

Article

Relationship of Nicotine Levels With Prolactant Hormones In Passive Smoking Postpartum Mom

Amrina Amran¹, Delmi Sulastr², Susilasastr³

¹²³Magister of Biomedic Faculty of Medicine Andalas University

SUBMISSION TRACK

Received: March 28, 2019
Final Revision: May 03, 2019
Available Online: June 28, 2019

KEYWORDS

Nicotine levels, prolactin hormone levels, postpartum mothers

CORRESPONDENCE

Phone: 085374442387
E-mail: amranamrina0@gmail.com

A B S T R A C T

Absorption of nicotine from the lungs into the blood takes place so quickly that 8 seconds have reached the brain and inhibits the central nervous system. Approximately 85% of housewives in Indonesia exposed to smoke, smokers die 8 for active smokers and passive smokers die because of the exposure to other people's smoke. Cigarette consumption can reduce the volume of milk for a right to disrupt the hormone prolactin. The purpose of this study was to determine the relationship between the levels of nicotine in the levels of the hormone prolactin in postpartum mothers smokers passive. Desain this study was *cross-sectional*. The population was postpartum mothers with a total sample of 49 people, by *consecutive sampling*. Examination of nicotine levels and prolactin hormone levels using the ELISA method. Data were analyzed by univariate and bivariate with correlation test. The results showed that the average nicotine level was 23.18 ± 3.18 ng / ml and the average hormone prolactin level was 7.61 ± 1.72 ng / ml. There is a correlation between nicotine level and prolactin hormone level ($r = -0.526$), ($r^2 = 0.276$), ($p < 0.05$). The conclusion of the study is a strong negative correlation between nicotine levels and prolactin hormone levels in passive postpartum mothers.

I. INTRODUCTION

Cigarette smoke inhaled by a smoker, contain components gas and particle. Gas component very potential to cause free radicals. (AYE et al., 2008). WHO predicts diseases related to smoking will be a health problem. Of the 10 adults who died, 1 of them died because of cigarette smoke. (WHO) later in 2025, when the world's number of smokers is around million, there will be 10 million deaths per year. But in reality, the exposure of cigarette smoke from day to day is increasing due to the increasing number of smokers. In 2020 Tobacco-related diseases are a major health problem in the world which causes 8.4 million deaths annually and half of them occur in Asia. (Fidrianny, 2004).

Currently, Indonesia ranks 3rd with the largest number of smokers in the world after China and India. Data for 2010 shows prevalence current smokers are 34.7%, of which 76.6% smoke inside the house with other family members (Rikesdas, 2013).

Based on the 2013 Basic Health Research (Riskesdas), 85% of Indonesian households were exposed to cigarette smoke, the estimate was eight smokers died because of active smokers, one passive smoker died from exposure to secondhand smoke. Based on this ratio calculation, at least 25,000 deaths in Indonesia occur due to cigarette smoke from other people. Simple description analysis was imported from Riskesdas in 2007 or 2013, and combined with the population of the 2013 Central Statistics Agency (BPS). The results of the analysis showed that there was an increase in the proportion of people who smoke every day from 2007 to 2013 (23.7% - 24.3%) (Infodatin, 2013).

Cigarette contains 4000 types of chemical compounds, a total of 400 species including a including hazardous substances and 43 types classified as carcinogenic with three main components, namely nicotine substances that cause addiction (addictive), tar cancer-causing (carcinogenic) and carbon monoxide (CO) is a toxic gas which lowers the oxygen content in the blood (Wijaya, 2010).

If someone smokes, cigarette smoke that goes into the blood is around 15 %, while the other 85 % is released and will be sucked by passive smoking. WHO estimates that nearly 700 million children or half of all children in the world, including babies who suckle their mothers, are forced to suck air containing cigarette smoke. This situation occurs more in their own homes (Riskesdas, 2013).

Cigarette consumption can reduce the volume of milk because it will disrupt the hormone prolactin and oxytocin for the production of breast milk. Smoking will stimulate the release of adrenaline, where adrenaline will inhibit oxytocin release, indicating an association between smoking and early weaning even though the volume of breast milk is not measured directly. In this study it was reported that the prevalence of mothers of smokers who were still breastfeeding 6-12 weeks after giving birth was less than those of non-smokers and also suggested that mothers who smoked more than 15 cigarettes/day had prolactin 30-50% lower on the first day and 21st day after giving birth compared to non-smoking mothers. (Aydore, 2012).

Nicotine along with thousands of other toxic ingredients of cigarette smoke enter the baby's respiratory tract. Nicotine which is inhaled through the respiratory tract and enters the body through the mother's milk will accumulate in the baby's body and endanger the health of the baby. Nicotine can also change the taste of breast milk, and endanger the health of the baby. Babies will be fussy and refuse to suckle if their mother just smokes or breathes cigarette smoke. As a result of disruption of cigarette smoke in infants, among others, vomiting, diarrhea, colic, increased heart rate, etc. (Arosuka, AIMI, 2014).

Exposure to someone's cigarette smoke to the health of others is still often underestimated. During this time, people only banned a woman who smokes because it can harm the fetus and the baby who was born. In fact, it is not only the mother who is breastfeeding who needs to stop smoking. Fathers and people around their mothers and babies must also stop smoking. Someone smokes, which means he only smokes cigarette smoke around 15 %, while the other 85% is released to be smoked by passive smokers. The number of smokers in the family is quite high. On average, in one family there are 1-2 people who smoke with the number of stems being smoked between 1-2 packs/day. (Mboi, 2013) ..

About 40% of women who smoke will stop smoking during pregnancy, but up to 85% smoke again after giving birth. (Susana, 2003) .

Based on ASI coverage in Indonesia is only 42%. This figure is clearly below the WHO target which requires ASI coverage of up to 50%. The birth rate in Indonesia reaches 4, 7 million per year, so babies who get ASI are only 32%, this year's coverage is still paying attention. This figure also shows that the increase in ASI coverage per year is only around 2%. In the year 2012 amounted to 48, 6%. The lowest provision of exclusive breastfeeding is found in West Papua Province at 20.57 %. While the highest exclusive breastfeeding was found in Gorontalo at 67.01%, and Bali at 66.94 (Mboi, 2013).

The secretion of breast milk is regulated by the hormone prolactin and oxytocin. Prolactin produces breast milk in alveolar, the process of prolactin is affected by the duration and frequency of *suckling*. The hormone oxytocin is secreted by the pituitary gland i as a *suckling* response that stimulates myoepithelial cells to excrete milk. This is known as the *milk ejection reflex*, or *let-down reflex* that is the flow of milk from the alveoli into lacteal sinuses deposits to suck the baby through the nipple (Jerem y, 2007).

Secretion of prolactin by the hypothalamus, the secretion of most anterior pituitary hormones is increased by neurosecretory releasing factors delivered from the hypothalamus to the anterior pituitary gland through the hypothalamic-pituitary port system, prolactin secretion is controlled by the opposite exact effect, the hypothalamus synthesizes Prolactin inhibitory factor (PIF). Under normal circumstances prolactin secretion is small. But during lactation, the formation of PIF itself is suppressed so that it allows the anterior pituitary to secrete prolactin in amounts that are not inhibited (Ganong, 1990).

II. METHODS

The research is an analytical study with a *cross-sectional* approach. This study was conducted in the Independent Practice Midwife (BPM) in Padang City, in postpartum mothers with passive smoking as many as 49 people, then venous blood was taken in the median cubital area which was used to examine nicotine and prolactin hormone levels analyzed by ELISA. , carried out in the United FK Biomedical laboratory. For examination of Nicotine Levels and Prolactin Hormone Levels,

The inspection steps are as follows:

Nicotine levels

1. The clerk included a standard, blank and sample of 50 μ L / well, then added a *biotinylated detection Ab* reagent as much as 50 μ L / well to each well, incubating at 37°C for 45 minutes.
2. Dispose of liquid from each *well* and wash using *wash buffer*, by inserting 350 μ L *wash buffer*, shaker for 1 minute, then dispose of liquid (do 3 x).
3. Add 100 μ L HRP *Conjugate* to each *well*, cover with *plate sealer*, and incubate at 37°C for 30 minutes.
4. Repeat step 2 for 4 x.
5. Add 100 μ L of the *substrate solution* to each well, incubate 30 minutes.
6. Add 90 μ L *stop solution* into each *well* (l solutions change color to blue), then mixed again *stop solution* changes color to yellow.
7. Measure *Absorbance* at a wavelength of 450 nm.
8. Enter the Reader engine results and get the results of each sample.
9. Store the remaining *reagents* in the *refrigerator*

Levels of the hormone prolactin

1. Preparation of Reagents

a. Wash Buffer

Leave the *wash* at room temperature (18-25 °C) before diluting. Dilute *the wash buffer* by dissolving 30 ml of *wash buffer* with 3 ml dH₂O to acquire 50 volumes of *wash buffer* 3 50 ml.

- b. Prolactin S standard (stock solution 1 00 ng/ml). Prepare standard 15 minutes before use. Centrifuge at 10,000 ng for 1 minute and dissolve the standard with 1 ml *reference standard* and *diluent sample*, tighten the lid, leave it for 10 minutes while going back and forth several times.

c. Standard Series

Prepare 6 *microtubes* filled with 500 µl of the *reference standard* and *sample diluent*. Move 500 mL of fluid from the tube prolactin and nicotine (stock solution 1 00 ng / mL) into the first *microtube* homogen by *pipetting / vortex*, formed the standard concentration was 50 ng / mL. Continue dilution up to 6 times.

- d. *Biotinylated Detection Ab* Dissolve the concentration of *biotinylated detection Ab* using *biotinylated detection Ab diluent* with a ratio of 1: 100

e. *Avidin-Horseradish Peroxidase (HRP) Conjugate*

Dissolve *biotinylated detection Ab* concentrations using *biotinylated detection Ab diluent* with a ratio of 1: 100.

- 1) Prepare all *reagents* and samples at room temperature before an inspection
- 2) Prepare the *microplate* to be used according to your needs
- 3) Add 10 0 µl standard, blank and get to each well
- 4) Add 10 0 µl *biotinylated detection Ab* to each well, cover with *plate sealer*
- 5) Incubation 1 clock at 37 °C
- 6) Dispose of all fluids in the *well*. Wash *well* by adding 350 mL *wash buffer* solution. Repeat 3 times the lock
- 7) Add 100 mL of *HRP conjugate* at all *well*. Cover with a new *plate sealer*. Incubate for 30 minutes at 37 °C
- 8) Repeat the washing process as in *step 6* 5 times
- 9) Add 90 µl of the solution *substrate the solution* to each *well*. Incubate for 15 minutes at 37 °C. Avoid bright lights.
- 10) Add 50µl *stop solution* to each *well*. The color will change from blue to yellow
- 11) Read the results of the inspection using *ELISA reader* at 450 nm wavelength
- 12) The concentration values of the samples examined were obtained.

This study has received ethical approval from the Research Ethics Committee at the Medical Faculty of Andalas University. The data obtained were carried out by the normality test with the *Shapiro-Wilk* test then processed by the correlation test with a significance level of $p = 0,05$

III. RESULT

Analysis Univariante

Univariate analysis was carried out to obtain an overview of each variable studied. The results of the univariate analysis in this study are as follows:

Table 3.1 Levels of Nicotine and Content Prolactin Hormone in Postpartum Mothers of Passive Smokers

Variabel	Mean \pm SD	Minimal-Maksimal
Nicotine level	23,89 \pm 13,18 ng/ml	4,38– 62,88 ng/ml
Prolactin level	7,612 \pm 1,725 ng/ml	3,94 – 9,84 ng/ml

The results of the study describe nicotine levels and prolactin hormone levels, even if in passive postpartum mothers, do statistical tests to assess normality using *the Shapiro-Wilk test*. Whereas to see the relationship using the correlation test

Bivariate Analysis

The bivariate analysis in this study was to determine an association levels nicotine with the hormone prolactin level can be done by a correlation test i. Before correlation test, first tested for normality using *the Shapiro-Wilk test*. Based on *Shapiro Wilk* normality test $p = 0,220$ for nicotine levels and $p = 0,083$ for the hormone prolactin level. This means that data is normally distributed ($p > 0,05$), then it can be continued with a correlation test.

Table 3.2 Relationship between Nicotine Levels and Prolactin Hormones in Postpartum Passive Smoker Mothers

Variabel	r	R Square	P Value
kadar Nikotin	- 0.526	0.276	0.000

On the curve, the relationship between nicotine levels and prolactin hormone levels in the negative patterned postpartum mothers means that nicotine levels contribute 27.6% to the prolactin hormone . in postpartum mothers and 72.4% had an effect on other factors not examined, namely maternal nutritional factors, length of breastfeeding mothers and prolactin hormones in postpartum mothers and maternal stresslevels in the results of this study belongs to the high category.

This research is similar to the research conducted by Hopkinson *et al* 1992, that passive smoking is associated with early weaning, decreases milk production and ASI reflex inhibitors ("let-down") reflexes. Cigarettes also reduce blood prolactin levels, indicating that smoking significantly reduces breast milk production in the two weeks after intercourse from 514 ml per day in non-smokers to 406 ml per day in passive smokers (La Leche, 2014). Subjects in this study were postpartum two weeks, while in the research conducted by researchers after the initial breastfeeding initiation (IMD) was carried out.

Prolactin Hormone Levels in Postpartum Passive smokers, Prolactin minimum levels of 3.94 ng/ml and Prolactin maximum levels of 9.84 ng/ml, with an average prolactin level of 7.612 ng/ ml and ± 1.725 ng / ml standard deviation ., the normal limit of prolactin levels is 15-25 ng/ml. (Aydore, 2012)

The results of this study are similar to those of Rio J, 2001¹² which state that the high level of nicotine causes a decrease in prolactin levels in nursing mothers exposed to cigarette smoke.

IV. DISCUSSION

Research Results from Postpartum maternal nicotine levels of passive smokers with a minimum nicotine level of 4.38 ng/ml and maximum nicotine levels of 62.88 ng/ml, with an average nicotine level of 23.89 ng/ml with a standard deviation of ± 13.18 ng / ml. According to Drastyawan, et al., 2001¹⁷, the classification of nicotine Prolactin stimulates breastfeeding on when after giving birth.

For pregnancy prolactin will many secreted and influenced by other hormones like estrogen, progesterone, *human placental lactogen* (HPL) and *cortisol* for stimulating growth *mamae*. After giving birth, grade estrogen and progesterone will downhill so that grade prolactin will increase stimulate *mamae* to remove breast milk. Prolactin levels will increase on *fetus* and baby newborn especially on age month first. On the curve it appears that nicotine levels are increased followed by decreased prolactin hormone levels, this shows a negative correlation with a high degree of relationship ($r = -0.526$), ($p = 0,000$). The results of this study have a significant relationship between prolactin hormone levels and prolactin hormone levels in passive postpartum mothers.

The results of this study are similar to the results of the study of Yeu Xeu, *et al.*, 2010¹⁴, indicating that there is a significant relationship ($r = 0.53$), ($p = 0,000$) with an average nicotine level of 0.20 ± 0.14 ng / ml and prolactin is 2.20 ± 0.38 ng / ml. The subject of this study was carried out on rats and the examiners were carried out for 2 days.

Research conducted by Thomas M *et al.*, 2009¹⁵, shows results that are not much different from previous studies where smoking can affect breastfeeding by showing a decrease in prolactin production in women who smoke, mothers smoking with premature infants also stateless milk volume and have low fat content in their milk than mothers exposed to cigarette smoke. In this study, the level of smokers was mild, moderate and severe.

Cigarette consumption can reduce the volume of milk because it will disrupt the hormone prolactin and oxytocin for the production of breast milk. In the Lyons DJ study, *et al.*, 2012 it was reported that the prevalence of mothers who were still breastfeeding 6-12 weeks after giving birth was less than those of non-smokers and also suggested that mothers who smoked more than 15 cigarettes/day had 30-50 prolactin % lower on the first day and 21st day after giving birth compared to non-smoking mothers.

Nicotine which is inhaled through the respiratory tract and enters the body through the mother's milk will accumulate in the baby's body and endanger the baby's health. Nicotine also can change the taste of breast milk, and endanger the health of the baby. Babies will be fussy and refuse to suckle if their mother just smokes or breathes cigarette smoke. As a result of the disruption of cigarette smoke in infants, among others, vomiting, diarrhea, colic, increased heart rate, and others - others. (Susana, 2003).

Nicotine inside cigarettes is absorbed rapidly from the respiratory tract to the maternal blood vessels and directly transferred to ASI by diffusion. If there are people outside who smoked on near the baby, then in addition to nicotine absorbed from breast milk, mothers who are exposed to cigarette smoke are also absorbed directly through baby's breathing. Nicotine along with thousands of other toxic ingredients of cigarette smoke enter the baby's respiratory tract. Nicotine which is inhaled through the respiratory tract and enters the body through the mother's milk will accumulate in the baby's body and endanger the health of the baby i. Nicotine can also change taste ASI, and endangering baby's health. Babies will be fussy and refuse to suckle if their mother just smokes or breathes cigarette smoke. As a result of the disruption of cigarette smoke in infants, among others, vomiting, diarrhea, colic, increased heart rate, etc. (Saroko AIMI, 2014).

V. CONCLUSION

There is a negative correlation with significant ties between nicotine levels of the hormone prolactin in postpartum maternal passive smoking. It is recommended for further research to examine maternal nutritional factors, the frequency of breastfeeding for endocrine disorders, maternal stress and the type of cigarette and subject used. All of these are factors that can affect the levels of the hormone prolactin.

REFERENCES

- Aditama. (1997). *Rokok dan Kesehatan*.
- Aydore. (2012). NIH Public Access. *Changes*, 29(6), 997–1003. <https://doi.org/10.1016/j.biotechadv.2011.08.021>. Secreted
- AYE, H.-H., JINNAI, K., SANO, A., FUNABASHI, T., MITSUSHIMA, D., & KIMURA, F. (2008). Nicotine Given Intracerebroventricularly Does Not Inhibit the Preovulatory Surge of LH and PRL Secretion in Female Rats. *Endocrine Journal*, 45(4), 575–580. <https://doi.org/10.1507/endocrj.45.575>
- Badan Pusat Statistik (BPS). (2013). *Kota Padang Dalam Angka 2013*.
- Drastyawan, D. (2001). Pengaruh Asap Rokok Terhadap Saluran Nafas. *Jurnal Persahabatan Ilmiah Kesehatan*.
- Fidrianny, I. (2004). *Analisis nikotin dalam beberapa organ mencit jantan yang telah menghirup asap rokok Analysis of nicotine in various organs of male mice after inhalation of cigarette smoke*. 15(4), 207–210.
- Ganong, F. W. (2008). *Buku Ajar Fisiologi Kedokteran* (22nd ed.). Jakarta: EGC.
- Infodatin. (2013). *Perilaku Merokok Masyarakat Indonesia*.
- Jeremy P.T. Ward, R. W. C. (2007). *At A Glance Fisiology*. Jakarta: EGC.
- League, L. L. (2014). *Smoking and Breastfeeding" explains how to minimize the effects of smoking on a breastfeeding baby. Includes information on nicotine gum and the nicotine patch*.
- Lyons Dj, Hellysaz A, C. B. (2012). *Prolaktin Regulates Tuberoin Fundibular Dopamin Neuron discharger Pattern : Novel Feedback Control Mechanisms in The Lactotrophic Axix*.
- Mboi, N. (2013). *Riskesdas 2013 : Pengertian*. (Riset Kesehatan Dasar).
- Randa, M. (2011). *Dilemma of women's passive smoking: Annals of Thoracic Medicine*.
- Rikesdas. (2013). *Riset Kesehatan Dasar*. Jakarta: Balitbang Kemenkes RI.
- Rio J. (2001). Influence of smoking on fertility, gestation, and lactation. *Journal de Pediatria*.
- Saroko, A. (2014). *Memberikan Bayi Anda ASI*.
- Susana, D. (2003). Penentuan Kadar Nikotin Pada Asap Rokok. *Makara Kesehatan*, 7(2), 2–5.
- Thomas M, et al. (2005). Association of Maternal Smoking Status With Breastfeeding Practices: Missouri. *Journal de Pediatrics*.
- Wijaya, H. (2010). *Gen CYP2AG meningkatkan keterangantungan Fisik Perokok Terhadap Nikotin*.
- Xue Yue, et al. (2010). *Venous plasma nicotine correlates of hormonal effects of tobacco smoking, HHS Public Access, Authur Manuscript*.

BIOGRAPHY

The author was born in Padang on June 17, 1978 as the youngest of 4 children of the couple Mr. Ali Amran and Ms. Zainimar. At present the writer resides in the Parak Kopi RT 02 Tw 10 Kel Alai Parak Kopi Kec Padang Utara. The author graduated from elementary school in 1991, a junior high school in 1994, SPK in 1997. The author was awarded the Midwifery Madiah Expert in

Midwifery Diploma III Program at the Bukittinggi Health Polytechnic in 2001. In 2006 the author obtained a Bachelor of Applied Science degree in Diploma IV Educator Midwives at the Ministry of Health polytechnic Padang, the author completed his education in the biomedical science graduate program and graduated on July 31, 2017.