



The Gag Reflex: A Hurdle in Dentistry– Literature Review

**S. Meenakshi^{1*}, Shyla Dureja¹, G. C. Kavitha², M. Pallavi³,
K. N. Raghavendra Swamy¹, Aishwarya Kottur¹ and Ramith Ramu⁴**

¹*Department of Prosthodontics, JSS Dental College and Hospital, JSS Academy of Higher Education and Research, Mysuru-570015, Karnataka, India.*

²*Department of Studies in Biotechnology, Davangere University, Shivagangotri, Davangere-577007, Karnataka, India.*

³*Department of Studies and Research in Biotechnology, Molecular Biomedicine Laboratory Sahyadri Science College, Kuvempu University, Shimoga-577203, Karnataka, India.*

⁴*Department of Biotechnology and Bioinformatics, School of Life Sciences, JSS Academy of Higher Education and Research, SS Nagar, Mysuru-570015, Karnataka, India.*

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Gagging reflex poses a hurdle in numerous dental procedures. It causes discomfort for the patient, extended procedure time for the clinician, compromised quality of treatment and along with a lot of physiological discomfort for both. The normal gag reflex is protective in nature, but few individuals elicit extreme response, leading to problems during the treatment procedures. It is extremely important for the clinician to identify the cause and severity of the condition so that it can be decided whether the patient can handle standard treatment techniques or whether alternative methods must be considered. There is no universal solution for successfully managing the gagging patient. Various modalities can be used according to the doctor's assessment and patient's conditions in order to control the gag reflex so that the patient can be comfortable and cope with the dental treatment. A wide range of management solutions are available, and many cases need a

combination of therapeutic procedures. The main aim of the present article is to comprehensively report the clinical significance, etiology, symptoms and various management approaches used during prosthodontic treatments.

Keywords: Gag reflex; prosthodontic gagging; etiology of gagging; neurophysiology of gag reflex.

1. INTRODUCTION

Gag reflex, clinically known as pharyngeal reflex, is an involuntary physiological phenomenon in human that is complex in nature [1,2,3]. This response causes perplexity and frustration in a variety of dental treatments, resulting in compromised treatment [2]. Identifying the severity of this condition enables the physician to determine if the patient can handle standard treatment techniques or an alternative method must be considered [4]. It can be managed by properly educating the patients through the procedure and providing a calm environment [5]. Numerous authors have discussed various aetiologies, methods of assessment and symptoms of gagging. Many treatment modalities including psychological intervention, prosthodontic management, systemic desensitization, pharmacological methods, surgical correction, acupressure and acupuncture have been tried to curb the gag reflex [6,7].

The gag reflex is a typical, healthy defence system that works to keep foreign bodies out of the trachea, pharynx, and larynx. It's a defensive response that's meant to keep the airway clear and irritants out of the posterior oropharynx and upper gastrointestinal system [8]. Some people have a weak or non-existent reaction, whilst others have a strong one. Gagging reflexes might jeopardize all elements of dental operations, from diagnostics to radiography and active treatment. Significant gag reflexes are most typically found during prosthodontic procedures, such as impression making, which may jeopardize the process or cause discomfort to patients and dentists [4].

This article describes in detail about the gag reflex, its clinical significance, aetiology, assessment, symptoms and a holistic management approach to control the gag reflex and provide a successful and comfortable treatment outcome for both the patient and clinician. It focuses on the various modifications that could be made by the Prosthodontist during rendering treatment to the patient and also during the fabrication of the prosthesis, to minimize the gag reflex in geriatric patients.

2. MATERIALS AND METHODS

This review article compiles the various aspects of neurophysiology, etiology, classification, assessment of the gag reflex and the various methods available in literature for controlling it. This comprehensive review was executed after a thorough literature search performed in the year March-April 2021. Research articles from reputed national and international databases were searched and ended with a large number of studies published on the management of gag reflexes. These studies were researched using key words such as etiology of gagging, physiological development of gag reflexes, medicinal interventions for gagging, management of gagging with an emphasis on prosthodontic gagging. The selection criteria were set to include research articles, short communications, book chapters and review articles. The literature search arrived at over 400 articles some of which were repeated findings or reporting less significant results. After eliminating such reports, 56 articles were retained and used for writing the present review.

3. RESULTS

3.1 Neurophysiology of Gag Reflex

The gagging reflex can be caused either due to a somatic or psychogenic response of the body. The somatic gagging is caused by the activation of the sensory nerve as a result of direct stimulation of the trigger area. Even though the trigger regions differ between individuals, some of the common areas around the palate and lateral margins of the tongue frequently trigger this reflex. On the other hand, psychogenic gagging is generated without physical touch by higher brain areas. A part of the population experiences such reflexes by the smell, sound, sight, or even the mere concept of the dental treatment procedure. These receptors are found on the region of soft palate or the posterior part of the tongue and are then transmitted to the gag centre in the medulla oblongata by sensory neurons through afferent (toward the brain) nerves. Then, from this centre, motor neurons

are transferred to the muscles in the throat that are involved in gagging through efferent (away from the brain) nerve fibres [3].

Gagging can be combined with lacrimation, excessive salivation, perspiration, fainting and sometimes a panic attack. When the trigeminal, vagus and glossopharyngeal nerves are stimulated intraorally, afferent fibres go directly to the medulla oblongata in the brain. The efferent impulses induce spasmodic and uncoordinated muscular movement that is typical of gagging. The gagging centre present in the medulla oblongata is adjacent to the vomiting, cardiac and salivating centres, which also may be activated during gagging [5,6,7]. This reflex is a normal response due to the stimulation of specific intra-oral tissues by touch. There are five intraoral "trigger zones": the palatoglossal and palatopharyngeal folds, the base of the tongue, the palate, the uvula, and also the posterior pharyngeal wall. In addition, non-tactile sensations like visual, auditory, or olfactory stimulation can also induce a gag reflex [5,8,9]. When the respiratory muscles contract spasmodically while retching, the air is driven past the glottis that is closed, generating a distinctive retching sound. Furthermore, the muscles in the chest are fixed, whereas the thoracic inlet muscles contract. This obstructs the venous return, leading to dilation of the veins of the head and neck region and causing flushing and also congestion of the face [10].

Gagging has certain characteristic features such as lip puckering, attempt to close the jaws, vomit sensation, excessive salivation, lacrimation, coughing, sweating. Furthermore, the tongue is elevated and rotated from back to the front with hyoid bone in the centre that appears elevated. This appears such due to the convergence of posterior pillars of fauces that raises the soft palate and closes the nasopharynx resulting in the rotation of tonsils anteromedially due to contraction of anterior & posterior fauces pillars. These lead to the laryngeal elevation, contraction, and retraction, as well as glottic closure, retching, concurrent and uncoordinated respiratory muscle spasm [1,4,11].

3.2 Etiology of Gagging

Gagging phenomenon is triggered but various factors that are classified as follows: Local Factors include deviated nasal septum, nasal polyps, nasal obstruction, sinusitis,

postnasal drip and psychological factors include fear, stress, learned responses and neuroticism [12]. Systemic Factors such as alcoholism, smoking, chronic gastritis, carcinoma of the stomach, partial gastrectomy, peptic ulceration, cholecystitis, carcinoma of the pancreas, diaphragmatic hernia, uncontrolled diabetes and medication produces nausea as a side effect [4,5].

Furthermore, several physiological factors also play an important role in causing gagging reflexes. Extraoral stimulation such as stimuli that are visual, auditory, or due to the objector and intraoral stimulation. For example, the mere sight of the impression trays, mouth mirror, and the smell or taste of various dental materials. Intraoral Stimulation, here the palate is divided into two regions that show different responses namely, the hyposensitive and hypersensitive ones. The hyposensitive anterior section is separated from the hypersensitive posterior section by a line imagined through the fovea palatine. In addition, the tongue is also divided into two different response regions: a hyposensitive anterior third and a hyper-sensitive posterior third. In that, the posterior one-third of the tongue is the most sensitive region of the oral cavity [1,2].

Apart from these, the prosthetic factors such as inadequate post dam indentures (causes gagging due to insufficient pressure exerted onto the palatal tissue and a shallow post dam causing tight pressure might give a tickling sensation that induces a gag reflex), [1] overextended denture borders (posterior portion of maxillary denture and distolingual region of mandibular denture may trigger regions resulting in a gag), inharmonious occlusions, poor retention of dentures, inadequate or excessive surface finish of the acrylic dentures and an inadequate freeway space also cause gagging reflexes. [4]. Patients reported that the issue was particularly severe in the morning hours during dental hygiene procedures and denture insertion process [13]. The reason for this could be that the patients were not habituated to the stimulation that is caused by the dentures, as they were not worn at night for many hours [14].

Iatrogenic factors namely, suction and water tubes, instrumentation, radiography, poor clinical technique and overloaded impression tray also contribute to gagging. Finally, the psychosomatic factors classified under classical conditioning process and operant conditioning process also adds to the factors responsible for gagging [15].

The classical conditioning process occur under the following circumstances. When a previously neutral stimulus is linked with a specific type of behavioural response, classical conditioning develops. Normal sensations, such as the sight of an impression tray, the scent of dental materials, or even the sound of a dental handpiece, may become problematic. The gag reflex may start due to an overflowing impression tray or if a significant quantity of water is collected in the mouth from the handpiece. Whenever the patient learns to strongly identify the stimuli as a trigger for gagging, a conditioned gag reflex to such stimuli may develop [16,17].

Similarly, the operant conditioning process is a training strategy in which the outcomes of a response influence the chance that the subject will repeat that response. Some behaviour patterns may be rewarded in operant conditioning because they gain attention and compassion, avoid a stressful circumstance, or

accomplish another desirable result. One example is that a patient who gags unintentionally learns to identify it with the temporary cessation of therapy. This outcome is favourable for him since the patient gains from the action, that is the treatment comes to a halt, this is consistent with the operant conditioning process [11,14].

3.3 Classification of Gagging

- (a) **Based On Origin:** According to Krol et al in 1963 as Psychogenic or Somatic
- (b) **Based On Severity:** According to Faigenblum et al in 1968 as Mild or Severe [4]

3.4 Assessment of Gag Reflex

Gagging severity is generally assessed based on the following description as given in Table 1.

Table 1. Gagging Severity Index by Dickinson and Fiske et al. [4]

Grades of Gagging	Severity of Gagging	Description
Grade I	Normal gagging reflex	Gagging reflex develops on rare instances during high-risk dental procedures such as making maxillary impressions or restoring the distal, palatal, or lingual surfaces of molar teeth. Under intense treatment conditions, this is essentially a 'normal' gag reflex. It is controlled primarily by the patient.
Grade II	Mild gagging reflex	Sometimes, gagging develops during basic dental procedures like fillings, scaling, and impressions. The patient can generally retake control, but may require support and reassurance from members of the dental team, and treatment should be resumed. In most cases, no additional steps are necessary to ease normal therapy, although more complex procedures may require them.
Grade III	Moderate gagging reflex	Gagging reflex is common during routine dental treatments. Mere physical examination of high-risk regions, including the lingual side of lower molars, may induce the reflex. Control is difficult to regain after the operation has been initiated. Temporary suspension may be challenging required. Generally, gag prevention measures are needed. The gag may have an influence on treatment strategy and limit therapy possibilities.
Grade IV	Severe gagging reflex	Gagging occurs with all aspects of dental treatment including basic visual examination. Routine treatment is impossible without a specific measure to try to regulate the gag reflex. Treatment options could be restricted, and the gagging issue will play a significant role in treatment decisions.
Grade V	Very severe gagging reflex	Gagging is a common reflex that does not always require physical intervention to activate. The gagging problem may influence the patient's behaviour and dental participation, and it will be a major consideration while planning therapy. The treatment choices available may be extremely restricted. Dental treatment will be impossible to perform without particular, specialized therapy for gagging.

3.5 Methods for the Management of Gag Reflex

The treatment of a patient who shows mild to moderate gagging can be treated in routine dental practice. A patient who shows severe gagging, on the other hand, needs a change in both the dentist's behaviour and the treatment approach [5].

Prior briefing about the intraoral examination should be followed by the patient's consent and then the dental procedure. It is the job of the dental team to be empathic towards the patient's concerns, to begin a discussion with him, and to instil trust in the patient [2]. Management of this reflex action should be subjective to individual patients. Several management methods are available and listed below.

1. Psychological Intervention

Relaxation

Relaxation techniques can assist to alleviate the memory of treatments performed. If the gag reflex is caused by anxiety, relaxation techniques may be beneficial. Relaxation can assist to alleviate or eliminate unhelpful thought processes. The patient is instructed to tense and release some muscle groups, beginning with the legs and moving up, while offering constant encouragement in a calm environment [2,5].

Distraction

The distraction technique could be useful for momentarily diverting the patient's focus and may enable short dental operations to be conducted while the patient's mind is detached from potentially uncomfortable conditions [11]. Landaet al in 1946 proposed that the dentist start a conversation with the patient about a topic of special interest to engage the patient [18,19]. Krol et al in 1963 suggested a strategy to distract attention in which the patient is advised to lift and hold his leg in the air. During this, the patient's muscle fatigues because to keep the leg up, more and more conscious effort is required, this distracts the patient and reduces gagging [20]. According to Faigenblum et al in 1968, vomiting was impossible during apnea. So, to control this gagging reflex the patient was urged to increase his expiratory effort at the expense of his inspiration. This process will result in apnea and thus discourage gagging [13]. Kovats et al in 1971 described a method where the patient

breathes audibly through his nose while repeatedly tapping the right foot on the floor. When concentrating on these tasks the patient's focus is shifted away from the gagging sensation.

In addition to these methods, authors proposed that common salt be used to temporarily eliminate the gag reflex. On tip of the tongue, table salt is placed for a span of five seconds. The gag is suppressed by stimulation of the branches of chorda tympani at the taste buds in the anterior 2/3 of the tongue. [21,22]

Yet another method of managing gagging reflex is by the earplug method wherein the earplug functions as the stimulator of the external auditory canal thus controlling the overactive gag reflex [23]. Further, as quoted by Boitelet al, temple tap method deals with the digital stimulation of the temporoparietal suture in conjunction with suggestion that prospectively regulate the gag reflex [24]. Herein, the authors also recommend closing their eyes and washing their mouths with icy water, and also distracting the patient's mind by asking the patient to count the numerical numbers [25].

Systematic desensitization

Desensitization is done systematically. Classical conditioning-learned behaviour may be unlearned by reversing the conditioning process [5]. This approach involves gradually exposing the patient to a feared stimuli in such a manner that when the frequency, intensity, and duration of the unpleasant stimuli increases, it leads to the patient being gradually habituated to the treatment to be performed. Singer's Marble Method is a successful desensitization method for the treatment of hopeless gaggers. During the initial appointment visit, no oral assessment of any type was performed using this approach. The patient was instructed to insert five, round glass, multi-coloured marbles, roughly 0.5 inch in diameter, in his mouth one by one till all five marbles had been put in his mouth. The patient was then reassured that ingesting a marble would not endanger him, as the anxiety of ingesting a foreign item might cause gagging. Singer's Marble Technique is a successful desensitization method for treating terrible gaggers.

Alongside this technique, at each weekly session, the patient was assured that he would be able to wear and use dentures. The patient was instructed to maintain the five marbles in his

mouth at all times, except while eating and sleeping, for a duration of one week. The patient was able to tolerate the five marbles on the second appointment and was reassured again that he would eventually be able to wear dentures, this added to his determination. Before making impressions, the hard palate and soft palate, along with the cheeks, tongue and lips were swabbed with topical anaesthetics on the third and fourth visits. Three marbles were instructed to be kept in the patient's mouth thereafter [3,26]. Wilks and Marks et al in 1983 advocated teaching the patient the procedure to swallow with their teeth apart, allowing the tip of their tongue to be more anteriorly placed on the palate causing the muscles to relax, thus minimizing gagging from occurring [27].

Another technique was to brush the hard palate softly with a toothbrush without causing the gag reflex. On the toothbrush handle, the patient marks the location of the maxillary incisors. The goal was to move the brush further posteriorly, and the patient was motivated as the marking on the toothbrush moved down the handle progressively [28].

Cognitive Behavioural Therapy (CBT)

This strategy tries to modify patients' irrational behaviour patterns regarding dental procedures that may enhance the sensitivity of the gag reflex. Patients are challenged by CBT to dispute firmly established views about gagging catastrophes based on personal experience [29,30]. A psychotherapist, for example, can use CBT to rationalize a patient who cannot handle the water in his/her mouth, fearing that the excess volume of water will choke him/her [5,31].

2. Prosthodontic Management

The selection of trays during the prosthodontic procedures plays a very important role as an oversized tray can lead to gagging. The other parameters that should be considered are:

Patient position: During a dental impression, the patient's head must be bent down and he should always be in a seated and resting position [25].

Material selection: The utilization of a fast-setting material is preferred. Impression material should not be used when its consistency is thin. The impression tray should never be overloaded with impression material, only an adequate amount of material is to be used. To treat the patient with a

shorter exposure time, use a rigid mix of impression materials and fast setting materials (like impression compound).

Posterior palatal seal area: It should be recorded appropriately and should never be underdamed or overdamed. Many numbers of post dams are provided on the final maxillary denture base to allow customization according to the patient's preference [32,33].

Modification of maxillary custom tray: It can be used to prevent the gag reflex. It is preferable to utilize these trays using disposable saliva ejectors at their distal end, allowing surplus impression material to pass through these regions without activating the soft palate [34].

Major connector with a 'horseshoe' design minimizes palatal coverage, resulting in less interference for the tongue.

Recording jaw relations: The vertical Dimension (VD) at occlusion must be recorded correctly because as VD decreases, room for the tongue diminishes, causing the tongue to sink back and produce a gag [35,36,34].

Final Prosthesis Fabrication: A well-filling denture must be provided to reduce the most common aetiologies of gag reflex, i.e., Denture looseness, thick palatal coverage, thickened denture posterior border, narrow arch bringing cusps of posterior teeth near the tongue's dorsal surface [37,38].

Use of Training Bases: This is another desensitization strategy in which the patient is gradually given a series of small to full-sized denture bases. This procedure is beneficial to people that are about to start wearing dentures for the first time. A thin denture base made of acrylic, without teeth is made, and the patient is advised to use it at home for a period of time that is gradually increased. A reasonable regimen may be for 5 minutes once a day, then twice a day progressing forward. [38,39,40]. One week later, the patient is instructed to raise this time to 10 minutes for three times each day, and then for 15, 30 and 60 minutes each day. Finally, the patient can endure these training bases for most time of the day. According to the patient's requirements and expectations, the time-frame and the rate of improvement will differ [41,42,43]. If issues arise, the extension of the denture's posterior border may need to be reduced. Anterior teeth are introduced into the original

training base, and posterior teeth are introduced when the patient can bear it. Compromises in denture fabrication standards are unproductive. The retention and denture stability should be improved. Palate-less denture use has been demonstrated to be beneficial for certain patients, and retention failure in such cases is not usually significant [30,37].

Making implant-retained prostheses: This process allows a decrease in prosthetic size and extension thus reducing the overall coverage and lowering gagging reflex.

Roofless dentures: Gagging is reduced or eliminated when palatal coverage is reduced. Maxillary dentures could be shortened and made into a U-shaped boundary which is around ten millimetres from the dental arch [44].

Matte-finished dentures: Jordan et al proposed this in 1954. A very smooth, highly polished denture surface that is coated with saliva might induce a slimy sensation in some patients, causing gagging; In this situation, a matte surface has been proposed as more acceptable.

Post insertion denture issues

Immediately after denture insertion, gagging is likely to occur owing to the two factors namely, maxillary dentures (an overextension of maxillary denture as well as an extensively thick posterior border) and mandibular dentures (distolingual flange of the denture maybe extensively thick) [39].

Some of the patients complain of delayed gagging which is 2 weeks to 2 months after insertion for reasons such as: An incomplete border seal in the denture or malocclusion that causes the denture to loosen both of which allows saliva to seep under the denture to induce gagging [45,46].

3. Pharmacological Methods

When clinical and prosthodontic therapy fails to reduce gagging, pharmaceutical approaches are considered. The drugs used to treat gagging are classified under the following sections:

Peripherally acting agents –Local and topical anaesthetics

The rationale behind using such medications is that if the afferent signals from more sensitive

oral tissues are blocked, the gag response is prevented. Watt and MacGregor et al recommend infiltrating the palatine nerves with local analgesia for maxillary impression taking. While Krolet al recommended numbing the soft palate, Kramer et al employed local anaesthetic sprays and Lee-Singer et al utilized swabs for topical application of a local anaesthetic to the palate before impressions [20,21,47]. Similarly, Hattab et al added local anaesthetic into the alginate impression material [30].

It is well known that the glossopharyngeal nerve block (GNB) is a generally safe, uncomplicated, and easy-to-learn technique for treating patients with excessive gag reflexes. GNB can be utilized in dental treatments in individuals who have an overactive gag reflex or while doing operations at the back of the mouth [48]. The GNB procedure was carried out with the operator standing contralaterally to the side to be blocked and the patient's mouth wide open. The palatopharyngeal fold (posterior tonsillar pillar) was identified, and a tongue blade (held in the non-dominant hand) was used to move the tongue medially (towards the contralateral side), establishing a gutter between the tongue and the teeth. A syringe with a 25 gauge needle was inserted into the membrane near the base of the anterior tonsillar pillar and inserted about 0.25 to 0.5 cm, then after careful aspiration, 3 ml of 2% lignocaine solution with 1:200000 epinephrine was slowly injected, and the injection was performed on the opposite side [48].

Centrally acting agents

Further, several marketed drugs act on the nervous system and classified under centrally acting agents as represented in.

4. Surgical Correction

Leslie et al described a surgical procedure for relieving gagging in patients who could not tolerate complete dentures. The theory behind this approach is based on the fact that recurrent gagging is caused by a relaxed soft palate, which is common in anxious patients. This procedure was mainly recommended to shorten and also tighten the soft palate to remedy this issue [1,21].

5. Acupuncture and Acupressure Therapy

Acupuncture therapy is a medical method in which a small needle is put into the skin to a few millimetres, kept in place for a while, occasionally

adjusted, and finally withdrawn. Ear acupuncture is considered a non-invasive treatment method. This method produces very slight discomfort, it is inexpensive, and takes minimal extra clinical-time [1].

Acupuncture, according to Rosted et al, is a highly safe practice if fundamental anatomy and aseptic precautions are followed by a properly qualified practitioner. Ear acupuncture was hundred percent effective for regulating the gag reflex, according to some authors [1,53]. The

mechanism of action of this treatment might be explained by the fact that one of the few primary nerves that is involved in the swallowing mechanism, the vagus nerve, also stimulates a portion of the ear which houses the acupuncture point for anti-gagging. This site is also close to the trigeminal nerve branch. Both the trigeminal and vagus nerves work together to control many of the motor and sensory activities of the larynx, throat, and palate. As a result, activating these anti-gagging points triggers systems that inhibit the gagging reflex [4,54].

Table 2. Centrally acting agents

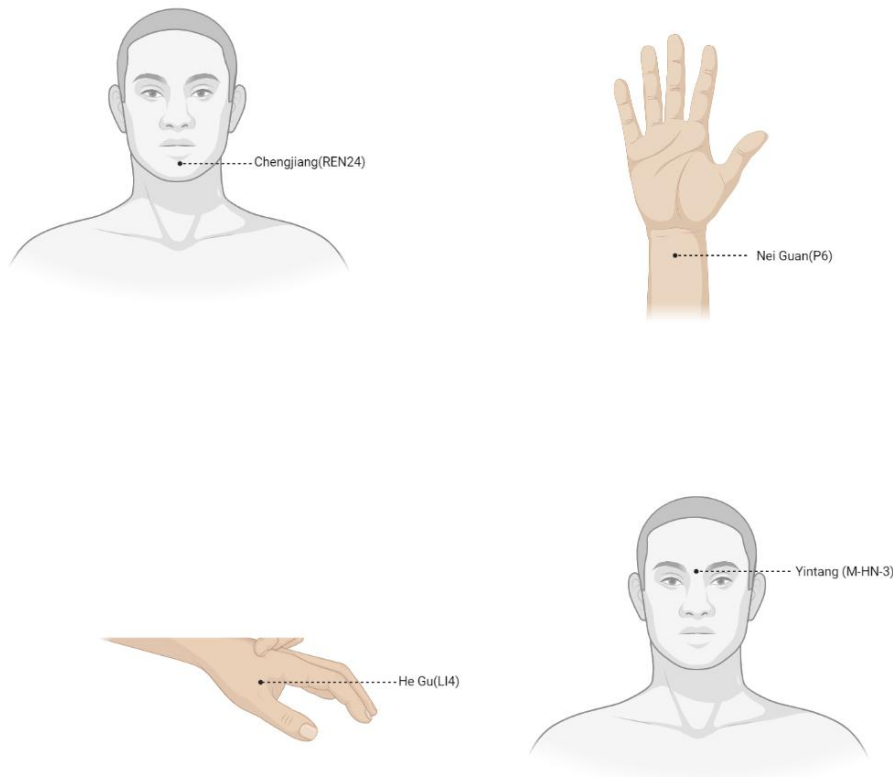
Class of drug	Name	Mode of action	Reference
Conscious sedation	Nitrous oxide	Alters the perception of external stimuli and thus this depresses the gag reflex.	[5,49]
Antihistamines	Benadryl Diphenhydramine hydrochloride	Histamine binding to cellular receptors on nerve terminals, smooth muscles, and glandular cells is competitively antagonized, thus depressing the gag reflex.	[2,21]
CNS depressants	Intranasal midazolam	Short-acting benzodiazepine central nervous system (CNS) depressant. Nasal anaesthesia has several benefits, including a quick absorption period and a rapid release process of anaesthetics transmitted to the systemic circulatory system.	[50]
Serotonin antagonists	Ondansetron Granisetron	5-HT ₃ receptors in the chemoreceptor trigger zone and gastrointestinal tract are blocked.	[51]
Dopamine antagonists	Metoclopramide Domperidone	Block dopamine type 2 (D ₂) receptors both centrally and peripherally in the chemoreceptor trigger zone in the gastrointestinal tract respectively.	[21]
Anticholinergics	Hyoscine Dicyclomine	Muscarinic receptors in the vestibular nucleus, vomiting center, and higher brain centers are blocked.	[51]
Sedative	IV Propofol	Antagonist at the 5HT ₃ receptor, as well as by regulation of subcortical pathways	[21,21,52]
The last option that a dentist will resort to is general anaesthesia [25]			



Fig. 1. Acupuncture at anti-gagging point (Hashim)

Table 3. Provides details of the various pressure points that have been employed for relieving gagging reflex

Pressure point	Location	Procedure	Reference
The REN-24/ CV-24 point (Fig. 2a)	Horizontal mentolabial groove, roughly halfway between the lower lip and the chin	With the index finger, Use gentle finger pressure. Gradually increase finger pressure until the patient feels discomfort/pain and distension.	[55,56]
Nei Guan (P6 or PC6) point (Fig. 2b)	Inner forearm between the two tendons	Three finger breadths underneath the wrist on the forearm is pressed. It is widely used to treat nausea, motion sickness, carpal tunnel syndrome, stomach upsets and also headaches.	[55,56]
He Gu (LI4) (Fig. 2c)	Between the thumb and the fore finger	When the thumb and index fingers are pulled together this point is positioned on the highest point of the muscle.	[21]
Yintang (Fig. 2d)	Midway between the medial ends of the eyebrows	With the index finger, Use gentle finger pressure. Virtually used to treat insomnia and anxiety.	[57,58]



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Fig. 2. a)REN-24/ CV-24 point b) Nei Guan point c) He Gu (L14) point and d) Yintang (M-HN-3) point

After disinfecting the skin with 70% alcohol at the location of the needle penetration, one tiny, single-use disposable needle (0.35 mm 40 mm) was pierced to a depth of 3 mm directly above the tragus in each ear's anti-gagging point. [Fig. 1]. Before performing the dental treatment, the needles were spun clockwise and then anticlockwise for a span of thirty seconds. The needles were kept in place during the impression-taking procedure and were withdrawn once the impression tray was withdrawn from the patient's mouth [54].

Acupressure works on the same principles as acupuncture, but the former uses mild finger pressure to stimulate the points rather than small needles, making it a less intrusive procedure. The acupressure procedure should begin about 5 minutes before the impression procedure. It is continued during the impression operations and is terminated only after the impression has been completely removed from the patient's mouth. The patient, dental assistant, or dentist can all apply pressure [1,11].

6. Laser Stimulation

For 1 minute, a red-light soft laser with a power output of 0.5 mW and a wavelength of 650 nm, a pulsating magnetic field of 9 Hz, and a penetration depth of 30 cm was utilized to stimulate (CV 24) point. The red-light soft laser triggers the organism's bioenergetic regulatory mechanisms at the cellular level. At a distance of 1 cm from the laser probe, the laser was applied directly to the skin. Laser treatment on acupuncture point CV 24 has been shown to be an effective treatment option for orthodontic patients with gagging reflexes [56].

4. DISCUSSION

Dentists see a large number of patients in their practice who have an oral cavity that is extremely sensitive, thus these patients cannot tolerate any foreign material in it. Gag reflexes can be triggered by any kind of dental procedure both before and after treatment for various reasons. Furthermore, it can be stated that the dentist's competence and patience are the prerequisites to controlling gag reflex and providing comfortable treatment outcomes. This article is a narrative review which comprises of a compilation of data on the gag reflex and the various methodologies documented in literature for controlling it. It comprehensively covers the various aspects of gagging from a geriatric

standpoint. It includes the various modifications that could be made by the prosthodontist during treatment procedures as well as during the fabrication of the prosthesis, to minimise the gag reflex in patients. Although there is no universal solution for successfully managing the gagging patient, various modalities can be used under the discretion of the dentist in order to control the gag reflex leading to smooth implementation of dental treatment.

5. CONCLUSION

A gag reflex in a healthy is meant to protect us but can cause hurdles for some individuals leading to interference with their everyday life and normal function. In dentistry procedures, gagging may upset the patient and the physician leading to apprehensions towards dental visits. There is no universal solution for successfully managing this reflex, but subject to individual patient, various modalities can be used according to the doctor's assessment and patient's conditions. With appropriate patient education and motivation as well as a careful approach and meticulous work by the dentist, a comfortable and productive treatment may be obtained. A wide range of management solutions have been elaborated, and many cases need a combination of therapeutic procedures. The present review article provides an overview of various treatment modalities documented in literature to control the gag reflex thus providing a successful and comfortable treatment outcome for both the patient and clinician.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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