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SWALLOWING PATTERNS IN AGED POPULATION

1Rakshitha S, 2Dr Satish Kumaraswamy

1PG student , 2Professor and principal

1Dr MV Shetty college of speech and hearing ,

2Dr MV Shetty college of speech and hearing

CHAPTER 1

INTRODUCTION

The term “dysphagia” comes from the Greek root word “dys” which means difficulty or disordered”, and “phagia” meaning “to eat”.

Swallowing, sometimes called deglutition in scientific contexts, is the process in the human or animal body that allows a substance to pass from mouthto the pharynx and into the esophagus while shutting the epiglottis. Swallowing is an important part of eating and drinking. If the process fails and the material (such as food, drink, or medicine) goes through the trachea then choking or pulmonary aspiration can occur. In the human body the automatic temporary closing of the epiglottis is controlled by the swallowing reflex.

http://en.wikipedia.org/wiki/swallowing

The term swallowing refers to the entire act of deglutition from placement of the food in the mouth, manipulation of the food in the oral cavity, oral, pharyngeal and esophageal stages of swallow until food enters the stomach. Any difficulty in moving food from mouth to stomach is called dysphagia.

Miller in 1986 defined swallowing as “the semiautomatic motor action of the muscles of the respiratory and gastrointestinal tract that propels the food from oral cavity to the stomach”.

The global definition of dysphagia is “difficulty in swallowing”. This encompasses a person’s swallowing of his or her saliva, liquids, food of all consistencies and pills. Swallowing difficulties can

arise from mechanical problems of the swallowing mechanism, neurologic disorders, gastro-intestinal disorders or loss of organs due to surgery or trauma.

Infancy and childhood represent a time of unparalleled physical growth and cognitive development. In order for infants and children to reach their linear and neurological growth potential they must be able to reliably and safely consume sufficient energy and nutrients. Swallowing difficulties (dysphagia) in pediatric populations can have a detrimental effect on dietary intake and thus, growth and development.

It is imperative to accurately identify and appropriately manage dysphagia in pediatric populations. Let us look to an overview on embryology on swallowing mechanism, normal swallow and dysphagia in children, as well as common causes of childhood swallowing difficulties, populations at risk for pediatric dysphagia, i.e., infants and children with dysphagia.

Swallowing results not only in transporting food to the stomach, but also in clearing the mouth and pharyngeal secretions, mucous and regurgitated stomach contents. Thus, the function of swallowing is nutritive as well as protective of the lower airways. The management of swallowing and feeding problems in infants and children required individualized treatment plans. These plans must be developed with a clear understanding of normal oral motor development and the how the deficits observed in each child differ from normal development.

The act of swallowing is complex because respiration, swallowing and phonation all occur at one anatomic location that is the region of pharynx and larynx. Neuromuscular coordination for swallowing involves central nervous system, afferent sensory input, efferent motor response, the brainstem and the enteric nervous system. That is nothing but for successful normal swallowing it requires the coordination of 31 muscles, 6 cranial nerves and multiple levels of the central nervous system including the brain stem and cerebral cortex (Bosma, 1986). Thus, understanding the anatomy, embryology, physiology and normal development of this functional neuromuscular unit is of paramount importance to the proper diagnosis and treatment of feeding and swallowing disorders in children.

Swallowing difficulties can have a detrimental effect on pulmonary health and can also impact nutritional intake. It is estimated that swallowing difficulties occur in approximately 1% of children in the general population, though the incidence rate is much higher in some clinical populations.

Common instrumental assessment for children suspected of dysphagia includes video fluoroscopic swallow study and fiber optic endoscopic evaluation of swallow. Common management strategies include the use of thickened fluids for children with demonstrated aspiration of thin fluids.

Aspiration is a term referring to the passive entry of any food item into the trachea (e.g. during inhalation) although the word often is used to denote any entry of a bolus into the trachea in any manner.

Penetration refers to the active entry of any food item into the trachea (eg, during swallowing), although the term often is used to denote the entry of any bolus into the laryngeal vestibule. Disorders of swallowing may be categorized according to the swallowing phase affected. A number of dysphagic problems can be identified during each phase of deglutition.

Pocketing of food in the mouth, circum oral leakage, and early pharyngeal spill can occur with weakness and poor coordination of the lips, cheeks, and tongue. Weak posterior tongue can lead to abnormal tongue thrusting leading to oral-phase disorder. Aspiration of food or drink, especially during inhalation, can occur before pharyngeal swallowing due to premature pharyngeal spillage. Changes in mental status with cognitive deficits also may affect the initiation of swallowing, increasing the tendency to pocket food in the lateral sulci and leading to possible aspiration.

Impaired esophageal function can result in retention of food and liquid in the esophagus after swallowing. This retention may result from a mechanical obstruction, a motility disorder, or an impairment of the opening of the lower esophageal sphincter leading to esophageal- phase disorder. Achalasia can lead to reduced gastro esophageal junction relaxation or absent esophageal peristalsis.

Eating, swallowing and breathing are tightly coordinated. Swallowing is dominant to respiration in normal individuals.Breathing ceases briefly during swallowing, not only because of the physical closure of the airway by elevation of the soft palate and tilting of the epiglottis, but also of neural suppression of respiration in the brainstem. When drinking a liquid bolus, swallowing usually starts during the expiratory phase of breathing. The respiratory pause continues for 0.5 to 1.5 s during swallowing, and respiration usually resumes with expiration. This resumption is regarded as one of the mechanisms that prevent inhalation of food remaining in the pharynx after swallowing.When performing sequential swallows while drinking from a cup, respiration can resume with inspiration.

Eating solid food also alters the respiratory rhythm. The rhythm is perturbed with onset of mastication. Respiratory cycle duration decreases during mastication, but with swallowing.The “exhale – swallow – exhale” temporal relationship persists during eating. However, respiratory pauses are longer, often beginning substantially before swallow onset.

In older population, loss of teeth reduces masticatory performance. Chewing can be prolonged by missing teeth, and particle size of the triturated bolus becomes larger due to lower efficiency of mastication. Xerostomia hampers food processing, bolus formation and bolus transport during eating. Chemoradiation therapy for head-and-neck cancer often causes delayed swallow initiation, decreased pharyngeal transport, and ineffective laryngeal protection.

Dysfunction of the pharynx can produce impaired swallow initiation, ineffective bolus propulsion, and retention of a portion of the bolus in the pharynx after swallowing. Insufficient velopharyngeal closure may result in nasal regurgitation and reduce pharyngeal pressure in swallow, hampering transport through the UES. Weakness of tongue base retraction or the pharyngeal constrictor muscles can render inadequate

the force of pharyngeal propulsion, resulting in retention of all or part of the bolus in the pharynx (usually the valleculae and pyriform sinuses) after swallowing. Incomplete tilting of the epiglottus may obstruct bolus propulsion, especially with higher viscosity boluses, resulting in retention in the valleculae.

Impaired opening of the UES can cause partial or even total obstruction of the food way with retention in the piriform sinuses and hypopharynx, increasing risk of aspiration after the swallow. Insufficient UES opening can be caused by increased stiffness of the UES, as in fibrosis or inflammation, or failure to relax the sphincter musculature, as noted above. Weakness of the anterior suprahyoid muscles can impair opening of the UES, since these muscles normally pull the sphincter open during swallowing.

Esophageal dysfunction is common and is often asymptomatic. Esophageal motor disorders include conditions of either hyperactivity (e.g., esophageal spasm), hypo activity (e.g., weakness), or inccordination of the esophageal musculature. Either of these can lead to ineffective peristalsis with retention of material in the esophagus after swallowing. Retention can result in regurgitation of material from the esophagus back into the pharynx, with risk of aspirating the regurgitated material. Esophageal motor disorders are sometimes provoked by gastro esophageal reflux disease, and in some cases, can respond to treatment with proton pump inhibitors.

Kumaraswamy and Arya (2016) studied on swallowing pattern changes in normal geriatrics of age 60- 70 years. They assessed with help of checklist and observation. They found no difference in swallowing pattern of geriatrics.

Kumaraswamy and Neethu (2016) studied the cardio related problems and the people undergoing angioplasty in a day to day Indian scenario is taken deep rise and the swallowing problems. Three consistencies were taken. Bedside swallowing checklist used. They found no difference in swallowing patterns of post angioplasty patients.

It is important to note that total oral motor, sensory and behavioral management program as advocated in this interdisciplinary team focused approach is very different from a feeding therapy program. The two approaches may over lap and can be co-ordinate in some instances; however, the differences need to be understood. The primary goal of feeding therapy is oral feeding. Although feeding and oral motor treatment programs may include some of the same component, the contexts are different.

CHAPTER 2

REVIEW OF LITERATURE

Traditionally the normal swallow has been described as a series of four phases that relate to the passage of the bolus through specific anatomic structures. These phases are the oral preparatory, oral, pharyngeal and esophageal phase.

Swallowing results not only in transporting food to the stomach but also in clearing the mouth and pharynx of secretions, mucous and regurgitated stomach content. The act of swallowing is complex because respiration, swallowing and phonation all occur at one anatomic location -the region of the pharynx and larynx.

For the swallow to be normal, the anatomical structures of the upper aero digestive system must be intact and their function in sequence with each other must be appropriately timed. This requires the integrity of both the motor and sensory nervous system.

Murray and Carrau (2006)

Dysphagia is a commonly documented morbidity after stroke, but its reported frequencies are widely discrepant, ranging between 19% and 81%. One in 25 adults of United State approximately had the prevalence of swallowing difficulties annually (Bhattacharyya, 2014).

Dysphagia has been associated with an increased risk for pulmonary complications and increased risks of mortality. It can result in aspiration pneumonia, malnutrition, dehydration, decreased functioning of the pulmonary system, and inability to take medications orally. Decreased saliva production can also increase the likelihood of oral bacteria developing in the oral cavity and spreading to the rest of the body.

Emerging evidence is that early detection of dysphagia in patients with acute stroke reduces not only these complications but also reduces length of hospital stay and overall healthcare expenditures. An accurate estimate of the incidence of dysphagia and its increased risk for pulmonary consequences in the stroke population will be critical to guide the design of future research aiming to assess benefits of dysphagia interventions.

PHYSIOLOGY OF SWALLOWING

The process of swallowing liquids and food consist of four phases, the oral preparatory, oral, pharyngeal and the esophageal phase. The first two phases are entirely voluntary; the pharyngeal phase is both voluntary and involuntary. The esophageal phase is completely involuntary. The swallowing process for liquid and food consist of four phases:

ORAL PREPARATORY PHASE: This stage includes a transfer phase during which the tongue arranges the bolus and moves it posteriorly to a position where it can be chewed.

ORAL PHASE: The food bolus is transported via the action of the tongue and its interaction with the palate, teeth and cheeks.

PHARYNGEAL PHASE: Involves the complex interaction of the tongue, velopharynx and larynx. As the tongue elevates, velopharynx closure begins

ESOPHAGEAL PHASE: Moves the bolus through the esophagus and ends when food passes through the gastro esophageal junction. The first two phases are entirely voluntary with the pharyngeal phase both voluntary and involuntary.

Avedeson and Brodsky (1993)

Dysphagia Dysphasia is defined as a difficulty or abnormality in swallowing. And in adulthood it is predominantly an acquired condition and may result from a wide variety of etiologies. It can also result from changes associated with the effecting of normal aging.

A swallowing disorder, known as dysphagia, may occur as a result of various medical conditions. Dysphagia is defined as problems involving the oral cavity, pharynx, esophagus or gastro esophageal junction American Speech and Hearing Association, ASHA (2019)

Prevalence of Dysphagia

According to (Cheng, Chan and Wong, 2017) Dysphagia is a common complication after stroke, the prevalence of which ranges from 41% to 78%. The quality of life of individuals with dysphagia is often hampered by discomfort and anxiety during eating and by the need for special mealtime arrangements, which may hinder social interaction during mealtimes.

Dysphagia can occur at any age, but it's more common in adults. The causes of swallowing problems vary, and treatment depends on the cause. The reported signs 5 and symptoms of dysphagia are having pain while swallowing, being unable to swallow, having the sensation of food getting stuck in your throat or chest or behind your breastbone, drooling and poor oral management, regurgitation and backflow of food back up, having frequent heartburn, having food or stomach acid back up into your throat Unexpectedly losing weight, coughing or gagging when swallowing, having to cut food into smaller pieces or avoiding certain foods because of trouble swallowing.

Cerebral, cerebellar or brain stem strokes can impair swallowing physiology. Cerebral lesions can interrupt voluntary control of mastication and bolus transport during the oral phase. Cortical lesions involving the precentralgyrus may produce contra lateral impairment in facial, lip, and tongue motor control, and contra lateral compromise in pharyngeal peristalsis. Cerebral lesions causing impairments in cognitive function such as concentration or selective attention may also impair control of swallowing. Brain stem strokes are less common than cortical lesions but result in the largest swallowing compromise. Brain stem lesions can affect sensation of the mouth, tongue, and cheek, timing in the trigger of the pharyngeal swallow, laryngeal elevation, glottic closure, and cricopharyngeal relaxation.

Effects of stroke in the Cerebral Cortex

Patients with lesions in the left or right hemisphere of the cerebral cortex display differences in swallow function. Swallowing disorders characteristic of various areas within each hemisphere have not been well defined to date. Stroke within the anterior left hemisphere of the cerebral cortex can result in apraxia of swallow which can range from mild to severe and usually but not always, accompanies some degrees of oral swallow with no tongue motion in response to presentation of a block in the mouth or by mild to severe searching motions of the tongue prior to initiating the swallow.

In contrast to the left cortical stroke patients, the patient who has suffered a stroke in the right hemisphere usually exhibits mild oral transit delay when the pharyngeal swallow triggers in these patients, laryngeal elevation may be slightly delayed, contributing to aspiration before or as the pharyngeal swallow is triggering.

Effects of sub cortical stroke

Sub cortical lesions may affect motor as well as sensory pathways to and from the cortex. Sub cortical stroke usually results in mild delays in oral transit time, mild delay in triggering the pharyngeal swallow, and mild to moderate impairment in timing of the neuromuscular components of the pharyngeal swallow.

A small number of these patients exhibit aspiration before the swallow as a result of the pharyngeal swallowing delay. Effects of lesions in the lower brainstem (The medulla) Lesion in the lower brainstem (medullary region) generally results in significant swallowing abnormalities. Patient with unilateral medullary lesions typically exhibit functionally impaired triggering and neuromotor control of the pharyngeal swallow. Effects of high brainstem (Pontine) stroke Brainstem strokes can result from either large or small vessel disease and often produce oropharyngeal dysphagia because of involvement of brainstem tracts and nuclei involved in control of swallowing, especially the corticobulbar tracts, the nuclei tract solitaire, the nuclei ambigus in the medulla and the adjacent medullary i.e. “swallowing centers”.

Neurogenic Dysphagia and Aspiration

Aspiration, defined as material passing from the oropharynx into the larynx below the true vocal folds, may cause life-threatening pulmonary disease. Fever, bronchospasm, and atelectasis are associated with aspiration of small quantities, whereas hypotension, hypoxia, hypercarbia, and pulmonary edema are usually caused by large amounts of aspirated material. Most often, the right lower lobe of the lung shows scattered densities on a chest radiograph after aspiration. Large solid particles may lodge in the airway and cause asphyxia. Aspiration may cause such symptoms as cough, intermittent fever, tracheobronchitis, atelectasis, pneumonia, and empyema, but it often goes undetected in its early stages until medical complications arise. Silent aspiration is defined as aspiration that does not evoke clinical observation of adverse symptoms, such as coughing, choking, or immediate respiratory distress. Patients with a

tracheostomy tube are at high risk for aspiration.

Assessment of Dysphagia

Dysphagia should be screened as soon as possible after a stroke gets diagnosed. Speech-language pathologists (SLPs) with appropriate training and competence are involved in the diagnosis and management of oral and pharyngeal dysphagia. SLPs also recognize causes and signs/symptoms of esophageal dysphagia and make appropriate referrals for its diagnosis and management.

They are integral members of an interprofessional team. The SLP's specific role and level of involvement may vary for each clinician and across patients, work settings, and institutions. Dysphagia assessment is generally split into clinical examinations or instrumental identifications. Each approach provides differing data with variable accuracy, the incidence of dysphagia can fluctuate depending on which assessment is used.

Dysphagia after stroke is a major cause of morbidity related to respiratory complications and malnutrition. Hemorrhagic stroke is generally more devastating than ischemic strokes and therefore are more likely to cause dysphagia, but ischemic strokes have a several folds higher incidence. Brainstem strokes are more likely to result in dysphagia than hemispheric strokes, but hemispheric strokes are much more common.

Clinical screening methods

Healthcare Research and Quality had published “Evidence Report/Technology Assessment on Diagnosis and Treatment of Swallowing Disorders in stroke patients” in (1999). And have concluded that there are no screening tools developed to detect the accuracy of patients with dysphagia. Most of the screening test assess for two or more components which will be in the form of questionnaires or preliminary 14 examinations. A structured questionnaire with direct interview was reported to be beneficial to assess the impairment and measurements of neurological examination (Lin, and Chen, 2002).

Water swallowing test (WST)

Water swallowing test is use frequently to check aspiration and prevent pneumonia in clinical purpose (Osawa, 2013). In this test the amount of water and without interruption was adopted there were many variations in WST when they do observations of swallowing functions. Originally 3oz (90ml) of liquid was used in that also they find difficulty in swallowing as per observation and in elderly patients they modified into 3ml water swallowing test developed. As per western practice world from 10ml to 150ml are used. When volume of liquid changes, it differs the outcome are incorporate depending on the populations, as researcher advice ensure the safety.

Gugging Swallowing Screen (GUSS)

GUSS is a screening tool used to measure swallowing function in acute stroke related dysphagia, as patient with dysphagia aspirating liquids compared with semi solids (John and Berger 2015). GUSS is used to identify the silent aspiration of slight signs as drooling, delayed swallowing, voice changes (Trapl, 2007). GUSS can begin with three stages it contains semisolid trial, liquid swallowing trial, and solid swallowing trial. In semisolid swallowing trial distilled water and instant food thicker should mixing in 1/3 to ½ teaspoon and as same it followed by 5 more ½ teaspoon, in liquid swallowing trial of aqua bi of various amounts 3ml, 5ml, 10ml, 20ml, and 50ml. and finally in the solid swallowing trial a small piece of bread is used as a bolus. Every 10s this trial is repeated 5 times (Trapl, 2007). GUSS was find to have 100% sensitivity and 69% specificity at predicting aspiration risk (John and Berger, 2015). Swallowing Provocation Test (SPT) Swallowing provocation test (SPT) is less used as it involves in screening the bolus injection of 0.4 ml and 2.0 ml of water at supra-pharynx through a small nasal catheter 0.5mm to elicit involuntary swallow. Then recorded and visual observation of the laryngeal movement as well as water injection for the onset of swallowing and 15 measured with stopwatch. The SPT are classified as normal or abnormal on the basic of induction of the swallowing reflex after water injection. Cut-off points as time second will differentiate between normal and abnormal swallowing in dysphagia (Teramotot, 1999; Fukuchi 2000)

Bedside Clinical Examination

In clinical implementation the bedside dysphagia evaluation is used to described screening and assessment. The methods contain target specific function task to know abnormal in irregularities in speech and gag reflex and abnormal volitional cough, these methods may or may not contain water swallowing test to identify the voice changes and cough after swallow (Daniels 2000). To reduce the clinical validity compared to instrumental methods bedside evaluation methods is frequently used for usefulness of acceptable level (Warnecke, 2008) . As mentioned before, early detection of dysphagia may shorten recovery periods and improve patient health outcomes.

PHYSIOLOGY OF SWALLOWING IN ADULTS AND GERIATRICS

ORAL PREPARATORY PHASE

The oral preparatory and oral phase of swallowing are sometimes considered one phase of swallowing. Traditionally, they are divided. The oral preparatory stage includes a transfer phase during which the tongue arranges the bolus and moves it posteriorly to a position where it can be chewed. In the normal person, the transfer stage usually results in the food being placed in the region of the molar teeth. At this point, the reduction phase takes over and the food is chewed, grounded and mixed with saliva to form the bolus, which eventually will be swallowed.

ORALPHASE

The food bolus is transferred via the action of the tongue and its interaction with the palate, teeth and cheeks. Contact of the back of the tongue with the soft palate retains the bolus in the oral cavity, preventing early spillage into the pharynx.

PHARYNGEALPHASE

the pharyngeal phase is dependent on the consistency of the bolus, the consistency of the bolus, the size of the bolus, and whether swallowing is a single event or continuous. The pharyngeal phase of swallowing involves the complex interaction of the tongue, velopharynx and larynx. As the tongue elevates, velopharyngeal closure begins.

ESOPHAGEALPHASE

Peristalsis, or sequential contraction of the esophagus and relaxation of lower esophageal sphincter characterizes the esophageal phase of swallowing. The process of peristalsis moves the bolus through the esophagus and ends when the food passes through the gastro esophageal junction.

Murray and Carrau(2006)

SWALLOWING MECHANISM IN GERIATRICS

Globally with aging, there is decreased striated muscle fiber sizewith muscle tone. In the tongue the changes are accompanied by an increase of fatty and connective tissue resulting in decreased strength and size. Decreased salivary production affects bolus formation and manipulation. These changes in the oral phase do not often lead to significant difficulties as

Patients are able to modify their food intake. Bolus control is affected by the normal aging process. As a result of these age related changes, there is decreased masticatory strength, reduced facial muscle strength with poor cup drinking, and reduced tongue strength and coordination. During the pharyngeal phase, age related changes have consequences compared with those of the oral phase. Primary peristalsis is often preserved, there is reduced secondary peristalsis causing decreased stripping of esophageal residue as well as increase in the frequency of tertiary peristalsis.

HOW AGING AFFECTS OUR SWALLOWING

Swallowing difficulty (dysphagia) is a common consequence of many medical conditions, including stroke, chronic disease that affects the nervous system and surgeries that affect the head and neck. But swallowing difficulty can also be associated with aging. Some changes that impact swallowing with aging may be obvious for example, missing teeth or shifting tooth positions that affect how we "prepare" food to be swallowed. Other changes may be less obvious, for example, missing teeth or tooth positions that affect how we "prepare" to be swallowed. Other changes may be less obvious, but can increase the effort required to swallow even interfere with our swallowing safely and effectiveness. These include reduced bulk and possibly sensitivity, in vocal cords that helps protect the airway. If the airway is not protected

completely or quickly during a swallow, material we swallow may enter our lungs, which is called "aspiration". One symptom of this would be coughing after a swallow, another might be a change in your voice after swallowing.. Some pneumonia or lung infections are related.

Reduced bulk and possibly strength, in the tongue and throat (pharynx). That constrict tightly from top to bottom during swallow to help move, or propel, food and liquids from the mouth into the esophagus. If their action is incomplete or ineffective, food may remain in the throat after the swallow and pose a threat to the airway. The top of the esophagus is a sphincter that must relax in order to open and allow food and liquid to enter with aging, the size of opening may decrease. If so, solid foods, pills or tablets, or even a large sip, may "get stuck", or be difficult to swallow. The throat (pharynx) is longer, and more dilated. The normal time for a single swallow, about one second in younger individuals, can be 20% or so longer in older people. This means that the airway has to be protected longer in order for a safe swallow to occur.

The changes noted here represent just a few of the issues associated with swallowing mechanics in the elderly. Other changes occur in our ab*ility* to smell, in how our brain functions, and even how we breathe, during a swallow. In addition, certain disease associated with dysphagia, eg: diabetes, osteoarthritis (especially affecting the spine) is common in elderly.

Often, we are able to accommodate these changes. We recognize them and assume they are typical of the aging process or we adapt to them so gradually that we aren't aware that were making compensations. And most importantly, we continue to swallow safely and effectively. But questions about, or change in, your swallowing ability should be addressed with a professional familiar with the swallowing process, such as physician or a speech language pathologist who specializes in swallowing problems. Some symptoms, for example, coughing or chocking during or after eating or drinking, or a feeling that food or a pill get stuck" somewhere may be an indication of a more serious problem and need to bring to your physician's attention right away.

For some swallowing problems, there are coping mechanisms strategies that can help prevent a small problem from becoming worse. Just taking good care of your teeth and maintaining good oral hygiene are excellent starting points. Chewing carefully and taking smaller bites may help food get into your esophagus. Tucking your chin down to your chest before swallowing can help protect your airway if you experience coughing during swallow.

STUDIES

Hirota, Konaka, Ono, Tamine, Kodi&Horo(2010) explained about Age-related Changes in Tongue Pressure during Swallowing. The results provided first quantitative evidence of the age-related changes in tongue movement during natural swallowing, which could be attributed to muscle weakening and morphological changes in the oropharynx.

Madhavan&Camaby (2012) investigated Dysphagia in the elderly: management and nutritional considerations. They found a strong relationship appears to exist between dysphagia and the negative health of malnutrition and pneumonia in patients following stroke, those with dementia, and also in community dwelling elderly adults. This trilogy of deficits, prominent among the elderly, demands more efforts focused on early identification and effective rehabilitation prevention. Addressing issues such as the most efficient and effective methods to identify dysphagia and malnutrition in high-risk patients and community dwelling elderly adults could result in reduced morbidity in elderly populations

Aslam&Vaezi (2013) investigated Dysphagia in the elderly and they found that dysphagia in the elderly is increasingly recognized as an important national healthcare concern with enormous cost. Aging may adversely affect all components of swallowing function, so the elderly are at increased risk for development of dysphagia, as illnesses affecting the swallowing mechanisms are more common in their population group. Therefore, physicians should inquire about dysphagia in their elderly patients and exert a heightened awareness of life-altering diagnoses and disease-guided therapy with the goal of improving patients' symptoms and quality of life.

Donini&Poggiogale (2013) reported about Anorexia and Eating Patterns in the Elderly. They found that in anorexic elderly subjects, the global food intake was reduced, and the eating pattern was characterized by the reduced consumption of certain food groups.

Chan & Kwan (2014) did a study on Feeding swallowing issues in older adults with dementia. The purpose of the study was to develop a set of intervention strategies using the cognitive behavioral approach to maximize oral feeding in elderly people with dementia who refuse food. And the concluded finding was Cognitive-behavioral strategies are viable for treating feeding-swallowing problems in patients with dementia.

Feldman & Chauncey (2015) studied on Aging and Mastication: Changes in Performance and in the Swallowing Threshold with Natural Dentition which included 863 subjects. And they finally concluded that the persistence of masticatory performance (fixed number of strokes per second) with age, and also indicate an age-related and dentition-related increase in the effort expended by the subject to prepare the test food for swallowing. Seo& Lee (2015) explained Influence of the Chin-Down and Chin-Tuck Maneuver on the Swallowing Kinematics of Healthy Adults. And the result was the chin-down posture has no remarkable effect. Except on horizontal epiglottis movement. In contrast, the exact chin-tuck posture represents distinct kinematics from the neutral and chmen postures, and facilitates airway protection and enhances tongue base retraction, but has the possibility of reducing the UES opening.

Sachdeva, Gupta & Sharma (2015), studied about dysphagia major problem in locally advanced head and neck cancer patients evaluating impact of dysphasia on quality of life using a designed questionnaire as assessing material and FEES helped in detection of silent aspiration in early stage and reduced aspiration related morbidity. It was reported that the swallowing exercise was continued after first week of chemo- radiation till six months had helped to improvement in swallowing function and quality of

life.

Hong &Yoo, (2017), studied about the stroke patients with dysphagia comparing the swallowing function and quality of life in two groups between oral intake and non- oral intake. The evaluation of swallowing functions done with the use of Swallowing Function Test and Quality of Life (SWAL-QOL) questionnaire the items were significantly different in SFT except for respiratory items between the groups, there were significantly different in all items on (SWAL-QOL) except in sleep items between the groups. Oral intake treatments during dysphagia rehabilitation have a positive effect on the patient swallowing and quality of life.

Krishnan, Goswami (2018) studied on Dysphagia research in India; A status report and concluded that research on dysphagia is still in its early- growing stages with a very gradual rise in the number of published reports these are also available on google scholar and pub med.

Triggs (2019) researched on the Recent advances in dysphagia management and summarized that endoscopic ultrasound and the use of endoscopic mucosal dissection technique to obtain deep muscle biopsies may assume a more prominent role if eosinophils are truly involved in esophageal dysmotality beyond EoE.

Sarve, Krishnamurthy &Balasubramanium (2021) conducted a study on timed water test of swallowing, reliability, validity and normative data from Indian population concluded that the norms used in this study can be used as screening tool for identifying swallow dysfunction in clinical population.

NEED FOR THE STUDY

From the above review of literature it is understood that there may be physiological changes in swallow due to aging. Swallowing changes are threat as it is an essential part of livelihood. The age related problem and the swallowing changes due to that are not been focused or reported in an Indian scenario. So the present study is first kind that reports swallowing patterns in aged population.

CHAPTER 3

METHOD

AIM

The aim of the present study was to report the swallowing patterns in Typicalaged population. Different aspects of clinical bedside swallowing assessment were evaluated in the current study. To do this, data was collected using a checklist of Clinical Bedside Swallowing Assessment.

Checklist for identifying swallow pattern in aged population was prepared and the same was validated by 5 Speech Language Pathologist. The modifications suggested by them were included in APPENDIX A. The checklist has three sections of 55 items.

PARTICIPANTS

Fifty typical aged Population in the age range of 50-60 years from Karnataka formed the subject of the study. All participants were native speakers of Kannada .Participants with no physical and psychological illness. Participants with neurological, psychological, speech, language and hearing impairment and age related dementia was excluded from the study.

Procedure:

A quiet sound treated room was selected for recording purposes. Participants were made to sit comfortably on a chair. A clear observation of swallowing was done in different consistencies like liquid, semisolid and solid. Clinical bedside swallowing assessment checklist was circulated among care takers of each individual participant.

The checklist consisted of three subsections:

a) OBSERVATIONS: Patient Status and Abilities
b) REPORTS: By patient, family or staff
c) NOURISHMENT INTAKE STATUS: Different consistencies of liquid semisolid and solid consistency were given.
   Liquid Consistency: Clear water
   Semi solid Consistency: Oats Ganji
   Solid Consistency: Idly

ANALYSIS

Scoring was done for the checklist given.

1 point was given for the task they were able to do.

0 point was given for the task which they don't have any problem.

The following signs and symptoms of swallowing was observed during the intake of consistencies.

Having pain while swallowing (odynophagia)

Being unable to swallow

Having the sensation of food getting stuck in your throat or chest or behind your breastbone (sternum)

Drooling

Being hoarse

Brining food back up (regurgitation)

Having frequent heartburn

Having food or stomach acid back up into your throat

Coughing or gagging when swallowing

Having to cut food into smaller pieces or avoiding certain food because of trouble swallowing.

A. **OBSERVATIONS: Patient Status and Abilities**

CONSISTENCY: LIQUID CONSISTENCY

Table 4.1 showing the percentage value of status and abilities of subject in liquid consistency.

	TOTAL	
	No. of subjects	%
Is able to independently feed him/ her?	50	100.0%
Is able to ambulate independently?	50	100.0%
Is on a mechanical ventilator? How long?	50	100.0%
Alert	50	100.0%
Cooperative	50	100.0%
Aware of difficulty	50	100.0%
Poor posture/ positioning	50	100.0%
Is able to consume at least ½ of the meal?	50	100.0%
Is able to brush teeth/ clean mouth himself?	50	100.0%
Lethargic	50	100.0%
Uncooperative	50	100.0%
Unaware of difficulty	50	100.0%
Others	50	100.0%

From the Table 4.1, it can be seen that all 50 subjects are able to feed independently and ambulate. They are not on mechanical ventilators, are alert and cooperative. All of them are aware that they do not have any difficulty with liquids; they have good posture/ positioning during the act of swallowing. Can get out of the bed without any help, are able to consume ½ of the meal, able to brush teeth's and mouth by their own. They are not lethargic and do not have any weakness. All of them are cooperative, aware that they don't have any difficulty and did not report any other signs or symptoms of swallowing problem. So when their total scoring is done on Observation they get a percentage of 100. This indicates that they don't have any problem with swallowing liquid consistency.

CONSISTENCY: SEMI SOLID CONSISTENCY

Table 4.2 Showing percentage score of status and abilities of 50 subjects in semisolid consistency.

	TOTAL	
	No. of subjects	%
Is able to independently feed him/her?	50	100.0%
Is able to ambulate independently?	50	100.0%
Is on a mechanical ventilator? How long?	50	100.0%
Alert	50	100.0%
Cooperative	50	100.0%
Aware of difficulty	50	100.0%
Poor posture/ positioning	50	100.0%
Is able to consume at least ½ of the meal?	50	100.0%
Is able to brush teeth/ clean mouth himself?	50	100.0%
Lethargic	50	100.0%
Uncooperative	50	100.0%
Unaware of difficulty	50	100.0%
Others	50	100.0%

From the Table 4.2, it can be seen that all the 50 subjects are able to feed independently and ambulate. They are not on mechanical ventilators, are alert and cooperative. All of them are aware that they do not have any difficulty with semisolid; they have good posture/ positioning during the act of swallowing. Can get out of the bed without any help, are able to consume ½ of the meal, able to brush teeth's and mouth by their own. They are not lethargic and do not have any weakness. All of them are cooperative, aware that they don't have any difficulty and did not report any other signs of symptoms of swallowing problem. So when their total scoring is done on observations they get a percentage of 100. This indicates that they don't have any problem with swallowing semisolid consistency.

CONSISTENCY: SOLID CONSISTENCY

Table 4.3 showing percentage score of status and abilities of 50 subjects in solid consistency

	TOTAL	
	No. of subjects	%
Is able to independently feed him/her?	50	100.0%
Is able to ambulate independently?	50	100.0%
Is on a mechanical ventilator? How long?	50	100.0%
Alert	50	100.0%
Cooperative	50	100.0%
Aware of difficulty	50	100.0%
Poor posture/ positioning	50	100.0%
Is able to consume at least ½ of the meal?	50	100.0%
Is able to brush teeth/ clean mouth himself?	50	100.0%
Lethargic	50	100.0%
Uncooperative	50	100.0%
Unaware of difficulty	50	100.0%
Others	50	100.0%

From the Table 4.4, it can be seen that all the 50 subjects are able to feed independently and ambulate. They are not on mechanical ventilators are alert and cooperative. All of them are aware that they do not have any difficulty with semisolid; they have good posture/ positioning during the act of swallowing. Can get out of the bed without any help, are able to consume ½ of the meal, able to brush teeth's and mouth by their own. They are not lethargic and do not have any weakness. All of them are cooperative, aware that they don't have any difficulty and did not report any other signs and symptoms of swallowing problem. So when their total scoring is font on observation they get a percentage of 100. This indicates that they don't have any problem with solid consistency.

A. REPORTS: By patient, Family or Staff

CONSISTENCY: LIQUID CONSISTENCY

Table 4.4 showing the percentage score regarding the patient's swallowing patterns and abilities while having liquids

	Could not perform	
	No. of subjects	%
Reports problem with liquids more than thicker foods	50	100.0%
Reports problem with thicker food more than liquids	50	100.0%
Reports problem with swallowing pills	50	100.0%
Reports feeling " lump" in the throat or pain with swallow	50	100.0%
Reports wet or gurgly voice after swallowing	50	100.0%
Reports increased phlegm or mucus after swallowing	50	100.0%
Reports pocketing or finding food in mouth after swallow	50	100.0%
Reports indigestion or burning near sternum	50	100.0%
Reports coughing or choking while eating/ drinking	50	100.0%
Reports runny nose after eating /liquid reflux through nose?	50	100.0%
Reports acidity or metallic taste in mouth upon waking	50	100.0%
Reports taking a long time to eat	50	100.0%
Reports throat clearing after swallow	50	100.0%
Reports dry mouth	50	100.0%

Table 4.4 gives a brief idea regarding, whether the person is having problem with liquids when compared to thicker food or thicker food are much difficult to swallow. Any problem with swallowing pills, feeling "lump", increased phlegm or mucous, wet or gurgly voice and pocketing of food after swallowing. Whether there is any ingestion or burning near the sternum, coughing or choking while having/ drinking, presence of reflex through nose. Presence of acidity or metallic taste in mouth when waking, reporting of long time to have food, throat clearing and dry mouth.

The total score obtained by individual persons are 100%, which means they do not have any problem with liquid consistency

CONSISTENCY: SEMISOLID CONSISTENCY

Table 4.5 showing the percentage score regarding the patient's swallowing pattern and abilities while having semisolids.

	Could not perform	
	No. of subjects	%
Reports problem with liquids more than thicker foods	50	100.0%
Reports problem with thicker food more than liquids	50	100.0%
Reports problem with swallowing pills	50	100.0%
Reports feeling " lump" in the throat or pain with swallow	50	100.0%
Reports wet or gurgly voice after swallowing	50	100.0%
Reports increased phlegm or mucus after swallowing	50	100.0%
Reports pocketing or finding food in mouth after swallow	50	100.0%
Reports indigestion or burning near sternum	50	100.0%
Reports coughing or choking while eating/ drinking	50	100.0%
Reports runny nose after eating /liquid reflux through nose?	50	100.0%
Reports acidity or metallic taste in mouth upon waking	50	100.0%
Reports taking a long time to eat	50	100.0%
Reports throat clearing after swallow	50	100.0%
Reports dry mouth	50	100.0%

Table 4.5 gives a brief idea regarding, whether the person is having problem with liquids when compared to thicker food or thicker food are much difficult to swallow. Any problem with swallowing pills, feeling "lump", increased phlegm or mucous, wet or gurgly voice and pocketing of food after swallowing. Whether there is any ingestion or burning near the sternum, coughing or choking while having/ drinking, presence of reflex through nose. Presence of acidity or metallic taste in mouth when waking, reporting of long time to have food, throat clearing and dry mouth.

The total score obtained by individual persons are 100%, which means they do not have any problem with semisolid consistency.

CONSISTENCY: SOLID CONSISTENCY

Table 4.6 showing the percentage score regarding the patient's swallowing pattern and abilities while having solids.

	Could not perform	
	No. of subjects	%
Reports problem with liquids more than thicker foods	50	100.0%
Reports problem with thicker food more than liquids	50	100.0%
Reports problem with swallowing pills	50	100.0%
Reports feeling " lump" in the throat or pain with swallow	50	100.0%
Reports wet or gurgly voice after swallowing	50	100.0%
Reports increased phlegm or mucus after swallowing	50	100.0%
Reports pocketing or finding food in mouth after swallow	50	100.0%
Reports indigestion or burning near sternum	50	100.0%
Reports coughing or choking while eating/ drinking	50	100.0%
Reports runny nose after eating /liquid reflux through nose?	50	100.0%
Reports acidity or metallic taste in mouth upon waking	50	100.0%
Reports taking a long time to eat	50	100.0%
Reports throat clearing after swallow	50	100.0%
Reports dry mouth	50	100.0%

Table 4.6 gives a brief idea regarding, whether the person is having problem with liquids when compared to thicker food or thicker food are much difficult to swallow. Any problem with swallowing pills, feeling "lump", increased phlegm or mucous, wet or gurgly voice and pocketing of food after swallowing. Whether there is any ingestion or burning near the sternum, coughing or choking while having/ drinking, presence of reflex through nose. Presence of acidity or metallic taste in mouth when waking, reporting of long time to have food, throat clearing and dry mouth.

The total score obtained by individual persons are 100%, which means they do not have any problem with any of the consistencies.

B. NOURISHMENT INTAKE STATUS

CONSISTENCY: LIQUID CONSISTENCY

Table 4.7 showing the percentage scoring of intake status for subjects in liquid consistency

	Total	
	No. of subjects	%
ORAL FEEDING (PO)	50	100.0%
Regular diet	50	100.0%
Thin liquids	50	100.0%
Mechanical soft	50	100.0%
Finely ground	50	100.0%
Chopped	50	100.0%
Solids	50	100.0%
NON ORAL FEEDING	50	100.0%
PEG	50	100.0%
Nasogastric Tube	50	100.0%
IV	50	100.0%
Others	50	100.0%
Caloric supplements	50	100.0%

Oral intake is there for liquids. They don't need extra thin liquids, mechanical soft, finely grounded or chopped food materials for swallowing. All of them are following the normal regular diets. They can have solids without any hesitation in the act of swallowing and they are not on the NON ORAL FEEDINGS like PEG (Percutaneous Endoscopic Gastrostomy), Nasogastric tube, IV and others.

Table 4.7 gives 100% scores for all the 50 participants which show their swallowing is normal in all the ways for liquids.

CONSISTENCY: SEMISOLID CONSISTENCY

Table 4.8 showing the percentage scoring of intake status for subjects in semisolid consistency

	Total	
	No. of subjects	%
ORAL FEEDING (PO)	50	100.0%
Regular diet	50	100.0%
Thin liquids	50	100.0%
Mechanical soft	50	100.0%
Finely ground	50	100.0%
Chopped	50	100.0%
Solids	50	100.0%
NON ORAL FEEDING	50	100.0%
PEG	50	100.0%
Nasogastric Tube	50	100.0%
IV	50	100.0%
Others	50	100.0%
Caloric supplements	50	100.0%

Oral intake is there for liquids. They don't need extra thin liquids, mechanical soft, finely grounded or chopped food materials for swallowing. All of them are following the normal regular diets. They can have solids without any hesitation in the act of swallowing and they are not on the NON ORAL FEEDINGS like PEG (Percutaneous Endoscopic Gastrostomy), nasogastric tube, IV and others.

Table 4.8 gives 100% scores for all the 50 participants which show their swallowing is normal in all the ways for semisolid.

CONSISTENCY: SOLID CONSISTENCY

Table 4.9 showing the percentage scoring of intake status for subjects in Solid consistency

	Total	
	No. of subjects	%
ORAL FEEDING (PO)	50	100.0%
Regular diet	50	100.0%
Thin liquids	50	100.0%
Mechanical soft	50	100.0%
Finely ground	50	100.0%
Chopped	50	100.0%
Solids	50	100.0%
NON ORAL FEEDING	50	100.0%
PEG	50	100.0%
Nasogastric Tube	50	100.0%
IV	50	100.0%
Others	50	100.0%
Caloric supplements	50	100.0%

Oral intake is there for liquids. They don't need extra thin liquids, mechanical soft, finely grounded or chopped food materials for swallowing. All of them are following the normal regular diets. They can have solids without any hesitation in the act of swallowing and they are not on the NON ORAL FEEDINGS like PEG (Percutaneous Endoscopic Gastrostomy), nasogastric tube, IV and others.

Table 4.9 gives 100% scores for all the 50 participants which show their swallowing is normal in all the ways.

DISCUSSION

The present study was aimed to find the swallowing pattern in typical aged populationin the age range of 50- 60 years. The swallowing was assessed with the help of checklist and observation. In the checklist it consisted mainly three sections, they are;

(a) Observations: patient status and abilities
(b) Reports: By patients, family or staff
(c) Nourishment intake status

This was checked in all three consistencies and the results showed 100% score, for Observations (patient status and abilities), reports (by patients, family or staff) and Nourishment intake status. This

indicates no problem in swallowing patterns either for liquid, semisolid or solid for the range of 50-69 for normal geriatrics.

The results of the present study shows significant contradiction with the studies which has done regarding the aged population swallowing. For example when compared with the study of Achem and Kenneth (2005) explained about "Dysphagia in aging", and they said that there will be difference in swallowing. But the result in present study does not agree with that, in all the three consistencies there is no difference.

CHAPTER 5

SUMMARY AND CONCLUSION

The present study aimed to find the swallowing patterns in typical aged population. Fifty typical geriatrics with no physical, neurological and hearing impairment.Participated in the present study CLINICAL BEDSIDE SWALLOWING ASSESSMENT checklist was used for the evaluation. It was administered for 10-15 minutes which was divided into three subsections for liquid, semisolid and solid consistencies. Other than checklist observation on swallowing pattern was done by giving three consistencies. Clear water was given to trail the semisolid consistency and idly was given for solid consistency.

Results shows that, the typical geriatrics within the age of 50-60 will not have any difference in their swallowing patterns. Both in Indian and Western scenario there are no much evidence to show the changes of swallowing patterns in normal geriatrics. So there should be much more effort in the field of geriatric swallowing.

Deglutition and the disorders followed are often neglected in the speech language pathology. From the past decades there is an increased incidence and prevalence of deglutition disorders, so a very drastically increased number of researchers and studies should be conducted to make a change in the field of swallowing.

LIMITATIONS OF THE STUDY

- Materials used for the study was less.
- Only small range category was taken.
- Cultural background was not considered.

FUTURE DIRECTIONS

- Video recording of the swallowing pattern can be done for better evaluation.
- Equal number of males and females can be considered for future evaluation.
- Number of participants can be increased for more accurate results.
- Tasks can be increased.
- Age range considerations can be increased.

REFERENCE

AikoOsawa , Shinichiro Maeshima& Norio Tanahashi (2013) Water-swallowing test: screening for aspiration in stroke patients. *Kargar International Journal*2013;35(3):276-81. doi: 10.1159/000348683. E pub 2013 Mar 26.

ArchanaRaiSarve, Rahul Krishnamurthy and Radish Kumar Balasubramanium(2021) The timed water test of swallowing: Reliability, validity, and normative data from Indian population. *International journal of health science.* v.15(2)

Aslam, M., Vaezi, F.M (2013) Dysphagia in the Elderly.*Gastroentrology&Hepatology.., The independent peer reviewed journal, 9(12), 784-795.*

Avedson, C.P., & Brodsky, L.(1993) Paediatric Swallowing and feeding, assessment and management. *Whurr Publishers,* U.K. P29-35

Bhattacharyya, N. (2014). The Prevalence of Dysphagia among Adults in the United States..*Otolaryngology-Head and Neck Surgery*,151(5),765–769.

Cheng, I., Chan, K., Wong, C., Li, L., Chiu, K., Cheung, R., &Yiu, E. (2017).Neuronavigated high-frequency repetitive transcranial magnetic stimulation for chronic post-stroke dysphagia: A randomized controlled study. *Journal of Rehabilitation Medicine*, 49(6), 475–481.

Daniels SK, McAdam CP, Brailey K, Foundas AL. Clinical assessment of swallowing and prediction of dysphagia severity. *American Journal of Speech-Language Pathology* 1997;6:17-24.

Donini, M.L., Poggiogall, E.(2013). Anorexia and Eating Patterns in the Elderly. *US national Library of Medicines National Institutes of Health PLOS J*, 8(5), e63539...

Gayathri Krishnan, SP Goswami (2018) Dysphagia research in India: A status report. *Journal of Indian Specch Language and Hearing Association* DOI: 10.4103/jisha.JISHA_44_17 Volume : 32, Issue : 2, Page : 39-46

Hong, D. G., &Yoo, D. H. (2017). A comparison of the swallowing function and quality of life by oral intake level in stroke patients with dysphagia.*Journal of Physical Therapy Science, 29(9), 1552–1554.*

Leigh, JH., Oh, BM., Seo, H.G Lee . *et al (2015).* Influence of the Chin-Down and Chin-Tuck Maneuver on the Swallowing Kinematics of Healthy Adults. *Dysphagia* **30,** 89–98 (2015). https://doi.org/10.1007/s00455-014-9580-3

John, J. S., & Berger, L. (2015).Using the gugging swallowing screen (GUSS) for dysphagia screening in acute stroke patients. *Journal of continuing education in nursing,* 46(3), 103-104

Joseph Triggs (2019) Recent advances in management of dysphagia. National Library of Medicine.Version 1. F1000Res. 2019; 8: F1000 Faculty Rev-1527.. doi: 10.12688/f1000research.18900.1

Kumar R, Gupta H, Anand A K, Sharma R, Sachdeva S,2015 Impact of early dysphagia. *Asian Journal of Oncology.*Volume 1, Issue 1.

Kumaraswamy.S & Kumar, A, J., (2014) Swallowing patterns in geriatrics, *An unpublished master's dissertation Mangalore university, Mangalore Karnataka.*

Kumaraswamy.S &Neethu.K.M., (2014).Swallowing patterns in Angioplasty Patients , *An unpublished master's dissertation Mangalore university, Mangalore Karnataka.*

Li-Chan Lin , Shiao-Chi Wu, HwaShen Chen, Tyng-Guy Wang&Miao-Yen Chen (2002) Prevalence of impaired swallowing in institutionalized older people in Taiwan *National Library of Medicine* 2002 Jun;50(6):1118-23. doi: 10.1046/j.1532-5415.2002.50270.x.

Madhavan, A., Canaby, D.G (2012) Dysphagia in the elderly Management and nutritional considerations. *Dove Medical Press Ltd*, 2012: 7, 287-298.

Murray, T., &Carrau, L.R (2006).Clinical Management of Swallowing Disorders. San Diego Oxford Brisbane*: Plural Publishing*, Inc.. P 19-25

Nobuko Hirota, KuniKonaka, Takahiro Ono, Kenichi Tamine, Jugo Kondo, Kazuhiro Hori(2010) Reduced tongue pressure against the hard palate on the paralyzed side during swallowing predicts Dysphagia in patients with acute stroke *National library of medicine Stroke*2010 Dec;41(12):2982-4.doi: 10.1161/STROKEAHA.110.594960. Epub 2010 Nov 11

Roberts, B.S., Rosenberg, I. (2006*)* Nutrition and Aging: Changes in the regulation of Energy Metabolism with Aging. *The American Physiological Society*, 86, 651-657.

Sami, A., Kenneth, R. (2005) Dysphagia in Aging. *Journal of Clinical Gastroenterology, 39, 357-371*

Singh, S. (2006).Dysphagia in stroke patients. *Postgraduate Medical Journal*, 82(968), 383–391.

Teramoto, S., Fukuchi, Y. (2000). Detection of aspiration and swallowing disorder in older stroke patients: simple swallowing provocation test versus water 74 swallowing test. *Arch.Phys.Med.Rehabil.*, 81(11), 1517-1519

Trapl, M., Enderle, P., Nowotny, M., Teuschl, Y., Matz, K., Dachenhausen, A., &Brainin, M. (2007). Dysphagia bedside screening for acute-stroke patients: the Gugging Swallowing Screen. *Stroke*, 38(11), 2948-2952.

Warnecke T, Teismann I, Meimann W, et al. Assessment of aspiration risk in acute ischaemic stroke--evaluation of the simple swallowing provocation test. *J NeurolNeurosurg Psychiatry 2008;79:312-314.*

Retrieved from:

http:// en.wikipedia.org/wiki/swallowing.

http://medical-dictionary.thefreedictionary.com/swalloing.

https:// samples.jbpub.cpm/

http:// swallowingdisorderfoundation.com/how-aging-affects-our-swallowing-ability/

https:// swallowingdisordersfoundation.com/how-aging-affects-our-swallowing-ability

https://www.asha.org/practice-portal/clinical-topics/adult-dysphagia/

https://medicalnewstoday.com/articles/177473.php

APPENDIX

A. Observation, Patient Status and Ability

Sl. No.	Questions	Yes	No
1.	Is able to independently feed him/her?		
2.	Is able to ambulate independently?		
3.	Is on a mechanical ventilator? How long?		
4.	Alert		
5.	Cooperative		
6.	Aware of difficulty		
7.	Poor posture/ positioning		
8.	Is able to get out of bed?		
9.	Is able to consume at least ½ of meal?		
10.	Is able to brush teeth/ clean mouth himself?		
11.	Lethargic		
12.	Uncooperative		
13.	Unaware of difficulty		
14.	Others		

B. Reports by patient family or Caregiver

Sl. No.	Questions	Yes	No
1.	Reports problem with liquids more than thicker foods		
2.	Reports problem with thicker food more than liquids		
3.	Reports problem with swallowing pills		
4.	Reports feeling " lump" in the throat or pain with swallow		
5.	Reports wet or gurgly voice after swallowing		
6.	Reports increased phlegm or mucus after swallowing		
7.	Reports pocketing or finding food in mouth after swallow		
8.	Reports indigestion or burning near sternum		
9.	Reports coughing or choking while eating/ drinking		
10.	Reports runny nose after eating /liquid reflux through nose?		
11.	Reports acidity or metallic taste in mouth upon waking		
12.	Reports taking a long time to eat		
13.	Reports throat clearing after swallow		
14.	Reports dry mouth		

C. Nourishment Intake Status

Sl. No.	Questions	Yes	No
1.	ORAL FEEDING (PO)		
2.	Regular diet		
3.	Thin liquids		
4.	Mechanical soft		
5.	Finely ground		
6.	Chopped		
7.	Solids		
8.	NON ORAL FEEDING		
9.	PEG		
10.	Nasogastric Tube		
11.	IV		
12.	Others		
13.	Caloric supplements		