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Efficacy of Electrical Stimulation Intervention in Treating Adults with Dysphagia: A Systematic Review

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Recommended Citation

Cheng, Virginia N.; Dalton, Jenna N.; and Howrigan, Kathryn R., "Efficacy of Electrical Stimulation Intervention in Treating Adults with Dysphagia: A Systematic Review" (2019). *Communication Sciences and Disorders: Systematic Review Publications*. 9.

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Efficacy of electrical stimulation intervention in treating adults with dysphagia: A systematic review

Cheng, V.N., Dalton, J.N., & Howrigan, K.R.

Background

- Dysphagia is a term used for a swallowing disorder resulting from problems with the oral cavity, pharynx, esophagus, or gastroesophageal junction.
- Effects of dysphagia can have significant impacts on an individual's quality of life and result in medical complications such as malnutrition, dehydration, aspiration pneumonia, and even death.
- Traditional dysphagia treatment (TDT) for adults currently consists of diet modification, compensatory strategies involving postural adjustments, and swallowing exercises to strengthen musculature.
- Electrical stimulation (ES) is relatively new as a dysphagia treatment approach, but has been used in rehabilitative medicine to prevent atrophy, stimulate striated muscle, and aid in muscle strengthening.

Objective

To determine whether ES improves swallowing function in adults with dysphagia

Methods

Systematic Review Protocol

- Sources: 4 indexed databases (Ovid MEDLINE; PubMed; PsycINFO; Google Scholar) & reference lists
- Search restrictions: Peer-reviewed and published articles in English
- Search terms: Combination of subject headings & keywords – dysphagia; deglutition disorders; swallowing disorders; oral/pharyngeal dysfunction; oropharyngeal dysfunction; oropharyngeal dysphagia; pharyngeal dysphagia; electrical stimulation; e-stim; VitalStim; neuromuscular electrical stimulation

Inclusion criteria

- Individuals age 18 and older
- Diagnosis of any type of dysphagia
- Dysphagia resulting from any etiology
- Electrical stimulation independent of other dysphagia treatment OR electrical stimulation used in conjunction with TDT

Exclusion criteria

- Individuals with tracheostomies
- Individuals with enteral feeding
- Individuals who are NPO (nothing by mouth)

Data Assessment, Extraction & Synthesis

- Quality assessment method: 3 appraisers rated the quality of studies independently and as a group based on nine criteria
- Data extraction: 3 appraisers read articles and extracted data independently; inclusion of data in final chart discussed as a group
- Consensus: data and quality assessments discussed as a group; consensus on differences reached through discussion

Selected References

- Blumenfeld, L., Hahn, Y., LePage, A., Leonard, R., & Belafsky, P.C. (2006). Transcutaneous electrical stimulation versus traditional dysphagia therapy: a nonconcurrent cohort study. *Otolaryngology – Head and Neck Surgery*, 135(5), 754-757. doi: 10.1016/j.otohns.2006.04.016
- Li, L., Li, Y., Huang, R., Yin, J., Shen, Y., & Shi, J. (2015). The value of adding transcutaneous neuromuscular electrical stimulation (VitalStim) to traditional therapy for post-stroke dysphagia: a randomized controlled trial. *European Journal of Physical and Rehabilitation Medicine*, 51(1), 71-78.
- Permsirivanich, W., Tipchatyotin, S., Wongchai, M., Leelamanit, V., Setthawatcharawanich, S., Sathirapanya, P., ... Boonmeeprakob, A. (2009). Comparing the effects of rehabilitation swallowing therapy vs. neuromuscular electrical stimulation therapy among stroke patients with persistent pharyngeal dysphagia: a randomized controlled study. *Journal of the Medical Association of Thailand*, 92(2), 259-265.

Results

Figure 1: Flow chart of included studies

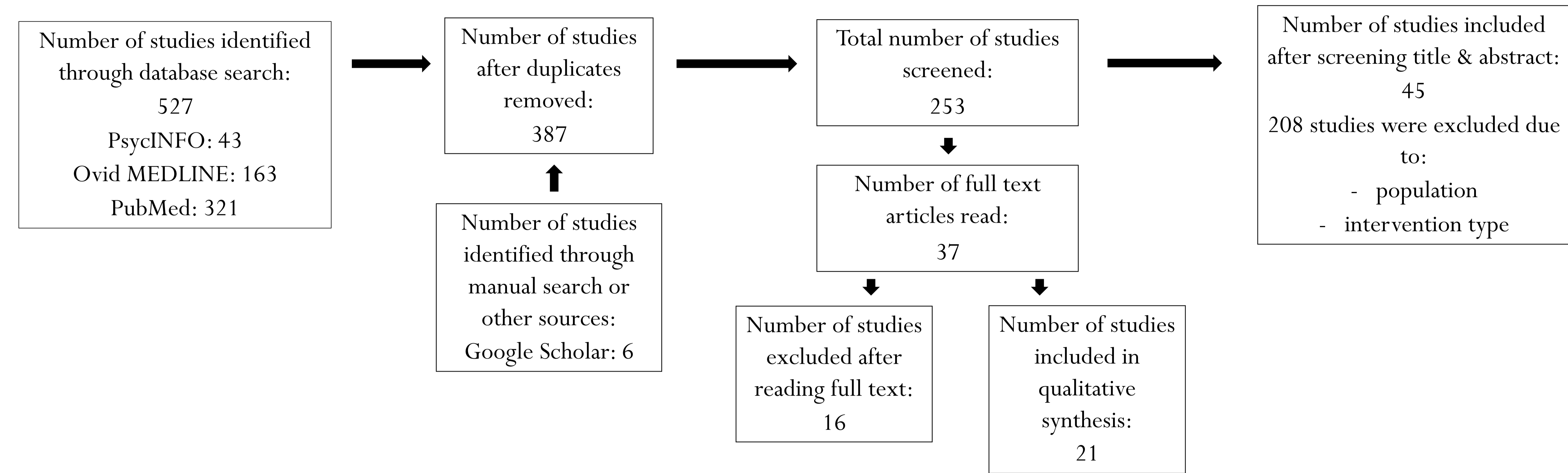


Table 1: Clinical Features of Studies

Study	Design type	Quality Assessment	Diagnosis	Population	Intervention/ Comparison	Outcome(s)	Measurement	Statistical Significance
Li (2015), China	Control study	8 out of 9 criteria met High	CVA	Mean age: 66.2 69 males, 66 females 45:45:45	1 – TDT 2 – VS 3 – VS with TDT	Changes in swallowing function	1 – sEMG 2 – SSA 3 – VFSS 4 – VAS	p < 0.001 Significant changes only for VS + TDT group
Lin (2011), Taiwan	Randomized control study	5 out of 9 criteria met Moderate	Nasopharyngeal carcinoma	Mean age: 54.2 6 males, 4 females 5:5	1 – FES 2 – HRP	Changes in swallowing function and self-perceived of quality of life	1 – VFSS 2 – PAS 3 – DOSS 4 – MDADI	p = 0.003 Significant changes for MDADI
Permsirivanich (2009), Thailand	Control study	5 out of 9 criteria met Moderate	Pharyngeal dysphagia	Mean age: 64.6 9 males, 14 females 12:11	1 – NMES 2 – TDT	Number of treatment sessions to achieve FOIS level 7	1 – FOIS 2 – Number of treatment sessions	p < 0.001 Significant changes for FOIS
Restivo (2013), Italy	Pilot study	6 out of 9 criteria met Moderate	Multiple sclerosis	Mean age: 39.7 7 males, 13 females 10:10	1 – ES 2 – Sham treatment	Difference between pre- and post-treatment PAS scores	1 – VFSS 2 – PAS	p < 0.0001
Ryu (2008), Korea	Case control study	7 out of 9 criteria met High	Head and neck cancer	Mean age: 63 25 males, 1 female 14:12	1 – NMES with TDT 2 – Sham treatment with TDT	Difference between pre- and post-treatment measurement scores	1 – CDS 2 – FDS 3 – ASHA NOMS 4 – MDADI	NS p > 0.05

Notes: CVA = cerebrovascular accident; NMES = neuromuscular electrical stimulation; TDT = traditional dysphagia therapy; ES = electrical stimulation; VS = VitalStim; VAS = visual analog scale; VFSS = videofluoroscopic swallowing study; FOIS = functional oral intake scale; sEMG = surface electromyography; SSA = standardized swallowing assessment; PAS = penetration-aspiration scale; DOSS = dysphagia outcome and severity scale; MDADI = M.D. Anderson Dysphagia Inventory; CDS = clinical dysphagia scale; FDS = functional dysphagia scale; ASHA NOMS = American Speech-Language-Hearing Association National Outcome Measurement System

Conclusions

- The quality of the studies overall was moderate. Greater gains in improved swallow function may be made when ES is used in conjunction with TDT.
- Studies with statistically significant results reported only a minor improvement with ES over TDT.
- None of the studies reported negative outcomes related to ES intervention.

Recommendations

- Additional research is needed to determine overall efficacy of ES intervention as an evidence based intervention for adults with dysphagia resulting from various etiologies.
- Further research should include assessment of electrode placement, frequency and intensity levels, effect on swallow musculature, and post-treatment follow-up.