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EVALUATING THE CAUSE OF MEMBRANOUS TONSILLITIS AND THE EFFECTIVENESS OF EPIDEMIOLOGICAL AND LABORATORY CLINICAL INDICATORS IN DIRECTING ITS TREATMENT

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ABSTRACT

Background: One of the most prevalent forms of acute tonsillitis in children is membranous tonsillitis. Despite the fact that different microorganism species have been linked to membranous tonsillitis, doctors believe that bacteria may be the cause, and they typically administer antibiotics from the penicillin class.

Aim: The purpose of the current study was to evaluate the causes of membranous tonsillitis and the effectiveness of laboratory clinical and epidemiological factors in directing the treatment of membranous tonsillitis.

Methods: The current study evaluated 846 patients with membranous tonsillitis who visited the institute's pediatric emergency department between the ages of 0 and 18 throughout the specified study period. Laboratory, clinical, and epidemiological parameters were evaluated and documented in every participant.

Results: Of the 846 research participants, 31.2% (n=264) had Group A beta-haemolytic streptococcus identified, followed by EBV (Epstein-Barr virus) in 24.3% (n=206) and other viral etiology in 44.4% (n=376). Of the people who tested positive with EBV, 27% were prescribed antibiotics, and 98% had Downey cells. Appropriate antibiotics were administered to 7% of research participants who had positive throat cultures.

Conclusion: the most often linked causal agents in patients with membranous tonsillitis were Epstein Barr virus and Group A beta-haemolytic streptococcus. The majority of diagnostic investigations in pediatric emergency rooms are peripheral blood smears and throat cultures, which guarantee the proper diagnosis and treatment of membranous tonsillitis.

Keywords: membranous tonsillitis, throat infection, tonsillitis, Group A beta-haemolytic streptococcus

INTRODUCTION

Membranous tonsillitis is a distinctive illness that manifests as tonsil inflammation and swelling, accompanied by a thick, gray film covering the tonsils. It is linked to fever, sore throats, and other organ systems. Clinicians typically view bacteria as a potential causal agent, and penicillin-group antibiotics are typically used for treatment, despite the fact that several microorganisms have been linked to the disease. However, due to etiological variations, antibiotics have a number of adverse effects, including the emergence of resistance and repeated emergency room visits.[1]

Due to a lackluster immunization campaign, Corynebacterium diphtheria continues to be the most frequent cause of membranous tonsillitis in impoverished countries like India. One important clinical condition that can lead to membranous

tonsillitis is infectious mononucleosis. Although it is most frequently associated with the Epstein-Barr virus (EBV), other viral and parasite illnesses can also cause it.[2]

Among the other etiological agents for illnesses are adenoviruses and cytomegaloviruses (CMV). Streptococcal tonsillitis is another bacterial agent that can cause membranous tonsillitis, in addition to Corynebacterium diphtheria. Pediatric emergency room doctors treat infections accurately and as soon as possible. The most important issues related to the illness are appropriate treatment, easily available diagnostics, and quick judgments.[3] Therefore, it is critical to evaluate the physical examination and laboratory results that might assist the medical team in making an accurate diagnosis in an emergency.[4]

The purpose of the current study was to evaluate the cause of membranous tonsillitis and the effectiveness of laboratory clinical and epidemiological factors in directing the treatment of membranous tonsillitis.

MATERIALS AND METHODS

The purpose of the current retrospective observational clinical study was to evaluate the causes of membranous tonsillitis and the effectiveness of laboratory clinical and epidemiological factors in directing the treatment of membranous tonsillitis. The Institute's Department of Medicine provided the study participants. Before each participant participated in the study, their parents or guardians gave their verbal and written informed consent.

Subjects between the ages of 0 and 18 who were clinically diagnosed with membranous tonsillitis and hospitalized to the Institute's pediatric emergency department throughout the specified study period were included in the study. The study evaluated data retrospectively by looking at the subjects' computer files and records.

Membranous tonsillitis was diagnosed clinically. Clinical courses, treatments, laboratory data, and physical examination results were documented for each individual. Cases in which the membrane completely covered both tonsils were included. Subjects with tiny crypts, hyperemia, and no membrane were excluded from the study. ELISA (enzyme-linked immunosorbent assay) was used to test each participant's IgM for VCA (viral capsid antigen). Individuals with IgM antibodies against VCA for EBV were considered positive. Atypical lymphocytes in peripheral blood smears and positive VCA IgM were also seen as indicators of EBV infection, in addition to membranous tonsillitis. Participants who presented to the Institute with membranous tonsillitis met the study's inclusion criteria.

Participants with upper respiratory tract infections other than membranous tonsillitis and chronic illnesses were not included in the study. ANOVA, Fisher's exact test, Mann Whitney U test, and SPSS (Statistical Package for the Social Sciences) software version 24.0 (IBM Corp., Armonk, NY, USA) were used to statistically analyze the data collected from research participants. A p-value of less than 0.05 was used as the significance criterion.

RESULTS

The current study evaluated 846 patients with membranous tonsillitis who visited the institute's pediatric emergency room between the ages of 0 and 18 during the specified study period. Laboratory, clinical, and epidemiological parameters were evaluated and documented in every participant.

846 participants between the ages of 0 and 18 were first screened for the study; of them, 56.5% (n=478) were male and 43.5% (n=368) were female. The average age of the study participants was 6.54±3.29 years for females and 6.20±3.07 years for males. 11.1% (n=94), 72.8% (n=616), and 16.1% (n=136) of the individuals were split into three groups according to their age range: 0–3, 4–10, and >10 years.

Clinical and laboratory results showed that 69.3% (n=586) of the individuals had fever, while 2.8% (n=24), 4.4% (n=34), 5% (n=42), 6.6% (n=56), 10.2% (n=86), and 2.1% (n=18) subjects had both fever and rash. Subjects of all ages were admitted to the Institute with similar primary complaints based on their age.

However, since $p>0.05$, no clear clinical characteristics were observed with age. Physical examination revealed non-significant differences in splenomegaly, hepatomegaly, lymphadenopathy, and eyelid edema in all three groups ($p>0.05$). However, when evaluating prescription medicines, more antibiotics were recommended because viral agents were more common in children under the age of three (Table 1).

According to the study's findings, participants between the ages of 4 and 10 had considerably more streptococcal tonsillitis in the laboratory than those in other age groups ($p=0.001$). Nevertheless, out of 264 individuals, 7% (n=20) showed positive throat cultures and were treated with antibiotics. In the 4–10 age group, mean monocyte counts were substantially lower ($p=0.01$) while platelet levels were significantly higher ($p=0.01$).

All age groups had equivalent EBV positive ($p=0.07$). There were no laboratory parameters with $p>0.05$ that showed a significant difference. Three groups of participants were created based on the etiology. 31.2% (n=264) of the participants

in Group I had positive streptococcal tonsillitis; 24.3% (n=206) of the subjects in Group II had positive EBV; and 44.4% (n=376) of the subjects in Group III had viral agents.

Gender and mean age were comparable among the three study groups when comparing different factors (p=0.39). In terms of clinical characteristics, individuals who tested positive for EBV had greater incidences of rash, vomiting, and sore throats than those in other groups. Subjects who tested positive for EBV had higher rates of hepatomegaly, splenomegaly, and eyelid edema (p<0.01).

There was no discernible variation in laboratory and clinical indicators for EBV positive participants when evaluated according to age range. At the time of admission, no specific factor related to the physical examination, symptoms, and laboratory results was seen.

DISCUSSION

The current study evaluated 846 patients with membranous tonsillitis who visited the institute's pediatric emergency department between the ages of 0 and 18 during the specified study period. Laboratory, clinical, and epidemiological parameters were evaluated and documented for each participant. 846 participants between the ages of 0 and 18 were first screened for the study; of them, 56.5% (n=478) were men and 43.5% (n=368) were women. The average age of the study participants was 6.54±3.29 years for females and 6.20±3.07 years for males.

Based on their age range, the participants were further separated into three groups: 0–3, 4–10, and >10 years, which included 11.1% (n=94), 72.8% (n=616), and 16.1% (n=136) subjects, respectively. These results were similar to those of earlier research by Thomas MR et al. (2015) and McDonald B et al. (2019), in which the authors evaluated participants with clinical and demographic information similar to those of the current study.

According to the study's clinical and laboratory results, 69.3% (n=586) of the individuals had a fever, whereas 2.8% (n=24), 4.4% (n=34), 5% (n=42), 6.6% (n=56), 10.2% (n=86), and 2.1% (n=18) of the subjects had both a rash and a fever.

Subjects from various age groups were admitted to the Institute with similar primary complaints based on their age. However, since p>0.05, no clear clinical characteristics were observed with age. Physical examination revealed non-significant differences in splenomegaly, hepatomegaly, lymphadenopathy, and eyelid edema in all three groups (p>0.05).

However, after evaluating the prescription medicines, more antibiotics were recommended because viral agents were more common in children under three. These findings were in line with those of Ebell et al. (2016) and Nicolai L. et al. (2020), whose clinical and laboratory results for membranous tonsillitis were similar to those of the current investigation.

According to a laboratory examination, respondents between the ages of 4 and 10 had considerably more streptococcal tonsillitis than subjects in other age groups (p=0.001). Antibiotics were used to treat 7% (n=20) of the 264 individuals who had positive throat cultures. Platelet counts were significantly greater (p=0.01) and mean monocyte counts were significantly lower (p=0.01) in the 4–10 age group. All age groups had equivalent EBV positive (p=0.07). There were no laboratory parameters with p>0.05 that showed a significant difference. Three groups of participants were created based on the etiology. 31.2% (n=264) of the participants in Group I had positive streptococcal tonsillitis; 24.3% (n=206) of the subjects in Group II had positive EBV; and 44.4% (n=376) of the subjects in Group III had viral agents. These results were consistent with those of Gup L et al. (2019) and Hamzeh-Cognasse H et al. (2018), who reported laboratory data in membranous tonsillitis that were similar to the current investigation.

In terms of comparing different parameters, the three study groups' mean age and gender were similar (p=0.39). In terms of clinical characteristics, individuals who tested positive for EBV had greater incidences of rash, vomiting, and sore throat than people in other groups. Splenomegaly, hepatomegaly, and eyelid edema were more prevalent in EBV-positive patients (p<0.01). There was no discernible variation in laboratory and clinical indicators for EBV-positive individuals when evaluated according to age range.

At the time of admission, no specific factor related to the physical examination, symptoms, and laboratory results was seen. These findings were consistent with those of Sharma K et al. (2022) and McIsaac WJ et al. (2004), whose results for comparing different parameters in people with membranous tonsillitis were similar to the current study's findings.

Summarization

Within its limits, the current investigation finds that the most often identified causal agents in participants with membranous tonsillitis were Group A beta-haemolytic streptococcus and Epstein Barr virus. The majority of diagnostic tests used in pediatric emergency rooms are peripheral blood smears and throat cultures. These tests can assist ensure that membranous tonsillitis is accurately diagnosed and treated.

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Characteristics	**0-3 (n=94)**		**4-10 (n=616)**		**11-18 (n=136)**		**p-value**
Mean age (years)	2 (1-2)		6 (3-8)		11 (10-14)		**<0.001**
Gender							
Boys	54		356		68		0.3
Girls	40		260		68		
Symptom							
Rash	4	4.3	26	4.2	4	2.9	0.23
Vomiting	2	2.1	12	1.9	10	7.4	
Sore throat	2	2.1	44	7.1	10	7.4	
Fever	68	72.3	436	70.8	82	60.3	
Lymphadenopathy							
Solitary	36	38.3	206	33.4	42	30.8	0.14
Conglomerated	2	2.1	6	1	4	2.9	
Eyelid edema	2	2.1	14	2.3	4	2.9	0.92
Splenomegaly	4	4.3	32	5.2	4	2.9	0.74
Hepatomegaly	6	6.4	28	4.5	2	1.5	0.37
Antibiotics use	28	29.8	58	9.4	16	11.8	**<0.001**

Table 1: Demographic and clinical data in study subjects from different age groups

Characteristics	**0-3 (n=94)**		**4-10 (n=616)**		**11-18 (n=136)**		**p-value**
Atypical leucocytes (%)	28	29.8	138	22.4	46	33.8	0.13
VCA-IgM positive	28	29.8	132	21.4	46	33.8	0.07
Mean throat culture positivity	6.2±12.6		112±36.2		14±20.4		**0.001**
Mean CRP (mg/l)	4 (2-76)		9 (3-203)		7 (3-162)		**0.001**
Mean ALT (U/l)	18 (7-398)		18 (4-1278)		18 (4-525)		0.97
Mean AST (U/l)	29 (12-598)		20 (4-1278)		28 (11-724)		0.97
Median monocyte (%)	5.7 (2.7-9.8)		5.4 (1.9-9.8)		5.5 (1.5-9.8)		**0.01**

Median leucocyte (10^3/µl)	4.738 (1.43-12.18)	3.248 (3.64-25.58)	3.89 (5.36-18.16)	0.2
Mean platelet counts (10^3/µl)	296.340±105.601	299.640±110.607	248.376±83.121	**0.01**
Mean hemoglobin (g/dl)	12.0±1.12	12.2±1.03	12.5±0.911	0.16
Median WBC (10^3/µl)	12.0 (3.46-28.38)	12.64 (4.41-27.81)	11.97 (2.100-31)	0.24

Table 2: Comparison of laboratory parameters in study subjects from different age groups

Characteristics	**Streptococcal tonsillitis (n=264)**		**EBV (n=206)**		**Other viruses (n=376)**		**p-value**
Mean age (years)	6 (1-12)		6 (1-14)		6 (1-15)		0.43
Gender							
Boys	156	69.1	130	63.1	192	51.1	0.13
Girls	108	40.9	76	36.9	184	48.9	
Symptom							
Rash	2	2.3	24	11.7	8	2.1	**<0.001**
Vomiting	4	1.5	14	6.8	6	1.6	
Sore throat	16	6.1	28	13.6	12	3.2	
Fever	220	83.3	112	54.4	254	67.6	
Cough	2		6		78	20.7	
Others	18	6	28	13.5	22	5.8	
Lymphadenopathy							
Cervical	112	42	108	52.4	64	17	**<0.001**
Submandibular	112	42	108	52.4	64	17	
Conglomerated	0		10	4.9	2	0.5	
Eyelid edema	0	0	20	9.7	0	0	**<0.001**
Splenomegaly	2	0.8	30	14.6	8	2.1	**<0.001**
Hepatomegaly	0	0	32	15.5	4	1.1	**<0.001**
Antibiotics use	20	7.6	56	27.2	26	6.9	**<0.001**

Table 3: Comparison of demographic and disease data in study subjects with different types of tonsillitis

Laboratory parameters	**Streptococcal tonsillitis (n=264)**	**EBV (n=206)**	**Other viruses (n=376)**	**p**
Atypical lymphocytes	10	202	0	**<0.001**
Mean CRP (mg/L)	51 (3-203)	10 (3-162)	3 (3-14)	**<0.001**
Mean lymphocytes (10^3/µl)	1.717 (0.34-8.18)	5.100 (1.00-25.58)	4.31 (0.86-13.58)	**<0.001**
Mean platelet (10^3/µl)	318 (102-722)	217 (72-629)	260 (106-408)	**<0.001**
Median WBC (10^3/µl)	16.87 (5.43-27.81)	13.78 (2.08-31)	10.00 (2.92-25.15)	**<0.001**

Table 4: Comparison of laboratory parameters in different groups