



EFFECT OF ENDOCRINE HORMONE ON VOICE DISORDER- A CASE REPORT

Clinical Research

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ABSTRACT

Harmonics are hormonally dependent. Many hormones are present in the body; evidence suggests that there are direct effects of the sex hormones and thyroid hormones particularly on the voice. Voice is considered as an important secondary sexual characteristic which gives an independent imprint to the character and personality of an individual. Sex hormones are strongly related to the hormonal changes occurs in the female life cycle. The importance of hormonal influence on the female voice is appreciated during the cyclical changes of the menstrual cycle. During the menstrual cycle or post puberty the vocal folds undergoes various structural changes which leads to vocal pathologies and change in voice quality. Even with such changes caused by hormones no study has documented in detail regarding the changes in voice post puberty. This single case study highlights on the persisting changes in the parameters of voice reported by female client post puberty

KEYWORDS

Hormones, menstrual cycle

INTRODUCTION:

Endocrine system has various glands which release different hormones. These hormones has various functions which includes growth, sexual reproduction, digestion, homeostasis and repair. [1]. Hormones which are secreted by the thyroid gland has an indirect effect on voice. Voice is considered as an important secondary sexual characteristic which gives an independent imprint to the character and personality of an individual [2].

The vocal instrument is comprised of the vibratory body, the respiratory power source and the oropharyngeal resonating chambers and the voice is extremely sensitive to changes in the hormonal milieu. For example, the human larynx contains thyroid hormone receptors which is clinically associated with vocal changes [3]. Voice is characterized by its intensity, frequency, and harmonics. The harmonics are hormonally dependent. Although there are numerous hormones in the body, evidence suggests that there are direct effects of the sex hormones and thyroid hormones particularly on the voice. Sex hormones are strongly related to the hormonal changes occurs in the female life cycle. During puberty, the elevated estrogens and progesterone in the females will cause minimal effect on the voice. The importance of hormonal influence on the female voice is appreciated during the cyclical changes of the menstrual cycle.

The voice changes associated with the premenstrual syndrome are grouped under dystrophia premenstrualis. **Premenstrual vocal syndrome** is characterized by vocal fatigue, decreased range, a loss of

power and loss of certain harmonics. The syndrome usually starts some 4–5 days before menstruation in some 33% of women. Vocal professionals are particularly affected. Dynamic vocal exploration by televideoendoscopy shows congestion, microvarices, edema of the posterior third of the vocal folds and a loss of its vibratory amplitude. The authors studied 97 premenstrual women who were prescribed a treatment of multivitamins, venous tone stimulants (phlebotonics), and anti-edematous drugs. We obtained symptomatic improvement in 84 patients. Chae et al., Conducted a study on both premenstrual vocal syndrome –positive and premenstrual vocal syndrome –negative women, he compared the acoustical analysis of both the groups and they reported that only jitter values were significantly higher among premenstrual syndrome –positive women[7].

Chernobelshy carried out study comparing 15 classical female vocalists who were reported to have vocal problems due to their vocal abusive behaviour with the 15 singing students who did not. In both groups, Mild vocal problems (subjective) were reported before menses: Stroboscope and electroglottography (EGG) reports revealed slight edema and erythema of the vocal folds and as well as decreased vocal muscles. Vocal symptoms and instrumental findings were more prevalent in the vocally abusive group. It was suggested that vocally abusive behaviours aggravate the mild vocal changes before menses, thus increasing risk for vocal pathologies[4]

The importance of hormonal influence on the female voice is appreciated during the cyclical changes of the menstrual cycle.

Table - 1 : represents the physiology changes of voice during female life cycle[3]:

Sl.NO	PHASE OF LIFE	HARMONAL CHANGE	STRUCTURAL CHANGE	VOICE CHANGE
1.	Puberty	- Increased estrogens - Increased progestogens	Vocal cord growth	No significant change in the voice quality.
2.	Menstrual cycle - Follicular phase - Ovulation - Ovulatory phase	- Increased estrogen - Increased estrogen - Increased progesterone	- Laryngeal edema - Thick vocal folds - Dry vocal folds - Reduced tonicity of laryngeal muscle	- Vocal fatigue - Loss of higher harmonic - Premenstrual vocal syndrome - Decreased range
3.	Menopause	- Reduced estrogen - Reduced progesterone - Reduced androgen	- Laryngeal muscles atrophy - Ossification of laryngeal cartilage - Vocal cord thickens - Stiffening of vocal apparatus - Reduced elasticity of vocal chords	- Reduced intensity - Vocal fatigue

- Amir O, Kishon-Rabin L.(2004)

Even with such changes caused by hormones no study has documented in detail regarding the changes in voice during and after puberty. This single case study highlights on the persisting changes in the parameters of voice reported by female client post puberty. Subjects and Methods: The client presented herself to department of speech and language pathology with the complaint of change in voice for the past 3 years. Voice evaluation of was carried out at Madras E.N.T Research Foundation, using formal and informal evaluation protocol.

- Detailed case history:** It was collected from the client in whom the following questions were probed; they are onset of the problem, nature of the problem.

- Vocal and non-vocal habits:** In order to rule out any vocal abusive behaviors.

She frequently cleared her throat. Vocal abusive behavior such as coughing, shouting and screaming were also reported.

- Laryngeal examination** using Videolaryngoscopy: To examine

the presence of any structural and functional abnormalities in the vocal folds.

- **Perceptual evaluation (Clinical Examination)**
- **Type of breathing in speech and non-speech activity**, as we know that respiration is one of the pre-requisite for speech
- **S/Z ratio** (/s/- voiceless fricatives, /z/- voiced fricative which requires the vibration of the vocal folds) helps to identify whether the client has laryngeal or respiratory pathology.
- **Maximum phonation duration** : 12 seconds

In the perceptual evaluation, restricted pitch range, reduced loudness, restricted loudness range and voice breaks was observed. She had hoarse voice quality and with poor endurance

Perceptual evaluation (using standard test tools)

- **GRBAS scale** is a tool which is used to subjectively assess the degree and quality of hoarseness Sustained vowel production and reading task was provided through which the patient's voice was scored

Perceptual evaluation of voice			
1.	GRBAS Scale:		
	Phonation task	Conversational task	
• Grade -	Moderate	Severe	
• Roughness -	Moderate	Severe	
• Breathiness-	Mild	Moderate	
• Asthenia-	Moderate	Moderate	
• Strain-	Moderate	Moderate	

- **CAPE-V**(Consensus Auditory Perceptual Evaluation of Voice) is primarily used to assess the severity of the voice problem and secondary purpose is to contribute to hypotheses regarding the anatomical and physiological bases of voice problems and to assess the need for additional testing. The patient was given with reading and spontaneous speech task through which the patients' voice was scored.

2.	CAPE-V:		
• Breathiness -	Mildly deviant		
• Roughness -	Moderately deviant		
• loudness -	Moderately deviant		
• Pitch -	Mildly deviant		
• Strain -	Moderately deviant		

- **Quality of life questionnaire**: VHI (Voice Handicap Index) and Voice related Quality of life are the self-rating scales are used to assess the voice pathology. Voice handicap index and Voice related quality of life is the test tools which are used to measure the influence of voice problems on a person's quality of life.

Patient reported outcomes

	VHI	VR-QoL
SCORE	78	27
IMPRESSION	Severe handicap	Poor to fair

- **Acoustical analysis**: It is used to characterize the vocal function using Praat(software). Parameters such as increased Jitter (cycle to cycle variation in frequency), shimmer (cycle to cycle variation in intensity) value and severe Dysphonia were observed.

RESULTS & DISCUSSION:

In this observational study, the client has change in her voice quality after the menstrual cycle .Good correlation between different subsets of voice evaluation was observed Acoustical analysis reveals severe dysphonia, perceptually through clinical examination her voice quality was observed to be hoarse and perceptual evaluation using standard tools such as CAPE-V (Consensus Auditory Perceptual Evaluation-voice)which reveals mild to moderate deviant in all parameters and Moderate to severe grade in GRBAS (Grade Roughness Breathiness Asthenia Strain)scale. In summary, the convolution of the human menstrual cycle affects both emotional well-being as well as all other aspects of female physiology including the larynx [8].In the year 1980, Wilson and Purvis had observed the female vocal folds prior to and during the menstruation period and it revealed that they were oedematous with reduced mucous secretion and swollen .and it was resulted in a vocal problems [17]. A study done by Bayer and Oppenheim in 1890 , they reported about premenstrual conditions which includes vocal edema and redness, laryngeal joint stiffness and aphonia [8]. A case study of Brodnitz on opera singer in

whom small membrane haemorrhages formed on the vocal folds premenstrually and Brodnitz concluded that changes in the larynx may occur as the result of hormonal changes during the menstrual cycle [6].

CONCLUSION:

Hormone-related alterations which are in vocal folds may have a role in the variability of vocal performance in certain women. Even though there are some studies which reviews changes in the female voice associated with menstrual cycle, there is a need for more studies to be carried out in diverse populations and in different outcome measures and also detailed evaluation need to be done [15,16].

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