



Prevalence of Children At-Risk for Developing Communication Disorders in the Urban Primary Schools of Dharwad

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Abstract

It is essential to estimate the prevalence of those at-risk for developing communication disorders in a specific area for their prevention, early identification and early rehabilitation. Availability of prevalence data helps in effective planning and implementation of rehabilitation services. The present study aimed to study the prevalence of school-going children at-risk for developing communication disorders and to estimate the distribution of such conditions across gender and grade in urban schools of Dharwad, North Karnataka. A total of 2241 children from Pre-Kindergarten (Pre-KG) to sixth grade were screened for risk of having communication disorders. The overall prevalence showed that around 10.3% of total children screened had risk of developing communication disorders. Among them, language disorders (40%) were found to be the highest followed by speech (29%) and hearing (9%). Further, 5% of the children had multiple disorders. Across gender, the prevalence was more in boys (61.2%) than girls (38.7%). Further, grade wise distribution showed higher occurrence of communication disorders from Upper-Kindergarten (UKG) to Grade 3. It can be concluded from the study that there is a high prevalence of school-going children at-risk for developing communication disorders. Hence, it is important to conduct regular speech and hearing screening in schools to enable early identification of the same.

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INTRODUCTION

The ability to communicate verbally is fundamental for the development and well-being of a child. Any impairment in communication can hinder a child's ability to learn effectively, to establish a meaningful and supportive relationship and to influence others. If not identified and treated early, a child with communication disorder is susceptible to poor educational outcomes and increased likelihood of social, emotional and mental health issues. The spectrum of communication disorders includes speech and language disorders which could be attributed to underlying conditions such as intellectual disability, hearing impairment, autism, learning disabilities, Specific Language Impairment (SLI), voice disorders, and fluency disorders (American Speech-Language-Hearing Association, 2016).

Over the last few years, several epidemiological studies have been conducted regarding the prevalence of communication disorders in Indian population. Singh et al. (1980) reported 7.3% prevalence of hearing impairment in the rural population of Lucknow. Kumar et al. (2008) reported 2.3% prevalence of mental retardation in Karnataka. National Sample Survey Organisation (2011) revealed that, in India, 19% of individuals have hearing impairment, 7% have speech impairment, 6% have mental retardation and 8% have multiple disabilities. A survey conducted by

Konadath, Jayaram, Maruthy, Gupta, and Swamy (2013) in the rural population of India reported that 6.07% of individuals are at-risk for communication disorders.

Sunderajan and Kanhere (2019) studied 1658 children in Maharashtra and reported that 2.53% children had speech and language disorders. Devadiga, Varghese, and Bhat (2014) conducted a retrospective study among individuals with speech, language and hearing impairment, in Mangaluru, Karnataka. In the total population studied, the prevalence of auditory disorders was 62%, whereas the prevalence of language and speech disorders was reported to be 24% & 14% respectively. Further, it was reported that among the language disorders, receptive-expressive language disorder (63.87%) was more prevalent and amongst the speech disorders, articulation disorders (48.4%) were more prevailing in the paediatric group. The study was conducted across pediatric, adult and geriatric groups. Among them, the pediatric group constituted 8.37% of the entire subjects.

A few studies estimated the prevalence of communication disorders in school-going children. Shanbal and Reddy (2015) screened 2010 school children for communication disorders. The children were 6 to 12 years old and were from the rural and urban regions of Mysuru. The results indicated that the more

prevalent disorders in school children include intellectual disability (10%), SLI (7.8%), multiple disorders (2.2%), and autism spectrum disorders (0.9%). Among the speech disorders, articulation/ phonological disorder was found to be more common (18.6%) compared to other speech disorders such as fluency disorders (10.8%), voice disorders (2.6%), childhood dysarthria (1.7%) and hypernasality with repaired cleft-lip and palate (1.3%). Dey et al. (2017) studied 6707 patients who visited audiology and speech language pathology wing of a tertiary care hospital in Faridkot, Punjab. Around 43% of the total patients were reported to have speech and language difficulties and all were aged below 10 years. Among them, cases with idiopathic delayed speech and language, mental retardation, cerebral palsy, and hearing impairment were also reported. Kumar and Mello (2006) screened 6591 children in Hyderabad. The results showed that 15.96% of the children were identified at-risk for hearing loss, 1.89% for speech and language problems and 0.76% for other disabilities.

The literature detailed above confirms that Indian studies investigating the prevalence of communication disorders in school children are limited. Further, studies done in India indicate that prevalence across different regions is not similar. Moreover, there is a dearth of published data in this regard in North Karnataka. Hence, the current study was conducted to establish the prevalence of children at-risk for developing communication disorders in the urban primary schools of Dharwad (a district in north karnataka) and to estimate their distribution across gender and grades.

METHODS

To determine the prevalence of children at-risk for developing communication disorders in urban primary schools in Dharwad, they were screened using formal/informal test procedures. The entire screening procedure was conducted by two Speech-Language Pathologists and Audiologists with more than five years of experience.

Participants

A total of 2241 school-going children from Pre-Kindergarden (Pre-KG) to sixth grade were screened for communication disorders. Distribution of children across grades is given in table 1. Among the 2241 children, 1125 were boys and 1116 were girls. All the schools were situated in the urban region of Dharwad district, Karnataka.

Material and Equipment

All the children underwent screening to detect problems related to hearing, articulation, fluency, voice as well as reading and writing. Hearing screening was conducted using a formal procedure given by American Speech Language and Hearing Association

(1997). Heine Mini 3000 FO otoscope was used to check for problems in the external ear. Pure-tone screening was carried out using ALPS AD 2000 diagnostic audiometers with telephonic TDH- 49 supra aural headphones. In contrast, speech and language abilities were screened informally through general conversation and story narration. The material used for speech and language screening were chosen from the Kannada language text books of their respective grade.

Procedure

All the procedures were carried out in a closed room in the school, away from the classrooms. The necessary permissions were obtained from the concerned authorities of the respective schools and the test procedures were explained to every child in a simple manner. The noise level inside the testing room was established using a sound level meter application available in the mobile phone. It was observed that the noise level varied between 45 and 55 dBA across schools. Hearing screening was conducted following an otoscopic examination. Prior to the hearing screening, behavioral calibration of the audiometers was conducted on five normal hearing young adults. Pure-tone screening was done at 500 Hz, 1 kHz, 2 kHz and 4 kHz for air-conduction. Children were instructed to raise their hand whenever the tone was audible. There were two trials conducted at each frequency to confirm the response. Based on the behavioral calibration, children with pure-tone thresholds higher than 25 dB HL at any one of the frequencies were referred. Further, those children with active ear discharge or ear pain were also referred for further evaluation.

In order to check for voice, fluency, articulation and language, children were screened informally through general conversation and/or story narration. The speech and language skills were perceptually evaluated during story narration and general conversation. Reading, writing and mathematics skills were informally screened. If required, the respective class teacher was interviewed to get further information regarding child's social skills, academic performance, functional and adaptive skills. Additionally, assessment of structure and function of oral mechanisms were carried out in all the children. Children who did not pass the screening tests were referred for diagnostic evaluation.

The results obtained were tabulated and subjected to statistical analysis using the statistical package for social sciences (SPSS) software (version -20). Descriptive statistics was done to study the prevalence and distribution of communication disorders across grades and gender.

RESULTS

Results of the study revealed that, among the 2241 children screened, 217 were found to be at-

Table 1: Distribution of children across grades

Grade	Boys	Girls	Total number of children	Mean age in years (Range)
Pre-KG	70	89	159	3 (3 to 5)
LKG	138	140	278	4 (3 to 5)
UKG	176	162	338	5 (4 to 6)
First	200	192	392	6 (5 to 7)
Second	152	164	316	7 (6 to 8)
Third	158	164	322	8 (7 to 9)
Fourth	80	69	149	9 (8 to 10)
Fifth	93	87	180	10 (9 to 11)
Sixth	58	49	107	11 (10 to 12)
Total	1125	1116	2241	

Note: Pre-KG= Pre-Kindergarten; LKG = Lower-Kindergarten, UKG = Upper-Kindergarten.

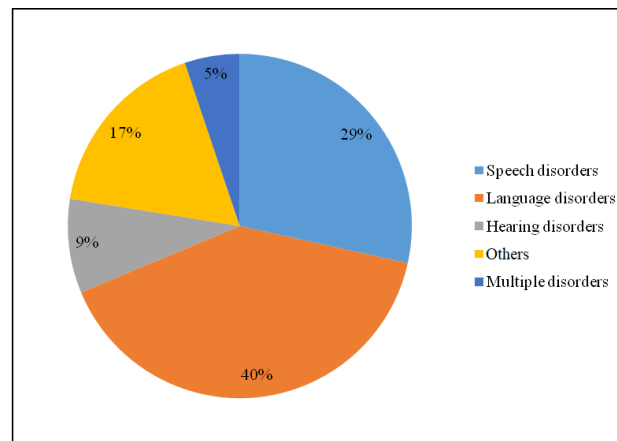


Figure 1: Overall distribution of communication disorders (Note: Others = ear wax, ear discharge and tongue tie).

Table 2: Distribution of different types of communication disorders

Disorders		Number of children	Percent (%)
Speech Disorders	Articulation/phonological errors	30	13.8
	Voice problems	27	12.4
	Dysfluencies	4	1.8
	Tongue tie with articulatory errors	3	1.4
Language Disorders	Reading and writing problems	64	29.5
	Language delay	16	7.4
	Poor social skills	4	1.8
	Poor functional and adaptive skills	2	0.9
Hearing Disorders	Reduced hearing sensitivity	17	7.8
	Reduced hearing sensitivity due to ear wax	2	0.9
Others	Ear wax only	29	13.4
	Tongue tie only	4	1.8
	Ear discharge	4	1.8
Multiple disorders		11	5.1

Table 3: Grade wise distribution of communication disorders

Grade/Disorders	Pre-KG	LKG	UKG	First	Second	Third	Fourth	Fifth
Speech Disorder	0	4	16	7	9	17	3	8
Language Disorder	9	7	8	14	14	17	7	11
Hearing Disorders	2	0	0	9	4	2	0	2
Others	2	0	18	8	4	2	1	1
Multiple disorders	1	1	0	1	0	4	4	0
Total	14	12	42	39	30	43	15	22

Note: Others = ear wax, tongue tie and ear discharge

Table 4: Distribution of different types of communication disorders across grades

Disorders	Pre-KG	LKG	UKG	First	Second	Third	Fourth	Fifth
Voice	0	3	2	4	3	8	1	6
Dysfluencies	0			0	1	2	0	1
Articulation/ phonological errors	0	1	12	3	4	7	2	1
Tongue tie with articulatory errors	0	0	0	0	1	0	0	0
Reading writing errors	0	5	4	12	10	17	6	10
Poor functional and adaptive skills	0	0	0	0	0	0	1	1
Language delay	8	1	3	2	2	0	0	0
Poor social skills	1	1	1	0	1	0	0	0
Reduced hearing	2	0	0	7	4	2	0	2
Ear wax and reduced hearing	0	0	0	2	0	0	0	0
Ear wax only	0	0	17	5	3	2	1	0
Tongue tie only	1	0	1	2	0	0	0	0
Ear discharge	1	0	0	1	1	0	0	1
Multiple conditions	1	1	0	1	0	4	4	0
	14	12	42	39	30	43	15	22

risk for developing communication disorders. Hence, overall prevalence of school going children at-risk for developing communication disorders in the urban area of Dharwad was 10.3%. Among these children, 86 of them were at-risk for developing language problems and 64 children were at-risk for developing speech problems. It was found that 19 children were at-risk for developing hearing disorders and risk for developing multiple disorders were identified in 11 children. 37 children were detected with other conditions such as ear wax, tongue tie and ear discharge. Overall distribution and distribution based on category of communication disorders are given in Figures 1 and 2 respectively.

Further, gender specific distribution showed that among 217 children at-risk for communication disorders, 133 were boys and 84 were girls indicating more prevalence in boys.

Grade wise distribution of communication disorders is given in tables 3 and 4. Relatively, higher risk for developing communication disorders was seen from UKG to 3rd Grade compared to other grades. Reading and writing errors were highly evident in these grades. Children exhibited difficulties in letter identification, confusions between upper case and lower case letters, illegible handwriting, multiple spelling mistakes, poor phonological awareness and poor phoneme grapheme correspondence. Risk for developing a Language delay (57.1%) was predominant in Pre KG children. Articulation/phonological errors (28.6%) and bilateral ear wax (40.5%) were relatively high in UKG children. Compared to all the other grades, first grade had more number of children at-risk for developing hearing loss (17.9%). While children in third grade (18.6%) and fifth grade (27.3%) were at-risk for voice disorders, multiple disorders were reported to be prevalent in fourth grade children (26.7 %).

DISCUSSION

The present study aimed at identifying the prevalence of school children at-risk for developing communication disorders in the urban area of Dharwad, Karnataka. The study also aimed to estimate the distribution of communication disorders across gender and grades. The overall prevalence showed that around 10.3% of total children screened were at-risk for developing communication disorders. Among them, language disorders were found to be the highest followed by speech and hearing disorders. The results of the present study are in accordance with the reports of Shanbal et al. (2015) where 2010 school children were screened for communication disorders. They found that around 11.5% of children had communication disorders and prevalence of language disorders were higher compared to other conditions.

Our findings showed that 29.5% of total population with communication disorders had reading and writing difficulties affecting their academic performances. Similarly, review of Indian literature reported significant number of school children having learning disability. Dhanda and Jagawath (2013) studied 1156 school children in the age range of 6-13 years in the rural area of Jaipur and reported 21.62% of children with dyslexia. The prevalence study on learning disability conducted at the L.T.M.G. Hospital, Mumbai (Hirisave, Oomen & Kapur, 2006) revealed that among the total number of 2,225 children visiting the hospital for certification of any kind of disability, 28.7% were diagnosed as having a Specific Learning Disability. Kuriyan and James (2018) reported 1-19% of school-going children in India to have learning disability. There are varying reports regarding the prevalence of learning disability in India. Padhy et al. (2016) reported 10%, Agarwal et al. (1991) found 13%, whereas Sridevi et al. (2015) reported 19%. These differences in prevalence could

be due to differences in geographical locations, population studied, socio economic status and screening procedures.

The findings of the study revealed that number of children with hearing impairment are lesser compared to studies carried out in other regions of Karnataka (Konadath, et al., 2013; Devadiga et al., 2014). The difference in findings could be probably due to different populations being studied. In the current study, all the children belonged to urban areas, where reduction in the number of hearing loss cases can be mainly attributed to healthcare accessibility, parental awareness, parental concern, standard of living index and nutritional status of the children (Rao, Subramanyan, Nair & Rajashekhar, 2002; Parvez, Khan, Hashmi & Khanet, 2016).

In the present study, 13.4% children were found to have bilateral impacted ear wax with no significant differences between genders. According to literature, impacted ear wax is considered as one of the common otological problems in school-going children that may or may not affect their hearing (Adegbiyi, Alabi, Olajuyin & Nwawolo, 2014; Akotey et al. 2017). Studies by Rathnaraajan, Maharajan, Nandhan and Kameswaran (2019) in Pondicherry (Tamilnadu), Adhikari et al. (2008) in Katmandu (Nepal), Ulaganathan & Shalini in Tiruchirapalli (Tamilnadu) and Rao et al. (2002) in coastal areas of South India report prevalence of impacted wax to be 29.86%, 60.6%, 45%, and 86.3% respectively in school children. Impacted wax often goes unnoticed by the parents and caregivers. This was also because most of such children were asymptomatic and therefore medical care was not sought.

The results of the present study indicated that the distribution of communication disorders was found to be greater in boys when compared to girls. Western as well as Indian studies have reported similar findings where ratio of boys with communication disorders were greater when compared to that of girls (Konadath et al., 2017; Binu, Sunil, Baburaj & Mohandas, 2014; Etchell et al., 2018; Mansson, 2000; Kogan et al., 2018). Though the specific cause for gender difference is still under investigation, literature sheds light on certain aspects. Adani and Capanec (2019) argues that women have an inherent advantage in the acquisition of communication and language system over men due to the functional organization in the brain. Lombardo et al. (2012) ascribe the gender differences to effects of sex hormones during fetal development, whereas whereas few others attribute such differences to the testosterone levels in amniotic fluid and the anatomy of language-related brain areas (Lutchmaya & Baron-Cohen, 2002; Knickmeyer & Baron-Cohen, 2006).

The results of the study revealed a high prevalence of school going children at risk for developing communication disorders. Further, communication disorders are more prevalent among boys compared to that of girls. However, the results of the

study should be interpreted with caution as the communication disorders were identified using screening procedures and not using any diagnostic procedures. This might have led to false positive results and an overestimation of the prevalence. Though some of the referred children were tested using diagnostic tests, their details were not available for the current study.

CONCLUSIONS

The present research aimed to study the prevalence of school-going children at-risk for developing communication disorders in Dharwad, Karnataka and also to estimate the distribution of communication disorders across gender and grade. The prevalence rate of those at-risk for developing communication disorders was 10.3%. From the current study, we can conclude that among the communication disorders reported, prevalence rate of language disorders was highest followed by speech and hearing disorders. This information could be used to develop a database which in turn would help in better understanding the prevalence of communication disorders in children studying in urban locality. This emphasizes on the need for increased awareness about language disorders in this region. Further, the prevalence of children with reading and writing difficulties indicates the need for creating awareness among parents and teachers to facilitate early identification of signs and symptoms leading to specific learning disability. Although the prevalence of those at-risk for disorders of speech, hearing and others were comparatively lesser, the mere presence of these conditions warrant attention. Early identification of such students can help in early institution of intervention and better prognosis. The present study is a preliminary attempt to establish region specific prevalence rate. Further, it is recommended to conduct prevalence studies in rural schools of Dharwad to compare the results across geographical areas. Since the present study did not aim at finding the causative factors for the existing prevalence, further studies are recommended in that direction.

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