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Risk Factors Associated with Chronic Suppurative Otitis Media in Children.

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Abstract:

Introduction: Chronic suppurative otitis media is one of the foremost infections that cause disabling hearing loss among children in underdeveloped countries, ultimately leading to speech delay and a negative impact on children's intellect and mental health.

Objective: To identify the risk factors associated with chronic suppurative otitis media, for early detection of disease and prevention of its complications.

Methodology: It prospective study was conducted at the Department of Ear, Nose, and Throat, Suleman Roshan Medical College, Tando Adam, Sindh, from January 2022 to July 2022. All the children ≤ 15 years with a history of chronically discharging ears were included after parental consent. A detailed history was taken and a comprehensive ENT examination was done. Patients with co-existing external ear infections, congenital anomalies, and a history of previous ear surgery were excluded.

Results: A total of 396 children participated with male preponderance. The majority of the patients were residents of rural areas. The unilateral and mucosal diseases were more prevailed. The commonest communal co morbidity was a nasal allergy. Other risk factors included rural area residency, the low literacy rate of parents, particularly mothers, and high exposure to passive smoking.

Conclusion: The occurrence of chronic suppurative otitis media is highly curable by spreading public education about child health care especially the institution of hygienic living conditions and avoidance of exposure to possible allergens especially tobacco smoke.

Keywords: Eustachian tube, Chronic suppurative otitis media, hearing impairment

Introduction:

Junk food Chronic suppurative otitis media is a global health problem affecting 9 in 100000 persons worldwide and is more prevalent in developing countries.¹

It is defined as inflammation of the middle ear and mastoid cavity associated with persistent otorrhea through an irreversibly damaged tympanic membrane. The duration of otorrhea varies according to researchers, ranging from 2-6 weeks up to 3 months.² Most of the time, it starts as a

sequela of acute otitis media which fails to resolve adequately or may occur as a complication of subacute inflammatory conditions of the middle ear like secretory otitis media or may be followed by traumatic perforation of the tympanic membrane which leads to recurrent ear discharge.³ Middle ear infections are the commonest paediatric infections; up to 80% of children have had one episode of acute otitis media by 3 years of age.⁴ According to WHO (world health organization), the disease is predomi-

nantly seen in Western Pacific (2.5% to 43%), followed by Southeast Asia (0.9-7.8%), Africa (0.4 to 4.2%), South and Central America (3%), Eastern Mediterranean (1.4%), and Europe (0.4%).⁵ Several risk factors are associated with its pathogenesis including recurrent upper respiratory tract infections, nasal allergy, recurrent tonsillitis, adenoiditis, etc. Children have a smaller and horizontal eustachian tube, which makes them prone to suffer from middle ear inflammation,⁶ because of ascending infections of the nose and throat. Socioeconomic factors also have a strong impact on the pathogenesis of the disease involving low-income families, residency in rural areas, low level of parents' education, lack of hygiene, overcrowded housing, living in nuclear families, and exposure to passive smoking. In most cases, disease outburst starts in early childhood, and the patient mostly presents with a history of recurrent visits and multiple prescriptions of antibiotics, sometimes judicious and sometimes not judicious too. In the United States, the annual health care budget for medical and surgical treatment of otitis media in children exceeds >\$5 billion.⁷

Recurrent middle ear infections carry a risk of several complications including compromised quality of life due to the burden of chronic illness. It is a highly curable cause of impaired hearing in children which may cause social withdrawal, speech defects, and learning difficulties that eventually decrease the productivity rate of individuals in the underdeveloped world.

Objective:

To identify the risk factors associated with chronic suppurative otitis media, for early detection of disease and prevention of its complications.

Methodology:

This prospective study was conducted at the Department of Ear, Nose, and Throat, Suleman Roshan Medical College, Tando Adam, Sindh, from January 2022 to July 2022. All the children ≤ 15 years with a history of recurrent ears discharge, for more than 12 weeks, participated after parental consent. After a detailed history, a comprehensive ENT examination was done. The status of the perforation, middle ear, and evidence of cholesteatoma was confirmed under microscopic guidance. Patients with co-existing external ear infections, congenital anomalies, and a history of previous ear surgery were excluded. Data were collected on a questionnaire developed at the department of E.N.T. Privacy and confidentiality of every patient was maintained throughout the study. Statistical Package for Social Sciences (SPSS) version 25.0 (IBM SPSS Statistics) was used for data entry and statistical analysis.

Descriptive statistics in the form of Frequencies and percentages (%) were reported for categorical variables (gender, age, laterality, type of CSOM, exposure to passive

smoking, rural vs urban area residence, joint vs nuclear family system, literacy rate of the parents). Data analysed using chi-square test was done where applicable. Mean \pm SD was stated for quantitative variables as age. A p-value of < 0.05 was considered significant all through the study. Approval was taken for this study from the Ethical Review Committee (ERC) of the institution. During the study, rules were followed by the tenets of the Declaration of Helsinki.

Results:

A total of 396 patients participated with a slightly male preponderance of 50.5% vs 48.5% females. The mean age of the patients was 8.29 ± 3.91 (0.9 to 15 years), mostly (81.80%) were from rural area while 18.20% children were from urban areas.

Socioeconomic factors included inadequate housing with overcrowding joint families (66.7%), while 31.3% of families were nuclear. 2% of children were living with relatives because their mothers died. 76.8% of children had more than 2 siblings while 22.2% had < 2 and 1% had no siblings. In most families, the economic burden was solely on the father (86.9%), and in 13.1% of families, both parents were earning livelihoods. The literacy rate was better among fathers than mothers. (Table 1)

Table No 1: Literacy level of parents.

S#	Education	Father	Mother
1	Illiterate	25.3	47.5
2	Primary	29.3	13.1
3	Matric	38.1	25.3
4	Graduate	7.3	14.1

The unilateral disease was common and found in 80.20% of cases while we observed bilateral disease in 19.20%. Mucosal disease (98%) was predominant and only 2% had clinical evidence of cholesteatoma. The duration of illness in different age groups is shown in table 2.

Table No 2: Duration of illness

S. No	Duration in years	Frequency	Percentage
1	1-3 years	212	53.5%
2	>3-5 years	92	23.2%
3	>5 years	92	23.2%

The associated diseases found in ascending order of frequency included enlarged adenoids 1%, nasal allergy with recurrent tonsillitis 2%, miscellaneous diseases like asthma, etc. 3%, tonsillitis 1.2%, and nasal allergy 23.2%. In 54.5% of cases, no comorbid was identified. The passive smoking exposure rate was 63.6%. Parents of 53.5% of children agreed that patients were hard of hearing, while 46.5% of parents repudiated it.

Discussion:

The study aimed to identify the risk factors associated with

the pathogenesis of chronically discharging ear. It was found more prevalent among males, with a mean age of 8.29 ± 3.91 . Several studies proved a higher disease burden in the male gender likely due to defected pneumatization of the mastoid process, and disproportionately narrower peripheral airway, prone to recurrent infections during the early years of life.⁸ This also attributes to male predominance in society in terms of healthcare; females mostly visit with acute infections or self-limiting diseases.

O.A Afolabi et al⁹ conducted a study on the general population and found the male to female ratio of 2.2:1; patients' ages ranged from 2–56 years with a mean of 8.84 years. Another study (2012) on the paediatric population also showed the mean age of $8.8 \text{ years} \pm 2.35$.¹⁰ Socioeconomic factor carries a high impact on the disease. Residence in rural areas, overcrowded housing, and illiterate or low literate parents with a lack of awareness about hygiene are strong predictors of disease pathogenesis. For current study, the majority of patients were inhabitants of rural areas i.e., 81.80% vs 18.20% urban, while 66.7% of children were living in joint families and 76.8% having more than two siblings showed a high rate of overcrowded housing. It has been reported that 41.9% of the patients were from rural areas, 27.5% were from semi-urban and 30% belonged to urban regions, whereas 41.3% faced overcrowding.⁹ Congested housing predisposes to the easy spread of droplet infections, including otitis media.⁹ In our study, 2% of children were found living with relatives because their mothers died. All these factors contribute to poor hygiene and predispose for different illnesses. With large number of family members, attention of parents particularly mother is divided that may contribute to the condition. In most families, the whole economic burden was on the shoulders of father, ultimately adding to the substandard lifestyle. Poor hygienic living conditions flourish with ignorance; and parental education is of vital importance to eradicate this factor. In our study, the literacy rate was much lower in mothers, 47.5% were illiterate while 38.1% of fathers were matriculated. A study conducted by Alzaid et al¹⁰ showed that parents who accomplished their secondary education were four times more knowledgeable about ear infections compared to their uneducated counterparts and fathers were less updated as compared to mothers. In 98% of cases, CSOM was the mucosal type, and 80.80% of patients had only unilateral involvement. These are in sharp contrast to the study of Alzaid et al¹⁰ that reported unilateral vs bilateral disease 62.2% vs 37.8% while 97.3% patients had mucosal disease while 2.7% patients had squamosal disease.¹⁰ Magnus et al¹⁰ Among 207 children studied none had evidence of cholesteatoma,¹⁰ high prevalence of mucosal disease points towards the strong implication of allergy in the pathogenesis of the disease. Duration of illness was 1

-3 year in 53.5% of cases, >3-5 years (23.2%) and those having the recurrent disease for >5 years was also 23.2%. In a study conducted by RP Dayasena,¹¹ the mean duration of ear discharge was 1.2 yrs. (range 6 weeks to 20 yrs.). It points out that the burden of disease is more in the earlier period of life, probably due to low immunity. Though no known comorbid was identified in 54.5% of cases, the most commonly found conjoint disease was nasal allergy 23.2%, followed by 3% miscellaneous diseases like recurrent URTI or asthma etc, and only 1% cases with already diagnosed adenoiditis. These results are in partial agreement to published study that reported highest rate of upper respiratory infection (31.58%) followed by nasal allergy (15.79%), chronic tonsillitis (28.95%), chronic adenotonsillitis (26.31%).¹² Nasal diseases have the strongest impact on with middle ear. Lasli et al¹³ reported an association of suppurative middle ear diseases with nasal allergy as 80%, Ig E antibody level was assessed in middle ear secretion, the resultant ratio between acute and chronic suppurative otitis media was 0.75:1.4.

Mucosal inflammation spreads from the nose to the eustachian tube quickly, obstructing the tubal lumen and exerting negative pressure in the middle ear, meanwhile, the secretory activity of middle ear mucosa also increases in response to the activation of inflammatory mediators.¹⁴ In our patients, the passive smoking exposure rate was 63.6%. One of the commonly accepted theories about the association of passive smoking with the pathogenesis of CSOM is that the smoke enhances bacterial adherence to respiratory epithelium, depresses local immunity, and impairs mucociliary clearance of respiratory secretions.¹⁵ Parents of 53.5% children agreed that children were hard of hearing, while 46.5% of parents repudiated it. Jean et al stated that up to 90% cases of hearing impairment are caused by CSOM in developing countries.¹⁶ In the paediatric population chances of permanent hearing loss is high which keeps negative impact on the development of speech and language skills, ultimately affects psychosocial and cognitive development.¹⁷ The resultant damaging effects include poor academic performance to wage-earning and economic prosperity, thus CSOM keeps a noteworthy detrimental economic impact on the world's developing countries with people who live in extreme poverty.¹⁸

Conclusion:

Raising public awareness about knowledge of ear infections, related risk factors and precautionary measures is crucial to control the spread of CSOM and its early diagnosis and prevention of its potential complications like hearing impairment.

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