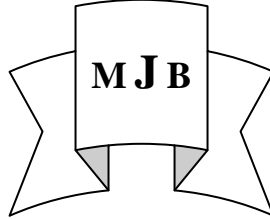


## Determination of Serum Immunological Parameters in Children with Recurrent Acute Tonsillitis after Tonsillectomy

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### Abstract

Immune status was examined after tonsillectomy operations in 30 children with recurrent acute tonsillitis, their ages ranged between 3-10 years, were clinically diagnosed by ENT surgeon at Al- Hilla General Teaching Hospital and 10 apparently healthy children were included as a control in the study which lasted from February to May 2011. Immunological parameters test were done directly postoperative by taking venous blood from the patients and control to determine the immunoglobulins of IgM, IgG, IgA, complement proteins C3 and C4 level in addition to C- reactive protein test were done as indicators of inflammation. It was shown that the immunological assays after tonsillectomy revealed positive changes: a significant increases in IgM and IgA levels in serum of patients in comparison to control although were still in normal reference values but serum IgG level and complement proteins C3 and C4 level were normal in addition to the results of CRP in patients giving positive results in comparison to controls.

### الخلاصة

تم فحص الحالة المناعية لدى ٣٠ طفلاً مصاباً بالتهاب اللوزتين الحاد المتكرر بعد إجراء عملية استئصال اللوزتين تراوحت أعمارهم بين ٣-١٠ سنوات والذين شخصوا سريريا من قبل أطباء اختصاص بجرراحة الأنف والأذن والحنجرة في مستشفى الحلة التعليمي العام و ١٠ أطفال أصحاء كعينة ضابطة للدراسة التي امتدت للفترة من شباط الى حزيران ٢٠١١. اختبار المعايير المناعية قد أجريت مباشرة بعد عملية الاستئصال وذلك بسحب الدم الوريدي من المرضى والأطفال الأصحاء لتحديد مستوى الكلوبولينات المناعية IgM و IgG و IgA وبروتينات المتممة C3 و C4 بالإضافة إلى إجراء فحص البروتين التفاعلي CRP كدالة على الالتهابات. وقد أظهرت الفحوصات المناعية بعد عملية استئصال اللوزتين تغيرات ايجابية إذ ظهرت زيادة معنوية في مستوى IgM و IgA في مصل المرضى مقارنة بالأصحاء على الرغم من أنها تقع ضمن القيم المرجعية الطبيعية لكن مستوى IgG وبروتينات المتممة C3 و C4 كانت طبيعية في المصل إضافة إلى إن نتائج فحص البروتين التفاعلي CRP كانت كلها ايجابية في المرضى مقارنة بالأصحاء.

### Introduction

The tonsils are two small glands found at the back of throat behind the tongue. It is thought that they act as a barrier against infection in children whose immune system is still developing [1]. Adenoids and tonsils are anatomically located at the entrance of the respiratory and digestive tracts and in fact are the body's first line of contact with various pathogens present in food

and air [2]. The tonsils are part of secondary lymphatic system in which B lymphocytes are predominant and the most important components of the immune system therefore the cellular and humoral responses depended upon their activities [3]. Tonsillitis is an inflammatory condition of the tonsils due to infection by bacteria, viruses, allergies and respiratory problems. Tonsillitis usually begins with a sudden

sore throat, painful swallowing and tonsils cause's throat tissues to swell obstructing air from passing in and out of the respiratory system .When inflamed, tonsils become swollen and red with a grayish or yellowish coating on its surface [٤]. The most common problems occurring with the tonsils including:

- 1- Acute tonsillitis
- 2- Chronic tonsillitis
- 3- Recurrent tonsillitis

Most cases of tonsillitis get better within a week, a small number of children have tonsillitis for a long time or it keeps coming back, complications may rarely include dehydration and kidney failure due to difficulty swallowing, blocked airways due to inflammation, and pharyngitis due to the spread of infection. In very rare cases of strep throat, diseases like rheumatic fever or glomerulonephritis can occur. These complications are extremely rare in developed nations but remain a significant problem in poorer nations [5,6] .A tonsillectomy can be performed to remove the tonsils. Patients whose tonsils have been removed are still protected from infection by the rest of their immune system [7,8]. In daily practice, clinicians are often faced with two dilemmas: whether a patient is infected or not, and whether the antibiotic therapy being given is effective. The distinction between infection and sepsis is frequently difficult to make [9] .However, bacteriological confirmation may be difficult to obtain and negative cultures do not exclude the presence of infection. Increasing understanding of the various inflammatory cascade mechanisms has given new insights and provided several markers that, in conjunction with other manifestations of sepsis, can be useful as indicators of infection. C-reactive

protein (CRP) is one such marker [10]. Various investigators have reported high serum levels of IgG and IgA in patients with chronic tonsillitis [11,12]. However, some studies reported that decreased in level of immunoglobulin IgM, IgG, IgA [13,14] while the others have found that no significant difference between the levels of immunoglobulins, complements and lymphocytes [15-17] among the children after tonsillectomy. Aim of the study was to assess serum values of immunoglobulin after tonsillectomy operations in children with recurrent acute tonsillitis.

## **Patients and Methods**

### **1- Patients**

A total of thirty (30) children (16 males and 14 females) with recurrent acute tonsillitis undergoing tonsillectomy admitted in ENT ward at Al-Hilla General Teaching Hospital. They were confirmed infected with bacterial causes such as *Streptococcus pyogenes* and *Staphylococcus aureus* by culture and clinically diagnosed by ENT surgeon. Their ages ranged between (3 – 10) years and 10 apparently healthy children were taken as a control group their ages matched to their patient's ages. This study lasted from February to May 2011.

### **2- Immunologic measurements**

Blood samples were taken from children with recurrent acute tonsillitis directly after tonsillectomy (as postoperative samples) a volume of five milliliters of venous blood in a disposable sterile plastic tube after clotting, the serum was separated and kept at – 20 C° until immunological analyzes done .We measured serum values of IgM ,IgG ,IgA and complement proteins C3 and C4 by radial immunodiffusion plate ( LTA-

Italy) in addition to C- reactive protein ( a rapid latex slide ) ( Spectrum, Egyptian Company for Biotechnology – Cairo ) to detect CRP in serum of patients and controls according to the instructions of manufacturer.

**3-Statistical analysis**

Data were analyzed using SPSS (statistical package for social science) of Mean, Standard deviation and T- test (P-value < 0.05) were used as statistical parameters in this work.

Table (1) shows data obtained from analysis of IgM, IgG, IgA of patients after tonsillectomy and control group. There was a statistically significant difference between the patients postoperative value of IgM , IgA and control which increase in those parameters (P < 0.05) although is still in reference ranges but the data of IgG although there was an increased on controls but there was not significant (P > 0.05 ).

**Results**

**Table 1** levels of immunoglobulins IgM, IgG and IgA (mg/ dl) in tonsillectomy patients and control’s sera

		IgM	IgG	IgA
<b>Patient</b> <b>N. 30</b>	<b>M</b>	<b>127.4770</b>	<b>1010.6200</b>	<b>282.5070</b>
	<b>SD</b>	<b>56.6190</b>	<b>519.2230</b>	<b>180.7400</b>
<b>Control</b> <b>N. 10</b>	<b>M</b>	<b>31.5500</b>	<b>923.2300</b>	<b>126.8600</b>
	<b>SD</b>	<b>12.6050</b>	<b>530.6100</b>	<b>66.64900</b>
<b>Significance</b>		<b>Significant</b> <b>P &lt; 0.05</b>	<b>Not significant</b> <b>P &gt; 0.05</b>	<b>Significant</b> <b>P &lt; 0.05</b>

**M= mean      SD= standard deviation**

The result of complement components C3 and C4 levels in (Table 2) showed no significant difference (P > 0.05) between the tonsillectomy patients and control.

The results of C- reactive protein of tonsillectomy patient’s sera giving positive in comparison to control group (Table 2).

**Table 2** levels of complement proteins C3 and C4 (mg/ dl) in tonsillectomy patients and control's

		C3	C4	CRP
Patients N. 30	M	80.3900	23.4300	Positive results
	SD	35.7900	10.5330	
Controls N. 10	M	72.3600	16.0700	Negative results
	SD	32.9300	13.0530	
Significance		Not significant P > 0.05	Not significant P > 0.05	

M= mean      SD= standard deviation

**Discussion**

Inflammation of human tonsil causes presenting many surface crypts which are specific components of lymph epithelial symbiosis, which play an important role in immune response [18]. Result of this study shows a significant increasing in an immunoglobulin IgM and IgA in recurrent acute tonsillitis children postoperative directly in comparison to control although this increasing was still in reference values (Table1).

The tonsils are lymph epithelial structures that provide a protective immunological ring at the openings of both digestive and respiratory tracts. Human tonsils are known to be immunological reactive lymphoid organs which manifest specific antibodies and T cell activity in response to a variety of antigens, carrying out the functions of humoral and cellular immunity [19] an increased number of antigens results in proliferation of B lymphocytes which are capable of migrating to adjacent tissues and producing antibodies [20]. IgM is a prominent antibody in initial response to most antigens and increased levels during frequent, chronic and acute

infections while IgA is the second most abundant immunoglobulin was found in lymphoid tissues of respiratory tract, digestive canal and increased during inflammations [21]. Some of investigators agreed with our result [12, 13] when assured that there is an increased in serum immunoglobulin levels during the episodes of tonsillitis (recurrent) in children due to lymphocyte stimulation by repeating antigenic stimulation and they confirmed that tonsillectomy do not disturb the humoral immune system postoperative, although adenotonsillar tissues are immunological active in children aged between 4-10 years [2]. In against of above result some of investigators found there is not significant differences between pre and postoperative in immunoglobulin values and were thought that the ending of continuous bacterial antigen stimulation of tonsillar tissue might be responsible for slightly decrease in serum values of IgM,IgG,IgA [16,22,23] while other studies show there is a significantly decrease in values of IgM ,IgG,IgA in serum of children pre and postoperative but the levels which retain normal at

least 2-4 months after surgery [11,24,25] and explain that decreases may reflect a reduction in antigenic stimulation [26]. Table (1) shows the values of immunoglobulin IgM, IgG, IgA of controls and this result is agreed with the study of investigator [27].

Table (2) showed no significant differences in level of C3 and C4 in tonsillectomy children in comparison to control. The complement protein is an important mediator of the acute inflammatory response and an effective inhibitor would suppress tissue damage in much autoimmune and inflammatory disease [28]. The result is agreed with some of studies that no significant difference in activity after the surgery [21, 27]. All the result of patients gives positive in CRP test on contrary to controls (Table 2). Together with complement components, CRP is the only acute phase protein directly involved in the clearance of microorganisms [29]

Lastly, it was found that there was a difference between this study and others is that in a short time of study because there is a difficulty to follow up the patients after getting out of hospital on contrary to other investigators the long term of their study reached about 4-6 months at least this enabled them to giving determination of immunological parameter results more exact and strongly.

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