



## RESPIRATORY SYSTEM INFECTIONS AND THEIR CORRELATION WITH ABO BLOOD GROUP IN DIFFERENT AGE GROUPS IN KIRKUK CITY

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<p><b>Received:</b> March 6<sup>th</sup> 2022 <b>Accepted:</b> April 6<sup>th</sup> 2022 <b>Published:</b> May 17<sup>th</sup> 2022</p>	<p>Respiratory tract infection; RTI is considered one of the most common infections that occurs in winter and infects all ages in both gender in human. In this regard, many studies investigated different parameters that could correlate with this type of infection and inflammation. However, a little is known about its relation with blood group. Therefore, this study hypothesised that the differences in the ABO blood groups could have a correlation with RTI. Samples were taken from patients who diagnosed for RTI in the period from January to March 2022 from both gender aged 20-70 years. About 146 sputum samples were collected; 82 males and 64 females. The results showed that from all samples, about 43.1% (63) males and 33.5% (49) females were positive for RTI, whilst other samples showed non-bacterial infections. Microbiological diagnosis of sputum showed different bacteria that cause RTI. <i>Streptococcus pneumoniae</i> showed highest percentages of 25.9% in 29 patients, followed by 17.8% of <i>M. pneumoniae</i> in 20 patients, about 16% <i>K. pneumoniae</i> in 18 patients. <i>Legionella</i> showed 12.5% in 14 patients and to less percentages in both <i>H. influenzae</i> (11.6% in 13 patients) and <i>S.aureus</i> 8.9% in 10 cases respectively. The least infection was seen in <i>S. pyogenes</i> (7.1% in 8 cases). These results correlated with blood group were RTI patient's carrying blood group O showed 54% RTI while AB group was 6%.</p>

**Keywords:** Respiratory Tract Infection, ABO blood group, *Streptococcus pneumoniae*

### INTRODUCTION

The respiratory system in human consists of nasal cavity, pharynx, oesophagus, trachea and lungs (1). The main function of the respiratory system is providing the body with oxygen that is needed for their functions and activities, and also for carrying the Carbone dioxide produced in oxidation process (2). This oxygen is provided via the process of respiration by respiratory system maintain the body temperature due to anabolic and catabolic reactions. The Lungs in turn orchestrate all these processes (3). The respiratory system is in contact with different viral or bacterial infections which lead to the RTI. Some of these infect the upper respiratory tract such as in cases of cold, sore throat, nasal cavity infection, tracheal infection and many others (4,5). Symptoms of RTI include nasal congestion, sneezing, sore throat. Other symptoms are cough with or without sputum, accompanied by whistling sound like trachea bronchitis (6).

The most common bacterial species that infect the RT is *Streptococcus* bacteria which is a gram positive bacteria and is a normal flora in the upper respiratory tract. However, it causes RTI in weakened immune system individuals. Of those bacterial species are *S. pyogenes* which causes Laryngitis and tonsillitis and otitis media. Another species that cause lung and nasal pouch infections is *S.pneumoniae*.

Other bacterial strains cause RTI are gram negative bacteria such as *H. influenzae* which cause chronic bronchitis and nasal cavity infections, *K. pneumoniae* causes infections similar to that of *M. tuberculosis* (tuberculosis) and other bacterial infections caused by *B. pertussis* (whooping cough) and *Mycoplasma pneumoniae* (RTI) (7,8).

In human, blood group are classified into four types (A, B, AB and O) according to the ABO system. This variation is due to the antigens A,B on their red blood cells and when both antigens are present on the surface of the RBC then the blood group would be AB, Whilst the presence of A antigen only this would be



blood group A and same for B blood group. In the absence of both antigens then the blood group would be O (9).

**MATERIALS AND METHODS**

One hundred and forty-six Sputum samples were collected from people suffering from RTI in ages

between 20 to 70 years from both gender (82 male that have 56.1% infection and 64 females with 43.8% infection). Those were taken from different private laboratories in the city of Kirkuk in the period from January to March 2022. Blood group test were performed to investigate their blood groups as shown in Table 1.

**Table 1: Sample collection and their RTI percentages**

Sex	No :	%
Male	82	56.1
Female	64	43.8
Total	146	100

**METHODS:**

Sputum samples were collected from people suffered from respiratory tract infections using sterilised test tubes and cultured on nutrient and blood agars. The plates were then incubated at 37 C° for 24 hours. After incubation time, the bacterial colonies were diagnosed using culture diagnosis methods and biochemical tests as described in details in (10, 11, and 12). On the other hands blood grouping test was performed for each patient in order to detect blood groups using ABO system following the procedure from (13) .

**RESULTS**

The results showed that bacterial infections in the respiratory tract was about 43.1% in 65 infected males from total 56.1% (82 males) in sputum samples. Whilst the percentage was 33.5% in 49 RTI infected females out of 43.2% in 64 cases. On the other hand, other infections were non-bacterial origin 13% in 19 males and 10.2% in 15 females as shown in Table 2.

**Table 2: Percentages of bacterial infections in RTI.**

Sex	Bacterial infection	%	Non bacterial infection	%	Total	%
Male	63	43.1	19	13.0	82	56.1
Female	49	33.5	15	10.2	64	43.8
Total	112	76.7	34	23.2	146	100

Results also showed that most RTI were in the age group (60-70) 17.8% in 20 males and 16.0% in 18 females followed by the age group (50-60) in 14.2% in 16 male. While RTI in the same age group was 11.6% in 13 females. The age group (40-50) results were 11.6% infection in 13 males and 8.9% in 10 females respectively. This followed by age group of (30-40)

which recorded 8.0% in 9 males and 4.4% in 5 females. The least RTI was recorded in the age group of (20-30) 4.4% in five males and 2.6% in three females as shown in Table 3. These results may be due to weak immune system in the elderly patients and their conditions with some chronic diseases and vitamin D deficiency.

**Table 3: RT bacterial infection rates in different age groups**

Ages	Male	%	Female	%	Total	%
20 – 40	5	4.4	3	2.6	8	7.1
30 – 40	9	8.0	5	4.4	14	12.5
40 – 50	13	11.6	10	8.9	23	20.5
50 – 60	16	14.2	13	11.6	29	25.8
60 – 70	20	17.8	18	16.0	38	33.9
Total	63	56.2	49	43.7	112	100

This study also investigated bacterial species that caused RTI in in both gender. Results showed that the highest percentages were caused by *S. pneumonia*

which was 14.2% in 16 males and 11.6% in 13 females. Second bacterial type was *Mycoplasma pneumonia* (9.8% in 11 males and 8% in 9 females).



Followed by *K. pneumoniae* (9.8% in 11 males and 6.2% in seven females). While RTI caused by *Legionella* showed less infection (7.1% in 8 males and 5.3% in six females). *H. influenzae* caused 5.3% in six males and 6.2% in seven females. *Staphylococcus*

*aureus* showed infection of 6.2% in seven males and 2.6% in three females. The least RT bacterial infection in the current study was *S. pyogenes* (3.5% in four males and 3.5% in four females) as shown in Table 4.

**Table 4: Bacterial species causing respiratory tract infections.**

Bacteria	Male	%	Female	%	Total	%
<i>S.pneumoniae</i>	16	14.2	13	11.6	29	25.8
<i>M.pneumoniae</i>	11	9.8	9	8.0	20	17.8
<i>K.pneumoniae</i>	11	9.8	7	6.2	18	16.0
<i>Legionella</i>	8	7.1	6	5.3	14	12.5
<i>H.influenzae</i>	6	5.3	7	6.2	13	11.6
<i>S.aureus</i>	7	6.2	3	2.6	10	8.9
<i>S.pyogenes</i>	4	3.5	4	3.5	8	7.1
<b>Total</b>	<b>63</b>	<b>56.2</b>	<b>49</b>	<b>43.7</b>	<b>112</b>	<b>100</b>

The reason of these infections may be due to variable weather changes in the winter when all study samples were taken. Smoking and air refreshing conditions of the houses could be possible reasons as well. Malnutrition and decreased immune response in some people also play a role in RTI.

Blood group test was also performed for all patients, and the results showed high levels of RTI in patients with blood group O (29.4% in 33 males and 18.7% in

21 females) followed by A blood group (13.3% in 15 males and 14.2% in 16 females). These percentages were close to those of B blood group (9.8% in 11 males and 8.9% in 10 females) whilst AB blood group showed lowest percentages in RTI (3.5% in four males and 1.7% in two females). Possible reasons for these results could be that most people carry a blood group of O rather than other blood group (see Table 5).

**Table 5: Blood groups in RTI patients**

Blood group	Male	%	Female	%	Total	%
<b>O</b>	<b>33</b>	<b>29.4</b>	<b>21</b>	<b>18.7</b>	<b>54</b>	<b>48.2</b>
<b>A</b>	<b>15</b>	<b>13.3</b>	<b>16</b>	<b>14.2</b>	<b>31</b>	<b>27.6</b>
<b>B</b>	<b>11</b>	<b>9.8</b>	<b>10</b>	<b>8.9</b>	<b>21</b>	<b>18.7</b>
<b>AB</b>	<b>4</b>	<b>3.5</b>	<b>2</b>	<b>1.7</b>	<b>6</b>	<b>5.3</b>
<b>Total</b>	<b>63</b>	<b>56.2</b>	<b>49</b>	<b>43.7</b>	<b>112</b>	<b>100</b>

**IN CONCLUSION,** bacterial infections in the respiratory tract could be related with the genetic variation of the A and B antigens that exist on the erythrocyte surface and in order to further confirm this correlation, gene expression investigation is needed.

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