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RESEARCH ARTICLE

ETIOLOGICAL, CLINICAL AND THERAPEUTIC CHARACTERISTICS OF BACTERIAL PHARYNGO-TONSILLITIS IN BENIN

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Abstract

The term pharyngo-tonsillitis refers to inflammation and infection of the mucosa and lymphatic elements of the oropharynx: lymphoid structures and tonsils. This work aimed to determine in all tonsillitis, the proportion of bacterial tonsillitis, their clinical presentation in order to identify the germs involved and the treatment administered at the Padre Pio Humanitarian Health Center (CSVH) in Cotonou and at the Vallée de Grace Medical Clinic in Abomey-Calavi (CMVG). To achieve the objective of this work, a prospective analytical and descriptive study was carried out at the CSVH and the CVGAB over a period of 12 months (July 2022 to June 2023). The patients in whom the diagnosis of pharyngo-tonsillitis was made and the bacterial etiology confirmed after a throat swabwere considered in this study. The variables age, sex, months, clinical signs, etiology and treatment were taken into account. In total, 272 cases of pharyngo-tonsillitis out of 2896 consultations in pediatrics and ENT in the health facilities serving as the framework for the study, representing a prevalence of 9.39% with a monthly average of 22.67 cases. Among the 272 cases of pharyngo-tonsillitis, the bacterial origin was confirmed with 143 cases, representing a proportion of 52.57%. The bacteria involved were: S. pyogenes (41.38%), S.aureus (18.62%), S. pneumoniae (14.48%), S. viridans (14.48%). The isolated bacteria were sensitive mainly to antibiotics in varying proportions: Imipenem (100%), Ceftriaxone (67.57%), Cefixime (66.22%), Amoxicillin clavulanic acid (59.46%) and Cefuroxime (58.78%). %). Antibiotic therapy was dominated by amoxicillin + clavulanic acid (27.52%) followed by the 3rd generation cephalosporinscefixime (25.50%) and cefuroxime (14.09%).Bacterial origin represents 52.57% of pharyngo-tonsillitis in Benin; this high rate is compatible with the probabilistic antibiotic therapy commonly used

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forpharyngo-tonsillitis in clinical practice where cytobacteriological examination is not easy.

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Introduction:-

The term pharyngo-tonsillitis refers to inflammation and infection of the mucosa and lymphatic elements of the entire oropharynx: lymphoid structures and tonsils. That of tonsillitis considers inflammation localized at the level of the tonsils, in particular those pharyngeal, palatine and lingual(Berezin, 1980; Strunski, 1993; Woolford, 2000). Acute angina is one of the most common upper respiratory tract infections(Bingen, 2005).

In Benin, the frequency of angina in children was 7.53%(Chobli et al., 2012). In Mali, pharyngo-tonsillitis represents 1.8% of pathologies encountered in ENT and constitutes the 3rd ENT infectious pathology after nasopharyngitis and otitis. Thesepharyngo-tonsillitis can generate complications which can be locoregional and/or general (Diop et al., 2020; Timbo et al., 2006). They are common in school-age children and young adults. The etiological diagnosis of angina is difficult based on clinical findings alone. Bacteriological examinations, in particular the culture of the throat swab, are necessary for a definitive diagnosis (AFSS, 1999;Kaplanet al., 2001).

Pharyngo-tonsillitis is usually caused by viruses or bacteria; but the bacterial etiology is formidable due to its potentially serious complications (post-streptococcal syndromes: acute rheumatic fever (AAR), acute glomerulonephritis (AGN), and locoregional septic complications whose prevention justifies the implementation of antibiotic therapy usually probabilistic. They can be acute or chronic. They constitute a public health problem, due to their frequency, their recurrence and their socio-professional and economic impact (Bingen, 2005;Spilf, 2022).

Pharyngo-tonsillitis has been the subject of little work in Benin. It is in this context that we decided to carry out our research work on the theme: bacteriological characteristics of pharyngo-tonsillitis, the objective of this workwas to determine the prevalence of bacterial tonsillitis, to study the clinical presentation, to isolate and identify the germs involved bacteria and the treatment administered at the Padre Pio Humanitarian Health Center (CSVH) in Cotonou and at the Vallée de Grace Medical Clinic in Abomey-Calavi.

Material and Methods:-

Study centers

The study was carried out in three centers: The Vallée de Grâce Medical Clinic, the Padre Pio Humanitarian Health Center (CSVH) and the Laboratory of Biology and Molecular Typing in Microbiology.

Vallée de Grace MedicalClinic (CMVG)

It is located in the Aidignon district, district of Togba, in the commune of AbomeyCalavi, in the department of Atlantique in Benin. It is organized into several sections: reception, pharmacy, consultation rooms, hospitalization rooms, room, Maternity department, pediatric department, otorhinolaryngology and the laboratory. The laboratory has several units including: Bacteriology/Parasitology, Serology, Biochemistry and Immunology.

Padre Pio Humanitarian Health Center (CSVH)

The CSVH Padre Pio is located in the 6^{th} arrondissement of Cotonou in the AkpakpaDodomè district, Coastal Department. It is organized into several sections: reception, pharmacy, consultation rooms, hospitalization rooms, treatment room, sampling room, the Hepato-gastroenterology service, the pediatric services, Medicine, endocrinology, maternity, cardiology, obstetrics and gynecology, otolaryngology (ENT) and the laboratory. The laboratory also has several units including: Bacteriology/Parasitology, Serology, Biochemistry and Immunology.

Laboratory of Biology and Molecular Typing in Microbiology

Located in the Department of Biochemistry and Cellular Biology of the Faculty of Science and Technology of the University of Abomey-Calavi, it is a research laboratory in Microbiology (clinical and food), Biochemistry, Molecular Biology and pharmacology of natural substances.

Methods:-

Prospective analytical and descriptive study was carried out during 12 months (from July 2, 2022 to June 31, 2023).

Sampling and variables analyzed

The patients who were sampled are those in whom the diagnosis of pharyngo-tonsillitis was made in the ENT and pediatric departments of the sturdy health centers on the clinical arguments (fever, odynophagia dysphagia, hypertrophy and redness palatine tonsils and pharyngeal inflammatory signs, earache, and digestive signs) and the bacterial etiology confirmed after a cytobacteriological examination of the throat swab. Variables such as age, sex, month, clinical signs, bacterial characteristics and prescribed antibiotic treatment were studied.

Ethical aspects

This research protocol was approved by the Scientific Ethics Committee of the Doctoral School (Life Sciences) of the University ofAbomeyCalavi (UAC), Benin under number UAC/FAST/EDSV/1562003 in accordance with national and local regulations. Likewise, all patients or their first-degree parents gave informed consent by verbal or written agreement and confidentiality was respected.

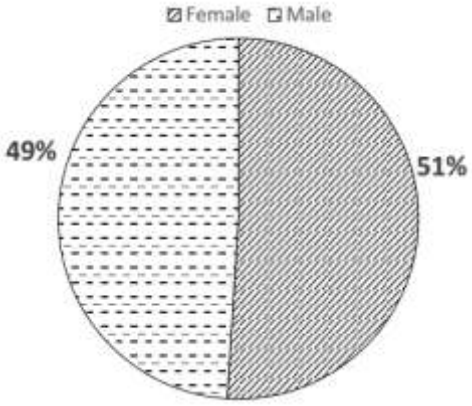
Data processing and analysis

Microsoft Excel 2016 spreadsheet was used for data processing and then subjected to a univariate or multivariate analysis of variance (ANOVA) using STATA 3 version 11.0 software.

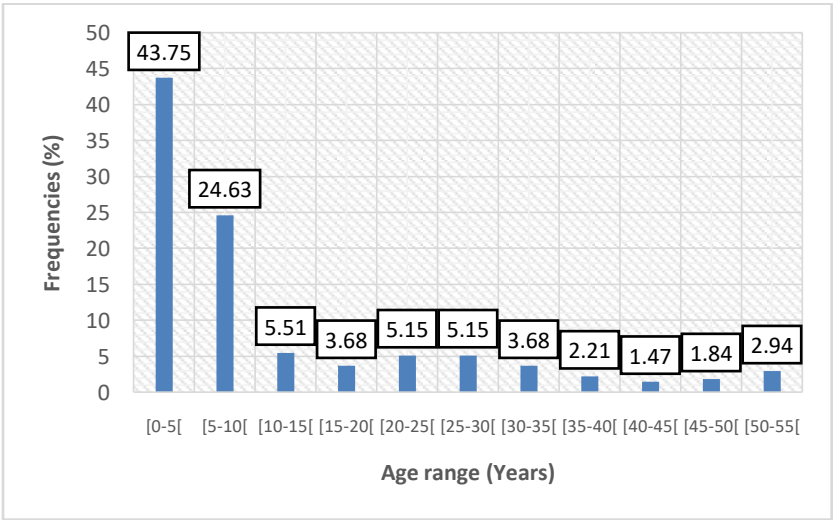
Results:-

Patient'ssociodemographic characteristics

Information relating to sex and age was collected from 272 patients. Average rate of 51.10% are women compared to 49.90% men (Figure 1a) with a sex ratio of 0.96 in favor of the female sex. They belonged to age bracketfrom 3 months and 54 years with 11.34 ± 4 years as average age. The age group from 0 to 4 years is the most affected with 119 cases out of 272representing the proportion of 43.75% (Figure 1b). Regarding the engines frequency, pharyngo-tonsillitis is more frequent in December and January with the respective proportions of 13.24% and 10.29% (Figure 1c).



[a]



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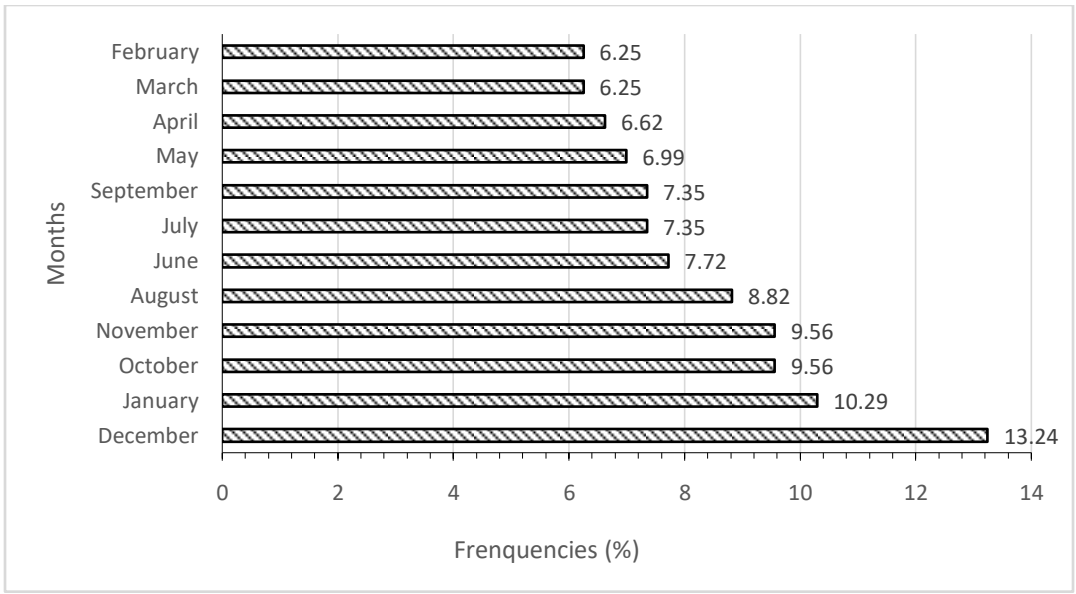

[c]

Figure 1:- Distribution of patients according to sex [a], age [b] and angina monthly frequency [c].

Epidemiological, clinical and paraclinical aspects

A total of 272 cases of pharyngo-tonsillitis were recorded out of 2896 pediatric and ENT consultations in the study health centers, representing prevalence of 9.39% with a monthly average of 22.67 cases. Among the 272 cases of pharyngo-tonsillitis, the bacterial origin was confirmed in 143 cases, with a proportion of 52.57% (Figure 2).

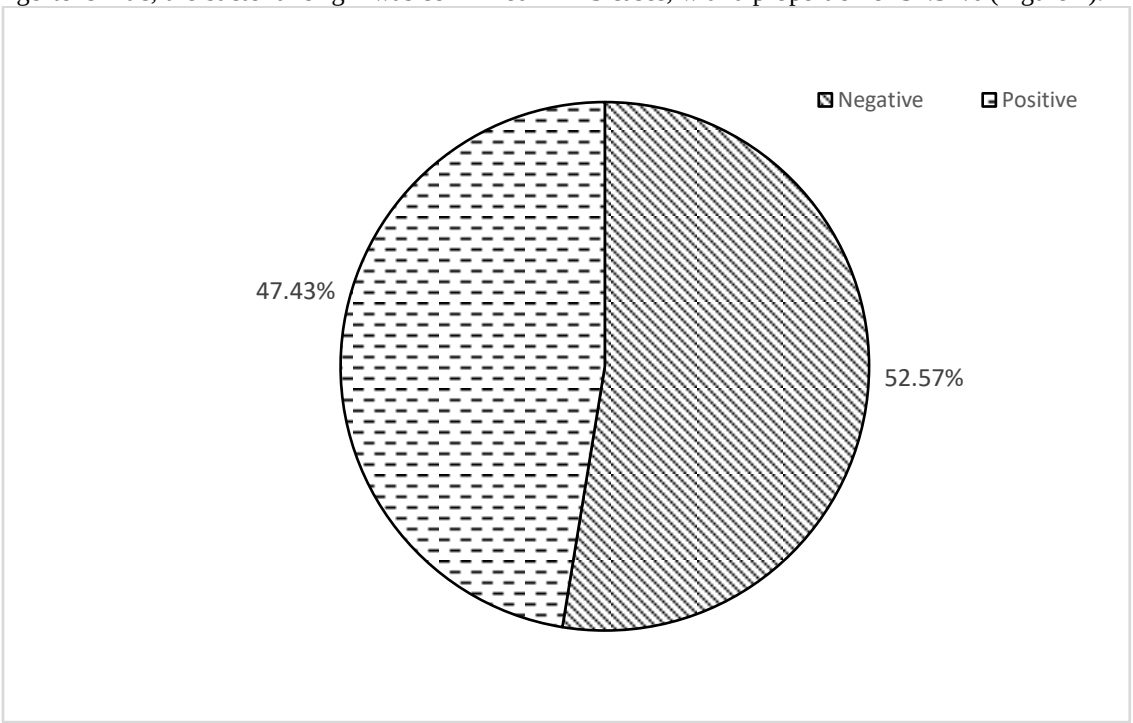

Figure 2:- Proportion positive cases of bacterial culture in the study population.

Regarding the reasons or clinical and paraclinical signs which accompany these cases of pharyngo-tonsillitis, we note that fever and odynophagia are the most frequent reasons for consultation with the proportions of 47.55% and 38, respectively. 46% (Figure 3)

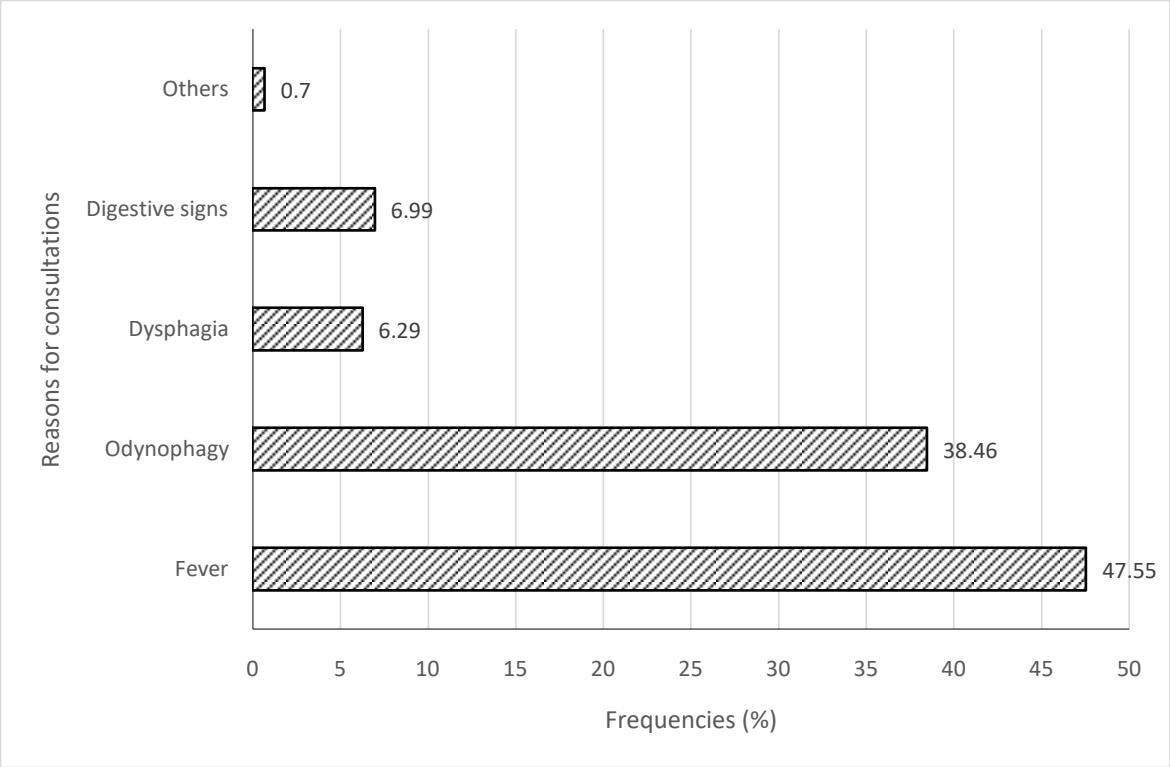

Figure 3:- Distribution of patients with bacterial tonsillitis according to reasons for consultation.

Bacterial tonsillitis can progress from acute to chronic form. The distribution of patients according to the mode of development shows that acute tonsillitis was observed with 101 patients, representing a proportion of 71% compared to 29% of chronic tonsillitis with 42 patients. Likewise among bacterial tonsillitis, several types have been identified in patients (Table 1). These are Erythromatous tonsillitis which are predominant (58.04%) followed by erythromato-pulbaceous tonsillitis (28.67%), ulcero-necrotic (12.59%) and pseudomenbranous in a small proportion (0.70%)

Table 1:- Distribution of patientsaccording to tonsillitis types.

Type of Tonsillitis	Number	Frequency (%)
Erythromatous	83,00	58,04
Erythemato-Pulbaceae	41,00	28,67
Ulcero-necrotic	18,00	12,59
Pseudomembranous	1,00	0,70
Total	143	100

Furthermore, in addition to the clinical and paraclinical reasons which accompany these cases of pharyngo-tonsillitis, several signs have been identified with the patients. These signs include fever, earache, hypersialorrhea and halitosis individually or in combination (Figure 4). Indeed, digestive signs are the most representative (32.15%) of the associated signs followed by fever (11.96%) and earache (4.90%).

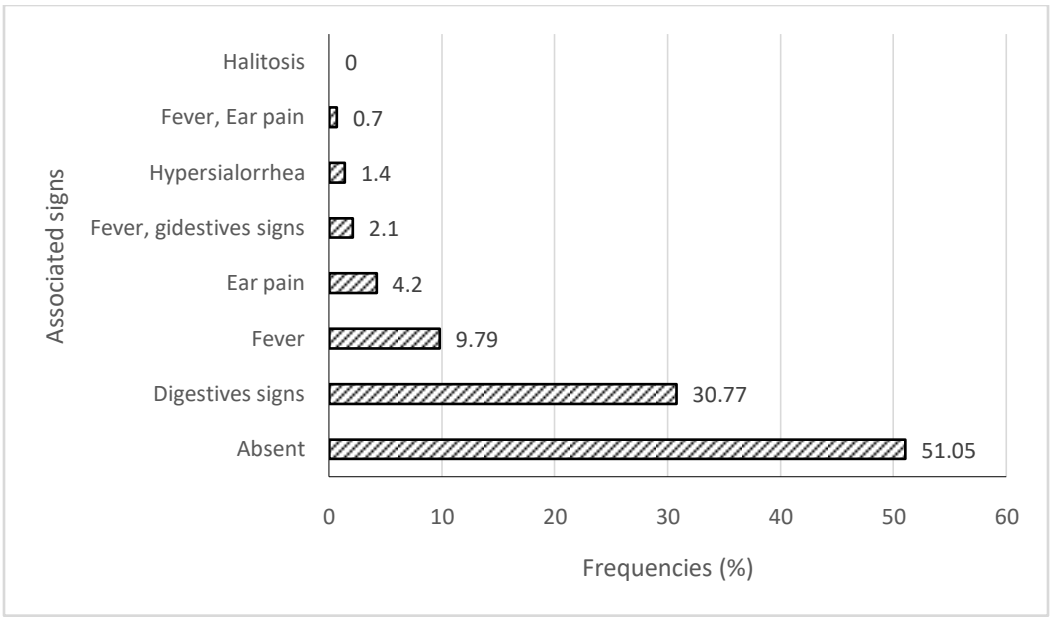

Figure 4:- Distribution of patients according to associated signs.

Bacteriological aspects

Etiologically, several groups of bacteria involved tonsillitis were isolated and identified in varying proportions after cytobacteriological examination and culture of the patients' throat swabs (Figure 5). These are S. pyogenes (41.38%), S. aureus (18.62%), S. pneumoniae (14.48%), S. viridans (14.48%).

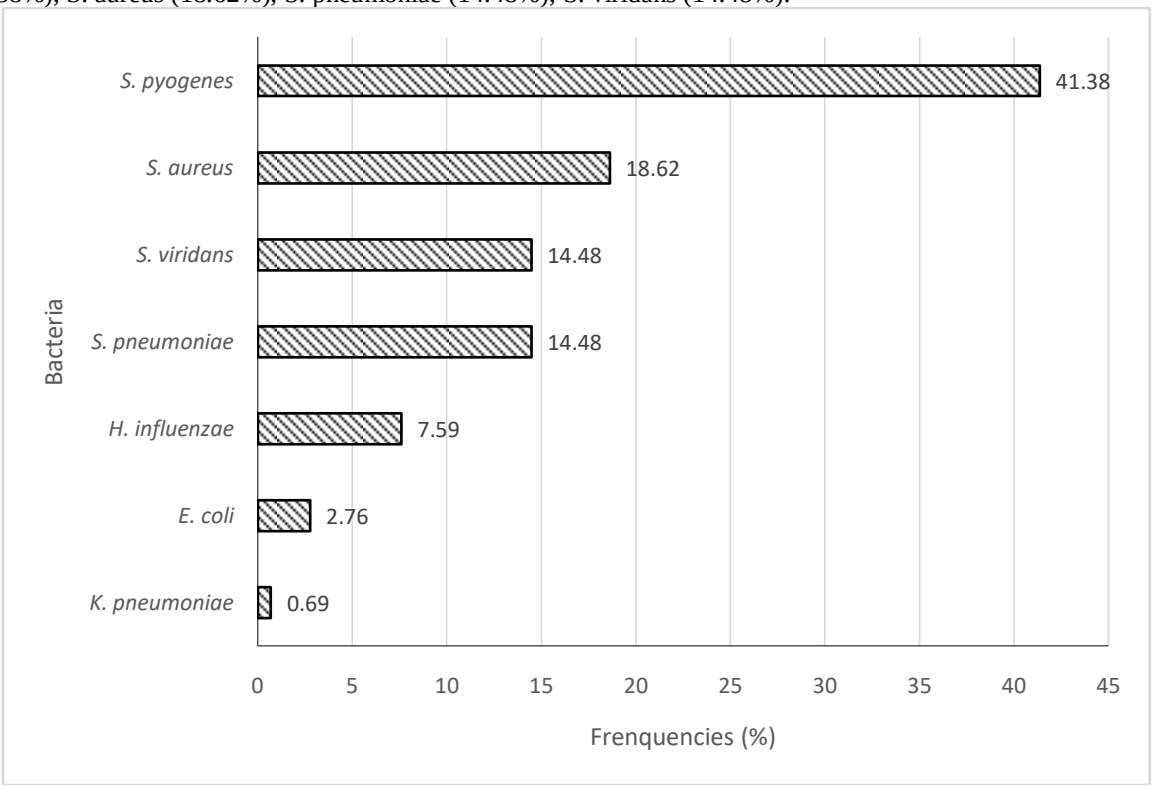

Figure 5:- Frequencies of tonsillitisisolated bacteria.

Figure 6 shows the sensitivity profile of the tonsillitisisolated bacteria to the antibiotics used for the antibiogram. It should be noted a high resistance (95.95%) to amoxicillin and erythromycin (60.81%). The tonsillitisisolatedbacteria

were sensitive mainly to the following antibiotics: Imipenem (100%), Ceftriaxone (67.57%), Cefixime (66.22%), Amoxicillin clavulanic acid (59.46%) and Cefuroxime (58.78%).

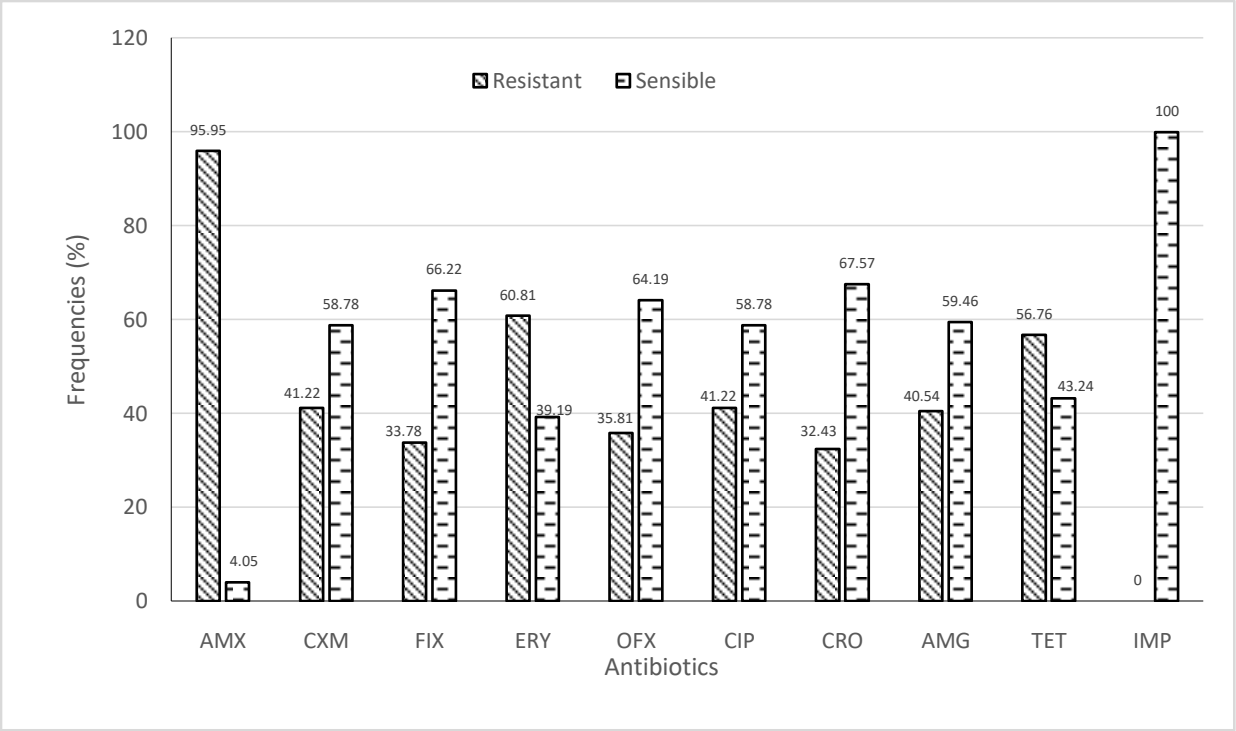

Figure 6:- Sensitivity oftonsillitis isolated strains to antibiotics.

AMX: Amoxicillin; CXM: Cefuroxime; FIX: Céfime; ERY: Erythromycin; OFX: Ofloxacin; CIP: Ciprofloxacin; CRO: Ceftriaxone; AMG: Amoxicillin + clavulanic acid; TET: Tetracycline; IMP: Imipenem

Therapeutic aspects

In the treatment of bacterial tonsillitis, antibiotics are prescribed in 139 cases (97.20%) out of the 143 bacterial tonsillitis compared to 10 cases (7.75%) out of the 129 non-bacterial cases (Table 3).

Table 3:- Distribution of antibiotics prescribed in relation to bacterial culture results.

Antibiotic	Bacterial culture				Total
	Negative		**Positive**		
	n	%	n	%	
Amoxicilline	0	0	4	2.88	4
Erythromycine	0	0	5	3.60	5
Ceftriaxone	1	10	15	10.79	16
Cefuroxine	1	10	20	14.39	21
Cefixime	3	30	35	25.18	38
Cotrimazole	0	0	2	1.44	2
Amoxicilline + acideclavulanique	2	20	39	28.06	41
Cefoperazine + sulbactam	1	10	7	5.04	8
Ceftriaxone + Sulbactame	2	20	12	8.63	14
Total	10	100	139	100.00	149

The antibiotic prescription rate in tonsillitis treatment is 54.77% (149 cases out of 272) for all tonsillitis forms. Antibiotic therapy showed a predominance of amoxicillin + clavulanic acid (27.52%) followed by 3rd generation cephalosporinscefixime (25.50%) and cefuroxime (14.09%). The evolution was favorable towards clinical cure at the control on the 7th day with 139 cases out of 143 cases of bacterial pharyngo-tonsillitis, representing 97.20%.

Table 4:- Frequency of antibiotics prescribed in the treatment of tonsillitis.

Antibiotics	Number	Frequency (%)
Amoxicilline	4	2.68
Erythromycine	5	3.36
Ceftriaxone	16	10.74
Cefuroxine	21	14.09
Cefixime	38	25.50
Cotrimazole	2	1.34
Amoxicilline + acideclavulanique	41	27.52
Cefoperazine + sulbactam	8	5.37
Ceftriaxone + Sulbactame	14	9.40
Total	149	100.00

Discussion:-

Pharyngo-tonsillitis constitutes one of the main reasons for consultations in pediatrics and ENT in the study health centers with a prevalence of 9.39% and a bacterial proportion of 52.57%. Njifouet al. (2020) in Mbouda found a prevalence of 9.84% with a proportion of 66.67% for bacterial tonsillitis. A prevalence of 7.53% among children aged 0 to 15 was found byChobli et al. (2012) in Cotonou city. Similarly,Gehanno et al. (1992) found a proportion of 38% for bacterial tonsillitis in France. From the results of our study, it appears that the tonsillitis bacterial proportion is high as in other studies: 66.67% found by Njifou et al.(2020) in Mbouda,52.35% found by Haidara et al.(2014) in Dakar and 44.59% found by Chobli et al. (2012) in Cotonou. The classic heat of tropical regions favors the development of bacteria. In our study, the age group from 0 to 4 years is the most affected with 119 cases out of 272, representing a proportion of 43.75%. Georgalas et al.(2014) had already shown that children and adolescents are much more susceptible to tonsillitis (inflammation of the tonsils) than adults. This observation would be linked to the weaker immunity of children than that of adults because other authors such as Weckx and Teixeira(1997) have shown the close relationship between tonsillitis and the immune system. The tonsils are the immune system's first line of defense against bacteria and viruses that enter in the mouth. This function can make the tonsils particularly vulnerable to infection and inflammation. However, tonsil immune system function declines after puberty, a factor that may explain the rare cases of tonsillitis in adults (Bartlett et al., 2015).

Acute bacterial tonsillitis is common (71%). This frequency is close to the 80% found by Njifouet al. (2020) and the 75% of acute forms found by Cohen et al. (2007). The frequency found in our study is higher than the 45.99% of acute tonsillitis found by Chobli et al.(2012). Fever and odynophagia were the most frequent reasons for consultation with the proportions of 47.55% and 38.46% respectively. The proportion 38.46% for odynophagia is close to the 31.88% found by Chobli et al. (2012) and lower than 100% of Njifouet al. (2020).The immune response to tonsillar infection triggers the generation of a complex mix of cytokines. These cytokines are responsible for the systemic symptoms of infection, such as fever and mood changes, which are sometimes collectively referred to as the ‘sickness response’(BathalaandEccles, 2013)

Etiologically, the bacteria involved after cytobacteriological examination and culture of the throat swab, in our study, were: S. pyogenes (41.38%), S. aureus (18.62%), S. pneumoniae (14.48%), S. viridans (14.48%), Hemophilusinfluenzae (7.59%), Escherichia coli (2.76%) and K. pneumoniae (0.69%), The predominance of S. pyogenes (41.38%) is close to the 45% obtained by Njifouet al.(2020). Scholz et al. (2013) had shown that the most important pathogens responsible for bacterial tonsillitis are GABHS, i.e. Streptococcus pyogenes. Wang et al. (2017) reported that Bacterial infections are typically due to group A beta-hemolytic Streptococcus (GABHS), but Staphylococcus aureus, Streptococcus pneumoniae, and Haemophilus influenza have also been cultured which was also the case in our study. Hemophilusinfluenzae was isolated at a proportion of 7.59%. The role of Haemophilusinfluenzae type b (Hib), non-typeableHaemophilus strains and bacteria of the genus Moraxella in tonsillitis is insignificant (Windfuhr et al., 2016). However, the formation of biofilm by this strain (H. influenzae) can be a virulence factor for the organisms responsible for the development of rhino-sinusitis(Zuliani et al., 2006).

In our study, the rate of antibiotic prescription was 149 cases out of 272, or 54.77% for all forms of tonsillitis. The prescription of antibiotics was systematic in bacterial tonsillitis while respecting in vitro sensitivity. The results of Grijalva et al (2009) gave an antibiotic prescription rate of 72% for all forms of tonsillitis, therefore higher than ours. Our prescription rate (54.77%) is close to the rate of 40% found by Njifouet al.(2020).

Systematic probalistic antibiotic therapy or based on Mac Isaac's clinical score is questionable in regions where rapid diagnostic tests are available in consultation. This problem is reinforced through our results of prescriptions for bacterial and viral forms of pharyngo-tonsillitis. Antibiotics were prescribed in 139 cases (97.20%) out of the 143 bacterial pharyngo-tonsillitis compared to 10 cases (7.75%) out of the 129 non-bacterial cases. Antibiotics were prescribed in 139 cases (97.20%) out of the 143 bacterial pharyngo-tonsillitis compared to 10 cases (7.75%) out of the 129 non-bacterial cases. This questionable attitude would favor the selection of new strains and bacterial resistance to antibiotics.

The isolated bacteria were sensitive to beta lactams and mainly to the following antibiotics: Imipenem (100%), Ceftriaxone (67.57%), Cefixime (66.22%), Amoxicillin clavulanic acid (59.46%) and Cefuroxime (58. 78%). Amoxicillin + clavulanic acid (27.52%) is the most prescribed followed by the 3rd generation cephalosporinscefixime (25.50%) and cefuroxime (14.09%). Our results are close to those of Bourrous et al.(2009) and Romicka et al. (2009) with respectively 31% and 26% prescription of amoxicillin clavulanic acid and far from 64% found by Haidara et al.(2014) and 70% ofNjifouet al.(2020) for the same association. The evolution was favorable towards recovery with 97.20% of cases. This result is close to the 95% obtained by Njifou et al.(2020) and far from the 84.46% found by Chobli et al. (2012).

Conclusion:-

Bacterial pharyngo-tonsillitis has a prevalence of 9.39% and a bacterial proportion of 52.57%. The bacteria most involved is Streptococcus pyogenes sensitive to 3rd generation cephalosporins (notably ceftriaxone and cefixime). The cure rate was 97.20%. Probabilistic antibiotic therapy with 3rd generation cephalosporins is justified but questionable due to inappropriate antibiotic prescriptions. In our context, etiological research by cytobacteriological examination of the throat swab must be carried out with the aim of limiting the selection of multi-resistant strains.

Acknowledgement:-

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Conflicts of interest

The authors declare that they have no conflict of interest.

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