EFFECTIVENESS OF CHIN TUCK AGAINST RESISTANCE (CTAR)
IN POST STROKE OROPHARYNGEAL DYSPHAGIA: A META-
ANALYSIS STUDY

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Abstract
This study aims to examine the effectiveness of the chin tuck against resistance (CTAR)
approach in reducing aspiration and increasing oral intake in individuals with post-stroke
swallowing disorders. This study was a systematic review and meta-analytical design.
Electronic database in the form of PubMed is used to search related data. Three
experimental articles with a randomized controlled trial (RCT) design were included in this study.
Based on related results, it is known that CTAR has an effect on reducing aspiration rate (SMD = -1.03;
95% CI -1.72 -- -0.35) and it is known that CTAR has an effect on increasing oral intake (SMD =
0.82; 95% CI 0.03 - 1.61).

Keywords: CTAR, post-stroke dysphagia, speech therapist, aspiration, oral intake

INTRODUCTION
Oropharyngeal dysphagia is a condition in which there is difficulty moving the bolus from the
oral preparation phase to the esophageal phase. These difficulties can eventually lead to
complications such as aspiration and malnutrition and dehydration in patients with dysphagia.
According to Groher and Crary, (2016), a potential complication for patients with
oropharyngeal dysphagia is aspiration pneumonia. Treatment of aspiration pneumonia is
expensive, and this is associated with increased length of hospital stay, greater disability at 3
and 6 months, and poorer nutritional status during hospitalization (Marik, 2001).

Dehydration is a frequent additional complication in patients who develop dysphagia
after stroke. Dehydration can lead to increased mental confusion and general organ system
failure, both of which lead to greater decompensation of swallowing (Smithard et al., 1996). In
addition, dysphagia can lead to malnutrition, which adversely affects energy levels, and if
severe or chronic, compromises the immune system (Smithard et al., 1996).

The management of dysphagia is basically multidisciplinary in nature, in which the
speech therapist is a team that has an important role in improving the ability to swallow safely
and efficiently (Groher & Crary, 2016). One method that speech therapists can use is chin tuck
against resistance (CTAR). This method is basically another version of the head-lift exercise
(HLE) or commonly known as the Shaker exercise.

The researchers explained that this method basically aims to increase the muscles
involved in laryngeal elevation, which in turn can increase the opening of the upper esophageal
sphincter and impact on decreased aspiration. Previous studies have shown that this method is
effective in reducing aspiration and helping to open the upper esophageal sphincter in patients with dysphagia after stroke. (Park et al., 2017; Logemann et al., 2009; Yoshida et al., 2007).

Referring to existing explanations, this study aims to provide evidence-based best practice regarding the effectiveness of CTAR in reducing aspiration and increasing oral intake in post-stroke dysphagia patients.

METHOD

Study Selection
The PubMed database was used to identify articles related to the effectiveness of CTAR in post-stroke patients. The keywords used to identify the articles in this study were CTAR, dysphagia, stroke. Inclusion criteria in this study consisted of articles published from 2012 to 2023 research articles, open access, and RCTs.

Identifying Study Statistics and Calculating Effect Sizes
Sample size, mean, and standard deviation in the post-intervention CTAR group and the control group were needed to identify SMD in each study. The analysis model used is a fixed effect if all research results are not heterogeneous. Data analysis in research uses Revman 5.4

RESULT

Database Search and Eligible Studies
Referring to the inclusion criteria, through the PubMed database, 12 articles were found, 5 of the 12 articles had something in common, which then became 5 articles. 2 out of 5 articles did not meet the RCT criteria so both were excluded.

Study Description
Referring to the three articles involved in this study, it was explained that all participants were stroke patients, both hemorrhagic and ischemic. The mean patient age of the three articles ranged from 58.43 years to 63.5 years. In an effort to determine the effect of the CTAR on swallowing ability, the three studies used similar measurement instruments, namely the penetration-aspiration scale (PAS) to assess the severity of aspiration, and the functional oral intake scale (FOIS) to assess oral intake in patients with dysphagia.
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<td>Control group</td>
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**Figure 1. Study Selection Chart**
Statistical Data Synthesis

Effects of CTAR on Decreased Aspiration
Based on the analysis results, it is known that CTAR has an effect in reducing the aspiration rate (SMD = -1.03; 95% CI -1.72 – -0.35). Based on the heterogeneity test, it was found that the three studies included in this meta-analysis had high heterogeneity (p > 0.08; I² 60%).

![Forest plot of CTAR effect for aspiration](image1)

**Figure 2.** Forest plot of CTAR effect for aspiration

![Funnel plot of CTAR effect for aspiration](image2)

**Figure 3.** Funnel plot of the CTAR effect for aspiration
**Effects of CTAR on Oral Intake**

Based on the analysis results, it is known that CTAR has an effect on increasing oral intake (SMD = 0.82; 95% CI 0.03 – 1.61). Based on the heterogeneity test, it was found that the three studies included in this meta-analysis had high heterogeneity (p > 0.11; I² 61%).

![Figure 4. Forest plot of CTAR effect for oral intake](image)

![Figure 5. Funnel plot of CTAR effects for oral intake](image)
DISCUSSION
This meta-analysis study shows how the effect of CTAR in post-stroke dysphagia patients is in reducing aspiration and increasing oral intake. In its measurement, penetration-aspiration scale (PAS) is used to assess the severity of aspiration, and functional oral intake scale (FOIS) to assess oral intake in patients. It was found that CTAR had an effect on reducing the aspiration rate (SMD = -1.03; 95% CI -1.72 − 0.33) and showed that CTAR had an effect on increasing oral intake (SMD = 0.82; 95% CI 0.03 − 1.61). Park et al (2018) reported that CTAR training reduced aspiration in patients with post-stroke dysphagia, explained by suprahyoid muscle endurance training via CTAR. Oh (2018) also reported an increase in the suprahyoid muscles as a result of resistance training of the swallowing muscles, which results in reduced aspiration rates.

CONCLUSION
This meta-analysis study aims to provide evidence-based best practice regarding the effectiveness of CTAR in reducing aspiration and increasing oral intake in post-stroke dysphagia patients. It was found that CTAR was effective in reducing aspiration and increasing oral intake in individuals with post-stroke swallowing disorders.

REFERENCES

