



This data should however be interpreted with caution as there are a number of limitations to the study. Firstly, it was unclear as to how far in advance of the swallow assessment the drugs were administered or if this was controlled. Because the effects of levodopa dissipate over time, it is important to control for the effects of time since administration. This also does not allow future researchers to replicate the study. Secondly, there were no multiple baseline or treatment measures completed for a more reliable assessment of swallowing. To make this study more comprehensive, the researchers could have looked at all phases of the swallow and analyzed the qualitative observations in a quantitative manner. This could have been done with a number of raters evaluating the swallow along a standardized rating scale. There were also a number of limitations with the participants alone. There was no power calculation reported to determine the likelihood of a Type II error occurring with the data for 18 participants. Also, as the researchers started out with 20



Following this, the researchers increased the dose of levodopa to 4 patients and were asked to return for further MBS studies. Two participants were unable to tolerate the chronically higher dose of medication. They then performed a repeat MBS after a single higher dose with no change in swallowing. In the remaining two patients, only one showed some improvement (decreased vallecular residue and normalization of laryngeal elevation).

The greatest limitation of this study is the lack of statistical analysis. Although the researchers evaluated the swallow on a large number of observations, statistical analyses of the data would have made the results more valid. A 4-point rating scale might have been developed for the raters when evaluating the MBS studies. These data could then have been statistically analyzed for a more unbiased assessment at the results. Conversely, if the researcher wished to provide a more descriptive study, more in-depth explanations of the observations could have been made.

Although no statistics were analyzed for the observations of the swallow, the small sample size may also have affected the results of the study. Also, as mentioned in critiques of previous studies, patients with dysphagia were not specifically selected. This may have resulted in different findings.

A case study was performed by Fonda, Schwarz and Clinick (1995) to assess the effectiveness of taking levodopa one hour prior to meals on swallowing. The participant was a 72 year old male with PD (9 years post onset) and dysphagia (18 months post onset). He was on a minced diet and had lost 30 kilograms in the previous 18 months. The participant went through a biochemical screen, a chest x-ray, and a barium swallow with no abnormalities found. A MBS was then performed with liquids and solids and the swallow was assessed for total swallow time, laryngeal tremor, pooling (valleculae and pyriform), epiglottic movement, laryngeal penetration and aspiration. The MBS showed a lengthy swallowing time, vallecular pooling and aspiration of thin liquids. Following this, the participant was instructed to take his regular dose of levodopa one hour prior to meals. He was also given techniques to improve swallowing function and minimize the chance of aspiration.

The participant reported feeling his swallow had improved and the researchers confirmed this on a second MBS three weeks after instructions were given. Swallow time was reduced by 3.1 and 0.7 seconds for solids and liquids, respectively. Laryngeal tremors went from a rating of moderate/severe to mild. Laryngeal penetration of solids went from 80% to 0%. For liquids,

an improvement of 100% to 25% was noted. Aspiration of liquids went from a rating of mild to nil. Assessments of facial and oral tremors were done over this time period as well and a reduction in the tremors was found after day 4 and was presumed to also contribute to the improved swallow.

The participant was followed for 2 months and his weight had increase by 6 kilograms. A few weeks after this, the participant developed pneumonia and died. The researchers concluded that the altered levodopa regiment and „related therapy improved swallowing function.

This study did not provide valid evidence to support levodopa taken one hour prior to meals as an effective treatment for dysphagia in patients with PD. Although the patient reported improvements in swallowing and this was shown on a MBS study, the „related therapy may have been the cause of this. It is unclear what was meant by this therapy aside form the techniques given to the participant to reduce aspiration. It was further unclear if the participant used these techniques during the second MBS study.

Further limitations of the study are that there was only one participant, rating of the MBS studies was not explained, and repeated measures were not taken for more valid data. Also, although the researcher suggested their intervention improved swallowing function, the participant died of pneumonia (presumed to be aspiration pneumonia) therefore the changes noted in the MBS study may not have been indicative of overall performance.

### *Discussion*

The literature reviewed in this paper provides no conclusive evidence for the effectiveness of levodopa to improve the abnormal swallow of patients with Parkinson s disease. The majority of the articles reviewed present a set of limitations in this area of study that should be addressed in future research. The first of these limitations is the lack of repeated measures taken for more reliable data. One s swallows vary a great deal throughout a day or across days. A set of swallows within minutes may not be representative of the clients typical swallowing performance. A number of swallows over time would allow for a more accurate illustration of the patients swallowing function.

This, however, raises a further limitation in the assessment of swallowing. MBS studies are often used to gain a clear visual evaluation of swallowing function however the accompanied exposure to radiation is a

