RESEARCH
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SEROLOGICAL DETECTION OF INTERLEUKINS IL-22 AND IL-37 IN CHILDREN INFECTED WITH RESPIRATORY SYNCYTIAL VIRUS IN DIYALA GOVERNORATE, IRAQ

Duaa Sabah ali *, Maha Falih Nazzal

College of Education for Pure Sciences, University of Diyala, Iraq
***Corresponding Author:** pbio.duaasabahali@uodiyala.edu.iq , Maha.falih@uodiyala.edu.iq

Abstract:
Respiratory Syncytial Virus is the primary reason for acute viral bronchiolitis and pneumonia among newborns additionally to young children. This study proposes to find antiRSV IL-22 and IL-37 antibodies in infants and kids from six months to five years old. ELISA was used to measure serum levels in 94 people (50 with respiratory symptoms and 44 healthy controls). The clinical grouping covers people hospitalized with acute respiratory symptoms and/or chest pain at Albatool Teaching Hospital for Children in Baqubah, Diyala governorate, based on their infection severity. ELISA results showed that patients had anti-RSV IL-22 serum levels of (173.25 ±72.8) while controls had levels of (79.59 ±47.36). IL-37 patients had blood levels of (30.49 ±13.9), while control subjects had serum levels of (12.22 ±4.57). The study found that all groups had a high percentage of IL-22 and IL-37 antibodies against the RSV virus. Early diagnosis of viral infection is advised since elevated levels are likely to be associated with infection start. Primary infection with the RSV virus, regardless of severity. These findings may help us better understand the transmission of RSV among infants and kids, in addition to the prevalence of RSV-infected respiratory tracts, potentially leading to fewer unnecessary antibiotic prescriptions in the community.
Keywords: RSV , IL-22, IL-37, ELISA.

Introduction:
Respiratory syncytial virus (RSV) is belonged to the family of Paramyxoviridae with negative polarity non-segmented RNA [1]. Lower infections of the respiratory tract have it as their primary cause, accounting for 6.7% of all infant deaths under one year [2]. It reaches its highest levels in children at 12 weeks old [3]. By the time the children turn three months old, most of them have been infected by RSV [4], and they will be infected repeatedly for the remainder of their lives as immune system of the host to this virus deteriorates [5]. The disease caused by RSV can cause airway obstruction, respiratory tract blockage, runny nose, wheezing, oxygen deprivation and, in more serious situations, pneumonia and bronchiolitis.
[3]. Furthermore, the asthma progression has been closely linked to RSV disease throughout early life stages. [6] This study will look into the effects of the respiratory syncytial virus on interleukins, specifically IL-22 and IL-37. Natural killer cells, innate lymphoid cells 2 and 3, γδ T cells and Th17 cells produce IL-22 which is a cytokine belonged to IL-10 family [7]. IL-22 mostly effects on non-hematopoietic epithelial and stromal cells and is required to maintain mucosal epithelial-barrier function, promote tissue regeneration, and host defense against a range of infections [8].
Interleukin 37 is an anti-inflammatory cytokine that appears in various inflammatory and autoimmune conditions. Immunofluorescence microscopy demonstrates that IL-37 serves both exterior and intracellular roles. IL-37 is present in both the cytoplasm and the nucleus, making it a dual-functioning cytokine. The newly found anti-inflammatory IL-37, a pro-inflammatory member of the IL-1 family, has been associated with [9]. Interleukin IL-37 test using ELISA technique

Materials and Methods

This investigation was done from November 2023 to January 2024. (94) Blood samples were taken from both sexes. The study participants' ages ranged from 6 months to 5 years.

The study participants were residents of Diyala Governorate. The samples were obtained from national pathological investigation laboratories and Al-Batoul Maternity and Children's Hospital. The patients who participated in the study were diagnosed Clinical pediatric physicians accepted the chest x-rays used in the study, which were obtained from radiology records after patients were moved to the radiology department.

blood samples collection:

Using medical syringes sterilized with 70% ethanol, 2-5 milliliters of venous blood were taken from the children participating in the study and deposited in laboratory tubes containing clotting activators (Gel and Clot Activator Tube). After being numbered, the samples were placed in an ice box.

Test Principle:

Using the Biotin double antibody sandwich approach, this kit detects Human Interleukin 22 (IL-22) employing an enzyme-linked immunosorbent assay (ELISA). Incubate the pre-coated wells with the IL-22 monoclonal antibody. Next, mix biotin-tagged anti-IL-22 antibodies with streptavidin-HRP to form an immunological complex. Remove any enzymes that remain unattached after incubation and washing. Combine Substrates A and B. The acidic action causes the solution to become blue and yellow. Based on the color, there is a positive correlation between liquid and the interleukin quantity.

This kit detects human interleukin 37 (IL-37) through an enzyme-linked immune sorbent assay (ELISA) with a Biotin double antibody sandwich technique. Incubate Interleukin 37 (IL-37) in wells coated with the IL-37 monoclonal antibody. For the creation of an immunological complex, mix biotin-labeled anti-IL-37 antibodies with streptavidin-HRP. After incubation and washing, remove any enzymes that are still unbound. Incorporate Substrates A and B. The acidic action causes the solution to become blue and yellow. The colors of the solution and the concentration of Human Interleukin 37 (IL-37) have a favorable association.

Results and Discussion:

1. Results of the Serum level of Interleukin -22 (IL-22):

The current investigation found a rise in the quantity of IL-22 in persons infected with respiratory syncytial virus. (173.25 ±72.8).

Table 1: Comparison of Mean Serum Concentration of IL-22 in children with respiratory syncytial virus and control group.

Variable	Study group	Control Group	p-value (Sig.)
	Mean ± SD No:60(50)	Mean ± SD No:44	
IL-22	173.25 ±72.8	79.59 ±47.36	<0.0001 (HS)

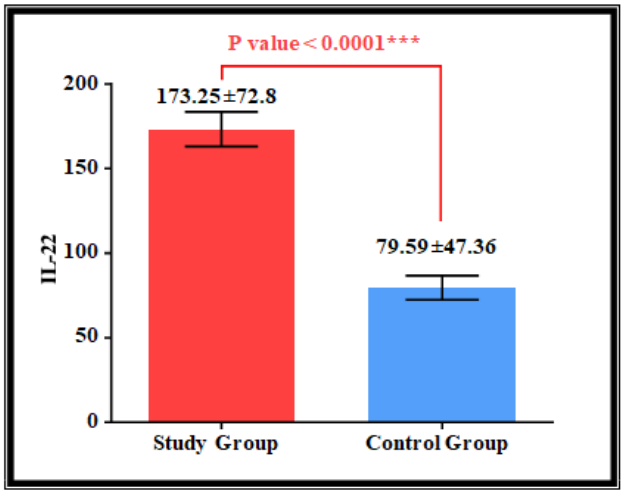

Figure (1): Boxplot of Mean Serum Concentration of IL-22 in children with respiratory syncytial virus and control group.

2. Results of the Serum level of Interleukin-37(IL-37):

Table 2: Comparison of Mean Serum Concentration of IL-37 in children with respiratory syncytial virus and control group.

Variable	Study group	Control Group	p-value (Sig.)
	Mean ± SD No:60(50)	Mean ± SD No:44	
IL-37	30.49 ±13.9	12.22 ±4.57	<0.0001 (HS)

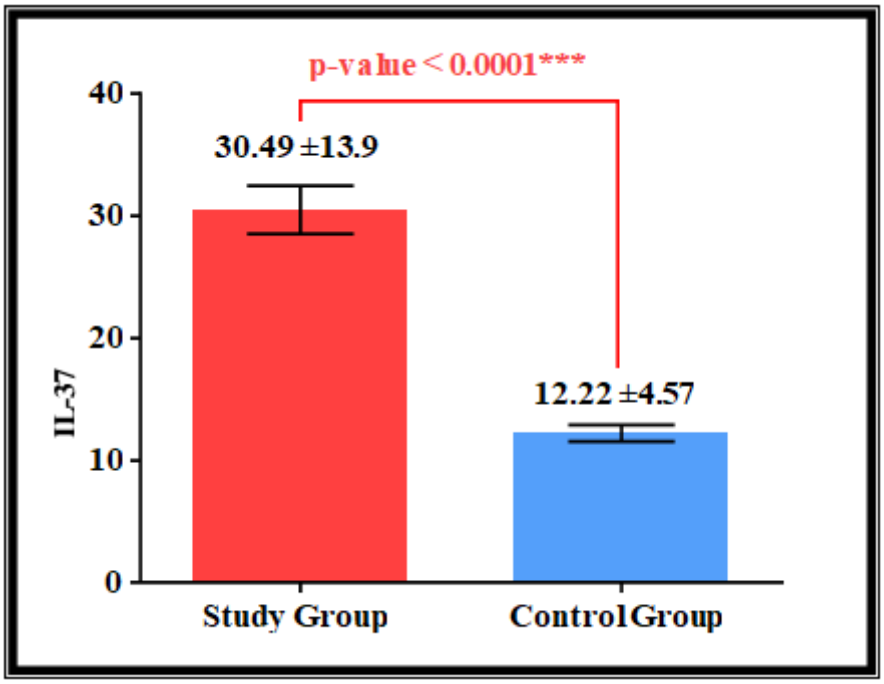

Figure (2): Boxplot of Mean Serum Concentration of Il-37 in children with respiratory syncytial virus and control group.

Results:

The study discovered that children infected with respiratory syncytial virus had greater levels of white blood cells (IL-22) than the control group (79.59 ± 47.36). The statistical analysis found a significant difference (p-value < 0.0001) as illustrated in Figure 1. The conclusions of the present investigation contradict those of this study. Recent studies have shown that this mechanism provides antiviral protection by degrading viral proteins in infected cells [10-11]. While the antiviral activities of IL-22 have already been described, its ability to reduce infection. Autophagy has never been demonstrated to promote output from infected cells. IL-22 was lately proven to be tolerant in a Phase I clinical trial, qualifying the drug for additional trials to investigate effectiveness in managing inflammatory illnesses [12].The study discovered that newborns infected with respiratory syncytial virus had more white blood cells (IL-37) than the control group (12.22 ±4.57). Figure 2 indicates a significant difference (p-value < 0.0001). These findings are consistent with previous reports of raised IL_37 levels, as well as the researcher's conclusion that serum LL-37 quantities were much greater in kids suffering from serious lower respiratory illnesses than in those with minor illness. [13]. As a result, predicting the likelihood of severe RSV sickness using LL-37 serum quantities is difficult. The present study found an increase of LL-37 quantities in children with RSV pneumonia, with the elevation being extra prominent in severe cases, hinting that raised LL-37 serum quantities may be associated with RSV pneumonia incidence and development. Our statistical investigation of serum LL-37 quantities in RSV-infected neonates found a greater probability of severe RSV [14]. Gedik et al. reported that the quantities of LL-37 were found to be considerably elevated in 63 children with post-infectious bronchiolitis obliterans as compared to children who were healthy [15].

Conclusion:

The current study concludes that there is an increase in lL_22 levels in serum Pediatric patients infected with respiratory syncytial virus when compared to the increased control group. lL_37 levels have also increased. In the sera of pediatric patients infected with respiratory syncytial virus against the control group.

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