International Journal of Otorhinolaryngology and Head and Neck Surgery
Baba SH et al. Int J Otorhinolaryngol Head Neck Surg. 2023 Apr;9(4):247-251
http://www.ijorl.com
pISSN 2454-5929 | eISSN 2454-5937

DOI: https://dx.doi.org/10.18203/issn.2454-5929.ijohns20230752

Original Research Article

Bacteriological study of nasopharyngeal carriage of the child with nasopharyngitis

Sacko Hamidou Baba[1]*, Maiga Ibrahim Mahamane[1], Kodio Aminata[1], Timbine Lassina Gadi[2], Abdoul Razak Dicko[3], Kouriba Bourema[2], Bagayogo Hawa Dicko[1]

[1]ENT Department, District Hospital IV, Bamako, Mali
[2]Bacteriology Unit, Charles Mérieux Center for Infectious diseases, Bamako, Mali.
[3]Director of the District Hospital IV, Bamako, Mali

Received: 31 January 2023
Revised: 14 March 2023
Accepted: 15 March 2023

***Correspondence:**
Sacko Hamidou Baba,
E-mail: sackohamidou85@gmail.com

ABSTRACT

Background: Nasopharyngitis is a public health problem due to the high frequency of medical consultations involving this condition, the significant economic cost of drug prescriptions. The etiologies are diverse, its management, first medicinal (whose contribution of bacteriology among many others), may require for some palpating indications a surgical cure. The objective was to identify the main bacteria responsible for nasopharyngitis in children within the ENT department of the District Hospital CIV Bamako.
Methods: This was a prospective cross-sectional study, over a period of 4 months, from 1 December 2018 to 31 March 2019 involving children with nasopharyngitis seen in consultation. The samples were taken by swabbing the nasopharynx using a sterile swab in accordance with the rules of asepsis and sterility and in the absence of antibiotic intake.
Results: A total of 51 nasopharyngeal swabs were taken and analyzed using usual laboratory methods, 26 strains were isolated from 24 children. The age group of 1 to 4 years was mainly concerned. Main germs identified were *Kocuria rosea* 30.8%, *Staphylococcus aureus* 15.4%, *Kocuria varians* 11.5% *Staphylococcus pneumoniae* 7.7%. We observed a low percentage of resistance to penicillin G and tetracyclins. The majority of our strains were sensitive to macrolids.
Conclusions: Nasopharyngitis of the child initial viral pathology, but whose clinical course may involve superinfection germs promoting complications. The bacteriological study of nasopharyngeal carriage rightly allows antibiotic therapy adapted to the germs in question, in this multivariate management of the nasopharyngeal disease of the child within our department.

Keywords: Nasopharyngitis, Bacteriology, Child

INTRODUCTION

Nasopharyngitis is an inflammatory disease of the upper stage of the pharynx (cavum) variably associated with nasal involvement. Nasopharyngitis results from the aggression of the nasal mucosa by certain viruses and bacteria, it is a pathology of adaptation of the child.[1-5]

It is the most common respiratory infection in children.[6-9] Nasopharyngitis is a public health problem because of the high frequency of medical consultations involving this disease.[10-13]

Nasopharyngitis is a public health problem because of the high frequency of medical consultations involving this disease, the high economic cost associated with drug

prescriptions, the high number of days of school absenteeism or parental absence from work.[5,10,14,15]

According to the WHO, in Mali the annual prevalence of acute upper respiratory infections in children was estimated at 370940 cases in 2018, with an incidence of 88.41% in children aged 0-11 months followed by 1-4 years (38.4%).[16]

Each year in the United States, nasopharyngitis is responsible for 22 million days of school absenteeism.[17]

The descriptive bacterial epidemiology of the nasopharynx, widely studied in developed countries, has been the subject of little work in children in developing countries, particularly in Mali, hence the subject of our study.

Objective

The objective was to identify the main bacteria responsible for nasopharyngitis in children within the ENT department of the district hospital CIV Bamako.

METHODS

This study took place in the ENT department of District IV Hospital Bamako and at the Rodolphe Mérieux laboratory for bacteriological analyses.

This was a prospective cross-sectional study, over a period of 4 months, from 1 December 2018 to 31 March 2019 involving children with nasopharyngitis.

Inclusion criteria

All patients with nasopharyngitis and/or rhinological disorders were included in our study.

Exclusion criteria

Not all children or parents of children who refused to submit to our study and patients who did not have nasopharyngeal signs, also those over 9 years of age, were not included in this study.

The variables studied were sociodemographic, clinical, biological and bacteriological.

The samples were taken by swabbing the nasopharynx using a sterile swab in accordance with the rules of asepsis and sterility and in the absence of antibiotic intake, they were transported in a refrigerated cooler and sent to the laboratory within a maximum of one hour.

Data collection was done on an individual survey sheet on interview.

Data capture and analysis was performed on SPSS 20.1 software and the office 2019 package.

Anonymity was strictly respected; the informed consent of the patients had been obtained beforehand to participate in the study.

For the sampling technique, it was a question of lifting the tip of the nose to clear the nasal orifice, insert the swab and insert it perpendicular to the plane of the face without touching the nasal opening, follow the floor of the nasal cavity and turn the swab before removal.

RESULTS

In Figure 1, we note a predominance of the male sex (53%), with a sex ratio of 1.13.

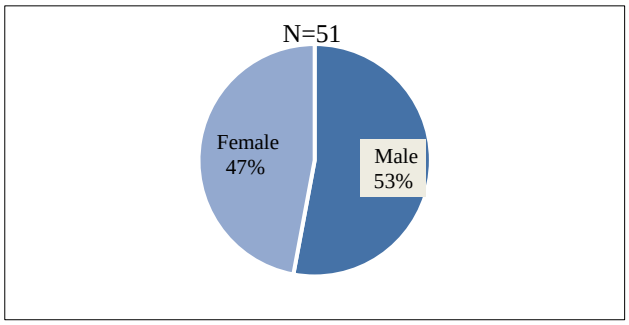

Figure 1: Gender distribution of children.

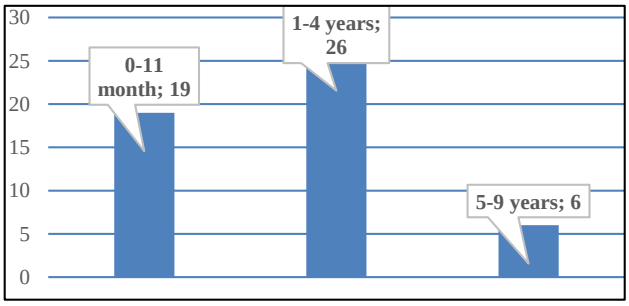

Figure 2: Age distribution of children.

The 1-4 age group accounted for 51.0%, the 5 to 9 age group was less affected, and the extreme age of our patients was 1 month to 9 years as shown in Figure 2.

Table 1 provides information on the results of the clinical examination: Fever, nasal obstruction, rhinorrhea, mouth breathing, coughing and sneezing were the main signs found at 31.4%.

Associated signs such as fever and cough, or fever and otorrhea were less found with 5.9% for each.

In our study as shown in Table 2, our young patients mainly suffered from the acute form of nasopharygitis (58, 80%).

Table 1: Distribution according to signs found during clinical examination.

Clinical signs	Number	%
Fever+nasal obstruction +rhinorrhea+mouth breathing+cough	16	31.4
Fever+nasal obstruction+ otalgia+cough/sneeze	13	25.5
Fever+rhinorrhea+nasal obstruction+cough/sneeze	11	21.6
Nasal obstruction+rhinorrhea +cough/sneeze	5	9.8
Fever+cough/sneeze	3	5.9
Fever+otorrhea	3	5.9
Total	51	100.0

Table 2: Distribution of cases of nasopharyngitis according to type.

Nasopharyngitis	Number	%
Acute	30	58.8
Recurrent	21	41.2
Total	51	100.0

We note from Table 3 that the age range of 1 to 4 years accounted for 31.4% of acute nasopharyngitis cases compared to 19.6% of recurrent nasopharyngitis, the 5-9 age group was less affected.

As shown in Figure 3, acute otitis media was mainly found in association with nasopharyngitis 25 cases (49, 1%), unlike angina and otitis externa, which were very little found.

Table 3: Distribution of patients according to age and form of nasopharyngitis.

Age range	Acute nasopharyngitis	Recurrent nasopharyngitis	Total
	N (%)	N (%)	N (%)
0-11 month	10 (19.6)	09 (17.6)	19 (37.2)
1-4 years	16(31.4)	10 (19.6)	26 (51.0)
5-9 years	04 (7.8)	02 (3.9)	06 (11.7)
Total	30 (58.8)	21 (41.1)	51 (100.0)

Table 4: Distribution according to nasopharyngeal swabs.

Results	Number	%
Positif	26	51.0
Négatif	25	49.0
Total	51	100

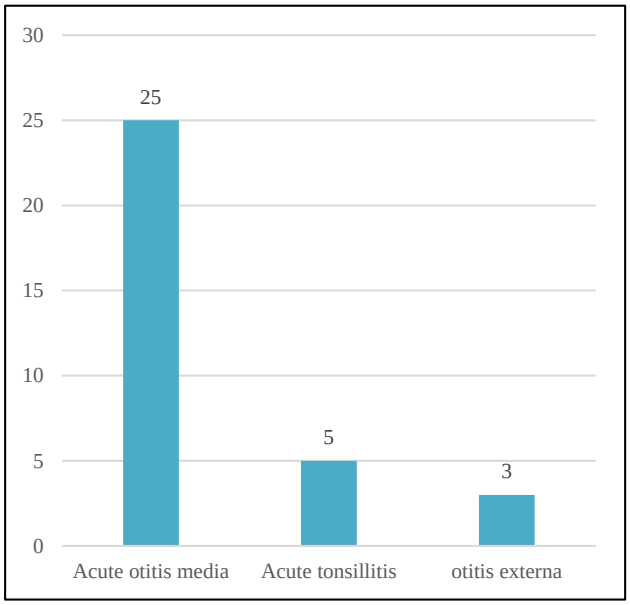

Figure 3: Distribution according to pathologies associated with nasopharyngitis.

Table 6: Distribution of germs found according to species.

Germs found	Number	%
K. rosea	8	30.8
S. aureus	4	15.4
K. varians	3	11.5
Granulicatella adiacens	2	7.7
***Staphylococcus* à coagulase negative**	2	7.7
S. pneumoniae	2	7.7
Erysipelothrix rhusiopathiae	1	3.8
Kocuria rhizophilae	1	3.8
S. aureus+Alloiococcus otitis	1	3.8
Enterrococcus raffinosus	1	3.8
S. pluranimalium + S. pneumoniae	1	3.8
Total	26	100.0

Table 4 shows that of the 51 nasopharyngeal swabs collected, 26 (51.0%) were positive.

As shown in Table 5, the study of 56 positive samples confirmed that *K. rosea* 8 cases (30.8) is the main microorganism found in the patients in our study.

Antibiograms: We observed a low percentage of resistance to penicillin G and tetracyclins. The majority of our strains were sensitive to macrolides.

DISCUSSION

Age and sex

The most affected age group in our study was between 1 and 4 years with a percentage of 51.0%, the extreme ages being 1 month and 9 years. Weber et al in France, in 1995 recorded 92% of children under 5 years of age above our rate, Satli et al in 2017 in Marrakech to reported 42.9% of children from 6 to 12 months.[18,19]

This difference can be explained by the fact that our study was not focused on a specific age group, namely that nasopharyngeal colonization reaches its maximum in preschool age and then gradually declines.

In our series boys were slightly more represented 52.9% with a sex ratio of 1.13.

Adedemy JD et al. at Parakou (Benin) in 2017 also found a male predominance in childen under 5 years 57.20 and sex ratio of 1.34.[20]

Clinical signs

Fever, nasal obstruction, rhinorrhea, mouth breathing, cough and sneezing were the main signs found in our study (31.4%). Satli et al in Marrakech in 2017 reported respectively: fever 73%, cough 38%, rhinorrhea 17%.[19]

Forms of nasopharyngitis

Uncomplicated acute nasopharyngitis accounted for 58.8%, 41.2% of cases were recurrent, a slightly elevated rate, compared to that obtained by Wald et al a Lyon (France) 37.8%.[21] This result could be explained by the frequency of recurrences up to 6 or 7 years confirming the notion of adaptive disease of nasopharyngitis in children, as mentioned by the authors Sacko and Froehlich.[4,8]

Associated pathologies and nasopharyngitis

Acute otitis media is mainly found in our study as a pathology associated with nasopharyngitis, 25 cases (49.01%). The impact of nasopharyngeal infections on the middle ear was widely argued in the literature; Sajitha et al, Sridhar.[22,23]

Germs found

Compliance with the methods of identification of germs sought in our study, allowed us to isolate 26 strains of germs (50.98%) from 51 samples, our rate was higher than that provided by Gouhoue et al in Senegal in 2003 where 34 strains of germs or a frequency of 19.43% were isolated from 175 samples.[24]

K. rosea was the most isolated species in our study (30.8%), Gouhoue et al had isolated *Moraxella catarrhalis* with 19.4%.[24]

Sensitivity of antibiotics to the germs found

The majority of our strains were sensitive to macrolides. Darelid 1993 confirmed the significant role of the macrolid in the drug management of nasopharyngitis.[25]

Limitations

Despite the low sampling, this study, the first in our country, allowed us to have first results on the bacterial ecology of the nasopharyngeal flora of the child. The lack of financial means of the parents of the young patients did not allow for the expansion of the sample, as the study did not receive funding from the state or private organizations. Other studies will allow us to take into account certain factors, not considered here but that can impact the evolution of nasopharyngitis and identification of the germs involved.

CONCLUSION

Nasopharyngitis of children initially a viral pathology, but whose clinical course may involve superinfection germs promoting complications. Public health problem, especially of the child. Common causes of truancy. Existence of fever, purulent rhinorrhea or non-fluctuating lymphadenopathy are not always synonymous with bacterial infections therefore do not justify the prescription of systematic antibiotics.

The bacteriological study of nasopharyngeal carriage rightly allows antibiotic therapy adapted to the germs involved, in this multivariate management of the nasopharyngeal disease of the child within our department.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Paltchun VT, Krioukov AI. Otorhinolaryngology. Clinical guidelines. GEOTAR-Media; 2012.
2. Brook I, Shah K. Bacteriology of adenoids and tonsils in children with recurrent adenotonsillitis. Ann Otol Rhinol Laryngol. 2001;110(9):844-8.
3. Balasubramanian T. Dr tbalu notes in otolaryngology. Res Gate. 2022.
4. Sacko HB. L'essentiel en oto-rhino-laryngologie et pathologie de la face et du cou. Paris: Mars; 2002.
5. Sacko HB, Dembélé RK, Telly N, Coulibaly S. Management of common ENT affections of the child in a reference health center in Mali (the

example of commune IV of the district of Bamako). La revue médicale du sahel. 2017;1(1):21-4.
6. Bogomilskii MR. Pharyngeal tonsils. Vestnik-Otorinolaringologii. 2013;78(3):61-4.
7. Rajeshwary A, Rai S, Somayaji G, Pai V. Bacteriology of symptomatic adenoids in children. N Am J Med Sci. 2013;5(2):113-8.
8. Froehlich P. Les infections ORL de l'enfant: rhinopharyngites, otites, amygdalites. Le conseil en pharmacie. Michel Servet; 2002.
9. Kryukov AI, Ivoilov YU, Zakharova AF, Khamzalieva RB, Rynkov DA. The structure of childhood diseases in the patients presenting with hospital-acquired ENT pathology estimated based on the results of monitoring children's hospitals in Moscow. Vestnik-otorinolaringologii. 2015;80(4):65-8.
10. Rutebemberwa E, Mpeka B, Pariyo G, Peterson S, Mworozi E, Bwanga F, et al. High prevalence of antibiotic resistance in nasopharyngeal bacterial isolates from healthy children in rural Uganda: A cross-sectional study. Ups J Med Sci. 2015;120(4):249-56.
11. Dhooge I, Van Damme D, Vaneechoutte M, Claeys G, Verschraegen G, Van Cauwenberge P. Role of nasopharyngeal bacterial flora in the evaluation of recurrent middle ear infections in children. Clin Microbiol Infect. 1999;5(9):530-4.
12. Konno M, Baba S, Mikawa H, Hara K, Matsumoto F, Kaga K, et al. Study of nasopharyngeal bacterial flora. Variations in nasopharyngeal bacterial flora in schoolchildren and adults when administered antimicrobial agents. J Infect Chemother. 2007;13(4):235-54.
13. Epote A. Etude de la sensibilité des souches isolées d'infections respiratoires de la sphère ORL. Dakar: Thèse Pharm; 2006.
14. Jourdain S, Smeesters PR, Denis O, Dramaix M, Sputael V, Malaviolle X, et al. Differences in nasopharyngeal bacterial carriage in preschool children from different socio-economic origins. Clin Microbiol Infect. 2011;17(6):907-14.
15. Sacko HB. Otorhinolaryngology of children in Mali, current aspects and perspectives (assessment of 1118 patients). Mali Medical; 1996.
16. WHO. Guide technique pour la surveillance integree de la maladie et la riposte au Mali. Available at: https://files.aho.afro.who.int/afahobckpcontainer/production/files/Guide_SIMR_Mali_13_JAN_2022.pdf . Accessed on 10 January 2023.
17. Heikkinen T, Jarvinen A. The Common cold. Lancet. 2003;361:51-9.
18. Weber M, Beley G, Thollot E, Vuillemin JL, Simeon D, Moulin C. Flora of purulent nasopharyngitis of the child of the agglomeration of Nancy (France) in 1995. Méd Mal Infect. 1996;26:572-5.
19. Satli M. Etude du portage rhinopharyngé du pneumocoque chez les nourrissons ayant une otite moyenne aiguë à Marrakech. Thèse présentée et soutenue publiquement le 14/07/2017 pour l'obtention du doctorat en médecine.
20. Bakondé B, K. Tatagan K, Kessie K, Kafechina ABL, Assimadi K, Paupe J, et al.. Published 1998. Médecine. Epidémiologie hospitalière des Infections Respiratoires Aiguës (IRA) basses chez le nourrisson et l'enfant Togolais. https://www.semanticscholar.org/author/B.-Bakondé/121956505 .
21. Wald ER, Dashefsky B, Byers C, Guerra N, Taylor F. Frequency and severity of infections in day care. J Pediatr. 1988;112:540-6.
22. Sajitha KB, Thomas B, Ihsan AT. A prospective study of sinonasal and nasopharyngeal pathology in chronic otitis media Int J Otorhinolaryngol Head Neck Surg. 2018;4:1263-6.
23. Sridhar MR. A clinical study to determine the effects of adenoidectomy in cases of secretory otitis media in school going children Otorhinolaryngol Head Neck Surg. 2018;4:1427-30.
24. Gouhoue T J. Isolation and validation of strain identification methods: *Haemophilus influenzae*, *Streptococcus pneumoniae*, *Streptococcus pyogenes*, *Moraxella catarrhalis* causing acute upper respiratory infections in children in Dakar (Senegal). UCAD. 2012:2013.
25. Darelid J, Löfgren S, Malmvall BE. Erythromycin treatment is beneficial for longstanding Moraxella catarrhalis associated cough in children. Scand J Infect Dis. 1993;25(3):323-9.

Cite this article as: Baba SH, Mahamane MI, Aminata K, Gadi TL, Dicko AR, Bourema K, et al. Bacteriological study of nasopharyngeal carriage of the child with nasopharyngitis. Int J Otorhinolaryngol Head Neck Surg 2023;9:247-51.