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Oropharyngeal dysphagia: An overview

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Abstract
Oropharyngeal dysphagia is a term that refers to swallowing issues that affect the mouth and/or throat. Impaired muscular function, sensory alterations, or growths and obstructions in the mouth or throat are the most prevalent causes of swallowing issues. Modified barium swallow study, Fiberoptic endoscopic evaluation of swallowing (FEES) EAT -10 assessment, video fluoroscopy can be used for testing. The treatment that is recommended will be based on the nature of the swallowing problem and what is causing it. For the best management approach, a dysphagia history, physical exam, and swallow studies are recommended. Tissue in the throat or upper oesophagus that obstructs the passage of food, drink, or saliva down the throat on its journey to the stomach is treated by surgery. Swallow therapy is a behavioural treatment that aims to strengthen the swallowing muscles while also reducing the amount of material that enters the windpipe. This review describes about the disease its symptoms causes, assessment and treatment of oropharyngeal dysphagia.

Keywords: Oropharyngeal, dysphagia, FEES, choking

Introduction
Swallowing is a universally important activity for supporting life, since it allows food and fluid to be taken safely and quickly, allowing normal physiological and biochemical functions to continue. Furthermore, an individual's assessment of their quality of life is influenced by their enjoyment of eating and drinking (Sasegbon and Hamd., 2018). The swallowing apparatus begins with the mouth and includes the lips, tongue, oral cavity, pharynx (throat), airway, esophagus and its sphincters. Oropharyngeal dysphagia is a common clinical problem among the elderly, affecting up to 13% of the overall population aged 65 and up, as well as 51% of institutionalised seniors (Wirth *et al*., 2016) [42]. Loss of muscle mass and function, a decrease in tissue flexibility, changes in posture, a decrease in saliva production, and a compromised dental health all raise the risk of dysphagia and may play a role.

When people have trouble swallowing, they may have one or more of the following symptoms like increased effort or resistance moving food and liquids from the mouth into the upper throat (pharynx), increased effort or resistance moving food from the upper throat (pharynx) into the lower throat (oesophagus), food and/or medication getting stuck, regurgitation of food, coughing and/or choking while eating and drinking, and weight loss due to food avoidance (Renton., 2021) [25].

There are several procedures for determining the presence of dysphagia, ranging from a simple screening to a comprehensive instrumental examination. Observations of medical state, facial musculature, swallowing of a small bolus, and observation of a full meal are common screening tools. All doctors who treat the elderly should make sure that this type of screening is provided on a regular basis; collaboration with local speech and language therapists, geriatric medicine, and stroke services can help build such procedures (O'Rourke *et al*., 2014) [20].

Renton (2016) described in her article that innadequate oral intake due to dysphagia can result in dehydration and malnutrition, as well as depression and a decline in quality of life. Choking, airway obstruction, and even death are all possible outcomes. In 50% of all cases of dysphagia, aspiration occurs. A further half of these people may experience' silent aspiration,' which is more common in elderly patients and happens without the typical clinical signs and symptoms of coughing. Softer foods and thicker drinks, which are easier to swallow, can be recommended by a dietitian. They may also endeavour to ensure that patients receive the assistance they require during mealtimes. Some folks require diets that are soft or pureed. Others may simply need to eat in lesser portions.

Dietary adjustments should be aimed at easing dysphagia symptoms while still providing for enough nourishment and preserving a person's enjoyment of eating.

Oropharyngeal dysphagia-definition

The World Health Organization defines oropharyngeal dysphagia (OD) as the difficulty or inability to safely and effectively transport a bolus from the oral cavity to the esophagus, which can involve aspirations, choking, and residue. Despite the reality that OD may be identified using well-defined clinical procedures and additional investigations, it is rarely routinely screened and treated in the clinical context, and knowledge among the geriatric community is limited. Many risk factors with neurogenic and neurodegenerative processes, muscle weakness, and sarcopenia contribute to the pathogenesis of OD in this population. Mechanical deficiencies in the swallow reflex, diminished pharyngeal sensitivity, and sensory central nervous system impairments are all part of the pathogenesis. Due to its high prevalence and connect to a number of comorbidities and their negative outcomes, such as malnutrition, respiratory infections, and aspiration pneumonia, functional disability and frailty, institutionalization and increased readmissions, and mortality, OD has been designated as a geriatric syndrome. There is an evidence-based and effective treatment for OD in the elderly that focuses on compensating for swallow impairments through fluid viscosity and solid food texture adaptations to avoid aspiration and choking, as well as improving nutritional status and oral health to prevent respiratory infections (Ortega *et al*., 2017) [18].

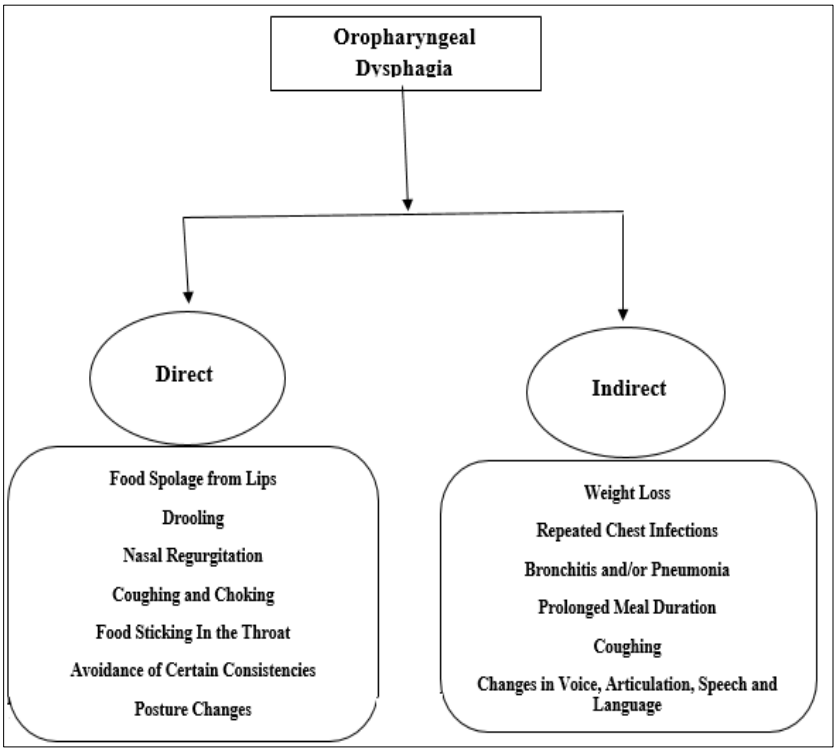
Physiology

The swallowing process has generally been divided into three parts. They are the oral, pharyngeal, and esophageal phases of the swallow. The oral component is voluntary and consists of the lips, teeth, mastication muscles, and tongue. It is separated into two or more stages: the oral preparation stage and the propulsive stage. The oral preliminary phase for fluids is very basic, involving the initial containment and positioning of the ingested fluid before its subsequent aboral propulsion. The oral preparation process is more extensive since more solid foods require mastication. This is because mastication necessitates the transportation of food from the oral cavity to the teeth, where it is broken down with the help of saliva. The consistency and texture of solid meals have been changed as a result of this technique. After that, it can be positioned and swallowed as if it were a beverage (Sasegbon and Hamd., 2018).

The oral preparation step includes grinding or chewing the food and mixing it with saliva to form a meal bolus of the proper size and consistency. The food bolus is pushed backwards into the oropharynx willingly. The reflex pharyngeal phase is triggered by a backward movement to the oropharynx. The stimulation of afferent receptors along the anterior tonsillar pillars, base of tongue, and epiglottis initiates the pharyngeal phase of swallowing, which is reflex mediated. The glossopharyngeal (cranial nerve [CN] IX) and vagus (CN X) nerves mediate the resulting efferent motor muscle activity. (Venkata *et al*., 2014).

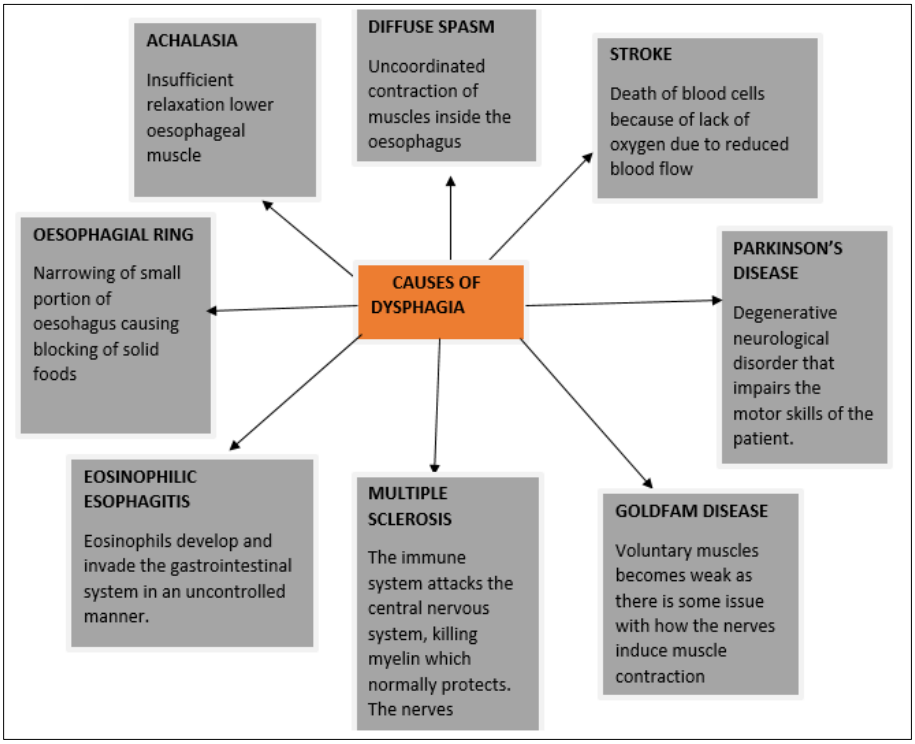
The pathogenesis of OD can be classified into two groups: those caused by impaired swallowing safety and those caused by impaired swallowing efficacy. The pathophysiology of decreased swallowing safety is linked to neurological changes that slow down the pharyngeal reconfiguration's physiological responses. Neurodegenerative disorders, frailty, confusion, ageing, dementia, and medicines that act on the central nervous system are all linked to these delayed, deglutitive neural responses. The pathophysiology of reduced swallow efficacy is more strongly linked to muscle variables such as weakness and sarcopenia, which result in a decrease in bolus propulsion power and/or altered pharyngeal clearance (Ortega *et al*. 2014) [19].

Symptoms



Etiology

Dysphagia can be caused by structural or motor issues. Luminal stenosis and diverticula are structural reasons, while muscle weakness, sphincter dysfunction, and spastic disorders are motor causes. Neurogenic dysphagia can be caused by a central pathology such as stroke, head injury, previous surgery and nerve damage from head and neck surgery, motor neuron disease, Parkinson's disease, multiple sclerosis, or a neurodegenerative disease such as Alzheimer's disease, or by a side effect of pharmacological agents such as benzodiazepines that alter neuromuscular function (Sebastian *et al*., 2015) [32].



Assessment tools

The gold standard for studying oral and pharyngeal causes of OD, swallowing difficulty, and aspiration is video fluoroscopy (VFS). However, performing a VFS on every patient at risk of OD is not possible since it necessitates specialised equipment that is not available in all healthcare institutions. As a result, clinical procedures for quick screening and reliable clinical assessment of OD has been designed (Rofes *et al*., 2014). Clinical evaluation or assessment by a dysphagia therapist is another procedure after screening. Despite the fact that speech and language pathologists assess and treat swallowing in many nations, there are exceptions. Other disciplines, such as occupational therapists, dieticians, nurses, or physiotherapists, may also be engaged in a patient's dysphagia treatment, or may even be the primary medical practitioner. The clinical examination may serve a variety of purposes, including identifying possible causes of dysphagia and assessing swallowing safety or aspiration risk; deciding on oral versus alternative feeding routes; clarifying the need for additional assessment (e.g., FEES or VFS); and establishing baseline or pretreatment clinical data to be compared with follow-up assessments after intervention or during the course of progressive diseases (Speyer., 2013) [34]. For patients with post-stroke OD, the Volume-Viscosity Swallowing Test (V-VST) and the Toronto Bedside Swallowing Screening Test (TOR-BSST) were developed. The V-VST is a clinical diagnosis test for OD that assesses clinical symptoms of reduced swallow efficacy and safety using three volumes and three viscosities with the use of a pulseoximeter (Ortega *et al*., 2017) [18].

The Eating Assessment Toll-10 (EAT-10) is a self-reporting, uni-dimensional screening tool for dysphagia and swallowing problems. It's a quick test that takes around 2 minutes to complete. It consists of ten Likert-type items and yields a raw score ranging from 40 (maximum) to 0 (minimum); A high raw score is frequently used as a dysphagia indicator (Quiros *et al*., 2019).

When motility issues are considered as the cause of dysphagia, Eosophageal manometry is usually the first diagnostic test to investigate structural and inflammatory abnormalities, followed by manometry. Following esophageal manometry showed a higher diagnostic yield than barium esophagram in individuals with dysphagia and a normal EGD examination (Rosenstock *et al*. 2011) [30]. While ingesting a high-density barium bolus of various consistencies, video fluoroscopy is a dynamic continuous radiographic assessment of the anatomy and function of the oral cavity, pharynx, and UES opening that includes lateral and frontal views. With the patient sat in an upright position, this test checks the oral and pharyngeal regions. Once a swallow dysfunction has been detected, the examiner can recommend postural or therapeutic approaches to help address the problem (Rommel and Hamdy, 2015).

Consequences of dysphagia

Undiagnosed or untreated dysphagia has been linked to dehydration, malnutrition, weight loss, anorexia, aspiration pneumonia, and depression. Secondary problems such as constipation, poor wound healing, increased susceptibility to infection, and reduced muscle function may occur as a result

of the latter. Because of their frequent ingestion of altered consistency intakes or less nutrient dense meals, and their difficulty tolerating big fluid amounts, dysphagic individuals are at a higher risk of micro- and macronutrient deficits. Dysphagia's psychological effects should also be considered. Increased reliance on carers at mealtimes, as well as new feeding patterns, are demeaning and unpleasant to patients, which can lead to loss of appetite, depression, anxiety, or fear at mealtimes, resulting to weight loss and exacerbation of malnutrition

Psychological problems associated with dysphagia

Verdonschot *et al*. (2013) [40] stated that the rising prevalence of oropharyngeal dysphagia, as well as the medical, social, and emotional burden imposed by dysphagia, prompted researchers to look into the psychological issues. Because eating and drinking are such a vital aspect of social contact, dysphagic individuals frequently eat alone to avoid embarrassment. Dysphagic individuals frequently worry that they will choke on their food or suffer aspiration pneumonia. The fear of dysphagic consequences can further reduce one's quality of life. Patients with oropharyngeal dysphagia may have elevated psychological distress, such as anxiety or depression symptom.

Drinking fluids when you have dysphagia can be uncomfortable and dangerous, and can lead to choking and aspiration, just like eating. Because of this, persons with dysphagia frequently refuse to consume fluids, which can lead to dehydration. People with dysphagia may need to use thickening agents to change the thickness of their fluids, similar to how they change the texture of their food. There are many different varieties on the market, and your doctor or speech and language therapist can help you choose the proper one (Specialist Nutrition).

Trustworthy healthcare experts and specialists can significantly alleviate anxiety. When patients understand that dysphagia is a very treatable condition and that, in many cases, simple treatments exist for the swallowing difficulty, their fear decreases substantially. Using thickeners and other products to change the consistency of food can assist to make mealtime less scary and the dining process easier. When dysphagia sufferers realize that there are options, they become less self-conscious and their feelings of shame diminish significantly. Developing a consistent food pattern can assist to alleviate emotions of helplessness. Patients with dysphagia were accustomed to having thickeners and other dietary adjustments added to their diets, and it became a routine part of their mealtime routine (Article).

Nutritional problems

Dysphagia can exacerbate changes in appetite in the elderly because trouble chewing and swallowing limits what someone can and cannot eat, and if they can't eat the same textures they're used to, they may not be able to eat enough. Dysphagia can lead to weight loss and malnutrition in this situation (also known as malnutrition). Malnutrition is a nutritional deficiency and a complication of dysphagia, particularly in patients who are unaware of their dysphagia and are not receiving treatment. When a person is malnourished, their health can deteriorate because they are likely to eat less of their meals and so receive less nourishment (Specialist Nutrition).

Dysphagia can result in decreased or changed oral food/liquid intake, which can lead to poor nutritional status. Community-dwelling elderly individuals are one population that need further research when it comes to potential links between dysphagia and nutritional status. Dysphagia can lead to malnutrition, and malnutrition can lead to a reduction in functional capacity. As a result, dysphagia may either initiate or exacerbate the frailty process in the elderly (Sura *et al*., 2012) [35].

Prevalence of oropharyngeal dysphagia

Roden and Altman (2016) [27] discussed in their paper that the prevalence of dysphagia is 6 to 50%. Stroke is one of the well-studied neurological causes of oropharyngeal dysphagia. Stroke is one of the leading causes of death and long-term disability (Tarvar, 2014). After a stroke, dysphagia is reported to be present in more than 70% of patients15.In at least 75% of individuals who have had a stroke with early swallowing issues, dysphagia continues moderate to severe, and in 15% of patients, it remains profound. It's hard to ascertain how prevalent dysphagia is in infancy, childhood, and early adolescence, but one of the most common causes of oropharyngeal symptoms is cerebral palsy, which can affect up to 99 percent of children. In frail old people, dysphagia is a prevalent symptom. (Rommel and Hamdy, 2015). Dysphagia is now recognised as a serious symptom in situations including thermal burns and traumatic brain damage. In addition, chemoradiation treatment for oropharyngeal cancer has a greater impact on swallowing function than on other aerodigestive tract activities like breathing (Hutcheson and Lewin, 2012) [11]. Dysphagia is reported to occur in 38–84 percent of cases of inflammatory myopathy. Dysphagia is the most common symptom of inclusion body myositis, a chronic progressive acquired myopathy marked by selective muscle involvement and growing corticosteroid resistance (Ko and Rubin 2014) [13]. Dysphagia affects 13–57 percent of those who have dementia (Alagiakrishnan *et al*., 2013) [1].

Nutritional support in oropharyngeal dysphagia

There are a number of scoring systems that can be used to identify a patient who is at risk of malnutrition. The screening is based on the patient's medical history (weight loss, etc.) and a physical examination (height, weight, and BMI). "Malnutrition universal screening instrument" ('MUST'), "quick nutrition screen for hospitalised patients," "nutrition risk index," "Mini Nutritional Assessment-Short Form (MNA-SF), "Short Nutritional Assessment Questionnaire" (SNAQ) (Shelat and Pandya 2015) [33].

Few techniques exist to assess the nutritional condition of hospitalised individuals. Nutritional assessment techniques include the SGA, brief nutritional assessment questionnaire, mini nutritional assessment (MNA), and corrected arm muscle area (CAMA). A full evaluation of the cause of dysphagia must be undertaken on all patients with dysphagia.

Treatment

The goal of swallowing exercises is to affect the swallowing physiology and aim to make long-term changes. Effortful swallow, su-praglottic swallow, super-supraglottic swallow, the Mendelsohn technique, Shaker's exercise, and Masako are examples of these exercises. Supraglottic swallowing, super-supraglottic swallowing, and the Mendelsohn manoeuvre have all been employed in the rehabilitation of dysphagic patients to compensate for the pharyngeal phase of

swallowing. Non-invasive brain stimulation techniques stimulate the pharyngeal motor cortex and corticobulbar pathways, whereas oropharyngeal afferent pathways are increased. Transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS) are the two most common non-invasive brain stimulation procedures (Solares *et al*., 2020) [43].

Non-invasive brain stimulation techniques (non-invasive brain stimulation techniques) stimulate the pharyngeal motor cortex and corticobulbar pathways, whereas oropharyngeal afferent pathways are increased. Transcranial direct current stimulation (tDCS) and transcranial magnetic stimulation (TMS) are the two most common non-invasive brain stimulation procedures (Park *et al*., 2013) [21].

Traditional OD treatment in the elderly relies on compensatory methods such as fluid adaptation using thickeners to avoid compromised safety and postures and movements to correct for biomechanical changes. Novel therapy options are now being investigated with the goal of restoring swallowing function. Many of these innovative approaches rely on stimulating the deglutition afferent route to increase cortical plasticity and restore or improve swallowing function (Cabib *et al*., 2016) [6]. Malnutrition is linked to the development of sarcopenia, reduced functioning, frailty, and poor immunity in older patients, all of which have a significant impact on patient outcome (Carrion *et al*., 2016). Following the determination of the patient's nutritional status, recommendations for nutritional supplementation and diet adaption are made based on the patient's needs. This nutritional modification is based on traditional items and includes three types of food adaptations (Ortega *et al*., 2017) [18].

Capsaicinoids are flavour components which include capsaicin (C), dihydrocapsaicin (DHC), nordihydrocapsaicin (n-DHC), homocapsaicin (h-C), and homodi hydrocapsaicin, mostly found in red chilli peppers (Asnin and Park, 2015) [5]. They are biosynthesized in the placenta of the fruits by condensation of vanillylamine and medium chain length fatty acids (Thiele *et al*., 2008) [38]. Capsaicin, along with dihydrocapsaicin, makes up around 90% of capsaicinoids found in a typical chilli pepper (Meghvansi *et al*., 2010). These compounds are responsible for the fruit's 'pungent' flavour sensation that has made it popular in culinary cultures around the world (Hursel & Westerterp-Plantenga, 2010). Capsaicinoids are stable in both polar and nonpolar solvents and cause a burning sensation in the body of those who come into touch with them (Tanaka *et al*., 2009) [36]. Almost 85 percent of the capsaicinoids in hot peppers are found in the placenta, while only 6% and 8% are found in the pericarp and seeds, respectively (Mazourek *et al*., 2009) [15]. Capsaicinoids can be found after only one week of flowering, although the kinetics of synthesis differ, with the peak concentration reaching after two to four weeks, depending on cultivation. Capsaicinoids concentration begins to decline 50 days after flowering due to oxidative metabolism (Patrick., 2005) [22]. Capsaicin, also known as 8-methyl-N-vanillyl-6-nonenamide, is the active ingredient in chilli peppers that causes burning, a flare-up, and a gastrointestinal response. As a result of TRPV stimulation, this response comes quickly while a poorly localised, long-lasting dull pain lingers from slow conducting C nerve fibres. Capsaicin also causes peripheral and central nerve terminals to release SP and calcitonin gene-related peptide, which contributes to the local flare (Peppin and Peppagallo, 2014) [23].

Pharyngeal sensory function declines in older adults with oropharyngeal dysphagia (OD). The biomechanical and neurophysiological effects of acute and subacute oropharyngeal sensory stimulation with transient receptor potential vanilloid 1 (TRPV1) agonists (capsaicinoids) in elderly patients with OD were investigated by Ortega, O *et al*. in 2019 [14]. They used video fluoroscopy (penetration-aspiration scale [PAS], timing of swallow response) and electroencephalography (EEG) (latency and amplitude of pharyngeal event-related potential) to compare the effects of a single dose versus multiple doses (2 weeks) of oral capsaicin treatment (10–5 M) or placebo in 28 older patients with OD (81.2 4.6 years). Oropharyngeal sensory stimulation with capsaicinoids caused brain alterations in older patients with OD after 2 weeks of treatment, which were linked to improvements in swallowing biomechanics. These findings also suggest that sensory stimulation with TRPV1 agonists could be an effective pharmacological treatment for older people with OD. Adults with neurologically induced dysphagia need speech-language pathologists (SLPs) who are educated in dysphagia treatment to evaluate and treat swallowing difficulties. Oropharyngeal dysphagia is frequently connected with cerebrovascular accidents (CVAs), head injuries, and degenerative disorders, and can result in significant and life-threatening outcomes such as aspiration pneumonia, starvation, and impaired health. The major goal of SLP intervention is to lower the risk of aspiration and enhance swallow function so that oral intake can be done safely and efficiently (Ashford *et al*., 2009) [3].

Conclusion

Oropharyngeal dysphagia is the difficulty in swallowing and so that solids and liquids cannot move out of the mouth properly. Dysphagia assessment is a multidisciplinary approach that begins with physicians and nurses at the bedside and progresses to speech pathology, radiography, and/or endoscopic evaluation. Oropharyngeal dysphagia can be treated by swallowing therapy, dietary changes and through feeding tubes. Although most people take swallowing for granted when they are young, swallowing difficulties and dysphagia are linked to ageing and age-related disorders. Aspiration causes the majority of the illness and mortality, but severe medical and ethical difficulties occur when feeding is provided, particularly in progressing neurological disease.

Reference

1. Alagiakrishnan K, Bhanji RA, Kurian M. Evaluation and management of oropharyngeal dysphagia in different types of dementia: A systematic review. Archives Gerontology Geriatrics. 2013;56:1-9.
2. Alexander JW. Nutritional pharmacology in surgical patients. The American Journal of Surgery, 2002, 349-352.
3. Ashford J, McCabe D, Wheeler-Hegland K, Frymark T, Mullen R, Musson N, *et al*. Evidence-based systematic review: Oropharyngeal dysphagia behavioral treatments. Part III--impact of dysphagia treatments on populations with neurological disorders. J Rehabil Res Dev. 2009;46(2):195-204.
4. Aslam M, Vaezi MF. Dysphagia in the elderly. Gastroenterology & hepatology. 2013;9(12):784-795.
5. Asnin L, Park SW. Isolation and analysis of bioactive

compounds in Capsicum peppers. Crit Rev Food Sci Nutr. 2015;55:254e89.
6. Cabib C, Ortega O, Kumru H, *et al*. Neurorehabilitation strategies for poststroke oropharyngeal dysphagia: From compensation to the recovery ofswallowing function. Ann N Y Acad Sci. 2016;1380:121e138.
7. Carrión S, Roca M, Costa A, Arreola V, Ortega O, Palomera E, *et al*. Nutritional status of older patients with oropharyngeal dysphagia in a chronic versus an acute clinical situation, Clinical Nutrition. 2014;36(4):1110-1116
8. Chilukuri P, Odufalu F, Hachem C. Dysphagia. Missouri Medicine. 2018;115(3):206-210.
9. Clavé P, Rofes L, Carrión S, Ortega O, Cabré M, Serra-Prat M, Arreola V. Pathophysiology, relevance and natural history of oropharyngeal dysphagia among older people. Nestle Nutr Inst Workshop Ser. 2012;72:57-66. doi: 10.1159/000339986. Epub 2012 Sep 24. PMID: 23052001.
10. Dibb MJ, Abraham A, Chadwick PR, Shaffer JL, Teubner A, Carlson GL, Lal S. Cen- tral venous catheter salvage in home parenteral nutrition catheter-related bloodstream infections: Long term safety and efficacy data. JPEN J Parenteral Enteral Nutrition. 2014.
11. Hutcheson KA, Lewin JS. Functional outcomes after chemo radiotherapy of laryngeal and pharyngeal cancers. Curr. Oncol. Rep. 2012;14:158-165.
12. Khan A, Carmona R, Traube M. Dysphagia in the elderly. Clinics in geriatric medicine. 2014;30(1):43-53.
13. Ko EH, Rubin AD. Dysphagia due to inclusion body myositis: case presentation and review of the literature. Annals Otology Rhinology Laryngology. 2014;123:605-608.
14. Kumar S, Wagner CW, Frayne C, Zhu L, Selim M, Feng W, *et al*. Non-invasive brain stimulation may improve stroke-related dysphagia: a pilot study. Stroke. 2011;42(4):1035-1040.
15. Mazourek M, Pujar A, Borovsky Y, Paran I, Mueller L, *et al*. A Dynamic Interface for Capsaicinoid Systems Biology. Plant Physiol. 2009;150:1806-1821.
16. Nassri A, Schey R. Deglutition and oropharyngeal dysphagia. Clinical and Basic Neurogastroenterology and Motility, 2020, 165-181.
17. Omar O, Cabre M, Clavé P. Oropharyngeal dysphagia: Aetiology and effects of ageing. Journal of Gastroenterology and Hepatology Research. 2014;3:1049-1054.
18. Ortega O, Martín A, Clavé P. Diagnosis and Management of Oropharyngeal Dysphagia Among Older Persons, State of the Art. Journal of the American Medical Directors Association, 2017, 576-582.
19. Ortega Omar, Cabre Mateo, Clavé Pere. Oropharyngeal dysphagia: Aetiology and effects of ageing. J. Gastroenterol. Hepatol. Res. 2014;3:1049-1054.
20. O'Rourke F, Vickers K, Upton C, Chan D. Clinical Medicine. Swallowing and oropharyngeal dysphagia. 2014;14-2:196.
21. Park JW, Oh JC, Lee JW, Yeo JS, Ryu KH. The effect of 5Hz high-frequency TMS over contralesional pharyngeal motor cortex in post-stroke oropha-ryngeal dysphagia: a randomized controlled study. Neurogastroenterol Motil. 2013;25:324.
22. Patrick MR. Manual of Clinical Microbiology. (6thedn), ASM Press, Washington. 2005.
23. Peppin JF, Pappagallo M. Capsaicinoids in the treatment of neuropathic pain: a review. Therapeutic advances in neurological disorders. 2014;7(1):22-32. https://doi.org/10.1177/1756285613501576
24. Quirós S, Serrano F, Mata S. Design and Validation of the Oropharyngeal Dysphagia Screening Test for Patients and Professionals: A Preliminary Study. Dysphagia. 2019.
25. Renton C. What Is Oropharyngeal Dysphagia? very well health. 2021.
26. Reyes-Torres CA, Castillo-Martínez L, Reyes-Guerrero R, Ramos-Vázquez AG, Zavala-Solares M, Cassis-Nosthas L, *et al*. Design and implementation of modified-texture diet in older adults with oropharyngeal dysphagia: a randomized controlled trial. European Journal of Clinical Nutrition. 2019.
27. Roden DF, Altman KW. Causes of dysphagia among different age groups: a systematic review of the literature. Otolaryngol. Clin. North Am. 2013;46:965-987.
28. Rofes L, Arreola V, Almirall J, Cabré M, Campins L, García-Peris P, *et al*. Diagnosis and Management of Oropharyngeal Dysphagia and Its Nutritional and Respiratory Complications in the Elderly, Gastroenterology Research and Practice. 2011.
29. Rofes L, Arreola V, Martin A, Clavé P. Natural capsaicinoids improve swallow response in older patients with oropharyngeal dysphagia. Gut. 2013;62(9):1280-1287.
30. Rosenstock A, Kushnir V, Patel A, *et al*. Diagnostic yield in the evaluation of dysphagia [abstract Su1509]. Gastrointest Endosc2011;73:AB287
31. Scottish Intercollegiate Guidelines Network. Management of patients with stroke: identification and management of dysphagia: A national clinical guideline. Guide 119. Edinburgh: Scottish Intercollegiate Guidelines Network, 2010.
32. Sebastian S, Nair PG, Thomas P, Tyagi AK. Oropharyngeal Dysphagia: Neurogenic Etiology and Manifestation. Indian Journal of Otolaryngology and Head & Neck Surgery. 2014;67(S1):119-123.
33. Shelat VG, Pandya GJ. Nutritional Support in Dysphagia. Seminars in Dysphagia. 2015.
34. Speyer Renée. Oropharyngeal Dysphagia Screening and Assessment. Otolaryngologic clinics of North America. 2013;46:989-1008.
35. Sura L, Madhavan A, Carnaby G, Crary MA. Dysphagia in the elderly: management and nutritional considerations. Clinical interventions in aging. 2012;7:287-298.
36. Tanaka Y, Hosokawa M, Otsu K, Watanabe T, Yazawa S. Assessment of capsiconinoid composition, nonpungent capsaicinoid analogues, in capsicum cultivars. J. Agric. Food Chem. 2009;57:5407-5412.
37. Tarver T. Heart Disease and Stroke Statistics–2014 Update: A Report from the American Heart Association. Journal of Consumer Health on the Internet. 2014;18(2):209-209.
38. Thiele R, Mueller-Seitz E, Petz M. Chili pepper fruits: presumed precursors of fatty acids characteristic for capsaicinoids. J Agric Food Chem. 2008;56:4219e24.
39. Tomsen N, Ortega O, Rofes L, Arreola V, Martin A, Mundet L, *et al*. Acute and subacute effects of

Oropharyngeal sensory stimulation with TRPV1 agonists in older patients with oropharyngeal dysphagia: a biomechanical and neurophysiological randomized pilot study. Therapeutic advances in gastroenterology, 2019, 12, 1756284819842043.
40. Verdonschot RJ, Baijens LW, Serroyen JL, Leue C, Kremer B. Symptoms of anxiety and depression assessed with the Hospital Anxiety and Depression Scale in patients with oropharyngeal dysphagia. Journal of psychosomatic research. 2013;75(5):451-455.
41. Liu WCL, Andrews CN, Armstrong D, Diamant N, Jaffer N, Lazarescu A, *et al*. Clinical Practice Guidelines for the Assessment of Uninvestigated Esophageal Dysphagia, Journal of the Canadian Association of Gastroenterology. 2018;1:5-19.
42. Wirth R, Dziewas R, Beck AM, Clavé P, Hamdy S, Heppner HJ, *et al*. Oropharyngeal dysphagia in older persons - from pathophysiology to adequate intervention: a review and summary of an international expert meeting. Clinical interventions in aging. 2016;11:189-208.
43. Zavala-Solares M, Reyes C, Funez-Madrid V. Oropharyngeal dysphagia treatment. Neurology Gastro Logy ATAM Reviews. 2020;4:10.