

Speech and Language Therapy interventions for dysarthria in Parkinson's Disease: An Updated systematic review

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Background: Parkinson's Disease (PD) is the second most common neurodegenerative disorder in the world. Also, Parkinson's Disease Collaborators emphasized that it has become the fastest growing neurological disorder in the world. About 90.0% of people with Parkinson's disease (PwPD) develop dysarthria following Parkinson disease. There are five systematic reviews have conducted to evaluate the effectiveness of Speech and Language Therapy intervention for Dysarthria in PD. A considerable number of Randomized Control Trials (RCTs) that were included in the two reviews published in 2012 were conducted before the introduction of CONSORT guideline in 1996. Numerically, two out of three RCTs of the first review and two out of six RCTs of the second review are conducted before the introduction of CONSORT guideline. In the third review published in 2015, electronic database search has only been performed in PubMed. The fourth study have only searched three electronic databases. Also, this systematic review of RCTs has included a non RCT which leads to a serious issue in the methodological quality of the systematic review. The second systematic review published in 2020 has searched six electronic databases. However, four of them were available in Chinese language only. Both reviews of 2020 had not included three recent related RCTs. Therefore, high possibilities of bias are concerned in systematic reviews published after 2012.

Objective(s): To systematically review and summarize the currently available Speech and Language Therapy interventions for dysarthria in Parkinson's disease.

Methods: This updated systematic review was conducted through adherence to Preferred Reporting Items for Systematic Reviews and Meta-Analysis protocol (PRISMA-P, 2015) with a PROSPERO registration number of CRD42020208936. Only RCTs were included that compare two types of SLT intervention or SLT intervention with placebo or no intervention. Patients with a proper diagnosis of Parkinson's disease were included in the review without any restrictions of age, severity, duration of post-diagnosis or drug therapy. Electronic databases of CINAHL, EBSCOhost, PubMed, Scopus, The Cochrane Library and Web of Science Core Collection were searched. Additionally, the search was performed in WHO International Clinical Trials Registry Platform (ICTRP) and ClinicalTrials.gov to identify the clinical trials. Eligible studies between 2011-2020 were included and the search was manually performed on the 23rd of December 2020 with no language restriction. Further, dissertations, theses and conference abstracts were manually searched to identify the available grey literature. Two reviewers independently performed the study selection process and data extraction from 20% of the articles. A narrative synthesis was performed with the extracted data. The modified Cochrane Collaboration's risk of bias tool (RoB-2) was utilized

to assess the quality of included studies. The overall quality of this systematic review was rated as moderate using the AMSTAR-2.

Results: A total of 1069 studies were identified through database searches and other sources. 438 duplicated studies were removed, and 631 studies were assessed during the title and abstract screening. 509 studies were excluded against the eligibility criteria and 122 studies were selected for full-text review. A total of six studies were included in quality assessments and narrative synthesis. LSVT LOUD is the most effective SLT intervention for dysarthria in Parkinson's disease. Both standardized LSVT and modified LSVT are effective in improving vocal sound pressure level, VHI score, CETI-M and other types of primary and secondary outcome measures. Further, effectiveness of LSVT LOUD does not depend on the mode of delivery (face-to-face or online).

Conclusion: LSVT LOUD appears to be the most effective SLT intervention for dysarthria in Parkinson's disease. However, evidence is scarce to generalize the effectiveness of SLT intervention for treating people with Parkinson's Disease due to the small sample size, possibility of biases and heterogeneity of included studies. RCTs with rigorous methodology are needed to draw a firm conclusion.

Keywords: *Parkinson's disease, Dysarthria, Speech and Language therapy, Intervention*