


Research Article

Epidemio-Clinical Profile and Determinants of Paediatric ENT Pathologies in Rural Hospitals: Case of Kimpese Evangelical Medical Institute

Thierry Mpengani^{1, 2, *}, Mireille Ngale^{3, 4, *} , Aliocha Nkodila⁵, Gabriel Lema¹, Damien Lumbu⁶, Moïse Mvitu⁷, Pepe Ekulu⁸, Richard Matanda¹, Jérôme Sokolo¹

¹Department of Specialities, Otorhinolaryngology Service, University of Kinshasa, Kinshasa, DR Congo

²Medical Evangelic Institute, The Church of Christ of Congo, Kimpese, DR Congo

³Pharmacovigilance Unit, University of Kinshasa, Kinshasa, Democratic Republic of the Congo

⁴Kimpese Health Research Center, Evangelic Medical Institute, Kimpese, DR Congo

⁵Department of Family Medicine and Primary Health Care, Protestant University in Congo, Kinshasa, DR Congo

⁶Saint Joseph Hospital, Kinshasa, DR Congo

⁷Department of Specialities, Ophthalmology Service, University of Kinshasa, Kinshasa, DR Congo

⁸Department of Pediatric, University of Kinshasa, Kinshasa, DR Congo

Abstract

Ear-Nose-Throat disorders in children are one of the leading causes of consultations in paediatrics, with a variety of aetiologies. The study aimed to investigate the epidemiological-clinical profile, treatment and determinants of Ear-Nose-Throat disorders in children attending the paediatric department of the KIMPESE Evangelical Medical Institute (EMI) hospital. This was a prospective cross-sectional study with a descriptive and analytical approach, which took place between October 2022 and March 2023. The KIMPESE Evangelical Medical Institute (KIMPESE/EMI/) was the setting for this study. The study included all children aged 0-16 years who had been consulted or admitted for any sign of Ear-Nose-Throat disease, whose parents had given their consent. The data collected was encoded in an Excel 2016 database. They were transferred to SPSS for Windows version 21 for processing and analysis. Out of a total of 205 children cared for at the EMI, 139 had presented with at least one ENT pathology, i.e. a frequency of 67.8%. The median age of the children was 5 (2-10) years, and more than half were under 5 years of age. They were predominantly male, with a sex ratio of 1,13. The ENT pathologies presented by these children were distributed as follows: 28.8% suffered from otological pathologies, 25.4% from rhinological pathologies and 17.1% from pharyngological pathologies. The most common otological pathologies were cerumen impaction and congestive AOM, while rhinitis was the most common rhinological pathology and rhinopharyngitis was the most common pharyngological pathology. The factors associated with ENT pathologies in children, in multivariate analysis, were determined by passive smoking, a history of rhinopharyngitis, household size ≥ 6 people, and living in a polluted environment. This study has shown that oral diseases in children are also common in rural areas, the case of KIMPESE Evangelical Medical Institute, especially in our African countries where the population is very young. The results obtained provide ample evidence of the existence of certain factors determining the genesis of certain oral diseases in children in the town of Kimpese.

*Corresponding author: thierrypengani@gmail.com (Thierry Mpengani), ngalemireille@gmail.com (Mireille Ngale)

Received: 12 February 2024; **Accepted:** 29 February 2024; **Published:** 13 March 2024



Copyright: © The Author(s), 2024. Published by Science Publishing Group. This is an **Open Access** article, distributed under the terms of the Creative Commons Attribution 4.0 License (<http://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

Keywords

ENT Disorders, Paediatrics, DR Congo

1. Introduction

ENT disorders in children are one of the leading causes of paediatric consultations. They have diverse and varied of causes: infectious, including angina, otitis, rhinosinusitis and rhinopharyngitis; tumours; traumatic conditions; emergency conditions such as foreign bodies in the aerodigestive tract; nasal haemorrhage). [1-4]. Infectious ENT diseases in children are very common and generally benign; along with lower respiratory tract infections, they represent the majority of community-acquired infectious diseases. [2, 5-7].

The management of paediatric ENT disorders in rural areas is often poorly understood, and remains largely unresolved. This is thought to be linked to the lack of codification of therapeutic attitudes, the lack of training for auxiliary staff, and the nearly total absence of doctors specialising in ENT. [6]

However, inadequate treatment can lead to serious complications, including meningitis, brain abscesses, serious respiratory problems and profound deafness. There are many personal, economic and social repercussions, such as school absenteeism, parents taking time off work, and the costs incurred by these pathologies. This is a genuine public health problem. [2, 8-10].

This study provides an overview of the epidemiological and clinical profile, treatment and determinants of ENT disorders in children attending the paediatric service at the EMI/Kimpese hospital.

2. Methods

This is a descriptive cross-sectional study which was conducted between October 2022 and March 2023 at the Kimpese Evangelical Medical Institute (KIMPESE/EMI). The Evangelical Medical Institute is a general referral hospital located in the town of Kimpese in the province of Kongo Central, 195 km from Kinshasa, the capital of the Democratic Republic of Congo (DRC),

The study population consisted of all children aged 0-16 years, who had consulted or been admitted for any sign of ENT damage, and whose parents or guardians had given their consent.

A systematic examination was carried out by careful interview of the ENT signs of the children surveyed. Clinical data were collected using the propaedeutic approach. The ENT examination included otoscopy, anterior rhinology, and examination of the oropharynx.

The data collected was encoded in an Excel 2016 database.

They were transferred to SPSS for Windows version 21 for processing and analysis. Categorical variables were presented in the form of absolute and relative frequencies, and quantitative variables were summarised in the form of median and interquartile range (IQR). Proportions were compared using Pearson's Chi-square test or Fischer's Exact test. The Man-Whitney U test was used to compare the medians of two groups. The determinants of ENT pathologies examined in the bivariate model were included in the logistic regression models as soon as they were associated with the dependent variable in the multivariate analysis. Variables that did not contribute significantly ($P \geq 0.05$) were progressively excluded to obtain the final models. The calculated adjusted ORs were used to estimate the degree of association between the dependent variables and the occurrence of ENT pathologies. The p-value of less than 5% ($p < 0.05$) was statistically significant.

3. Results

Out of a total of 205 children cared for at the EMI, 139 had presented with at least one ENT pathology, a frequency of 67.8%. The median age of the children was 5 years old (2-10), and more than half were under 5 years old. They were predominantly male, with a M/F sex ratio of 1.13. More than half lived in the health zone, belonged to the Protestant religion and attended pre-school (Table 1).

Table 1. Socio-demographic characteristics of children.

Variables	Total (n=205)	Percentage (%)
Age		
≤ 2 years	57	27.8
3 - 5 years old	50	24.4
6-10 years old	54	26.3
>10 years	44	21.5
Gender		
Male	109	53.2
Female	96	46.8
Origin		

Variables	Total (n=205)	Percentage (%)
Health zone	144	70.2
Non-health zone	61	29.8
Province of origin		
Out of Kongo Central	76	37.1
Central Kongo	129	62.9
Religion		
Catholic	29	14.1
Protestant	97	47.3
Kimbanguist	22	10.7
Revival	53	25.9
Black church	4	2.0
Level Child study		
Pre-school	65	31.7
Nursery	39	19.0
Primary	61	29.8
Secondary	40	19.5

Different categories of ENT disease

The ENT pathologies presented by these children are distributed as follows 28.8% suffered from otological pathologies, 25.4% from rhinological pathologies and 17.1% from pharyngological pathologies. (Figure 1)

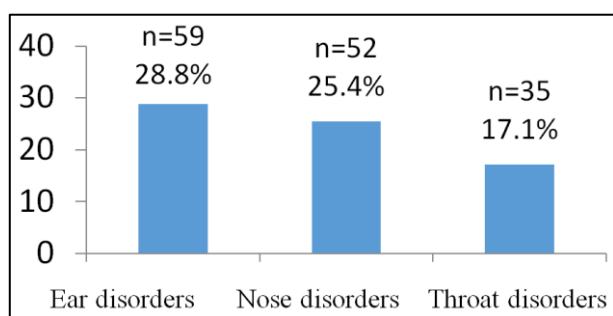


Figure 1. Different categories of ENT pathology.

ENT pathologies in children according to age

ENT pathologies are evenly distributed by age, with a low frequency in children over 10. (Figure 2)

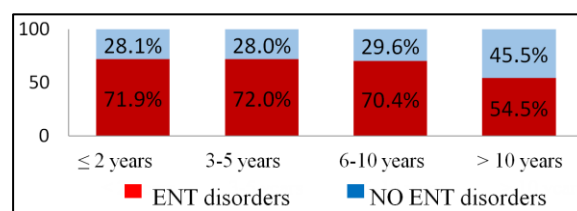


Figure 2. ENT pathologies in children according to age.

Type of ENT pathology

The most common ear diseases were cerumen impaction and congestive AOM, while rhinitis was the most common rhinological disease and nasopharyngitis was the most common pharyngological disease. (Table 2)

Table 2. Distribution of different types of ENT pathology in children.

Variables	Total	Percentage (%)
Ear diseases		
Cerumen plug	24	11.7
Congestive AOM	24	11.7
Foreign Body	4	2.0
CSOM	4	2.0
Deafness	4	2.0
SAOM	3	1.5
Rhinological diseases		
Rhinitis	48	23.4
Sinusitis	4	2.0
Epistaxis	4	2.0
Allergic rhinosinusitis	4	2.0
Pharyngological pathology		
Rhinopharyngitis	19	9.3
Adenoid hypertrophy	16	7.8
Acute tonsillitis	16	7.8
Chronic Hypertrophic Tonsillitis	4	2.0

Table 3 shows that the frequency of ENT pathologies was significantly higher in children born by caesarean section, with reports of alcohol consumption, passive smoking and rhinopharyngitis transfusions. Similarly, children living in households with more than 6 people, in polluted areas and with poor hygiene had a high frequency of ENT pathologies.

Table 3. Characteristics of children by ENT disease.

Variables	No ENT (Disorders (n=66))	ENT (Disorders (n=139))	P
Age	6 (5-9)	5 (4-6)	0.167
<under 5	24 (36.4)	62 (44.6)	
≥5 years	42 (63.6)	77 (55.4)	
Gender			0.154
Male	39 (59.1)	70 (50.4)	
Female	27 (40.9)	69 (49.6)	
Origin			0.104
Health zone	42 (63.6)	102 (73.4)	
Outside health zone	24 (36.4)	37 (26.6)	
Type of delivery			0.029
Normal	52 (78.8)	90 (64.7)	
Caesarean section	14 (21.2)	49 (35.3)	
Notion Alcohol intake	28 (42.4)	41 (29.5)	0.048
Notion Pre-eclampsia	4 (6.1)	4 (3.6)	0.319
Smoking father	3 (4.5)	19 (13.7)	0.036
Alcohol	26 (39.4)	79 (56.8)	0.014
High Blood Pressure	8 (12.1)	28 (20.1)	0.111
Diabetes	5 (7.6)	3 (2.2)	0.073
Gout	1 (1.5)	4 (2.9)	0.482
Heart disease	1 (1.5)	8 (5.8)	0.154
Bronchial asthma	4 (6.1)	4 (2.9)	0.232
Allergy	1 (1.5)	8 (5.8)	0.154
Vaccination	65 (98.5)	135 (97.1)	0.482
Transfusion	8 (12.1)	5 (3.6)	0.024
Rhinopharyngitis	10 (15.2)	8 (5.8)	0.028
Repeated rhinorrhea	26 (39.4)	59 (42.4)	0.398
Purulent otorrhea	12 (18.2)	8 (5.8)	0.007
CMO	4 (6.1)	8 (5.8)	0.578
Acute tonsillitis	4 (6.1)	8 (5.8)	0.578
Household size ≥6 persons	32 (48.5)	40 (28.8)	0.005
Living in polluted area	42 (63.6)	58 (41.7)	0.003
Hygienic installation	22 (33.3)	84 (60.4)	<0.001

The factors associated with ENT pathologies in children, in univariate analysis, were determined by passive smoking, passive drinking, a history of rhinopharyngitis, household size ≥6 people, and living in a polluted environment.

After adjustment for these 6 variables, 5 variables persisted as independent factors for ENT pathologies, including passive smoking, previous rhinopharyngitis, household size ≥6 people, and living in a polluted environment. (Table 4)

Table 4. Determinants of ENT disorders in children.

Variables	Analyse univari é		Analyse multivari é	
	P	OR (IC95%)	p	ORa (IC95%)
Passive smoking				
No		1		1
Yes	0.001	3.33 [1.95-6.66]	0.001	3.86 [2.39-5.87]
Passive alcohol				
No		1		1
Yes	0.020	2.03 [1.12-3.68]	0.727	1.74 [0.31-2.70]
History of rhinopharyngitis				
No		1		1
Yes	0.032	2.92 [1.10-7.80]	0.011	3.34 [2.02-8.56]
Household size ≥ 6				
No		1		1
Yes	0.006	2.33 [1.27-4.27]	0.005	4.99 [2.27-8.96]
Living in a polluted environment				
No		1		1
Yes	0.004	2.44 [1.34-4.47]	0.001	4.07 [1.93-8.61]
Poor hygienic installation				
No		1		1
Yes	0.003	0.43 [0.25-0.75]	<0.001	0.23 [0.11-0.45]

4. Discussion

This study aimed to contribute to the improvement of knowledge about ENT pathologies observed in children in Kimpese city.

Epidemiology

The mean age of 5 years found in our patients is comparable to that of NP. Ramarozatovo et al, and Randrianandraina et al [9, 11]. In contrast, H. Tall found a mean age of 6 years [6]. However, this difference is not statistically significant.

The distribution according to sex varies according to the studies. Male predominance has been noted in our series, as by B. K Chaudari, NP. Ramarozatovo [11, 12]. While Suman Yeli and Randrianandraina [9, 13] reported a female predominance. All this is simply due to the random nature of our respective samples. Admittedly, it is paradoxical to note a direct relationship between the different sexes of the children surveyed.

In our study, the majority of children surveyed came from our health zone, i.e. 70.2%. Very few of our children (29.8%)

came from elsewhere. This can be explained by the accessibility and credibility of our institution, which is also a provincial referral hospital.

Most of the people surveyed were Protestants (47.3%); however, several authors were imprecise in identifying the religion of most of the people investigated.

The Protestant religion constituted the stronghold of the chosen study context, and in view of the multiplicity of divinities present, it remained the link on which Christianity in this rural environment is based.

Contrary to several studies carried out throughout the world, which reported a high or average socio-economic level, the present study found that the majority of our patients had a low socio-economic level. This corroborates Randrianandraina's studies carried out in Madagascar in 2020 [9].

Clinical

On the basis of our results, recurrent rhinorrhoea and purulent otorrhoea were recorded as antecedents in 41.9% and 9.8% of children respectively. A study by Cherian et al [14] in India revealed that recurrent rhinorrhoea was commonly observed in rural children. These signs, as reported in the present study, confirm the allergenic and infectious environ-

ment in which the study was conducted.

This discrepancy could probably be explained by the difference between our context and that in which the other studies were conducted, i.e. the urban versus the rural environment. In regard to pathophysiology, this rhinorrhoea, despite its high frequency, confirms through its occurrence, the polluted nature of the study setting by the irritant substances present in the dust and sand. These two main signs, rhinorrhoea and otorrhoea, are part of the pattern of intoxication of the airways.

ENT pathologies are a frequent reason for consultation in paediatrics. The frequency in our series was about 67.8%. This is similar to Otouana Dzon et al in Congo Brazzaville and Do Santos Zounon et al in Benin, who reported 62.2% and 73% respectively [15, 16]. Several other authors have emphasised the importance of ENT disorders in children in African hospitals [6, 17, 18].

In our study, otological pathology predominated (30.9%), followed by rhinological pathology (29.4%) and pharyngological pathology (26.9%). This profile varies from author to author. Suman Yeti in the United Arab Emirates [13] observed the same profile in his study. On the other hand, Bijay in Nepal [12] found a predominance of otological pathology, followed by pharyngeal pathology and then rhinological pathology.

The most common otological pathology in our series was cerumen impaction, on a par with AOM (11.7%). This result corroborates those of studies carried out by H. Tall, Rijal As. and Acharya A. [15, 19, 20]. The high incidence of cerumen plugs is thought to be linked to the excessive use of cotton buds by mothers.

Rhinitis was the most common rhinological pathology observed in our series, similar to the study by Suman Yeli. Cherian et al. demonstrated in their study that rhinitis was associated with otitis media. [14]

Rhinopharyngitis was the predominant pharyngological pathology in our series, similar to the study by Randrianandraina. It is the starting point for other ENT infections, due to the contiguity of the mucosa and the narrowness of the aerodigestive tract in children. [21-23]

Determining factors

There are many environmental and clinical circumstances associated with the onset of ENT pathologies.

In our study, passive smoking, rhinological history, household size greater than 6 individuals, and environmental pollution were the factors associated with ENT pathologies. A similar study performed by Randrianandraina et al. noted that promiscuity (comparable to household size > 6), a history of previous ENT infections and smoking were frequently encountered among children with ENT diseases, not to mention poverty (low socio-economic level), immunodepression and malnutrition.

Passive smoking and environmental pollution, considered to be irritants, lead to chronic irritation of the mucous membranes of the upper aerodigestive tract, making them vulner-

able to ENT diseases, and disrupting the natural defence mechanisms of the respiratory mucosa. [24, 25]

In this section, authors are advised to provide a thorough analysis of the results and make comparisons with relevant literature, not a short summary or conclusion. Any future research directions could also be stated in the discussion.

5. Conclusions

This study, undertaken at the Kimpese EMI, showed that ENT diseases in children are common in rural areas and also in Africa, where the population is very young. The results provide ample evidence of the existence of certain factors involved in the genesis of childhood ENT disorders in the Kimpese town.

Abbreviations

AOM	Acute Otitis Media
CMO	Chronic Otitis Media
CSOM	Chronic Suppurative Otitis Media
EMI	Evangelical Medical Institute
ENT	Ear-Nose-Throat
IQR	Interquartile range
OR	Odds Ratio
RDC	Democratic Republic of Congo
SAOM	Suppurative Acute Otitis Media
SPSS	Statistical Package for the Social Sciences

Conflicts of Interest

The authors declare no conflict of interest.

References

- [1] Sacko HB. L'essentiel en oto-rhino-laryngologie et pathologie de la face et du cou. Bamako Mars 2002.
- [2] ALICE du Laboratoire Pediact: Pediact.com: <https://www.pediact.com/connaissez-vous-les-troubles-orkl-de-l'enfant/9Mars2015>
- [3] Sacko HB, Dembélé RK, Diallo AO. Panorama des affections ORL de l'enfant âgé de 0 à 5 ans en commune IV du district de Bamako. In *2 énes journées de la polyclinique Lac Tédé*, Bamako, Mali, 2007.
- [4] Sacko HB. Etudes de particularités pathologiques de la surdité neurosensorielle (études expérimentale et clinique), PhD en ORL, 2 éme Institut de médecine Piragov, Moscou Septembre 1989.
- [5] B. Barry. Données récentes en pathologies infectieuses ORL sur le traitement de première intention des infections ORL courantes. *La lettre d'oto-rhino-laryngologie et de chirurgie cervico-faciale* –n°258 – décembre 2000.

- [6] Tall H, Bah F, Nasser T et al. Ear, nose and throat disorders in pediatric patients at a rural hospital in Senegal. *Int J Pediatr Otorhinolaryngol.* 2017, 96: 1-3.
- [7] Raobijaona H. Infections respiratoires aiguës hautes (IRAH) en milieu pédiatrique à Antananarivo. *M éd Afr Noire.* 2000, 47: 143-4.
- [8] Société de Pathologie Infectieuse de Langue Française d'ORL et de Chirurgie Cervico-Faciale. Société Française de Pédiatrie. Groupe de Pathologie Infectieuse Pédiatrique. Les Infections ORL. *M éd. Mal Infect.* 1996; 5 suppl: 1-8. 10^e conférence de consensus en thérapeutique anti-infectieuse.
- [9] Randrianandraina MP et al. Epidemiological profile of ear, nose and throat infections in children. *Revue Malgache Pédiatrie* 2020, 3(1): 90-97.
- [10] Signorelli L, Mendes E. Prevalence of otorhinologic diagnoses in the pediatric emergency room. *Int Arch Otorhinolaryngol.* 2013, 17: 10-3.
- [11] Bijay K, Dipendra G. et al. Spectrum of ear, nose and throat disorders among children reporting to the out-patient department of tertiary care center, Nepal. *International Journal of otorhinolaryngology and Head and Neck Surgery.* 2018, 4(5): 1125-1129.
- [12] Suman Yeli. Prevalence of ENT disorders among children in UAE: A tertiary medical care study. *Int. J. Curr. Microbiol. App. Sci.* 2015, 4(7): 682-687.
- [13] Cherian T, Bhattacharji S, et al. Persistent Rhinorrhea in rural Indian children: Prevalence and consequences. *J Tropical Pediatr.* 2000, 46(6): 365-367.
- [14] Otouana Dzon HB, Diambi S. et al. Prévalence des infections ORL et statut vaccinal chez l'enfant de moins de 5 ans à Brazzaville. *Health Sci. Dis.* 2020, vol 21(8).
- [15] Do Santos Zounon A. Njifou Njimah A. et al. Panorama des pathologies ORL en situation d'activité médicale gratuite à Dan (Benin). *Health. Sci. Dis.* 2020, Vol: 21(5), p26-29.
- [16] Kebebew T, Tesfaye A. Pattern of ear, nose and throat diseases in Addis Abeba. *Ethiop. J. Health Dev.* 2021, 35(3).
- [17] Fansula J, Samdi M. et al. An audit of ear, nose and throat diseases in a tertiary health institution in South-western Nigeria. *Pan Afr Med J.* 2013, 14: 1.
- [18] Rijal AS, Joshi RR, et al. ear diseases in children presenting at Nepal Medical College Teaching Hospital. *Nepal Med Coll J.* 2011, 13(3): 164-8.
- [19] Acharya A, Singh MM et al. Ear, nose Throat disorders in government schools of far-western Nepal. *L M Coll J.* 2013, 1(2): 86-8.
- [20] Couloigner V, Graber M. L'angine et ses complications. EMC – Oto- rhino- laryngologie. Paris: Elsevier Masson SAS 2014: 20-500-A-10.
- [21] Teissier N, Van Den Abbeele T. Mastoïdite aiguë de l'enfant. EMC- Oto- rhino- laryngologie. Paris: Elsevier Masson SAS 2015: 20-086-A-12.
- [22] Farinetti A, Nicollas R, Triglia J. Diagnostic des dyspnées laryngées de l'enfant EMC- Oto- rhino- laryngologie. Paris: Elsevier Masson SAS 2015: 20-645-E-10.
- [23] Couloigner V, Van Den Abbeele T. Rhinopharyngite de l'enfant. EMC- Oto-Rhino-laryngologie. Paris: Elsevier Masson SAS; 2004. 20-510-A-10.
- [24] Al-Mendalawi M, Mohsen H. Ear, Nose and Throat Diseases in Children: Pattern and Risk Factors. *The Iraqi postgraduate medical journal.* 2008, 7: 106-12.
- [25] Guerrier Y. Anatomie à l'usage des oto-rhino-laryngologistes et des chirurgiens cervico-faciaux. Tome 1. Anatomie chirurgicale de l'os temporal, de l'oreille et de la base du crâne. Joué-Lès-Tours: La Simarre; 1988: 210.