

Analysis of Singing Voice

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The review of literature on differences between trained and untrained singers reveal a significant difference between acoustic and aerodynamic factors, namely fundamental frequency and its range, vital capacity and mean airflow rate.

The present study was conducted to determine the acoustic and aerodynamic factors among singers and compare them among trained and untrained singers as also across the two groups.

The following were the acoustic and aerodynamic factors studied :-

Acoustic parameters:

1. Fundamental frequency and frequency range in reading, singing octave range and singing the song.
2. Transition from one register to the other in an octave range.
3. The ratio of energy concentration above and below 1 KHz (Alpha ratio) and the frequency at which there was maximum concentration of energy around 1-3 KHz region.

Aerodynamic factors:

1. Vital capacity
2. Mean airflow rate during phonation at low, mid and high pitches.

Procedure :

10 trained and 10 untrained singers with mean age of 21.6 years and 20.3 years respectively served as subjects. All of them reported of no hearing problem or vocal pathology at the time of recording. Sample of reading passage, singing octave range and singing a piece of song were audio recorded. The passage included the Kannada voiced passage. The above sample were analysed for acoustic parameters of fundamental frequency, frequency range, transition, alpha ratio and energy concentration around 1-3 KHz region using PCXT and PM 100. Aerodynamic factors were measured using a wet expirograph. The results were compared among the trained and untrained singers and across the two groups using Mann-Whitney U test and Wilcoxon matched pair test procedures.

Conclusions:

The following conclusions were drawn from the present study

1. Significant difference have been noticed among trained singers when fundamental frequency in reading, singing octave range and singing song were compared.
2. Significant differences have been noticed among untrained singers when fundamental frequency in reading, singing octave range and singing song were compared.
3. No significant difference was noticed in singing octave range and song among trained and untrained singers when fundamental frequency was compared.

4. No significant difference was noticed when trained and untrained singers were compared except for fundamental frequency in reading condition.
5. No significant difference was noticed among and between trained and untrained singers when frequency range in reading, singing octave range and song were compared.
6. Significant difference was noticed between trained and untrained singers when vital capacity was compared.
7. No significant difference was noticed between trained and untrained singers when mean airflow rate was compared during phonation at low, mid and high pitches.
8. No significant difference was noticed when alpha ratio was compared between trained and untrained singers.
9. No significant difference was noticed during transition except that trained singers consumed longer time

for transition and lesser number of pauses were observed in between the swaras (notes).

10. Maximum energy concentration was around 2500-2900 Hz region for trained singers and 2300-2500 Hz region for untrained singers.
11. Maximum concentration of energy below 1 KHz was around 250-350 Hz region for singers who had alpha ratio less than one and around 1900 Hz region for those singers who had ratio more than one.

Recommendations :

These results need to be confirmed using

1. Larger sample,
2. Across amount of training,
3. Across various styles of music.

Limitations :

1. Sample was limited to 10+10 subjects only,
2. Years of training was not considered as a factor.