



ORIGINAL ARTICLE

## Neck auscultation using acoustic analysis to determine the time and the sounds of swallowing mechanics



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### KEYWORDS

Acoustics;  
Dysphagia;  
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Physiology;  
Software;  
Speech therapy;  
Swallowing

### Abstract

**Introduction:** Although neck auscultation is a subjective diagnostic method that can identify the sounds and mechanical disruptions of swallowing, the acoustic analysis provides greater objectivity as it makes these sounds visible and the physiology of swallowing can clearly be seen.

**Objective:** To determine the time and the sounds of swallowing in people 20–50 years of age in the city of Bucaramanga, Colombia.

**Materials and methods:** A quantitative descriptive study that included the swallowing process of 306 participants. These were recorded by acoustic analysis using a computer application and neck auscultation to determine the sounds and time whilst food passed from the mouth to the esophagus.

**Results:** Of the 306 participants, 50.9% were between 20 and 31 years, and 57.5% were women between 20 and 50 years. The mean swallowing time in this study was .387 s (compared to a mean of .5 s in studies in other countries), with 16.3% taking between 0225 and 0281 s.

**Conclusions:** Identifying the sounds of swallowing using acoustic analysis improves the therapeutic processes performed by audiologists in patients with dysphagia.

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### PALABRAS CLAVE

Acústica;  
Disfagia;  
Intervención;  
Fisiología;  
Software;

### Auscultación cervical a través del análisis acústico para determinar el tiempo y los sonidos de la mecánica deglutoria

### Resumen

**Introducción:** La auscultación cervical es un método subjetivo para el diagnóstico que permite identificar los sonidos y las rupturas de la mecánica deglutoria, pero

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## Fonoaudiología; Deglución

el análisis acústico brinda mayor objetividad, dado que hace visibles estos sonidos y permite apreciar con mayor claridad la fisiología de la deglución.

*Objetivo:* Determinar el tiempo y los sonidos propios de la deglución en personas de 20 a 50 años de edad de la ciudad de Bucaramanga.

*Materiales y métodos:* Se realizó un estudio descriptivo cuantitativo en donde se grabó el proceso deglutorio de 306 participantes a través de un software de análisis acústico y la auscultación cervical para determinar los sonidos y el tiempo que tarda el alimento en pasar de la boca al esófago.

*Resultados:* De los 306 participantes, el 57.5% son mujeres de entre 20 y 50 años, el 50.9% están entre los 20 y 31 años y el 16.3% tarda entre 0.225-0.281 segundos en deglutir, siendo el promedio deglutorio de 0.387 segundos según esta investigación. Investigaciones realizadas en otros países habrían determinado el promedio en 0.5 segundos.

*Conclusiones:* La identificación de los sonidos propios de la deglución a través del análisis acústico permite mejorar los procesos terapéuticos realizados por los fonoaudiólogos en pacientes con disfagia.

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## Introduction

Within the broad phonoaudiological to do one of the areas of research and management is swallowing disorders and derivatives such as "dysphagia as a disease that affects the daily lives of sufferers, patients should be constantly aware of how to swallow, moving from one to another that is unconscious conscious process. We can say that swallowing starts from lips to stomach, dysphagia can result from abnormalities in swallowing occurred anywhere in the path." (Queiroz Merchesan, 2002). This path is known as phases of swallowing distributed as follows: preparatory phase which includes chewing and mixing with saliva of the bolus; oral phase during which the bolus preparation in the mouth is transported to the pharynx; pharyngeal phase in which the bolus goes into the esophagus without aspiration of material into the airway and esophageal bolus transport phase through the esophagus to the stomach (Llorente, 2012) occurs.

Swallowing disorders anatomically divided into two types: oropharyngeal dysphagia and esophageal dysphagia. A variety of pathologies dysphagia may occur in each of the phases. Patients with oropharyngeal dysphagia usually referred difficulty initiating swallowing or handling food in the mouth and more difficult to handle liquids. Other associated symptoms like regurgitation to the nose, coughing during or immediately after swallowing, changes in the quality of speech, etc., usually appears Greater difficulty in solid food intake (Jiménez, 2006) initially appears in esophageal dysphagia origin; professional speech therapy performed in the evaluation, diagnosis, treatment and follow-up oral pharyngeal function, which includes stages: preparatory, oral and pharyngeal swallowing, as indicated by the procedures manual for the practice of audiology MPPF-II (2001).

In the methods of care for patients with impaired swallowing evaluation orofacial mechanical structural level, functional observation, instrumental evaluation (videofluorografía, ultrasound, manometry, endoscopy) objective techniques being performed; and subjective clinical evaluation techniques for swallowing. McKaig (2004) describes the

cervical auscultation as the process of listening to the sounds of swallowing using the instrument of amplification, which allows to determine the integrity of protection mechanisms of the airway and the sounds associated with swallowing. It is a low-cost approach and noninvasive swallowing (Chinero & Murdoch, 1998) because it places a stethoscope on the skin in the region of the larynx to the lateral side of the thyroid cartilage; to detect the sounds of swallowing and thus potentially determine the possibility of a compromised airway presence of dysphagia and the likelihood of aspiration.

The Auscultation Cervical been investigated since 1988 and more popularity since 1994. Research (Boor, Hielsecher, & Lucking, 2007; Chinero & Murdoch, 1998; Leslie et al., 2004; Logemann, 1988) claim that this evaluation can discriminate individuals with and without dysphagia and could indicate that part of the mechanism is altered. The Auscultation Cervical could successfully distinguish between subjects who aspire and those who do not (Barragan Fonseca, 2008).

Furkim (2008) reports that cervical auscultation is to determine the activation of mechanisms to protect lower airways and the time passes by bolus pharyngeal phase. The Fonoaudióloga Patricia Cedeno said that there are noises that occur sequentially, and could follow a change in the normal swallowing (Angel, Casas, & Suarez, 2001).

Therefore the objective of this research was to characterize the acoustic phenomena in normal Oropharyngeal swallowing through digital cervical auscultation, allowing time to obtain data and intensity of sounds "click" of swallowing.

## Materials and methods

A descriptive cross-sectional study on a quantitative approach was carried out. The study population were citizens of the city of Bucaramanga, Santander, Colombia, male and female between 20 and 50 years of chronological age, the scope of the study looked at people with various activities, without relevant socioeconomic backgrounds to level of health. People who did not meet the age range, with

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