

Comparison of prevalence of various ENT diseases and hearing impairment among children of government schools versus private schools of Mardan

Sumera Akram¹, Muhammad Ahmed Khan², Abdul Rehman³, Kamran Zamurrad Malik⁴, Jehangir Ahmed Afridi⁴

¹Bacha Khan Medical College and Mardan Medical Complex, Mardan, Pakistan, ²ENT Department, CMH Mardan, Pakistan, ³Bahawal Victoria Hospital, Bahawalpur, ⁴ENT Department, CMH Nowshera, Pakistan

Correspondence to: Dr. Muhammad Ahmed Khan, Email: akawan79@gmail.com

ABSTRACT

Background: School children are frequently afflicted with ENT diseases. The diseases and their associated complications, especially hearing impairment, can be devastating to the children and families alike. Socioeconomic status of children can have strong effect on frequency of various ENT diseases. The objective of this study is to compare the frequency of various ENT diseases among children studying in government schools versus those in private schools of district Mardan.

Subjects and methods: A cross-sectional descriptive study was carried out at Mardan from July to December 2019. The researchers visited four schools (two government and two private schools) in Mardan district. Relevant history was obtained and physical examination was done to find out the frequency of various ENT diseases. The data variables (age, gender, ENT diseases, hearing impairment) were noted in research Performa and data was entered and analysed in SPSS 21 software. Frequencies were determine for age, gender and ENT diseases. Independent t-test was used to analyze quantitative variables, while Chi-square was used to analyze qualitative variables. A p-value less than 0.05 was taken as significant.

Results: Total 2986 children were examined in 4 schools. The mean age of the children was 11 years. There were 56% boys and 44% girls. Total 2106 children were examined in two government schools and 880 children were examined in two private schools. The frequency of impacted cerumen was 18.4% (21.2% of government school children versus 11.4% of private school children; $p < 0.05$). Frequency of allergic rhinitis was 9.7% (9.5% of government school children versus 10.1% of private school children; $p = 0.635$). The frequency of chronic suppurative otitis media (CSOM) in government school children was 4.9% versus 2.5% among those in private schools ($p < 0.05$). In this study cumulative prevalence of hearing impairment was 26.8%, where prevalence in government school children was 30.9% versus 17.2% in private schools (p -value < 0.001). The causes of hearing impairment were impacted ear cerumen (68.3%), CSOM (15.7%), otitis externa (6.2%), OME (4.1%), otitis media (2.8%), congenital ear deformities (1.6%) and foreign bodies in ear (1.2%). The main causes of hearing impairment in majority of children were impacted cerumen and CSOM in 84% children.

Conclusion: Various ENT diseases like impacted cerumen, rhinosinusitis, allergic rhinitis, pharyngitis, tonsillitis and CSOM are common in school going children. Impacted cerumen and CSOM are significantly more prevalent in government school children as compared to private schools which are primary cause of hearing impairment in children leading to significantly high prevalence of hearing impairment in government school children.

Keywords:

Children, School, Government, Private, ENT diseases

INTRODUCTION

School children are frequently afflicted with ear, nose and throat (ENT) diseases. Morbidity associated with ENT diseases and the complications associated with them, especially hearing impairment, can be devastating to the child and family alike. Normal and healthy

hearing is essential for adequate learning of children at schools. The prevalence and incidence of various ENT diseases is dependent on the socioeconomic conditions, living standards and hygiene. Significant association has been reported between ear diseases e.g. chronic suppurative otitis media and low socioeconomic status.^{1,2} In addition, literacy rate is very low in this country and people have a trend of consulting quacks for their ailments instead of visiting medical health facilities because of illiteracy and lack of awareness. Many individuals in community even manage these problems without seeking specialist help.² Consequent

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to the lack of efficient primary health care, lack of health awareness, poverty and various community trends, there is tremendous increase in morbidities associated with various preventable diseases. Low socioeconomic groups (low class) are particularly at risk as compared to high socioeconomic (high or middle class). The government schools in Pakistan offer almost free education and books catering education to children of low socioeconomic class whereas private schools have enormous fee structure and expenses so only the children belonging to well-off, higher economic class with better living conditions study in these schools. Majority of population falls in low socioeconomic category and government schools remain the major source of education for children. Aim of this study was to compare the frequency of various ENT diseases in school children studying in government schools versus those in private schools with objective to study the effect of socioeconomic conditions on frequency of these diseases.

SUBJECTS AND METHODS

The authors visited four schools (two government schools & two private schools) in the district Mardan. Permission was taken from ethical review board for subject purpose and consent was taken from concerned authorities (principals/headmasters) and all students. The children were divided in two groups on basis of government and private schools. Two government schools including Government High School Mardan and Government School Maho Dheri Mardan and two private schools, Hira School and College Mardan and Iqra Public School, Mardan, were visited. Relevant history was taken and examination of all children was carried out to find out the frequency of various ENT diseases. The students who were absent from school due to any reason, were examined after their joining back on next visit. Complete ENT examination was carried out of all the students. Hearing was assessed clinically and with help of tuning fork tests (Rinnes test and Weber test). Ear examination was performed with ear speculum and otoscope. Nose was examined through rhinoscopy and throat was examined adequately with disposable tongue depressors. Battery operated headlights were used for thorough examination. Impacted cerumen was diagnosed on ear examination with adequate-sized ear speculum under headlight. In children pinna (external ear) was pulled downward and backward to straighten external auditory meatus. In older children, pinna was pulled upward and backward. Cerumen is easily visible in form of yellow to

brown coloured wax. Rhinosinusitis was defined as mucosal inflammation of nasal and paranasal sinuses. Patient had complaints of flu, fever, nasal congestion, headache etc. Typical symptoms, signs and nasal examination via rhinoscopy confirms it.³⁻⁵ Allergic rhinitis was diagnosed through history and nasal examination. Typical history of nasal itching, sneezing, congestion and rhinorrhoea along with bluish or swollen turbinates on rhinoscopy confirmed allergic rhinitis.³ Pharyngitis was defined as inflammation of pharyngeal and adjacent mucosa, mostly viral in etiology but bacteria are also involved. Adequate examination of oral cavity was sufficient to diagnose pharyngitis. Tonsillitis was defined on relevant history (odynophagia, dysphagia, pain throat, fever etc.) and inflammation and swelling of tonsillar tissue.³ Chronic suppurative otitis media (CSOM) was defined as perforated ear drum with discharging ear for more than 2 – 6 weeks. History along with ear examination with ear speculum confirms CSOM (chronic suppurative otitis media).³⁻⁵ Otitis externa was considered when inflammation was confined to external auditory meatus.⁴ Tragal tenderness in addition to symptoms of otalgia and ear blockage pointed towards its diagnosis. Acute otitis media was diagnosed through history of ear pain along with redness of tympanic membrane visible on otoscopy or via ear speculum. Symptoms of otitis media with effusion comprise of hearing loss, delay in speech development or aural fullness. Ear examination may reveal dull ear drum with fluid and/or bubbles behind the drum. Nasal polyps are polypoidal nasal mass visible on anterior rhinoscopy. Patient complaints of nasal blockage and de-nasal speech.³ Two groups were later compared in terms of frequency of various ENT diseases. Data collected included ages, gender and frequency of various ENT diseases found. Simple descriptive statistics were used to describe frequencies and percentages. Chi square was used for comparison of qualitative variables and independent t test for quantitative variables. A p-value less than 0.05 was taken as significant.

RESULTS

Total 2986 children were examined in 4 schools. Age ranged from 5 to 17 years with mean of 11.01±3.74 years. There were 1672 (56%) boys and 1314 (44%) girls. Total 2106 children were examined in the two government schools and 880 children were examined in the two private schools. Most common ENT disease found was ear wax (18.4%), followed by rhinosinusitis (15.6%), allergic rhinitis (9.7%), pharyngitis (9.3%),

Table 1. Frequency of various ENT diseases in government school children versus private school children

Disease	Type of school		Total cases n (%)	p-value
	Public sector n (%)	Private sector n (%)		
Impacted ear wax	447 (21.2%)	101 (11.4%)	548 (18.4%)	0.000
Rhinitis/Rhinosinusitis	323 (15.3%)	142 (16.1%)	465 (15.6%)	0.580
Allergic rhinitis	201 (9.5%)	89(10.1%)	290 (9.7%)	0.635
Pharyngitis	199 (9.4%)	81 (9.2%)	280 (9.3%)	0.891
Tonsillitis	113 (5.3%)	49 (5.5%)	162 (5.4%)	0.791
CSOM	104 (4.9%)	22 (2.5%)	126 (4.2%)	0.002
Otitis externa	93 (4.6%)	33 (3.7%)	126 (4.2%)	0.484
Otitis media	28 (1.3%)	10 (1.1)	38 (1.3%)	0.858
Otitis media with effusion	24 (1.1%)	9 (1.1%)	33 (1.1%)	0.850
Nasal polyps	19 (0.9%)	4 (0.5%)	23 (0.8%)	0.255
Foreign body ear	17 (0.8%)	6 (0.6%)	23 (0.8%)	0.822
Congenital ear deformity	11 (0.5%)	2 (0.2%)	13 (0.4%)	0.376

tonsillitis (5.4%), CSOM (4.2%), OME (1.1%), otitis externa (4.2%), otitis media (1.3%), nasal polyps (0.8%), foreign body ear (0.8%) and congenital deformities of ear (0.4%).

Frequency of impacted cerumen in school children was 18.4%. Impacted cerumen was found in 21.2% of government school children and in 11.4% of private school children ($p < 0.05$). Rhinosinusitis was seen in 15.6% of school children. Frequency of rhinitis/rhinosinusitis was 15.3% among government school children versus 16.1% among private school children ($p > 0.05$). Frequency of allergic rhinitis came out to be 9.7%. Allergic rhinitis was found in 9.5% of government school children versus 10.1% of private school children ($p > 0.05$). Pharyngitis was seen in 9.3% children. Its frequency in government school children was 9.4% versus 9.2% in private school children ($p > 0.05$). Tonsillitis frequency came out to be 5.4% in children with 5.3% of government school children versus 5.5% in private schools ($p > 0.05$). The frequency of CSOM in government school children was 4.9% versus 2.5% among private school children ($p < 0.05$). The frequencies of other ENT diseases and the among government school children and private school children are summarized in Table 1. It is evident from the results that impacted cerumen and CSOM (chronic suppurative otitis media) are prevalent significantly more in government school children representing lower socioeconomic family status.

There were total 802 children with hearing impairment. Out of them, 651 (79.6%) were government school children and 151 (20.4%) were private school children. Majority of children had mild hearing impairment i.e. 739 (92.1%), and 63 (7.9%) had moderate hearing impairment as shown in Table 2. There was no case of severe hearing impairment. The frequency of hearing impairment was higher in

government school children (79.6%) versus private schools (20.4%).

Prevalence of hearing impairment in present study was 26.8% (802 out of total 2986 children). Prevalence in government school children was 30.9% (651 out of 2106 children) and in private schools 17.2% (151 out of 880 children); p -value < 0.001 (significantly more in government schools).

The causes of hearing impairment were impacted ear cerumen (68.3%), CSOM (15.7%), otitis externa (6.2%), OME (4.1%), otitis media (2.8%), congenital ear deformities (1.6%) and foreign bodies in ear (1.2%). The main causes of hearing impairment in majority of children were impacted cerumen and CSOM in 84% children. Other causes comprised a small percentage as shown in Table 3. All the causes except CSOM and congenital deformities are easily treatable. The frequency of various causes eventuating hearing impairment were almost similar in both government schools and private schools as shown in Table 3.

DISCUSSION

Hearing is an important special sense of mankind. One needs adequate sense of hearing for communication. Children rely on hearing for learning. Healthy hearing is required for kids not only for conversing and learning but for cognition as well.³ Children develop their articulation and language through hearing different words spoken to them in their initial phase of life. If they are suffering from any disease which is affecting hearing, it will hamper their articulation, language development and communication. This may drastically affect their future. Ear wax is a silent condition which causes mild degree of hearing impairment. Even mild hearing loss (up to 30 dB) affects performance and learning of school children. Ear wax was the most common ENT disorder found in school children. In

Table 2. Hearing Impairment in school children

Degrees of hearing Impairment	Type of school		Total cases n (%)	p-value
	Public sector n (%)	Private sector n (%)		
Mild hearing impairment	605 (92.9%)	134 (88.7%)	739 (92.1%)	<0.001
Moderate hearing impairment	46 (7.1%)	17 (11.3%)	63 (7.9%)	

Table 3. Causes of hearing impairment in children

Causes of Hearing Impairment	Type of school		Total cases n (%)
	Public sector n (%)	Private sector n (%)	
Impacted ear wax	447 (68.7%)	101 (66.8%)	548 (68.3%)
CSOM	104 (15.9%)	22 (14.6%)	126 (15.7%)
Otitis externa	41 (6.3%)	9 (5.9%)	50 (6.2%)
Otitis media with effusion	24 (3.7%)	9 (5.9%)	33 (4.1%)
Otitis media	17 (2.6%)	5 (3.3%)	23 (2.8%)
Congenital ear deformity	11 (1.7%)	2 (1.3%)	13 (1.6%)
Foreign body ears	7 (1.1%)	3 (1.9%)	10 (1.2%)

previous studies, frequency of impacted cerumen has been reported varying from 8.6% to 28.2%.⁴⁻⁶ In this study, frequency of impacted ear wax in government school children was 21.2% versus 11.4% in private school children. Cumulative frequency was 18.4%. Prevalence of rhinosinusitis varies from 6 to 15% cases.⁷ Rhinosinusitis was seen in 15.6% children. 15.3% of government school children versus 16.1% of private school children were suffering from rhinitis/rhinosinusitis. Frequency of rhinosinusitis in Shangla valley school children was reported as 11.6% which is slightly less as compared to current study.⁸ Rhinosinusitis is caused by viruses in majority of cases and spreads through contact and droplets. Less than 2% cases are caused by bacteria.⁷ Allergic rhinitis is symptomatic manifestations induced after exposure of allergens to nose and is mediated by IgE related inflammation of nasal mucosa.⁹ Allergic rhinitis is a common disease which affects 10% to 20% of general population.¹⁰ In the present study 9.5% of government school children had allergic rhinitis as compared to 10.1% of private school children which is almost similar. Hypersensitivity due to atopy to allergens, is not dependent on socio-economic factors, thus similar frequencies in low and high socioeconomic classes. The prevalence of allergic rhinitis is said to be increasing with time.¹⁰ CSOM is a significant and common ailment in resource constraint countries. In our study prevalence of CSOM came out to be 4.9% among government school children and 2.5% among private school children. Impacted cerumen and CSOM were observed as significantly more prevalent in lower socioeconomic families' children as compared to higher socioeconomic children in this study. Hussain and colleagues showed prevalence of CSOM in private schools as 7% versus 12.2% in government schools, which is higher than our study.¹¹ Adhikari and

coworkers have shown 5.1% prevalence of CSOM in urban areas versus 2.3% in rural areas.¹² It is the most common cause of mild to moderate hearing loss in children.¹³ *Pseudomonas aeruginosa* and *Staphylococcus aureus* are most common microorganism involved in CSOM.¹⁴ Pharyngitis and tonsillitis is defined as inflammation of pharyngeal and tonsils secondary to infection. Mainly these are caused by viruses, but bacteria are also responsible for tonsillitis, pharyngitis and pharyngotonsillitis.^{15,16} Group A beta haemolytic streptococci are notorious causative micro-organisms as they are associated with serious complications like rheumatic fever and glomerulonephritis.¹⁶ Frequency of pharyngitis and tonsillitis in our study was 9.4% and 5.4% respectively. Zeeshan and coauthors reported frequency of pharyngitis and tonsillitis as 8.4% and 15.6% respectively.¹⁸ Follicular tonsillitis is associated with dreadful complications if it is not adequately treated. Complications include parapharyngeal abscess, retropharyngeal abscess, rheumatic fever, reactive arthritis and post streptococcal glomerulonephritis.¹⁹ Rheumatic fever and post streptococcal glomerulonephritis are lifelong morbidities requiring frequent follow ups and interventions, affecting quality of life and economic burden on parents and health care system. This class difference in schools obviously results in difference in frequencies of diseases afflicting the children studying in the two school systems. However, frequencies of rest of ENT disorders including otitis media with effusion, otitis externa, otitis media, nasal polyps, congenital ear disorders and foreign body ear were quite less and almost same in both groups i.e. government and private school children. Foreign bodies removed from ears of children included pieces of pencil lead, chalk pieces, stones, beads, paper pieces, insects, cotton pieces etc. Foreign bodies were removed

carefully, in cases of impacted foreign bodies children were sent to hospital for required procedures. Very few of school going children especially those of government schools present to the concerned specialists for their ailments because of lack of efficient health care system, lack of health education and poverty.⁸

Hearing impairment has been declared an important health problem in resource constraint countries where screening for hearing is not routinely performed in school children⁶. In our study cumulative prevalence of hearing impairment was 26.8% where prevalence in government school children was 30.9% and 17.2% in private schools. Prevalence of hearing impairment in our study was higher than other studies of Pakistan.^{21,22} Elahi et al showed 9.7% prevalence of hearing impairment in rural areas.²⁰ Hussain T et al found 13.6% hearing impaired children in Karachi.²¹ On the other hand, Jalali et al showed a very low prevalence in Iran (2.1%).²² Elbeltagy showed even a higher prevalence of hearing impairment in school children i.e. 23% and showed association with attention, communication and performance of children at school.²³ Similarly, Su et al has shown poor academic performance and achievements in children with hearing impairment.²⁴ There is need to incorporate hearing screening programmes in our country for all school children and treat them to improve academic performance of children and reduce morbidity as majority of cases are easily treatable. ENT examination of school children should also be made mandatory to pick relevant diseases and plan their treatment.

Therefore, it is recommended to provide efficient health care to children by the government and the awareness level of parents should also be enhanced through education and campaigns. Needless to say; improvement in health care system of children especially in growing and learning phase of life is of paramount significance.

CONCLUSION

Various ENT diseases like impacted cerumen, rhinosinusitis, allergic rhinitis, pharyngitis, tonsillitis and CSOM are common in school going children. Impacted cerumen and CSOM are significantly more prevalent in government school children as compared to private schools which are primary cause of hearing impairment in children leading to significantly high prevalence of hearing impairment in government school children.

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