The Influence of the Menstrual Cycle and the Oral Contraceptive Pill on the Female Singing Performance
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Aims and objectives

Previous studies have provided evidence for the connection between sex hormonal variations and voice quality; however, the extent and type of this relationship still raises some controversy, especially with regard to the singing voice. The current investigation aims to: (i) provide consistent information about the effects of the hormonal variations during a natural menstrual cycle on the quality of the trained singing voice in a population of healthy singers; (ii) investigate whether the use of an OCP has an effect on the quality of the trained singing voice in a population of healthy singers.

Context

The oral contraceptive pill (OCP) is one of the most common and effective contraceptive methods used all over the world. However, research concerning the effects of OCP use on the singing voice is too scant to allow firm conclusions. On the one hand, early studies done by Zilstorff (1965), Brodnitz (1971), and Dordain (1972) have shown that the use of an OCP causes temporarily voice masculinisation due to its androgenic derived progestogen. Therefore, during the later 1960s and 1970s, OCPs were regarded as a dangerous drug for professional voice users, and those who were taking an OCP were advised to do regular phoniatric examinations. On the other hand, authors such as Isenberg, Brown and Rothman (1983), Wendler (1995), and Amir and his associates (2002) showed that there were no alterations in the acoustical characteristics of the voice or in the quality of the voice of OCP users. In the 1980s, as a consequence of the pharmacological evolution of the OCP, in which hormonal dosages were decreased and non-androgenic progestogens were used, there was a reduction of complaints of vocal changes. No evidence of voice virilisation as a side effect of the intake of more modern OCPs could be found. These findings lead us to believe that the use of an OCP with antiandrogenic properties can be prescribed to singers without expecting vocal changes as a side effect. Moreover, the use of Yasmin might benefit singers by dampening variations in sex
hormonal concentrations during the menstrual cycle, which might be the cause of vocal aberrations reported by singers.

**Methodology**

To test the above mentioned hypothesis, two major assessments were done: (i) a preliminary questionnaire assessing the singer's perception of vocal changes associated with specific phases of the menstrual cycle and during the intake of an oral contraceptive pill; (ii) a double blind randomized placebo controlled trial involving 10 healthy operatic singers who took a placebo and a third generation oral contraceptive pill, Yasmin, each during three consecutive menstrual cycles.

The preliminary questionnaire was piloted on a professional singer and singing teacher (J.D.) and later distributed to advanced singing students, studying at several music colleges in the U.K. The questionnaire involved several multiple choice questions, which included general information about the participant, and specific questions about the singer's perception of the quality of the voice during a natural and an OCP menstrual cycles. A total of 102 questionnaires were returned. Respondents were aged between 18 and 39 years old; 85 singers (83.3%) complained about vocal changes across the menstrual cycle. The most reported symptom was vocal fatigue, reported by 59 singers (57.8%), and menstruation was most associated with vocal changes, reported by 63 singers (64.5%). In a scale between 1 – not affected to 5 – very much affected, 39 singers (38.6%) felt that vocal changes across the menstrual cycle considerably affect their performances. OCP use did not show a negative effect on singer’s voice. In fact, singers who were or have been OCP users reported less vocally affected across the menstrual cycle than singers who were not using an OCP \[ z = -2.309; p = 0.021 \], feeling more comfortable with their performances.

The double blind randomized controlled placebo trial involved 10 singers (mean age = 23.10 years; SD = 2.18 years; range 21-27 years), final students and postgraduate students at three different music schools in the U.K., GSMD, RCM and Music Department of Sheffield University. Each participant was asked to take three months of active Yasmin and three months of matched placebo, without a washing period. Neither the participants or the researchers knew which arm of the study would come first. The randomization was done at the Pharmacy Department of the University of Sheffield, who labelled three identical packs of Yasmin and matched placebo. A total of six audio recordings and 6 blood samples were done for each participant, at three different stages of the menstrual cycle, for both natural and Yasmin use cycles: menstruation, and follicular and luteal phases. Each participant was therefore tested taking and not taking Yasmin. All participants were asked to read a standard text, to sing specific technical exercises, to ensure that they had warmed-up their voice before starting recording the repertoire, and to sing two contrasting songs of the singer’s choice: a Lied, and an Operatic aria, listening to the respective piano accompaniment on one head phone. All recordings were done in a sound proof room at the music school where the participants were studying, using a stereo digital audio tape-recorder (DAT) and a portable electrolaryngograph connected to a portable oscilloscope.
Acoustical parameters such as irregularity in the amplitude and frequency of vibration of the vocal folds (CAx and CFx, respectively) and closed quotient (CQ) were compared, and sex hormonal concentrations measured for each recording session.

**Results and discussion**

The results of this study suggest that, when not using Yasmin, menstruation and follicular phases of the menstrual cycle show higher vocal irregularity, and follicular phase shows higher values of closed quotient, for both Lied and operatic aria, when compared with Yasmin use. Possible explanations for these results might be related to the fact that when not using Yasmin, rapid variations in concentrations of sex hormones, more evident for menstruation and follicular phases of the menstrual cycle, interfere with the laryngeal neurocontrol, and therefore contribute to an increase in the irregularity of vibration of the vocal folds. Additionally, the increase in concentration of oestrogens during the follicular phase of a natural menstrual cycle, might be responsible for a proliferation of the cells of the laryngeal mucosa, which increases the mass of the mucosal tissue. This results in a longer contact of the mucosa of the vocal folds during each vibratory cycle, and thus higher CQ values during this phase of the menstrual cycle when not using Yasmin.

In conclusion, the psychological, physiological and perceptual aspects of the performance of highly trained singers might be improved when using Yasmin.

**Key contribution**

This study is a new departure in research into the interface between voice and endocrinology.

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**References**


