

Deglutition In Elderly Patients - A Review

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Abstract: *Deglutition is the process of swallowing. During this process, substance travels from the mouth via pharynx into oesophagus. When there is a malfunction in this process, then the substance passes through trachea leading to choking. Deglutition is a series of sensory and motor events. Any difficulty in swallowing causes dysphagia. Ageing may cause dysphagia which inturn may lead to less intake of food and liquids. Improper denture usage may lead to changes in tongue movements, which in-turn cause swallowing difficulties. The knowledge about this subject is very useful for suggesting dental treatments and medications for elderly. This study topic is vast and has an extensive scope for discussions and research. The review was done based on the articles obtained from various platforms like pubmed and google scholars. When article holder websites were analysed on the topic of deglutition in elderly patients, more than 100 articles were obtained and then filtered to 20 articles according to the abstract, title and complete article and then reviewed. This review article elaborates about the deglutition process in elderly patients. The present review is to analyse the current knowledge about deglutition, its dysfunction, cause, symptoms and types of dysphagia among elderly patients.*

Key words: *Deglutition; dry mouth; dysphagia; oral changes in elderly; stages in swallowing.*

1. INTRODUCTION

Deglutition is an action or process of swallowing that is a vital part of eating and drinking (Hamdy et al., 1998). The word "Deglutition", originated from the French word deglutition, which is derived from the Latin verb deglutition, meaning "to swallow down". During this process the substances are carried from the mouth to the pharynx and into the esophagus, while epiglottis is kept shut (Mosier et al., 1999). When there is a malfunction in this process the food or drink or medicine goes through the trachea which leads to pulmonary aspiration or choking (Lee et al., 1999). Deglutition is a series of sensory and motor events.

This process begins voluntarily in the oral cavity and proceeds autonomously in the pharynx and oesophagus. Swallowing process is divided into three phases. The first phase is the oral phase, second phase is the pharyngeal phase and the third phase is the esophageal phase. Difficulty in the swallowing process leads to dysphagia (Logemann et al., 2002). Dysphagia in elderly occurs generally due to two reasons: One is the natural age related physiological and anatomical changes and the other reason is age related diseases and their treatments (Groher and Crary, 2001). Anatomically dysphagia and esophageal dysphagia (Bülow et al., 2008). Deglutition has several adverse effects on elderly, like malnutrition and aspiration pneumonia. Motor changes occur when there is reduction in swallowing performance among elderly. Sensorimotor changes related to health aging leads to voluntary alteration in dietary intake. Age related diseases are considered as the primary factor of dysphagia in elderly.

Previous study by Barczy found that about 300,000 to 6,00,000 persons are affected by dysphagia in the US every year (Barczy et al., 2000). More than 15% of the population are elderly people. According to leader S B et al., dysphagia referral rates in elderly have escalated to about 20 percent from 2002 to 2007. Among which 70% are above 60 years (Leder and Suiter, 2009). Aging effects of swallowing in elderly are prolonged duration of oral swallowing phase and reduced sensitivity in pharyngeal areas (Shaw et al., 1995). This leads to smaller swallowing volume, premature loss of liquids, accumulation of residue and high laryngeal penetration rate (Gunasekaran and Abilasha, 2016; Yoshikawa et al., 2005). Change in swallowing function, oral and pharyngeal sensation change, lingual pressure generation, pharyngeal pressure generation and swallowing duration have minimal effect on swallowing among older adults (Robbins et al., 1992). Dysphagia in older adults is 63% in the oral stage, 25% in the pharyngeal stage and 35% in esophageal stage (Ekberg and Feinberg, 1991). In Europe, 17% of citizens above 65 yrs develop dysphagia and it has increased by 28% in the last decade (Rofes et al., 2011).

The limitations of most of the previous researches are that they have given only systematic review or cross sectional study on a small population. This study topic is vast and has an extensive scope for discussions and research. The knowledge about this subject is very useful for suggesting dental treatments and medications for elderly. The present review is to analyse the current knowledge in deglutition, it's dysfunction, cause, symptoms and types of dysphagia among elderly patients.

2. METHODOLOGY

This article is a narrative review of primary research literature obtained from pubmed and google scholars. Restrictions were placed on the time period between 1990 to 2020 and the abstract of non-english papers were excluded. All international articles were searched for deglutition in elderly patients, where more than 100 articles were obtained and then filtered few articles according to the abstract, title and complete article and then reviewed. The keywords of this study like deglutition, oral changes in elderly, dysphagia, dry mouth, types of dysphagia, stages in swallowing, were utilized to consult the databases. The description of included studies is summarised in table 1. The level of evidence of the reviewed articles were categorized as per the criteria of the Centre for Evidence-Based Medicine, Oxford, UK. (CEBM, 2011)

Deglutition

Deglutition is the process of swallowing. During this process, substance travels from the mouth via pharynx into oesophagus. When there is a malfunction in this process, then the substance passes through trachea leading to choking. Deglutition takes place with the help of 5 cranial nerves and 50 muscles (Wirth et al., 2016). Any difficulty in swallowing causes which ranges from mild difficulty to complete blockage. Anatomically dysphagia is classified

into oropharyngeal which is related to difficulty in initiation of swallowing and esophageal which is related to difficulty in passing food to stomach. Elderly are more proven to develop dysphagia. (Rofes et al., 2011). Adaptive cerebral changes in response to ageing, affects the swallowing process (Palati et al., 2019; Teismann et al., 2010).

Swallowing is a complex function and occurs in 3 stages. The 1st stage is voluntary and it takes place within the mouth. The 2nd stage is purely reflex in action and it sends sensory impulses to deglutition centre present in medulla and sends motor impulse to soft palate, pharynx, larynx and tongue which triggers a coordinated series of events ensuring that food enters only into the esophagus. This stage lasts for less than a second. The 3rd stage takes about 6 seconds and it's marked by reflex relaxation of conically closed cricopharyngeus muscle (Matsuo and Palmer, 2009).

Effect of dry mouth on elderly patients

Dry mouth is a common inconvenience faced by older people. Dry mouth may cause significant oropharyngeal disorders and pain which in turn leads to impaired quality of lifestyle causes of dry mouth may vary. Some of them are local salivary disorders, plethora of medication and medical conditions. Treatments have to be designed according to the cause. To enhance the salivation, topical and systemic stimulants are used to present deleterious consequences of dry mouth in elderly people (Turner and Ship, 2007)(Shree et al., 2019)(Turner and Ship, 2007).

People above 65 yrs are more proven to have dry mouth syndrome. It is caused by diminution of saliva flow, by acinar destruction and hyalinization. At times atrophy of salivary gland ducts and infection can be associated within the stoma (Błochowiak et al., 2016). Diabetes mellitus is the most important causative disease of dry mouth syndrome. Diabetes mellitus causes oral mucosal information, hyperglycemia, dehydration, which in-turn leads to dry mouth. The induced insulin resistance then impairs saliva secretion mechanisms causing dry mouth syndrome (Abitha and Santhanam, 2019; Matsumoto et al., 2020). Instance of decreased saliva flow by sjogren's syndrome is caused due to keratoconjunctivitis sicca, xerostomia which affects the middle aged and more in older aged. Swelling of major salivary gland causes atrophy and fibrous replacement (Tsubota et al., 1999a). Sjogren's syndrome often occurs with other such disorders, such as rheumatoid arthritis and lupus. Treatments given are eye drops, medications and eye surgery (Ship et al., 2002). Biopsy test can be taken for conformation of dry mouth due to sjogren syndrome (Sheriff et al., 2018).

Dysphagia

About 3,00,000 to 6,00,000 persons are affected by dysphagia in the US every year. Among them 15 percent of the population are elderly people (Barczy et al., 2000). Dysphagia referral rates in elderly have increased about 20 percent from 2002 to 2007, among which 70 percent of the population were above 60 years (Leder and Suiter, 2009).

Dysphagia contributes to aspiration and decreased dietary intake which in-turn leads to malnutrition, aspiration pneumonia. Signs and symptoms of dysphagia are slurred speech, drooling, poor tongue control, facial weakness, choking / coughing while eating and prolonged chewing (Aslam and Vaezi, 2013). Video fluoroscopy analysis can be used to analyse oropharyngeal swallowing among younger and older people (Logemann et al., 2002).

Complications caused

Ageing may cause dysphagia which in turn may lead to less intake of food and liquids. This may be caused due to depleted levels of consciousness, physiological weakness.

Incoordination in swallowing. This in-turn leads to malnutrition. A strong relationship is absorbed between dysphagia and pneumonia in patients with dementia, stroke and community dwelling in elderly adults more effort has to be taken for early identification, effective rehabilitation and prevention of such problems (Crary et al., 2012).

Clearance of pharynx occurs during the deglutition process by removing matters that could be aspects if this fails to occur then it causes aspiration pneumonia in elderly patients (Ney et al., 2009). Oropharyngeal dysphagia is highly prevalent in elderly with pneumonia and it is an indicator of severity of the disease in older patients with pneumonia (Cabre et al., 2010). Bedside assessment of swallowing habits with food of varying consistency as dietary recommendation by video fluoroscopic swallowing study (Finestone and Greene-Finestone, 2003).

Denture use and dysphagia

Denture usage may reduce sensations in the oral cavity among elders. Improper denture usage may lead to changes in tongue movements, which in-turn cause swallowing difficulties. It may also result in dental caries, stomatodynia and dental sores (Yoshikawa et al., 2005). Laryngeal penetration is different between edentulous older people who are not wearing denture and edentulous older people (Yoshikawa et al., 2006). Using partial denture meets the dietary needs of elderly. It is important to maintain healthy nutritional status (Su et al., 2020).

Promises And Pitfalls

Over-management of dysphagia in elderly on the basis of false assumptions leads to unnecessary restrictions on nutritional intake, undermanagement of dysphagia in elderly leads to dehydration and pneumonia (McCullough and Gary, 2016).

3. DISCUSSION

Barozi et al., and leder S.B et al., have reinforced the fact that ageing causes reduction of muscle mass and the connective tissue which affects the deglutition process. Ageing is considered as the primary factor and has clinical significance of dysphagia in elderly patients (Barozi et al., 2000; Leder and Suiter, 2009). Laiarofes et al., and crary et al., state that dysphagia may lead to malnutrition problems among elderly people (Crary et al., 2012; Rofes et al., 2011). 25% to 75% patients with dysphagia may suffer from malnutrition and dehydration that are induced by decreased efficacy of deglutition choking, tracheobronchial aspiration is caused by reduced deglutition safety which in turn results in pneumonia in 50% of the patients was stated by Laiarofes et at., in his study (Rofes et al., 2011; Sarbeen et al., 2016).

Oropharyngeal dysphagia is considered to be highly prevalent among elderly with pneumonia and it acts as an indication in assessing the severity of the disease in older patients when pneumonia. To find the prevalence of oropharyngeal dysphagia and aspiration, Cabre used a water swallow test in elderly patients. It was found to be as high as 55%. This was accepted by Ney & Cabre (Cabre et al., 2010; Ney et al., 2009). Michael D turner el al., in his study stated that patients wearing complete dentures are associated with dry mouth problems that suffer from path & discomfort. They also suffer from difficulties in normal functions. Craving at corners of mouth, burning sensation of tongue, alteration in taste and also failure of denture retention (Turner and Ship, 2007). Minekayoshikawa et al., stated liquid swallowing functions in edentulous elderly patients are less effective when dentures are not worn (Yoshikawa et al., 2005). The five major tools which are employed to estimate and

qualify the swallowing dysfunction are barium radiography, fiberoptic endoscopic evaluation of swallowing, video fluoroscopic swallowing study (Finestone and Greene-Finestone, 2003; Logemann et al., 2002), upper endoscopy and esophageal manometry (Aslam and Vaezi, 2013). Dziewas in his study carried out the cortical representation of swallowing using MRI, PET, TMS, MEG and found bilateral involvement of sensorimotor area and insula (Wirth et al., 2016). Robbins observed that periventricular white matter changes (Harrita and Santhanam, 2019; Robbins et al., 1992). In the survey done by Palati et al. It has been found that 72 % elderly yearly visit a dentist (Palati et al., 2020). Knowledge about legal aspects of medical negligence is poor among dentists (Prasanna and Gheena, 2016; Uma et al., 2020). When specimens are transferred from operation theater to lab there must be an essential communication between surgeon and pathologists (Krishnan et al., 2018). Recording patient's cases using dental photographs may help in better understanding and treatment planning (Hannah et al., 2018). Molar incisor hypomineralisation is a developmental dental defect on permanent teeth (Sukumaran and Padavala, 2018). Evidence based dentistry uses current scientific evidence to guide decision making in dentistry (Ahad and Gheena, 2016). In the survey done by Manohar et al., 2019, it has been said that interns are more knowledgeable about gingival pigmentation (Manohar and Abilasha, 2019).

The limitations of the present review is that only the recent studies on this interesting and important subject have been included, the older studies have not been included. There are several previous researches which were done on different populations wherein the results may vary. The scope of the review can be expanded and a wide range of studies can be brought under, about deglutition and its problems in elderly. The study setting can also be focused as a particular region.

Future scope of this current review article is getting more acquainted with the issue of deglutition and its negative impact on the elderly, its cause and effects. This cognition is helpful for dentists in treating the elderly patients.

4. CONCLUSION

This review article gives us the current knowledge about deglutition, causes of dysfunction and types of dysphagia in elderly patients. The awareness of this topic will immensely help the doctors to suggest a more relevant medical treatment for elderly.

CONFLICT OF INTEREST

None Declared.

AUTHOR CONTRIBUTIONS

KandhalYazhini : Literature search, data collection, analysis, manuscript writing.

GifrinaJayaraj: Data verification, manuscript drafting.

YuvarajbabuK : Data verification, manuscript drafting.

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Table 1: Description of Included studies

Author	Year	Type Of Study	Key Points	Quality Assessment
Su et al (Su et al., 2020)	2020	Case controlled study	Using partial denture meets the dietary needs of elderly. It is important to maintain healthy nutritional status.	Level 3
Matsumoto et al (Matsumoto et al., 2020)	2020	Systematic review	Diabetes mellitus is the main cause of dry mouth syndrome.	Level 3
Stefanski et al (Stefanski et al., 2017)	2017	Expert opinion	Sjogren's syndrome and its treatments.	Level 3
KBlochawaik et al (Błochowiaket	2016	Randomised controlled trial	Dry mouth syndrome after age 65 & its	Level 2

al., 2016)			cause in 55 patients.	
wirth et al (Wirth et al., 2016)	2016	Expert opinion	Deglutition-process definition.	Level 5
Muhammalaslam et al (Aslam and Vaezi, 2013)	2013	Case controlled study	Signs & symptoms of dysphagia were discussed.	Level 3
crary et al(Crary et al., 2012)	2012	Systematic review	Dysphagia in elderly causes less intake of food which in turn causes malnutrition.	Level 3
Laiarofes et al (Rofes et al., 2011)	2011	Systematic review	25%-75% of patients with dysphagia suffer from malnutrition.	Level 3
Cabre et al (Cabre et al., 2010)	2010	Systematic review	Causes of aspiratory pneumonia in elderly patients.	Level 3
Teisman et al (Teismann et al., 2010)	2010	Systematic review	Adoptive cerebral changes in response to ageing and its effect in swallowing.	Level 3
Leder et al (Leder and Suiter, 2009)	2009	Systematic review	Causes of dysphagia & its effect in elderly.	Level 3
Matsuo et al (Matsuo and Palmer, 2009)	2009	Systematic review	Used water swallowing test to find the prevalence of oropharyngeal dysphagia & aspiration pneumonia.	Level 2
Michaeld Turner et al (Turner and Ship, 2007)l	2007	Systematic review	Causes & treatments for dry mouth are discussed.	Level 3
Minekayoshikawa et al (Yoshikawa et al., 2006)	2006	Case controlled study	Influence of aging & denture use on liquid swallowing in healthy dentulous &adentulous older people.	Level 3
Yoshikawa et al (Yoshikawa et al., 2005)	2005	Case controlled study	Malnutrition risk due to denture wearing.	Level 3

Millel M Finestone et al (Finestone and Greene- Finestone, 2003)	2003	Case series	Rehabilitation medicine, diagnosis of dysphagia & its nutritional management for stroke patients.	Level 4
Jeri A logemann et al (Logemann et al., 2002)	2002	Systematic review	Videofluoroscopic analysis of oropharyngeal swallowing in younger & older women.	Level 2
Barczi et al (Barczi et al., 2000)	2000	Systematic review	Physiological changes occurring due to ageing & its effect in dysphagia is discussed.	Level 3
Tsubota et al (Tsubota et al., 1999b)	1999	Systematic review	Cause of sjogren's syndrome was discussed.	Level 2