==========
Language in India www.languageinindia.com **ISSN 1930-2940 Vol. 15:7 July 2015**
==========

Acoustic Analysis of Speech Language Pathologist - Before and After Therapy Sessions

Sudheep. S. and Satish. K.

==========

Abstract

The present study aimed at examining selected parameters of voice among Speech Language Pathologists (professional voice users). Subjects were ten female professional voice users, with a mean age of 25. All the Speech Language Pathologists had a minimum of one year experience working as a professional Speech Language Pathologists. Voice handicap index was administered and subjects were found not having any apparent voice problems. Subjects were asked to phonate /a/, /i/, and /u/ in quiet condition and were recorded. PRAAT software 5.1.35 version was used to extract voice related parameters. Specifically various parameters of voice were determined. F0, F1, F2, F3, Jitter and Shimmer was determined and compared between pre and post therapy sessions.

This study gives an understanding of the various parameters that are expected to undergo significant changes following vocal fatigue. The need of vocal hygiene for speech language pathologist after therapy is revealed. It gives direction for counselling and treatment. The parameters could be used to determine the efficiency of therapy programs.

Key words F0, F1, F2, F3, Jitter and Shimmer

Introduction

Voice plays the musical accompaniment to speech reading, it is tuneful, pleasing, efficient communication by the spoken word". The term professional voice user is used to denote the segment of population for whom voice is used as a primary tool for their occupation. Anyone who needs their voice in order to carry out their job is considered as a professional voice user.

Professional voice users are those individuals who are directly dependent on vocal communication for their livelihood (Stemple, 1991).

Professional voice users are "Those individuals who are directly dependent on vocal communication for their livelihood". Professional users are more prone to the laryngeal pathologies than general, due to their work and lifestyle. Professional voice users are also often considered 'athletic' voice users because their voice use is more extensive and strenuous than that of a non-professional voice (Titze, Lemke, and Montequin 1997).

The professional singers are a highly visible and specialized subset of individuals who are often presented with the unusual challenge for Speech Language Pathologist. and otolaryngologists. Professional voice users are those individuals who are directly dependent on vocal communication for their livelihood.

Professional voice users rely on consistent, distinctive, appealing voice quality as their primary tool of their trade. Professional voice users are teachers, actors and speech language pathologists. They must need a well functioning and a enduring voice to communicate with audiences, students and clients on daily basis. Because of their vocally dependent occupational duties they use their voice in emotional and stress full condition.

Voice users have to manage their voice which place further demands on vocal intensity power and stamina. Many professional voice users have to use their voice in both performance and habitual voicing. Nothing regarding this has been mentioned in literature that is the performance and habitual voice have not been clearly distinguished or described in literature.

Speech language pathologists are a group of professional voice users who depend on use of a consistent and intelligible voice. Their primary work involves communicating effectively with clients, parents, caregivers, teachers and other colleagues for a large portion of their work time. A sub-optimal and presumably dysphonic voice may therefore impact on their ability to perform their required role. For example, children find dysphonic voices (both mild and severe) more difficult to understand than voices without dysphonia.

This implies that communication efficacy may be affected by a dysphonic voice. In addition to communicating effectively, a speech language pathologist often acts as a provider of voice therapy and is required to model or perform vocal behaviours and techniques.

Need for the Study

The area of voice analysis in Speech Language Pathologist is the most evolving area. But research regarding this is very limited in Indian context and the need for research is substantial. Hence with an easily available technology like acoustic analysis, the frequency of detection will also increase.

Aim & Objective

The aim of the present study is to compare the acoustic characteristics of speech language pathologist before and after therapy session.

Subjects

The voice samples from the therapy sessions were recorded from ten professional Speech language pathologists with a mean age range of 25 (10 females). All the speech language pathologists had a minimum professional experience of two years. They had no apparent speech, hearing, ENT problems or voice problems. Voice Handicap Index was administered and subjects were found to be not having any apparent voice problems. Samples were taken before and after therapy sessions. The recording was carried in a quiet surrounding using a headphone (creative HS150) with mic attached.

Recording of Speech Samples

The subjects were seated comfortably in a quiet room. Phonation of /a/, /i/ and / u/ vowels was recorded and words like *camp*, *meat*, and *lunar* were used. Prior to recording, subjects were instructed to take a deep breath and phonate vowels and words. The voice and speech system PRAAT (5.2.35 version) program software was used to extract frequency and pitch related measurements to determine the possible difference in the voice of the speech language pathologist (professional voice users). Sustained phonation of three vowels /a/, /i/ and /u/ and words like *camp*, *meat* and *lunar* were used to measure fundamental frequency, F1, F2, F3, Jitter

and Shimmer, HNR. This was to statistically compared using wilcoxon signed rank test for finding out the significant difference.

Results and Discussion

The result of the present study reveals variations in certain acoustic characteristics of voice, when comparing female subjects. Vowel /a/ was showing no significant difference in f0, f1, f2, f3, jitter, shimmer and HNR. Vowel /i/ was showing no significant difference in f0, f1, f2, f3, jitter, shimmer and HNR. Vowel /u/ was showing no significant difference in f0, f1, f2, f3 jitter, shimmer and HNR between pre and post therapy sessions during the production and also for words like *camp, meat,* and *lunar*. Vowel /u/ and word *camp* were showing a significant difference in formant 1 and formant 2 between pre and post therapy sessions.

The present study strengthens the importance of counseling about vocal hygiene programme in professional voice users. This finding is in agreement with a study done by William (2003) which states that professional voice users are at an increased risk of having voice disorders. These findings are consistent with the earlier findings from a previous study by Stephen (2009) among theologians, which states that a negative correlation was obtained between VHI scores when compared with Jitter, Shimmer and HNR. This can be due to the reason that voice of Speech Language Pathologist has frequent pitch fluctuations during the therapy sessions.

Summary and Conclusion

The present study aimed at examining selected parameters of voice among Speech Language Pathologists (professional voice users). Subjects were ten female professional voice users, with a mean age of 25. All the Speech Language Pathologists had a minimum of one year experience working as a professional Speech Language Pathologists. Voice handicap index was administered and subjects were found not having any apparent voice problems.

Subjects were asked to phonate /a/, /i/, and /u/ in quiet condition and were recorded. PRAAT software 5.1.35 version was used to extract voice related parameters. Specifically various parameters of voice were determined. F0, F1, F2, F3, Jitter and Shimmer was determined and compared between pre and post therapy sessions.

Wilcoxon signed rank test was used to compare the selected acoustical parameters of voice among the Speech Language Pathologists (before and after therapy sessions). It was observed that, when comparing female subjects, vowel /a/ was showing no significant difference in f0, f1, f2, f3, jitter, shimmer and HNR. Vowel /i/ was having no significant difference in f0, f1, f2, f3, jitter, shimmer and HNR. Vowel /u/ was showing no significant in f0, f1, f2, f3, jitter, shimmer and HNR between pre and post therapy sessions during the production of the sounds and for words like *camp*, *meat*, and *lunar*. Vowel /u/ and word *camp* was showing a significant difference in formant 1 and formant two between pre and post therapy sessions.

Implication of the Study

This study gives an understanding of the various parameters that are expected to undergo significant changes following vocal fatigue. The need of vocal hygiene for speech language pathologist after therapy is revealed. It gives direction for counselling and treatment. The parameters could be used to determine the efficiency of therapy programs.

Limitations

- The study was limited to only 10 subjects.
- The study was limited only to female subjects.

Future Directions

- More number of parameters can be included to study the voice of professional voice users.
- Study can be performed in male subjects also.

==========

References

Abraham, R. & Kumaraswamy, S. (2013) Studied acoustic characterstic changes in news reporters before and after broadcast sessions. Dissertation submitted to Mangalore University as part of course fulfilment.

Babu, M .T. & Kumaraswammy, S. (2012) Vocal behaviour and acoustic characteristics of female evangelists. Dissertation submitted to Mangalore university as part of course fulfilment.

Boersmsa, P. & Weenink , D. (2007) PRAAT Doing Phonetics by computer(5.1.35),computer software available from website: http//www.praat.org.in

Catten (1990), Hibis, (1990) Cited in Sataloff, R .T. (1991) Professional voice science and art of clinical care. Raven publication.

Chandran , P. & Subbarao. (2009) Studied certain acoustic parameters in the speech of speech language pathologist during therapy and routine conversations.Dissertation submitted to Mangalore university as part of course fulfilment.

Classificationofprofessionalvoicelevel.Retrivedfrom:http://www.sandiegovoice.org/professional.html.

Jacobson, B.H., Johnson, A., Grywalski, C., Silbergelit, C., Jacobson. G. & Benninger, M.S. (1997) The Voice Handicap Index (VHI): development and validation. *American Journal of Speech Language Pathology*, volume 6, pages 66-70 .

James, G. (2003) Voice teacher and vocal diagnostician. James, G. (2003). Voice teacher and vocal diagnostician. Retrieved 17 December2014 fromwww.jamespagregory.com/index.html

Johnson, F.A. (1994) Vocal arts medicine the care and prevention of professional voice disorders. Thieme publication.

Koufman and Isakson (1991) cited in Johnson, F,A. Benninger, M. Jacobson, B,.(1994) Vocal arts medicine the care and prevention of professional voice disorders . Thieme publication.

Lemke, Montequin, Titze (1997). cited in Aronson, E.A. (2009). Clinical voice disorders fourth edition. Thieme publication.

Lundy, D.S., Roy, S., Casiano, R.R., Xue , J.W. & Evans, J. (2000). Acoustic analysis of the singing and speaking voice in singing students. *Journal of voice,* 14(4), 490-493.

Mary, P.F. & Kumaraswamy, S,. (2013). Acoustic analysis of female pastors Dissertation submitted to Mangalore University as part of course fulfilment.

Menon, R. & Kumaraswamy, S. (2011). Voice quality in amateur thullal artist before and after performance session. Dissertation submitted to Mangalore University as part of course fulfilment.

Raj, V. & Kumaraswamy, S. (2011). Voice Quality in Radio jockeys before and after Broadcast Session. Dissertation submitted to Mangalore University as part of course fulfilment.

Sapir, S. (1993). Vocal attrition in voice students: Survey findings. *Journal of voice*, Volume 7, 69-74.

Sataloff, R. T. (1993). The human voice. Scientific American publication 267 pages 108-115.

Sataloff, R. T. (2006) Vocal health and pedagogy science and assessment. Second edition volume 1 2006. Plural publication.

Sataloff, R.T. (1991). Professional voice science and art of clinical care. Raven publication.

Stemple (1991) cited in Sataloff, R.T. (1991). Professional voice science and art of clinical care Raven publication.

Stemple, J. C., Glaze, L.E., Gerdeman, B.K. (1995). Clinical voice pathology (2nd ed.). San Diego: Singular Publishing Group Inc.

Stemple, J.C. (1993). Clinical Voice pathology Theory and management, Mosby Year Book Inc. MO. USA. Page no: 155-171.

Stephen, S. (2009). Correlation of VHI and acoustic analysis of voice in theologians. Dissertation, submitted to Mangalore University as part of course fulfillment.

Titze, I.R. Lemke, J. Montequin, D. Populations in the U.S. workforce who rely on voice as a primary tool of trade: a preliminary report. *Journal of Voice*. 1997, volume 11, pages 254–259.

==========

Sudheep Sudhakaran
Second Year Post Graduate Student
Dr. M.V. Shetty College of Speech and Hearing
Maladi Court, Kavoor
Mangalore- 575015
Karnataka, India
appus89@gmail.com

Satish Kumaraswamy
Principal
Dr. M.V. Shetty College of Speech and Hearing
Maladi Court, Kavoor
Mangalore - 575015
Karnataka
India
sat8378@yahoo.com.