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## Frequency of Mamelons in Relation to Age, Gender and Occlusion among the Saudi Population

معدل انتشار حلمة الأسنان (Mamelons) وارتباطها بالعمر والجنس والإطباق السني للضكين بين السكان السعوديين

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### Abstract

This observational study aimed to determine the prevalence and identify the presence of mamelons while simultaneously correlating the age, gender, and bite relationship of the subjects.

Total sample size included 518 patients, both males and females. Study participants were selected by systematic random sampling using the randomizer.org website. Clinical examination as well as the presence of mamelons on each jaw and the relationship of anterior teeth such as open bite, functional contact, or not were screened by trained personnel performed by using a mouth mirror, latex gloves, a dental probe, and a dental chair light.

256 (49.4%) males and 262 (50.5%) females participated in this study. It was observed that the presence of mamelons was more frequent among females (84.7%) rather than males (79.3%). During the first decade of life, the percentage of mamelons is higher, irrespective of gender. However, the frequency and percentage of mamelons start to decrease with age. Mamelons are more prevalent in an open bite occlusion (90.0%) followed by a non-functional occlusion, i.e., 81.7% (edge to edge re-

### المستخلص

كان الهدف من هذه الدراسة القائمة على الملاحظة هو تحديد مدى الانتشار وتحديد وجود حلمة الأسنان Mamelons وارتباطها في نفس الوقت بالعمر والجنس وعلاقة العض عند الأشخاص.

وشمل حجم العينة الإجمالي ٥١٨ مريضاً من الذكور والإناث. تم اختيار المشاركين في الدراسة بأخذ عينات عشوائية منهجية باستخدام موقع randomizer.org. وتم الفحص السريري وكذلك الكشف عن وجود حلمات الأسنان على كل من الفكين العلوي والسفلي وعلاقتها بالأسنان الأمامية ووجود العضة المفتوحة مثلاً، ووجود التلامس الوظيفي للأسنان أو عدمه من قبل أفراد مدرين، حيث تم إجراؤه باستخدام مرآة الفم، وقفازات اللاتكس، ومسبار الأسنان، وضوء كرسبي الأسنان.

شارك في هذه الدراسة عدد ٢٥٦ (٤٩,٤٪) من الذكور و٢٦٢ (٥٠,٥٪) من الإناث. ولوحظ أن وجود حلمات الأسنان كان أكثر انتشاراً بين الإناث (٨٤,٧٪) مقارنة بالذكور (٧٩,٣٪). خلال العقد الأول من الحياة، كانت نسبة حلمات الأسنان أعلى، بغض النظر عن الجنس. ومع ذلك، فإن مدى انتشار أو نسبة وجود حلمات

**Keywords:** Forensic Science, Mamelons, Age, Gender, Occlusal Relationship.

الكلمات المفتاحية: علوم الأدلة الجنائية، حلمات الأسنان، العمر، الجنس، علاقة الإطباق للأسنان.



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lation) and then a functional occlusion, i.e., 75.5%.

Persistence of mamelons in either gender is higher up to the age of 25 years, afterward mamelons dramatically reduce. Additionally, mamelons appear more in maxillary incisors than mandible incisors.

الأسنان تبدأ في الانخفاض مع تقدم العمر. وتكون حلمات الأسنان أكثر انتشاراً في الأشخاص الذين لديهم إطباق العضة المفتوح (٩٠,٠٪)، يليه الإطباق غير الوظيفي للعضة بنسبة ٨١,٧٪ (علاقة الحافة على الحافة)، ومن ثم الإغلاق الوظيفي للأسنان، على سبيل المثال كان ٧٥,٥٪.

استمرار وجود حلمات الأسنان في أي من الجنسين كان أعلى حتى سن ٢٥ عاماً، وبعد ذلك ينخفض بشكل كبير. بالإضافة إلى ذلك، تظهر حلمات الأسنان في القواطع الفكوية العلوية أكثر من القواطع في الفك السفلي.

## 1. Introduction

Mamelons are three rounded protuberances that are present along the cutting edge of the permanent incisors teeth when they first erupt through the gingiva [1,2]. These are prominent in newly erupted incisors, both maxillary and mandible. Soon after an eruption, they are worn down quickly due to attrition [3]. However, misalignment or in open bite, they may not wear down [4].

Mamelons are more prominent and easier to identify in the first decade of life and disappear with age [5]. They may vary from person to person. Mamelons are translucent with no dentin underneath [6]. All anterior teeth show traces of four lobes- three labially and one lingually. As compared to the lateral incisors they form as the result from four lobes, three labially, and one lingually (palatally), the lingual (palatal) lobe being represented by the cingulum [7]. The number and prominence of mamelons are variable in maxillary and mandibular teeth [8]. Mamelons are absent on the primary dentition, therefore, they help to differentiate between primary and permanent dentition [5] and may help with the incisal edge in certain systematic diseases such as the manifestation of Hutchinson's, incisors teeth which are characteristic of syphilis [9], and macrodontia of upper incisors generally a final diagnosis of KBG syndrome [10].

Age approximation in children and adolescents is essential for a range of legal issues such as employment, child labor, rape, adoption, eligibility for marriage, or when the birth certificate is not available [11]. Teeth might be the mode of identification and estimation for forensic and other scientific purposes [12]. Therefore, this observational study aimed to determine the prevalence and identify the presence of mamelons while simultaneously correlating the age, gender, and bite relationship of the subjects. It was hypothesized that the presence of mamelons is age, gender, and relationship of occlusion dependent.

## 2 Materials and Methods

Ethical approval was obtained from the institutional review board of Riyadh Elm University (REU), Riyadh, Saudi Arabia. The targeted population for this cross-sectional observational study was between six and fifty years old patients, who visited the REU hospital clinics in Riyadh, Saudi Arabia, from 1st July to 30th October, 2019. The inclusion criteria were as follows: the patient presented with no systematic diseases, fractures, or syndromes affecting the upper and lower incisors. Additionally, subjects with incisor hypomineralization, restoration of upper and lower incisors teeth were excluded from this study. Total sample size was 518 patients, both males and females. Study participants were selected by systematic random sampling using the <https://randomizer.org> website. After consent and demographic data were taken from participants, a clinical examination was performed noting the presence of mamelons on each jaw and the relationship of anterior teeth such as an open bite and functional contact or not. Participants were screened by trained personnel using a mouth mirror, latex gloves, a dental probe, and a dental chair light. A professional camera (Canon EF 100mm f/2.8 Macro USM Lens) was used for the questionable case reassessment by an additional examiner.

The collected data were analyzed with the help of the Statistical Program for Social Sciences (SPSS, Chicago, IL, USA) version 21.0. Descriptive statistics such as frequency and percentage were used to delineate the study population. Furthermore, the Chi-square test was employed to determine the relationships between categorical variables ( $p < 0.05$ ).

## 3. Results

In this study, a total of 4108 teeth were examined (2054 each for maxillary and mandibular). The frequency of mamelons was found to be more in central incisors



compared to lateral incisors, irrespective of the jaw. The details are presented in Table-1.

A total of 518 patients, 256 (49.4%) males and 262 (50.5%) females, participated in this study. Their ages were between 6 to 50 years. It was observed that the presence of mamelons was more frequent among females (84.7%) than males (79.3%), as shown in Table-2.

Table-3 illustrates the relationship of mamelons with age. During the first decade of life, the percentage of mamelons is higher, irrespective of gender. However, the frequency and percentage of mamelons start to decrease with age. The details are presented in Table-3.

Table-4 presents the relationship of occlusion with mamelons. It was observed that mamelons are more prevalent in open bite occlusions (90.0%) followed by non-functional occlusions, i.e., 81.7% (edge to edge relation) and then functional occlusions, i.e., 75.5%.

Table-5 presents the Chi-square test for relationships between categorical variables. No statistical differences were observed between gender and occlusal relationship ( $p=0.391$ ).

#### 4. Discussion

The hypothesis of this study is partially accepted: that is the presence of mamelons was found to be age and relationship of occlusion dependent. However, no statistical difference was observed in the mamelon's presence between genders. Mamelons are three small eminences, each developed on the incisal edges of the newly erupted incisors from one of the three facial developmental lobes

(9). Various methods such as radiographic, histological, or clinical/visual methods can be used for age approximation from dentition [3]. However, the presence or absence of mamelons on the incisal edge of the permanent incisor could be an interesting aspect in determining the age.

When a permanent incisor erupts, three mamelons are always present on its edge. However, with aging or incisal wear, these mamelons wear away (6). The present study represents the first clinical screening conducted to assess the prevalence of mamelons in 6 to 50-year-old male and female subjects. The findings of this study are in agreement with those reported by Gorea et al. who found that mamelons decreases with the increase in age [5]. In our study, participants were divided into 9 groups, i.e., every 5 years from 6 to 50 years. Whereas, the previous study employed 6 groups, i.e., every 10 years. Our results found that after the age of 25 years, the mamelons dramatically decreased.

The prevalence of Mamelons in open bite and non-functional was 90% and 81.7%, respectively. Followed by the functional (edge to edge relation) at 75.5%. This might be because these teeth with open bite do not have direct contact with opposing teeth, and are difficult to use. The incisors are mainly used for cutting hard food. If the incisors are nonfunctional either due to overlap or overjet, the upper and lower anterior teeth do not come in contact with each other during the mastication process, and hence mamelons do not wear away. Our finding agree with Gorea et al. who asserted that mamelons

**Table 1-**Distribution of mamelons on maxillary and mandibular teeth among study participants.

Jaw	Total number of examined teeth	Central		Lateral	
		Right(n) %	Left (n)%	Right(n) %	Left (n) %
Maxilla	2054	(461)22.4%	(458)22.2%	(386)18.7%	(388)18.8%
Mandible	2054	(444)21.6%	(444)21.6%	(394)19.1%	(396)19.2%

**Table 2-**Gender wise mamelons frequency and percentage.

Gender	No. of examined teeth	Teeth with mamelons	Percentage (%)	p-value
Male	2028	1609	79.3%	0.712
Female	2080	1762	84.7%	-



**Table 3-**Frequency and percentage of mamelons with age among the study participants.

Age group (Years)	Total number of examined teeth	Number of teeth with mamelon	Percentage (%)
6-10	724	706	97.5%
11-15	728	704	96.7%
16-20	480	452	94.1%
21-25	696	648	93.1%
26-30	376	283	75.2%
31-35	512	369	72%
36-40	160	88	55%
41-45	216	69	31.9%
46-50	184	20	10.8%

**Table 4-**Relationship of occlusion with mamelons

Occlusion	Total examined teeth	Teeth with mamelons	Percentage (%)
Non-Functional occlusion	3660	2993	81.7%
Functional occlusion	176	133	75.5%
Open bite	272	245	90%

**Table 5-**Chi-square test between gender and occlusion relationship.

Occlusal relationship	Male	Female	p-value
Non-Functional occlusion	232 (90.6%)	229 (87.4%)	0.696
Functional occlusion	11 (4.3%)	12 (4.6%)	0.635
Open bite	13 (5.1%)	21 (8.0%)	0.443



persist in females (84.7%) more than males (79.3%) [5]. This might be because men eat harder food compared to women. Secondly, men eat more than women, and hence their teeth are more functional than those of women.

Another important aspect that was observed in this study was that the maxillary central incisors had more mamelons compared to the lower central incisors. However, there was no statistical difference between right or left central or lateral incisor where the mamelons appear in central incisors more commonly than lateral incisors in upper and lower jaws. This study was limited by being conducted in only one city in Saudi Arabia. A bigger sample size from all over the country is recommended to better determine the prevalence of mamelons and to correlate the effect of age, gender, and bite relationship on the wear and tear of mamelons.

## 5. Conclusion

Within the limitations of this study, it may be concluded that the frequency of mamelons is higher in females compared to males, and persistence of mamelons in either gender is higher up to the age of 25, afterward mamelons dramatically reduce. Mamelons decrease with an increase in age and are more prevalent in open bite and nonfunctional overlap and overjet relationships. Additionally, mamelons appear more in maxillary incisors than mandible incisors.

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### Conflicts of interest

There are no conflicts of interest

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