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PREVALENCE, CAUSE, AND PRESCRIPTION TREND IN PATIENTS WITH UPPER RESPIRATORY TRACT INFECTIONS AND MEMBRANOUS TONSILLITIS

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ABSTRACT

Background: One of the most prevalent types of acute tonsillitis observed in pediatric patients is membrane-associated tonsillitis. Although membranous tonsillitis can be caused by a variety of related microorganisms, bacterial pathogens are typically identified as the causative agent and a penicillin-group of antibiotics is provided.

Aim: The purpose of this study was to evaluate the cause, prevalence, and prescribing patterns of upper respiratory tract infections and membranous tonsillitis in participants. The effectiveness of laboratory, clinical, and epidemiological measures as well as their function in directing management were evaluated in the study.

Methods: Using kid patients from an Indian tertiary care center's emergency room, the current study used a retrospective design. 846 children with a confirmed diagnosis of membranous tonsillitis, ages 0 to 18, were included in the study from the pediatric outpatient department. Prevalence, etiology, and prescribing pattern were evaluated for each patient.

Results: Of the individuals in Group A, 31.2% (n=264) had beta-hemolytic streptococcus, 44.4% (n=276) had various viral etiologies, and 24.3% (n=206) had Epstein-Barr virus. Subjects with positive Epstein-Barr virus had a 27% prevalence of antibiotic prescriptions, while those with Down syndrome had a 98% prescription rate. Seven percent of participants with positive throat cultures received the appropriate antibiotics.

Conclusion: the most frequent etiological factors linked to membranous tonsillitis were Epstein-Barr virus and group A beta-hemolytic streptococcus. In pediatric emergencies, throat cultures and peripheral blood smears were the most helpful testing. These exams advise management in nearly all subjects and produce quick reports showing accurate diagnosis.

Keywords: membranous tonsillitis, Epstein-Barr virus, group A beta-hemolytic streptococcus, antibiotics, and prescription pattern

INTRODUCTION

One of the most prevalent types of acute tonsillitis observed in pediatric patients is membrane-associated tonsillitis. Symptoms of membrane-related tonsillitis typically include tonsillar irritation, edema, and hyperemia. A thick, grey covering typically covers the tonsil in membranous tonsillitis, which is accompanied by a high temperature and painful throat.[1]

Other organ systems are also affected. However, membranous tonsillitis can be caused by a variety of microorganisms, Penicillin-group medicines are typically recommended for membranous tonsillitis because most doctors believe that bacterial pathogens are the cause of the illness. Antibiotic-related side effects, the emergence of antibiotic resistance, repeated emergency room visits, and resistance development can all be observed as a result of the etiological variations.[2]

Corynebacterium diphtheria is rarely found in Western countries with high vaccination rates, but it remains one of the main causes of membranous tonsillitis in developing countries like India due to inefficient vaccination regimens. Membranous tonsillitis can result from infectious mononucleosis, a critical clinical disease. Although other viruses and some parasite illnesses can potentially cause it, EBV (Epstein-Barr virus) is mostly responsible for its etiology.[3,4]

In instance, adenovirus and CMV (cytomegalovirus) may aid in the association of other variables. Along with Corynebacterium diphtheria, streptococcal tonsillitis is another common bacterial cause of membranous tonsillitis. Physicians in the pediatric emergency department should treat infections accurately and promptly. The most important related issues are prompt decision-making, accessible laboratory testing, and appropriate management.[5]

In order to enable medical professionals, make the right diagnosis in emergency situations, it is crucial to evaluate the results of the laboratory tests and physical examination.[6] Assessing the etiology, prevalence, and prescribing pattern in patients with upper respiratory tract infections and membranous tonsillitis was the goal of the current study. The effectiveness of laboratory, clinical, and epidemiological measures as well as their function in directing management were evaluated in the study.

MATERIALS AND METHODS

Assessing the etiology, prevalence, and prescribing pattern in patients with upper respiratory tract infections and membranous tonsillitis was the goal of the current retrospective observational clinical investigation. The effectiveness of laboratory, clinical, and epidemiological measures as well as their function in directing management were evaluated in the study.

The study participants came from the Institute's outpatient division. Prior to their involvement in the study, all subjects gave their written and verbal informed consent. Participants in the trial ranged in age from 0 to 18 and were diagnosed with membranous tonsillitis during the specified study period after being admitted to the pediatric emergency department. Analyzing the files and records of the included subjects as well as their computer-automated records allowed for a retrospective investigation.

Children who arrived at the emergency outpatient department with a diagnosis of membranous tonsillitis and all supporting documentation were eligible to participate in the trial. Participants who were admitted to the Institute, had upper respiratory tract infections other than membranous tonsillitis, had chronic illnesses, or had incomplete medical records and data were excluded from the study.

Clinical courses, treatment, laboratory values, and physical examinations were evaluated for each of the study patients who were enrolled. Study participants with membranous tonsillitis were diagnosed using the clinical diagnostic. The current investigation comprised participants whose tonsils were fully covered by the membrane. The study eliminated patients with minor crypts, just hyperemia, or no membrane at all.

All of the participants had ELISA (enzyme-linked immunosorbent assay) IgM testing for viral capsid antigen (VCA). IgM antibodies against VCA or EBA infection were considered positive in these subjects. Positive atypical lymphocytes, IgM, and VCA in peripheral blood smears were also recognized as indicators of EBV infection in addition to membranous tonsillitis. Only participants who received testing for acute-phase reactants, including as C-reactive protein (CRP) levels, biochemistry, throat culture, total blood count, and EBV-VCA IgM antibody were included and evaluated. Participants who were subjected to tests other than those listed above were not allowed to participate in the study.

SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk, NY, USA) was used to statistically analyze the collected data. The t-test, Shapiro-Wilk test, Mann Whitney U test, and descriptive measures were evaluated. The findings were presented as frequency, percentages, mean, and standard deviation. Statistical significance was defined as a p-value of less than 0.05.

RESULTS

Assessing the etiology, prevalence, and prescribing pattern in patients with upper respiratory tract infections and membranous tonsillitis was the goal of the current retrospective observational clinical investigation. The effectiveness of laboratory, clinical, and epidemiological measures as well as their function in directing management were evaluated in the study. 846 children with a confirmed diagnosis of membranous tonsillitis, ages 0 to 18, were included in the study from the pediatric outpatient department. The study participants in the 0-3, 4-, 10-, and 11-18-year age groups had corresponding mean ages of 2 (1-2), 5 (3-9), and 10 (10-16), with statistically significant findings ($p<0.001$). Fever, sore throat, vomiting,

and rash were statistically non-significant in three age range groups (p=0.23). With p=0.4, the gender distribution was statistically similar among the three groups.

In three age groups, eyelid edema, hepatomegaly, and splenomegaly were statistically similar (p=0.92, 0.74, and 0.37). Solitary and conglomerated lymph nodes in lymphadenopathy were similar across the three groups (p=0.4). The prevalence of antibiotic prescriptions was substantially greater in children aged 0–3 years (29.8%; n = 28), followed by 11–18 years (11.8%; n = 16), and 4–10 years (n = 58; p<0.001) (Table 1).

The mean WBC was statistically equivalent across the three age ranges (p=0.24) when the laboratory parameters of the study participants were compared by age group. Atypical leucocytes, VCA-IgM positive status, mean ALT, mean AST, mean leucocyte, and mean hemoglobin counts all showed similar non-significant differences (p=0.13, 0.07, 0.97, 0.97, 0.2, and 0.16, respectively).

With p=0.001, the mean CRP levels and throat culture positive were considerably greater in the 4–10, 11–18, and 0–3 year groups. 0.3 years, 11–18 years, and 4–10 years had statistically higher mean monocyte counts (p=0.01). With a p-value of 0.01, the mean platelet counts were substantially higher in the 4–10, 0–3, and 11–18 age groups (Table 2).

The age distribution for streptococcal tonsillitis, EBV-positive, and other virus infections was shown to be statistically non-significant (p=0.43) when comparing clinical and demographic data in study participants according to etiology. The gender distribution showed a similar non-significant difference (p=0.13).

There was a statistically significant difference (p<0.001) between the three groups in terms of rash, vomiting, sore throat, cough, fever, and other clinical symptoms. Eyelid edema was only found in EBV-positive patients with p<0.001. EBV-positive patients also had considerably greater levels of splenomegaly and hepatomegaly (p<0.001). In hepatomegaly, 0.5% (n=2) and 4.9% (n=10) of EBV-positive and other virus-infected participants exhibited conglomerated lymphadenopathy. In 42% (n=112), 52.4% (n=108), and 34% (n=64) of the individuals, cervical lymphadenopathy was observed. In 42% (n=112), 52.4% (n=108), and 34% (n=64) of the individuals, submandibular lymphadenopathy was observed from individuals with p<0.001 who had streptococcal tonsillitis, EBV, and other viral infections. 7.6% (n=20), 27.2% (n=56), and 6.9% (n=26) of the participants who tested positive for streptococcal tonsillitis, EBV tonsillitis, and other viral tonsillitis received antibiotic prescriptions; this difference was statistically significant with p<0.001 (Table 3).

According to the study's findings, there was a statistically significant difference (p<0.001) in atypical lymphocytes, mean CRP (C-reactive protein), mean lymphocytes, mean platelet counts, and mean WBC (white blood cell counts) between study participants with streptococcal tonsillitis, EBV tonsillitis, and other viral tonsillitis subjects when comparing laboratory parameters based on etiology (Table 4).

DISCUSSION

846 children with a confirmed diagnosis of membranous tonsillitis, ages 0 to 18, were included in the current study from the pediatric outpatient department. The study participants in the 0-3, 4-, 10-, and 11-18-year age groups had corresponding mean ages of 2 (1-2), 5 (3-9), and 10 (10-16), with statistically significant findings (p<0.001). Fever, sore throat, vomiting, and rash were statistically non-significant in three age range groups (p=0.23). With p=0.4, the gender distribution was statistically similar among the three groups.

846 children with a confirmed diagnosis of membranous tonsillitis, ages 0 to 18, were included in the current study from the pediatric outpatient department. The study participants in the 0-3, 4-10, and 11-18-year age groups had corresponding mean ages of 2 (1-2), 5 (3-9), and 10 (10-16), with statistically significant findings (p<0.001). Fever, sore throat, vomiting, and rash were statistically non-significant in three age range groups (p=0.23). With p=0.4, the gender distribution was statistically similar among the three groups.

The mean WBC was found to be statistically equivalent across three age groups with p=0.24 when the laboratory parameters of the study participants were compared by age group. Atypical leucocytes, VCA-IgM positive status, mean ALT, mean AST, mean leucocyte, and mean hemoglobin counts all showed similar non-significant differences (p=0.13, 0.07, 0.97, 0.97, 0.2, and 0.16, respectively). With p=0.001, the mean CRP levels and throat culture positive were considerably greater in the 4–10, 11–18, and 0–3 year groups. 0.3 years, 11–18 years, and 4–10 years had statistically higher mean monocyte counts (p=0.01).

With p=0.01, the mean platelet counts were substantially higher in the 4–10 year group, followed by the 0–3 and 11–18 year groups. The findings aligned with the research conducted by Gewitz MH et al, when the authors reported laboratory parameters similar to those used in the current investigation.

According to the study findings, the age distribution was statistically non-significant (p=0.43) for streptococcal tonsillitis, EBV-positive, and other virus infections when comparing clinical and demographic data in study participants according to etiology. The gender distribution showed a similar non-significant difference (p=0.13).

The three groups differed statistically significantly (p<0.001) in terms of fever, cough, sore throat, rash, vomiting, and other clinical symptoms. Eyelid edema was only present in those with EBV (p<0.001). Additionally, splenomegaly and hepatomegaly were significantly higher in EBV-positive patients (p<0.001). Conglomerated lymphadenopathy was present in 0.5% (n=2) and 4.9% (n=10) of participants with EBV and other viral infections in hepatomegaly. Cervical lymphadenopathy was found in 42% (n=112), 52.4% (n=108), and 34% (n=64) of the subjects.

In 42% (n=112), 52.4% (n=108), and 34% (n=64) of the individuals, submandibular lymphadenopathy was observed. from individuals with p<0.001 who had streptococcal tonsillitis, EBV, and other viral infections. The percentage of participants who were prescribed antibiotics who tested positive for streptococcal tonsillitis, EBV tonsillitis, and other viral tonsillitis was 7.6% (n=20), 27.2% (n=56), and 6.9% (n=26), with a statistically significant difference (p<0.001). These results were consistent with the findings of Nicolai L et al. and Hamzeh-Cognasse H et al, who compared clinical and demographic data in study participants based on etiology for streptococcal tonsillitis, EBV positive, and other virus infections to those reported by the authors in their respective studies.

A statistically significant difference was observed between streptococcal tonsillitis, EBV tonsillitis, and other viral tonsillitis subjects for atypical lymphocytes, mean CRP (C-reactive protein), mean lymphocytes, mean platelet counts, and mean WBC (White blood cell counts) with p<0.001 when comparing laboratory parameters in study subjects based on etiology. These findings were consistent with research conducted by Gup L et al.13 and McDonald B et al.14, wherein the authors reported a comparison of laboratory parameters in study participants depending on etiology similar to the current investigation.

CONCLUSIONS

Considering its limitations, the present study concludes that group A beta-hemolytic streptococcus and Epstein-Barr virus were the most common etiological factors associated with membranous tonsillitis. Peripheral blood smears and throat cultures were the most useful tests in pediatric emergencies. These tests lead to fast reports depicting correct diagnosis and guide management in almost all subjects.

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S. No	Characteristics	0-3 years		4-10 years		11-18 years		p-value
		n=94	%	n=616	%	n=136	%	
1.	**Mean age (years)**	2 (1-2)		5 (3-9)		10 (10-16)		**<0.001**
2.	**Gender**							
a)	Males	54	57.4	256	41.5	68	50	0.4
b)	Females	40	42.5	260	42.2	68	50	
3.	**Rash**	4	4.3	26	4.2	4	2.9	0.23
4.	**Vomiting**	2	2.1	12	1.9	10	7.4	
5.	**Sore throat**	2	2.1	44	7.1	10	7.4	
6.	**Fever**	68	72.3	436	70.8	82	60.3	
7.	**Eyelid edema**	2	2.1	14	2.3	4	2.9	0.92
8.	**Splenomegaly**	4	4.3	32	5.2	4	2.9	0.74
9.	**Hepatomegaly**	6	6.4	28	4.5	2	1.5	0.37
10	**Lymphadenopathy**							
a)	Solitary	36	38.3	206	33.4	42	30.8	0.14
b)	Conglomerated	2	2.1	6	1	4	2.9	
11	**Antibiotics prescribed**	28	29.8	58	9.4	16	11.8	**<0.001**

Table 1: Comparison of demographic characteristics in study subjects based on age group

S. No	Characteristics	0-3 years		4-10 years		11-18 years		p-value
		n=94	%	n=616	%	n=136	%	
1.	**Mean WBC (10^3/µl)**	12.06 (3.46-28.38)		12.64 (4.41-27.81)		11.97 (21.02-31.02)		0.24
2.	**Atypical leucocytes**	28	29.8	138	22.4	46	33.8	0.13
3.	**VCA-IgM positive**	28	(29.8)	132	21.4	46	33.8	0.07
4.	**Mean throat culture +**	12	12.8	224	36.4	28	20.6	**0.001**
5.	**Mean CRP (mg/L)**	5 (3-76)		8 (3-203)		6 (3-162)		**0.001**
6.	**Mean ALT (U/L)**	18 (9-398)		18 (4-1278)		18 (6-525)		0.97
7.	**Mean AST (U/L)**	29 (12-598)		20 (11-1278)		28 (9-724)		0.97
8.	**Mean monocyte (%)**	5.7 (2.7-10)		5.4 (2.3-10)		5.5 (1.5-10)		**0.01**
9.	**Mean leucocyte (10^3/µL)**	4.742 (1.43-12.22)		3.252 (3.64-25.62)		3.93 (5.36-18.16)		0.2
10	**Mean platelet count (10^3/µL)**	296.344±105.601		299.644±110.607		248.376±83.121		**0.01**
11	**Mean hemoglobin (g/dl)**	12.4±1.12		12.6±1.07		12.9±0.915		0.16

Table 2: Comparison of laboratory parameters in study subjects based on age group

S. No	Characteristics	Streptococcal tonsillitis		EBV positive		Other viruses		p-value
		n=264	%	n=206	%	n=276	%	
1.	**Mean age (years)**	6 (1-12)		6 (1-14)		6 (1-13)		0.43
2.	**Gender**							
a)	Males	156	59.1	130	63.1	192	51.1	0.13

b)	Females	108	40.9	76	36.9	184	48.9	
3.	**Rash**	2	2.3	24	11.7	8	2.1	**<0.001**
4.	**Vomiting**	4	1.5	14	6.8	6	1.6	
5.	**Sore throat**	16	6.1	28	13.6	12	3.2	
6.	**Cough**	2	0	6	0	78	20.7	
7.	**Others**	18	6	28	13.5	22	5.8	
8.	**Fever**	220	83.3	112	54.4	254	67.6	
9.	**Eyelid edema**	0	0	20	9.7	0	0	**<0.001**
10.	**Splenomegaly**	2	0.8	30	14.6	8	2.1	**<0.001**
11.	**Hepatomegaly**	0	0	32	15.5	4	1.1	**<0.001**
12.	**Lymphadenopathy**							
a)	Conglomerated	0	0	10	4.9	2	0.5	**<0.001**
b)	Cervical	112	42	108	52.4	64	34	
c)	Submandibular	112	42	108	52.4	64	34	
13.	**Antibiotics prescribed**	20	7.6	56	27.2	26	6.9	**<0.001**

Table 3: Comparison of clinical and demographic data in study subjects based on etiology

S. No	Laboratory tests	Streptococcal tonsillitis (n=264)	EBV positive (n=206)	Other viruses (n=276)	p-value
1.	**Atypical lymphocytes**	10	202	0	**<0.001**
2.	**Mean CRP (mg/L)**	51 (3-203)	10 (3-162)	3 (3-14)	**<0.001**
3.	**Mean lymphocytes (count (10^3/µL)**	1.717 (0.34-8.18)	5.102 (1.00-25.62)	4.31 (0.86-13.62)	**<0.001**
4.	**Mean platelet count (10^3/µL)**	320 (102-722)	217 (72-633)	260 (106-412)	**<0.001**
5.	**Mean WBC count (10^3/µL)**	16.87 (5.43-27.81)	13.82 (2.12-31.00)	10.04 (2.92-25.15)	**<0.001**

Table 4: Comparison of laboratory parameters in study subjects based on etiology