

## PERUBAHAN CIRI-CIRI AKUSTIK SUARA DALAM KALANGAN GURU SEPANJANG WAKTU BEKERJA

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Kajian ini bertujuan mengetahui perbezaan ciri-ciri akustik suara sebelum dan sesudah kegiatan mengajar sepanjang waktu bekerja. Dalam kajian ini, beban suara semasa kegiatan mengajar sepanjang waktu bekerja dianggap sebagai *vocal loading*. Oleh sebab itu, ciri-ciri akustik sebelum kegiatan mengajar dinamakan sebagai *pre vocal loading acoustic features*. Sementara itu, ciri-ciri akustik selepas kegiatan mengajar dinamakan sebagai vokal *post vocal loading acoustic features*. Tujuan utama kajian ini ialah untuk membandingkan *pre vocal* dan *post vocal loading acoustic features* sepanjang waktu bekerja, dan untuk menentukan pola perubahan ciri-ciri akustik dari *pre vocal loading* ke *post vocal loading*. Kajian ini berbentuk *cross-sectional* dan melibatkan 40 guru yang direkrut melalui *convenience sampling* di sekitar Kota Bharu, Kelantan. Pengumpulan data melibatkan sampel rakaman bunyi sebelum (misalnya, mengandungi *pre vocal loading*) dan sesudah (iaitu, *post vocal loading*) kegiatan mengajar yang biasa (contohnya, *vocal loading*) dalam minggu yang sama. Sampel suara yang diambil semasa fasa *pre vocal* dan *post vocal loading* dianalisis secara objektif untuk mendapatkan ciri-ciri akustik suara (iaitu, frekuensi asas, peratusan *jitter*, peratusan *shimmer* dan julat *harmonic-to-noise*) dengan menggunakan *Dr Speech's Vocal Assessment* untuk *Windows* Versi 4 (Tiger DRS, Amerika Syarikat). *Pre vocal loading acoustic features* dibandingkan dengan *post vocal loading acoustic features* untuk mengkaji perubahan suara selepas *vocal loading*. Keputusan kajian menunjukkan bahawa ada perbezaan yang signifikan antara *pre vocal* dan *post vocal loading* bagi kebanyakan ciri-ciri akustik suara (iaitu, frekuensi asas, peratusan *jitters* dan nisbah *harmonik-to-noise*) kecuali untuk peratusan *shimmer*. Dalam pola perubahan pula, subjek perempuan menunjukkan frekuensi asas *post vocal loading* yang secara signifikannya lebih rendah berbanding frekuensi asas ketika *pre vocal loading*, manakala subjek lelaki menunjukkan frekuensi asas *post vocal loading* yang secara signifikannya lebih tinggi berbanding frekuensi asas ketika *pre vocal loading*. Selain itu, ciri-ciri akustik yang lain seperti peratusan *jitter* dan nisbah *harmonic-to-noise* didapati jauh lebih tinggi semasa *post vocal loading* berbanding semasa *pre vocal loading* bagi semua subjek. Selain itu, peratusan *shimmer* didapati lebih tinggi semasa *post vocal loading* berbanding *pre vocal loading*, meskipun perbezaannya tidak cukup signifikan. Penemuan kajian ini menunjukkan bahawa *vocal loading* mungkin berkait secara negatif dengan ciri-ciri akustik suara dalam kalangan guru. Hasil kajian ini memberikan maklumat tambahan yang inklusif kepada penemuan kesan penggunaan suara yang berpanjangan terhadap kualiti suara guru. Oleh kerana lumrah dalam bidang kerja guru-guru sebagai pengajar memerlukan penggunaan suara profesional,

hasil kajian ini mungkin menawarkan maklumat awal dalam perkembangan program pencegahan gangguan suara dalam kalangan guru di Malaysia.

**Kata kunci:** Ciri-ciri akustik, perubahan, suara, guru, waktu bekerja

### **CHANGES OF ACOUSTIC FEATURES OF VOICE AMONG TEACHERS DURING WORKING PERIOD**

This study aims to investigate the differences of acoustic features of voice before and after normal teaching activities within working period. In this study, normal teaching activities within the working period are considered as the vocal loading. Therefore, acoustic features before these normal teaching activities are termed as pre vocal loading acoustic features. Meanwhile, acoustic features after these normal teaching activities are termed as post vocal loading acoustic features. Specifically, the objectives of this study are to compare the pre and post vocal loading acoustic features during working period, and to determine the pattern of changes in acoustic features from pre vocal loading to post vocal loading. This cross-sectional study involved 40 teachers who were recruited through convenience sampling in Kota Bharu, Kelantan. Data collection involved recording of voice samples before (i.e., pre vocal loading) and after (i.e., post vocal loading) normal teaching activities (i.e., vocal loading) within the same week. These pre vocal loading and post vocal loading voice samples were objectively analyzed to obtain several acoustic features of voice (i.e., fundamental frequency, percent jitter, percent shimmer and harmonic-to-noise ratio) using Dr Speech's Vocal Assessment for Windows Version 4 (Tiger DRS, United States). The pre vocal loading acoustic features were compared to the post vocal loading acoustic features to investigate the changes in voice after the vocal loading. The results indicated that there were significant differences between all pre and post vocal loading acoustic features of voice (i.e., fundamental frequency, percent jitter and harmonic-to-noise ratio) except for percent shimmer. In terms of pattern of changes, the overall and female post vocal loading fundamental frequencies were found to be significantly lower than pre vocal loading fundamental frequencies but the post vocal loading fundamental frequency among male teachers was found to be significantly higher than pre vocal loading. Additionally, post vocal loading percent jitter and harmonic-to-noise ration were significantly higher than pre vocal loading percent jitter and harmonic ratio respectively. Similarly, post vocal loading percent shimmer was higher than pre vocal loading percent shimmer, albeit it was not significant. The findings of the present study indicated that vocal loading may be negatively associated with acoustic features of voice among teachers. The information from the present study provides additional information to somewhat inclusive findings on the effects of prolonged voice usage to the voice quality of teachers. As the nature of teaching necessitates teachers to have professional voice use, this information may offer preliminary information on the development of preventive voice disorders program among teachers in Malaysia.

**Key words:** Acoustics features, changes, voice, teacher, working period

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