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Role of parental socio-educational factors on prevalence of paediatric otological disorders

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ABSTRACT

Background: Parental socioeconomic status, often designated by education and occupation is likely to have significant implications in children's otological health. Hence the present school screening study was formulated in an attempt to establish the role of these factors on the prevalence of various ear diseases and related hearing impairment in children.
Methods: A total of 346 lower primary school children, in the age group of 5-10 years were included in this cross sectional study. Details pertaining to the socioeconomic background of children were collected by questionnaire method. All children were initially evaluated by otoscopy and tuning fork testing and those having equivocal or abnormal tuning fork test results were subjected to pure tone audiometry and tympanometry.
Results: There was significantly higher prevalence of hearing impairment among children of mothers with lower maternal educational status (13.2% versus 6.3%, (p=0.04, Odds ratio (95% CI) 2.27 (1.004-5.13)). Normal ear findings were noticed significantly higher among children with higher paternal (62.3% versus 47.7%) and maternal (59.1% versus 45.7%) educational status.
Conclusions: Favourable parental socio-educational factors, especially maternal education have a significant positive impact on children's otological health.

Keywords: Ear diseases, Hearing loss, Children, Educational status, Social conditions

INTRODUCTION

Hearing impairment and related ear diseases constitute a major public health problem in the developing world which can have devastating and detrimental effects on children's social, linguistic and academic development. Even mild degrees of hearing loss in children can interfere with effective learning in noisy classroom conditions, which is typically an auditory verbal environment where effective communication among students and teachers is essential for proper learning.[1] Therefore, minimal hearing impairment is noticed to have adverse effects on the academic performance as well as functional development of the affected children.[2-4] Hence effective school screening programmes are essential for timely identification and treatment of the often underestimated minimal hearing impairment and related ear diseases, thereby reducing the chances for permanent repercussions in children's overall development.

Parental socioeconomic status, often designated by education and occupation is likely to have significant implications in children's otological health. Children grown up in lower socioeconomic environment are prone to be at an auditory disadvantage compared with children who come from more privileged circumstances.[5-7] Understanding this social patterning of ear diseases is important while generating or modifying national health

programmes. In this context, the present school screening study was formulated in an attempt to establish the role of parental socio-educational factors prevailing in our south Indian rural community, in relation with the prevalence of various ear diseases and related hearing impairment in children.

METHODS

This is a cross-sectional study conducted among children studying in lower primary schools in the age group of 5-10 years. Study period was from December 2012 - August 2014. At first, all primary schools within 10 km of our tertiary care centre, Dr. Somervell Memorial C.S.I. Medical College and Hospital, Karakonam situated in rural Trivandrum district, Kerala, India were enumerated. From these, 7 schools were selected by random sampling technique.

After explaining the study details to the school management, consent was obtained. A detailed questionnaire was issued before the date of screening to be filled in by the parents, which contains details pertaining to the socioeconomic background of children including parental education and occupation as well as informed consent.

A total of 346 lower primary school children were included in the study. During screening, otoscopic examination followed by tuning fork testing was done using 512 Hz tuning fork by residents pursuing Masters in ENT. Initially Rinne, Weber and absolute bone conduction tests were performed in all children and those with equivocal or abnormal test results were subjected to screening audiometry. It was performed using a calibrated Classic I portable audiometer, in the quietest room in each school, by a qualified audiologist. All children having air conduction threshold levels more than 20 dB at any of 0.5K, 1K, 2K or 4K were considered to have 'possible hearing loss'. These children were referred to the ENT department in our tertiary care centre, for further detailed audiometric evaluation on a later date. A pure tone average above 25 dB at 0.5K, 1K, 2K and 4K was considered as abnormal.

Data analysis

The data collected was entered in Microsoft Excel and was analysed using SPSS software. The socio-demographic factors including age, gender, parental education, parental occupation etc. were tabulated. Based on Kuppuswamy's socioeconomic scale, the educational levels were classified into illiterate, primary, middle and high school (secondary) certificate, intermediate/ post high school diploma/pre degree/ plus two/ higher secondary, graduate/ post graduate and professional levels.[8] Parental occupation was categorised into unskilled worker, semi-skilled worker, skilled worker, clerical/ farmer, semi-professional and professional.

The prevalence of various ear diseases and co existing hearing impairment were calculated. The association between ear diseases and various socioeconomic factors were computed by bi-variable analysis using Chi square test and Odd's ratio with 95% confidence interval. P value less than 0.05 was considered to be statistically significant.

RESULTS

A total of 346 lower primary school children, in the age group of 5-10 years were included in the in the study. Out of this, 169 (48.8%) were males and 177 (51.2%) were females (Figure 1). The mean age was 7.61.

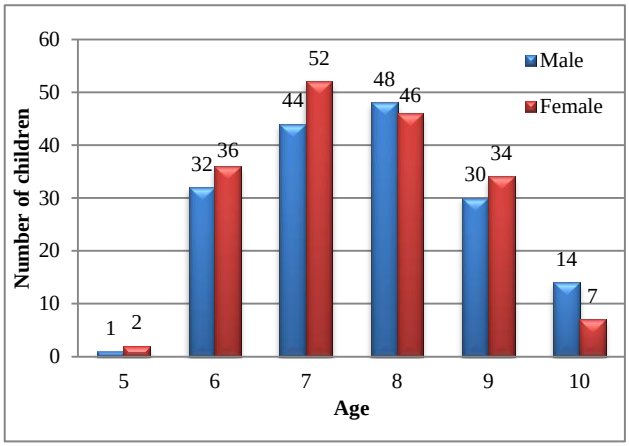

Figure 1: Age and gender distribution (n=346).

Pattern of ear diseases

The most common ear condition detected among the school children in the specified age group was cerumen impaction, found in 39.0% of children. Details of the pattern of ear diseases are shown in Table 1. Varying degrees of hearing impairment was noticed in 37 children, i.e. 10.70% of the study population, of which 34 cases had conductive and 3 cases had sensorineural hearing loss.

Table 1: Prevalence of various ear diseases (n=346).

Ear disease	Affected individuals	
	N	%
External ear		
Cerumen impaction	135	39.0
Foreign body	1	0.3
Middle ear		
Acute otitis media	3	0.9
Chronic otitis media	1	0.3
Otitis media with effusion	17	4.9
Eustachian tube dysfunction	13	3.8
Inner ear		
Sensorineural hearing loss	3	0.9

Significance of positive history in identifying paediatric hearing impairment

On analysing the significance of positive history in relation with the actual presence of hearing impairment, it was found that only 40.5% of cases having hearing impairment had been already suspected by the parents (Table 2).

Table 2: Hearing impairment versus positive history (n=346).

History of hearing impairment	Hearing impairment		
	Present	Absent	Total
	N (%)	N (%)	N (%)
Present	15 (40.5)	3 (1.0)	18 (5.2)
Absent	22 (59.5)	306 (99.0)	328 (94.8)
Total	37 (100.0)	309 (100.0)	346 (100.0)

Socioeconomic background of children

Depending on the educational status, the parents were divided into group 1 (below or up to secondary level i.e. high school level) and group 2 (up to higher secondary, graduation or post-graduation levels). Majority of parents were belonged to group 1 (277 cases i.e., 80.01% of fathers and 219 cases i.e. 63.29% of mothers). Interestingly, a higher percentage of mothers (36.71%) had studied up to higher secondary, graduation and post-graduation levels compared to fathers (19.99%). Details of educational status of parents are depicted in Table 3.

Table 3: Parental educational status (n=346).

Education level		Father		Mother	
		N	%	N	%
Group 1	Illiterate	1	0.30	0	0.00
	Primary school certificate	11	3.20	7	2.00
	Middle school certificate	50	14.50	33	9.50
	High school certificate	215	62.10	179	51.70
Group 2	Higher secondary	25	7.20	70	20.20
	Graduate/ post graduate	39	11.30	55	15.90
	Professional degree	5	1.40	2	0.60
Total		346	100	346	100

On considering the occupation of parents, they were divided into group A (unemployed and unskilled worker) and group B (semiskilled worker, skilled worker and professional). 66.47% of fathers (230 out of 346 cases) and 93.35% of mothers (323 out of 346 cases) belonged to group A and rest in group B. Details are shown in Table 4.

Table 4: Parental occupation (n=346).

Type of occupation		Father		Mother	
		N	%	N	%
Group A	Unemployed	0	0.00	301	87.00
	Unskilled worker	230	66.50	22	6.40
Group B	Skilled worker	74	21.40	7	2.00
	Clerical/ farmer	23	6.65	0	0.00
	Semi professional	14	4.05	14	4.00
	Professional	5	1.40	2	0.60
Total		346	100	346	100

Role of parental socio-educational factors on the prevalence of various ear diseases

Bi-variable analysis using chi-square test was done to find out the association between various ear pathologies and socio-educational factors.

Hearing impairment

On considering the role of parental education on hearing impairment of children (Table 5), no statistically significant association was noticed between paternal education or occupation and presence of hearing loss in children. However, statistically significant association was found between educational status of mothers and presence of hearing loss in children. Prevalence of hearing impairment was 13.2% in group 1 where as it was only 6.3% in group 2 with higher educational status of mothers. Moreover, 78.4% (29 out of 37 cases) of children with hearing impairment had maternal educational status below or up to secondary level (group 1).

Considering maternal occupation, prevalence of hearing impairment was lower among children of skilled workers and professionals compared to children of unemployed and unskilled workers (4.3% in group B versus 11.1% in group A). But this difference was not statistically significant. Moreover, mothers of 97.3% of children (36 out of 37) with hearing impairment were either unemployed or unskilled workers.

Cerumen impaction

On analysing the role of paternal education on cerumen impaction in children, the prevalence of the latter was found to be 42.6% in group 1 and 24.6% in group 2 respectively. This difference was found to be statistically significant. Out of the 135 children with cerumen impaction, 118 (87.4%) had paternal educational status below or up to secondary level (group 1).

Table 5: Role of parental socio-educational factors on hearing impairment (n=346).

Social factor		Hearing impairment			Odds ratio (95% CI)	P value
		Present	Absent	Total		
		N (%)	N (%)	N (%)		
Education of father	Up to secondary school (Group 1)	29 (10.5)	248 (89.5)	277 (100.0)	0.892 (0.39 - 2.05)	0.79
	Above secondary school (Group 2)	8 (11.6)	61 (88.4)	69 (100.0)		
	Total	37 (10.7)	309 (89.3)	346 (100.0)		
Education of mother	Up to secondary school (Group 1)	29 (13.2)	190 (86.8)	219 (100.0)	2.27 (1.004 - 5.13)	0.04
	Above secondary school (Group 2)	8 (6.3)	119 (93.7)	127 (100.0)		
	Total	37 (10.7)	309 (89.3)	346 (100.0)		
Occupation of father	Unemployed and unskilled worker (Group A)	24 (10.4)	206 (89.6)	230 (100.0)	0.92 (0.45 - 1.89)	0.83
	Skilled worker and professional (Group B)	13 (11.2)	103 (88.8)	116 (100.0)		
	Total	37 (10.7)	309 (89.3)	346 (100.0)		
Occupation of mother	Unemployed and unskilled worker (Group A)	36 (11.1)	287 (88.9)	323 (100.0)	2.76 (0.36 - 21.09)	0.49
	Skilled worker and professional (Group B)	1 (4.3)	22 (95.7)	23 (100.0)		
	Total	37 (10.7)	309 (89.3)	346 (100.0)		

Table 6: Role of parental socio-educational factors on cerumen impaction (n=346).

Social factor		Cerumen impaction			Odds ratio (95% CI)	P value
		Present	Absent	Total		
		N (%)	N (%)	N (%)		
Education of father	Up to secondary school (Group 1)	118 (42.6)	159 (57.4)	277 (100.0)	2.27 (1.25-4.12)	0.01
	Above secondary school (Group 2)	17 (24.6)	52 (75.4)	69 (100.0)		
	Total	135 (39.0)	211 (61.0)	346 (100.0)		
Education of mother	Up to secondary school (Group 1)	95 (43.4)	124 (56.6)	219 (100.0)	1.67 (1.05-2.64)	0.03
	Above secondary school (Group 2)	40 (31.5)	87 (68.5)	127 (100.0)		
	Total	135 (39.0)	211 (61.0)	346 (100.0)		
Occupation of father	Unemployed and unskilled worker (Group A)	99 (43.0)	131 (57.0)	230 (100.0)	1.68 (1.05-2.69)	0.04
	Skilled worker and professional (Group B)	36 (31.0)	80 (69.0)	116 (100.0)		
	Total	135 (39.0)	211 (61.0)	346 (100.0)		
Occupation of mother	Unemployed and unskilled worker (Group A)	130 (40.2)	193 (59.8)	323 (100.0)	2.43 (0.88-6.69)	0.12
	Skilled worker and professional (Group B)	5(21.7)	18 (78.3)	23 (100.0)		
	Total	135 (39.0)	211 (61.0)	346 (100.0)		

On considering maternal education, cerumen impaction was found in 43.4% in group 1 and 31.5% in group 2, and this difference was also found to be statistically significant. Moreover, 70.4% (95 out of 135 cases) of children with impacted wax had maternal educational status below or up to secondary level.

On analysing the role of paternal occupation, the prevalence of impacted wax was significantly higher among children whose fathers belonged to group A (43.0%), compared to group B (31.0%). Maternal occupation also seemed to have a similar effect with 40.2% of prevalence of impacted wax in group A and 21.7% prevalence in group B. However this difference was found to be statistically insignificant. In addition to this, 73.3% (99/135 cases) with impacted wax had fathers belonged to group A, and 96.3% (130/135 cases) had mothers who were in this group, i.e. unemployed or unskilled workers.

The details of the role of parental socio-educational factors on cerumen impaction in children are depicted in Table 6.

Otitis media with effusion

On considering the association between the prevalence of otitis media with effusion and paternal education, higher

prevalence was found among children whose fathers belong to group 1 compared to group 2 (5.1% versus 4.3%). A similar pattern was seen in relation with maternal education also (6.4% in group 1 versus 2.4% in group 2). Paternal occupation also showed similar trend, with 5.2% prevalence of the disease in group A (whose fathers are unemployed or unskilled workers) and 4.3% in group B (father being skilled workers or professionals). The disease prevalence was 5.3% among children whose mothers are in group A compared to 0.0% in group B. However all these differences were turned out to be statistically insignificant (p>0.05). Details are depicted in Table 7.

The relation between socio-educational factors and the prevalence of ear diseases like acute and chronic otitis media could not be analysed because of the smaller number of such cases detected in the present study.

Table 7: Role of parental socio-educational factors on otitis media with effusion (n=346).

Social factor		Otitis media with effusion			Odds ratio (95% CI)	P value
		Present	Absent	Total		
		N (%)	N (%)	N (%)		
Education of father	Up to secondary school (Group 1)	14 (5.1)	263 (94.9)	277 (100.0)	1.17 (0.33-4.19)	1.0
	Above secondary school (Group 2)	3 (4.3)	66 (95.7)	69 (100.0)		
	Total	17 (4.9)	329 (95.1)	346 (100.0)		
Education of mother	Up to secondary school (Group 1)	14 (6.4)	205 (93.6)	219 (100.0)	2.82 (0.80-10.02)	0.12
	Above secondary school (Group 2)	3 (2.4)	124 (97.6)	127 (100.0)		
	Total	17 (4.9)	329 (95.1)	346 (100.0)		
Occupation of father	Unemployed and unskilled worker (Group A)	12 (5.2)	218 (94.8)	230 (100.0)	1.22 (0.42-3.56)	0.78
	Skilled worker and professional (Group B)	5 (4.3)	111 (95.7)	116 (100.0)		
	Total	17 (4.9)	329 (95.1)	346 (100.0)		
Occupation of mother	Unemployed and unskilled worker (Group A)	17 (5.3)	306 (94.7)	323 (100.0)	---	0.62
	Skilled worker and professional (Group A)	0 (0.0)	23 (100.0)	23 (100.0)		
	Total	17 (4.9)	329 (95.1)	346 (100.0)		

Table 8: Role of parental socio-educational factors on normal ear findings (n=346).

Social factor		Normal ear findings			Odds ratio (95% CI)	P value
		Present	Absent	Total		
		N (%)	N (%)	N (%)		
Education of father	Up to secondary school (Group 1)	132 (47.7)	145 (52.3)	277 (100.0)	0.55 (0.32-0.95)	0.03
	Above secondary school (Group 2)	43 (62.3)	26 (37.7)	69 (100.0)		
	Total	175 (50.6)	171 (49.4)	346 (100.0)		
Education of mother	Up to secondary school (Group 1)	100 (45.7)	119 (54.3)	219 (100.0)	0.58 (0.37-0.91)	0.02
	Above secondary school (Group 2)	75 (59.1)	52 (40.9)	127 (100.0)		
	Total	175 (50.6)	171 (49.4)	346 (100.0)		
Occupation of father	Unemployed and unskilled worker(Group A)	109 (47.4)	121 (52.6)	230 (100.0)	0.68 (0.44-1.07)	0.11
	Skilled worker and professional (Group B)	66 (56.9)	50 (43.1)	116 (100.0)		
	Total	175 (50.6)	171 (49.4)	346 (100.0)		
Occupation of mother	Unemployed and unskilled worker (Group A)	159 (46.0)	164 (50.8)	323 (100.0)	0.42 (0.17-1.06)	0.08
	Skilled worker and professional (Group B)	16 (69.6)	7 (30.4)	23 (100.0)		
	Total	175 (50.6)	171 (49.4)	346 (100.0)		

Normal ear findings

On analysing the role of paternal education, normal ear findings were noticed in 47.7% of children whose fathers belonged to group 1 and 62.3% of children in group 2. This difference between lower and higher paternal educational status was found to be statistically significant. On considering maternal educational status also, a similar trend was noticed (45.7% versus 59.1%). This difference was also turned out to be statistically

significant. Moreover, higher paternal and maternal educational status was found out to be a protective factor against any of the abnormal ear findings (Odd's ratio with 95% CI (0.55 (0.32-0.95) and 0.58 (0.37-0.91) respectively).

Out of the 175 children with normal ear findings, 43 (24.6%) had fathers with higher educational status (group 2) whereas, out of the 171 children with any of the abnormal ear findings, only 26 (15.2%) had fathers in group 2. Similarly, 42.9% of children (75/175 cases) with normal ear findings had higher maternal educational status compared to 30.4% of children (52/171 cases) with abnormal ear findings.

On considering the association between paternal occupation and normal ear findings in children, higher prevalence of normal ear findings was noticed in group B compared to group A (56.9% versus 47.4%). In addition to this, 37.7% of children (66/175 cases) having all normal ear findings had fathers belonging to group B (skilled workers or professionals). Meanwhile, only 29.2% of children (50/171 cases) with any of the abnormal ear findings had fathers in group B. However, this difference was found to be statistically insignificant.

On analysing the role of maternal occupation also, higher prevalence of normal ear findings was noticed in group B compared to group A (69.6% versus 46.0%). Similarly, 9.1% of children (16/175) with normal ear findings had mothers in group B (skilled workers or professionals) compared to 4.1% of children (7/171) with abnormal ear findings. However this difference also failed to be statistically significant. Details of the role of parental socio-educational factors are given in Table 8.

DISCUSSION

Significance of school screening programmes in identifying paediatric hearing impairment

In the present study, only around 2/5th of cases having hearing impairment had been already suspected by the parents. This highlights the role of school hearing screening programmes in early detection and treatment of hearing impairment which can have serious adverse effects on children's overall development.

Socio-educational environment of children

On considering the educational status of parents, only a single parent was found to be illiterate even though majority of them (80.01% of fathers and 63.29% of mothers) had studied up to or below secondary level. Furthermore, a higher percentage of mothers had studied up to higher secondary, graduation and post-graduation levels compared to fathers (36.71% versus 19.99%). All this indicates the relatively better socio-educational environment existing even in rural areas of Kerala, the most literate state of India. Moreover, girls constituted greater proportion of the study population than boys (51.8% versus 48.2%). This reflects the pattern of sex ratio prevailing in Kerala, the only Indian state where the number of females is higher than that of males in both urban as well as rural areas (1077 females per 1000 males in rural areas, as per population Census 2011).[9]

Role of parental educational factors

In our study, the most important socio-educational factor affecting the children's otological health was found to be maternal education, to the extent that higher maternal educational level can be termed as a 'protective factor' against any of the abnormal ear findings (Table 8). The association of lower maternal education with hearing impairment and cerumen impaction was found out to be statistically significant also. It could be due to the better health consciousness, health seeking behaviour, effective utilization of health facilities and improved personal as well as environmental hygiene prevailing in the families of more educated mothers. Previous literature by Grossman et al has established that maternal education has a positive impact on the child's overall heath.[10] Studies from India and nearby South and Middle East Asian countries also showed a significant association between lower maternal education and higher prevalence of chronic ear diseases.[5,11-14]

Educational status of the father also turned out to be an important factor in the present study which has a statistically significant association with normal ear findings in children. This has not been identified previously as a significant independent factor associated with children's otological health, in any of the literature in the same country.

Role of parental socioeconomic factors

In our study, various external and middle ear diseases as well as hearing impairment were found to be more prevalent in lower socioeconomic strata as indicated by the lower parental occupational levels. Nevertheless we failed to establish a statistically significant association between parental occupation and ear diseases, except in case of cerumen impaction. In a comparable study by Ebenezer et al. among the urban children and another study by Philip et al among the rural children of the same district of Kerala reveal considerably lower prevalence of chronic ear disease in urban areas, indicating the existence of more favourable socioeconomic factors in urban area compared to rural areas.[15,16] The inverse relationship between prevalence of chronic middle ear diseases and better socioeconomic background has been established in literature from various developing countries in South East Asian region.[5,13,17,18] Higher prevalence of hearing impairment among children from lower socioeconomic strata is seen in literature from developed countries like United States of America and England also.[19,20] The health model postulated by Grossman et al. explains how parental socioeconomic background could affect the child health.[10,21,22] Firstly, budget constraints in poorer families prevent them from

availing better health care facilities, nutritional inputs and living conditions. Secondly, socioeconomic status can affect what the parents opt to do with the available health inputs they can afford, since the parents of lower socioeconomic strata can have different health preferences, diverse health beliefs and different previous experiences with the health care system. This is how lower parental education can have a significant negative impact on children's health. Finally, children born in lower socioeconomic strata are prone to have lower neonatal health status either due to a worse genetic endowment or due to diverse environmental triggers existing in the gestational and perinatal period which can activate certain genes. This can adversely affect the overall health status of the children when they grow up.

CONCLUSION

Favourable parental socio-educational factors, especially maternal education has a significant positive impact on children's otological health, apparently due to the better health consciousness, effective utilization of health facilities and improved personal and environmental hygiene. Understanding this social pattern of ear diseases is important while generating or modifying national health programmes.

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