

Voice onset time of Hungarian voiceless plosives in Multiple Sclerosis

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Introduction

Multiple sclerosis (MS) is an inflammatory disease of the central nervous system, and one of the most common neurodegenerative diseases. The multifocal lesions of the CNS lead to extremely various symptoms in sensory-, motor- and cognitive fields. Based on the course of the disease, 3 main subtypes can be identified in MS: relapsing remitting (RRMS), secondary progressive (SPMS), and primary progressive (PPMS). Its symptoms are quite various. Almost 2/3rd of the MS patients have some language or speech symptoms. Among these the most frequent ones are the following: dysarthria, word finding difficulties, deteriorating verbal fluency, problems in sentence repetition, limitations of the higher level language processes (Laakso et al. 2000), and reduced inclination for communication (Gerald et al. 1987).

Regarding the speech symptoms of MS patients, the most often examined areas are changes in speech and articulation rate. We have little data about the differences in the articulation between patients and controls. It remains a question whether there is a difference. According to the few researches on the topic, dysarthria is typical for a high proportion of MS patients, and it goes together with inaccurate articulation, decrease of comprehensibility of speech, and can go together with changes in VOT (Kisomi et al. 2020). We don't have any data about VOT especially not in languages where stops are unaspirated, like in Hungarian.

We supposed that dysarthria might affect VOT, because previous studies proved that the slower movements of the speech organs, the lesser change in air pressure, and the less accurate closure formation influence VOT. For example, the comparison of VOT of healthy Hungarian young and elderly speakers showed that VOTs of elderly speakers are significantly longer in case of [p, t], and significantly shorter in case of [k] than those of young adults (Bóna 2014). In this presentation, the effect of the disease on voiceless plosives is analysed using acoustic measurements.

The main question of this presentation is if there are differences in the VOT and VOT ratio between MS patients and controls.

Hypotheses:

1. The disease will affect the VOT and VOT ratio: MS patients will produce longer VOTs and higher VOT ratio in each voiceless plosive than controls.
2. Standard deviation will be higher in MS patients than in controls.

Methods

Subjects

- 10 MS patients and 10 age- and gender-matched control speakers participated in the analysis.
- Symptoms of the patients are quite various, and the severity of the disease was different. All of them were native Hungarian speakers with normal hearing.

Material

Speech recordings analysed in this study were parts of a longer session of recordings which consisted of more different types of tasks. Participants were asked to read aloud non-words in the same sentence. Voiceless plosives [p, t, k] occurred in (V)CV sequences before the vowels [i:, a:, u:]. Each consonants occurred 36 times in one recording, this means that 108 plosives from each speaker were analysed.

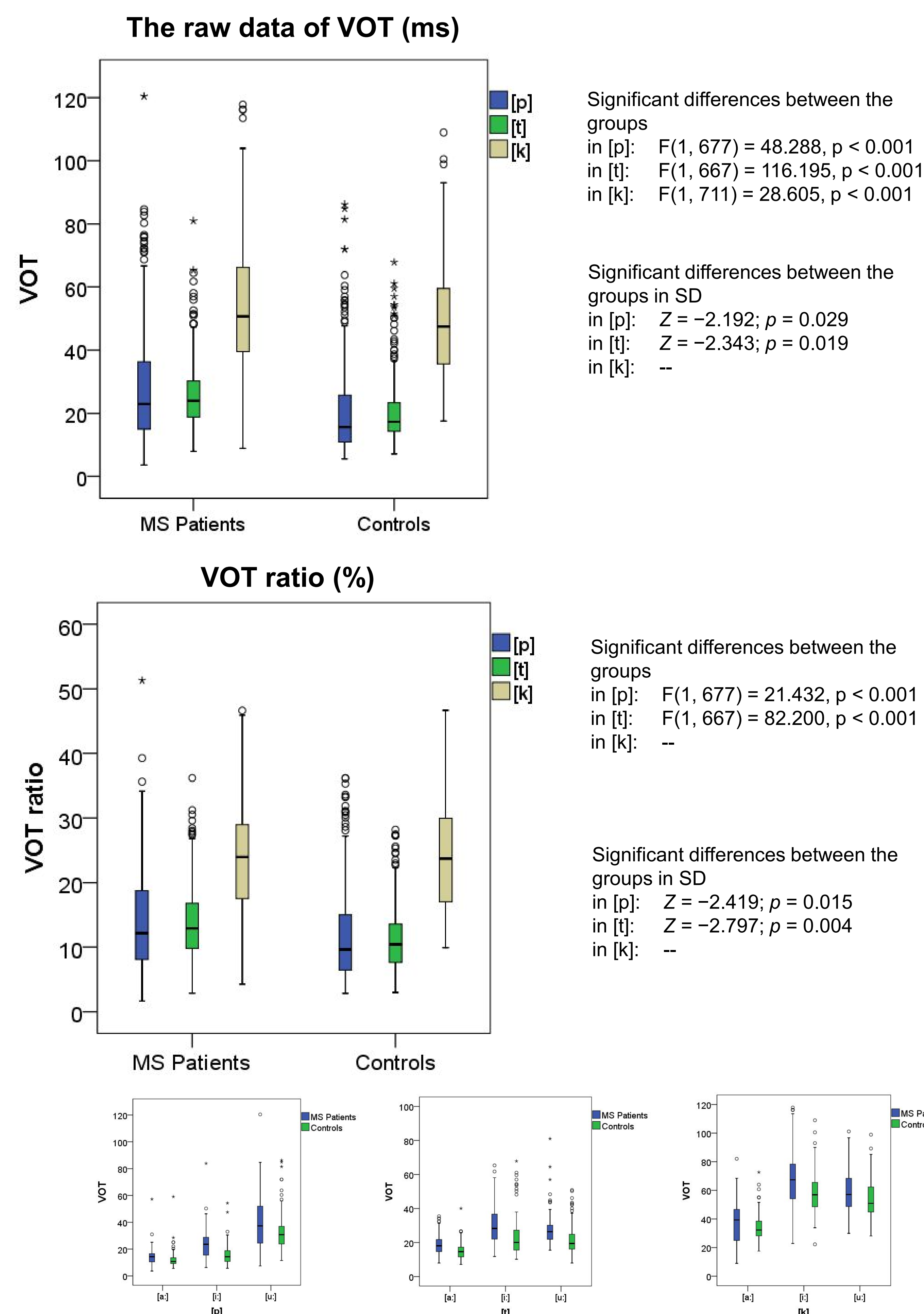
Methods

Measurements were carried out by Praat 5.0 (Boersma – Weenink 2008). VOT and the duration of the syllables which contained the plosives were measured (syllables were measured from the burst to the end of the vowel, Fischer & Goberman 2010).

After that VOT ratio in the syllables were calculated to eliminate the differences in the articulation rate between the speakers.

Finally, data were compared between the two groups. Statistical analysis (Univariate GLM) was carried out with SPSS 20. Dependent variables were VOT and VOT ratio, independent variables were the type of the consonant, the following vowel, and speaker group; and random factor was the identification number of the individual speakers.

Results



Conclusions

Results show that there are differences in VOTs and VOT ratio between MS patients and controls (although these are little differences). There are significant differences also in standard deviation: it is higher in MS patients. This means that they produced the plosives with higher variability. All these results prove that dysarthria in MS might affect articulation.

Results provide new details of the difficulties in the speech of MS patients, and they provide new aspects for speech therapy.

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