

---

# Pigmentation Lesions and Salivary Flow Rates on Woman Smokers

## Lesi Pigmentasi dan Laju Aliran Saliva pada Wanita Perokok

Aulia Fatimah\*, Sri Tjahajawati, Ervin Rizali

Department of Oral Biology,  
Faculty of Dentistry, Universitas Padjadjaran Bandung  
\*Corresponding Author: auliafatimah00@gmail.com

---

### Abstract

Smoking habit has many negative effects towards women's systemic and oral health. One of them are decrease of salivary flow rate and an appearance of pigmentation lesion in gingiva. The aim of this research is to obtain data regarding salivary flow rate and pigmentation lesion on women smokers. This descriptive research used 50 samples by simple random sampling method. The salivary flow rate data was obtained by spitting method and the pigmentation lesion data was described by visual method. The other data was obtained through filling the questionnaire. By the findings of this research, it was found that the mean value of salivary flow rate and pigmentation lesion of women smoker who consumed 1-8 cigarettes per day for 1-2, 2-5 and > 5 years were 0.4 ml/min & 51,7%, 0.4 ml/min & 100%, 0.4 ml/min & 100%. The mean value of salivary flow rate and pigmentation lesion of women smokers who consumed 9-16 cigarettes per day for 1-2, 2-5 and > 5 years were 0.4 ml/min & 100%, 0.4 ml/min & 100%, 0.4 ml/min & 90%. The mean value of salivary flow rate and pigmentation lesion of women smokers who consumed >16 cigarettes per day for 1-2, 2-5 and > 5 years were 0.3 ml/min & 100%, 0.2 ml/min & 100%, 0.2 ml/min & 100%. The conclusion shows that salivary flow rate on women smokers has a lower value compared to normal salivary flow rate or its called oligosialia and most of the subjects have a pigmentation lesion.

**Key Words:** Pigmentation lesion, salivary flow rate, woman smoker

### Abstrak

Kebiasaan merokok pada wanita merupakan kebiasaan yang memiliki banyak efek negatif bagi tubuh dan kesehatan oral. Salah satu efek negatif tersebut adalah menyebabkan penurunan laju aliran saliva dan timbulnya lesi pigmentasi. Tujuan dari penelitian ini adalah memperoleh data mengenai gambaran lesi pigmentasi dan laju aliran saliva pada wanita perokok. Metode penelitian ini adalah deskriptif. Pengambilan sampel sejumlah 50 orang secara *simple random sampling*. Data objektif lesi pigmentasi dan laju aliran saliva masing-masing diperoleh secara visual dan menggunakan metode *spitting*. Data subjek lainnya diperoleh melalui kuisioner. Hasil penelitian rata-rata nilai laju aliran saliva dan persentasi lesi pigmentasi pada wanita perokok dengan konsumsi rokok 1-8 batang per hari selama 1-2, 2-5 dan >5 tahun masing-masing 0.4 ml/menit & 51,7%, 0.4 ml/menit & 100%, 0.4 ml/menit & 100%. Rata-rata nilai laju aliran saliva dan lesi pigmentasi pada wanita perokok dengan konsumsi rokok 9-16 batang per hari selama 1-2, 2-5 dan >5 tahun masing-masing 0.4 ml/menit & 100%, 0.4 ml/menit & 100%, 0.4 ml/menit & 90%. Rata-rata nilai laju aliran saliva dan lesi pigmentasi pada wanita perokok dengan konsumsi rokok >16 batang per hari selama 1-2, 2-5 dan >5 tahun masing-masing 0.3 ml/menit & 100%, 0.2 ml/menit & 100%, 0.2 ml/menit & 100%. Kesimpulan penelitian memperlihatkan nilai laju aliran saliva pada wanita perokok lebih rendah dari nilai laju aliran saliva normal dan sebagian besar subjek memiliki lesi pigmentasi.

**Kata Kunci:** Lesi pigmentasi, laju aliran saliva, wanita perokok

---

## INTRODUCTION

According to the WHO survey in 2008, Indonesia ranked 3<sup>rd</sup> as the largest number of smokers in the world. This situation is increasingly alarming, because the prevalence of women smokers also increased from 4.2% in 1995 to 6.7% in 2013. Thus, 20 years ago out of every 100 Indonesian women 4 of

whom were smokers, then today of every 100 Indonesian women 7 of them are smokers.<sup>1</sup>

Some of the special negative effects of smoking that found in women are not found in man because the difference in the structure of a woman's body.<sup>2</sup> All the chemical content contained in cigarettes is

very dangerous for example it can influence the systemic abnormalities of the body and also in the oral cavity.<sup>3, 4, 5</sup> Continuous exposure to cigarette smoke can cause disorders and diseases in oral cavity.<sup>6</sup> Continuous exposure of smoking is an external factor that can reduce salivary secretion. Lack of saliva represents a major health problem because it completely compromises oral function and oral health.<sup>7,8</sup> Gingiva are an important component of masticatory mucosa, contributing not only to the mastication process but also to anatomic and aesthetic characteristics of the individuals.<sup>9</sup> The color of the gums is determined by the thickness of epithelium, keratinization degree, the presence and degree of melanin deposition, and the underlying connective tissue, including blood irrigation with presence of other pigments such as hemoglobin or oxyhemoglobin. The melanocytes are seen in the basal layer of the epithelium. The melanocytes release melanin granules granular endogenous non-hemoglobin pigment that gives a brown or black color (eumelanin) to the skin, mucosa, hair, and eye or sometimes a reddish colour (pheomelanin) through the dendrite projections to the interior of the adjacent keratinocytes. Smoking can produce polycyclic amines such as nicotine and benzopyrenes as an agent that can excessive deposition of melanin in the oral epithelial layer of oral mucosa. Polycyclic amines such as nicotine and benzopyrenes as a protective adaptation of oral mucosa against tobacco agents, activate the melanocytes to produce melanin. Tobacco-associated melanin pigmentation (smoker melanosis) has been reported in 22% of smokers and is dose-dependent. Women are more affected and the characteristic presentation is a diffuse black-brown macule that can involve mainly the gingiva, followed by buccal mucosa, lips, and hard palate.<sup>8,10,11</sup> Diagnosis is based on clinical characteristics and on smoking history in addition to the exclusion of physiological pigmentation, systemic causes such as Addison disease, hemochromatosis, and drug induced pigmentations.<sup>13</sup>

Based on the description that has been explained above, the identification of the problem to be studied is how the depiction of pigmentation lesions was and salivary flow rate in women smokers and the purpose of this research was to determine the description of pigmentation lesions and salivary flow rate in women smokers. Dentists play an important role in educating and motivating the society, especially women smokers to stop smoking, thus it can help dentists to provide appropriate care.<sup>8</sup>

## MATERIALS AND METHODS

This research is a descriptive research with survey technique. This research was conducted in November 2017 at the Faculty of Cultural Sciences, Universitas Padjadjaran Jatinangor. The population in this research was a group of female students of the Faculty of Humanities Universitas Padjadjaran aged 18-24 years old. Subject retrieval is done by Simple Random Sampling technique, which is a subject size selection technique from a population that shows every member of the population has the same opportunities and all possible mergers selected as subjects have the same opportunity. The number of subjects obtained from the calculation is include 50 people.

In this research the sample is instructed to open their mouth and the operator visually checks the state of the oral cavity to see brownish black pigmentation lesions around the oral cavity.

The procedure for measuring the saliva flow rate is as follows, participants are asked to sit down and then, participants are asked to dispose of saliva in the container through a funnel every 1 minute. Measurement of saliva based on saliva released by participants for 5 minutes. Then record the results of the participants' Saliva Flow Rate (mL / minute).

The data collected is the primary data obtained from the results observed directly in the field, and the results of the examinations that will be presented in the form of tables and images

The number of the ethics approval letter is 1178 / UN6.C.10 / PN / 2017.

## RESULT

This research showed an overview of pigmentation lesions and the value of salivary flow rates. In addition, the results of this research were questionnaires containing smoking habits by smokers. This research was conducted using visual methods on pigmentation lesions and spitting method to determine the salivary flow rate of the subject, the subjects were asked to accumulate saliva in the floor of the mouth and the subject spit it into a test tube every 60 seconds for 5 minutes. Salivary flow rate is obtained from the distribution of total salivary volume within 5 minutes.

The result of this research showed that subjects aged 18-24 years of 50 subjects had an average salivary flow rate of 0.37 ml / min. The results of the standard deviation of the saliva flow rate which shows the difference in the average value is 0.



**Figure 1.** Pigmentation Lesions differences based on the number of cigarette consumption and length of smoking in Women Smokers.

In addition, it can be seen that from 50 subjects, 46 people or 92% of them had pigmentation lesions. While 4 people or 8% of the subjects did not have pigmented lesions. Based on these data it can be seen that most subjects have pigmentation lesions.

**Table 1.** Description of Saliva Flow Rate and Pigmentation Lesions Based on Amount of Cigarette Consumption and Length of Smoking in Smoker Women

Group	Cigarette Consumption (number of cigarettes/day)	Length of Smoking (in a year)	Saliva Flow Rate (ml/minute)			Gingival Pigmentation Lesion	
			N	$\bar{x}$	Sd	n	%
1	1-8	1-2	7	0,4	0,10	4	57,1%
2	1-8	2-5	9	0,4	0,11	9	100%
3	1-8	>5	1	0,4	-	1	100%
4	9-16	1-2	5	0,4	0,08	5	100%
5	9-16	2-5	11	0,4	0,28	11	100%
6	9-16	>5	10	0,4	0,17	9	90%
7	>16	1-2	2	0,3	0,07	2	100%
8	>16	2-5	2	0,2	0,10	2	100%
9	>16	>5	3	0,2	0,04	3	100%
<b>Total</b>			50	0,37	0,17	46	92%

Table 1 showed that the group that consumed cigarettes 1 to 16 cigarettes for 1 to more than 5 years had an average salivary flow rate of 0.4 ml / minute. In subjects who consumed cigarettes more than 16 cigarettes per day for 1 to 2 years had an average salivary flow rate of 0.3 ml / minute and in subjects who consumed cigarettes more than 16 cigarettes for 2 to more than 5 years had an average Salivary flow rate of 0.2 ml / min. It can be concluded from the table that there is a decrease in salivary flow rate along with the increase in the number of cigarettes and the duration of smoking. While the results of the standard deviation of the saliva flow rate which shows the difference in the mean value is  $0.04 \pm 0.28$ .

In addition, table 1 showed that the group who consumed cigarettes 1 to 16 cigarettes per day with a duration of 2 to more than 5 years, all subjects (100%) found to have pigmented gingival lesions. Subjects who consumed more than 16 cigarettes per day with duration of 1 to more than 5 years, all subjects (100%) had gingival pigmentation lesions. In the subjects who consumed 1-8 cigarettes per day with 1-2 years duration (57.1%) and 9 to 16 cigarettes per day with duration of more than 5 years, not all subjects (90%) had gingival pigmentation lesions.

## DISCUSSION

The data obtained shows that the average value based on the number of cigarettes and the length of smoking from the smallest to the highest shows a decrease in the value of saliva flow rate. Based on the number and duration of smoking, most subjects have pigmentation lesions. Subjects with 100% pigmentation lesions were found in 7 groups.

The overall mean value shows that the salivary flow rate in women smokers tends to decrease with a value of 0.37 ml / minute which is referred to as oligosialia when compared to the normal salivary flow rate of 0.40 to 0.50 ml / minute.<sup>13</sup> When viewed separately, the data shows that the value of the saliva flow rate varies in each group. The group that smoked relatively short and the consumed fewer cigarettes tended to have a higher salivary flow rate, while the group that smoked relatively longer and the consumed more cigarettes tended to have a lower salivary flow rate. This is related to the theory that the longer a person smokes and the more cigarettes they consume, the lower the salivary flow rate.

The overall percentage of pigmentation lesions was 92%. This shows that 46 persons of 50 subjects were detected to have pigmentation lesions on maxillary gingiva and mandibular gingiva. Although the exact pathogenesis remains uncertain, melanin stimulation may represent a protective mucosal response to

either the heat of the smoke or to an irritant within the cigarette. Women are most commonly affected. Smoker's melanosis usually presents as diffuse but patchy and irregular pigmentation of the anterior facial maxillary and mandibular gingivae. Other mucosal sites are less commonly affected.<sup>15</sup>

Histologically, the findings are non-specific in the form of abundant melanin within the basal cell layer with melanin incontinence. The presence of pigmentation lesions depends on the nicotine levels that a person smokes when smoking and depends on how deep a smoker smokes his cigarettes.<sup>16,17</sup> So in the research it was shown that the duration of smoking, the number of cigarettes consumed, and how deep a cigarette smoked cigarettes would affect the colour intensity of pigmentation lesions. Based on the results of the studies that have been conducted, the salivary flow rate in women smokers has a lower value than normal salivary flow rates and most subjects have pigmented lesions.

## ACKNOWLEDGMENT

We thank our colleagues from Faculty of Dentistry Universitas Padjadjaran who provided insight and expertise that greatly assisted the research, although they may not agree with all of the interpretations/conclusions of this paper.

## REFERENCES

1. Kementrian Kesehatan Republik Indonesia. HTTS 2016: Suarakan Kebenaran, jangan bunuh dirimu dengan candu rokok <http://www.depkes.go.id/article/print/16060300002/htts-2016-suarakankebenaran-jangan-bunuh-dirimu-dengan-candu-rokok.html> (25 September 2018)
2. Rahmanian SD, Diaz PT, Wewers ME. Tobacco Use and Cessation Among Women: Research and Treatment-Related Issues. *J Women's Heal* 2011; 20(3): 349–57.
3. Chaturvedi P, Mishra A, Datta S, Sinukumar S, Joshi P, Garg A. Harmful effects of nicotine. *Indian J Med Paediatr Onco* 2015; 36(1): 24.
4. Amos A, Greaves L, Nichter M, Bloch M. Woman and tobacco: a call for including gender in tobacco control research, policy and practice. *Tobacco Control* 2012; 21: 236-43.
5. Tumilisar, D. L. Tembakau dan pengaruhnya terhadap kesehatan mulut. *J Kedokteran Meditak* 2011; 17(44): 19-23.
6. Glick M. *Burket's Oral Medicine* 12th ed. USA: People's Medical Publishing House, 2015.
7. Paludo T, Londero VW, Rockenbach MI. Secretory Ig A and salivary flow in smokers and non-smokers. *J Dent Sci* 2013; 28 (4): 105-9.
8. Monteiro LS, Costa JA, da Câmara MI, Albuquerque R, Martins M, Pacheco JJ, et. al. Aesthetic depigmentation of gingival smoker's melanosis using carbon dioxide lasers. *Case Rep Dent* 2015; 2015: 1-5
9. Witt RL. *Salivary gland diseases: surgical and medical management*. New York: Thieme, 2011: 1-15.
10. Grover HS, Dadani H, Bhardwaj A, Lal S. Evaluation of patient response and recurrence of pigmentation following gingival depigmentation using laser and scalpel technique: a clinical study. *J Indian Soc Periodontol* 2014; 18(5): 586-92.
11. Hajifattahi F, Azarshab M, Haghgo, R, Lesan S.. Evaluation of the relationship between passive smoking and oral pigmentation in children. <<http://www.ncbi.nlm.nih.gov/pubmed>> (20 Januari 2018).
12. Petrušić N, Posavac M, Sabol I, Mravak-Stipetić M. The Effect of Tobacco Smoking on Salivation. *Acta Stomatol Croat*. 2015; 49(4): 309–15.
13. George B, Mulamootil V, Cherian S, John J, Matthew Ta, Sebastian S. Awareness on smoking cessation counseling among dentists in Kerala, India. *J Indian Assoc Public Heal Dent* 2015; 13(3): 254.
14. Adda J, Cornaglia F. Taxes, cigarette consumption, and smoking intensity. *Am Econ Rev*. 2006; 96(4): 1013–28.

15. Nadeem M, Shafique R, Yaldram A, Lopez R. Intraoral distribution of oral melanosis and cigarette smoking in a Pakistan population. <<http://search.ebscohost.com/>> (20 Januari 2018).