

Assessment Of Awareness, Knowledge , Attitude Among Female Mishri Users Towards Oral Melanosis In Urban Slums Of Pune City.

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ABSTRACT

Introduction

Oral Melanosis is commonly seen due to increased melanin deposition, influenced by tobacco usage. Chemical compounds present in Mishri are not only irritants and toxins but are also carcinogenic and may result in Oral Melanosis.

Aim

This survey was planned with aim to assess the knowledge and awareness about carcinogenicity of Tobacco among female misri users since this habit is commonly seen in slum areas.

Materials and Methods

A survey was carried out among female mishri users in Urban Slums of Pune. Participants were examined with demographic data, questionnaire and personal history regarding tobacco habits. The collected data were subjected to comprehensive statistical analysis using SPSS version 22.

Results

Mishri Consumption was found to be prevalent in 97% of subjects in the study. Over 89% of subjects colour pigmentation was seen in oral cavity. 96% of the participants were aware about tobacco cessation while only 4% were not aware.

Conclusion

It can be concluded from the present study that the Mishri Consumption is a significant reason for Oral Melanosis among Female Population in Urban Slums of Pune city.

Keywords: Oral Melanosis, Tobacco, Mishri, Pigmentation, Slums.

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I. Introduction

Oral cavity is lined by both keratinized and non keratinized mucosa. ¹Keratinized mucosa is seen in gingival, hard palate, dorsum of tongue. ³ Non-keratinized is observed in labial and buccal mucosa, soft palate, alveolar mucosa, ventral aspect of the tongue and floor of the mouth. ³ Oral mucosa acts as a physical barrier and has many functions such as protective (protects the deeper tissue from mechanical forces caused by mastication and from abrasive nature for food stuff), secretory (saliva secreted from the salivary gland keeps the oral mucosa moist thus preventing it from drying and cracking) and sensory (the oral mucosa is sensitive to touch, pressure, pain, temperature). ¹

The oral mucosa is normally coral pink: Oral mucous membrane are not uniformly colored, it is dependent on various factors such as anatomic factors, presence or absence of keratin, presence of vascular structures. ² The pink and red tint is observed due to the vascular supply and blood circulation. ⁴ Pigments that contribute to normal colour of the skin and mucosa are melanin, carotenoids, reduced HB, oxygenated HB. Melanin is an endogenous non hematogenous pigment. ⁵ It is produced by melanocytes present in the basal layer of the epithelium and is transferred to adjacent keratinocyte via membrane organelles called melanosomes. ⁴ It is also synthesized by nevus cells which are neural crest derivatives and are found in the oral mucosa and skin. ⁴ Melanin is transferred through dendritic cell processes of melanosomes to adjacent keratinocyte. ²

Oral pigmentation is the process of deposition of pigments in the tissues.⁸ Depending on the location and amount of melanin in the tissue, pigmentation can be black, grey, blue or brown in colour.⁴ Melanin pigmentation may be focal, multifocal, or diffuse in nature.⁶ The degree of pigmentation is related to physical, mechanical or chemical stimulation.⁶ Oral Melanosis is a benign focal pigmentary (brown or black) lesion of the oral mucosa.⁸ Oral Melanosis is commonly seen due to increased melanin deposition, influenced by tobacco usage. In India tobacco is used in two forms smoking and smokeless.⁵ Smoking form consists of cigarette, beedi, hookah.⁵ Smokeless form consists of chewing tobacco, misri, khaini, kiwam, zarda, gutka.⁵ Misri is a powdered form of tobacco commonly seen in females of Maharashtra.⁷ Mishri was earlier used as dentifrice turned into addiction.⁷ A typical user applies Mishri to the teeth and gums several times a day.⁷ It is mainly homemade preparation. Mishri contains alkaloid nicotine which is main addictive agent.³ Chemical compounds present in Mishri are not only irritants and toxins but they are also carcinogens.³ The most potent carcinogens in misri are the specific nitrosamines, polycyclic aromatic hydrocarbons.⁵ So keeping all this point in mind, this survey was planned with the aim to assess the knowledge and awareness about carcinogenicity of tobacco among misri users.

II. Materials and Methods

An observational study was conducted of 203 patients of various age groups with habit of tobacco (misri) usage in Parvati slum area, Pune for a research project titled "Assessment of Awareness, Knowledge, Attitude among Female mishri users towards Oral Melanosis in Urban Slums of Pune City". Patients with tobacco history were selected for the study.

Questionnaire Validation and Reliability

The validation of the questionnaire involved the calculation of Mean Content Validity Ratio (CVR), resulting in a CVR score of 0.807, demonstrating its robust content validity. Reliability of questionnaire was done using Cronbach's alpha value determined by average of four evaluators which was found to be 0.783 (good) agreement between evaluators. The questionnaire comprised a total of 25 items.

Sample Size Determination

To establish the required sample size, the assumed population prevalence (P) was set at 15% (0.15). A confidence level (1- α) of 95% (0.95) was chosen, corresponding to a Z value of 1.96, with an absolute precision (d) set at 0.05. Based on these parameters, the minimum sample size (n) was calculated to be 196. To account for potential non-responses or data-related issues, the final sample size for this study was rounded up to 200 subjects.

Method of data analysis:

Statistical analysis will be performed using Statistical Product and Service Solution (SPSS) version 21 for Windows (SPSS Inc, Chicago, IL).

Descriptive quantitative data will be expressed in mean and standard deviation respectively.

Descriptive qualitative data will be expressed in percentage/proportion.

Chi square test was used to find out association of various factors with knowledge, attitude regarding melanosis.

Questionnaire Structure

The questionnaire utilized in this study was carefully designed to investigate various aspects

Methodology

All the patients were explained about the details of study and informed consent was obtained, the ones who were not interested to participate were excluded from the study. All the patients were examined under special designed performa which included demographic data, questionnaire and personal history regarding tobacco habits.

The clinical diagnosis of oral mucosal lesion was established using criteria provided by Epidemiology Guide for Diagnosis of Oral Mucosal Diseases (WHO) criteria. Clinical examination was performed using standard diagnostic instruments. Study participants were grouped based on different parameters like age and sex. Assessment of oral melanosis appearing as brown black hyperpigmentation of the oral mucosa was done at various sites in the oral cavity like buccal mucosa, tongue palate and gingiva. These clinical findings were compared with tobacco consumption habits.

III. Result

A study was carried out to assess the prevalence of Mishri Use and Oral Melanosis among the Parvati Slum population. The patients examined included women from different age groups. Data collected was analyzed and arrived at following findings based on our analysis.

Table 1 shows Prevalence of Tobacco consumption in women of Urban Slums.

Among the 202 population, 97.5% women had a habit of Mishri Consumption , 2.5% women did not have any habit with a significant statistical difference (p value-0.001).

	Yes (%)	No (%)	Chi square test value	P value
Prevalence of Mishri Consumption	197 (97.5%)	5 (2.5%)	Chi = 24.08	P < 0.001**

Table 1 Prevalence of Tobacco consumption in women of Urban Slums.

Table 2 signifies: Prevalence of Oral Melanosis in Urban Slum Population. There were 202 oral lesions, out of which 178(89)% colour pigmentation was seen in oral cavity and 23(11%) had no pigmentation in oral cavity with a significant statistical difference.(p <0.001)

	Yes (%)	No (%)	Chi square test value	P value
Colour changes seen on soft areas of the mouth.	178 (89%)	23 (11%)	Chi = 24.89	P < 0.001**

Table 2: Prevalence of Oral Melanosis in Urban Slum Population.

Table 3 shows Clinical Significance of Oral Mucosal Condition seen in Urban Slum Population.

Maximum cases presented Oral Melanosis 42.6%), followed by OSMF (18.4%), Lichen planus (10.3%), Candidiasis (10.9%), Leukoplakia (7.8%), Anug (2.5%) and No abnormal condition was seen in 12 % participants with a significant p value <0.002.

Oral Mucosal Condition	n	%	Chi Square test	P value
No abnormal condition	6	12%	Chi=11.98	P<0.002
Malignant Tumor	4	2%		
Leukoplakia	16	7.9%		
Lichen planus	16	10.3%		
OSMF	35	18.4%		
Anug	5	2.5%		
Candidiasis	16	8.9%		
Abscess	0	0%		
Others(Melanosis)	84	42.6%		

Table 3- Clinical Significance of Oral Mucosal Condition seen in Urban Slum Population. .

Table 4 shows Prevalence of Site of Oral Melanosis in Urban Slum Population

Melanosis in oral mucosa was assessed at different sites in oral cavity namely Vermilion border,

Lips, Sulci, Buccal mucosa, Floor of mouth, Tongue, Hard/Soft Palate, Alveolar Ridge. Among 202 cases 57.9% (117) showed melanosis on buccal mucosa, 11.9% on commissure, 9.4% (19) on floor of mouth, 8.9% (18) on vermilion border, 8.9% (18) on alveolar ridge, 5.4% (11) on tongue and 1.5% (3) on hard palate while 11.9% the data was not recorded.

Site of Oral Mucosal Lesion	n	%	Chi square test	P value
Vermilion border	18	8.9%	Chi = 15.98	p < 0.001**
Commissures	24	11.9%		
Lips	10	5%		
Buccal mucosa	117	57.9%		
Floor of mouth	19	9.4%		
Tongue	11	5.4%		
Hard/Soft Palate	3	1.5%		
Alveolar Ridge	18	8.9%		
Not recorded	24	11.9%		

Table 4- Prevalence of Site of Oral Melanosis.in Urban Slum Population.

Table 5 shows distribution of Tobacco related habits in different age groups in Urban Slum Population,among 200 patients most of them were in age group 40-60 years (31.2%),20-40 years (27.7%),23.8% with 60-80 years of age and 17.3% with age more than 80 years old.

	Frequency (n)	Percentage (%)
20-40 years	56	27.7%
40-60 years	63	31.2%
60-80 years	48	23.8%
>80 years	35	17.3%
Total	202	100%

Table 5 Distribution of Tobacco related habits in different age groups in Urban Slum Population

Table 6 shows Prevalence of tobacco related habits and marital status of the Population. Married women showed very high prevalence (89.6%) with a high statistical significant difference (p=0.001) and in unmarried women the prevalence was low(10.4%).

	Frequency (n)	Percentage (%)
Married	181	89.6%
Unmarried	21	10.4%
Chi square test = 2.83, p =0.418 (NS)		

Table 6 Prevalence of tobacco related habits and marital status of the Population

Table 7: Prevalence of knowledge about different forms of tobacco in Urban Slum Population.

Awareness about the most common form of tobacco was Mishri(n=107,53%) along with Bidi 6%,Cigarette 4%,Gutka 2.5% and 30.6% of the population had knowledge about all the forms of tobacco with significant statistical difference (p=0.018).

	Frequency (n)	Percentage%
Bidi	12	6%

Cigarette	8	4%
Misri	107	53%
Gutka	5	2.5%
All	65	30%
Chi = 6.51, p =0.018*		

Table 7 Prevalence of knowledge about different forms of tobacco in Urban Slum Population.

Table 8. shows the prevalence of Knowledge related to the Constituents present in Mishri.

Most of the females were aware about the constituents present in Mishri .62.9% females had knowledge that Mishri is made up of Tobacco leaves, followed by Khaini(4.5%), Zarda(8.4%). 24.3% of women were aware that Mishri is made up of Tobacco leaves ,Kahini and Zarda with a significant statistical difference (p=0.01).

	Frequency (n)	Percentage%
Tobacco leaves	127	62.9%
Khaini	9	4.5%
Zarda	17	8.4%
All of the above	49	24.3%
Chi = 9.27 p =0.015*		

Table 8-Prevalence of Knowledge related to the components present in Mishri.among females

Table 9 shows Prevalence of awareness Of Carcinogenicity in Mishri among Females.

76.2% of the the study participants were aware that Mishri is a risk factor that causes cancer, 21.3% were not aware about the Carcinogenicity in Mishri and few(1.5 %) participants were not sure about the Carcinogenicity Mishri with a significant statistical difference(p=0.012).

	Frequency (n)	Percentage%
Yes	154	76.2%
No	3	1.5%
Maybe	43	21.3%
Don't know	2	1%
Chi = 12.48, p = 0.012*		

Table 9:Prevalence of awareness Of Carcinogenicity in Mishri among Females.

Table 10 shows prevalence of knowledge of Oral melanosis in Urban slum Population

Among 200 participants 48 % were aware that In oral melanosis there is brown discoloration the oral cavity., followed by 24.8% for black discoloration, 24.8% for Grey discoloration with significant statistical difference (p=0.045)

	Frequency (n)	Percentage%
Brown	98	48.5%
Black	50	24.8%

Blue	0	0%
Grey	50	24.8%
All of the above	4	2%
Chi = 8.41 , p = 0.045*		

Table 10 Prevalence of knowledge of Oral melanosis in Urban slum Population.

Table 11 shows Awareness about the factors responsible for Oral Melanosis.

Among the study participants, most 72.8%(147)of them were aware that tobacco is the major risk factor for Oral Melanosis,while other participants (25%)were aware that it may be due to tobacco,smoking,alcohol with a significant statistical difference (p=0.002)

	Frequency (n)	Percentage%
Chewing tobacco	147	72.8%
Smoking	1	0.5%
Alcohol	2	1%
All of the above	52	25.7%

Table 11 Awareness about the factors responsible for Oral Melanosis.

Table 12 shows the Attitude of the participants toward Mishri.

55.4 %participant agree that Misri consumption habit can be controlled, followed by (26.7%) of the participants having no opinion ,while 15.3% disagreed ,The chi test=5.87 with significant statistical difference (p value 0.012.)

Maintaining oral hygiene was important for 67.8% of the participants, while rest 23.3% were neutral .The Chi test=8.91 with significant statistical difference (p=0,008)

Misri cleans better than toothpaste was the attitude of 47.5% participant , followed by 25.2% with no opinion, 20.8% who disagreed and 6.4% who strongly disagreed. The chi square test was 5.87 with significant statistical difference (p=0.048).

	Strongly Agree N (%)	Agree N (%)	Neutral N (%)	Disagree N (%)	Strongly Disagree N (%)	Chi	P value
Habitual usage of misri can be controlled	5 (2.5%)	112 (55.4%)	54 (26.7%)	31 (15.3%)	5 (2.5%)	Chi = 7.89	P =0.012*
Maintaining oral hygiene is important	8 (4%)	137 (67.8%)	47 (23.3%)	10 (5%)	0 (0%)	Chi = 8.91	P =0.008*
Misri cleanses better than toothpaste	13 (6.4%)	96 (47.5%)	51 (25.2%)	42 (20.8%)	0 (0%)	Chi = 5.87	P =0.048*

Table 12 signifying the Attitude of the participants toward Mishri.

Table 13-Clinical significance of Patch in Oral Melanosis

Maximum cases presenting melanosis among the population, 62.4%(123) had a single pigmented patch while 37%(73) had multiple patches in their oral cavity showing a significant statistical difference.

	n	%	Chi square test	P value
Single Patch	123	62.4%	Chi=3.41	P =0.031

Multiple Patch	73	37.6%		
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Table 13-Clinical significance of Patch in Oral Melanosis.

Table 14-Clinical Significance of Duration of patch

The distribution of patients based upon their duration of tobacco usage was shown in the Table 14. The maximum distribution of Mishri usage was among 48.5% (98) with more than 1 year, 28.2% (57) with duration 6-12 month, 18.8% (38) with 1-6 months and 4.5% (9) with less than 1 month duration with a significant statistical difference (p value=0.031).

	n	%	Chi square test	P value
< 1 month	9	4.5%	Chi = 7.03	P =0.031*
1-6 month	38	18.8%		
6-12 month	57	28.2%		
1 year	98	48.5%		

Table 14- Awareness about Tobacco Cessation.

96% (194) of the participants were aware that we can quit tobacco and it is possible while only 4% (8) were not aware about tobacco cessation with a significant statistical difference (p=0.001).

	Yes (%)	No (%)	Chi square test value	P value
Awareness of tobacco cessation .	194 (96%)	8 (4%)	Chi=21.73	P<0.001

Table 15- Awareness about Tobacco Cessation.

IV. Discussion

Oral Melanosis is a benign focal pigmentary (black or brown) lesion of oral mucosa¹. Multiple etiologies are associated with oral melanosis. Melanin is the most common etiological factor for Oral melanosis. Oral Melanosis is associated with various forms of tobacco (Mishri) consumption.

This research aimed to estimate the prevalence of oral melanosis among Mishri Users in Parvati Slum area of Pune City.

The Prevalence of Oral Melanosis in Mishri Users was 89.5% which was higher as compared to previous studies conducted by A. Garg *et al.* in New Delhi, India⁵. Oral pigmentation varies with age, the pigmentation was most prevalent in the age group 21-40 years and was comparatively decreased between 45-80 years. Thus this finding agrees with the previous studies by Axeix T *et al* and Saraswathi TR *et al* reported in Swedish and Indian Population^{11,13} this could be due to younger age groups practicing deleterious habits.

Among the study participants oral melanosis was more prevalent in women over men this finding is with the previous study conducted by Naveen-Kumar B *et al*¹⁵ but contrary to studies conducted by Saraswathi TR *et al*, Hedin CA and Ray JG *et al* in past Indian Population^{12,13,14}.

Assessment of Oral Melanosis was done at various sites in the Oral Cavity. In this study Buccal Mucosa was found to be the common site (57%). The association between tobacco users and high melanin pigmentation was found to be statistically significant (p value-0.001). This result agrees with the previous findings by Axeix *et al*¹¹. It is hypothesized that the mechanical and chemical irritation from smokeless tobacco may induce melanin pigmentation¹. According to Larsson BS

the reason behind the lesions developing in the surrounding tissue is long term exposure of injurious chemicals leading to levels of stored melanocyte resulting in their degeneration¹⁸. There are two possible hypothesis associated with melanosis. The first being ability of nicotine to produce melanocyte and secondly binding of melanocyte to noxious substances^{12,19}.

In the current study who used tobacco in the form Misri 53%, Bidi-6%, Cigarette-4%,

Gutka 2.5% and Misri along with gutka, bidi and cigarettes was used by 30%. These findings were similar to that of previous study by Feller L *et al* of the target population¹⁰. Tobacco is advertised in media, thus Mishri is readily available in general stores locally and used by women in this area.

Presence of lesion depends on various factors like form, duration, type of habit and genetic factors¹⁶. The most common lesion present among Mishri Users were Oral melanosis (42.6%) including oral pigmentation and hyperkeratosis. This finding was similar to the previous study conducted in hazaribagh by Anand Chowdhary *et al.*² These may have been caused by the effects of nicotine and heat on melanocyte located along the basal cells of the lining epithelium of oral mucosa and also on minor salivary glands.¹⁷

Oral Melanosis had a very high association with OSMF in the current study. OSMF (Oral Submucous Fibrosis) was seen in 36 (18.4%) subjects. This finding was similar to the studies by Anand Chowdhary *et al.*² whose findings of this condition were 16.1%. The high prevalence could be because of high chemical and mechanical irritation by Mishri.

In the present study Leukoplakia was present in 16 (7.9%) subjects. The results were in agreement with findings reported in Anand Choudhary *et al.* (7.2%)².

The present study showed prevalence of ulceroproliferative lesion (Oral carcinoma) in 2% individuals. This finding was similar to the survey conducted by Anand Chowdhary *et al.*² But this finding was lower compared to the rates of prevalence reported by Navin Kumar *et al.*²⁰ at 6.6%.

V. Limitations

Tobacco related habits are diverse and various factors contribute to the formation of lesion. In the current study the diagnosis of melanosis was not correlated with the histological findings.

VI. Conclusion

Tobacco is a major risk factor for causing cancer in the world and has devastating effects on health. Mishri a form of tobacco seen in Maharashtra among women. This study presents prevalence of oral melanosis among Mishri users in Urban Slum area. People with habit of Mishri presented with oral melanosis had a strong association with the frequency and duration of mishri usage. Thus from the above results we can arise to a conclusion that there is an increase in the cases of oral melanosis among women using Mishri, which is an alarming signal towards development of cancer. Hence efforts should be taken to educate individuals about the hazards of Mishri through Tobacco Awareness programs like video telefilms on effects of tobacco, counseling in regional language and imposing ban on advertisement of tobacco products. These measures will help in reducing the malignant transformation and will improve the quality of life in Urban slum.

Bibliography

- [1]. C. Sreeja, K. Ramakrishnan, D. Vijayalakshmi, M. Devi, I. Aesha, & B. Vijayabanu. (2015, Aug 7th). Oral Pigmentation: A Review. *Journal Of Pharmacy And Bioallied*.
- [2]. Choudhary, A., Kesarwani, P., Chakrabarty, S., Yadav, V. K., & Srivastava, P. (2022, August 30th). Prevalence Of Tobacco Associated Oral Mucosal Lesion In Hazaribagh Population : A Cross- Sectional Study. *Incidence Of Tobacco-Associated Lesion*.
- [3]. Cicek, Y., & Ertas, U. (2003, August 15). The Normal And Pathological Pigmentation Of Oral Mucous Membrane- Review. *The Journal Of Contemporary Dental Practice*, 4.
- [4]. Eric T, S., & Alawi, F. (2017). Pigmented Lesion Of The Oral Mucosa. An Update . *Dent Clin N Am* , 699-710.
- [5]. Garg, A., Maheswari, R., & Urs, A. B. (2021, Nov). Association Of Oral Melanosis With Soft Tissue Pathologies - A Hospital Based Observational Study. *Journal Of Clinical And Diagnostic Research*, 15 (11) Ec 15- Ec 18.
- [6]. Kumar, B. N., Tatapudi, R., -Reddy, R. S., Alapati, S., Pavani, K., & Kotu-Naga Venkata, S. P. (2015, Nov 11th). Various Forms Of Tobacco Usage And It's Associated Oral Mucosal Lesion. *Oral Medicine And Pathology*.
- [7]. Ramasamy, J., & Sivapathasundharam, B. (2022, Jan 11th). A Study On Oral Mucosal Changes Among Tobacco Users. *Journal Of Oral And Maxillofacial Pathology*, 25.
- [8]. Vikneshan M, Anil V. Ankola, Anand Hiremath, Mamata Hebbal, & Suganya M. (2014, Apr- Jun). Smokeless Tobacco And It's Adverse Effect On Oral Cavity -An Overview. *Annals Of Dental Speciality*, 2(2).
- [9]. Sreeja C, Ramakrishnan K, Vijayalakshmi D, Devi M, Aesha I, Vijayabanu B, Et Al. Oral Pigmentation: A Review. *J Pharm Bioallied Sci*. 2015;7:403-08.
- [10]. Feller L, Khammissa Ra, Lemmer J. *Oral Mucosal Melanosis. Melanin*. 2017;2. Doi: 10.5772/65567.
- [11]. Axeix T, Hedin Ca. Epidemiologic Study Of Excessive Oral Melanin Pigmentation With Special Reference To The Influence Of Tobacco Habits. *Scand J Dent Res*. 1982;90:434-42.
- [12]. Hedin Ca. Smokers' Melanosis: Occurrence And Localization In The Attached Gingiva. *Arch Dermatol*. 1977;113:1533-38.
- [13]. Saraswathi Tr, Ranganathan K, Shanmugam S, Sowmya R, Narasimhan Pd, Gunaseelan R, Et Al. Prevalence Of Oral Lesions In Relation To Habits: Cross-Sectional Study In South India. *Indian J Dent Res*. 2006;17:121-25.
- [14]. Ray Jg, Ganguly M, Rao Bs, Mukherjee S, Mahato B, Chaudhuri K, Et Al. Clinico-Epidemiological Profile Of Oral Potentially Malignant And Malignant Conditions Among Areca Nut, Tobacco And Alcohol Users In Eastern India: A Hospital Based Study. *J Oral Maxillofac Pathol*. 2013;17:45-50.
- [15]. Naveen-Kumar B, Tatapudi R, Sudhakara-Reddy R, Alapati S, Pavani K, Sai-Praveen Kn, Et Al. Various Forms Of Tobacco Usage And Its Associated Oral Mucosal Lesions. *J Clin Exp Dent*. 2016;8:E172-77.
- [16]. Nwhator So, Winfunke-Savage K, Ayanbadejo P, Jeboda So. Smokers' Melanosis In A Nigerian Population: A Preliminary Study. *J Contemp Dent Pract*. 2007;8(5):68-75.
- [17]. Hashibe M, Sankaranarayanan R, Thomas G, Kuruvilla B, Mathew B, Somanathan T, Et Al. Alcohol Drinking, Body Mass Index And The Risk Of Oral Leukoplakia In An Indian Population. *Int J Cancer*. 2000;88:129-34.
- [18]. Larsson Bs. Interaction Between Chemicals And Melanin. *Pigment Cell Res*. 1993;6:127-33.