CHAPTER - 6

Summary and Conclusion
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In India, call centers are one of the fastest growing employment sectors, sought after by most of the youngsters. According to literature available on people working in call centers, the amount of their voice use is substantial. Often, they speak for more than eight hours in stressful conditions, which places them at greater risk for vocal abuse and resultant dysphonia. With the recognition of their working conditions as being different from their foreign counterparts, the present study was interested in exploring the prevalence and nature of the voice problems experienced by this population in the Indian context.

The study was conducted using a questionnaire developed by Jones et al., (2002) with appropriate modifications. This study was also interested to find out the acoustic and perceptual characteristics of these CCO’s voices. Purposive sampling was done by distributing 2000 questionnaires at 11 different call centers from which, 1219 were completed and returned resulting in a moderate response rate (60%). The results of the current study are based on 1093 eligible questionnaires from them. A total of 104 voice samples were recorded for the acoustic and perceptual analyses that included those CCOs reporting frequent vocal symptoms and those with no vocal symptoms.

6.1 Prevalence of vocal symptoms

Questionnaire analysis revealed prevalence of vocal symptoms in 59% of the CCOs with no significant difference between genders. Among those who reported of experiencing vocal symptoms, majority (83%) considered their vocal quality as normal in the beginning of the shift while 61% of them reported a change in the vocal quality (hoarse or loss of voice) at
the end of the shift. Most of them (78%) experienced two or more symptoms frequently with the severity rating as mild.

### 6.2 Impact of vocal symptoms

The presence of vocal symptoms was not a major source of frustration or affecting social interactions among most of the CCOs, irrespective of the gender. However, the presence of vocal symptoms did affect their job performance and contributed for missing work in significantly higher number of females compared to male CCOs.

### 6.3 Seeking medical help

Seeking of professional help from medical personnel and SLPs by the CCOs who experienced frequent vocal symptoms was observed to be poor in the present study.

### 6.4 Instructions received for voice care

Majority (86%) of the CCOs who participated in the present study did not receive any instructions for voice care. However, most of them (71%) evinced interest in receiving instructions for voice care.

### 6.5 Risk factors and their association with vocal symptoms

Multiple logistic regression analysis (Wald forward) showed significant association between certain factors related to; work environment/vocational (working in other jobs, raising voice because of noise, experiencing stressful calls), personality (rate of speech) and biological (hearing loss, acid reflux, throat clearing, hydration) with the reporting of vocal symptoms.
6.6 Acoustic characteristics of voice

No significant differences in acoustic parameters were observed between CCOs reporting of frequent vocal symptoms and those who did not, excepting significantly higher NHR values in female CCOs who reported vocal symptoms than those who did not. Further, the acoustic parameters of CCOs (combined) when compared with the existing Indian normative values and subjected to one sample t-test revealed:

Fundamental frequency related measures showing significant difference in Standard deviation F0 for both male and female CCOs. Further, female CCOs also showed significant increase in the acoustic parameter of F0 range.

Most of the frequency perturbation measure values (RAP, sPPQ, vF0) were significantly higher in CCOs (both genders), while PPQ was found to be significantly higher in only male CCOs. Most of the amplitude perturbation measures (sAPQ, Shimmer %, APQ, Peak - to - Peak Amplitude variation) were significantly higher in female CCOs compared to normative values. In the case of males, only sAPQ was significantly higher.

Noise and tremor related measures such as VTI, SPI and F0-tremor Intensity Index (FTRI) were significantly higher in male CCOs, while NHR, SPI, FTRI and ATRI were significantly higher in female CCOs compared to normative values.

6.7 Auditory perceptual parameters of voice

The perceptual analysis of voice using CAPE-V by the SLPs could not differentiate the CCOs who reported of vocal symptoms and who did not. That is, the range of perceptual rating scores between the two groups overlapped considerably (a substantial number of CCOs
who did not report of any vocal symptoms and those who did were identified as having deviancy or normalcy in the perceptual vocal parameters respectively). Among the three tasks given in the CAPE-V, CCOs were identified to have greater deviancy during phonation tasks than reading or spontaneous speech. Among the different perceptual vocal attributes, higher number of males was rated as having a mild hoarse voice and higher number of females, a breathy voice.

Literature regarding professional voice users indicates that occupational voice disorders are very common and constitute a real threat to the functionality and working ability of these individuals. Since voice is multi-dimensional, it can be characterized by acoustic, perceptual, physiological and self-reported aspects. The present study attempted to understand the voice characteristics of CCOs using self-reported questionnaire along with acoustic and auditory perceptual measures.

The results of the current study support the findings in the literature that CCOs are at greater risk of developing voice disorders, irrespective of experiencing one or more vocal symptoms. This is further substantiated in the acoustic and perceptual analysis of these participants, irrespective of their indicating of vocal symptoms or not (self-reported). These symptoms experienced by the CCOs could be considered as early signs of vocal attrition even though not very severe in their form. The current study hence projects and reiterates the need to educate CCOs on early identification and management of vocal symptoms as majority had not received any instructions on voice care. It was also evident that these professional voice users were highly interested in receiving voice care education, thus sending a clarion call to the practicing SLPs on the dire need to develop specific preventive voice care techniques.
suitable for CCOs. Studies conducted on CCOs in the literature have indicated that, vocal education for short or long periods does show some improvement on the experienced vocal symptoms but fails to show its effects on long run. Thus, there is a great need for periodic assessment and monitoring of the needs of these professional voice users for their effective functioning. In addition, to make this work, it is necessary to convince the employers/organizations about the consequences of voice problems on the performance of their employees with its ramifications on the productivity and growth of their organization and recommendations on in house voice care strategies to get their best output.

6.8 Limitations of the study

- Data for the present study was obtained with the help of HR managers and not by random sampling and thus inducing a bias.
- The CCOs were asked to return the filled questionnaires to their HR managers which could have influenced their responses and the results and the outcome of the study.
- Acoustic and perceptual analysis of voice along with phoniatric examination (not done) would have contributed in better understanding the effect of voice use on the vocal folds and the measured parameters in the CCOs.
- Work environment analysis would have helped in identifying the possible risk factors in this population and develop and appropriate and effective voice care strategies.
- A separate quality of life measurement scale to study the impact of voice problems would have helped the researcher understand the consequences of vocal attrition symptoms better.
Multiple observations could have been averaged to obtain perceptual judgment for each stimulus to minimize the variability within and across the listeners (improve the inter and intra rater reliability).

The domestic and international CCOs have not been considered as separate entities but as one common entity. With differences in their work aspects (say, time of the day, types of customers and their expectations), they would constitute two different groups and warrant independent study and comparison.

The present study is an effort to identify the prevalence and nature of voice problems in CCOs, given the limitations stated. However, higher prevalence of vocal symptoms in this population points to the need for more extensive research and more refined methods (phoniatric examination, analysis of work ambience, quality of life measurement scales) to extensively study the nature of voice problems and factors influencing them. The findings however, dovetail to the conclusion that CCOs are at greater risk of developing voice problems and need sessions on voice care strategies during their training period and periodically thereafter for optimal productivity and vocal health.