Original Research

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Status of first molars, its visualization in a smile and opinion about its influence on an esthetics teeth arch: comparative study of Russian and foreign students

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Abstract

AIM. To determine factors influencing the assessment of the contribution of the first molar to smile aesthetics in Russian and international students.

MATERIALS AND METHODS. The study involved 193 students, including 119 Russian citizens (21.63 ± 1.55 years old) and 74 international students (23.93 ± 2.82 years old). Participants completed an anonymous questionnaire and then underwent a clinical oral examination, during which the condition of their first molars was assessed for caries, fillings, and artificial crowns, as well as the visibility of the first molars during a broad smile and loud laughter. Statistical analysis was performed using StatTech v. 4.9.2, values at $p < 0.05$ were considered significant.

RESULTS. Among Russian students, 1 (0.8%) had amalgam fillings in the area of their first molars, compared to 22 (29.7%) among foreign students, predominantly students from Iran (24.3%); the difference was significant ($p < 0.001$). Chinese students were more likely to have intact first molars (75%). Upper and lower molars were visible in the smile zone in 47.1% and 54.1% of participants, respectively, with no significant difference between the groups. Russian students were more likely to pay attention to the condition of their first molars (66.4% vs. 44.6%; $p = 0.002$), while foreign students were more likely to rate the contribution of molars to aesthetics as "significant" (48.6% vs. 29.4%; $p < 0.001$). Women were more likely to note the aesthetic significance of first molars ($p = 0.032$).

CONCLUSIONS. The condition and visibility of first molars influence the perception of smile aesthetics. Cross-cultural differences in the prevalence of amalgam restorations and the assessment of the aesthetic significance of first molars highlight the need to consider national dental traditions and gender differences when analyzing factors shaping smile perception. Among Russian students, dental factors influence the assessment of the contribution of first molars to smile aesthetics. Among foreign students, gender, along with dental factors, has a significant influence.

Keywords: students, esthetics of smile, first molars, physiological factors

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Состояние первого моляра, видимость его в зоне улыбки и оценка мнения о его влиянии на эстетику зубного ряда: сравнительное исследование российских и иностранных студентов

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Резюме

ЦЕЛЬ. Определение факторов, влияющих на оценку вклада первого моляра в эстетику улыбки у российских и иностранных студентов.

МАТЕРИАЛЫ И МЕТОДЫ. В исследовании приняли участие 193 студента, из которых гражданами РФ являлись 119 студентов (21,63 ± 1,55 лет), а 74 – иностранными гражданами (23,93 ± 2,82 лет). Участники заполняли анонимную анкету, а затем им проводили клинический осмотр полости рта, в ходе которого оценивали состояние первых моляров на предмет кариеса, пломб, искусственных коронок, а также видимость первых моляров при широкой улыбке и громком смехе. Статистический анализ проводился с использованием программы StatTech v. 4.9.2, значимыми считались значения при $p < 0,05$.

РЕЗУЛЬТАТЫ. Среди российских студентов амальгамовые пломбы в области первых моляров имел 1 человек (0,8 %), среди иностранных – 22 (29,7 %), преимущественно студенты из Ирана (24,3 %), различие достоверно ($p < 0,001$). У китайских студентов чаще отмечались интактные первые моляры (75 %). Верхние и нижние моляры были видимы в зоне улыбки у 47,1 и 54,1 % участников, без достоверной разницы между группами. Российские студенты чаще обращали внимание на состояние первых моляров у других (66,4 % против 44,6 %; $p = 0,002$), тогда как иностранные студенты чаще оценивали вклад моляров в эстетику как «значительный» (48,6 против 29,4 %; $p < 0,001$). Женщины чаще отмечали эстетическую значимость первых моляров ($p = 0,032$).

ВЫВОДЫ. Состояние и видимость первых моляров оказывают влияние на восприятие эстетики улыбки. Межкультурные различия в распространенности амальгамовых реставраций и оценке эстетической значимости первых моляров подчеркивают необходимость учета национальных стоматологических традиций и гендерных особенностей при анализе факторов, формирующих восприятие улыбки. Среди российских студентов на оценку вклада первых моляров в эстетику влияние оказывают стоматологические факторы. Среди иностранных студентов наряду со стоматологическими факторами выраженное влияние имеет гендерный фактор.

Ключевые слова: студенты, эстетика улыбки, первые моляры, психологические факторы

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INTRODUCTION

A beautiful smile is a social resource, particularly for young people, as it influences self-esteem, social interactions, and the perception of attractiveness and success. In contemporary society, a smile is often regarded as a reflection of health, self-confidence, and even professional potential, which makes aesthetic dentistry a priority for many adolescents and young adults [1–4]. The importance of smile aesthetics is underscored by the high demand for orthodontic and cosmetic treatment among young people, who are especially sensitive to peer opinion and societal standards [5].

The perception of a beautiful smile is influenced by multiple factors, including tooth alignment, color and shape, the visibility of the gingival contour, the number of visible teeth (including the first molars), as well as the harmony of dental and facial proportions [6]. The visibility and condition of the first molar, although discussed less frequently than the anterior teeth, may affect the overall impression of the dentition, particularly in the case of a broad smile [1; 7; 8].

Cultural context plays a significant role in shaping standards of dental beauty. Although features such as white and well-aligned teeth are valued worldwide,

preferences regarding gingival contour, tooth proportions, and the number of visible teeth may vary between countries and ethnic groups [9]. Comparative studies of students, for example, demonstrate both shared and distinct criteria for an attractive smile, highlighting the importance of cultural context in the assessment of smile aesthetics [9–11].

AIM

The aim of this study was to identify the factors influencing the assessment of the contribution of the first molar to smile aesthetics among Russian and international students.

MATERIALS AND METHODS

The publication of this article was approved by the Ethics Committee of the Peoples' Friendship University of Russia named after Patrice Lumumba (Protocol No. 12 dated November 17, 2022).

A total of 193 dental students from the Peoples' Friendship University of Russia named after Patrice Lumumba and I.M. Sechenov First Moscow State Medical University participated in this study. Of these, 119 participants were citizens of the Russian Federation, and 74 were international students. All participants provided written informed consent to take part in the study. The distribution of participants by sex, age, and year of study is presented in Table 1.

Participants completed an anonymous questionnaire designed to collect demographic data and their opinions on the contribution of the first molars to smile aesthetics. The questionnaire was provided in Russian or English depending on the participant's language. After completing the questionnaire, participants underwent a clinical oral examination, during which the condition of the first molars was assessed for caries, the presence and material of defective restorations, and the presence of artificial crowns. To evaluate the visibility of the first molars in the smile zone, participants were asked to smile as broadly as possible (to assess the visibility of the upper molars) and then laugh aloud (to assess the visibility of the lower molars). Table 2 presents the distribution of international students according to the country of citizenship, and Table 3 shows the nationalities reported by the participants.

Table 1. Distribution of participants by sex, age, and year of study

Таблица 1. Распределение участников по полу, возрасту и курсу обучения

Parameter	Russian students		International students	
Total number of participants	*n* = 119		*n* = 74	
Mean age (years), M ± SD (min–max)	21.63 ± 1.55 (19.00–28.00)		23.93 ± 2.82 (19.00–31.00)	
Sex distribution, *n* (%)	Male *n* = 40 (33.6)	Female *n* = 79 (66.4)	Male *n* = 34 (45.9)	Female *n* = 40 (54.1)
Distribution by year of study, *n* (%)				
3rd year	17 (14.3)		36 (48.6)	
4th year	94 (79.0)		38 (51.4)	
5th year	8 (6.7)		0 (0)	

Table 2. Distribution of international students by country of citizenship

Таблица 2. Распределение иностранных студентов в зависимости от страны, гражданином которой является участник

Country	Number of respondents, *n* (%) *n* = 74
Iran	43 (22.3)
Namibia	3 (1.6)
China	12 (6.2)
Lebanon	5 (2.6)
Turkmenistan	5 (2.6)
Uzbekistan	3 (1.6)
Armenia	2 (1.0)
USA	1 (0.5)

Table 3. Distribution of students according to the nationality they reported

Таблица 3. Распределение студентов в зависимости от национальности, которую они указали

Nationality	Number of respondents, *n* (%) *n* = 193
Russians	102 (52.8)
Iranians	45 (23.3)
Namibians	3 (1.6)
Uzbeks	5 (2.6)
Armenians	8 (4.1)
Greeks	3 (1.6)
Kyrgyz	2 (1.0)
Lebanese	5 (2.6)
Turkmens	5 (2.6)
Kazakhs	1 (0.5)
Chinese	12 (6.2)
Tajiks	2 (1.0)

Statistical Data Analysis. Statistical analysis was performed using StatTech v. 4.9.2 (developer – StatTech LLC, Russia). Quantitative variables were assessed for normality using the Shapiro–Wilk test (for sample sizes under 50) or the Kolmogorov–Smirnov test (for sample sizes over 50). If the data did not follow a normal distribution, quantitative variables were described using the median (Me) and the lower and upper quartiles (Q1–Q3). Categorical variables were presented as absolute numbers and percentages. Ninety-five percent confidence intervals (95% CI) for percentages were calculated using the Clopper–Pearson method. As a measure of effect for comparing proportions, the odds ratio with a 95% confidence interval (OR; 95% CI) was calculated. Comparisons of percentages in multicategory contingency tables were performed using Pearson's chi-squared test. Differences were considered statistically significant at $p < 0.05$.

RESULTS

During the clinical examination, it was found that among Russian students, only 12 individuals (10.1%) had all four first molars intact. Among international students, 13 individuals (17.6%) had intact first molars; specifically, among Iranian students, 4 individuals (9.3%) had intact first molars (Fig. 1), while among Chinese students, 9 individuals (75.0%) had intact first molars. The number of students from other countries was insufficient to assess this parameter separately for each country.

Among Russian students, 7 individuals (5.9%) had one first molar extracted. Among international students, 5 individuals (6.8%) had extracted first molars – three with one extracted first molar each, and two with two extracted first molars each (Fig. 2).

The next step involved determining the number of students whose first molars were all present, with restorations intact and no carious lesions. This condition was observed in 38 Russian students (31.9%) and 25 international students (33.8%). Among Chinese students, three individuals (25.0%) exhibited this condition. Thus, of the 12 Chinese students, nine had intact first molars, and the remaining three had sound restorations without carious lesions; in other words, none of the Chinese students required dental treatment in the first molar region. Considering the limitations of this study, it can be preliminarily concluded that the condition of first molars among Chinese students appears somewhat better compared to other students, although a larger sample of Chinese students is needed to confirm this trend.

When assessing the presence of artificial crowns in the first molar region, 9 Russian students (7.6%) and 4 international students (5.4%) had crowns.

Regarding the presence of amalgam restorations in the first molars, only 1 Russian student (0.8%) had amalgam, compared to 22 international students (29.7%), a statistically significant difference ($p < 0.001$). The highest number of amalgam restorations in the first molars was observed among Iranian students – 18 individuals (24.3%), along with 2 Chinese students (2.7%), 1 Lebanese student (1.4%), and 1 Namibian student (1.4%) (Fig. 3).

Iranian students have a significantly higher number of amalgam restorations in the first molars compared to students from other countries ($p < 0.001$) (Fig. 4).

Upper first molars were visible during a maximal smile in 56 Russian students (47.1%) and 39 international students (52.7%), while lower first molars were visible during loud laughter in 57 Russian students (47.9%) and 40 international students (54.1%), with no significant differences observed for these parameters.

Analysis of the questionnaire responses revealed that Russian students significantly more often paid

Fig. 1. Student F., 23 years old (Iran), has intact lower first molars, with six cusps on each tooth being particularly notable

Рис. 1. Студент Ф., 23 года (Иран), имеет интактные первые нижние моляры, обращает на себя внимание наличие шести бугров у каждого из них

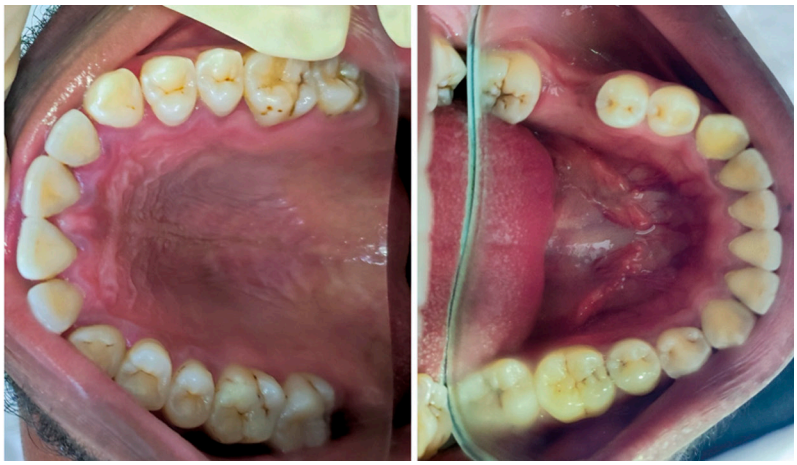

Fig. 2. Student B., 24 years old (Namibia), tooth 4.6 is missing

Рис. 2. Студент Б., 24 года (Намибия), зуб 4.6 отсутствует

attention to the condition of first molars in others; this response was selected by 79 Russian students (66.4%) compared to 33 international students (44.6%) ($p = 0.002$). Regarding the contribution of first molars to smile aesthetics, international students were significantly more likely than Russian students to rate their contribution as “significant” (36 students, 48.6%, versus 35 students, 29.4%, respectively; $p < 0.001$).

Among Russian students, those with defective restorations or carious lesions in the first molars paid significantly more attention to the condition of these teeth in others compared to those whose first molars had sound restorations and no caries (64, 79.0%, versus 15, 39.5%, respectively; $p < 0.001$). Lower first molars were visible during loud laughter and conversation significantly more often in students with sound restorations and no caries compared to those with first molars requiring dental treatment (25, 65.8%, versus 32, 39.5%, respectively; $p = 0.007$).

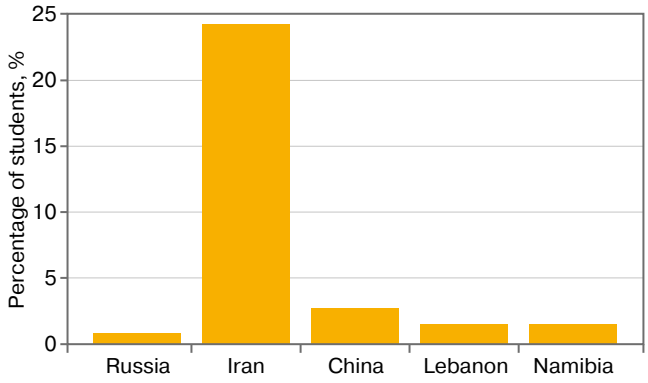

Fig. 3. Graph showing the proportion of students with amalgam restorations in the first molars. This proportion is significantly higher among Iranian students compared to other countries ($p < 0.001$)

Рис. 3. График, показывающий долю студентов с амальгамовыми пломбами в области первых моляров. У иранских студентов этот показатель значительно выше по сравнению с другими странами ($p < 0,001$)

Fig. 4. Student M., 24 years old (Iran), all first molars have amalgam restorations

Рис. 4. Студент М., 24 года (Иран), все первые моляры имеют пломбы из амальгамы

Russian students with intact first molars were significantly more likely to consider their contribution to smile aesthetics as significant compared to those with previously treated first molars (66.7% versus 25.2%, respectively; $p = 0.011$).

Among international students, sex influenced the assessment of first molars’ contribution to smile aesthetics. A significantly higher proportion of female students considered first molars to make a significant contribution to smile aesthetics (22, 55.0%, versus 14, 41.2%; $p = 0.032$). Additionally, international female students were significantly more likely than male students to pay attention to the condition of first molars in others (24, 60.0%, versus 9, 26.5%; $p = 0.003$). Lower first molars were visible during loud laughter significantly more often in male international students compared to female students (23, 67.6%, versus 17, 42.5%; $p = 0.031$). No significant sex-related differences were observed among Russian students.

Among international students, lower first molars were visible during loud laughter more often in those with sound restorations and no caries compared to those with first molars requiring dental treatment (19, 76.0%, versus 21, 42.9%; $p = 0.007$). International students with defective restorations or carious lesions in the first molars were significantly more likely to pay attention to the condition of these teeth in others compared to those with sound restorations and no caries (28, 57.1%, versus 5, 20.0%; $p = 0.003$).

DISCUSSION

The results obtained demonstrate significant differences in the condition of first molars and the perception of their aesthetic significance between Russian and international students. The highest number of amalgam restorations in first molars was observed among Iranian students (24.3%), which may reflect national standards of dental care and the economic accessibility of modern restorative materials. In countries where amalgam is still used in clinical practice due to its durability and low cost, such restorations remain common despite being less aesthetically appealing than composites. Thus, the observed cross-cultural difference in the prevalence of amalgam fillings has both clinical and sociocultural explanations.

Interestingly, among Chinese students, the condition of first molars was the best – 75% had intact teeth, and the remainder had sound restorations without signs of caries. This may be associated with high accessibility to preventive programs and a cultural emphasis on regular dental check-ups, characteristic of the East Asian region.

Gender differences observed among international students are also noteworthy: female students more frequently reported a significant contribution of first molars to smile aesthetics and paid more attention to the condition of these teeth in others. This may reflect general trends reported in the literature, where women exhibit greater sensitivity to facial and smile aesthetics. Thus, the perception of the aesthetics of posterior teeth, particularly first molars, may depend not only on cultural but also on gender-related factors.

The literature consistently highlights the central role of smile aesthetics in the psychosocial well-being of young people [2]. Although the greatest influence is exerted by anterior teeth and the degree of gingival display during smiling, the visibility and condition of first molars may also contribute to overall dental harmony, particularly in a broad smile [4]. However, their impact is generally secondary compared to anterior teeth.

Cultural differences play a significant role: what is considered an attractive smile in one country may not be perceived as such in another [12]. For example, some cultures prefer minimal gingival display, whereas in others, a "gummy" smile is considered acceptable [4]. Dental students and professionals tend to evaluate aesthetic parameters more critically and accurately than non-specialists, and women more frequently show sensitivity to aesthetic deviations [13].

Evidence is well-established regarding the psychosocial importance of smile aesthetics and key influencing factors such as tooth alignment and color. However, the specific role of first molars in smile attractiveness has been studied considerably less and is likely more relevant in certain cultural or clinical contexts.

Among the dental and demographic factors studied, none had a significant influence on the visibility of upper first molars during a broad smile. This may be explained by the fact that upper molar visibility is more determined by anatomical structure than by the factors analyzed in this study.

Lower first molars during loud laughter were significantly more visible both among Russian and international students in those without defective restorations or carious lesions in these teeth. This pattern may also indicate a psychological component: students with intact first molars may laugh more freely. Among international students, the visibility of lower first molars during laughter was influenced by the participant's sex, with male students showing greater visibility than female students. This may be explained by sex-related anatomical differences as well as behavioral factors, such as differences in the way young men and women express laughter.

Both among Russian and international students, individuals with defective restorations or carious lesions in the first molars were significantly more likely to pay attention to the condition of these teeth in others.

The contribution of first molars to smile aesthetics was more frequently rated as significant by international students compared to Russian students. Among Russian students, those with intact first molars more often rated their contribution as significant, and this was the only factor influencing the assessment of first molars' aesthetic contribution identified in the Russian student group. Among international students, the only factor significantly influencing the perceived contribution of first molars to smile aesthetics was the participant's sex, with female students more frequently rating this contribution as significant compared to male students.

CONCLUSION

The study demonstrated that the condition and visibility of first molars in the smile zone have a measurable impact on the perception of dental aesthetics. Cross-cultural differences in the prevalence of amalgam restorations and in the subjective assessment of the significance of first molars highlight the importance of considering national dental traditions and gender-specific factors when analyzing smile aesthetics. Iranian students exhibited a higher number of amalgam restorations in first molars compared to Russian students and students from other countries, whereas Chinese students showed the best indicators of dental health. Differences were observed in the perceived contribution of first molars to smile aesthetics between Russian and international students. Among Russian students, this perception was primarily influenced by dental factors, while among international students, gender also had a significant impact alongside dental factors.

These findings can serve as a basis for further research aimed at exploring cultural, behavioral, and gender-related factors that influence perceptions of smile aesthetics and dental health.

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