

Gingival Pigmentation in Relation to Dental Caries Among students in Diayala City/Iraq

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ABSTRACT

Background: Gingival pigmentation is a discoloration of the gingiva due to a variety of lesions and conditions associated with several endogenous and exogenous etiologic features. Melanin, a non-hemoglobine derived brown pigment, is the most common of the endogenous pigments and is produced by melanocytes present in the basal and suprabasal cell layers of the epithelium, it may have indirect defensive role against dental caries.

Aims: This study was carried out to investigate the association of gingival pigmentation in relation to dental caries among students.

Results: The total mean value of dental caries (DMFs) were recorded to be significantly less among gingival pigmentation group (6.95 ± 0.92) than control group (7.93 ± 0.37). However the same result found concerning each component, Ds was higher in control group (7.54 ± 0.37) than study group (6.67 ± 0.92), also the missing surfaces due to caries were higher in control group (0.09 ± 0.18) than study group (0.08 ± 0.03) in addition the filling surfaces due to caries were higher in control group (0.19 ± 0.06) than study group (0.18 ± 0.05).

Conclusions: This study concluded that there is an obvious decrease all grads of dental caries including decayed, missing and filling due to caries among gingival pigmentation group.

Key words: Melanin, Dental caries

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INTRODUCTION

Gingiva is the most pigmented intra oral site, in addition to being the most readily seen during inspection. The most common reason for gingival pigmentation is melanin, though other pigments, such as, oxyhemoglobin, reduced hemoglobin, and carotene, which contribute to the normal color of the integument, are also found in the masticatory mucosa [1]. Oral pigmented lesions can have various etiologies including drugs, heavy metals, endocrine disturbance, inflammation, and genetics [2]. Smoking also stimulates melanin production leading to exceedingly evident intra oral pigmentation [3]. There are three basic types of melanin: eumelanin, pheomelanin, and neuromelanin. The

most common type is eumelanin, of which there are two types-brown eumelanin and dark brown eumelanin. Pheomelanin is a cysteine-derivative that contains polybenzothiazine portions that are largely responsible for the color of red hair, among other pigmentation. Neuromelanin is found in the brain [4].

Melanocytes are melanin-producing cells originating from the neural crest [5]. It constitutes a heterogeneous group of cells. These unicellular dendritic cells reside in the basal cell layer of the epidermis and oral epithelium. Depending on the amount and area of distribution of melanin the effect of pigmentation varies from light to dark brown or even black [1]. The intensity of pigmentation largely depends on the activity of melanocytes rather than their number [5].

Dental caries is one of the most common chronic infectious diseases worldwide and endangers humans throughout their life, not only during childhood or adolescence. It is the most common

cause of tooth loss and pain in the oral cavity [6,7]. Epidemiological studies indicate a differentiated incidence of caries in various countries. Dental caries, as a process determined by lifestyle, may be subject to activation in each period of human life if hygiene and diet are neglected even for a period as short as a few weeks [8,9]. In adverse conditions even the most resistant teeth will be affected by this disease [10]. In the early stages the caries progress, can be stopped or reversed, but if left untreated, the disease may cause dysfunctions of the masticatory apparatus and systemic odontogenic infections.

Melanin pigmentation may possess indirect defensive role against dental caries, through the role of melanocyte on immune system. melanocytes can act as antigen presenting cells, can stimulate T-cell proliferation and can phagocytose microorganisms. Thus, melanocytes and their products have the capacity to inhibit proliferation of bacterial and fungal microorganisms. Therefore, melanocytes and melanins may be viewed as an integral part of the innate immune system with a role in neutralizing the products of superficial bacterial and fungal infective agents [11].

As far there is no previous Iraqi study concerning the effect of gingival pigmentation on oral health. The aim of this study was to investigate the caries experience in relating to gingival pigmentation among intermediate and secondary students.

SUBJECT AND METHODS

Across sectional comparative study was carried out during the period from mid-October 2019 until the mid of March 2020. The representative sample of students with gingival pigmentation will be pooled from intermediate and secondary school students their age ranging from 13-16 years for both gender and compared with students with non-pigmented gingiva. gingival pigmentation was assessed according to the criteria of gingival pigmentation index by Kumar, et al. [12]. An approval was obtained from the student's parent that were given an information sheet and consent form which provide simple description about the present study and its importance to insure voluntary precipitation. Oral examination was carried out under standardized condition according to the criteria of WHO in 2013. Clinical examination

was performed by using plane mouth mirror and dental probe. Caries experience was recorded according to the criteria suggested by Manji et al. [13], these criteria allow for recording decayed lesion severity.

Data were collected and analyzed using using SPSS version 21 (statistical package for social sciences). Differences between 2 groups were examined by Two independent sample T test, $p < 0.05$ was considered as statistically significant.

RESULTS

Dental caries experience are shown in Table 1 that illustrates dental caries represented by DMFS was recorded to be less among gingival pigmentation group with mean value (6.95 ± 0.92) than control group (7.93 ± 0.37) with a statistically significant difference in DMFs ($p < 0.038$). The same result found concerning DMFT, but the difference was not significant. concerning each component, the result of present study illustrates although the mean values of Ds Ms Fs were higher in control group than study group. But the differences were not significant.

Table 2 shows caries experience among study group according to gingival pigmentation scores, concerning DMFs and DMFT the mean values were higher among score one and decrease with increase gingival pigmentation severity how are the differences were not significant. The figure was found concerning each component of DMF score (Ds, Ms, Fs) as the mean values decrease with increasing severity of gingival pigmentation.

Table 3 shows the severity dental caries that was represented by four grades between study and control groups. the data revealed that all grades of dental caries Ds (D1, D2, D3, D4) were lower among study group than control group. However, all the differences were not significant.

Table 4 demonstrates the severity of dental caries according to the severity of gingival pigmentation scores. This table shows that the higher mean score for dental caries concerning D1 and D4 were found among score 2 gingival pigmentation, other value was found among score 3 and the D3 was found to be higher among lowest score of gingival pigmentation. All these differences were found not to be significant.

Table 1: Dental caries experience among student with gingival pigmentation (study) compared to control group.

	Groups						t
	Study			Control			
	N	Mean	SE	N	Mean	SE	
Ds	140	6.67	0.29	140	7.54	0.37	1.848
Ms	140	0.08	0.03	140	0.18	0.09	1.074
Fs	140	0.18	0.05	140	0.19	0.06	0.175
DMFs	140	6.95	0.29	140	7.93	0.37	2.090*
DMFt	140	5.6	0.2	140	6.09	0.25	1.543

*Significant p ≤ 0.05

Table 2: Dental caries experience according to the severity of gingival pigmentation score.

	Gingival pigmentation score	N	Mean	SE	F	p
Ds	1	32	7.38	0.6	0.86	0.43
	2	55	6.51	0.5		
	3	53	6.42	0.46		
Ms	1	32	0.09	0.07	0.2	0.82
	2	55	0.09	0.05		
	3	53	0.06	0.03		
Fs	1	32	0.34	0.16	2.1	0.13
	2	55	0.2	0.1		
	3	53	0.06	0.03		
DMFs	1	32	7.91	0.57	1.67	0.19
	2	55	6.8	0.5		
	3	53	6.53	0.46		
DMFt	1	32	6.25	0.39	1.81	0.17
	2	55	5.53	0.31		
	3	53	5.283	0.317		

Table 3: The severity of dental caries among gingival pigmentation group compared with control group.

	Groups						t	p
	Study			Control				
	N	Mean	SE	N	Mean	SE		
D1	140	1.36	0.13	140	1.51	0.16	0.75	0.46
D2	140	3.53	0.22	140	3.89	0.27	1.03	0.3
D3	140	1.31	0.23	140	1.66	0.24	1.09	0.28
D4	140	0.47	0.12	140	0.61	0.14	0.77	0.44

Table 4: The severity of dental caries according to gingival pigmentation scores.

	Gingival pigmentation score	N	Mean	SE	F	p
D1	1	32	1.28	0.21	0.13	0.88
	2	55	1.44	0.19		
	3	53	1.32	0.24		
D2	1	32	3.63	0.51	0.23	0.8
	2	55	3.35	0.37		
	3	53	3.66	0.31		
D3	1	32	2.19	0.62	2.35	0.1
	2	55	1.15	0.36		
	3	53	0.94	0.28		
D4	1	32	0.34	0.17	0.27	0.77
	2	55	0.56	0.21		
	3	53	0.45	0.19		

DISCUSSION

The data of present study showed that the Severity of dental caries was found to be lower

with increase gingival pigmentation score, there is no previous study to compare with, this result could be attributed to the ability and the capacity of Melanins to sequester metal ions and

to bind certain drugs and organic molecules, melanocytes and their products have the capacity to inhibit proliferation of bacterial and fungal microorganisms, Melanin itself can neutralize bacteria-derived enzymes and toxins, and since it has strong binding properties it can also act as a physical barrier against microorganisms [7]. The colonization of children by microorganisms considered to be associated with the development of caries is related to their transfer by saliva from people in the child's closest environment. Most data show that oral colonization by *S. mutans* occurs through direct and indirect contact with related persons whose oral cavity is colonized by such microorganisms [14-16]. melanocytes and melanins may be viewed as an integral part of the innate immune system with a role in neutralizing the products of superficial bacterial and fungal infective agents [11], so there is indirect relation between melanin and dental caries through the effect of melanin on immunity.

CONCLUSION

This study concluded that gingival pigmentation might contribute to decrease susceptibility to dental caries.

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