American Journal of Medicine and Medical Sciences 2023, 13(5): 608-611
DOI: 10.5923/j.ajmms.20231305.13

# Assessment of the Clinical-Immunological Characteristics of Antiendotoxic Immunity in Diseases of Microbial Etiology in Children

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**Abstract** Today, endotoxins of gram-negative bacteria have been studied worldwide, and their differentiation by the fact that they induce the synthesis of various cytokines and other mediators when they enter the human body, that endotoxins are not organotropic from protein toxins, that they have the property of suppressing the phagocytosis process, and that they have non-specific effects, and the role of antitoxic immunity in diseases of bacterial etiology has been shown. but has not been proven to have a high diagnostic value.

**Keywords** Antilelo, Grammanfi bacteria, Enotoxin, Antiendotoxic, V-lymphocyte, Intestinal dysbiosis

## 1. Introduction

It has been proven that all groups of their molecules are responsible for the biological effects of endotoxins of gram-positive bacteria [2]. Antibodies are known to be important humoral antiendotoxin factors. Antibodies against the lipopolysaccharide (LPS) O-chain of gram-positive bacteria have high neutralizing activity, but the high variability of this O-chain reduces the probability of specific antibodies encountering their corresponding endotoxin. Therefore, attention has been paid to the deep determinants of the LPS R-layer, especially antibodies against Re-glycolipid [4].

A small amount of endotoxins of representatives of the normal microflora of the human large intestine in the blood has an antigen-stimulating effect on the immune system, strengthens the non-specific resistance of the human body, and increases the anti-tumor activity of cells [2].

It is known that endotoxins consist of a complex of proteins and LPS, all groups of the endotoxin molecule are responsible for their biological effect in the body in vivo [3]. LPS penetrates thymus-dependent antigens, polyclonally stimulates V-lymphocytes, activates the complement system in an alternative way, and is considered an adjuvant.

It was found that the distal sections of the large intestine are a natural reservoir for gram-negative microflora and their endotoxins. Normally, taking into account the barrier function of the intestine, a relatively small amount of endotoxin enters the blood stream, it binds with Kupffer cells, macrophages, erythrocytes, lipoproteins, other proteins of the blood plasma in the valvular vein system, and undergoes detoxification in hepatocytes [8].

It has been shown that up to 6% of normal portal blood is discharged into the systemic blood stream through the portocaval and hepatic anastamoses without entering the liver. The control of LPS release of microorganisms from the intestine into the general bloodstream without entering the liver is mainly carried out by the hypothalamic-pituitary-adrenal gland system, the level of portal bleeding through portocaval anastamoses depends on its functional activity [3]. This allows us to reflect the physiological phenomenon such as the presence of endotoxin in the systemic bloodstream of healthy people in the postulates of "systemic endotoxinemia" and the universal factor in the pathogenesis of human diseases "endotoxin aggression", the development of which is associated with an excess of LPS in the general bloodstream and a deficiency of endotoxin-binding systems.

With the introduction of intestinal microflora in babies, there is an increase in the level of antibodies to endotoxin (IgG), their amount was on average 231 ± 21 optical density conditional units in healthy newborns on the fifth day, which indicated the ability of babies to synthesize their own antibodies. Placental passage of maternal antiendotoxin antibodies is one of the factors of natural immunity, which ensures the adaptation of the newborn from the womb to the external life conditions [5].

It is known that antibodies are important humoral antiendotoxin factors. Antibodies against the LPS O-chain of gram-negative bacteria have high neutralizing activity, but the high variability of the O-chain of gram-negative bacteria

Received: Apr. 20, 2023; Accepted: May 8, 2023; Published: May 13, 2023
Published online at http://journal.sapub.org/ajmms

reduces the probability of specific antibodies meeting the corresponding endotoxin.

**The purpose of the study** was to evaluate the diagnostic value of comparative determination of clinical-immunological characteristics of antiendotoxic immunity in children's blood serum in inflammatory diseases of bacterial etiology.

## 2. Research Material and Method

As 251 3-12-year-old children diagnosed with inflammatory diseases of bacterial etiology (acute tonsillitis, acute bronchitis, urinary tract infection), 61 colon dysbiosis of the same age and 25 healthy children were taken for comparison.

To achieve the goal The blood serum of children suffering from acute tonsillitis, acute bronchitis and urinary tract infections (UTIs) was studied among children living permanently in the region. 251 sick children aged 3-12 years living in the Khorezm region of Uzbekistan were involved in the research, 87 of them (34.66±3.00%) had acute tonsillitis, 71 (28.29±2.84%) had acute bronchitis, 93 (37.05±3.05%) SYI diagnoses were verified (Fig. 1).

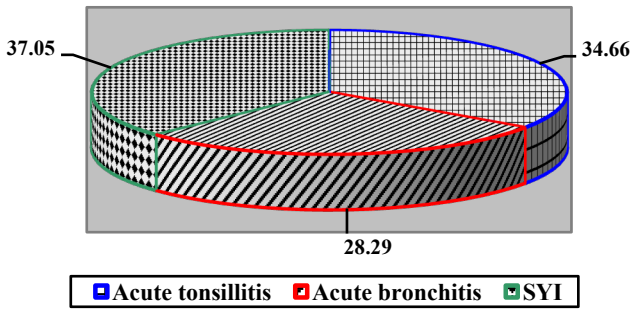


**Figure 1.** Distribution level of nosological units diagnosed in children patients included in the main group, %

All of these studied children (acute tonsillitis, acute bronchitis, SYI) were combined into the main group as diseases of microbial etiology (MEK), the results of which were compared with the 1st and 2nd comparison groups.

**Table 1.** Group distribution of all healthy and sick children involved in research, in absolute and relative (%) numbers

| Groups of patients | | Amount of studied contingent | |
|---|---|---|---|
| | | Absolutely | % |
| Main group, n=251 | Acute tonsillitis | 87 | 25.81±2.38 |
| | Acute bronchitis | 71 | 21.07±2.22 |
| | SYI | 93 | 27.60±2.44 |
| Comparison group 1 (healthy children) | | 25 | 7.42±1.43 |
| Comparison group 2 (YID) | | 61 | 18.10±2.10 |
| Total | | 337 | 100.0 |

In order to compare the results obtained by the main group, a total of 25 practically healthy children (comparison group 1) and 61 children with colonic dysbiosis (YID) (comparison group 2) were also examined (Table 1).

All compared groups were representative in terms of the number of children examined, the age-sex composition of the studied contingent. Practically healthy children (comparison group 1) were selected based on the results of a medical examination, children with IID (comparison group 2) were included in this group after the study of microbiocenosis of the colon and on the basis of the microbiological confirmation of the symptoms of dysbiosis of this biotope, infected with MEK children (main group) were children with the above-mentioned diseases who were treated during the research period at the Children's Multidisciplinary Medical Center of Khorezm region, the diagnoses were verified using clinical, laboratory, and instrumental methods, and the causative agent was confirmed by bacteriological methods.

## 3. Research Result

Since these indicators may remain within the normal range in many infectious and somatic diseases, they do not indicate the specific cause of the body's disorders, and their general clinical information may be low, which makes it difficult to choose an adequate treatment for various chronic infectious and inflammatory processes.

The use of immunocorrective treatment for the purposes of treatment leads to temporary restoration of decreased indicators of immunocompetent cells, indicators of humoral immunity and non-specific protective factors, and some prolongation of remission.

All this requires the search for different approaches to the assessment of the immune status, which can help the doctor to improve the quality of life and the treatment of patients with immune system disorders.

These new approaches we used are based on the following key principles:

selective increase or decrease of serum antibodies against antigens of microorganisms (gram-negative and gram-positive) - representatives of the normal microflora of the human body, indicates the functional state of the immune system in general or the formation of a secondary immune deficiency;

- in inflammatory (infectious) processes, allergic and autoimmune components are involved in the pathogenesis of the disease, and the longer and more severe the inflammatory process, the more clearly expressed are the changes in these components;
- dynamic assessment of the degree of microbial sensitization and changes in the amount of natural anti-microbial antibodies allows to answer the question of the direction, increase or decrease of the patient's immune reactions.

**Table 2.** Comparative indicators of the detection of antibodies against antigens of GShPMs in the blood serum of healthy and children diagnosed with diseases of microbial etiology

| Collectable microorganisms | healthy children, n=25 | | Children diagnosed with MEK, n=251 | |
|---|---|---|---|---|
| | Absolutely | % | Absolutely | % |
| *Escherichia coli* | 4 | 16.00±7.33 | 221 | 88.05±2.05* ↑ |
| *Proteus vulgaris* | 2 | 8.00±5.43 | 141 | 56.18±3.13* ↑ |
| *Citrobacter freindii* | 2 | 8.00±5.43 | 199 | 79.28±2.56* ↑ |
| *Klebsiella pneumoniae* | 1 | 4.00±3.92 | 129 | 51.39±3.15* ↑ |
| *Pseudomonas aeruginosa* | 1 | 4.00±3.92 | 176 | 70.12±2.89* ↑ |

Note: * is a sign of reliable difference between healthy and MEK observed children; MEK - diseases of microbial etiology; GShPM - Gram-negative conditionally pathogenic microorganisms.

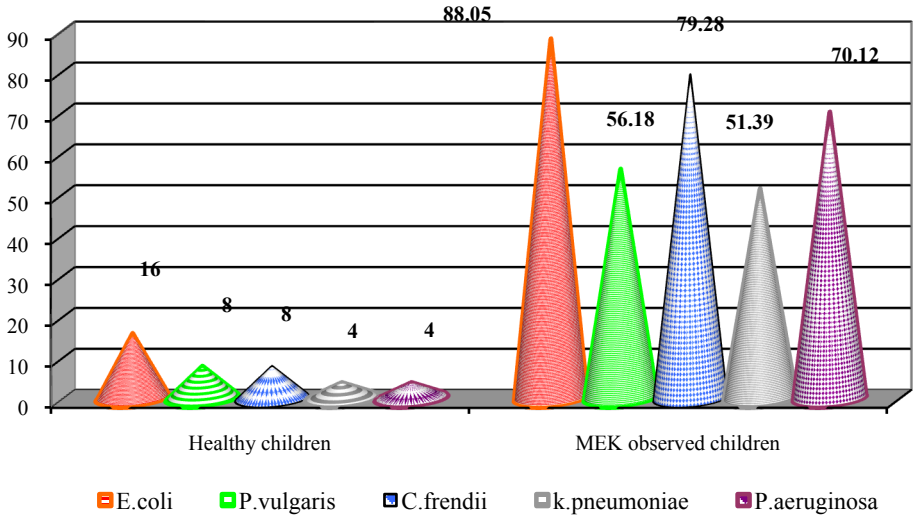


**Figure 2.** Comparative results of IFA of children's blood serum with antigens of bacteria causing diseases of microbial etiology, %

At the next stage of our scientific work, the results of healthy children and MEK were studied comparatively. In both groups, children's serum seropositive results were compared with seronegative results (Table 2).

*Escherichia coli* antigens (seropositive result) was 88.05±2.05% (n=221) in children diagnosed with MEK , while in the remaining cases the titer of antibodies was not detected (seronegative result). In other 4 studied GShPBs, this indicator was reliably higher than the parameters of healthy children (R<0.001), but it was reliably lower than the parameters of *Escherichia coli (R<0.001). Citrobacter freindii* (79.28±2.56%, n=199) and *Pseudomonas aeruginosa* (70.12±2.89%, n=176) were in the next place according to the level of antibodies. The lowest detection percentage was observed for *Proteus vulgaris* (56.18±3.13%, n=141) and *Klebsiellae pneumoniae (51.39±3.15, n=129).*

The interpretation and analysis of the given data showed that *the Escherichia coli* indicator was 1.11 times more statistically significant than *Citrobacter freindii,* 1.26 times more than *Pseudomonas aeruginosa ,* 1.57 times more than *Proteus vulgaris, and 1.71 times more than Klebsiellae pneumoniae.* determined (R<0.05 - R<0.001).

When the results are compared with the parameters of healthy children, antibodies against *Escherichia coli* are 5.50 times higher in sick children compared to healthy children, antibodies against *Proteus vulgaris* are 7.02 times higher, antibodies against *Citrobacter freindii* are 9.91 times higher, and antibodies against *Klebsiella pneumoniae* are 12.85 times higher. , antibodies against *Pseudomonas aeruginosa by 17.53 times* was found to be significantly more common (R<0.001). This situation is evidenced by a sharp increase in the level of formation of antibodies against GShPB antigens when MEK is observed (Fig. 2).

Thus, the detection rate of antibodies against *Escherichia coli* antigens (seropositive result) in children with MEK diagnosis was 88.05%. In other 4 GShPBs, this indicator was reliably lower than the parameters of *Escherichia coli,* although it was reliably higher than the parameters of healthy children (R<0.001). *Citrobacter freindii* (79.28%), *Pseudomonas aeruginosa* (70.12%), *Proteus vulgaris* (56.18%) and *Klebsiellae pneumoniae* (51.39%) were in the next place in terms of antibodies. It was determined that *the Escherichia coli* indicator was statistically significantly higher than *Citrobacter freindii by 1.11, Pseudomonas aeruginosa* by 1.26, *Proteus vulgaris* by 1.57, and *Klebsiellae pneumoniae by 1.71 times (R<0.05 - R* <0.001).

Also, antibodies against *Escherichia coli are 5.50 in sick children compared to healthy ones,* antibodies against *Proteus vulgaris 7.02, antibodies against Citrobacter freindii* 9.90, antibodies against *Klebsiellae pneumoniae 12.85,* antibodies against *Pseudomonas aeruginosa 17.53* times was found to be significantly more common (R<0.001). This situation is evidence of a sharp increase in the level of formation of antibodies against GShPB antigens when MEK is observed. Children diagnosed with MEK had a higher percentage of samples seropositive for *Escherichia coli antigens in children diagnosed with MEK.*

## 4. Conclusions

According to the obtained results, the following immunological aspects were determined according to the level of detection of antiendotoxic antibodies in the blood serum of children: the level of detection of antibodies against GShPB endotoxins in the blood serum depends on the age of the examined children; it was found that the formation of IID in children causes a sharp increase in the titers of antitoxic antibodies in the blood serum, which are reliably higher than the parameters of healthy children, and a patient diagnosed with MEK is close to the parameters of children; the titer of antitoxic antibodies in blood serum depends on the diagnosed nosological entity, for example, the antibody titer and "high" titer in SYI were higher than in acute tonsillitis and acute bronchitis; antibody titers also depend on the type of GShPB produced against them.

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