Effect of Menstrual Cycle Phase on Vocal Fatigue

Mary Gorham-Rowan, Ph.D., Richard Morris, Ph.D.

1Dept. of Communication Sciences and Disorders, Valdosta State University  
2Dept. of Communication Disorders, Florida State University

INTRODUCTION

Previous studies have documented significant changes in phonatory function in response to the fluctuations in estrogen and progesterone levels during premenstruation

Effect of estrogens on laryngeal tissue:  
- laryngeal water retention & vocal fold edema; increased thickness of laryngeal mucosa; increased mucus production; dilatation of microvessels

Effect of progesterone on laryngeal tissue:  
drying of laryngeal mucosa; increased tissue congestion

Reported voice changes include decreased intensity range, loss of harmonics, and reduced frequency perturbation

- "premenstrual vocal syndrome" in singers described by Abitbol et al.

Laryngeal mechanism may be more susceptible to effects of vocal loading during the luteal phase due to vocal changes

Vocal loading generally noted by an increase/decrease in fundamental frequency (F0) or intensity – reflects adaptation of laryngeal mechanism to vocal loading or possibly a vocal warm-up

- may indicate increased muscle activity or decreased viscosity of the vocal fold mucosa during certain vocal tasks

Minimal change in F0 or intensity suggests vocal fatigue

Laryngeal mechanism may be more susceptible to effects of vocal loading during premenstrual secondary to tissue changes

PURPOSE

The purpose of this study was to examine possible changes in voice production associated with vocal fatigue during the premenstrual phase.

METHODS

PROCEDURES – VOICE RECORDINGS:

- Recordings completed during the luteal phase (~day 10) and premenstrual phase (~day 24) of each participant’s menstrual cycle
- Voice recordings obtained pre, post-1st reading, post-2nd reading, post-3rd reading
- Three trials of sustained /æ/ at a comfortable pitch and loudness level
- Three trials of the 1st two sentences of the Rainbow Passage
- Voice recordings collected in a soundproof booth using an AT 3032 omnidirectional microphone at a mouth-to-microphone distance of 30 cm
- Fundamental frequency (F0) and relative loudness level (RLL) obtained from middle 1 second of phonation
- Speaking fundamental frequency (SFF) and relative loudness level (RLL-pa) obtained from paragraph reading
- Measurements completed using TF32
- Data analyzed using a repeated measures ANOVA (SPSS)

RESULTS

- No significant main effect of time of recording
- Significant main effect of day of recording on F0 (F=4.022, p=0.016), SFF (F=8.398, p=0.016), and RLL-pa (F=6.203, p=0.032)
- Significant effect of recording x day interaction for F0 (F=0.393, p=0.545) and SFF (F=3.534, p=0.026)

DISCUSSION

- Contrary to expectations, evidence of vocal fatigue did not appear to be greater during PMS
- Changes in F0/SFF during day 10 and PMS for 3 participants – suggests adaptation to vocal loading during both days
- Changes in sustained vowel F0 more marked than changes in SFF from reading task – sustained vowel task may be a more sensitive indicator of vocal adaptation/vocal fatigue
- Examination of data indicates a drop in F0 after 3rd reading during day 10, approaching initial F0 levels – perhaps indicative of early vocal fatigue?
- In contrast to findings for F0/SFF, no significant difference in RLL/RLL-pa with continued vocal loading – alterations in F0/SFF may be a more reliable indicator of laryngeal response to vocal loading
- Additional participants are needed to clearly elucidate relationship of menstrual cycle phase and vocal fatigue

REFERENCES