



Research Article

PREVALENCE OF VOICE PROBLEMS AMONG PRESCHOOLERS (3.5-5.5YEARS) IN YEMMIGANUR TOWN (ANDHRA PRADESH)

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ABSTRACT

The aim of the study was to find out the prevalence of voice problems among preschoolers in Yemmiganur town of Andhra Pradesh. 320 subjects were grouped equally into 2 subgroups 3.5-4.5 and 4.5-5.5years from anganwadis and private schools randomly. The study involved two phases, qualitative and quantitative assessment. For qualitative assessment the questionnaire called Functional Indicators of Voice Problems (FIVP) was constructed which had 20 questions, grouped into 4 major domains. Questionnaire was given to parents and teachers, their responses were considered. Quantitative assessment included acoustic analysis of phonation samples. The periodic prevalence was calculated. Out of the 320 subjects children who participated in the study from Yemmiganur town in Andhra Pradesh, 71 children were identified to have deviant voices and the periodic prevalence was estimated as 22%. Among the 71 subjects identified with deviant voices, 51% were males and 49% were females. When periodic prevalence was checked for deviant voices across school setup, it was found that 42% of these subjects were from government and 57% were from private.

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INTRODUCTION

Voice is the most important means of communication for an individual from infancy. A normal voice should have a quality that is pleasant, has appropriate pitch, loudness with adequate flexibility and sustainability (Johnson, Brown, Curtis, Edney & Keaster, 1965). Any deviation from this will result in a voice disorder. A voice disorder is present when a person's quality, pitch, and loudness differ from those of a person's of similar age, gender, cultural background, geographic location, or when an individual indicates that his or her voice is not sufficient to meet daily needs, even if it is not perceived as deviant by others (Colton & Casper, 1996; Stemple, Glaze & Klaben, 2000). Voice disorders in pediatric population can be classified as congenital and acquired voice disorders. Congenital voice disorders refer to conditions that are present at birth with idiopathic causes in the larynx. Laryngomalacia, laryngeal web, laryngocele, laryngeal stenosis are a few congenital disorders of voice which can alter the voice from infancy. The cause of acquired voice problems exist on a continuum with organic at one end and functional at the other. Acquired voice disorders are caused due to vocally abusive behaviors.

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Vocal abuses occur when the vocal folds are forced to adduct in a vigorous manner causing hyper function of the laryngeal mechanism. Children may enjoy making vocal noises during play and imitating environmental sounds which leads to hyper functional voice disorder. Common types of vocal abuse include shouting, screaming, cheering, strained vocalizations, excessive talking, reverse phonation, explosive release of vocalizations, abrupt glottal attack, throat clearing, coughing, and talking in the presence of high level noise (Wilson, 1972). Vocal misuse refers to improper use of pitch and loudness, vocal abuse and misuse may be more pronounced in living environments of some children such as loud talking families and large families are conducive to poor vocal habits (Wilson, 1972). Milutinovic (1994) compared 362 12–13 years aged children living in rural and urban areas of Serbia. Many more children living in urban areas (43.67%) were reported to have voice problems as compared to children living in rural areas (3.92%). Carlin and Saniga (1993) conducted study on vocal abuse behaviors in young children to identify the frequency of those behaviors across ages. Mixture of rural and urban public school districts in Mississippi students in kindergarten through second grade was considered. Questionnaire was sent to parents to comment on their child's voice use and vocal abusive behaviors.

Voice conversation index was used as questionnaire. Results revealed parental report on vocal abuse behaviors are more in older children. Takeshita, Auigar-Ricz, Issac, Ricz and Anselmo-Lima (2009) conducted research in Sao Paulo, Brazil on preschool children. This was a questionnaire based study. The participants were 33 parents of kindergarten children between the age ranges of 5-7 years. There were 14 girls and 19 boys who belonged to a day nursery school. The questionnaire contained 12 questions which were divided into 6 categories such as vocal identity, favorite play, vocal habits and family environment, pathological factor and behavior of parents for vocal alteration. Results indicated that most of the parents recognized their children had abusive voice, predominate usage of voice was noticed in children's favorite plays, allergic rhinitis in almost half and habit of shouting and speaking with strong intensity was noticed in less than half of the children.

Reviews and Literature

Duff, Proctor and Yairi (2003) conducted study on African and American preschool children. The participants were 2445 children between 2 and 6 years enrolled in 49 different preschools in urban, rural and suburban regions of Illinois. The African-American children were around 64.8% and European-American children were around 35.1%. Using three diagnostic indicators (i.e., teacher identification, parent identification, and investigator screening), voice disorders characterized by hoarseness were identified in 95 children, or 3.9% of the sample. A longitudinal study of prevalence was conducted in Newcastle, United Kingdom by Carding, Roulstone, and Northstone (2006) to estimate the prevalence of dysphonia in a large cohort of children. A sample of prolonged vowel phonation /a:/ and spontaneous speech were recorded. The voice assessment involved rating on a binary choice judgment by a speech language pathologist who had an expertise in pediatric voice. A rating procedure was also used to know their reactions to voice of their child. Authors identified a dysphonia prevalence of 6% compared with a parental report of 11%. Higher proportion of boys (7.4%) and 4.6 % of girls were identified with atypical voices. 52.9% were children with older siblings and 51.3 % for younger sibling had abnormal voice. A study was conducted by Mckinnon, Mcleod and Reilly (2007) on school children in Australia which aimed at prevalence of voice problems and gender distribution. Results indicated that the subjects identified were 36 children from kindergarten to grade six. Results revealed prevalence of voice disorders was 0.12% and higher prevalence was found in males compared to females.

Manohar and Jayaram (1973) conducted a study to check prevalence of speech disorders among school children of Mysore city. 1454 children aged 3-16years were tested in that 707 were boys and 747 were girls. They conducted a screening program on these children for about 2yrs to detect the speech and hearing problems. Speech evaluation was carried out by graduate and post graduate students under the supervision of a Speech Pathologist and all the children were tested for normalcy of speech mechanism, articulation, voice, fluency and language. Voice was examined for the possible deviations in the pitch, quality and loudness with respect to the age of the children. Mutational voice change in children was noted separately. Results revealed 46% of boys, 73.47% girls had

dysphonias and higher incidence of dsphonias were found more in girls compared to boys.

Need for the study

Vocal behaviors such as screaming, whispering, imitating environmental sounds and making vocal noises during play and learning through verbal means are observed in children. Attention seeking behaviors, such as screaming, whispering, crying, speaking and singing loudly are considered vocally abusive behaviors that pave way for voice disorders. Often children get parents attention by employing such behaviors. This may cause a voice problem and decrease the child's ability to interact and communicate effectively. Preschool or Kindergarten is the most important phase for children to move from unstructured play and early learning to a more structured learning environment of formal schooling. Children communicate, narrate and sing in groups, make vocal sounds/noises becoming more prone to develop voice problems. Such behaviors may continue even when they begin formal education. Thus a study on prevalence of voice problems would help us to know the boundaries between impairment and typical development and to identify the children at risk of voice to develop voice disorder which helps in early identification and early intervention. This would lead to restoration of vocal behavior into 'normal voice stream'.

Aim of the study

To study the prevalence of voice problems among preschoolers (3.5- 5.5yrs) in Yemmiganur town (semi-urban)

Objectives of the study

- To study the occurrence of voice problems among preschoolers using questionnaire.
- To confirm the prevalence of voice problems using acoustic measures of voice quality.
- To investigate the differences if any to prevalence of voice problems across gender and school setup.
- To correlate the results of qualitative of questionnaire with quantitative analysis of voice quality estimates.

METHODS

Subjects

Total number of subjects comprised 320 children and equally distributed into 2 groups, first 3.5- 4.5yrs and second 4.5-5.5yrs. Each group consisted of 160 children of 80 girls and 80 boys. Equal number of subjects was chosen from schools of government and private aided setups. All the subjects were native speakers of telugu.

School selection

Examiner initially surveyed the details of the school, number of children prior to the study, the examiner contacted the school authorities in the town and sought their cooperation to the study. They were given objectives of the study depending on the consent provided, equal numbers of schools were chosen to represent the government and private aided setups.

The study was carried out in 8 government schools (anganwadis) and 8 private schools in the town of Yemmiganur.

Procedure: The study was carried out in 2 phases.

In Phase I: A questionnaire was developed by the investigator in Telugu language in line with voice conservation index Saniga and Carlin (1991) and Quick screen for voice and supplementary documents for identifying pediatric voice disorders Lee, Stemple, Glaze, and Kelchner (2004) to tap the presence of behaviors that were functional indicators of voice problems (FIVP).

Functional voice indicators of voice problems (FIVP) questionnaire consisted of four domains as listed below.

- Vocal abusive behaviors consisted of 8 questions.
- Reactions of significant others about voices of children, consisted of 4 questions.
- Voice related symptoms, consisted of 5 questions.
- Diet habits influencing voice, consisted of 3 questions. Listed in the appendix
- A score of "1" was assigned for yes, and "0" was assigned to no responses.

Validation of the questionnaire

The questionnaire was given to five experienced Speech Language Pathologists (SLP) for validation. A detailed method of the study was described to the valuator. They were requested to check the content in the questionnaire. Their views, suggestions and comments were duly incorporated in the questionnaire. Respondents of the questionnaire: The questionnaire was administered to 50% of parents and 50% of teachers of the chosen participants in the study. They were instructed to choose between the two binary choices namely, 'yes' and 'no' to indicate the presence or absence of functional indicators of the voice problems in the child. They were instructed to indicate only when these functional indicators of voice problems were persistent problems. Total responses of yes were calculated and converted into percentages under all the domains of questionnaire. Phase II quantitative analysis: using acoustic measures of involved voice quality measures and estimates. Samples of phonation of /a/ were collected from the subjects of both groups. Each subject was tested individually they were rewarded with tangible reinforces on completion of the task successfully.

Procedure

Initially, rapport was built with the children before the actual voice samples were elicited. Children were instructed to take deep breath and phonate /a/. The phonation was modeled 3-4 times before the actual sample was elicited. The recording of the voice samples was done using Olympus 16 bit voice recorder with 44,000Hz sampling frequency. These samples were collected in a relatively quiet environment within the school. Minimum of 3 phonation samples of /a/ were collected from each child and the best of the 3 trials was considered for acoustic analysis. A steady 2 seconds portion from the chosen trail was subjected for acoustic analysis. Acoustic analysis was done using Vocal Assessment profile of the Dr. Speech (Dr.

Speech 4.3u software, Tiger Electronics, Seattle, WA). The following parameters were extracted and then the quality estimates were noted

Four major parameters that signify voice quality were extracted.

- **Jitter:** The random variations in the periodicity of the Fundamental frequency. An indication of the pitch variability or pitch control instability.
- **Shimmer:** The random variations of voice amplitude between adjacent cycles of vocal fold vibrations. An indication of the voice intensity variability or instability.
- **Standard deviation of F0:** It is a measurement of the variability in statistical sampling of the Fo.
- **NNE:** It is a measure of turbulent noise energy in the vocalization.

Quality estimates of voice

This was based on the above four parameters the quality of voice is labeled as hoarseness, harshness and breathiness and also quantification is done numerically. A score of 1 indicates mild, 2 indicates moderate, and 3 indicates severe deviancy under each type.

Hoarseness: a voice that is characterized by a rough and husky voice quality, often thought as a combination of harshness and breathiness. eg: voice during an acute upper respiratory infection.

Harshness: a voice that is characterized by a rough, strained, dry and strident quality, often associated with increased levels of vocal effort.

Breathiness: a voice quality that is marked by the overlay of audible turbulent noise over a voice signal that is usually reduced in intensity. This condition is most often associated with voice pathologies that present with incomplete glottal closure.

Scoring: Labeling voice quality as "deviant voice" was done when sum total of 5 or more was obtained for the voice quality estimates.

Calculation of prevalence: The prevalence or proportion of individuals from a population that had the illness at one particular moment is the prevalence. The prevalence was calculated as follows,

Prevalence = number of people with the illness / total population

Statistical Analysis

Statistical analysis will be done by using Statistical Package for Social Science (SPSS) version 18.0 software. Qualitative analysis of questionnaire was done by chi-square analysis to know major precursors of comment on the vocal behaviors of the children. 4-way MANOVA was done to see the main effect of the acoustic parameters on age, gender and school setup. Correlation analysis was done for qualitative and quantitative using Spearman's Rank Correlation.

RESULTS AND DISCUSSION

The objective of the present study was to identify the prevalence of voice problems among preschoolers in a semi-urban setup. A total of 320 subjects were categorized into two groups. Among them, 160 children were from government and the remaining from private school setup. Table 1 summarizes the details of subjects.

Table 1. Distribution of subjects

Group 1				Group 2			
Male		Female		Male		Female	
Govt	Priv	Govt	Priv	Govt	Priv	Govt	Priv
40	40	40	40	40	40	40	40

The questionnaire “functional indicators of voice problems” was developed and used to obtain information about occurrence of voice problems in the subjects by their parents and teachers who were the respondents. The phonation samples were subjected to acoustic analysis and, voice quality parameters and estimates were extracted. The raw data were subjected to statistical analysis using Statistical Package of Social Sciences (SPSS) version 18. The responses of respondents were subjected to Chi-square analysis. The voice quality estimates were subjected to descriptive statistics for mean and standard deviation and, the four way multivariate analysis of variance (MANOVA) for finding the effect of voice quality parameters across groups, gender, and school setup. The grand total of voice quality estimates obtained as 5 and above was consider as deviant voice, based on which periodic prevalence was calculated. Voice quality and FIVP domains were correlated using spearman’s rank correlation.

The results are explained and discussed under the following subheads,

- Qualitative analysis
- Quantitative analysis
- Correlation between qualitative analysis and quantitative analysis

Qualitative analysis

The association effects on different domains of FIVP across groups, gender and school setup was studied using Chi-square test. These results are tabulated in Tables 2-4. Table 2 indicates the association effect for questions under different domains in the FIVP questionnaire across 2 groups. It can be observed that the percent affirmative responses were 57, 36, 14, 15 for the vocal abusive behaviors, reactions of significant others, voice related symptoms and diet habits influencing voice respectively for group 1. The percent responses were 61, 43, 16 and 15 for the second group under each domain considered, respectively. Though the scores were slightly more for group 2 in all domains except “diet habits influencing voice”, there was no significance noticed between the questions under different domains and groups. The results in the Table 2 indicate that older children indulge in vocal behaviors more frequently compared to younger children. This finding is similar to the findings of Carlin and Saniga (1993) who reported that vocal abuse related voice problems were more common in older children. Vocal abuse and other related voice behaviors could be more common in older children due to differences in play activities of these children.

In general, younger children are confined to home and indoor games where as older children are allowed to be in open environment and indulge in outdoor games more often. The responses to the domain “diet habits influencing voice” were same for both groups. This finding is similar to the results of Skinner, et.al, (2002), wherein, it was reported that the food preferences of children were not significantly different between ages 2-8. Table 3 indicates the association effect for questions under different domains in the FIVP questionnaire across gender. It can be observed that the percent affirmative responses were 59, 36, 18, and 19 for the vocal abusive behaviors, reactions of significant others, voice related symptoms and diet habits influencing voice respectively, for males. The percent responses were 59, 23, 12, and 15 for the females under each domain considered, respectively. Though males showed higher percentage of affirmative responses for other domains of FIVP, there were no significant differences except for “reactions to significant others” present across gender.

The responses for vocal abusive behaviors for both males and females were same indicating that both males and females subjects indulge in vocally abusive behaviors to the same extent. This inference is in contrast to the findings of Takeshita et al. (2009) reporting higher abusive behaviors in boys compared to girls. These results were attributed to the type of play boys indulged in and, the environment. Since boys involve more in outdoor play activities, the maintenance of vocal self control was difficult. Based on the findings of the present study, it can be inferred that the females could be indulging in excessive talking, loud talking, and also taking part in outdoor games as frequent as their male counterparts. For the domain “reactions of significant others”, responses of parents and teachers showed higher affirmatives for females compared to males. This might be due to the assumption of teachers and parents that females indulge more frequently in vocal acts like talking, than males. This difference is because girls are primarily interested in people and relationships. Girls are generally more sensitive to social and personal context and express their emotions through conversation. They also want to convey large chunks of information in a short span of time (Gurian, Henley & Trueman, 2001).

These could be the possible reasons for such findings. This was further supported by the findings of Takeshita et al. (2009) who opined that around 16% of children were talkative. They found that the voice deviations such as rough/hoarse voice quality were higher in talkative children. The increased responses for the domain “voice related symptoms” for males compared to females could be because of higher susceptibility to different airborne infections due to outdoor play. This could be possibly because boy’s tend to play more in open environment and, in diverse weather conditions (such as hot sun, in the rain etc). The increased responses for domain “diet habits influencing voice” for males was in agreement with the findings of Lucy, Cooke and Wardle (2005) suggesting that girls had healthier diet habits than boys. Table 4 indicates the association effect for questions under different domains in the FIVP questionnaire across school setup. It can be observed that the percent affirmative responses were 47, 22, 8 and 4 respectively for the vocal abusive behaviors, reactions of significant others, voice related symptoms diet habits influencing voice for government.

Table 2. Correlation of percent responses for FIVP across the groups

Domains	Response	Groups		Chi-square	df	P
		1	2			
Vocal abusive behaviors	Yes	57	61	4.34	6	0.63
Reactions of Significant others	Yes	36	43	8.34	4	0.77
Voice related Symptoms	Yes	14	16	2.32	4	0.51
Diet habits influencing voice	Yes	15	15	5.38	4	0.15

Table 3. Correlation of percent responses for questionnaire across gender

Domains	Responses	Gender		Chi-square	df	p
		Males	Females			
Vocal abusive behaviors	Yes	59	59	3.98	6	0.68
Reactions of Significant others	Yes	36	23	16.83	4	0.02
Voice related Symptoms	Yes	18	12	3.21	4	0.35
Diet habits influencing voice	Yes	19	13	2.85	4	0.42

Table 4. Correlation of percent responses for questionnaire across school setup

Domains	Responses	School %		Chi-square	df	P
		Govt	Priv			
Vocal abusive behaviors	Yes	47	71	32.47	6	0.00
Reactions of Significant others	Yes	22	41	15.16	4	0.04
Voice related symptoms	Yes	8	22	13.53	4	0.04
Diet habits influencing voice	Yes	4	27	33.43	4	0.00

Note: Govt- Government, Priv- Private

Table 5. The mean and standard deviation of voice quality parameters across groups, gender and school setup

Parameter	Government				Private			
	Group1		Group 2		Group1		Group2	
	M	F	M	F	M	F	M	F
Jitter	0.31 (0.24)	0.29 (0.13)	0.34 (0.18)	0.36 (0.37)	0.36 (0.26)	0.43 (0.44)	0.44 (0.41)	0.40 (0.23)
Shimmer	3.09 (1.57)	3.09 (1.08)	3.43 (1.35)	3.37 (1.50)	3.49 (1.81)	3.33 (1.74)	3.68 (1.47)	3.77 (1.46)
NNE	-14.21 (4.96)	-13.72 (4.60)	-10.55 (4.66)	-12.99 (4.60)	-13.93 (5.30)	-13.54 (6.39)	-11.10 (5.17)	-11.55 (4.43)
SDF0	2.84 (0.83)	3.23 (1.32)	2.76 (0.95)	2.94 (1.10)	3.07 (1.07)	3.60 (2.20)	3.28 (1.53)	3.27 (1.41)

Table 6. The F value and p values of voice quality parameters for groups, School setup and gender

Parameter	Groups		School setup		Gender	
	F	p	F	p	F	P
Jitter	1.33	0.24	5.43	0.02*	0.03	0.85
Shimmer	3.35	0.06	3.58	0.06	0.04	0.83
NNE	16.51	0.00**	0.34	0.55	0.78	0.38
SDF0	0.64	0.04*	5.60	0.02*	3.10	0.08

Note: F(1,304) **- p < 0.01, *- p < 0.05,

Table 7. Correlation of voice quality estimates with questionnaire

Domains	Voice quality estimates					
	Hoarseness		Harshness		Breathiness	
	r	p	r	p	r	P
Vocal abusive behaviors	0.141	0.24	0.05	0.62	0.15	0.20
Reactions of significant others	0.184	0.12	0.13	0.25	0.12	0.29
Voice related symptoms	0.004	0.97	0.08	0.48	0.013	0.91
Diet habits influencing voice	-0.019	0.87	-0.112	0.35	-0.04	0.71

The percent responses were 71, 41, 22, and 27 for private school in each domain considered respectively. The scores for all domains were increased significantly for private setup compared to government setup.

The findings of the present study could be due to differences in socio-economic status among children in private school setup and government school setup. Additional factor contributing to the findings would be the differences in respondent's attitude.

Also, the teachers and parents of children in private setup were more sensitive in suspecting voice problems, when compared to government schools. This might be due to the dual responsibilities of teachers in government setup, reducing the time spent with children. The educational and economic status of parents along with the lesser awareness about the voice problem could also be contributing to these findings.

Quantitative analysis

Quantitative analysis involved extraction of voice quality parameters and estimates for the phonation samples and confirmation of deviant voice in the subjects. The effects of voice quality parameters were compared across group, gender, and school setup using four-way MANOVA. Tables 5 and 6 represent the mean, F, p values of the voice quality measures. The jitter and shimmer values showed increased mean values for group 2 compared to group 1 across school setup indicating that jitter and shimmer values were higher for older children when compared to younger children. The NNE and SDF0, on the other hand were lower for the group 2 in contrast to group 1. However, these differences were not statistically significant for all the parameters, except NNE. These results could have been noticed because of increased vocal abusive behaviors in older children as shown in qualitative analysis. The mean values of voice quality parameters across the gender were statistically not significant. There was no obvious trend seen in the parameters across the gender. The variation in voice development across gender is considerably less pre pubescent males and females compared to post pubescent development.

The comparison of mean value across school setup showed that except NNE, all the parameters were higher for subjects in private setup compared to government setup. However, the statistical significance was noticed only for jitter and, SDF0. This could be attributed to poor vocal habits in older children which might result in glottal insufficiency, and altering voice quality. These findings draw support from the earlier studies by Yumoto, Sasaki, and Okamura (1984) and Eskenazi, Childers, and Hicks (1990) who reported that though jitter and shimmer are more specific measures of vocal perturbation, noise measures may be an important predictive factor of dysphonia. They also concluded that the morphological changes during childhood are significant and hinder the establishment of acoustic parameters in children.

Periodic prevalence: The periodic prevalence was calculated by using voice quality estimates. Subjects who scored grand total of 5 and above were labeled as deviant voices. Of the 320 subjects who participated in the study from Yemmiganur town in Andhra Pradesh, 71 subjects had deviant voices and the periodic prevalence was estimated as 22% in the given population. Among the 71 subjects identified with deviant voices, 51% were males and 49% were females. When periodic prevalence was calculated for deviant voices and school setup it was found that 42% of them were from government and 57% was from private setup. Earlier studies reported by Duff, Proctor and Yairi (2003) found a prevalence of 3.9% among a total of 2445 children. Carding et.al, (2006) reported clinicians identified a dysphonia prevalence of 6% compared with a parental report of 11% and Mckinnon et al., (2007) found it to be 1.51% for a total population of 10,425. Balakrishnan (1969) reported 3.8% of their population had dysphonias.

Mittal et. al., (1977) found voice defects in 10% for a total population of 327. All the above mentioned studies used perceptual analysis and the ratings were done by teachers /investigators, student trainees of Speech Language Pathology. The results of the present study found a prevalence of 22% for a population of 320 subjects which is high when compared to results reported in literature. This could be because of fact that acoustic analysis was carried out for the study. Acoustic analysis is an objective procedure which was quantitative in nature when compared to earlier studies where in perceptual analysis was carried out to calculate prevalence. In the present study the prevalence was found to be more in males compared to females. Mckinnon, Mcleod, Reilly (2007) reported 0.12% higher prevalence in males when compared to females which is in consonance with present findings. But Manohar & Jayaram (1973) reported 46% of boys and 73.47% of girls had dysphonia. This difference in the prevalence of voice disorder in children with gender as a factor could be due to the differences in the methodology considered between the two studies. In the present study the prevalence was calculated based on acoustic analysis, while Manohar and Jayaram (1973) used perceptual analysis by student SLPs. This could also be the reason for the higher prevalence reported in the present study. Increased prevalence for the private school setup compared to government as reported in the present study could be because of vocal demands from parents and teachers on the children could be more in private school setup compared to government school setup. In addition to the differences in the type of analysis for calculating prevalence, the higher percentage of prevalence reported in the present study could be due to high sensitivity of the software used for analysis. The presence of background noise while recording could have also contributed to the higher prevalence seen in this study.

Correlation between qualitative and quantitative analysis

Table 7: depicts the correlation between voice quality estimates and domains of FIVP. It showed that the correlation between voice quality estimates and all the domains of questionnaire were not significant ($p \geq 0.05$).

This might be due to following reasons,

Firstly, the coordination between respiratory and phonatory systems is not well developed in children. Hirano, Kurita, Nakashima (1980) reported that anatomical changes that occur in prepubescent years might impact the acoustic measures. Also, dramatic changes in the inner structures of the vocal folds occur in early childhood. The vocal fold structure of four-year-olds has a thicker mucosal layer than that in adults. Also, the vocal ligament is immature. The lamina propria is undifferentiated between collagen and elastic fibers (intermediate and deep layers) and this differentiation does not occur until 10 years of age. So, one might predict that these histological differences of the vocal fold in children would result in differences in the mechanical properties of the larynx. In addition to the above mentioned reasons, the back ground noise at the time of recording, and the addition of slight noise during the conversion of samples could have attributed to the increased noise component in the samples which in turn might have resulted in higher prevalence of deviant voice when acoustic analysis was considered. Secondly, the respondents' educational status, cultural background, and lifestyle could have also contributed. Also, lack of awareness about the FIVPs might have also contributed to voice problems.

Moreover the extent of effect of these factors on voice can vary depending on frequency and extent of occurrence of these factors. It also depends on the child's immune system and other factors related to the child health as some of children may be more prone immediately after 2 or 3 episodes of vocal abuse while some might be developing voice problem only after continuous usage of voice. Finally communication is usually conveyed using speech. Phonation is noted to be difficult to sustain than speech. Hence it was found difficult for the children to phonate accurately even after repeated trials. Factors such as excess mouth opening, aspirated phonation, expelling of saliva during phonation may influence the quantitative measures of voice.

Conclusion

The periodic prevalence was calculated by using voice quality estimates. Subjects who scored grand total of 5 and above were labeled as deviant voices. Of the 320 subjects children who participated in the study from Yemmiganur town in Andhra Pradesh, 71 children were identified to have deviant voices and the periodic prevalence was estimated as 22%. Among the 71 subjects identified with deviant voices, 51% were males and 49% were females. When periodic prevalence was checked for deviant voices across school setup, it was found that 42% of these subjects were from government and 57% were from private setup.

An increased prevalence percent in the present study might be because of methodological differences. Here, quantitative assessment was used as an indicator for deviant voice. But most of the studies in review were based on perceptual analysis, which is considered as a qualitative analysis procedure. Statistical correlation between the qualitative and quantitative assessment, i.e., domains of FIVP and voice quality estimates were negative indicating that functional indicators of voice problems did not show a relationship with any parameters of voice quality. This might be due to anatomical and physiological factors related to tolerance and sustenance of vocal demands on a regular basis. Results of the present study cannot be generalized owing to small sample size. Large number of subjects could not be considered due to the time constraints. Further research in this area may consider a long term study including larger population and check for differences in identification of Functional Indicators Voice Problems by teachers and parents.

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