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Limiting the role of antibiotics in children with adenotosilitis

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***Abstract*---**Background In the past, group A beta-haemolytic streptococcus infection consequences were the main goal of empirical antibiotic therapy of sore throat. Antimicrobial stewardship is crucial due to the threats posed by multi-resistant pathogens. The aim of this study : was to investigate the possibility of limiting the role of antibiotic in children with adenotosilitis Methods: This hospital-based, randomised, prospective research involved 120 child who visited OPD of both Pediatrics and Otorhinolaryngology departments, pesented with adenotonsillitis were enrolled . All cases met the eligibility requirements were randomly assigned to two groups: 60 cases in Group A got systemic antibiotics. Group B 60 cases received symptomatic treatment with immune modulator, vit D 2000-5000 IU orally once daily. The cases were selected through 2 months from

February 2022 to April 2022. Age :2 years to 9 years. In younger children less than 3 years, dysphagia was expressed by the mothers as difficult swallowing and crying during feeding with drolling of saliva. Results: Regarding baseline symptoms and indicators and after three days, there was no discernible difference between groups A and B. However, after six days of therapy, group B considerably outperformed group A in terms of absent sore throat, dysphagia, and tonsillar hypertrophy. Comparing group B to group A, there was a noticeable improvement in clinical symptoms and indicators. Parents' clinical cure assessments of patients dramatically increased in group B, and group B also had a much shorter time to clinical cure.Conclusion: Vitamin D supplementation can reduce inflammation and modulate innate and adaptive immunity in children with adenotonsillitis, which can be utilised in place of antibiotics in these situations to restrict the usage of antibiotics.

***Keywords*---**Antibiotic, children, adenotosilitis.

Introduction

The primary cause of adenotonsillitis, which is an inflammation of the adenoids and tonsils, is the most common bacterial or viral infection. It's one of the most frequent problems that Pediatrician and otorhinolaryngologists observe in both young people and adults. More than 6 million kids between the ages of 5 years and 15 years seek medical attention for this issue each year. **(Anderson J et al.,2022).**

Bacterial or viral infection can cause tonsillitis. Group A beta hemolytic streptococcus is the most frequent bacterium responsible for bacterial tonsillitis (GABHS)(**Windfuhr JP et al.,2016**). 15 to 30 percent of toddlers with sore throats and 5 to 15 percent of adults with sore throats had tonsillitis caused by the GABHS (**Mustafa Z et al.,2020).** Every year, GABHS is a significant global source of morbidity and mortality and is responsible for a number of suppurative and non-suppurative diseases.. **(Anderson J et al.,2022).**

Tonsillitis often cures in three to four days without any issues and runs its course (**Georgalas CC et al.,2014**). Antibiotic treatment is appropriate in cases of clinically confirmed or definite bacterial tonsillitis that is distressing. In comparison to a placebo, it shortens the duration of the illness and lowers temperature and discomfort (**Stelter K.,2014).** The use of antibiotics also offers a largely dependable defense against rheumatic fever and glomerulonephritis, conditions that frequently result in arthritis, myocarditis, and even death. (**Robinson JL.,2021).**

Antibiotic overprescription for tonsillopharyngitis is a well-known issue with several possible causes **(Wolford RW et al.,2022).** Researchers have tried to identify the causes of over prescription, particularly in general practice **(Tariq RA et al.,2022).** This is crucial to cut costs and avoid unnecessarily exposing yourself to adverse effects. (**Mustafa Z et al.,2020)**

We are running out of antibiotics. As no new antibiotics were discovered since 2012 . There are currently very few treatment options available for some bacterial illnesses, which is one factor contributing to the current focus on antibiotic resistant bacteria. In addition to supporting modern medicine, antibiotic usage has fundamentally altered society, particularly in terms of expectations for children's survival into adulthood. Antimicrobial resistance: no action now, no cure tomorrow was the focus of World Health Day in 2011. The disappearance of antibacterial medication development raises the threat of incurable illnesses. Antibiotic Action is a new effort that has been developed in response to the urgent need for quick action to avert this calamity. **(Bassetti M et al.,2017).**

Alternative treatments for adenotonsilitis included symptomatic medications and vitamins, such as vitamin D, which has a preventative function in thwarting bacterial biofilm. Even if environmental reasons like staying indoors in the winter may be used to explain why some diseases are more common in the winter, the lack of sunlight is another aspect that deserves consideration. The creation of vitamin D is the most significant benefit the sun provides. **(Yildiz I et al.,2012).**

The purpose of this research :
Was to investigate the possibility of limiting the role of antibiotics in children with adenotosilitis

Patients and methods

This hospital-based, prospective, randomised research included 120 child presented with adenotonsillitis who visited the OPD of both Pediatrics and Otorhinolaryngology departments were enrolled, with age from 2 years up to 9 years during the period from February 2022 to April 2022.

According to the DEGAM recommendations in the clinical guidelines, diagnostic and differential criteria for acute tonsillitis were completed. (**Windfuhr JP et al.,2016; Geißler K et al.,2020**).

Inclusion criteria

Children aged 2 years to 9 years clinically diagnosed as bacterial adenotonsillitis by concerned pediatrician and ENT specialist .

Exclusion criteria included

patients with a history of hypersensitive response or who acquired one to AMC, azithromycin throughout course of therapy, patients with severe condition necessitating hospitalisation, patients with clinically confirmed viral tonsillitis by concerned pediatrician or ENT specialist.

Method

Age, sex, residence, employment, clinical data (during, signs and symptoms ratings of tonsillitis), prescription medication, dosage, and illness severity by parent were all documented in a proforma.

All patients who met the eligibility requirements were randomly assigned to one of three groups:

Group A: 60 cases received systemic antibiotics.

Group B: 60 cases received symptomatic treatment with immune modulators vit D 2000-5000 IU orally once daily.

Randomization

The randomised study's clinical portion is not blinded and is available to the public. According to the fundamental randomization list, subjects are randomly assigned to one of two potential treatments. The programme [StatSoft is a random number generator] was used to randomise. Each patient who completed an informed permission by parents form underwent randomization.

Methods:

All cases underwent detailed history taken from parents.

Systemic examination of all systems and local examination of mouth, nose and throat were done.

Laboratory data : Complete blood count including differential count specially Polymorphonuclear

neutrophils (PMN).

Outcome measurements

Based on sign and symptom scores, the study's clinical effectiveness was compared; the highest value was 3. Both medication groups' sign and symptom scores were recorded at baseline (day 1), and after Three days of therapy and six days later. Three criteria were used to score the signs and symptoms: dysphagia, tonsillar hypertrophy, and sore throat.

The employed score by parents —absent, mild, moderate, or severe—helped identify the disease's severity. '0' denoted absence, '1' mildness, '2' moderateness, and '3' severity. Clinical cure was defined as a clinical sign and symptom reduction to a total severity of score 0 or 1 (from score 3) and score 0 (from score 2 and 1) after therapy.

For sore throat

Score 0: absent; Score 1: mild (less severe than cold); Score 2: moderate (like cold); Score 3:severe (more severe than cold)

For dysphagia

Score 0: absent; Score 1: mild (painful with certain foods); Score 2: moderate (painful with all foods); Score 3: severe (unable to swallow own secretions)

For tonsillar hypertrophy

Score 0: absent (tonsils inside tonsillar fossa); Score 1: mild (tonsils occupying upto 25% of oropharynx); Score 2: moderate (tonsils occupying upto 26-50% of oropharynx); Score 3: severe (tonsils occupying more than 50% of oropharynx)

Result

Table (1): Demographic data of included subjects.

Parameter	Group A (N = 60)	Group B (N = 60)	P. Value
Age (years)	7.63 ± 2.42	7.73 ± 2.44	0.8222[T]
Weight (kg)	19.52 ± 4.5	19.6 ± 4.57	0.92[T]
Height (cm)	98.08 ± 16.65	98.83 ± 16.4	0.8041[T]
Duration of symptoms(days)	5.97 ± 2.22	5.83 ± 2.08	0.7344[T]
Temperature	38.44 ± 0.43	38.47 ± 0.41	0.6954[T]
Sex N (%)			
Male	33 (55%)	32 (53.33%)	0.855[X]
Female	27 (45%)	28 (46.67%)	

T: T. Test | X: Chi square test

P<0.05 non-significant

There was significant indifference between group A and B regarding demographic data

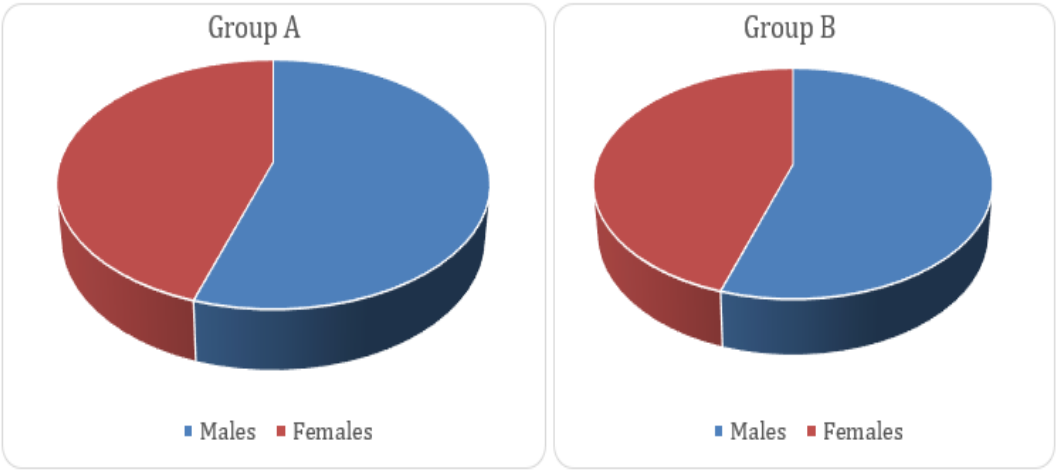

Figure (1): Gender distribution in both groups

Table (2): Laboratory investigations of included subjects

Parameter	Group A (N = 60)	Group B (N = 60)	P. Value
Hemoglobin (g/dl)	11.74 ± 0.77	11.68 ± 0.81	0.6621[T]
Platelet count	272.43 ± 11.28	271.92 ± 10.99	0.7998[T]
WBCs count	9766.02 ± 1073.01	9785.62 ± 1049.67	0.9196[T]
Polymorphonuclear Neutrophils (%)	72.12 ± 5.63	72.53 ± 5.47	0.6817[T]

There was insignificant difference between group A and B regarding Laboratory investigations.

Table (3): Baseline Symptoms and signs of included subject in two groups.

Parameter		Group A (N = 60)	Group B (N = 60)	P. Value
Sore Throat	Absent	0	0	-
	Mild	0	0	-
	Moderate	27 (45%)	24 (40%)	0.5796[X]
	Severe	33 (55%)	36 (60%)	
Dysphagia	Absent	0	0	-
	Mild	0	0	-
	Moderate	7 (11.67%)	12 (20%)	0.211[X]
	Severe	53 (88.33%)	48 (80%)	
Tonsillar Hypertrophy	Absent	0	0	-
	Mild	0	0	-
	Moderate	14 (23.33%)	18 (30%)	0.409[X]
	Severe	46 (76.67%)	42 (70%)	

There was insignificant difference between group A and B regarding Baseline Symptoms and signs.

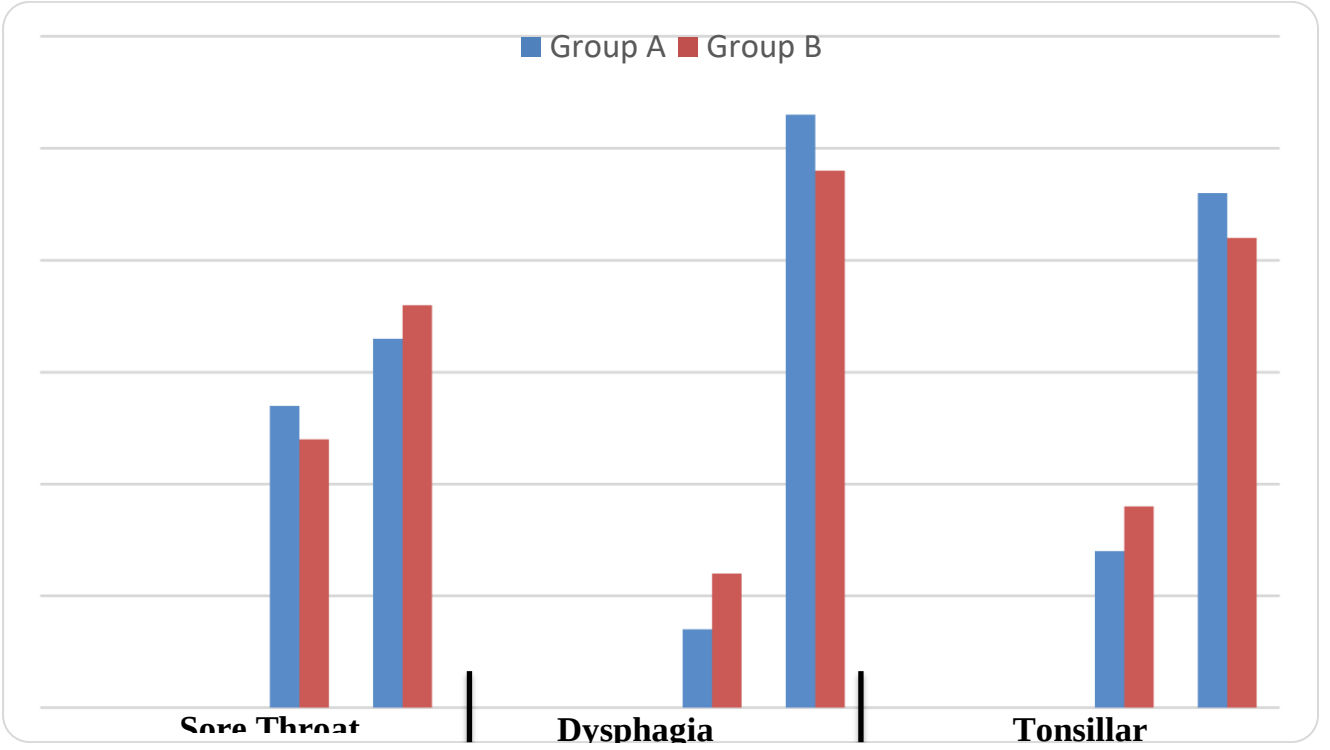

Figure (2): Baseline Symptoms and signs of included subject in two groups.

Table (4): 3 days Symptoms and signs of included subject in two groups.

Parameter		Group A (N = 60)	Group B (N = 60)	P. Value
Sore Throat	Absent	0	0	-
	Mild	1 (1.67%)	4 (6.67%)	0.171[X]
	Moderate	42 (70%)	43 (71.67%)	0.841[X]
	Severe	17 (28.33%)	13 (21.67%)	0.399[X]
Dysphagia	Absent	0	0	-
	Mild	0	2 (3.33%)	0.496[X]
	Moderate	42 (70%)	44 (73.33%)	0.685[X]
	Severe	18 (30%)	14 (23.33%)	0.409[X]
Tonsillar Hypertrophy	Absent	0	0	-
	Mild	0	0	-
	Moderate	26 (43.33%)	27 (45%)	0.854[X]
	Severe	34 (56.67%)	33 (55%)	

There was insignificant difference between group A and B regarding Symptoms and signs at 3 days of management.

Table (5): Symptoms and signsat 6 Days after treatment in the two groups

Parameter		Group A (N = 60)	Group B (N = 60)	P. Value
Sore Throat	Absent	4 (6.67%)	26 (43.33%)	<0.0001*[X]
	Mild	18 (30%)	18 (30%)	1[X]
	Moderate	38 (63.33%)	16 (26.67%)	0.000054*[X]
	Severe	0	0	-
Dysphagia	Absent	4 (6.67%)	24 (40%)	0.000016*[X]
	Mild	23 (38.33%)	31 (51.67%)	0.1421[X]
	Moderate	33 (55%)	4 (6.67%)	<0.0001*[X]
	Severe	0	1 (1.67%)	0.965[X]
Tonsillar Hypertrophy	Absent	0	20 (33.33%)	<0.0001*[X]
	Mild	14 (23.33%)	30 (50%)	0.0024*[X]
	Moderate	46 (76.67%)	6 (10%)	<0.0001*[X]
	Severe	0	4 (6.67%)	0.1187[X]

Absent sore throat, dysphagia and tonsillar Hypertrophy was significantly increased in group B compared with group A. There was significant improvement in clinical symptoms and signs in group B compared with group A.

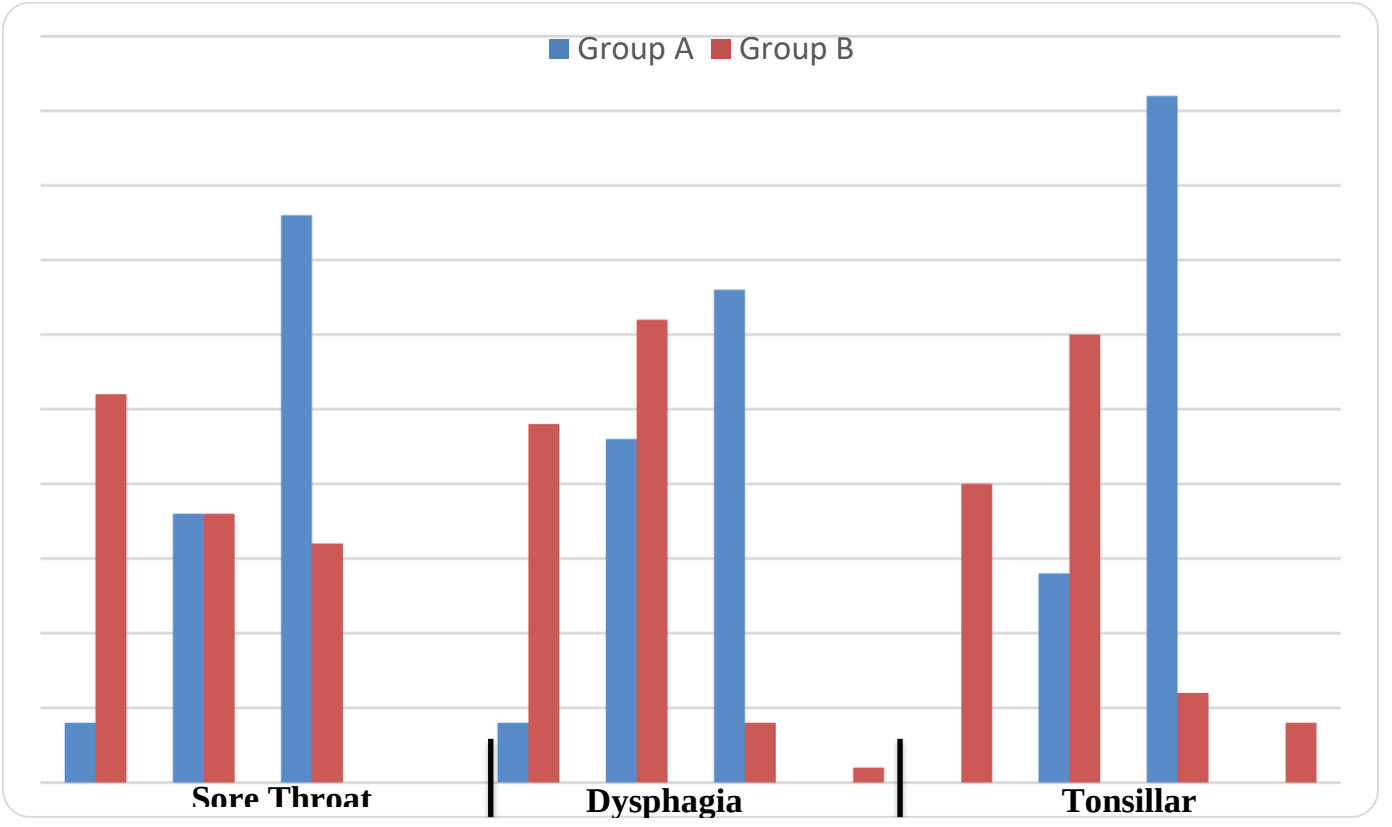

Figure (3): Symptoms and signs at 6 Days after treatment in the two groups

Table (6): Clinical cure assessed by parents

Parameter	Group A (N = 60)	Group B (N = 60)	P. Value
Assessment by parents	27 (45%)	55 (91.67%)	<0.0001*[X]
Time to clinical cure\days	6.75 ± 1.81	2.51 ± 0.81	<0.0001*[T]

X: Chi square test | T: T. Test

P>0.05 non-significant | *P<0.05 significant

There was significant increase in patients with clinical cure assessment by parents in group B also regarding Time to clinical cure was significantly lower in group B.

Discussion

The 60 patients in each group in the current investigation were matched based on demographic information.

Regarding baseline symptoms and indicators and after three days, there was no discernible difference between groups A and B. However, after six days of therapy, group B considerably outperformed group A in terms of absent sore throat, dysphagia, and tonsillar hypertrophy. Comparing group B to group A, there was a noticeable improvement in clinical symptoms and indicators. Parents' clinical cure assessments of patients dramatically increased in group B, and group B also had a much shorter time to clinical cure.

This was cited as evidence that vitamin D may prevent the biofilm development linked to bacterial tonsillitis (Van Etten E et al.,2005). An connection like this shows that vitamin D supplementation or treatment for vitamin D insufficiency may reduce the frequency of tonsillitis, tonsillectomies, and the anticipated postoperative sequelae (Baugh R.F et al.,2019).

Because vitamin D's function in regulating innate and adaptive immunity is disrupted as a result of vitamin D insufficiency, it is also possible to consider this condition as a risk factor for recurrent tonsillitis.

Vitamin D supplementation will therefore boost the modulation of innate and adaptive immunity and reduce inflammation in children with adenotonsilitis, which can be utilised in place of antibiotics in these situations to restrict the function of antibiotics.

If there has been bacterial biofilm, antibiotics are ineffective. The prevention of bacterial biofilm formation is facilitated by vitamin D. Even if environmental reasons like staying indoors in the winter may be used to explain why some diseases are more common in the winter, the lack of sunlight is another aspect that deserves consideration. The creation of vitamin D is the most crucial benefit the sun offers. Previous studies indicate that vitamin D is crucial for the immune system. **(Bartley J.,2010).**

Innate immunity is crucially maintained by vitamin D. New theories about the role of this vitamin have emerged as a result of the assignment of vitamin D receptors (VDR) in several organs. Numerous immune system cell types, including dendritic cells, B lymphocytes, T lymphocytes, and NK cells, are impacted by vitamin D. (Van Etten E et al.,2005).

Regarding the VDR gene, which is impacted by vitamin D, certain polymorphism traits have been reported. The Fok I, Bsm, Apa, and Taq polymorphisms are the most often researched ones. There is a connection between some illnesses and polymorphisms. (**Valdivielso JM et al.,2006)**

Conclusion

Vitamin D supplementation can reduce inflammation and modulate innate and adaptive immunity in children with adenotonsillitis, which can be utilised in place of antibiotics in these situations to restrict the usage of antibiotics.

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