

# Selected Immunological Effects of Laser Acupuncture Therapy in Pneumonic Children

Shehab M. Abd El-Kader\*, Fatma A. Hegazy\*, Samia A. Abdel Rahman \* and Ragaa M. Ahmed\*\*

\* Faculty of Physical Therapy, Cairo University.

\*\*Faculty of Medicine, Cairo University.

## ABSTRACT

**Background:** The National Institute for Statistics in Egypt has proved that 68% of children death under the age of five years are mainly caused by respiratory diseases mainly pneumonia. **Objective:** To determine the effect of laser acupuncture therapy on immune system in pneumonic children. **Methods:** Thirty pneumonic children participated in this study and divided into two equal groups; the training group received medical treatment, the usual physiotherapy in addition to laser acupuncture therapy where the control group received medical treatment in addition to the usual physiotherapy. The program continued for one month. Measurement of IgG, WBCs and CRP obtained before starting of the study and at the end of the study after one month. **Results:** The results of this study indicated that there was a significant improvement in values of IgG, WBCs and CRP of the training and the control groups, where there was a significant difference between both groups ( $p < 0.05$ ).

## INTRODUCTION

Pneumonia is defined as an infection involving the alveoli of the lungs. It occurs in patient of all age groups but children and elderly are especially at risk<sup>4</sup>.

Pneumonia is one of the leading causes of morbidity and death. It is the most common cause of hospital attendance in adult and mortality in children. Four millions children under the age of five years die of pneumonia every year<sup>7</sup>.

Bacterial pneumonia in neonates generally follows acquisition of pathogen during passage through the birth canal and is a common focus of early onset neonatal sepsis<sup>11</sup>.

Chest physiotherapy is a specialized area of practice involving the optimization of respiratory function. Percussion, vibration and postural drainage are physiotherapeutic technique which used to clear secretions from the lung or to ease the work of breathing<sup>13</sup>.

Immunity is the resistance to infection by microorganisms. The main role of the immune system is to prevent or to limit such infections. Immunity may be innate "inborn or nonspecific" or acquired "specific"<sup>8</sup>.

Low level laser has an exciting role both in immunobiological functions for immune system disease and to activate the normal reaction of the immune system components against harmful bodies<sup>3</sup>.

In bronchial asthma alone and combined with active pulmonary tuberculosis there is marked shift in the immune system. Laser therapy displayed a good immunocorrecting action<sup>12</sup>.

The purpose of this study was to investigate the effect of laser acupuncture therapy on immune system in pneumonic children.

## SUBJECTS, MATERIALS AND PROCEDURES

### Subjects

Thirty pneumonic children of both sexes (14 girl and 16 boy) were selected randomly from Abo-ELresh pediatric hospital, their age ranged between four and five years, they were in the first attack of pneumonia, they were free from any other chest problem, they were presented with bronchopneumonia.

Patients were divided into two equal groups. Group (1) was the study group received laser therapy and the usual physical therapy in addition to medical treatment where group (2) was the control group received the usual physical therapy in addition to medical treatment.

### Materials

- 1-Laboratory kits to measure immunoglobulin G (IgG) level in the serum, Acetic acid for white blood cells (WBCs) and Avitex RF for C - reactive protein (CRP).
- 2-ADVIA 120 (by Bayer) for detection of WBCs, centrifuge and disposable plastic syringes.
- 3-Acuhealth professional 900 Acuhealth Australia (An Acupuncture point detector and cunometer were used to detect the acupuncture points for the respiratory system disorders).
- 4- Gallium-Arsenide Laser (LTU - 904 H, Class I laser product manufactured by

Laserex technologies PTY LTD, Australia): Its maximum peak power was 5 watt, wave length equal  $904 \pm 10$  nm and pulse length equal 200 ns.

### Procedures

#### Patients were divided into two groups:

Group (1): (Laser therapy group) received medical treatment, the usual physiotherapy in addition to laser acupuncture therapy, each acupuncture point of the immune system received laser therapy for 90 seconds, three sessions per week for one month. The child was bare skin; the sites of acupuncture points were detected and confirmed by the acupuncture point detector the cleaned by alcohol. Both the patient and the therapist used protective glasses. The acupuncture points of the immune system are<sup>5</sup> (Figure 1a,b,c and d):

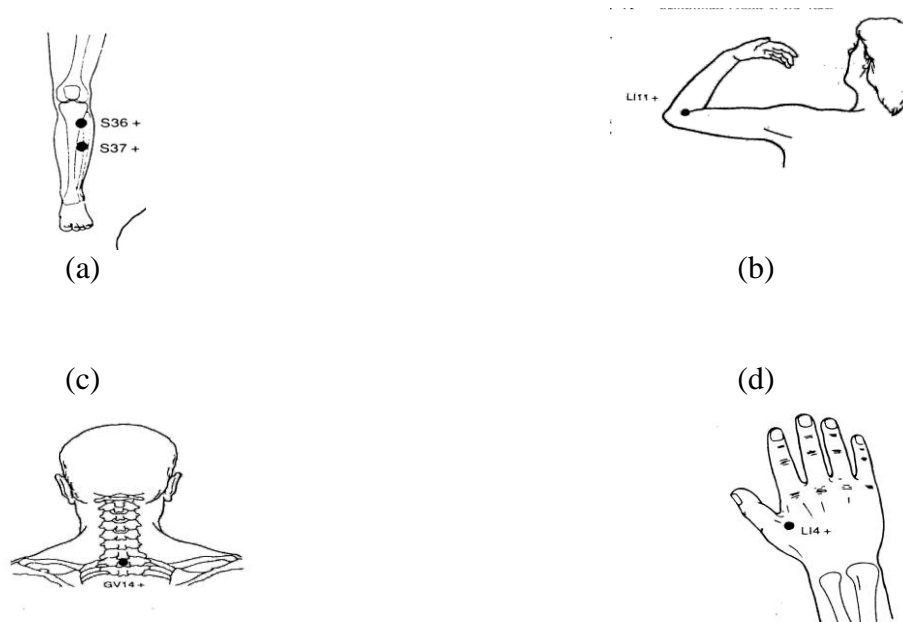
Dubi (St.36): In the depression below the patella on the lateral side of the ligamentum patellae.

Zusanli (St.37): One finger breadth lateral to the inferior end of the tibial tuberosity.

Quchi (L.I.11): At the outer end of the elbow crease when the elbow is semiflexed.

Dazhui (GV.14): On the back midline between the dorsal spines of the 7<sup>th</sup> cervical and 1<sup>st</sup> thoracic vertebra.

Hegu (L.I. 4): It is situated in the web between the index and thumb on the dorsal (posterior) aspect of the hand, may be located when the index and thumb are adducted at the highest point of the muscles on the back of the hand.



**Fig. (1a, b, c and d): The acupuncture points for the immune system.**

**Group (2): (control group)** received medical treatment in addition to the usual physiotherapy.

Each child rest comfortably in a quite room and 2.5 ml venous blood sample was obtained for measurement of (IgG), WBCs and CRP before starting of the study and at the end of the study after one month.

#### Statistical analysis

The mean values of immunoglobulin G (IgG), WBCs and CRP obtained before and after two months in the control and the training

groups were compared using paired "t" test. Independent "t" test was used for the comparison between the two groups ( $P < 0.05$ ).

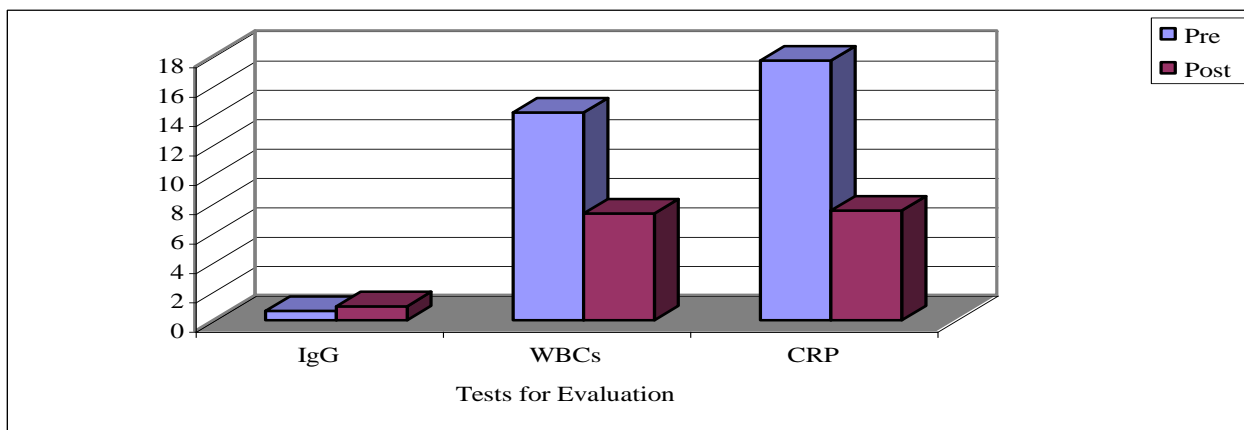
### RESULTS

The results of this study indicated that there was a significant improvement in values of IgG, WBCs and CRP of the training group. The percentage of changes in IgG, WBCs and CRP were 48%, 49% and 57% respectively (table 1 and figure 2).

**Table (1): The difference between the pre and post test values of IgG, WBCs and CRP in the raining group.**

	Mean $\pm$ SD		t- value	%of change	Significance
	Pre	Post			
IgG(mg/dl)	0.64 $\pm$ 0.18	0.95 $\pm$ 0.12	3.25	48%	Sig.
WBCs(thousands/mm <sup>3</sup> )	14.13 $\pm$ 2.56	7.27 $\pm$ 1.67	3.50	49%	Sig.
CRP(mg/dl)	17.67 $\pm$ 2.02	7.47 $\pm$ 2.56	3.64	57%	Sig.

Level of significance  $p < 0.05$



**Fig. (2): The difference between the pre and post test values of IgG, WBCs and CRP in the training group.**

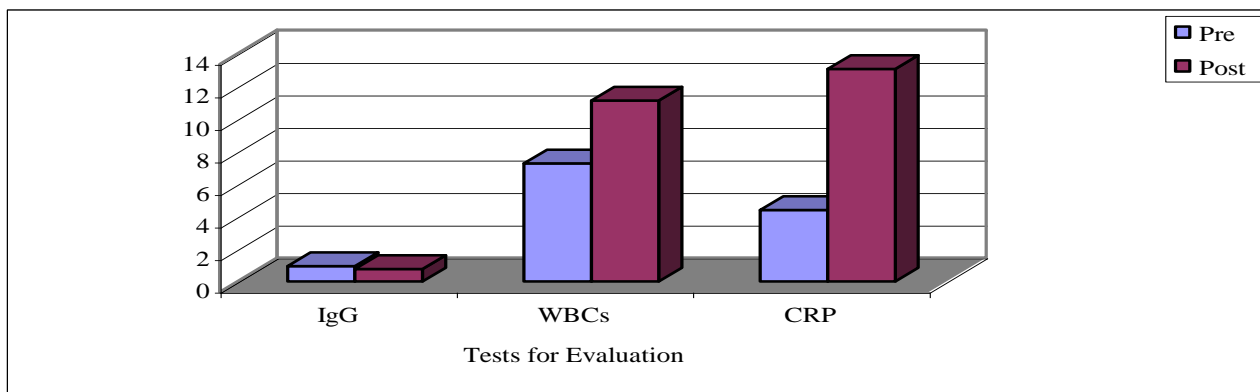
The results of this study indicated that there was a significant improvement in values of IgG, WBCs and CRP of the control group.

The percentage of changes in IgG, WBCs and CRP were 27%, 23% and 28% respectively (table 2 and figure 3).

**Table (2): The difference between the pre and post test values of IgG, WBCs and CRP in the control group.**

	Mean $\pm$ SD		t- value	%of change	Significance
	Pre	Post			
IgG(mg/dl)	0.61 $\pm$ 0.17	0.78 $\pm$ 0.11	3.21	27%	Sig.
WBCs(thousands/mm <sup>3</sup> )	14.4 $\pm$ 2.69	11.13 $\pm$ 2.17	3.74	23%	Sig.
CRP(mg/dl)	18.13 $\pm$ 2.32	13.07 $\pm$ 2.96	3.44	28%	Sig.

Level of significance  $p < 0.05$



**Fig. (3): The difference between the pre and post test values of IgG, WBCs and CRP in the control group.**

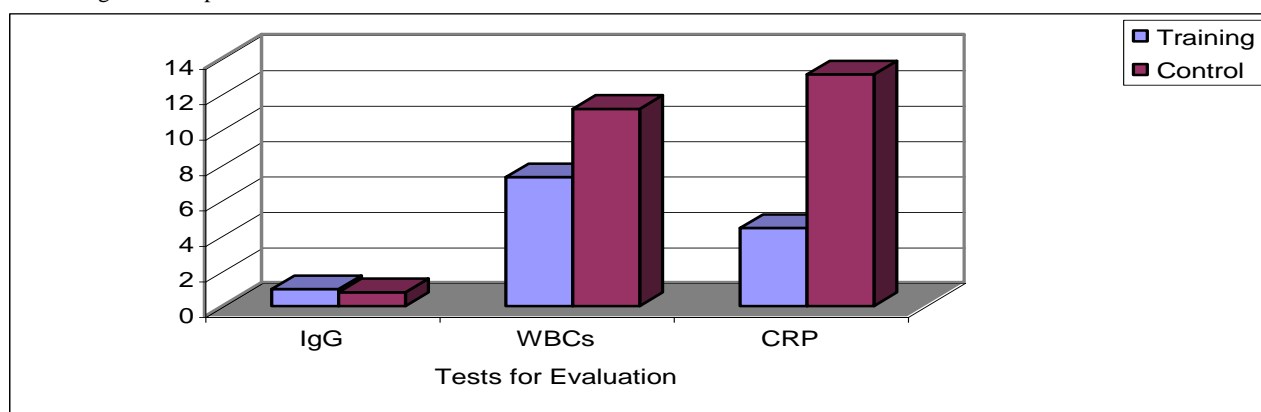
The results of this study indicated that there was a significant difference between the

values of IgG, WBCs and CRP in the training and the control group (table 3 and figure 4).

**Table (3): The difference between the values of IgG, WBCs, and CRP in the training and the control groups.**

	Mean $\pm$ SD		t- value	Significance
	training	control		
IgG (mg/dl)	0.95 $\pm$ 0.12	0.78 $\pm$ 0.11	3.22	Sig.
WBCs (thousands/mm <sup>3</sup> )	7.27 $\pm$ 1.67	11.13 $\pm$ 2.17	3.89	Sig.
CRP(mg/dl)	4.4 $\pm$ 1.54	13.07 $\pm$ 2.96	3.94	Sig.

Level of significance  $p < 0.05$



**Fig. (4): The difference between the values of IgG, WBCs and CRP in the training and the control groups.**

## DISCUSSION

This study was designed to investigate the effect of laser acupuncture therapy on immune system in pneumonic children. Thirty pneumonic children participated in this study and divided into two equal groups; the training group received medical treatment, the usual physiotherapy in addition to laser acupuncture therapy where the control group received medical treatment in addition to the usual physiotherapy.

Measurement of IgG, WBCs and CRP obtained before starting of the study and at the end of the study after one month.

The results of this study indicated that there was a significant improvement in values of IgG, WBCs and CRP of the training and the control groups, where there was a significant difference between both groups.

Immunoglobulin G (IgG) is the most common Immunoglobulin found in the airway and alveolar space secretions diffusing into the

lungs from the blood. With an absolute or functional deficiency of respiratory tract IgG recurrent and chronic types of infections occur<sup>8</sup>.

The efficacy of low intensity laser therapy on the immune system was studied through its application on chronic bronchitis; there was an increase in macrophage activity and level of secretory IgA<sup>6</sup>. A significant increase in IgG was found after irradiation of the caesarian section with infra-red laser<sup>14</sup>. Also, the activity of cellular immunity and humoral immunity in lymph node cells of rates were enhanced by laser<sup>15</sup>.

The increased value of IgG serum level post laser acupuncture therapy may be attributed to enhance activities of cellular and humoral immunity in lymph nodes and lymphocytes or due to stimulation of the immune system through T-cellular immunity or due to the effect of laser in reinforcement of the immune function of body fluids and cells through increasing serum gamma globulin<sup>10</sup>.

The significant improvement in value of WBCs following application of laser therapy was due to stimulation of specific and non specific immunity, activation of alveolar macrophages & phagocytes and anti-inflammatory effect. This conclusion is confirmed with a previous study conducted for clinico-cytological evaluation of treatment of bronchitis using laser therapy and proved that laser therapy enhanced the resolution of leucocytosis<sup>1</sup>.

The significant results of CRP after application of laser therapy was due to immunomodulating effect of laser therapy through activation of nonspecific mechanisms of infectious immunity, intensifying antibacterial activity of serum and activation of phagocytosis<sup>9</sup>. Also, laser acupuncture therapy produced anti-inflammatory effect in addition to anti-microbial effect caused by photothermal effect of laser<sup>2</sup>.

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### الملخص العربي

#### بعض التأثيرات المناعية المختارة للعلاج بالليزر في الأطفال المصابين بالالتهاب الرئوي

يعتبر مرض الالتهاب الرئوي من أكثر أسباب الوفاة في الأطفال . وبالتالي هناك حاجة دائمة لإثبات فعالية طرق جديدة لتحسين أداء جهاز المناعة والحد من الآثار السلبية لهذا المرض . أجرى البحث على ثلاثين طفلاً من الجنسين حيث قسمت العينة إلى مجموعتين: المجموعة التجريبية تلقت العلاج بالليزر بمعدل ثلاث جلسات أسبوعياً لمدة شهر والعلاج الطبيعي التقليدي بالإضافة للعلاج بالأدوية والمجموعة الضابطة تلقت العلاج بالأدوية بالإضافة للعلاج الطبيعي التقليدي وتم قياس مستوى الأجسام المضادة ج وعدد كرات الدم البيضاء قبل الدراسة وبعد أربعة أسابيع في نهاية التجربة . أظهرت النتائج تحسناً أكبر في مستوى الأجسام المضادة ج وعدد كرات الدم البيضاء في المجموعة التجريبية بدرجة أكبر منها في المجموعة الضابطة وبالتالي يمكن اعتبار العلاج بالليزر وسيلة فعالة في علاج الأطفال المصابين بالالتهاب الرئوي .