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# Evaluation of the Gag Reflex in Patients of Partial Denture Wearer While Taking Impression

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*Funding Source: None*
*Conflict of Interest: None*

*Received: June 10, 2025*
*Revised: Nov 29, 2025*
*Accepted: Dec 15, 2025*

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**ABSTRACT**

Objective: To determine the frequency of the gag reflex in patients wearing partial dentures during impression-taking procedures.

Methodology: A cross-sectional descriptive study was conducted at the Department of Prosthodontics, Institute of Dentistry, Liaquat University of Medical & Health Sciences (LUMHS), Jamshoro, from August 2023 to February 2024. A total of 97 prosthodontic patients aged 20–60 years, of either gender, receiving removable partial dentures or fixed restorations (crowns and bridges) were included. Data regarding demographic characteristics and gag reflex were collected using the Gagging Problem Assessment Questionnaire (GPA – Patient Short Form). Gag reflex scores were categorized as mild, moderate, or severe. After data collection, analysis was performed using IBM SPSS version 26.

Results: The overall mean age of the participants was 36.93 ± 7.66 years, and females constituted the majority (n = 63, 64.9%). Among partial denture wearers, 92.8% reported experiencing a gag reflex. Most participants (62.9%) exhibited a mild gag reflex, 26.8% showed a moderate response, 3.1% reported a severe gag reflex, while 7.2% experienced no gag reflex. However, the severity of the gag reflex was not significantly associated with age or gender ($p > 0.05$).

Conclusion: This study revealed that a mild to moderate gag reflex was most commonly observed among partial denture wearers, particularly during impression procedures involving the maxillary arch and posterior oral regions, with no significant association with age or gender.

Keywords: Partial denture, Gag reflex, Impressions

*Cite this article as: Sanam, Memon MR, Sakina, Rahoojo A. Evaluation of the Gag Reflex in Patients of Partial Denture Wearer While Taking Impression. Ann Pak Inst Med Sci. 2025; 21(4):745-749. doi. 10.48036/apims.v21i4.1563*

## Introduction

The gag reflex is a biological mechanism designed to safeguard the mouth and thorax.[1] It is a typical, involuntary, physiological, and protective defensive mechanism that serves to protect the airway, prevent foreign objects from entering the respiratory system, and eliminate irritant mass from the upper gastro-intestinal tract and posterior oropharynx.[2] When a patient gags, they frequently experience unpleasant feelings, nausea or vomiting, excessive salivation, lacrimation, perspiration, and coughing, which makes managing the condition challenging. [3]

Gagging is common problem during dental procedures; it is a physiological response of the body in reaction to some unpleasant sensory input or a physical trigger. The process of gagging takes place in response to an event that can be internal or external. Almost 74% or more people possess this physiological reflex and its intensity varies from minor to strong enough response. In some cases, it is so bothersome for some people that it leads them to a dentist. [4] The factors responsible for inducing gagging reflex can be broadly divided into two main categories i.e. somatogenic and psychogenic. Somatogenic factors belong to physical sensory stimuli like a dental procedure, oral or throat examination or obnoxious food, etc.[5] While, as the name suggests, psychological factors belong to any psychological event like anxiety, severe depression, fear of developing gagging reflex, negative expectations, etc. Abnormally high sensitivity towards a gagging reflex may

be attributed to heavy smoking, or excessive alcohol intake, according to Zuschlag D et al. Sometimes, an oversensitive gagging reflex can be so disturbing for a patient as well as for a dentist that it may make any treatment impossible. [6]

Due to varying degrees of sensitivity to gagging reflex, Fiske and Dickinson developed a standard severity checking index for gagging sensitivity. This scale ranges from least severe to most severe respectively. This index is considered universally applicable to all dental professionals in the world. This scale makes it easy to tailor the dental treatment and etiology for every single patient according to their gagging sensitivity. [4] Gagging severity for each patient depends on his /her own remark. Due to varying degrees of sensitivity to gagging reflex, if the patient answers that he /she is suffering from gag reflex rarely, it means mild type of gag reflex present in this patient, gag reflex occur during basic dental procedures such as impression taking, physical examination of high-risk region include lingual side of lower molar, and selection of tray, it means the type of reflex in moderate condition. However, the gag reflex that occurs unexpectedly during or the rapidly after the insertion of a denture is believed a severe form of the reflex. [1]

According to a previous report, 49.1% of patients noted with a gag reflex during dental processes. On the other hand, Kassab NH et al demonstrated gagging in 43 out of 200 cases.[7] Based on another report with the frequency of problematic gagging during treatments procedure was estimated, 49.2% of individuals had gag irregularly, 43.3% cases had gagging in moderate condition and 7.5% show signs of a higher frequency of gag reflex in dental clinic.[8] Management of this reflex action should be subjective to individual patients, many ways and techniques can be mastered by clinicians helpfully for both dentist and patient, and several management methods are available including intervention of psychological management, prosthodontics treatment, desensitization systemically, different methods of pharmacology, acupuncture and the acupressure. The attitude of the dentist toward the patient may influence the treatment outcome. [9,10] There is lack of data on gag reflex in Pakistani population. So, the purpose of this study was to determine prevalence of gag reflex in treatment planning and management of patients with gag reflex. If an accurate diagnosis and treatment plan are not developed, any treatment for gagging will fail. To managing an individual with presentation of gag reflex involves taking a comprehensive dental and the medical history, consenting the dentist to evaluate the severity of the complaint and determine suitable strategy of the management tailored to the needs of patients.

Overall, there is very limited research studies found regarding its prevalence and severity among patients. Hence this study has been done to asses incidence of the gag reflex among patient of partial dentures wearer while taking impression and the exploration of this issue may helpful for dentists anticipate and gagging management, success enhancement of procedure and improve the satisfaction among patients.

# Methodology

This descriptive cross-sectional study was conducted at the Department of Prosthodontics, Institute of Dentistry, Liaquat University of Medical and Health Sciences (LUMHS), Jamshoro, from August 2023 to February 2024. Ethical approval was obtained from LUMHS (Ref: LUMHS/REC/117). The sample size of 97 patients was calculated using a sample size calculator, based on a prevalence of gag reflex problems of 49.1%, with a margin of error of 10%. The total calculated sample size was therefore 97 patients.

All prosthodontic patients, including those receiving removable partial dentures or fixed restorations such as crowns and bridges, aged 20–60 years, and of both genders were included. Patients with implants, neuromuscular disorders, maxillary or mandibular defects, or those unwilling to participate were excluded.

Eligible participants were provided with a detailed explanation of the study purpose, procedures, potential risks and benefits, and their rights as participants. Informed consent was obtained from all individuals who voluntarily agreed to participate.

After documenting participants' demographic data, the risk of gagging was assessed using the Gagging Problem Assessment Questionnaire (GPA). The original GPA consists of 32 questions divided into patient and dentist sections; however, the GPA–Patient Short Form (GPA-Pa-SF), which includes only nine patient-related questions, was utilized in this study.

Three scoring levels were defined based on the correlation between participants' responses and the clinical occurrence of the gag reflex: Score 1 indicated a mild gag reflex or rare discomfort; Score 2 indicated a moderate gag reflex; and Score 3 represented a severe gag reflex, characterized by total refusal of the procedure or occasional vomiting, where tray placement was impossible. Responses were scored as follows: "No" = 0,

"Rarely" = 1, "Sometimes" = 2, and "Yes" = 3. The total GPA-Pa-SF scores were interpreted as follows: 1.00–1.74 = mild, 1.75–3.24 = moderate, and 3.25–4.00 = severe gag reflex.

Data analysis was performed using IBM SPSS Statistics version 26. The mean and standard deviation were calculated for quantitative variables such as age and GPA-Pa-SF scores, while frequencies and percentages were calculated for qualitative variables. Stratification was performed according to gender and age group, and a post-stratification chi-square test was applied, with a p-value of less than 0.05 considered statistically significant.

# Results

The mean age of the participants was 36.93 ± 7.66 years. Of the 97 participants, 34 (35.1%) were male and 63 (64.9%) were female, indicating a female predominance in the study population. Among the partial denture wearers, 68% reported experiencing a gag reflex, whereas 24.7% did not. During routine daily activities such as brushing or flossing, 59.8% of participants experienced gagging. Nearly all participants (95.9%) reported gagging during upper jaw impression procedures, while only 16.5% experienced gagging during lower jaw impressions. When an examination mirror was placed in the anterior region of the mouth, 73.2% of participants reported no gag reflex; however, 63.9% experienced gagging when the mirror was positioned between the posterior teeth. Approximately 22.7% of participants experienced gagging even before entering the dental clinic, and 42.3% reported gagging after wearing removable partial dentures. Additionally, 22.7% experienced gagging during episodes of anxiety, depression, or excitement, indicating that both physical and psychological factors contributed to the gag reflex among the participants (Table I).

According to the severity of the gag reflex, the majority of participants (61; 62.9%) had a mild gag reflex, 26 (26.8%) had a moderate response, 3 (3.1%) reported a severe gag reflex, while 7 (7.2%) showed no gag reflex. (Figure 1)

Severity of the gag reflex did not show a statistically significant association with age and gender (p->0.05, particularly as the mild gag reflex was most common across all age groups, while moderate gag reflex was observed in 21.6% of younger and 5.2% of older participants. Additionally mild gag reflex was more frequent in females (42.3%) than in males (20.6%), while moderate severity was noted in 17.5% of females and 9.3% of males. (Table II)

**Table I: Gag reflex responses frequency in partial denture wearers while taking impression. (n=97)**

| Questions | | N | % |
|---|---|---|---|
| Are you having problem of gag reflex | No | 24 | 24.7 |
| | Rarely | 7 | 7.2 |
| | Yes | 66 | 68.0 |
| | Total | 97 | 100.0 |
| Have daily activities like brushing, flossing your teeth ever made you gag? | No | 18 | 18.6 |
| | Rarely | 8 | 8.2 |
| | sometimes | 13 | 13.4 |
| | Yes | 58 | 59.8 |
| | Total | 97 | 100.0 |
| Are you feel gag reflex during taking impression of upper jaw? | Rarely | 4 | 4.1 |
| | Yes | 93 | 95.9 |
| | Total | 97 | 100.0 |
| Are you feel gag reflex during taking impression of lower jaw? | No | 57 | 58.8 |
| | Rarely | 20 | 20.6 |
| | Sometimes | 4 | 4.1 |
| | Yes | 16 | 16.5 |
| | Total | 97 | 100.0 |
| Are you feel gag reflex during touching the examination mirror in front of your mouth? | No | 71 | 73.2 |
| | Rarely | 16 | 16.5 |
| | Sometimes | 3 | 3.1 |
| | Yes | 7 | 7.2 |
| | Total | 97 | 100.0 |
| Are you feel gag reflex during touching the examination mirror between posterior teeth? | No | 4 | 4.1 |
| | Rarely | 11 | 11.3 |
| | Sometimes | 20 | 20.6 |
| | Yes | 62 | 63.9 |
| Are you feel gag reflex before enter to dental clinic? | No | 66 | 68.0 |
| | Rarely | 3 | 3.1 |
| | Sometimes | 6 | 6.2 |
| | Yes | 22 | 22.7 |
| | Total | 97 | 100.0 |
| Are you feel gag reflex after the wearing of removable partial denture? | No | 39 | 40.2 |
| | Sometimes | 17 | 17.5 |
| | Yes | 41 | 42.3 |
| | Total | 97 | 100.0 |
| Have you experienced a gag in a state of anxiety, depression, while coughing or sever excitement? | No | 45 | 46.4 |
| | Rarely | 10 | 10.3 |
| | Sometimes | 20 | 20.6 |
| | Yes | 22 | 22.7 |
| | Total | 97 | 100.0 |

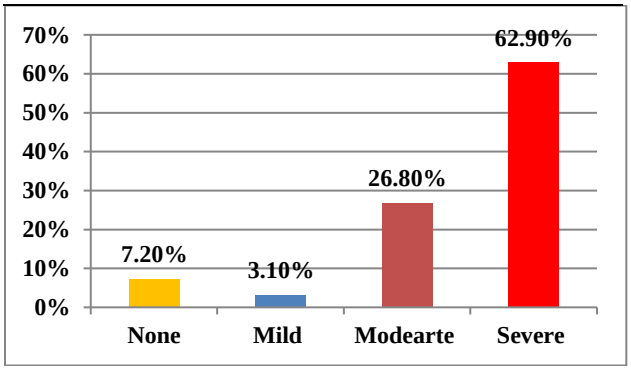


**Figure 1. Severity of gag reflex among patients. (n=97)**

**Table II: Severity of gag reflex according to age and gender. (n=97)**

| Variables | | severity | | | | Total | p-value |
|---|---|---|---|---|---|---|---|
| | | Mild | Moderate | None | Severe | | |
| Age groups | 20-40 years | 47 | 21 | 5 | 2 | 75 | 0.916 |
| | | 48.5% | 21.6% | 5.2% | 2.1% | 77.3% | |
| | 41-60 years | 14 | 5 | 2 | 1 | 22 | |
| | | 14.4% | 5.2% | 2.1% | 1.0% | 22.7% | |
| Gender | Male | 20 | 9 | 3 | 2 | 34 | 0.649 |
| | | 20.6% | 9.3% | 3.1% | 2.1% | 35.1% | |
| | Female | 41 | 17 | 4 | 1 | 63 | |
| | | 42.3% | 17.5% | 4.1% | 1.0% | 64.9% | |

# Discussion

Generally, gag reflex serves as a natural protective response that stops foreign objects from arriving the trachea, or the pharynx, due to working by triggering the contraction of the oropharynx muscles, which expels irritating, or the unwanted substances from the upper respiratory tract. Among individuals with partial dentures, the gagging during the impression-taking course is a common issue, frequently arising from physical or the psychological factors, and it can result in inaccurate or defective dental impressions. However, this study aimed to determine the frequency of the gag reflex in 97 partial denture wearers during impression procedures, with an overall mean age of 36.93 ± 7.66 years and a majority of females (64.9%). Comparable demographic findings were reported by Alamgir and Saleem,[11] who observed a female predominance (59.3%). Although they reported a higher mean age (51.5 years), the majority of their patients were younger (18–40 years), suggesting that younger patients may more commonly experience a gag reflex than older individuals. Similarly, Meshni AA et al.[12] reported a female predominance of 60.7%.

In the present study, the majority of partial denture wearers (68%) reported experiencing a gag reflex. Additionally, 59.8% experienced gagging during routine activities such as brushing or flossing. Almost all participants (95.9%) reported gagging during upper jaw impressions, whereas only 16.5% experienced it during lower jaw impressions. When an examination mirror was placed in the anterior region, 73.2% reported no gag reflex, but 63.9% experienced gagging when the mirror was positioned between the posterior teeth. About 22.7% of participants experienced gagging even before entering the dental clinic, and 42.3% reported gagging after wearing removable partial dentures. Furthermore, 22.7% experienced gagging during episodes of anxiety, depression, or excitement, indicating that both physical and psychological factors contribute to the gag reflex. These findings are consistent with Alamgir and Saleem,[11] who reported a relatively lower incidence of gag reflex during upper jaw impressions in 55.14% of patients. Similarly, Meshni AA et al.[12] observed gag reflex in 49.1% of patients, with fixed partial dentures (bridge) being the most common prosthesis (54.5%), followed by removable partial dentures (flipper) in 30.4%, full dentures in 13.4%, and a combination of removable partial and full dentures in 1.8%. Aligning with these observations, Suresh[13] reported a lower incidence of gag reflex (55.14%) during palatal coverage and posterior oral contact.

The literature identifies the base of the tongue, palate, fauces, uvula, and posterior pharyngeal wall as the primary zones of gag reflex activation.[14,15] Differences in the reported frequency of gag reflex across studies may be attributed to variations in inclusion and exclusion criteria, as well as differences in sample size.

In current study, according to the severity of the gag reflex, the majority of participants had a mild gag reflex (62.9%), while 26.8% reported moderate response, 3.1% had a severe gag reflex, and 7.2% of patients showed no gag reflex. These findings are in lie with the study of Alamgir and Saleem, [11] who found that mild gag reflex was the most common category, as grade-I gaging was present in 40.0%, followed by grade II (32.7%), and grade III among 20.0% of patients, while the proportion of patients in severe categories grade IV (6.7) and grade V (0.7%) were the least common. Consistently, in another study carried out by Qamar et al[16] grade I gag reflex of mild severity was most frequent (59.2%), while severity declined in grade II (22.0%), followed by grade III (8.4%), grade V (5.6%), and grade IV (4.8%) was least common. Comparably, in the study of Kassab and Al–Saffar et al[7] Mild gage reflex was most frequent reported by 56% of patients. Then again, in the study of Hearing et al[18] Mild gage reflex was most frequent, with grade-I (65%), followed by grade-II and grade–II (15% each), and grade-IV (5%).

In this study, stratification of gag reflex severity showed that its overall severity did not have a statistically significant association with age ($p > 0.05$). Mild gag reflex was the most common across all age groups, whereas moderate gag reflex was observed in 21.6% of younger participants and 5.2% of older participants. Mild gag reflex was more frequent in females (42.3%) than in males (20.6%), while moderate severity was noted in 17.5% of females and 9.3% of males. However, gender was significantly associated with gag reflex grading ($p = 0.02$).

Correspondingly, Hosseine et al.[18] reported that gag reflex is not associated with patients' age or gender. Similar

findings were reported by Randall et al.[19] Partially aligning with our results, Qamar et al.[16] observed no significant association between age groups and gag reflex grading (p = 0.07). Overall, women and individuals with lower educational levels exhibited a higher incidence of gag reflex compared to males.[16,20] However, no definitive treatment be present, thorough the counseling of the patients combined with careful helpfulness by the dentist may help to manage the reflex effectually and guide future strategies of the treatment. Additionally, this study possesses several limitations like the inadequacy of previous literature for direct comparison, limited small sample size and the study did not assess the helpfulness of different strategies of management for the gag reflex occurrence specifically in partial denture patients. Hence further larger scale studies with more diverse populations are recommended to endorse the findings of this study and to explore evidence-based methods for prevention and management of gagging in these cases. The implementation of counselling and management strategies can improve the comfort of patient, may enhance the impressions accuracy and improve overall prosthodontic outcomes.

# Conclusion

This study revealed that a mild to moderate gag reflex was the most commonly observed among partial denture wearers, particularly during impression procedures involving the upper jaw and posterior oral regions, without a significant association with age or gender. The overall findings highlight the importance of identifying patients with a predisposition to gagging prior to impression taking, allowing clinicians to adopt preventive strategies, improve patient comfort, and enhance the accuracy of prosthodontic techniques. However, due to several significant limitations, further studies should focus on exploring effective behavioral and clinical techniques to manage the gag reflex in susceptible patients.

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