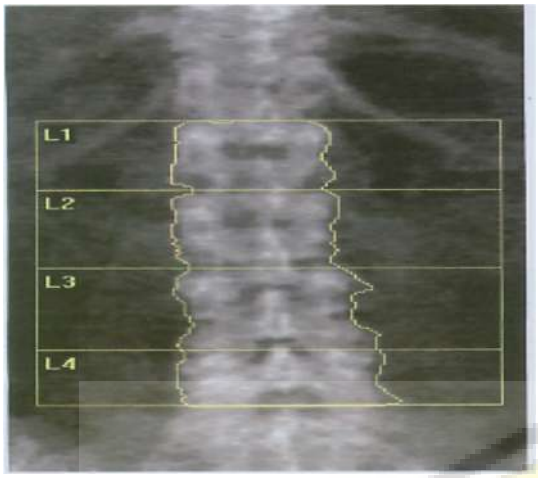

Fig 2. Normal Spine Osteoporosis

The Relationship Between fracture, hunchback, reduced height, back pain with the Occurance of Osteoporosis.

Fracture, hunchback, reduce height, back pain were the sign of osteoporosis. The Multiple logistic regression showed that fracture, hunchback and back pain sign were correlated with ostoporosis. Bone loss increases the risk of fractures (p=0.027), hunchback (p=0.008) and back pain (p=0.016). This is due to the decline in bone mass.

DISCUSSION

Lead (Pb) can enter the body through the respiratory tract, absorption and digestive tract (ingestion). Pb distributed into 3 main parts of the body, that is blood, Soft Tissue and Bone (EHC WHO, 2006). Pb deposited in bone. As much as 90-95% Pb that entered the body accumulated in bones, a little stored in the brain (Barry and Mossement, 1970). Pb has a long half-life in bone, especially in people who were exposed to lead in the past and for a long time.

The results of this study showed that blood lead levels were significantly associated with the occurrence of osteoporosis. Blood lead level for adult was ≤10 µg/dL (ATSDR, 2013). The respondents were shown that their blood lead level was more than 10 µg/dL and they had osteoporosis. Pb absorbed by bone. Pb known to have effect on osteoblasts, osteoclasts and kondrocit, which are affected on osteoporosis (Carmouche, 2005). Studies on animals showed that a rise in Pb exposure degraded bone density (Gruber, 1996), inhibited osteoblastogenesis and decreased bone strength (Ronis, 2001). There is a relationship between the Infant mean blood Pb, with mothers who have high blood lead levels in the median cohort 7.7 µg/ dL, which infant has a shorter body length of 2 cm at the age of 15 months, compared with mothers who not exposed to Pb (Shukla, 1989).

Levels of Pb blood describe the movement of Pb from the bones into the bloodstream. If there is a process of bone resorption, Pb from the bone will be released to blood. Pb Blood is also an indicator of exogenous Pb exposure that is happening and Pb exposure in the past that stored in bones (Hu et al, 1998). Although 90-95% Pb stored in bones (Campbell and Auinger, 2007), Pb will lead to blood flow in certain conditions such as pregnancy, lactation, osteoporosis etc (Squib, 1997).

This results also consistent with the results other research that there are relationship between lead exposure in the past with occurrence of osteoporosis (Campbell and Auinger, 2007), Bone Mineral Density was significantly associated with the amount of lead in the blood (Nash, 2004), and low bone mineral density in children associated with Pb blood serum (Riedt, 2009).

There was a relationship between lead exposure in the past with the occurrence of osteoporosis (Campbell and Auinger, 2007). The Bone Mineral Density (BMD) was significantly associated with the amount of lead in the blood (Nash, 2004), and the low BMD in children associated with Pb blood serum.

There are possibilities that in the past, respondents had been exposed by Pb, furthermore, Pb deposited to bones. Then

when they get older, in line with the weakening of the balance in bone remodeling process, Pb mobilized into the blood. Pb are toxic to soft tissues and organ systems (4-6). At the low level of toxicity, Pb has been able to influence the body's biochemical processes.

The risk of osteoporosis will increase with increasing age, but indeed it also influenced by other factors. Bone remodeling process in young adult is on balance, and will be declined in line with increasing age, so that the risk of osteoporosis will be higher.

Nutrition plays an important role on health including bone mass and fracture risk. Pb has a role as a calcium antagonist, which is calcium intake will reduce the absorption of Pb in adults and animals (4-6). There is a relationship between calcium intake with the decrease of blood Pb (P=0.02) (Yuan et al, 2004).

Exercise dosage must be appropriate because if it is too light it will not be useful and if it is too heavy it will be dangerous. Cooper et al 1988; Snelling et al 2001 said that Physical activity is proven to lower the risk of hip fractures (Campbell and Auinger, 2007). People who are too lazy to move or exercise will obstruct the process of its osteoblast (the process of bone formation). In addition, bone mass density will decrease. The more movement and exercise, the muscles will spur bone to form a mass. Bass et al said that Observations conducted to athletes showed that athletes had higher BMD than the people that did a rarely exercise (WHO, 2003). Pb levels <20mg/dL are supposed to influence the metabolism of vitamin D in the body, while Pb>30µg/dL has been able to interfere with bone metabolism (Brasslow et al, 2002).

Osteoporosis can be called as a thief in the night, people who suffered from osteoporosis do not feel a specific soreness. It will be felt when the bones are fractured that will cause pain, deformity, and impaired function. Detailed history of patient risk factors is helpful in establishing the diagnosis. Analysis of risk factors is important to determine whether the examination of bone mineral density (BMD) needed or not, which is important to establish the diagnosis.

Fractures, hunchback, back pain, reduced height are the signs of osteoporosis. If the bone density is greatly reduced, the bones will be crushed, so that will develop bone pain and deformity. The destruction of the spine will cause chronic back pain. Fragile spine might be destroyed spontaneously or due to minor injuries. Pain will arise suddenly and felt in certain areas of the back, and the pain will be increased if the patient standing or walking. If some spine shattered, it will form an abnormal curvature of the spine (Dowager's hump), which causes muscle tension and pain.

CONCLUSION

Work history is associated with blood lead levels. Fracture, humpback and back pain are the sign of osteoporosis. Age, blood lead level, calcium consumption and exercise habits were together significant correlation with the occurence of osteoporosis. Age, Blood lead Level, calcium consumtion and exercise habits were the factors to increase the risk of osteoporosis.

Keep a healthy lifestyle such as avoiding contact with the sources of Pb pollution, meet the needs of calcium, and regular exercise to prevent osteoporosis.

CONFLICT OF INTEREST

The author declares there is no conflict of interest regarding the publication of this paper.

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