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Predisposing factors of childhood dysphonia in primary school children



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Abstract

Background: Although dysphonia is a common symptom in children, there is lack of mass screening studies to cover its prevalence rate in the Egyptian Alexandrian schools. The aim of the work was to screen Alexandrian school-age children for dysphonia in order to determine the prevalence and to detect its possible predisposing factors. The study was carried out on 1913 school children (4th-6th grade), age range of 9-13 years and presenting the seven Alexandrian Educational districts. All patients were screened for the presence of dysphonia. The grade of dysphonia was assessed by a phoniatician using perceptual auditory evaluation. Determination of possible predisposing factors was done through the application of a questionnaire. Only 317 students responded to the questionnaire.

Results: There was a significant difference between dysphonic and non-dysphonic as regards gender, and school grade. Having a smoking family member and conducting activities requiring high vocal demands were recorded with the highest percentage among dysphonic children.

Conclusion: The Study revealed a prevalence rate of childhood Dysphonia of 12.4%. The presence of chest problems, prolonged loud cry, temperament personality and passive smoking predisposed to dysphonia in primary school students.

Keywords: Childhood dysphonia, Hoarseness of voice, Dysphonia

Background

The childhood dysphonia is reported by various researchers to have a wide range of incidence that range from 4.4% to 38%, but the researchers agreed that the peak age for emergence of childhood dysphonia is between 5 and 10 years [1–9]. Dysphonia is a common symptom in children, and has adverse etiologies [10]. The etiologies, range from self-limiting diseases such as acute viral laryngitis to life-threatening disabling injuries, such as tumors or laryngeal stenosis of varying degrees [11, 12]. Dysphonia may result from inappropriate vocal behavior or an imbalance of anatomical, physiological, social, emotional and/or environmental factors. The predisposing and aggravating factors for dysphonia were grouped into five categories: [1] Inadequate vocal habits,

physical and psychological factors, personality structure, phonic inadequacy and allergic factors. Dysphonia may adversely impact a child's general health, communicative effectiveness, social (affective –emotional) [6] development, educational development, self-esteem, self-image, and participation in school group activities [13]. Thus identification and management of childhood dysphonia is important for the child's educational, psychosocial development, physical health and emotional health. One common method of identifying childhood communication disorders in general and childhood dysphonia in particular is through mass screening [14]. This may be considered as an important part of the protocol of evaluation. In 2012, a study was conducted in Dakahlia governate to identify communication disorders in nursery school children. The study revealed a prevalence rate for voice disorders of 2.4% [15] As far as we know, those children was not subjected to prevalence and incidence

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studies of childhood dysphonia at school age especially that school conditions of governmental schools are very challenging. High crowding index, and high noise levels ratios are among these challenging aspects. These extreme school conditions may alter suspected predisposing factors for childhood dysphonia. Angelillo et al 2008 indicated that the pathogenesis of the dysphonia in pediatric age, is not only determined by how the child uses his voice but also how it is used within the surrounding environment.¹⁶

Aim of the work

The aim of the work is to screen Egyptian school-age children for childhood dysphonia in order to determine its prevalence rate and to detect the possible predisposing factors for childhood dysphonia among Egyptian primary school children.

Methods

The study samples consisted of 1913 school children. They represented the seven Educational districts. (Fig. 1) The males constituted 958 (50.1%) of studied sample while females constituted 958 (49.9%) they were almost equally selected. They were all in 4th, 5th and 6th grades and they were distributed as follows 637,639,637 respectively. Their ages ranged from 9 to 13 years with a mean and standard deviation of 10.6±4.2 years. The school noise level was determined using sound level meter, the recordings of noise level were documented hourly during morning school periods.

All students were subjected to a clinical interview for pointing out dysphonic children. The dysphonia was further evaluated by auditory perceptual assessment using modified GRBAS scale to determine the overall grade of dysphonia. Recording of the voice sample was further

assessed by the second author and a trained senior resident for interrater reliability assessment. Parents were further asked to fulfill a questionnaire that consisted of 20 Yes/No questions. These questions entailed inquiries about possible predisposing factors for childhood dysphonia in addition to some questions that confirm and describe the personal perception of the present problem to confirm the persistence of the problem. Only 317 of the students completed the questionnaire given previously and were committed to fulfill it again after one month for determination of reliability of their answers. The Dysphonic students were referred for voice evaluation, but only 35 of the students actually came for further assessment and video endoscopic assessment in the unit of phoniatrics

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. Qualitative data were described using number and percent. Significance of the obtained results was judged at the 5% level. The used tests were Chi-square test for categorical variables, to compare between different groups. Retests were taken for determination of reliability. Cronbach alpha and Spearman coefficient were calculated.

Results

Figure 1 represent the distribution of the 1913 students according to the 7 educational districts, Egypt and the number and percentage of dysphonic students in each district. Dysphonic students represented about 238 (12.4%) of the total number of sample students as assessed using auditory perceptual assessment. The interrater reliability of degree of dysphonia was r=0.82. The overall grade of dysphonia (G) was 1 in 66% of the

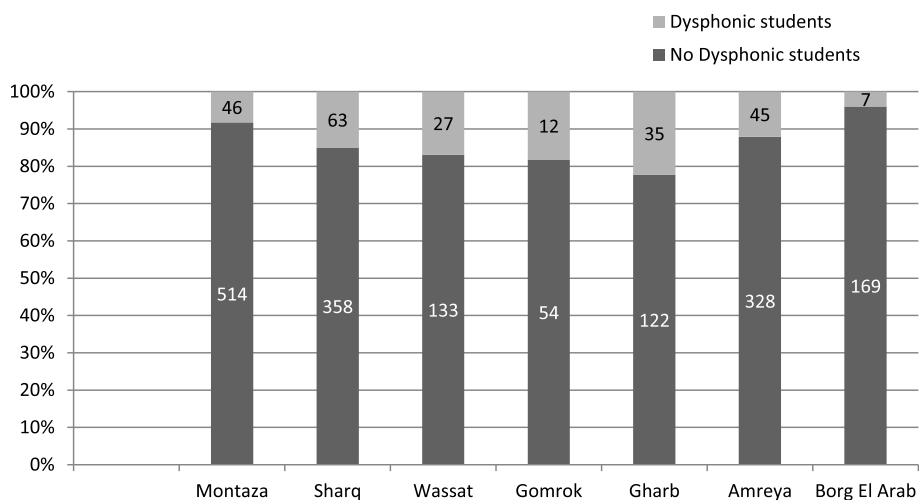


Figure 1 show the distribution of dysphonic and nondysphonic students in each 7 Alexandria Educational district.

dysphonia studied students, while G2 was perceived in the rest of them. 153 (64%) of the dysphonic students were males while the rest were females and a significant relation between dysphonia and gender has been found ($X^2 = 19.14, p = 0.000$). 85 (35%) children were in school grade four at the time of the study 56 (23.5%) children were in grade five while 97 (41.5%) children were in grade six. Significant difference as regards the presence and absence of dysphonia between school grades has been found ($X^2 13.38 p = 0.001$). Change of voice was reported to be a persistent complaints and of concern for students or teachers in 121 (51%) of children, while the rest indicated that the change of voice was temporary and was associated with upper respiratory tract infection. 289 out of the 317 children were non-dysphonic, while the rest [16] of the children were dysphonic and represented 8.8 % of the studied sample responding to the questionnaire. The dysphonic children were 15(53%) females and 13 (47%) males. The questionnaire used for spotting the predisposing factors was statistically reliable by Cronbach alpha (0.94) using test-retest method. Table 1 shows the distribution of the total studied sample regarding the responses to the questionnaire. The highest percentage of positive answers (42%) was recorded in question Q19 which inquiries about passive smoking. Also using loud voice during sport activities (Q1) was recorded with 32%. The Predisposing factors for childhood dysphonia revealed by questionnaire indicated that the presence of chest problems, prolonged period of crying with loud voice, temperament personality and passive smoking predisposed to dysphonic in primary school students (Table 2).

Follow up of suspected cases at the unit of Phoniatics using endoscopic examination revealed that 16 students showed signs of habitual hyperfunctional dysphonia, 13 students were diagnosed as having vocal fold nodules and three students had vocal fold cysts.

Discussion

Dysphonia prevalence indices, reported in the literature, vary between 4.4% and 38% [17–20]. The present study revealed a prevalence rate of 12.4%. We would like to believe that temporary dysphonia, which is most probably due to transient upper respiratory infection, should not be included when calculating the prevalence rate, thus if dysphonia related to temporary etiologies were excluded, the prevalence rate would drop to about 6.5%. Fuchs et al also questioned whether all children with dysphonia should be considered as patients with voice disorder [21]. Carding et.al suggested that using the different assessment methods to document prevalence rate may help the reduction of the variability in prevalence rates reported [2]. Variability in the rate was also justified by the need of the parents to commute to the

hospital in order to undergo the evaluation which was not always possible and by the little collaboration of the children [22]. It was noticed that the Alexandria educational districts showed variable prevalence rates. The highest percentage of dysphonic children was found in educational districts of higher noise ratios and high class crowding index. Unfortunately, there is lack of reports documenting noise levels and class crowding index or even documented data to allow accurate measurements thereby we depended on personal observation of sound level meters' recordings, which was about 60 dB in some schools during lessons and about 80dB during the school breaks. The students at this challenging environment will practice phonotrauma and phonotrauma especially in a noisy environment was mentioned to be the most important worsening factor associated with vocal symptoms [22]. The present study revealed that the overall grade of dysphonia perceived was G1 and G2. Although Travares et. al revealed similar auditory perceptual analyses they claimed that mild changes in the voice quality parameters are commonly seen in children's voices and must not be considered pathological. They only appreciated the vocal changes scored only on the G parameter above 1 for the calculation of the dysphonia prevalence [22]. It was noticed that males predominated females in the occurrence of dysphonia this was also reported by several studies [23, 24]. Interestingly, adult voice disorders (especially nonorganic dysphonias) are more common in females [25]. The awareness of parents, severity of perceived dysphonia as well as the underlying pathologies may explain this discrepancy. One cannot overlook for example the fact that low pitched rough voices may be seen of signs of manhood for boys and are accepted in the Egyptian culture and thus parents will not see that of a sign requiring medical care. The higher prevalence of dysphonic children found in the six grade students may indicate that older students are more aware of their voice quality problem and that the voice complaint may show a consistent pattern. The lower prevalence rate recorded in nursery school may emphasize this finding [15]. The smaller number of children responding to the questionnaire was due to the drop outs from research as students were required to change of schools due to variable reasons e.g. changing residence or transference to a secondary school. Of course awareness of some parents as well as students, has driven them to seek medical advice later especially when dysphonia became a chronic complaint and shows some handicapping signs. The presence of chest disorders, prolonged period of crying with loud, temperament personality and passive smoking predisposed to dysphonic in primary school students as revealed by the present study. We would like to relate chest disorders in part to passive smoking as well as to being allergic and suffering

Table 1 represents the questionnaire and the responses of the studied students to the questions

Negative	Positive	Question number
67.8%	32.2%	1-Does the child practice any sports requiring voice use?
95.3%	4.7%	2-Does the school teacher demand elevation of the voice?
98.1%	1.9%	3-Does the voice problem become worse during school days than in summer?
96.5%	3.5%	4-Does the child suffer from any hearing problems?
98.4%	1.6%	5-Does the child suffer from any psychological problems?
80.1%	19.9%	6-Does the child suffer from repeated attacks of upper respiratory tract infections?
93.1%	6.9%	7-Does the child suffer from any chest problems?
95.9%	4.1%	8-Is his voice change noticeable?
97.5%	2.5%	9-Does his change of voice problem affect his/her academic performance?
96.8%	3.2%	10-Does the child suffer from repeated attacks of coughing during speech?
98.4%	1.6%	11-Are congested neck veins noticed during speech?
85.8%	14.2%	12-Is the child a screamer?
83.9%	16.1%	13-Does the child cry with loud voice for prolonged periods?
72.9%	27.1%	14-Is the child "temperamental"?
75.4%	24.6%	15-Does the child speak for long periods of time using a loud voice?
90.5%	9.5%	16-Is the voice break noticed during speech?
94.6%	5.4%	17-Is his/her voice change noticed by his/her peers?
93.7%	6.3%	18-Did the school teacher pay any comments on his/her voice change?
58.0%	42%	19-Is there a smoker in his/her family?
95.0%	5%	20-Does the child take part in school choir?

from asthma in case of atopic children. Smoking may additionally initiate coughing which causes vocal trauma. Carding et al also [2] studied common risk factors for dysphonia as asthma, regular conductive hearing loss, and frequent upper respiratory infection and indicated that Asthma has long been described as a possible cause of voice problems in adults [26, 27]. Pediatric dysphonia may also worsen by respiratory allergies and nasal obstruction, which were also stressed on in some studies [2, 16, 28, 29]. Being temperamental and frequent crier reported in the present research, are very much related and may stand for personal/ psychological factors predisposing to dysphonia by causing vocal overload. Stivanin et al on the other hand claimed that there is no significant relation between dysphonia and psychiatric

disorders [30] while Kotby et al indicated that there is evidence psychological background for a number of non-organic childhood dysphonia [31]. Vocal abuse, associated with bearing a high phonatory demand are in many cases, followed by an increase in voice intensity, especially in children, and hyperfunctional peaks with muscle-skeletal stress. This phonatory pattern causes the traumatic collision of the vocal folds and then the development of laryngeal lesions, such as vocal nodules [17, 32]. The present study found that habitual voice disorders which result mainly of vocal abuse and misuse are most frequently diagnosed followed by vocal childhood nodules. Normal videolaryngoscopy exams in many children with vocal symptoms; characterize the functional dysphonia cases, responsible for most of the infantile

Table 2 The significant correlation between the presence of dysphonia and possible predisposing factors.

Questions Number		Non Dysphonic (n=28)	Dysphonic No(n=289)		P value
Q7:Chest disorder	No	94.8%	75%	15.6863	<0.001*
	Yes	5.2%	25%		
Q13: Cry for long periods	No	85.5%	67.9%	8.0378	0.045*
	Yes	14.5%	32.1%		
Q14:Temperamental	No	74.4%	57.1%	6.3945	0.01447*
	Yes	25.6%	42.9%		
Q19: Smoking parent	No	59.9%	39.3%	8.4497	0.003651*
	Yes	40.1%	60.7%		

P value significant at 0.05

dysphonia [2]. These disorders are characterized by an exaggerated contraction of the intrinsic and extrinsic laryngeal muscles, resulting in a traumatic collision of the vocal folds and a posterior triangular glottic gap. It was also reported that the most frequently diagnosed laryngeal lesions in the videolaryngoscopic exam were: vocal nodules, mucosal thickening and inflammatory processes according to Tavares et al' [22]

Conclusion

The Study revealed a prevalence rate of childhood Dysphonia of 12.4%. There was a significant difference between dysphonic and non-dysphonic children as regards gender, and school grade. Presence of chest problems, prolonged loud cry and passive smoking predisposed to dysphonia in primary school students. Habitual voice disorders are more commonly seen among school age children.

Recommendation

The extend of the screening studies for dysphonia to a wider number and age groups of children and to detect the incidence rate of dysphonia in school age children in order to increase parents, school teachers and primary school children awareness of childhood dysphonia and its predisposing factors.

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Authors' contributions

The first author Prof Dr MM designed the work , collected the data. The second author Dr RM analysed and interpreted the data. The manuscript has been read and approved by all authors. Each author believes that the manuscript represents honest work. All authors read and approved the final manuscript.

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Availability of data and materials

All data generated or analysed during this study are included in this published article

Declarations

Ethics approval and consent to participate

The ethics committee's name:
Faculty of Medicine, Alexandria university
Reference number: 0301872
Date of approval: 6/3/2013
It is a prospective study.

Informed written consent was taken from the patient to participate in the study; it was approved by ethics committee
Parents' of the participants in the case of children under 16 years old:
Informed written consent to participate was taken.

Consent for publication

A written informed consent was taken from the participants for publication.
A written informed consent was taken from the parents' of the participants in the case of children under 16 years old.

Competing interests

No conflict of interest

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