

Critical Review: Effect of Levodopa (L-dopa) medication on speech intelligibility and articulation in individuals with Idiopathic Parkinson's Disorder (IPD)

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This critical review examined the effects of Levodopa (L-dopa) medication on speech intelligibility and articulation

repeated. Four speech-language pathologists evaluated the video-recorded tapes. Each recording was presented once and 'off' and 'on' samples were presented auditorily in a randomized manner. The panel was instructed to rate the speech sample according to its variation in pitch, loudness, reading rate and comprehensibility. These aspects were scored using a ten-point scale with severely abnormal on the left end and normal on the right end of the scale. Statistical analyses were performed using a non-parametric test for paired groups between the 'off' and 'on' states. Again, reliability between the four raters was calculated using intraclass correlation of kappa. In accordance with previously mentioned articles, results revealed a significant improvement in comprehensibility during the 'on' state of L-dopa treatment ($X=0.1$; $p<0.5$).

Leanderson, Meyerson & Persson (1971) conducted an electromyography (EMG) study to examine the articulatory function of the labial musculature before and after L-dopa therapy. Seven individuals with IPD participated in this study. EMG activity was recorded from the labial musculature while the patients produced different vowel-consonant-vowel utterances. The muscles investigated included the orbicularis oris superior and inferior (lip rounding/closing muscles) and the levator and depressor labii (lip-opening/spreading muscles). Results indicated that six of the patients subjectively reported improvements in speech post L-dopa therapy. In two of the patients, improvements were corresponded by a normalization of the articulatory pattern from the EMG. One patient developed perioral hyperkinesias and thus evaluation of recordings was impossible. EMG traces showed that before medication there was an increased tonic activity in the muscles that presented as a high intensity background noise making articulatory movements hard to identify. Once medication had been administered, the background muscular activity both between and during utterances was reduced. Thus, articulation of speech was more easily identifiable.

Cahill et al., (1998) investigated labial movement disruption and measured interlabial pressure. Sixteen patients with mild-moderate IPD, all receiving stable doses of L-dopa participated in the study. A baseline measure of lip function was obtained in the 'off' condition for both speech and non-speech tasks. A bite block was used to help stabilize the jaw and ensure pressure being

Nakano, Zubrick & Tyler (1973), as well as Leanderson, Meyerson & Persson (1971) included participants who have undergone bilateral or unilateral thalamotomies prior to the study. It is possible that such surgeries can interfere with overall findings and conclusions. Additionally, both studies were conducted on participants that were first time users of L-dopa medication. As a result, findings are not generalizable to IPD patients that are regular, on-going L-dopa users. Lastly, De Letter et al. (2007b) included twenty-five participants with “probable” IPD. Such wording leads one to question the validity of IPD disorder in subjects recruited.

Methodologies

Although most studies reviewed reported significant improvement of intelligibility and articulation post L-dopa therapy, methodological concerns limit confidence in some of the findings. The sample size amongst the articles reviewed varied from seven to twenty-five participants. Studies failed to provide a power analysis, making it difficult to analyze the sufficiency of each sample size.

Four out of six articles reviewed, required rater judgments to be made (Nakano, Zubrick, & Tyler, 1973; De Letter et al., 2007a; De Letter et al., 2007b; De Letter, Santens, & Van Borsel, 2005). All samples were randomized for raters, increasing validity and reducing bias, however, with the exception of Nakano, Zubrick, & Tyler (1973), it was uncertain whether raters were blinded to the medication status of the participants. Furthermore, of these four articles, only two (De letter et al., 2007a; De Letter et al., 2007b) included inter-rater reliability computations. As a result, the reliability of rater judgments is a concern.

Poor descriptions of methods used (Leanderson, Meyerson, & Persson, 1971; Nakano, Zubrick, & Tyler, 1973) and insufficient tasks performed (Cahill et al., 1998; Leanderson, Meyerson, & Persson, 1971) by participants maresdln0 1cBctsthe sr.w

