

Etiology of Respiratory tract infections using Physiological markers patterns for diagnosis in Hillah patients

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Abstract:

In this study, 210 respiratory patients' specimens were collected to reveal the main causative agents of respiratory infections. The study performed from 1/12/2008 to 1/7/2009 in Babylon province (Marjaan hospital , Babylon Maternity and Children Hospital and Al-Hillah Teaching Hospital).

Bacterial infection represented by *Mycobacterium tuberculosis* (24.76%), *Methicillin-Resistant Staphylococcus aureus MRSA* (15.32%), *Streptococcus pneumoniae* (12.8%), *Mycoplasma pneumoniae* (10.95%), *Staphylococcus aureus* (9.52%), *Haemophilus influenzae* (8.1%), *Chlamydia pneumoniae* (7.14%), *Moraxella catarrhalis* (6.2%) and *Acintobacter spp.* (5.23%).

Sex distribution of Respiratory infection causes isolated from patients formed 124(59%) for male while 86(41%) for female. The age (1-9 years) formed the highest ratio of respiratory infection 50(23.8%).

Residential distribution of Respiratory infection causes isolated from patients found to be higher in rural than urban area; 81(38.6%) for urban patients while 129(61.4%) for rural patients.

Distribution of pneumonia Cases according to Family History of Asthma and Severity Found to be major cause of sever pneumonia 105(50%). 133 (63.3%) pneumonia patients found smoking. other physiological measurements found revealed higher than normal value like C-reactive protein, ESR, Total WBCs.

Introduction

Despite the availability of effective chemotherapy pneumonia and tuberculosis are still major health problem in most countries of the world. There are many different causes of pneumonia but the most common are produced by *Streptococcus pneumoniae*, *Klebsiella pneumoniae*, *Mycoplasma pneumoniae*, *Legionella pneumophila*, *Staphylococcus aureus*, *Haemophilus influenza* and in rare cases *Neisseira meningitides*. *Streptococcus pneumoniae* accounts for over 60% of bacterial pneumonia in adults who require hospitalization [1].

Both viral and bacterial agents have been proposed to play important roles in the development of childhood airway infections [2]. Changes in the local and innate immunity of the pharyngeal space also influence upper respiratory infections [3]. In 1957 upper respiratory disease was considered to play an important role in the etiology of middle ear disease; the same report generalized that the whole respiratory tract should be seen as a unit liable to similar natural changes [4].

Pneumonia ranks sixth as the leading cause of death in children. The transmission of pneumonia includes aspiration of or pharyngeal organisms, inhalation of aerosols containing bacteria or less frequently by hematogenous spread from a distant site and bacterial translocation from the GIT, which is recently being hypothesized as a mechanism of infection [5].

Materials and methods

210 respiratory patients' specimens of blood and sputum were collected to reveal the main causative agents of respiratory infections. The study performed from 1/12/2008 to 1/7/2009 in Babylon province (Marjaan hospital, Babylon Maternity and Children Hospital and Al-Hillah Teaching Hospital).

Some pathogens like *Mycobacterium tuberculosis*, *Mycoplasma pneumoniae*, *Influenzae virus* Type A and *Chlamydia pneumoniae* were detected by using Elisa technique, IgM kits from DRG International Inc. Germany. *Haemophilus* strains were identified by X and V factor requirement and reaction to polyvalent antiserum (Difco Laboratories, USA), and strains were confirmed as *H. influenzae* by determination of the requirement for both the X and V factors. While other bacterial isolates diagnosed by classical procedure by culturing (nutrient agar, blood agar, Chocolate agar, Mannitol salt agar) and identical biochemical tests.

Results and Discussion

The results of this study revealed that the major cause of respiratory infection was *Mycobacterium tuberculosis* 24.76%, followed by *Methicillin-Resistant Staphylococcus aureus* MRSA (15.32%), *Streptococcus pneumoniae* (12.8%), *Mycoplasma pneumoniae* (10.95%), *Staphylococcus aureus* (9.52%), *Haemophilus influenzae* (8.1%), *Chlamydia pneumoniae* (7.14%), *Moraxella catarrhalis* (6.2%) and *Acintobacter spp.* (5.23%) respectively as shown in table (1). These results agreed with Pipat, *et,al.* that *Streptococcus pneumoniae* , *Acintobacter spp.*, *Methicillin-Resistant Staphylococcus aureus* MRSA are the most common cases of pneumoniae [6]. In other study Measurements and Main Results Estimated that the prevalence of respiratory infections was formed 63% [7]. *Influenzae virus* Type A results are agreed with Abdulaziz study that shows the ratio was 22% [8].

Table1: Distribution of pneumoniae causes in serum and sputum samples from patients.

Causes	No.	%
<i>Mycobacterium tuberculosis</i>	52	24.76
<i>Methicillin-Resistant Staphylococcus aureus MRSA</i>	32	15.23
<i>Streptococcus pneumoniae</i>	27	12.85
<i>Mycoplasma pneumoniae</i>	23	10.95
<i>Influenzae virus Type A</i>	20	9.52
<i>Haemophilus influenzae</i>	17	8.1
<i>Chlamydia pneumoniae</i>	15	7.14
<i>Moraxella catarrhalis</i>	13	6.2
<i>Acintobacter spp</i>	11	5.23
<i>Total</i>	210	100

Table 2 revealed that the main age group for pneumonia infection was (1-9 years) and (70-79 years) 23.8% and 14.76% respectively. This result are nearly agreed with other studies like Ansart, *et.al.* that patient from 26-67 years were suffering from respiratory disorder [9]. *Chlamydia pneumoniae* results are revealed to other study that showed *Chlamydia pneumoniae* is one of the most common cause of pneumonia in all age groups [10].

Table 2: Age distribution and frequency of Respiratory infection causes isolated from patients.

Pathogens	Number of samples	Age (Years)															
		1 - 9		10 – 19		20 – 29		30 – 39		40 – 49		50 – 59		60 – 69		70 – 79	
		No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
<i>Mycobacterium tuberculosis</i>	52	2	4	4	14.28	2	7.40	2	16.66	11	55	11	50	7	35	13	41.93
<i>Methicillin-Resistant Staphylococcus aureus</i>	32	11	22	4	14.28	2	7.40	1	8.33	-	-	-	-	12	60	2	6.45
<i>Streptococcus pneumoniae</i>	27	2	4	5	17.85	10	37.03	-	-	2	10	7	31.81	-	-	1	3.22
<i>Mycoplasma pneumoniae</i>	23	9	18	1	3.57	6	22.22	-	-	1	5	3	13.63	1	5	2	6.45
<i>Influenzae virus Type A</i>	20	2	4	5	17.85	3	11.11	4	33.33	2	10	-	-	-	-	4	12.90
<i>Haemophilus influenzae</i>	17	8	16	-	-	2	7.40	-	-	-	-	-	-	-	-	7	22.58

<i>Chlamydia pneumoniae</i>	15	8	16	2	7.14	-	-	3	25	1	5	1	4.54	-	-	-	-
<i>Moraxella catarrhalis</i>	13	6	12	3	10.71	-	-	2	16.66	-	-	-	-	-	-	2	6.45
<i>Acintobacter spp</i>	11	2	4	4	14.28	2	7.40	-	-	3	15	-	-	-	-	-	-
Total	210	50 (23.8)		28 (13.33)		27 (12.85)		12 (5.71)		20 (9.52)		22 (10.47)		20 (9.53)		31 (14.76)	

Strong association had been observed regarding positive patients history of chronic or major illness and the occurrence and severity of pneumonia in the present study,(123 patients) of pneumonia cases were having such history. This observation was documented by AL-Jassar and Qasim in Iraq and Mc Millan et al in USA [11,12]. This could be explained by that, children with chronic or major illness may have a general ill health, impaired immunity and poor nutrition [13].

Table 3: History of Major or Chronic Illnesses* of cases and pneumonia Severity.

Patients history of major or chronic illness	pneumonia Cases		Severity of pneumonia cases					
			Severe pneumonia		pneumonia		No Pneumonia	
	No	%	No	%	No	%	No	%
Yes	188	89.52	112	91.06	68	93.15	8	57.14
No	22	10.48	11	8.94	5	6.85	6	42.86
Total	210	100	123	100	73	100	14	100

*Patients history of major or chronic illness includes :(Hepatitis, chronic renal frailer, Leukemia, chronic diarrhea and other types of cancer)

In table 4, we see that the ratios of respiratory infections in males are higher than females (59%), (41%) respectively for Tuberculosis, and other pathogens show the same principle. This result was agreed with Erbes and Pipat study who found that males more susceptible for respiratory infections than females [14,6]. While *Chlamydia pneumoniae* infection showed higher infection in females than males (13.95%), (2.41%) respectively, these results are similar to Iranian study that revealed females infection was higher than males [15,16].

Table 4: Sex distribution and frequency of Respiratory infection causes isolated from patients.

Pathogens	Total	Sex distribution			
		Male		Female	
		No.	%	No.	%
<i>Mycobacterium tuberculosis</i>	52	31	25	21	24.41
<i>Methicillin-Resistant Staphylococcus aureus</i>	32	28	22.58	4	4.65
<i>Streptococcus pneumoniae</i>	27	19	15.32	8	9.30
<i>Mycoplasma pneumoniae</i>	23	12	9.67	11	12.79

<i>Influenzae virus Type A</i>	20	11	8.87	9	10.46
<i>Haemophilus influenzae</i>	17	7	5.64	10	11.62
<i>Chlamydia pneumoniae</i>	15	3	2.41	12	13.95
<i>Moraxella catarrhalis</i>	13	8	6.45	5	5.81
<i>Acintobacter spp</i>	11	5	4.03	6	6.97
Total	210	124 (59)		86 (41)	

According to area of residence, most of cases (61.4%) were from rural areas. This was result also found by American study and UNICEF\WHO statement program for the control of pneumonia in developing countries in 1986 [17, 18]. They found that only (20%),(32%) respectively of pneumonia cases are from urban area. Rural areas appeared to play an major role, there are a significant association between pneumonia severity and rural residency. This may be explained by the fact that cases of severe pneumonia residing in rural areas are usually referred to hospital for admission, while less severe cases are usually treated in the primary areas [19].

Table 5: Residential distribution and frequency of Respiratory infection causes isolated from patients.

Pathogens	Total	Residential distribution			
		Urban		Rural	
		No.	%	No.	%
<i>Mycobacterium tuberculosis</i>	52	22	27.16	30	23.25
<i>Methicillin-Resistant Staphylococcus aureus</i>	32	11	13.58	21	16.27
<i>Streptococcus pneumoniae</i>	27	14	17.28	13	10.07
<i>Mycoplasma pneumoniae</i>	23	5	6.17	18	13.95
<i>Influenzae virus Type A</i>	20	11	13.58	9	6.97
<i>Haemophilus influenzae</i>	17	12	14.81	5	3.87
<i>Chlamydia pneumoniae</i>	15	-	-	15	11.62
<i>Moraxella catarrhalis</i>	13	4	4.93	9	6.97
<i>Acintobacter spp</i>	11	2	2.46	9	6.97
Total	210	81 (38.6)		129 (61.4)	

Paternal smoking found to be highly associated with occurrence of pneumonia ,father smoking was positive in (63.3%) of total pneumonia, this finding agreed with the result found by Fergusson *et, al.* in USA [20] that maternal smoking was strongly correlated with children respiratory diseases than paternal smoking, in our results of association of smoking and

occurrence of pneumonia was in agreement with result found by Rahman and Rahman in Bangladesh and Biswas *et, al.* in India [21] ,those found that (62%),(77%) respectively of pneumonia cases have father smoked .Passive smoking can act by increasing the rate of cross infection from the smokers, mediating an allergic reaction.

Table 6: Distribution of pneumonia Cases According to Smoking and Severity.

Patients history of Smoking	pneumonia Cases		Severity of pneumonia cases					
			Severe pneumonia		pneumonia		No Pneumonia	
	No	%	No	%	No	%	No	%
Yes	188	89.52	116	87.22	67	93.1	5	100
No	22	10.48	17	12.78	5	6.9	-	-
Total	210	100	133 (63.3)		72 (34.3)		5 (2.4)	

In this study, there is correlation appeared between patients from families with a positive history of asthma and pneumonia occurrence, (50%) of pneumonia cases have family history of asthma. This was documented by Lopez *et,al*, and Mc Connchie *et,al*, in America [22] ,they found that (60%),(71%) respectively of pneumonia cases have history of asthma.

Table 7: Distribution of pneumonia Cases According to Family History of Asthma and Severity.

Family History of Asthma	ARI Cases		Severity of ARI Cases					
			Severe Pneumonia		Pneumonia		No Pneumonia	
	No	%	No	%	No	%	No	%
Present	188	89.52	92	87.62	73	90.12	23	95.8
Absent	22	10.48	13	12.38	8	9.98	1	4.2
Total	210	100	105 (50)		81 (38.6)		24 (11.4)	

Our investigation showed (Table 8) that from the 210 cases with pneumonia, 201 had CRP >24 mg/L, 82 had ESR >200 mm/hour, and 188 had WBC >15 000/mL. Our results corroborate the findings of Crain and Dar-Shong [23] whose sample was similar to ours.

Table 8: The Results of Diagnostic Test in Presence of a Positive Blood Culture for pneumonia patients.

Diagnostic Test	No.	%
CRP > 24 mg/L	201	95.7
ESR > 35 mm/h	200	95.2
Peripheral WBC > 15 000/mL	188	89.5

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دراسة المسببات المرضيه لاصابات الجهاز التنفسي باستخدام المعلمات الفسيولوجيه
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الخلاصه

في هذه الدراسه تم جمع 210 عينه من المرضى المصابين بالتهاب الجهاز التنفسي لغرض تحديد العوامل المسببه لهذه الاصابات. استمرت الدراسه من 1-12-2008 لغاية 1-7-2009 في مدينه الحله في مستشفيات مرجان والنسائيه والتوليد والحله التعليمي.

الاصابات البكتيرييه الناتجه عن *Methicillin-Resistant Mycobacterium tuberculosis* %24.76 ، *Staphylococcus aureus MRSA* %15.32 ، *Streptococcus pneumoniae* %12.8 ، *Haemophilus influenzae* %8.1 ، *pneumoniae* %10.95 ، *Staphylococcus aureus* %9.52 ، *Chlamydia pneumoniae* %7.14 ، *Moraxella catarrhalis* %6.2 و *Acintobacter spp.* %5.23 . كان توزيع مسببات الاصابه التنفسيه المعزوله بالنسبه للجنس كالاتي: بالنسبه للذكور كان عدد العينات 124 (59% للاناث بينما 41% للذكور). الفئه العمرية (1-9 سنوات) شكلت اعلى نسبة لمسببات الاصابه التنفسيه حيث كانت النسبه %23.8 . اما بالنسبه للتوزيع السكاني فكانت اعلى نسبة لاصابات الجهاز التنفسي المعزوله هي في الريف حيث شكلت %61.4 بينما في المدينه كانت النسبه %38.6 .

كان توزيع المسببات وفقا للتاريخ العائلي بالنسبه الى حالات الربو وجد بانها المسبب الرئيسي للحالات الشديده من الاصابات التنفسيه (%50). 63% من العينات كانت لاشخاص مدخنين. القياسات الفسيولوجيه الاخرى توضح زياده في الحالات بالنسبه لارتفاع قيم كل من ESR و البروتين الفعال نوع سي والعدد الكلي لكريات الدم البيض مقارنة للقيم الطبيعه لها.