

# IgM-IgG-IgA Secondary Mixed Cryoglobulinemia Associated with Paediatric Tonsillitis

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**Abstract:** A cryoprotein was separated from sera of the pediatric tonsillitis patients. Such protein characterized as: precipitable at 4°C, dissolvable at 37°C and reprecipitable at 4°C. It showed gelatinous or crystalline texture. The immunochemical quantitation using single radial immune diffusion for immunoglobulin isotypes revealed mixed IgM-IgG-IgA isotypes. Hence secondary mixed cryoglobulinemia type III was proven in association with pediatric tonsillitis rate of 29:30(96.66%).

**Keywords:** Cryoglobulin, Mixed Cryoglobulinemia, Paediatric, Sera, Texture

## 1. Introduction

Tonsils are lymphoid glandular compartments that stand as a part of the common mucosal immune system which denoted as by: welder wring<sup>[1,2]</sup>. They are located in human stomium and acts as safe-guard of food, drink and suck born pathogens<sup>[3]</sup>. Tonsillitis is a state of tonsillar infection occurred when the invading overwhelming pathogen load, gain food hold and seeded within these lymphoid tissue<sup>[3]</sup>. Such seeded infectious pathogens when they becomes in rather meaningful population size started quorum sensing communication producing virulence factors<sup>[4]</sup>. Where in intact subunits secretion protein toxin and/or the immune consequences in single or collective initiated the inflammatory responses<sup>[5]</sup>. During infectious processes and then after, hypersensitivity and/or autoimmune besides the immune responses may follow the inflammatory responses<sup>[6]</sup>. Among the most often occurred consequences of tonsillitis is the rheumatic autoimmune responses initiated by molecular mimicking epitopes of the pathogens and joint and/or heart tissue epitopes<sup>[7]</sup>. Such situation made host vulnerable to cryoglobulin responses<sup>[8]</sup>. The present work was undertaken to map the possible cryoglobulin responses among childhood tonsillitis.

## 2. Main Body

Thirty clinically proven tonsillitis in paediatric patients<sup>[9]</sup>. the patients complained fever, headache, vomition, swelling

and tender in the tonsillar region with an apparent difficulty in swelling food and drinks, rise up of acute phase protein C stands as a confirmation for bacterial inflammation. The age range were from 6-12 years old, Table 1. Ten apparently normal child of age group matching to that of patients were considered as controls. Five mls blood samples without anticoagulants were collected both from patients and controls. Sera were obtained and saved in 0.5 ml aliquots at -18°C<sup>[10]</sup>. The cryoglobulin responses were detected using Lynch<sup>[11]</sup>, criteria, including, precipitation within seven days at 4°C, crystalline or gelatinous textures, dissolved at 37°C or 45°C then reprecipitated on reincubation at 4°C and being positive in biurt test Table 2. The cryoglobulin preparations were isotyped using single radial immunodiffusion in gel containing anti-IgG, Anti-IgM, IgA from ready makes, concentration of immunoglobulins were determined in comparison with standard concentration tables provided by manufacturer instruction leaflet<sup>[12]</sup>.

Table 1. Childhood tonsillitis patients characteristics.

Age: 6 – 12 years	
Age group distribution:	Number of patients
6 years	9
9 years	10
12 years	12
Total	29
Sex: Male to female ratio	1.2/1
Disease Duration; few days, concurrent, chronic	
Signs and Symptoms ;Fever	
	Joint pain
	Headache

Age: 6 – 12 years	
	Swallowing difficulty
	Vomition
	Tender and pain in the neck area
Fallow up and diagnostic, Acute Phase protein C is clinically significant titre and concentration	
Titre Range: 4 to 12	
Concentration Range: 28 to 65 mg/ml	

**Table 2.** The research oriented modification of Lynch 2006(11) basic criteria for cryoglobulin determinations in child hood tonsillitis sera.

-Sample bottles should be heated to and maintained at 40C prior to venopuncture
- Five mls. Of blood collected into red-tapped clotted sample tubes
-Samples must be transported to the laboratory at 40C and must not allowed to fall below 3&C.Samples arrived below 37C should be rejected.
-Samples should be allowed to clot at least at 37C for two hours
-Samples should be centrifuged at 37 C for 5 min. at 1500g
- Serum Samples should be incubated at 4 C
-The incubated serum samples should be observed daily up to 7 days
-Any precipitates or gels must be re solubilized at 37C
-All positive samples for cryoglobulin must be quantified using standard total protein method
-Cryoglobulin should be washed at least five times with ice cold normal saline or phosphate buffer saline before immunofixation

### 3. Results and Discussion

The 29 tonsillitis patients serum samples were showing cryoprecipitates when incubated at 4c for up to seven days their nature were either gelatinous or crystalline with milky or creamy white colors. The test serum samples were showing cryocrit percentage ranged from 1.2-17.5% 1 (A) Table .The cryoprecipitates were of protein nature by the virtue of being positive in biurt test. Their ranges were between 23-55 mg/ml. while the man concentration ratio was 34.808mg/ml Table 1 (C)The concentration of CRP were ranging between 12 & 96 and with a mean of 40.6mg/ml while the titers were ranging between 2-16 with a mean of 6.9Table 1 (D).The obtained cryoglobulin preparation were precipitated at 4c , dissolved at 37c and reprecipitate The immunofixation studies done on the cryoglobulin preparations were found IgM concentration of 0.745 to 3.977, IgG concentration ranging from 0.448 to 28.049 and IgA concentration ranging from 0.334 to 4.767mg/ml. while the mean concentration were 2.3015, 15.1041, 2.8619 mg/ml for IgM, IgG, IgA respectively Table 2 controls were negative for cryoglobulin studies

**Table 3.** Assessment of cryoglobulin response in childhood tonsillitis patient.

A/ cryocrite percent	
Features	Percentages
Mean	8.04
Median	9.4
Range	1.2-17.3
B/Dissolving time	
Mean	1.45 hours
Median	1.5 hours
Range	1.15-2.80
C/ protein concentration	
Mean	34.808mg/ml
Median	29mg/ml

A/ cryocrite percent		
Features	Percentages	
C/Range	20.5-55.6	
D/Acute phase protein response	Titer	Mg/ml
Mean	6.9	40.6
Median	4.0	40
Range	2-16	6-96

**Table 4.** Tonsillitis patients cryoglobulin isotypes.

Features	Concentration		
	IgM	IgG	IgA
Mean	2.3015	15.1041	2.8619
Median	2.882	18.040	3.036
Range	0.745-3977	11.117-28.049	0.334-4.767

Cryoglobulin responses among pediatric tonsillitis patients Table1 and 2 are being reported. The possible immune potential of tonsil invading pathogens may stimulate normoglobulin response both at muscosal compartment and systemic level<sup>[13]</sup>, as well as cryoglobulin responses Table 3 and 4. The epitope inducing the normoglobulin responses may be the same as that induce cryoglobulin responses and/or there might be presence of cryo -acting B-cell clones that respond well to cryo inducing other epitope(s)<sup>[14,19]</sup>. Based on these findings Table 3 and 4 and on the explanatory assumptions<sup>[14,19]</sup>, tonsillar inflammations were showing secondary mixed cryoglobulinemia type III<sup>[8]</sup> which composed of the isotypes IgM-IgG-IgA Table 4. In this province , Shanawa and his colleagues have been reported cryoglobulin responses in tuberculosis<sup>[14,15]</sup> typhoid<sup>[16]</sup> and brucellosis<sup>[17]</sup> and tuberculosis experimentally in rabbits<sup>[18]</sup>,Table 5 . Thus, tonsillitis, type III secondary mixed cryoglobulinemia are being reported.

**Table 5.** Comparative view to the bacterial infection associated cryoglobulinemia in this area.

Infectious disease	Nature of cryoglobulinemia
<b>Tuberculosis</b>	<b>Secondary mixed, of IgM-IgG-IgA type(14)</b>
Geriatric tuberculosis	Secondary mixed of IgM-IgG-IgA type, lower in concentration than tuberculus young(15)
Typhoid	Secondary mixed of IgM-IgG-IgA type(16)
Brucellosis	Secondary mixed of IgM-IgG and IgM-IgG-IgA types (17)
This study childhood tonsillitis	Secondary mixed of IgM-IgG-IgA type

### 4. Conclusion

- i. Cryoglobulin response is being reported in pediatric tonsillitis patients.
- ii. Pediatric tonsillitis associated cryoglobulinemia is of mixed secondary type and may be classified as type III

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