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Beyond the Gag Reflex: Understanding Soft Palate Variations for Better Dental Care

Khezran Qamar[1*], Maryam Mumtaz[2], Muhammad Hammad Rafique[1], Khalid Yaqub[2], Ayema Nazif[1], Tayyaba Hamid[1] and Sajid Naeem[1]

[1]Department of Prosthodontics, Lahore Medical and Dental College, Lahore, Pakistan
[2]Department of Prosthodontics, Institute of Dentistry, Combined Military Hospital Lahore Medical College, Lahore, Pakistan

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***Corresponding Author:**
Khezran Qamar
Department of Prosthodontics, Lahore Medical and Dental College, Lahore, Pakistan
khezranqamar@gmail.com

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ABSTRACT

The gag reflex is a defense process to protect the airway from irritants. In a few patients, exaggerated reflexes jeopardize the dental treatment and compromise the dental procedures. **Objectives:** To evaluate the potential association of the severity of gag reflex with types of soft palate in patients attending to prosthodontic clinic and to find out the association within gender, age groups. **Methods:** A cross-sectional observational study included 250 patients of both genders who needed dentures, were selected. Gag reflex was checked by touching the anterior to posterior part of the maxilla and mandible with a dental mirror while taking impressions. Gag Reflex Index (GRI) was used for the assessment of gag response. The reaction of the patients was recorded on V grades. The types of soft palates were classified via house classification as I, II, and III. **Results:** The soft palate forms frequently observed were soft palate drop type I, 60.0% followed by type II, 31.6 % and 8.0 % patients had type III soft palate drop. The gag reflex grade V was 5.6 %, grade IV was 4.8 %, grade III was 8.4%, grade II was 22.0 % and grade I was 59.2%. The association of gag reflex grades with gender and types of soft palate drop was found to be significant, 0.02 and 0.00. However, with different age groups, insignificant results were obtained, p 0.07. **Conclusions:** The study concluded that the severity of gagging is found more in female patients and patients with type II and III soft palatal anatomy. Dentists need to evaluate different soft palatal types, especially when dealing with female patients needing prosthodontic treatment.

INTRODUCTION

The pharyngeal reflex, also known as the gag reflex, is a complex involuntary phenomenon in human physiology. Though the gag reflex is a protective defense response to keep the airway clear of irritants, in a few patients the extreme response elicits and jeopardizes the dental treatment [1]. During dental procedures, especially fabricating complete and partial dentures in prosthodontics, the frequency of gagging is common. The prosthodontic procedures, such as steps of making dentures like try selection, impression taking, determining vertical and horizontal jaw relation, denture insertion, and removal, elicit gag reflex. There can be external and internal stimuli that trigger the gagging response. External stimuli such as the sight of a mouth mirror, impression trays, taste, and smell of impression materials can trigger the gag reflex [2,3]. Intraoral stimuli, such as the soft palate anatomy, show hyposensitive and hypersensitive responses. The trigger points of the gag reflex are associated with the types of soft palate. The soft palate is a muscular, mobile fold that is suspended from the hard palate posteriorly between the oropharynx and nasopharynx [4]. In the two domes of the hard palate, the muscles of the soft palate are inserted, and they hang down posteriorly and help in speech and swallowing [5]. There are three types of soft palate based on the angle that it forms with the hard palate. Type I is the soft palate angle

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with the hard palate that is horizontal, shallow <10 degrees angle, and flat. Type II soft palate makes an angle between 10-45 degrees, whereas type III palate runs down, making a sharp angle of 70 degrees [6]. In denture patients, the posterior denture seal is made, and the posterior extension of the maxillary denture is always kept anterior to the mobile tissues of the soft palate. Any extension ahead of the movable soft palate tissues elicits gagging [7]. Patients with type II and III soft and hard palate anatomy greatly affect the posterior denture seal, as there is more mobile tissue and contact, and a lack of contact with the denture during speech and swallowing triggers gagging [8]. Prosthodontic treatment modalities to minimize the gagging reflex should be practiced. To cope with the gagging reflex and for practicing smooth dentistry, various prosthodontic modalities to control the gag reflex can be used [9]. The methods to manage gag reflex include psychological intervention, relaxation, distraction, desensitization, and cognitive behavior therapy. Practicing these modalities not only prevents disturbance, delay, and repetition of treatment but also saves time and cost of the procedure [10]. It is empirical to identify the severity of gagging in prosthodontic patients so that the dentist has the idea of dealing with the patient via standard treatment procedures or practicing alternative methods to control the gag reflex and get a successful and comfortable treatment outcome [11]. Care is needed, especially when dealing with geriatric patients during impression taking with alginate and impression compound [12]. Depending on the patient's condition and accurate diagnosis, the gagging can be controlled, and any disturbance that can jeopardize the steps of dental procedures can be rectified [11]. The soft palate plays a critical role in the gag reflex, and its morphology can influence the severity of gagging [13]. By understanding individual variations in gag reflex and soft palate anatomy, prosthodontists can tailor their approaches to minimize discomfort and anxiety and can improve patient compliance and treatment success rates. To the best of our knowledge, no study in our region has been conducted to evaluate the types of soft palate and gag reflex frequency in prosthodontic patients.

The study aimed to evaluate the potential association of the severity of gag reflex with types of soft palate in patients attending to prosthodontic clinic and also find out the association within gender, age groups.

METHODS

A cross-sectional observational study of 3 months duration from 20th Feb 2025 till 20th May 2025 was carried out in the department of Prosthodontics of Lahore Medical and Dental College Lahore. Ethical clearance was obtained from the Ethical Review Board of the Dental College. Every patient was comfortably seated in the dental chair in upright position with straight legs on the chair and facing the dentist. A total of 250 patients of both gender; needing complete and partial dentures presented to the OPD of clinic with in the age range from 20 till 80 years were included in the study. The sample size was calculated from the RAO Soft Epi calculator against a 20.0% prevalence of type III gag reflex in patients, with 95% confidence interval, keeping margin of error 5%. Non-probability purposive sampling technique was used for sample selection. Healthy patients requiring complete and partial dentures within the selected age range were included. Patients with Congenital and developmental soft and hard tissue defects, palatopharyngeal incompetencies, a history of oral/maxillofacial trauma, and patients wearing obturators were excluded from study. Verbal consent was taken. The gag severity index (GSI) was used to find out the severity of gagging and the patients were divided into 5 grades based on the severity of gagging reflex. Grade V: Patients start to gag just by sitting into the dental chair on their first dental visit. [14] Grade IV: Patients start to gag during visual examination. Grade III: Patients who gag when the maxilla is touched by the mouth mirror from anterior palate to the post dam area and in the mandible when the mirror was moved from the labial sulcus to the lingual sulcus and to the reteromolar pad. Grade II: Patients who gag while taking primary impression with alginate and impression compound in stock trays. Grade I: Patients who felt little controllable gag during primary impression taking. Two experienced prosthodontists evaluated the gag reflex and evaluated the soft palate types and decided them by agreement. The types of soft palates noted were classified based on House Classification as I, II, III [15]. Class I: drop of soft palate concerning hard palate is horizontal, flat extension posteriorly, minimum muscle activity, making an angle with hard palate <10 degrees. Type II: The drop of soft palate is more than 45 degrees with a gradual slope and moderate muscle activity, making an angle with the hard palate from 10-45 degrees. Type III: The drop is more than a 45-degree angle concerning the hard palate, steep descent of the soft palate. The patients were divided into 3 groups concerning age, i.e., Group I: 20 -40, Group II:41-60 years, Group III:61-80 years. The Data was analyzed using SPSS Version 26. Qualitative variables were presented as frequencies and percentages, whereas the quantitative variables were presented as means and SD. Chi-square square used to find out the association of gag reflex with gender, age groups, and soft palate types. p-value <0.05 will be the significance level.

RESULTS

Out of 250 patients 111(44.4 %) were males and 139 (55.6 %) were female patients. The patients age ranged from 20 to 80 years with mean age of 53.79±13.50 SD. 41(16.4 %) of

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patients were of younger age group from 20-40 years, 120(48.0 %) were from 41-60 years, and 88(35.2%) patients presented were from older age group. The type of soft palate forms frequently observed was soft palate drop type I 151(60.0%) followed by type II 79(31.6%) and only 20(8.0 %) patients had type III soft palate drop. The gag reflex grade V was 14(5.6 %), grade IV was 12(4.8%), grade III was 21(8.4%), grade II was 55(22.0 %), and grade I was 148(59.2%)(Table 1).

Table 1: Frequency Distribution of Gag Reflex Grades and Types of Soft Palate Drops. N=250.

Gag Reflex Grades					Soft Palate Types		
Grade I n %	Grade II n% %	Grade III n% %	Grade IV n% %	Grade V n% %	Drop I n %	Drop II n %	Drop III n %
148 (59.2)	55 (22.0)	21;8.4	12 (4.8)	14 (5.6)	151 (60.0%)	79 (31.6)	20 (8.0)

The association of gag reflex grades with gender was found to be significant 0.02. The association of different age groups with gag reflex was found to be insignificant p 0.73 however, gag reflex severity (grade I-V) increases with the increasing grade of types of soft palate drop (I, II, III), and a significant association was found p value 0.00 (Table 2).

Table 2: Association of Gag Reflex Grades with Age Groups, Gender, and Soft Palate Types; N=250

Variables	Gag Reflex Grades					p-Value
	Grade I n (%)	Grade II n (%)	Grade III n (%)	Grade IV n (%)	Grade V n (%)	
Age Groups						
20-40 yrs	27 (65.9)	10 (24.4)	1 (2.4)	2 (4.9)	1 (2.4)	0.07
41-60 yrs	80 (66.7)	23 (19.2)	10 (8.3)	5 (4.2)	2 (1.7)	
61-80 yrs	55 (62.5)	21(23.9)	10 (11.4)	0 (0.0)	2 (2.3)	
Gender						
Male	78 (52.7)	20 (36.4)	7 (33.3)	3 (25.0)	3 (21.4)	0.02
Female	70 (47.3)	35 (63.6)	14 (66.7)	9 (75.0)	11 (78.6)	
Soft Palate Types						
Drop I	129 (87.2)	18 (32.7)	2 (9.5)	1 (8.3)	1 (7.1)	0.00
Drop II	18 (12.2)	35 (63.6)	17 (81.0)	8 (66.7)	1 (7.1)	
Drop III	1 (0.7)	2 (3.6)	2 (9.5)	3 (25.0)	12 (85.7)	

Significance level p<0.05.

DISCUSSION

Dental practitioners frequently encounter the challenge of gagging during procedures, which can hinder or even prevent effective treatment despite advancements in modern dentistry. Understanding the causes and impact of gagging is essential for improving patient comfort and acceptance of dental treatment [16, 17]. In the present study, grade I gag reflex was the most frequent (59.2%), followed by grade II (22.0%), while severe grades IV (4.8%) and V (5.6%) were the least common. These findings align with those of Alamgir *et al.*, who reported grade I (40.0%) and grade II (32.7%) as the most frequent, with lower rates for grades IV (6.7%) and V (0.7%) [14]. Similarly, Meshni *et al.* found a 49.1% prevalence of gagging in their patients [18]. Current results showed a higher proportion of female patients (55.6%) compared to males (44.4%). Although grade I was the most common in both genders, severe gag reflexes were more frequent in females. Specifically, grade IV occurred in 75.0% of females and 25.0% of males, while grade V was observed in 78.6% of females and 21.4% of males. The association between gag reflex grades and gender was statistically significant (p=0.02). These findings agree with Alamgir *et al.*, who also reported a higher prevalence of exaggerated gag reflex in females (59.3%) compared to males (40.7%) [14], as well as studies from Saudi Arabia and other regions reporting similar trends [19-21]. Gender differences in jaw size and psychological sensitivity, as suggested by Stefos *et al.*, may partially explain these findings [22]. Regarding soft palate morphology, type I was the most common (60.0%), followed by type II (31.6%) and type III (8.0%). The association between gag reflex severity and soft palate type was highly significant (p<0.001). Patients with type I soft palate predominantly exhibited grade I gag reflex (87.2%), whereas severe grades IV and V were rare (8.3% and 7.1%, respectively). In contrast, type II was more frequently associated with higher gag reflex grades, including grade IV (66.7%). Type III showed the most severe response, with 85.7% of patients having grade V gag reflex. These observations correspond with Halboub *et al.*, who reported a significant correlation between soft palate type and gagging, with more severe gagging in type II and III morphologies [19]. Anatomically, a steep drop from the hard palate and reduced posterior surface area in types II and III may predispose to increased gag sensitivity due to reduced tolerance for impression trays [4]. Age did not show a statistically significant association with gag reflex severity (p=0.73, not significant). However, most patients were middle-aged (41–60 years; 48.0%), followed by older adults (61–80 years; 35.2%), with younger adults (20–40 years) representing the smallest group (16.4%). Grade I gag reflex was the most frequent across all age groups, while severe grades IV and V were uncommon. Similar findings were reported by Alamgir *et al.*, where a mild gag reflex was more prevalent in younger patients, while a moderate gag reflex appeared more in middle-aged individuals [14]. The study was conducted in a single clinic, limiting generalizability. Its cross-sectional design prevents causal conclusions. Psychological factors affecting the gag reflex were not evaluated, and subjective grading may introduce bias.

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CONCLUSIONS

The severity of gagging is found more in female patients and patients with type II and III soft palatal anatomy. Dentists need to evaluate different soft palatal types, especially when dealing with female patients needing prosthodontic treatment.

Authors Contribution

Conceptualization: TH
Methodology: KQ, AN, TH
Formal analysis: MHR
Writing review and editing: MM, KY, SN

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

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