



ORIGINAL ARTICLE

## Prevalence and severity of gag reflex in patients presenting at the department of prosthodontics.

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**ABSTRACT... Objective:** To determine the prevalence and severity of gag reflex at initial appointment of patients visiting the department of Prosthodontics using the Gag Severity Index (GSI) tool proposed by Fiske and Dickinson. **Study Design:** Cross-sectional study. **Setting:** Department of Prosthodontics, Islamabad Dental Hospital, Islamabad. **Period:** 1<sup>st</sup> November, 2022 to 31<sup>st</sup> April, 2023. **Methods:** All the patients who presented in outpatient (OPD) of Prosthodontics with 18 to 85 years of age were included in this study. All the data of age, gender, educational levels and gag severity grades were noted on a predesigned proforma. Percentages and frequencies were calculated for all the data by using SPSS version 22. **Results:** A total of 150 (55.14%) patients out of 272 who gagged, were included in the study, with 61 (40.66%) males and 89 (59.3%) females, the gag reflex being more prevalent in female patients. The patients' age range was from 18 to 85 years. In terms of gag severity grades in 150 patients, grade I was observed in 60 patients (40.0%), grade II in 49 patients (32.7%), grade III in 30 patients (20.0%), grade IV in 10 patients (6.7%) and grade V in 1 patient (0.7%). 40.0% of grade I patients were from 18-40 years age group and 51.6% were from 61-85 years age group. 37.0% of grade II patients belong to 41-60 years of age. In terms of qualification, 40.6% exhibited hyper active gag reflex in patients with university level or above. **Conclusion:** Female patients exhibit a higher prevalence of gag reflex than male patients, with grade I being the most common. While a definitive solution is yet to be established, effective patient education and dentist diligence can lead to productive management and future treatment exploration.

**Key words:** Alginate, Dental Impression Technique, Gag Reflex, Gagging, Prosthodontics, Prevalence.

### INTRODUCTION

The gag reflex is a physiological defence mechanism that prevents foreign bodies from entering the trachea, pharynx or larynx.<sup>1</sup> Gag reflex is controlled by parasympathetic autonomic nervous system. There are five major trigger zones in oral cavity responsible for gag reflex. Most common areas are base of the tongue, palate, faucial pillars, uvula and posterior pharyngeal wall.<sup>2</sup>

The patient experiencing gagging may present with a range of disruptive responses, from simple contraction of palatal or circum-oral musculature to spasm of pharyngeal structures, often accompanied by vomiting.<sup>3</sup> An exaggerated gag reflex can make it difficult for the dentists to successfully complete the important clinical

procedures, which can result in poor treatment outcomes.<sup>4</sup> Individuals with an hyperactive gag reflex experience more anxiety during dental procedures compared to those without it.<sup>5</sup>

The aetiology of gag has been related to several factors such as local, systemic, anatomical, physiological, psychological, prosthetic, and iatrogenic.<sup>6</sup> It is important that before starting diagnosis and treatment of the patient, the dentist should know the severity of gag reflex.<sup>9</sup> Due to exaggerated gag reflex, patients often refuse for dental procedures which can create difficulty for dentists to perform their procedures. In Prosthodontics, gagging can compromise all aspects of dental treatments from diagnostic procedures to active treatment, and can be distressing for all concerned. It affects many

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procedures like hindrance even in the simple routine oral examination. It can cause difficulty in the selection of impression trays and making primary and secondary impressions, insertion of dentures (especially maxillary dentures), placement of dental implants in patients with severe gagging, recording the posterior vibrating line for complete dentures, abutment preparations, taking the oral radiographs and even insertion of a finger may cause exaggerated gag reflex.<sup>7,8</sup>

There are different indices for measuring the severity of gag reflex like the Classification of Gagging Problem (CGP) index and Gag Severity Index (GSI). For this study, the Gag severity index tool proposed by Fiske and Dickinson, was used to rank a patient's sensitivity to gagging on a scale from 1 (least severe) to 5 (most severe) because it categorizes the gag reflex into five grades based primarily on the degree of difficulty encountered during dental procedures, such as taking impressions and performing restorations.<sup>10</sup> This index is helpful in the diagnosis of a specific patient and after the diagnosis; the methods to overcome gagging problems can be planned accordingly.<sup>11</sup> This index is also applicable for comparing the treatment of a patient allowing for an assessment of the level and type of gagging management techniques needed.<sup>12</sup> Ideally, GSI can serve as a valuable tool for customizing dental treatment to suit specific subsets of patients with varying levels of gagging intensity.

The primary focus of this study is to scrutinize the occurrence and prevalence of gag reflex in prosthodontic patients. This research attempts to identify varying degrees of gag reflex in patients across different age groups, providing valuable insights for clinicians.<sup>13</sup>

## METHODS

A cross-sectional study was conducted at the department of Prosthodontics, Islamabad Dental Hospital after ethical approval from Institutional Review Board (Ref # IMDC/DS/IRB/218). The study was done from Nov, 2022 to April, 2023 on all patients visiting the Prosthodontics department. The sample size was calculated

using the WHO sample size calculator and simple random sampling technique was used.<sup>9</sup> A sample of 150 patients, who presented in the department of Prosthodontics and met the inclusion criteria, and who gagged during the initial evaluation, were included in the study. Non-probability sampling technique was used for data collection purpose. They were briefed about the study and written informed consent taken from every patient for participation in the study. Demographic details and Gag Severity Index (GSI) score of every patient were recorded on the study performa.

Each patient was seated in the upright position with his head against the headrest facing the dentist and his legs were straight. From this point, hyperactive gag reflex was being observed. Patients were seated in the upright position with their head against the headrest facing the dentist and their legs straight. Gag severity index (GSI) was used to categorize the patients in five grades. The patients who gagged just by seating on the dental chair were categorized in grade V and those who gagged by just visual examination were categorized as grade IV. The patients who did not gag yet were examined using the mouth mirror by slightly moving it from the anterior palatal region to the junction of hard and soft palate. In the lower arch the mouth mirror was inserted and moved from the anterior labial region to the posterior region while touching the retromolar pad area and then the lingual side of lower posterior teeth. While the mouth mirror was moving intra-orally, the patients' reaction was being noticed. The patients who gagged at this time were categorized in grade III. Then the impressions were taken of the patients who did not gag yet, standard technique of making impression with alginate impression material was used. Recommended water to powder ratio was used and alginate was mixed according to the manufacturer's directions. The measured water was poured in a controlled manner in the clean mixing bowl containing alginate impression material. By using spatula, continuous mixing was done against the walls of the bowl to avoid air incorporation and to have a homogenous consistency. The impression tray was loaded with the impression material, the spatula was used to

spread the material evenly in the tray ensuring all areas were adequately covered.

The impression tray was seated carefully and gently in the patient’s mouth and the alginate material was allowed to set. The patients who gagged, removed the tray themselves immediately and required the assistance of dental team, were categorized in grade II. The patients who felt gag during impression making but the control was acquired by the patients themselves were categorized in grade I.

The collected data were encoded, entered and statistical analysis was done through Statistical Package for Social Sciences (SPSS) version 22 software. Chi-square test was used to compare qualification with GAG score, Gender vs Age stratification. P-value <0.05 was taken as level of significance.

**RESULTS**

Out of 272 patients presenting in the department of Prosthodontics, 150 patients gagged (61 males, 40.66% and 89 females, 59.3%), with a mean age of 51.5 years. The prevalence of gag reflex found out to be 55.14%. In terms of gag severity grades in the whole sample, the gag severity grades were as follows. Grade I in 60 patients (40.0%), grade II in 49 patients (32.7%), grade III in 30 patients

(20.0%), grade IV in 10 patients (6.7%) and grade V in 1 patient (0.7%).

The patients were classified in three age groups as shown in the Table-II. Grade I was more prevalent in patients with age group of 18-40 years (40.0%) and with age group of 61-85 years (51.6%). Grade II was more prevalent in age group of 41-60 years (37.0%).

Table-I depicts the count and percentage of gag severity score in patients among different educational levels. Figure-1 represents the percentage and significant P-value of gag severity score among gender.

**DISCUSSION**

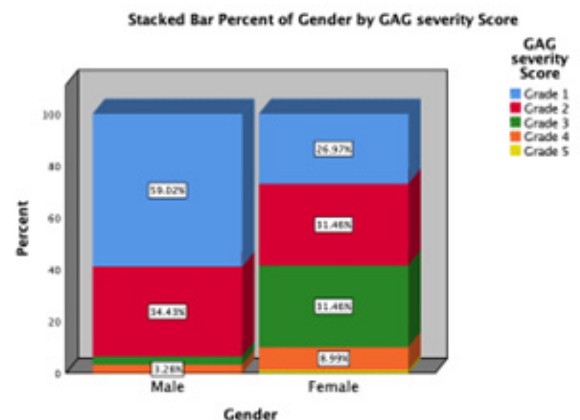


Figure-1.

		GAG severity Score					Total	P-Value
		Grade 1	Grade 2	Grade 3	Grade 4	Grade 5		
Qualification	Primary	23	10	5	2	0	40	0.064
		38.3%	20.4%	16.7%	20.0%	0.0%	26.7%	
	Secondary	13	8	8	2	1	32	
		21.7%	16.3%	26.7%	20.0%	100.0%	21.3%	
	HSc	2	6	6	3	0	17	
	3.3%	12.2%	20.0%	30.0%	0.0%	11.3%		
	University and above	22	25	11	3	0	61	
		36.7%	51.0%	36.7%	30.0%	0.0%	40.7%	
Total		60	49	30	10	1	150	

Table-I. Gag severity Score Crosstabulation among different educational levels

		Gender Age Crosstabulation			Total	P-Value*
		Age				
		18-40 Years	41-60 Years	61-85 Years		
Gender	Male	20 (32.7%)	22 (36%)	19 (31.1%)	61	0.017
	Female	45 (50.5%)	32 (35.9%)	12 (13.4%)	89	
Total		65	54	31	150	

Table-II. Gender age cross tabulation  
\*P<0.05 was taken as level of significance

Despite the advancements and modern technologies in dentistry, dental practitioners often encounter a common challenge with patients experiencing gagging, making the dental procedures quite challenging, and at times, even impossible to perform.<sup>14</sup> There are many causes of exaggerated gag reflex, like somatic, psychogenic or both, although it is not fully understood. The main aim to identify the cause of exaggerated gag reflex is to make the patient accept the treatment.<sup>15</sup> This study determined the prevalence and severity of gag reflex at initial appointment of patients who visited the department of Prosthodontics using the gag severity index (GSI) tool.

The score of severity of gag reflex in this study was found to be more prevalent in female patients (59.3%) compared to the male patients (40.66%). A study conducted in Saudi Arabia in 2023 reported that 48% of females with type II soft palate and 100% of females with type III suffered from hyperactive gag reflex upon taking the impression which was higher than reported in male patients.<sup>14</sup> Similar findings were seen in the study of Kassab NH et al, where 68.7% females presented with exaggerated gagging when compared to the males.<sup>16</sup> This finding can be justified owing to the fact that the females have relatively smaller jaws and may be psychologically more sensitive as reported in a study conducted by Stefos et al.<sup>17</sup>

In a recent study, the prevalence of the gag reflex was found to be approximately 49.1% among the total participants, whereas in this study, it was slightly higher at 55.14%.<sup>2</sup> In another study, the prevalence of gagging was reported as 29.5%.<sup>18</sup>

A study conducted in Turkey reported that patients with lower educational levels had more score of exaggerated gag reflex.<sup>19</sup> Also, in another recent study conducted in Turkey, female patients with low educational levels were found to be more prone to hyperactive gag reflex during the dental procedure as compared to the patients with higher educational levels.<sup>20</sup>

Prior researches have established connections

between patients with varying educational backgrounds. Therefore, our study sought to examine the connection between educational levels and gag reflex. This trend is also seen in this study where patients with primary educational levels ranked second highest among the total number of patients examined. Nevertheless, upon conducting statistical analysis, these findings revealed no significant comparison of gag severity scores among patients with varying educational backgrounds.

One notable strength of this study is the broad range of age represented in the sample, showcasing considerable diversity. Additionally, the practical implications of this clinical study can extend to various other related fields, including medicine, psychology, otorhinolaryngology and more. This interdisciplinary applicability stands as a primary strength of this research.

Our study focused on assessing the gag reflex score during various stages specifically from a basic routine examination to impression making excluding its evaluation during other dental procedures. It is important to note that this study did not address the different treatment options for patients based on the severity of their gag reflex, leaving room for future research to explore this aspect.

## CONCLUSION

Female patients exhibit a higher prevalence of the gag reflex when compared to the male patients. However, it is observed that grade I ranks as the most common among all the grades of gag severity in both males and females. A definitive solution for the successful treatment of this reflex remains elusive. However, through effective patient education, motivation and diligent work by the dentists, it is possible to achieve productive management and explore various treatment modalities in the future.

## CONFLICT OF INTEREST

The authors declare no conflict of interest.

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**AUTHORSHIP AND CONTRIBUTION DECLARATION**

No.	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Kainaat Alamgir	Conception of study, Study conduction, Analysis, Interpretation, Manuscript writing.	
2	Tayyaba Saleem	Conception of study, Analysis, Interpretation, Critical review.	