

## POLLUTION EXPOSURE ON THE GINGIVAL LEAD LINE CASE ON STREET CHILDREN IN SDN KOTA LAMA 5 MALANG

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### ABSTRACT

**Background:** Street children often carry out activities on the streets, which causes them to be exposed to lead at a much higher rate than the average person. Apart from being found in exhaust gases and motor vehicle batteries, lead can also be present in cigarette smoke. The high frequency of street children being exposed to different sources of lead will make them more at risk of developing the gingival lead lines. **Aim:** To analyze the effect of pollution exposure on street children in SDN Kota Lama 5 Malang with the occurrence of gingival lead line. **Method:** This research is observational analytic research with a cross-sectional approach. The research samples are street children from SDN Kota Lama 5 Malang, with a total of 30 children. The data obtained were the results of direct measurements of the upper anterior gingiva (canines, central incisors, right and left lateral incisors). **Results:** A 2<sup>nd</sup>-degree description of gingival lead line is found to be the most prevalent, with a percentage of 53.3% of 30 street children having it. Furthermore, every street child who lives in the street for 7–12 months was found to have either a 2<sup>nd</sup>-degree or a 3<sup>rd</sup>-degree description of the gingival lead line. The longer the child is in the street, the higher the number of children affected by a 2<sup>nd</sup>-degree or a 3<sup>rd</sup>-degree description of the gingival lead line, followed by another risk factor such as their smoking habits. **Conclusion:** The pollution exposure on street children affects the incidence of gingival lead lines, such as the amount of time the children are in the street, the intensity of their eating habits while in the street, their smoking activities and their use of protective masks for themselves.

**Keywords:** exposure, lead, gingival lead line, street children.

### INTRODUCTION

According to *Jurnal Pendidikan Kewarganegaraan* (2016), street children are children who spend half of their time to sustain their living or stray around the streets or other public places. According to Data and Information Centre of Ministry of Social Affairs in 2015, the population of street children has reduced to 33.400. Although this reduction occurs every year, there are still quite several problems on the circle of oral health, especially on street children(1). In East Java, aside from Surabaya with the most significant population of street children, the next city with the complex rate of the said problem is in the City of Malang. Surabaya has the most population of street children. However, it is still a small number compared to Malang which street children stray mostly on the centre of the city and known public places around it(2).

The City of Malang includes a big city in East Java. It has also problems with street children. The population of street children in Malang in 2012 is approximately 227 people. The street children in Malang packed up the downtown to make living such as in the crossroad, shopping centre, and city squares more than the street children in Surabaya. The work pattern of street children could be seen from how they work, their working locations, and their work time. Type of work such as busker, are mostly done by boys, averagely working alone, two people or teaming up more than two, total working hour about five or six hours per day, and working location near public transportation or buses(3).

The society could influence people in a significant number of ways in the same way smoking could. Most smokers and cigar consumers start that habit before they reach adulthood. Statistic data shows that in between the smoking teenagers, almost 25% of them smoked their first time before their 10<sup>th</sup> year of(4).

Aside from those that are inside the gas exhaust and motor vehicle battery, lead/plumbum is a dangerous element that is also contained in the cigar smoke. Metal elements in a cigarette are distributed in smoke about 3-79%. The smoke from cigarettes contains heavy metal/lead which is higher than filtered cigarette smoke(5). That particular smoking activity could result in lead poisoning which manifests on the oral cavity, especially on *gingiva* which causes the color change in pigment from greyish blue to black which is called by *gingival lead line*(6–8).

The increase in growth and development of transportations is clearly seen with the increase in number and kinds of the motor vehicle. One of the negative causes obtained is the high level of air pollution in the city environment. It is caused by the gas emission of motor vehicle disposal. Lead is one of the dangerous elements contained in gas emission disposal and motor vehicle battery(9). The level of lead in the normal category is <40 mg/100ml, lead poisoning could emerge if the person has about >45ug/dl of lead in their blood. The lead particle could poison the body through the food chain, inhaled, or also skin penetration. One sign of lead poisoning that could be observed since the early stage is the forming of *gingival lead line* image or lead line in the *gingival* margin(10,11). According to previous research, the toxic effect of lead causes nausea, vomit, the decrease in appetite, the break in the primary neuron system and edge neuron such as tremor, headache, numb neck, fever, decrease in intelligent, seizure, the accumulation of cerebrospinal liquid in the brain if the lead concentration in blood is too high.

According to Government Regulation of the Republic of Indonesia Number 32 article 14 year the 1999 states that every prisoner and correctional students, including street children, have the right to obtain decent health service. Thus, doctors as health worker should look after that problem. Many street children cannot access necessary public facilities, such as health. There is a program called Special Service Class in Malang city. It is a class to prepare Elementary school students that stopped going to school or unschooled because of geographical and economic reasons in order for them to continue to Junior High, similar to the case in SDN Kota Lama 5 Malang. According to the background, this research aims to analyze the effect of exposure to lead pollution on street children in SDN Kota Lama 5 Malang with the occurrence of the *gingival lead line*.

## METHODS

This research was conducted in SDN Kota Lama 5 Malang on July 2018. The sample used is street children in SDN Kota Lama 5 Malang. It fulfilled the research criteria of averagely working more than 6 hours per day on the street, working location is on the side road of the

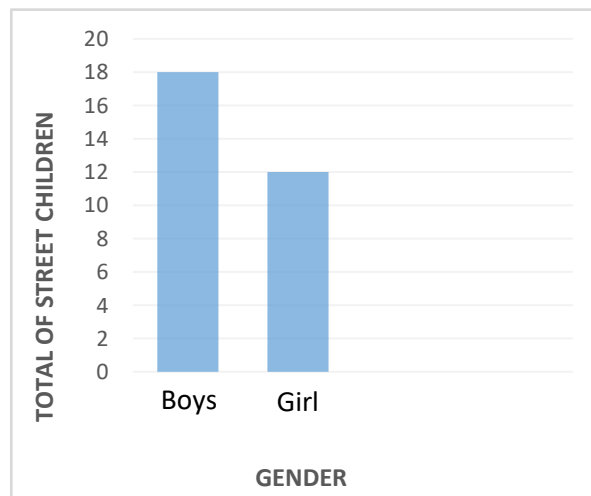
street that is packed up with vehicles, also the range of the street children's age between 6-12 years old.

Examining samples fulfill the criteria. Then the samples were given a briefing about the research conducted, and Informed Consent were also given to the parents' prior research. Distribution of questionnaires which is filled with how long and since when the street children roam the street for one year, 24 hours, their eating pattern on the street, their behaviors on street, and negative behavior such as smoking. Oral examination was conducted on-site using a flashlight as the source of light. Measurements were also directly conducted visually on the upper anterior of the *gingiva* (canines, centre insisivus, right and left insisivus lateral). Examination on the *gingiva lead line* was conducted by counting the total greyish blue to black lines on the *gingiva* margin. The approval of ethic feasibility of this research had been given by *Health Research Ethical Clearance Commission (HRECC)* Faculty of Dentistry, Universitas Airlangga (149/HRECC.FODM/VII/2018).

The obtained data were then processed and analyzed to find the analysis of the relationship between the exposures of lead pollution on street children with the case *gingival lead line* by dividing it into four criterias. They are degree 0, degree 1, degree 2, and degree 3, using the SPSS program and the Spearman method.

## RESULTS

Diagram 1 shows that most of the respondents used for this study are males, with the approximate number of 18 children, and the rest 12 children are females.



**Figure1.** Total of street children in SDN Kota Lama Malang

**Table 1.**Degree Distribution of *Gingival Lead Line*

Street Children	<i>Gingival Lead Line</i>			
	Degree 0	Degree 1	Degree 2	Degree 3
<b>Total</b>	4	6	15	5
<b>Percentage</b>	13.3%	16.7%	53.3%	16.7%

Results showed that *gingival lead line* with degree 2 was mostly found on street children near SDN Kota Lama 5 Malang, which is approximately 50%. Research data showed results with street children from SDN Kota Lama 5 Malang who live on the street for less than one month experiencing the exposure of *gingival lead line* degree 0 and degree 1. Then, street children who had been living for 2-6 months and experiencing the exposure of *gingival lead line* vary from degree 0, degree 1, degree 2, and degree 3. Meanwhile, the street children who have been living from 7-12 months had been experiencing exposure of *gingival lead line* degree 2 and degree 3.

**Table 2.**Total Lead Exposure on street children for a year.

Number of street children	Duration being street children	<i>Gingival Lead Line</i>
7 people	< 1 month	D0 and D1
19 people	2-6 month	D0, D1, D2 and D3
4 people	7-12 month	D2 and D3

The next step was doing significance between variables using the Spearman to find the relation between variables. Results were obtained after conducting the relation testing. The results show that the duration of the children on the street for a year with the p-value of 0.03, then the 24 hours duration on the street with the p-value of 0,00, intensity of eating on side of the road in a day with the p-value of 0.039, smoking habit of street children with the p-value of 0,00, intensity of smoking in a week with the p-value of 0.00 and the use of health protection such as breathing mask with the p-value of 0.00. Thus, it could be concluded that there are relations between the duration of the street children on the street for a year, 24 hours, the intensity of eating on the street, smoking habit, and the use of breathing protection with the *gingival lead line* case.

Insignificant relation test that includes the use of bought food and lunch box with p-value around 0.663 and 0.819 which means that the value is higher than 0.05. It has the further meaning that there is no relation between the food package of bought food and lunch box with the case of the gingival lead line in the oral cavity.

**Table 3.** Spearman's Test Table

NUM	Spearman's rho	Correlations <i>Gingival Lead Line</i> Sig. (2 tailed)*
1	1 year time on street	0.03
2	24 hours on street	0.00
3	Intensity of eating on the side of the road	0.039
4	Packaging of the food bought	0.663
5	The kind of packaging used for lunchbox	0.819
6	Smoking habit	0.00
7	Smoking intensity in 1 week	0.00
8	Breathing mask ever used	0.00

**\*Note : Significant if the p-value is 0.05.**

## DISCUSSION

This research was conducted to find the influence of lead pollution exposure on street children in SDN Kota Lama 5 Malang with the case of the *gingival lead line*. Examinations were conducted by counting the total of greyish blue to black lines on the *gingival* margin of upper anterior teeth (canines, insisivus central, upper right and left insisivus lateral) with the average research subjects living/currently on the street and became street children for 7–12 months. A child, who is in its developing state, lives with their parents who are also working on the street such as working as vehicle parker, construction worker, or pedicab driver, causes the child to live on the street for a relatively long time. The relation of the street children

duration lingering on the street with the *gingival lead line* case is shown from the street children who had been living on the street for 7-12 months. They experience a worse degree of the *gingival lead line* than those street children who only linger on the street for less than a month and 2-6 months because, averagely, they have the habit of smoking and having to work on the street.

Research results of the street children near SDN Kota Lama 5 Malang were obtained as long as those children are on the street, which means that those children will be frequently exposed to lead and the degree value of the *gingival lead line* will also increase. A respondent with the *gingival lead line* maximum degree of 2 with different time intensity was obtained, on street children near SDN Kota Lama 5 Malang who had been living for less than 1 month was found mostly struck with *gingival lead line* degree 0 and 1. Then, for the street children near SDN Kota Lama 5 Malang who had been living on the street for 2-6 months had struck *gingival lead line* degree 0, degree 1, degree 2 and degree 3 then for those who had been living for 7-12 months were struck with *gingival lead line* degree 2 and degree 3. Thus, the longer the children roam the street the more children struck with degree 2 and 3.

The longer the children stay on the street highly influence the *gingival lead line* case on their oral cavity. This explanation is in line with the research conducted by Cecillia (2009) which explains that *gingival lead line* is a special case of lead poisoning that could be caused if someone has the lead level of  $>45\mu\text{g}/\text{dl}$  in their blood for around 2 months. This is also in line with the findings on street children near SDN Kota Lama 5 Malang, research results showed that 15 out of 30 research subjects were struck with *gingival lead line* degree on their *gingiva*. A total of 15 children among them confessed that they had been on the street for 1 year recently. This result is also in line with the research conducted by Chahaya (2005) in his research in Pematang Siantar which states that the factor behind the high level of lead is because the long exposure of lead, the dosage of lead inhaled and oral hygiene.

In this research, the smoking habit of street children was divided into few times every week. Street children mostly smoke 1-3 times in a week. Most of the smoking activities of street children is included in the criteria of "seldom" in smoking reaches up to 11 to 30 children (36,7%). This is caused by their free lifestyle and also their environment that highly influences on one of the habit they are doing every day (12). This result matches with the statistic data from Badan POM (2018) that shows almost 25% smokers and tobacco inhalers on adults started their first smoke before they are 10 years old. Cigarette also contains lead (Pb) and could slip in the smoke and inhaled by both active and passive smokers. Smoking activity with the *gingival lead line* case shows that there is a connection between smoking and the case of *gingival lead line*. Smoking habit could risk someone having worse *gingival lead line* which size could be twice more dangerous than non-smoking street children (13). Aside from that, smoking is considered to influence the change of pigment in the *gingiva* or *gingival lead line* on street children (14).

Results show that the street children near SDN Kota Lama 5 Malang never wear mask while they are on the street, which causes the *gingival lead line*. There are children among them who did not know about the existence of disposable surgical mask/one time usage mask. This causes the less awareness of the street children on their own health which results in the relation between the usage of protection mask with *gingival lead line* case. Because of that, the relation between lead pollution exposure on street children that influences the *gingival lead line* case could be seen from 4 points. They are: the duration of the street children on the street, their eating pattern on the street, their behavior on the street, and negative habit such as smoking. Those points each has significant role in influencing the *gingival lead line* case on oral cavity.



## CONCLUSION

A second degree description of gingival lead line is found to be the most prevalent. The pollution exposure on street children affects the incidence of gingival lead lines, such as the amount of time the children are in the street, the intensity of their eating habits while in the street, their smoking activities and their use of protective masks for themselves.

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