

# Literature Review: Effect Of Lead Toxicity On Reproductive System

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**Background:** Lead (Pb) is a chemical that belongs to the heavy metal group is bluish grey and is the main pollutants in the environment. The lead that enters the body will be distributed into the blood compound 95% and interfere with the body sistem, one of which is in the reproductive system. The purpose of writing this article is to determine the effects of lead toxicity on the reproductive system. **Method:** The design of research used is the study of libraries from various sources. The articles are gathered using search engines such as PubMed, Google Scholar, Science Direct, ProQuest and Elsevier. The article used in the study was published in 2011-2020. **Results:** Based on the articles collected, it is derived that the consequences of exposure or lead poisoning are disruptive to the body sistem. Disrupted sistems include the reproductive sistem, digestive sistem, cardiovascular sistem and nervous sistem. Reproductive sistem disorders can occur in men and women. In men there can be decreased quality and quantity of sperm, decreased prostate function, decreased testosterone, decreased sexual desire. In women there can be decreased sexual desire, increased cases of infertility, spontaneous abortion, menstrual disorders and stillbirths. **Conclusion:** Lead poisoning in the reproductive sistem, disorders that can arise are decreased fertility in men and women, increased miscarriage, stillbirth, premature birth, and increased sex desire.

## Keywords:

Lead (pb)

Toxicity

Reproductive System

## I. Introduction

Currently, human life is highly dependent on technological sophistication and industrial products. there are also many negative impacts caused, for example industrial waste that pollutes water and soil, industrial dust that endangers workers, vehicle and factory fumes which often also make it difficult for humans (De Rosa et al., 2003). Various pollutant substances and frequency of exposure are often disruptive to human health (Marcus, 2018).

Toxicological studies state that heavy metals can be distinguished in two types. The first type is an essential heavy metal, where its existence in certain amounts is needed by living organisms, but in excessive numbers it causes toxic effects (Anies, 2015). Examples of these heavy metals are Zn, Cu, Fe, Co, Mn and others. While the second type is heavy metal is not essential or toxic, where its existence in the body is still not known benefits, even some are toxic such as Hg, Cd, Pb, Cr and others (Wijaya, 2013).

This heavy metal can cause effects for human health depending on how the heavy metal is bonded in the body, the poison has the power to work as a barrier to enzyme work, so that the body metabolism process is disconnected (Nghiem et al., 2019). Furthermore, this heavy metal will act as the cause of allergies, mutagen, teratogen or carcinogens for humans. The groove in the body is through the skin, breathing and digestion (Stellman, 2018).



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In everyday life, humans are often exposed to lead, whether at home, outdoors, or at work (Palar, 2014). As a lead-polluted country, Indonesia entered the 5th according to Political and Economic Risk Consultancy Ltd (PERC), after India, China, Vietnam, and the Philippines. In Indonesia, approximately 70% of air pollution is caused by the emission of motor vehicles containing of lead (Pb), Suspended Particulate Matter (SPM), Oxides of Nitrogen (NO<sub>x</sub>), Hydrocarbons (HC), Carbon Monoxide (CO), and photochemical oxide (Ox) (Santhosh Kumar & Asha Devi, 2018). The use of lead-free gasoline until 2006 was implemented in several cities/regions, such as in Jakarta, Bogor, Tangerang, Bekasi, Cirebon, Batam, and Bali. The lead in the air threshold set by WHO is 0.5 µg/m<sup>3</sup>, Bandung is the 2nd city with a high level of lead pollution (2 – 3.5 µg/m<sup>3</sup>).

Lead is a soft white silvery white metal solid with a melting point of 327,43°C and a boiling point of 1740°C. Lead color can fade when exposed to air exposure. Lead is very soft and easily forged, easily melted, molded, rolled and extruded. Lead (Pb) exposure or the term black lead can pose various problems in the world (R.E., N.N., & S., 2018). It can also be one of the major environmental health risks faced in various countries, both developed and developing countries (de Souza, de Andrade, & Dalmolin, 2018).

The widespread use of lead will result in the greater entrance or exposure to the human body. The use of lead closest to everyday life such as the use of lead for drains, water pipes and cooking utensils (Bharatraj & Yathapu, 2018). In the last decade the lead exposure can also be a result of increased human pattern and activity. Foods and beverages that are substantially contaminated with lead will provide adverse health effects. However, this metal is also needed to maintain body balance in a certain concentration (Suciani, 2017).

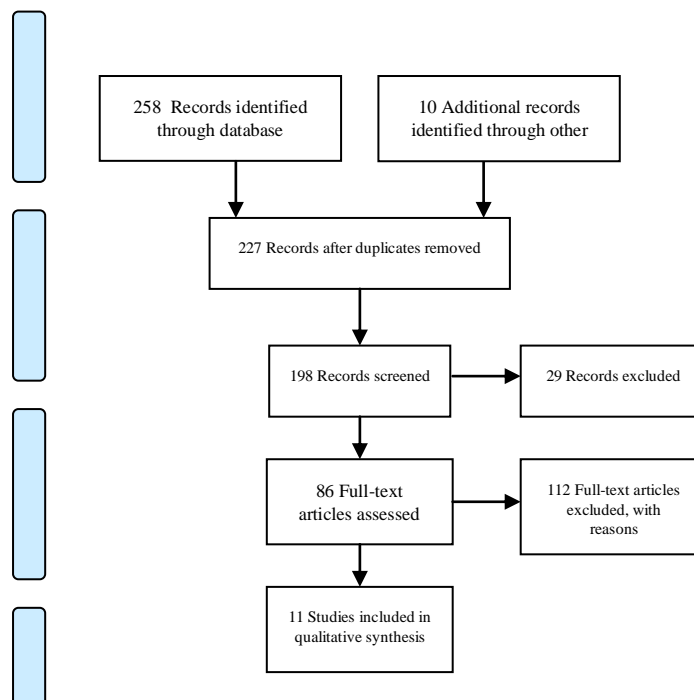
Lead is a toxic compound, where the effects of lead exposure can occur without obvious symptoms. The explanation effect is chronic so that the longer a person is exposed there will be a progressive cumulative dose increase. Long-lasting Pb exposure can cause interference to various organ systems such as blood, nervous system, kidney, reproductive system and gastrointestinal tract. Usually the effect of elevated levels of lead in blood such as increased risk of hypertension, kidney disease, cognitive impairment and or rapid deterioration of cognitive function as well as reproductive risk (Suciani, 2017).

Lead can accumulate in the body of an organism and remain in the long term as poison (Fraser et al., 2018). Humans can accumulate the lead from air, water and soil contaminated by heavy metals. Lead can be distributed to parts of the human body and will partly accumulate through various intermediaries one of which is through a lead-polluted air inhalation. If this situation lasts continuously for a long time then it can reach a number that endangers human health (Fardizaz, 2017).

Lead that is inhaled will enter the blood vessels and lungs. Lead metal that enters the lungs through inhalation will be absorbed and bind to the blood of the lungs and then circulated to all tissues and organs of the body (Assi, Hezmee, Haron, Sabri, & Rajion, 2016). The initial signs of chronic lead poisoning are disruption of the biosynthesis of heme, if this disorder is not resolved immediately one of the consequences is anemia. The disruption of heme biosynthesis results in a decrease in the number of erythrocytes, a decrease in the quality of hemoglobin (Suciani, 2017).

The impact of lead toxicity on the reproductive system in both men and women needs to be known in depth. Based on the above background, the authors are interested in conducting a literature review of the effects of lead toxicity on the reproductive system.

## II. The Proposed Method



**Figure 1 Study-based selection  
Diagram Prism**

## III. Method

The method used in the writing of this article was the literature review, i.e. a search of both international and national literature conducted using PubMed databases, Google Scholar, Scindirect, Proquest and Elsevier (Cresswell, 2010). In the early stages of the search the article journal obtained 258 articles from 2011-2020 using the keyword "toxicity lead" and "toxicity Lead with system reproduction". The number of articles obtained has not been conducted identification and exploration of its relevance to the compiled articles. Of these, only about 11 articles are considered relevant. From the relevant articles found 11 articles that have the criteria of inclusion of researchers and qualified.

## IV. Results and Discussion

### RESULTS

Based on the results of the article, the author's analysis found that some consequences of exposure or lead poisoning are disrupting the body system (Gangnon, 2016). Disrupted system such as reproductive system, digestive system, cardiovascular system and nervous system. In the system of reproductive disorders that may arise including fertility disorders in both men and women, increased miscarriage, death, birth, premature, and decreased sex arousal (De Rosa et al., 2003).

The amount of lead levels present in the blood of one can be influenced by the amount of his explanation. In this case, the possibility of exposure of the existing lead is not too high, so the level of lead in the blood of most samples is still within normal limit. It is not only the amount of exposure that can affect the level of lead in the blood, but the level of lead in the blood can also

increase with the length of exposure, and the way of entering the lead into the body (Suciani, 2017). In adults there is a difference in the lead content in the blood, this is due to the environmental and geographical factors where the people are (Palar, 2014). The length of work for years of exposure to lead causes the body to be unable to absorb lead in the blood so that the lead in the blood keeps accumulating and settling into a lot of lead..

Lead exposure in Pb adults can also reduce fertility, even causing infertility in pregnant women. Pb Organic poisoning can increase the miscarriage, death or premature births (Sharma, Rawal, & Mathew, 2015). It is a must-watch for women workers who in this study were largely unmarried for 30 respondents (88.2%) That will likely impact their lack of fertility and infertility for the workers ' reproductive system. Lead exposure can also lead to decreased sex arousal. In this study, 1 respondents from 4 married respondents experienced a decline in sex arousal. So this is in accordance with the research done (Marija, 2015) on female laborers who work exposed to lead experiencing decreased sexual arousal, although the decline in sex arousal in men's workers in the study is more dominant to experience it.

Another effect of lead exposure to the reproductive system in women is that Pb can penetrate the placenta tissue thus causing abnormalities in the fetus. Increased cases of infertile, spontaneous abortions, menstrual disorders and dead infants on female workers who were exposed to Pb have been reported since the 19th century, nevertheless the data on the dose and effect of Pb to the reproductive function of women, until now still a little (Alpatih & Nurullita, 2018).

The other lead exposure effect can provide toxic effects on the gastrointestinal tract, nerves and kidneys. The effects on the gastrointestinal tract are the most common intestinal colic (intestinal spasm), followed by gray pigmentation on the gums known as lead lines. This ingredient may cause prominent abnormalities in the nervous system, in the form of inaction in action, decreased memory function and concentration, depression, headache, vertigo (swivel spinning), tremor (abnormal movements with rapid frequency), stupor (decreased mild consciousness), coma, convulsions, psychomotor disorders, mild intelligence disorders and personality changes. While the lead alkyl form causes a special form of abnormalities in the central nervous system, with manifestations among other insomnia, nightmares, and in severe cases can be Schizophto (Anies, 2015).

## DISCUSSION

Not all lead compounds can be absorbed by the body, only about 5-10% of the amount of lead coming through food or inhalation will be absorbed by the body. From the amount of waste that is absorbed will settle in the body's tissues and the rest will also be wasted with the rest of the metabolism, namely along with urine and feces (Gangnon, 2016). The level of lead in the blood is the best indicator to show exposure, it only applies to a person who is exposed to lead continuously. Thus, to achieve this condition it takes a continuous exposure for two months (Santhosh Kumar & Asha Devi, 2018)

The result of exposure or lead is to disrupt the body's systems. In the reproductive system, disorders that can arise include fertility problems in men and women, increased rates of miscarriage, stillbirths, premature births, and decreased sex desire.

### Fertility Disorders

Acute toxicity by lead rarely occurs, but lead exposure over a long period of time can lead to various abnormalities. In adults can cause anorexia symptoms, vomiting, abdominal pain, diarrhea or constipation (Sharma et al., 2015). The sufferer will experience headaches, lethargy, depression, sleep disorders in the form of insomnia or hypersomnolen, sometimes aggressive or

antisocial behavior, can not concentrate. In heavier exposure may cause microcytic anemia, motor neuropathy, hypertension, hyperuricemia, and renal failure.

One study showed a significant association between low blood lead and cadmium levels and infertility in a sample of US adults. Although it still requires confirmation, these results suggest that even low levels of heavy metals, below current reference values, significantly affect reproductive health (Sohyae Lee et al, 2020).

In males it can lower the libido, decrease the sperm count and cause abnormal sperm morphology resulting in infertility. In women causing menstrual disorders, pregnant mothers can cause spontaneous abortions or stillborn babies.

The toxic effect of lead metals in males differs from women. Women are more susceptible than men due to differences in body size factors (physiology), hormonal balance and metabolism differences (Saito, 2017). Exposure generated from lead can result in impaired reproductive system. Studies conducted on lead-exposed male workers showed that workers experienced decreased prostate gland function at lead level in blood 40-50 µg/dL (Environmental Protection Agency (EPA), 2014).

Other factors affecting male fertility include daily nutritional intake, smoking habit, overly restrictive use of panties, drugs, radiation, exposure to heavy metals, cycling, and medicines (Quintanilla-Vega et al., 2000). A study in Italy revealed that the exhaust gas of motorists could damage the sperm and lower the male fertility. The research was conducted against 85 toll gate guards who were exposed to lead for 6 hours daily and 85 men of the same age who lived in the area around the toll gate as a control group. The results of the study showed that the sperm count of both groups was not reduced, the hormones FSH, LH, and testosterone needed for spermatogenesis were still within normal limits, but sperm motility decreased. From the interview shows that the sample group took an average of 15 months to make their wife conceiving while the control group needed only half the time. It is associated with high nitrogen oxide, sulfur oxide, and lead in the air at the toll gate area that can cause methaemoglobin levels to increase with the consequences of lowering sperm quality (De Rosa et al., 2003).

Research on experimental animals on mice showed a significant reduction in testosterone levels in the 50 and 100 mg / kg lead acetate group compared to the control group and changes in sexual habits (Mohktari 2011).

This sexual change occurs due to decreased levels of testosterone, where testosterone functions as a hormone that plays an important role in the reproductive system (one of which plays a role in the production of spermatozoa) and for male sexual arousal.

### **Miscarriages, Dead Births, and Premature Births**

Considering that pregnant women are the most important segment of a new generation of birth events. The impact of Pb on health and reproduction should be a warning to the public health sector and the environment. Exposure in the workplace at a high level of lead can also cause spontaneous abortion in pregnant women (Uchewa & Ezugworie, 2019)

For women who are subject to high exposure, then the lead will be stored in the bones. In pregnant women, the absorbed lead will be piled in bone and then mobilized and enter the blood circulation, through the placenta and will then enter into the circulatory system of the fetus and cause the baby with BBLR (low birth weight) inhibits the development of the brain and also the fetus's intelligence. Further lead can also be forwarded to the baby mother through breast milk (ASI) (R.E. et al., 2018)

Normal hemoglobin levels in adult women do not conceive between 12-16 g/dL and mature women who are pregnant between 11-13 g/dL (Estridge & Barbara, 2017). Kada this hemoglobin can decrease due to several factors, one of which is the existence of the lead in the

Blood (Yartieh & Hossein, 2013). The formation of heme, which caused a decreased hemoglobin level (Lubis, 2017). The lead effect on the fetus in the womb can occur obstacles in its growth and affect the function of Thiorid.

Lead will accumulate in the human body and cause health problems because it can give toxic effects on various body systems, among others gastrointestinal tract (fine bowel spasm, gray pigmentation on the gums), hematopoietic system (hemolytic anemia), nervous system (convulsions, delirium, and coma), kidneys (Aminoaciduria, Glycosuria, and Hyperphosphaturia), endocrine (bone and tooth growth impaired), reproductive system (low birth weight, premature birth and decreased sperm count and motility) (Chaouali, Nouioui, Aouard, Amira, & Hedhili, 2018)

## V. Conclusion

Lead toxicity in the reproductive system, disorders that can arise are decreased fertility in men and women, increased rates of miscarriage, stillbirths, premature births, and increased sex desire.

Further studies are suggested to consider effects on various variables taking into account random effects and model changes with the addition of contextual effects in the analysis. As further investigation of the effects of lead exposure on various systems in the body through various studies and the mechanisms of lead poisoning in the reproductive system.

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