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Incidence of Ear, Nose and Throat Disorders in Children: A Prospective Observational Study from Tertiary Care Teaching Hospital in Gujarat

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ABSTRACT

Diseases affecting the Ear, Nose and Throat (ENT) account for a substantial portion of medical conditions globally, particularly in resource-limited settings. Despite their prevalence, ENT diseases have historically been overlooked by global health initiatives. Pediatric populations, constituting a significant segment globally, face a notable burden of ENT disorders, influenced by factors such as the absence of routine screening programs, educational gaps, poverty, malnutrition and limited healthcare access. Understanding the prevalence of ENT diseases in children is crucial for designing effective healthcare services, especially considering the variability observed across different periods and regions. This prospective observational study spanned one year in a Tertiary Care Teaching Hospital in Gujarat, India, analyzing 5832 children aged 0-18 seeking care in the Pediatric/ENT department. Demographic information, clinical history and examination findings were documented. Standardized protocols guided diagnosis, including otoscopy, nasal examination and throat examination. Data were analyzed based on age, gender, socio-economic status and seasons using descriptive statistics and Chi-square tests. Ear disorders predominated (76.29%), with Acute/chronic suppurative otitis media being the most prevalent (40.66%). Throat disorders constituted 15.84%, with tonsillitis prevalent (29.55%). Rhinitis (49.67%) dominated nose disorders. Males showed a higher incidence of ear disorders and socio-economic status significantly influenced disorder prevalence. Seasonal variations were observed, with ear disorders peaking in summer. Epistaxis exhibited seasonal fluctuations, aligning with increased occurrences during summer and spring. This study provides comprehensive insights into pediatric ENT disorders, emphasizing the prominence of ear disorders, notable gender and socio-economic variations and seasonal trends. Understanding these patterns is crucial for tailored healthcare planning and resource allocation. The findings underscore the need for context-specific interventions, including School Health Services, health education and socioeconomic improvement to alleviate the burden of pediatric ENT disorders in Gujarat, India.

INTRODUCTION

Diseases impacting the structures of the Ear, Nose and Throat (ENT) account for 20-50% of medical conditions addressed in healthcare facilities[1]. In resource-limited settings, these ailments are frequently linked to unfavorable health outcomes[2]. Despite their notable prevalence, global health initiatives have traditionally overlooked ENT diseases[3]. Disorders within the ENT domain are frequently cited reasons for seeking medical attention, both in rural and urban settings[4].

The pediatric demographic constitutes a significant segment of the global population, with children comprising 25.31% of India's populace the second most populous country globally[5]. Given India's status as a developing nation with a burgeoning economy, its healthcare system is still undergoing evolution. Ear, nose and throat maladies represent significant public health concerns with a widespread impact across all age cohorts, particularly among the pediatric population. Contributing factors include the absence of routine screening programs for ear conditions, educational gaps, poverty, malnutrition, ignorance and limited access to healthcare resources[6].

Respiratory tract manifestations, such as cough, cold, earache and sore throat, manifest prominently in children, particularly during climatic transitions or in rainy and winter seasons. Frequently, these symptoms are managed at home or through alternative and symptomatic treatments, possibly influenced by financial considerations. The escalation of these symptoms prompts medical intervention.

Ear, Nose and Throat (ENT) issues are more prevalent in children compared to adults, notably encompassing conditions like acute suppurative otitis media, acute tonsillitis, acute epiglottis, laryngotracheobronchitis and rhinitis. This heightened susceptibility in children may be attributed to various factors, including a wider and horizontally oriented Eustachian tube, underdeveloped immune systems, malnourishment, suboptimal hygiene and sanitation, overcrowded living conditions and lower socioeconomic status[7]. Otitis media, denoting inflammation of the middle ear cleft, stands out as a common medical challenge in childhood and a frequent cause of hearing impairment, rendering it a prevalent morbidity in routine clinical practice[8,9]. While pediatric ENT cases exhibit a low mortality rate, except in emergencies, morbidity persists despite advancements in healthcare[10,11].

A comprehensive comprehension of the prevalence of Ear, Nose and Throat (ENT) diseases and the contributing factors within the community is crucial for designing healthcare services focused on the early identification and management of such morbidities. Existing research suggests variability in the frequency of pediatric visits for ENT disorders across different periods of the year. However the specific influence of geographical location, seasonality, ethnicity and socioeconomic status on the pattern of ENT diseases within the Tertiary Care Teaching Hospital of Gujarat remains unclear. This study seeks to delineate distinct patterns of ENT disorders in the pediatric population, considering seasonal variations, within the tertiary care teaching hospital in Gujarat, India. Notably, there is currently a dearth of data regarding the incidence of ENT diseases in the pediatric demographic in Gujarat, emphasizing the significance of this investigation.

MATERIALS AND METHODS

This prospective observational investigation transpired within the Department of Pediatric and Otorhinolaryngology (ENT) at a Tertiary Care Teaching Hospital in Gujarat, spanning a duration of one year from April 2022 to March 2023. The study encompassed children aged 0 to 18 years who sought care within the Pediatric/ENT department of the aforementioned hospital. Essential demographic information, including age, gender, socio-economic status, clinical history and examination findings, were systematically documented for all participating patients.

Otoscopy was employed for the examination of the ear to assess conditions such as otitis media, ear perforation and ear discharge. Nasal examination involved external assessments, along with anterior rhinoscopy to evaluate nasal discharge, airway obstruction and signs of infection. Additionally, adenoid hypertrophy was scrutinized for. Throat examination focused on detecting any indications of tonsillitis or pharyngitis. When deemed necessary, pertinent investigations, including X-rays, culture, sensitivity, etc., were conducted. Data acquisition utilized a structured proforma, encompassing demographic particulars, clinical examination findings and laboratory investigation results. Ethical approval was obtained from the Institutional Ethical Committee.

Inclusion criteria:

- Children in the age group 5-15 years
- Both males and females
- Those presenting with complaints of ear, nose or throat

Exclusion criteria:

- Cough with expectoration
- Pneumonia
- Tuberculosis
- Haemoptysis and other systemic diseases
- Children with immunocompromised state
- Children presenting with headache due to any ophthalmic reasons or neurological reasons

Statistical analysis: Ata were presented as mean±standard deviation (SD). Descriptive analyses, including mean values, percentages and proportions, were computed. The Chi-square test was employed to assess trends or heterogeneity for ordinal and diverse categorical variables. Bar diagrams and pie charts were generated to illustrate various Ear, Nose and Throat (ENT) outcomes categorized by age groups, seasons or gender. The data analysis was performed using Graph Pad version 3.0.

RESULTS

A total of 5832 patients were included in the study. Table 1 presents the demographic characteristics of study participants, categorized by the type of ear, nose and throat disorders. The data includes information on age, gender, socio-economic status and seasons, providing a comprehensive overview of the participant distribution within each disorder category.

Age: Participants were divided into age groups, ranging from 0-1 year to 12-18 years. The majority of participants in the Ear, nose and throat Disorder group fell into the 5-12 years age category (74.32%), while the Nose Disorder and Throat Disorder groups exhibited diverse age distributions. Mean ages were statistically different across the three disorder groups ($p<0.001$).

Gender: The gender distribution showed variations among the disorder groups. In the Ear Disorder group, 75.98% were male, while the Nose and Throat Disorder groups had different proportions (11.33% and 12.69% respectively), leading to statistically significant differences in gender distribution ($p<0.05$ and <0.001, respectively). In overall distribution, males had a predominance incidence of ear disorders as compared to females.

Socio-economic status: Socio-economic status was categorized into Upper class, Upper Middle, Middle, Lower Upper and Lower lower. The distribution of socio-economic status varied significantly among the disorder groups ($p<0.001$), indicating different economic backgrounds associated with each disorder.

Seasons: Participants were categorized based on the seasons during which they presented with disorders. The distribution across seasons varied significantly among the disorder groups ($p<0.001$), suggesting potential seasonal patterns in the occurrence of ear, nose and throat disorders. For instance, a higher proportion of Ear Disorder cases occurred in the summer and in the spring, while Nose (more in spring) and Throat Disorder (more in spring and summer) cases were more evenly distributed across seasons in the overall study.

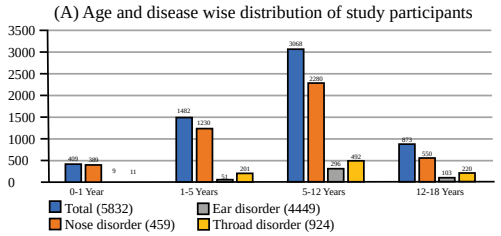


Fig. 1A: Distribution of study participant according to various demographic data

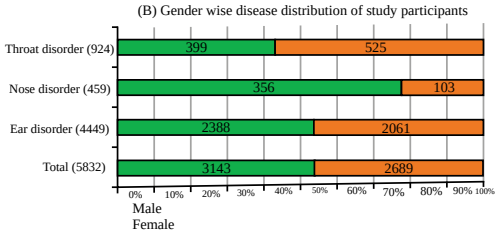
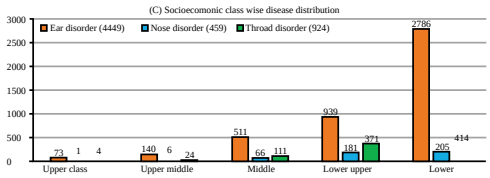


Fig. 1B



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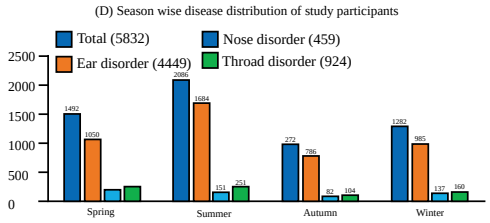

Fig. 1D

This comprehensive analysis of demographic characteristics provides valuable insights into the composition of the study population, highlighting significant differences across age, gender, socio-economic status and seasons in relation to specific ear, nose and throat disorders (Fig 1 A-D). Table 2 provides an overview of the education status and family-type demographic data of the study participants. The data is presented in terms of the number of participants and the corresponding percentages for each parameter.

Education status: The education status of the participants is categorized into four groups: Illiterate, Primary, Secondary and Graduate above. The majority of participants, 48.11%, were classified as illiterate, followed by 26.40% with a primary education level, 14.21% with a secondary education level and 11.26% who were graduates or held higher educational qualifications.

Table 1: Demographic characteristics of study participants

Characteristics	Total	Ear disorder (4449)	Nose disorder (459)	Throat disorder (924)
Age				
0-1 year	409	389 (95.11%)	09 (2.22%)	11 (2.67%)
1-5 years	1482	1230 (83%)	51 (3.44%)	201 (13.56%)
5-12 years	3068	2280 (74.32%)	296 (9.65%)	492 (16.03%)
12-18 years	873	550 (63%)	103 (11.80%)	220 (25.20%)
Mean age	8.11±3.01	11.25±4.67	10.87±4.64	
p-value	<0.001	<0.001	<0.001	
Gender				
Male	3143	2388 (75.98%)	356 (11.33%)	399 (12.69%)
Female	2689	2061 (76.65%)	103 (3.83%)	525 (19.52%)
p-value	<0.05	<0.001	<0.05	
Socio-economic status				
Upper class	78	73 (93.59%)	1 (1.28%)	4 (5.13%)
Upper middle	170	140 (82.35%)	6 (3.53%)	24 (14.12%)
Middle	688	511 (74.28%)	66 (9.59%)	111 (16.13%)
Lower upper	1491	939 (62.98%)	181 (12.14%)	371 (24.88%)
Lower lower	3405	2786 (81.82%)	205 (6.02%)	414 (12.16%)
p-value	<0.001	<0.001	<0.001	
Seasons				
Spring	1492	1050 (70.37%)	189 (12.67%)	253 (16.96%)
Summer	2086	1684 (80.73%)	151 (7.23%)	251 (12.04%)
Autumn	972	786 (80.86%)	82 (8.44%)	104 (10.70%)
Winter	1282	985 (76.83%)	137 (10.69%)	160 (12.48%)
p-value	<0.001	<0.001	<0.001	

Table 2: Education status and Family type demographic data of study participants

Parameters	No	percentage
Education status		
Illiterate	2806	48.11
Primary	1540	26.40
Secondary	829	14.21
Graduate or above	657	11.26
Family type		
Nuclear	4446	76.23
Joint	1386	23.77

Family type: The family type parameter classifies participants into two categories: Nuclear and Joint families. The majority of participants, 76.23%, belonged to nuclear families, while 23.77% were from joint families.

This table provides essential information about the educational background and family structure of the study participants, offering insights into the diversity of the participant demographics. The data is presented concisely, allowing for a clear understanding of the distribution across different education levels and family types within the study population. Table 3 outlines the incidence of various Ear, Nose and Throat (ENT) diseases among the study participants, providing a detailed breakdown of the number and percentage of cases for each specific condition.

Ear (4449): Otitis Media was the most prevalent ear condition, affecting 40.66% of participants, followed by Impacted Wax (19.55%), Foreign Body (10.05%), Otitis Media with Effusion (16.16%), Otomycosis (9.33%), Hearing Loss (2.43%) and Other ear-related conditions (1.82%).

Nose (459): Rhinitis was the most common nose-related condition, affecting 49.67% of participants, followed by Allergic Rhinitis (9.37%), Chronic Sinusitis (11.11%), Epistaxis (7.41%), Foreign Body (5.88%), Nasal Polyp (4.36%), Deviated Nasal Septum (5.45%) and Other nose-related conditions (6.75%).

Throat (924): Tonsilitis was the predominant throat-related condition, observed in 29.55% of participants, followed by Pharyngitis (21.33%), Adenoid Hypertrophy (15.92%), Chronic Lymphadenitis (13.20%), Foreign Body (7.04%) and Other throat-related conditions (12.96%). This table offers a comprehensive overview of the distribution of ENT diseases within the study population, highlighting the prevalence of specific conditions within each anatomical category. The data provides valuable insights into the relative frequency of various ear, nose and throat disorders among the participants.

DISCUSSIONS

The investigation involved the analysis of 5832 children, aged 0-18 years, attending Ear, Nose and Throat (ENT) and Pediatric outpatient clinics throughout the year 2022. The findings derived from our prospective study indicate a decline in the prevalence of ear disorders with advancing age (12-18 yrs) in children, juxtaposed with an escalation in the incidence of nose and throat disorders with increasing age. Furthermore the results suggest that the highest proportion of children seeking care in the ENT/Pediatric outpatient department with ear disorders occurs during the spring and summer seasons compared to winter and autumn.

The present investigation reveals a male predominance, with 53.89% males compared to 46.11% females, resulting in a male-female ratio of 1.16:1. This observation aligns with analogous studies. In a study conducted by Ibekwe *et al*.[12-14] a comparable gender distribution was observed, with 56.58% males and 43.41% females, yielding a male-female ratio of 1.3:1. Nepali *et al*.[15] reported a prevalence of 60% males (n = 979) and 40% females (n = 653) in their study[16]. The prevailing male-centric societal structure in India, where in extra care is often afforded to male children, contributes to the higher prevalence of male participants in our study compared to females.

Conforming to the stratification of familial backgrounds based on socioeconomic status (SES), a predominant majority of children are associated with

Table 3. Incidence of various ENT disease

Parameters	Disease	No	Percentage
Ear (4449)	Otitis Media	1809	40.66
	Impacted Wax	870	19.55
	Foreign body	447	10.05
	Otitis Media with effusion	719	16.16
	Otomycosis	415	9.33
	Hearing Loss	108	2.43
	Others	81	1.82
Nose (459)	Rhinitis	228	49.67
	Allergic Rhinitis	43	9.37
	Chronic Sinusitis	51	11.11
	Epistaxis	34	7.41
	Foreign Body	27	5.88
	Nasal Polyp	20	4.36
	Deviates Nasal Septum	25	5.45
	Others	31	6.75
Throat (924)	Tonsilitis	273	29.55
	Pharyngitis	197	21.33
	Adenoid hypertrophy	147	15.92
	Chronic Lymphadenitis	122	13.20
	Foreign body	65	7.04
	Others	120	12.96

the Lower-lower socioeconomic class (58.38%), followed by the lower-upper class (25.56%) the Middle class (11.80%) the Upper middle class (2.91%) and the upper class (1.34%). A prevailing observation posits that children from higher SES backgrounds exhibit a diminished prevalence of diseases, notably infectious ailments, relative to their counterparts from lower SES strata. The rationale behind this phenomenon may be attributed to heightened literacy levels and the adoption of healthier lifestyles and behaviors among individuals in higher SES brackets[17]. Nevertheless, it is imperative to acknowledge that the constrained availability of time for hospital visits among individuals with busy schedules and elevated SES may also constitute a significant contributing factor to the observed pattern of presentation in this study[18].

The preponderance of children in this study experienced ear disorders at the highest frequency (76.29%), succeeded by throat disorders (15.84%) and nose disorders (7.87%). Concordant findings have been documented in studies conducted by Gupta *et al*., Yeli *et al*. and Gupta *et al*.[19-21]. A commensurate outcome was observed in the investigation by Chaudhari *et al*. where in ear disorders constituted the most prevalent category (49.8%), followed by throat and neck disorders and subsequently, nose disorders[22]. Nepali *et al*.'s study underscored the substantial contribution of ear diseases to the overall disease burden in childre[16]. Ear disorders prominently feature in pediatric and otorhinolaryngology clinics[23,24]. The significance of ear-related illnesses in children lies in their substantial financial implications and the consequential loss of school and work days for both children and parents. Moreover the psychological stress induced by ear diseases is incalculable, given the potential devastating complications[25]. Correspondingly, reports from various countries, including Dhaka (39.75%), Zambia (47.1%), India (49.32%) and Nepal (57.84%), reinforce the prevalence of ear disorders in pediatric cohorts globally[16,26,12].

In the current investigation, Acute/chronic suppurative otitis media (ASOM/CSOM) emerged as the most prevalent Ear, Nose and Throat (ENT) disorder, succeeded by impacted wax, otitis media with effusion (OME), foreign body entrapment, otomycosis and hearing loss, along with other ear disorders such as acute pharyngitis. A parallel observation was noted in the study by Chaudhari *et al*. where in CSOM ranked as the foremost ear disorder, while acute rhinitis and tonsillitis predominated among nose and throat disorders, respectively[22]. In contrast, alternative studies identified wax impaction as the predominant ear disorder[16,27,28].

Given that our investigation transpired at a district tertiary care teaching hospital-a referral facility where patients typically seek care for more complex cases-this may account for the secondary occurrence of impacted wax and the heightened prevalence of ASOM/CSOM in our study. Plausibly the recurrent practice among mothers of cleansing the ears of infants and children with ear-buds might inadvertently disrupt the physiologic mechanisms of the ears, leading to wax impaction-an observation similarly reported in other studies[15,29-34]. Correspondingly, various authors[31-34] have expounded upon the consequence of frequent ear cleaning with buds, elucidating that this practice propels cerumen deeper into the external auditory canal, impeding its natural expulsion through the physiologic process of epithelial outward migration.

In our investigation, rhinitis emerged as the predominant nose disorder, followed by Chronic rhinosinusitis, allergic rhinitis, epistaxis, foreign body entrapment and Deviated Nasal Septum (DNS). This pattern aligns with findings from a study conducted in

India, where rhinitis was identified as the most prevalent, succeeded by chronic sinusitis[34]. Conversely, a study in Nepal reported DNS as the leading nose disorder, followed by allergic rhinitis and rhinosinusitis. In the investigation by Briggs *et al*.[35] Chronic/allergic rhinosinusitis (4.3%) and foreign body entrapment in the nose (2.9%) were the predominant nose-related disorders[36].

Predisposing factors for chronic rhinosinusitis in children encompass viral upper respiratory tract infections and acute exacerbation of allergic rhinitis. Furthermore, our study, set in the highly industrialized environment of Port Harcourt with elevated air pollution rates affecting respiratory airways, may contribute to our observed outcomes, consistent with another study in Port Harcourt[37]. The inherent curiosity of children and their proclivity for exploring their bodies and surroundings elevate the risk of introducing foreign objects into various orifices, including the nose. In this investigation, foreign bodies in the nose ranked as the 5th most common reason for pediatric ENT clinic visits following a nose-related disorder, with prevalent objects ranging from beads to pebbles. Our reported prevalence of 5.88% falls between the 27% reported in a study in Zambia and the 1.4% reported in another study in Ibadan[12,29].

Epistaxis, attributed to local irritation in Kiesselbach's plexus, is relatively common in children and may stem from local inflammatory diseases, infections, trauma. Although often self-limiting, recurrent instances may occur. Our study identified a prevalence of 7.41%, falling within the range reported by Yeli (15%) and Sanjay *et al*.[39] (16.6%). Throat-related disorders emerged as the second most prevalent Ear, Nose and Throat (ENT) afflictions within the pediatric age cohort in this investigation, constituting approximately a quarter (15.84%) of the cases. Tonsillitis, encompassing 29.55% (273 out of 924) of the pediatric ENT cases, predominated among throat disorders, followed by pharyngitis and adenoid hypertrophy. Comparable findings were observed in a study conducted in Telangana, India, albeit with pharyngitis being more prevalent than tonsillitis in their investigation Yeli *et al*.[34] similarly reported a notable prevalence of tonsillitis, while Nepali *et al*.[16,20] documented a higher proportion of pediatric cases with pharyngitis. In parallel to our study, researchers in Ibadan identified Adenotonsillar hypertrophy as the third most frequent ENT-related disorder[29]. Conversely, our results deviate from a study conducted in Senegal, where throat-related disorders ranked as the third most common ENT affliction[40].

While several prior studies in India have investigated the prevalence, incidence and patterns of Ear, Nose and Throat (ENT) disorders, none have systematically reported on the seasonal variations of ENT disorders in a prospective study. In our research, we observed a noteworthy seasonal fluctuation in the occurrence of ENT disorders. Ear problems consistently ranked as the primary reason for hospital visits across all seasons, followed by throat and nose disorders, respectively ($p<0.001$). Notably, a substantial number of children sought medical attention for ear disorders during the summer season, while nose and throat disorders were more prevalent in the spring.

Epistaxis exhibited a seasonal variation in our study, with increased occurrences noted during the summer and spring seasons, in contrast to a study conducted in the UK reporting higher prevalence in winter and spring seasons[41]. The heightened incidence in our investigation may be attributed to the desiccation of nasal mucosa during the summer months, while the use of heating appliances in winter could similarly contribute to nasal mucosa dryness, potentially precipitating epistaxis-a trend corroborated by studies conducted in the UK and Nepal. Further insights from Danielides *et al*.[41,35] underscored that weather influence on epistaxis is more pronounced during the cold period of the year, particularly under very cold and dry conditions[42]. A study in Greece reported a notable proportion of overall ENT disorders in March but did not delineate specific subtypes of ENT disorders for that month, nor did it distinctly elucidate the precise seasonal variations of ENT disorders in children[43]. The severity of nasal disorders, as evidenced by nasal cytology indicating neutrophilic infiltrates (80% versus 52%), was more prevalent in winter than in spring among Australian Aboriginal children, emphasizing the potential role of seasonality[44].

CONCLUSIONS

Pediatric individuals afflicted with ear disorders exhibit a heightened frequency of visits to the Ear, Nose and Throat (ENT) outpatient department, with a predominant representation of infants and young children. Notably, ear disorders and throat disorders manifest as prevalent occurrences among adolescents and teenagers. The typology of ENT disorders observed at a tertiary hospital manifests seasonal variability. An investigation into the prevalence and distribution of ENT diseases within a tertiary care teaching hospital, specifically in Gujarat, India, serves as a pivotal means to discern the disease burden. This understanding facilitates the implementation of judicious diagnostic approaches the delivery of appropriate treatment modalities and the initiation of preventive measures. Moreover, insights into seasonal trends are instrumental in devising strategic management approaches during outbreak scenarios. The potential mitigation of the burden and prevalence of ENT disorders can be achieved through the implementation

of School Health Services, targeted health education initiatives and concerted efforts aimed at enhancing socioeconomic status.

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