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ORIGINAL ARTICLE

SEX & AGE-WISE DISTRIBUTION AND CAUSES OF DYSPHONIA IN CHILDREN

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ABSTRACT

Background: Dysphonia is common in children due to which they suffer adversely both at home and at school. The objectives of this study were to determine the sex & age-wise distribution and causes of dysphonia in children.

Materials & Methods: This descriptive cross-sectional study was conducted at the Department of ENT and Head & Neck surgery, Hayatabad Medical Complex, Peshawar, Pakistan from January 1, 2017 to December 31, 2018. Sample size consisted of 72 patients presenting with chronic dysphonia, selected using the non-probability consecutive sampling technique Inclusion criteria were children presenting with dysphonia for more than 4 weeks. Exclusion criteria were children with stammering, puberphonia, acute respiratory distress, deaf mutism, speech articulation and increased or decreased nasal twang in voice. The demographic variables were sex and age groups and research variables were causes of dysphonia. All variables except age being categorical were analyzed by frequency and percentages carried out using SPSS 16.0 for windows.

Results: Mean age of the sample of patients was 8.78+3.6 with range of 12 years (3-15). Out of 72 patients, 44(61.11%) were boys and 28(38.89%) girls with boy to girl ratio of 1.57:1. Chronic nonspecific laryngitis was the commonest etiology followed by reflux laryngitis. Functional dysphonia was noted only in girls and vocal nodules, vocal hematoma and post traumatic laryngeal stenosis were noted only in boys.

Conclusion: Chronic nonspecific laryngitis and reflux laryngitis were the commonest causes especially in males less than 9 years of age. Vocal nodules, vocal hematoma and post traumatic laryngeal stenosis were found only in boys and functional dysphonia was noted only in adolescent girls.

KEY WORDS: Dysphonia; Paediatric Age; Vocal Nodules; Voice Disorders; Laryngitis.

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INTRODUCTION

Dysphonia commonly known as hoarseness is a broad term used to describe abnormal voice changes and include voice fatigue, strain, increased harshness and abnormal loudness & pitch. Voice disorders in children are very common presentation. Unless severe enough, they receive little attention from both parents and the physicians. For most part, in 42.1% of cases dysphonia is short lived and occurs due to acute laryngitis following an episode of upper respiratory tract infection.[1]

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Changes in structure and function of the developing paediatric larynx can lead to dysphonia and this may occur for a number of reasons[2]. These changes are usually secondary to disorders of the true vocal cords which may be congenital or acquired. Therefore the causes may be anatomic, infectious, traumatic, inflammatory, neurologic or neoplastic in nature.[3]

Epidemiologic studies on prevalence of paediatric dysphonia are rare in literature. Carding et al examined the prevalence of dysphonia in a cohort of 7389 children at age 8 years and found that 6% of them had dysphonia.[4] Other studies reported wide variationsbetween 6% to 38% of in school aged children. Another study quoting these figures at 4% to 30%[5,6]. Most voice surveys were conducted over 30 years ago and their relevance to modern day paediatric population is not clear.[7]

The most frequent cause of chronic childhood dysphonia is vocal nodules (38-78%). Vocal fold lesions such as oedema, webs, polyps comprise 13.3%[8,9].

Other causes include gastro-oesophageal reflux disease (GERD) and juvenile respiratory papillomatosis and very rarely malignancies. The prevalence of respiratory papillomatosis is 1.11 – 2.59 per 100,000 children.[10] The role of GERD in the causation of various ENT problems has been cited by many but remains to be established with reasonable certainity. However, it is gaining increasing attention as an aetiologic factor for various aerodigestive tract disorders including chronic dysphonia. The exact prevalence of GERD in children is not known but it is estimated that 1 in 5 children suffer from this disorder.[11]

The management of chronic dysphonia in children varies considerably and depends largely upon the availability of expertise and resources. A thorough history taking and clinical examination including flexible endoscopy and micro-laryngoscopy remain at the center of making a correct diagnosis. Imaging studies are seldom required. Voice analysis by an expert and video-stroboscopy are modern day modalities to assess children with chronic dysphonia. Appropriate surgery and speech therapy play a key role in management of dysphonic children. The objectives of this study were to determine the sex & age-wise distribution and causes of dysphonia in children.

MATERIALS AND METHODS

This descriptive cross-sectional study was conducted at the Department of ENT and Head & Neck surgery, Hayatabad Medical Complex, Peshawar, Pakistan from January 1, 2017 to December 31, 2018. Sample size consisted of 72 patients presenting with chronic dysphonia were selected using the non-probability consecutive sampling technique. Sample size was calculated from an online calculator; margin of error of 9.68%, confidence level of 90%, estimated population 20,000/- and response distribution of 50%. Inclusion criteria were children presenting with dysphonia for more than 4 weeks. Exclusion criteria were children with stammering, puberphonia, acute respiratory distress, deaf mutism, speech articulation and increased or decreased nasal twang in voice.

The procedure was explained and Informed consent was obtained from parents. Ethical approval for the study was obtained from institutional ethical committee. A detailed history was obtained about the onset, duration, severity and persistence of hoarseness. A probe was made regarding the relieving & aggravating factors. Associated symptoms like sore throat, cough, nasal obstruction, nasal and postnasal discharge, difficulty in swallowing, heartburn, water brash and haemoptysis were enquired into. A detailed ENT examination was performed. The ears were examined to exclude local pathology. The oral cavity and pharynx were examined for any inflammation, mass, sensations, the hard and soft palates were looked for clefting & palatalmovements. Nose was examined for any discharge, inflammation and pathology. The paranasal sinuses were palpated to elicit tenderness. X-Ray sinuses were obtained to exclude sinusitis. CT and MRI were employed when there was a suspicion of malignancy. Hematological investigations were carried out when indicated. Endoscopic direct laryngoscopy using 70^0rigid telescope was carried out to examine the supraglottis, vocal cords, valleculae and the interarytenoid area. Microlaryngoscopy was carried out under general anaesthesia when endoscopic D/L was difficult, did not reveal any lesion and the problem persisted for more than 04weeksor when removal of lesion was undertaken. The findings obtained on clinical, endoscopic, microlaryngoscopic and biopsy examinations were documented on a proforma. The demographic variables were sex, age and age groups (3-6, 7-9, 10-12, 13-15) and research variables were causes of dysphonia. All variables except age being categorical were analyzed by frequency and percentages carried out using SPSS 16.0 for windows.

RESULTS

Mean age of the sample of patients was 8.78±3.6 with range of 12 years (3-15). Out of 72 patients, 44 (61.11%) were boys and 28 (38.89%) girls with boy to girl ratio of 1.57:1. (Table 1)

The various age groups included in the study are shown with majority of the children falling in age group 3-9 years. (Table 2)

Chronic nonspecific laryngitis was the commonest cause followed by reflux laryngitis. (Table 3)

Functional dysphonia was noted only in girls and vocal nodules, vocal haematoma and post traumatic laryngeal stenosis were noted only in boys. (Table 4)

DISCUSSION

We found chronic nonspecific laryngitis in 29% of children. It is quite difficult to ascribe chronic laryn-

Table1. Sex of children in sample and population with dysphonia in Hayatabad Medical Complex, Peshawar, Pakistan (n=72).

Sex	Frequency	Percentage	95% CI for Proportion
Boys	44	61.11	49.85-72.35
Girls	28	38.89	27.63-50.15
Total	72	100	--

Table2. Age groups of the children in sample and population with dysphonia in Hayatabad Medical Complex, Peshawar, Pakistan (n=72).

Age Group	Frequency	Percentage	95% CI for Proportion
3-6 years	21	29.2	18.70-39.70
7-9 years	24	33.3	22.41-44.19
10-12 years	13	18.1	9.21-26.99
13-15 years	14	19.4	10.27-28.53
Total	72	100.0	--

Table3. Causes of dysphonia in sample and population in children with dysphonia in Hayatabad Medical Complex, Peshawar, Pakistan (n=72).

S. No.	Causes of dysphonia	Frequency	Percentage	95% CI of Proportion
1	Chronic non-specific laryngitis	21	29.16	18.66-39.66
2	Vocal nodules	7	9.72	2.88-16.56
3	Vocal polyp	4	5.55	0.26-10.84
4	Reflux laryngitis	18	25	15.00-35.00
5	Vocal hematoma	2	2.77	-1.02 -- 6.56
6	Vocal cyst	3	4.16	0.45-8.77
7	Muscle tension dysphonia	8	11.11	3.85-18.37
8	Functional dysphonia	5	6.94	1.07-12.81
9	Juvenile onset recurrent respiratory papillomatosis	2	2.77	-1.02 – 6.56
10	Post traumatic laryngeal stenosis	2	2.77	-1.02 – 6.56
Total		72	100	--

Table 4: Causes of dysphonia sex-wise in children with dysphonia in Hayatabad Medical Complex, Peshawar, Pakistan (n=72).

S.No.	Causes of dysphonia	Boys		Girls	
		Frequency	Percentage	Frequency	Percentage
1	Chronic laryngitis	14	19.45	7	7.72
2	Vocal nodules	7	9.72	0	0
3	Vocal polyp	3	4.16	1	1.38
4	Reflux laryngitis	10	13.89	8	11.11
5	Vocal hematoma	2	2.78	0	0
6	Vocal cyst	2	2.78	1	1.38
7	Muscle tension dysphonia	3	4.16	5	6.95
8	Functional dysphonia	0	0	5	6.95
9	Juvenile onset recurrent respiratory papillomatosis	1	1.38	1	1.38
10	Post traumatic laryngeal stenosis	2	2.78	0	0
Total		44	61.11	28	38.89

gitis to any single cause. The causes are many and usually are present simultaneously. These were the cases in which reflux was less likely as compared to other causes of laryngitis. In one large review based on PubMed and Cochrane review using American Academy of otolaryngology and Head & Neck Surgery guidelines, chronic laryngitis was shown to be responsible for 9.7% of the visits to ENT clinics for dysphonia.[1]

Upper respiratory tract infections in children are fairly common. This picture may further be complicated by secondary bacterial infections that lead to sinusitis and post nasal dripping. The presence of nasal allergies, recurrent episodes of viral and bacterial infections is cause for persistent symptoms and chronicity.[12]

Persistent hoarseness in children is commonly due to benign lesions of the vocal cords such as nodules, polyps, hemorrhage, hematoma. Vocal nodules are the most common cause of chronic hoarseness in school aged children. The majority these lesions occur in boys particularly at the age of 9 years[13, 14].This finding conforms to the findings of our study. We found vocal nodules in 9.7% of the children and all were boys.

Juvenile recurrent respiratory papillomatosis (RRP) is most often diagnosed in children aged 1-3 years and is a rare disease[15]. A persistent hoarse voice that progresses to noisy breathing and shortness of breath on exertion raises the suspicion its presence. Frequent recurrence of disease and repeated surgeries aimed at removal of the papillomata leads to chronic inflammation and permanent damage due to scarring. The exact prevalence and incidence of RRP is not known but one large survey conducted in two US cities, Atlanta and Seattle, in 1996involving children of <18yrs found an incidence of 0.4/100,000 children aged <16 years.[16] We found 2 children affected by the disease as proven by biopsy taken during microlaryngoscopy.

Gastro-oesophageal reflux in children is fairly common as reported by various studies. Gumpert and colleagues reported that 62% of children with chronic hoarseness had gastro-oesophageal reflux in their study.[17] The next year Contencin P and colleagues while studying the effect of gastro-oesophageal reflux on laryngitis found that 59% of the children in their study had pathological reflux.[18] However Michael F and colleagues in a review studying cause and effect of GERD and laryngitis concluded that although GERD was associated with laryngeal signs and symptoms; the frequency of this association was not well established.[19] This may be because patients who present with dysphonia frequently have symptoms of both allergy and reflux and it is difficult to determine the main causative factor on clinical examination of the larynx.[20] We diagnosed 25% of children with reflux laryngitis mainly on the basis of history, clinical examination and endoscopic findings suggestive of gastro-esophageal reflux. The lower number of patients in this study may be due to lack of proper facilities such as oesophageal pH monitoring and manometer. Thus, quite a number of patients with gastro-oesophageal reflux might have been missed.

Compared to adults, blunt laryngotracheal trauma is rarely encountered in the paediatric population and the injuries are less severe.[21] A review published by Oosthuizen, blunt laryngeal trauma in children accounted for less than 1% of trauma to the head and neck region. We found two adolescent boys who had sustained blunt trauma to the neck with resultant scarring distorting the architecture of the larynx and a persistent hoarse voice.

According to Angelillo N and colleagues, out of 312 dysphonic children ageing between 2&16 years, 17.6% had no visible or identifiable vocal cord lesion[7], whereas muscle tension dysphonia in our study is in 11.11% cases.

CONCLUSION

Chronic nonspecific laryngitis and reflux laryngitis were the commonest causes especially in males less than 9 years of age. Vocal nodules, vocal hematoma and post traumatic laryngeal stenosis were found only in boys and functional dysphonia was noted only in adolescent girls.

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CONFLICT OF INTEREST
Authors declare no conflict of interest.
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AUTHORS' CONTRIBUTION

The following authors have made substantial contributions to the manuscript as under:

Conception or Design:	KA, SK
Acquisition, Analysis or Interpretation of Data:	KA, SK, MAA, MJ, MIK, IS
Manuscript Writing & Approval:	KA, SK, MAA, MJ, MIK, IS

All the authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.