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ORIGINAL ARTICLE

STUDY OF THE PATTERN OF RESPIRATORY INFECTIONS IN ELDERLY PATIENTS AT AIN SHAMS UNIVERSITY HOSPITALS

By

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INTRODUCTION

Most developed world countries have accepted the chronological age of 65 years as a definition of 'elderly' or older person, but like many westernized concepts, this does not adapt well to the situation in Africa. While this definition is somewhat arbitrary, it is many times associated with the age at which one can begin to receive pension benefits. At the moment, there is no United Nations standard numerical criterion, but the UN agreed cutoff is 60+ years to refer to the older population.(1)

Elderly patients are affected predominantly by LRTI like acute bronchitis, exacerbations of preexistent chronic obstructive pulmonary disease (COPD) or, less often, pneumonia,(2) the more serious is pneumonia, which necessitates hospitalization for many elderly patients. The second is non-pneumonic LRTI, which is much more common but has a much more benign clinical course.(3)

Ageing is not only a major risk factor for infection, but infection may also contribute to the ageing process.(4) Lower respiratory tract infections (LRTI) have long been recognized as the major cause of morbidity and they rank among the most frequent causes of death among the elderly (≥ 65 years) with greater incidence ranging from 25-40 cases per 1000 inhabitants per year. Accordingly, epidemiological studies on the occurrence of such illnesses in the community have been abundant.(5)

PATIENTS AND METHOD

The current study was conducted upon elderly patients (≥ 60 years) at different departments and intensive care units at Ain Shams university Hospitals from October 2009 to April 2010.

In this study two hundreds and ten patients were included, all had clinical and radiological manifestations of lower respiratory tract infection.

The current study includes 4 groups of patients:

1. ***Community acquired pneumonia (CAP):*** includes 49 patients. It was defined as pneumonia in last 48 hours prior to admission.(6)
2. ***Hospital acquired pneumonia (HAP):*** includes 42 patients. It is defined as pneumonia that occurs 48 hours or more after admission, which was not incubating at the time of admission.(6)
3. ***Ventilator associated pneumonia (VAP):*** includes 60 patients. It refers to pneumonia that arises more than 48–72 hours after endotracheal intubation.(6)
4. ***Non-pneumonic LRTI including acute exacerbation of chronic obstructive airway disease (COPD):*** includes 59 patients. It was suspected by any abnormality on pulmonary auscultation in combination with at least two of the following symptoms and signs: fever ≥ 38C°, or fever in the past 48 hours; dyspnea or cough; tachypnea, malaise or confusion or purulence and/or increased amount of sputum.(7)

All patients were subjected to the following:

1. History taking.
2. Thorough Clinical examination.
3. Plain chest X-ray.

4. Arterial blood gases
5. Laboratory Investigations: Blood sugar, liver profile, renal profile, CBC, CRP quantitative, and serum electrolytes.
6. Collection of early morning sputum specimen.
7. Throat swab and PCR for H_1N_1 whenever swine flu was suspected.[8,9]
8. Patients with VAP were subjected to endotracheal aspiration by standard methods using closed suction method.[10] The duration of each suctioning event was approximately 10-15 seconds,[11] and/or bronchoalveolar lavage (BAL) by fiberoptic bronchoscopy. The bronchoscope (BF20-OLYMPUS-JAPAN) was used for collecting BAL specimens. BAL was done by the standard techniques.[12,13]

The following were excluded from the study:

1. Non elderly patients.
2. Non infectious respiratory disorders such as acute severe asthma, non infectious exacerbation of asthma and COPD, pulmonary embolism, non infectious inflammatory respiratory diseases eg: collagen vascular disorders.
3. Non microbial infectious pulmonary disorders eg: parasitic lung diseases.

All specimens were submitted to the following:

1. Sputum examination by direct smear using gram stain.[14]
2. Ziehl–Neelsen stain.[14]
3. Culture and sensitivity for aerobic bacteria.[14]

RESULTS

Two hundred and ten elderly cases were included in the period of October 2009 to April 2010, who developed lower respiratory tract infection or pneumonia, 60 years old or more and who were admitted to Ain Shams University Hospitals at different departments and intensive care units. The age range of the patients was from 60 to 88 years old with mean age 65.366 years old. 61.4% were males and 38.6% were females. The prevalence of lower respiratory tract infection was 28%, community acquired pneumonia was 23.4%, hospital acquired pneumonia was 20%, and ventilator associated pneumonia was 28.6% among studied cases.

Table 1. Prevalence of non-pneumonic lower respiratory tract infection, CAP, HAP and VAP among studied cases.

Type of infection	Number of cases	Percent
Non pneumonic lower respiratory tract infection	59	28%
Community acquired pneumonia (CAP)	49	23%
Hospital acquired pneumonia (HAP)	42	20%
Ventilator associated pneumonia (VAP)	60	29%
Total	210	100%

Table 2. Demographic data of the studied groups.

	Age (mean±SD)	Males	Females
CAP	64.88 ±4 years	32 patients (71.4%)	17 patients (28.6%)
HAP	70 ±8years	12 patients (28.6%)	30 patients (71.4%)
VAP	74 ±8years	40 patients (71.4%)	20 patients (28.6%)
Non pneumonic lower respiratory tract infection	67 ±3years	47 patients (84.8%)	12 patients (15.2%)

Table 3. Prevalence of respiratory failure in studied cases.

Respiratory failure	Number of cases	Percent
Type I	58	27%
Type II	127	60.4%
Not in failure	25	12.6%
Total	210	100%

Table 4. Distribution of patients admitted at different departments and intensive care units.

Site of admission	Number	Percent
RICU (Ain shams university hospital)	40	19%
Chest department (Ain shams university hospital)	42	20.47%
Oncology department (Ain shams university hospital)	7	3.4%
Internal medicine department(Ain shams university hospital)	3	1.4%
Geriatric department (Ain shams university hospital)	13	6.2%
Neurology department (Ain shams university hospital)	11	5.23%
Neurosurgery department (Ain shams university hospital)	4	1.9%
Isolation(Ain shams university hospital)	9	4.2%
CCU(Ain shams university hospital)	4	1.9%
RICU(ASUSH)	33	15.71%
Chest department (ASUSH)	32	15.2%
Internal medicine department(ASUSH)	4	1.9%
Neurology department (ASUSH)	7	3.3%
Surgery department(ASUSH)	8	3.8%
CCU(ASUSH)	2	0.9%
Total	210	100%

This table shows that the highest prevalence of studied patients was admitted at chest department (Ain shams University hospital) (20.47%), and that the lowest prevalence was at CCU (ASUSH) (0.9%).

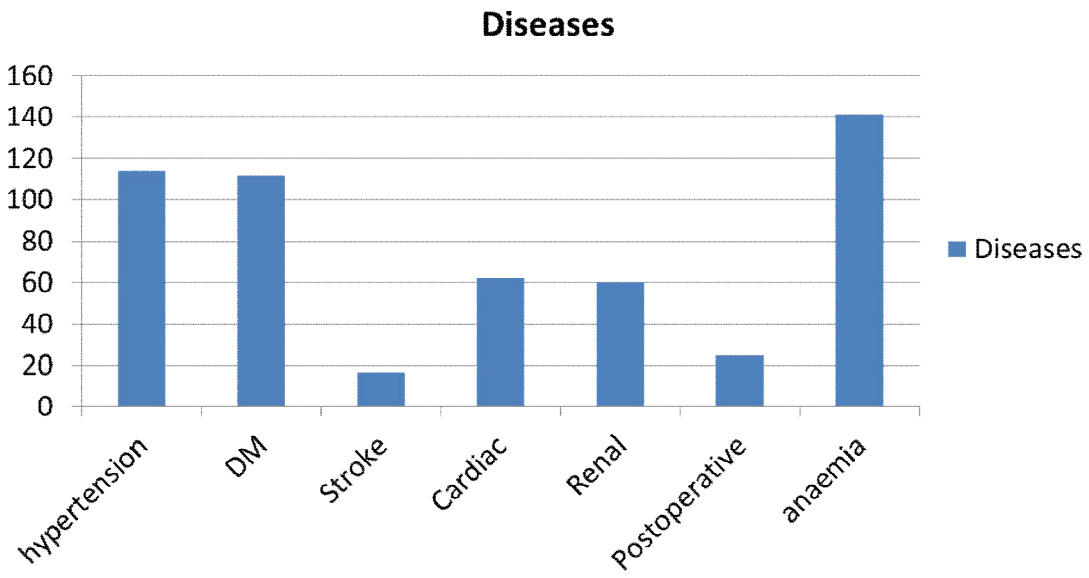

Fig 1. Shows the prevalence of the comorbid diseases among the studied patients.

Table 5. Prevalence of organisms found in studied cases.

Organism	Number of cases	Prevalence
Klebsiella	35	16.7%
Acinetobacter	27	12.9%
Pseudomonas	36	17.1%
Hemophyllis influenza	10	4.7%
MRSA	17	8.1%
E-Coli	14	6.7%
TB	9	4.3%
H_1N_1	9	4.3%
Staph coagulase positive	9	4.3%
Proteus	3	1.4%
Streptococcus pneumonia	7	3.3%
Enterobacter	5	2.4%
Candida	5	2.4%
No growth	26	12.4%
Total	210	100%

This table shows that pseudomonas aeroginosa (17.1%) was the most common organism followed by Klebsiella pneumoniae (16.7%), Acinetobacter (12.9%) , MRSA (8.1%), E-Coli (6.7%), TB(4.3%), H1N1(4.3%), Staph coagulase negative (4.3%), Streptococcus pneumonia (3.3%), Enterobacter (2.4%), Candida(2.4%), Proteus (1.4%). 12.4% of microbiological analysis showed no growth of organisms.

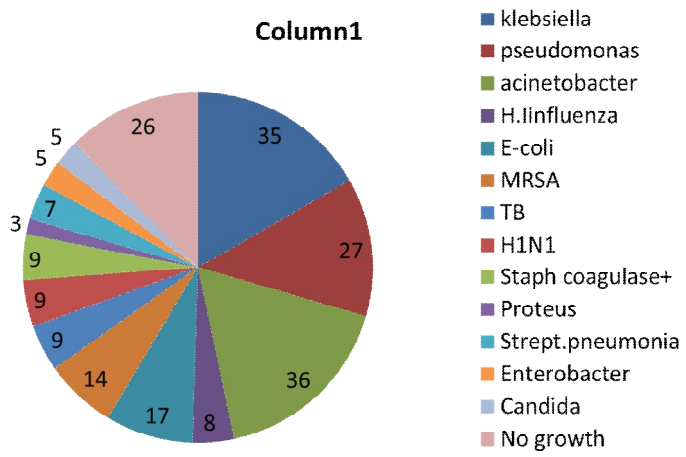

Fig 2. Shows the organisms cultured among different patients.

Table 6. Results of antimicrobials used according to sensitivity testing.

Antimicrobials used	Sensitive alone	Sensitive to combination	Total frequency	Prevalence
Macrolides	6	3	9	4.2%
Anti TB chemotherapy	-	9	9	4.3%
3rd generation cephalosporines	8	12	20	9.5%
Pipercellin/tazobactam	10	8	18	8.6%
Vancomycin	13	8	21	10%
Aminoglycosides	5	5	10	4.7%
Doxycycline	2	3	5	2.4%
Imipenem	17	6	23	11%
Quinolones	9	15	26	12.4%
Oseltamivir	-	-	9	4.3%
CO-trimoxazole	2	7	9	4.3%
Amoxicillin /Clavulanate	5	3	8	3.8%
Carbapenem	7	5	12	5.7%
Fluconazole	0	5	5	2.4%
No results	0	0	26	12.4%
Total			210	100%

Table 7. Relation of cultured microorganisms to age of patients.

Organism	Mean age ± SD in years	Number of cases	Prevalence
Klebsiella pneumoniae	66.14 ± (5.16)	35	16.6%
Acinetobacter	65.14 ± (5.39)	27	12.8%
Pseudomonas	67.11 ± (6.49)	36	17.1%
H.influenza	61.37 ± (1.65)	8	3.8%
MRSA	68.52 ± (5.1)	17	8%
E-Coli	64.64 ± (4.8)	14	6.6%
TB	66.88 ± (4.9)	9	4.3%
H1N1	62.11 ± (3.7)	9	4.3%
Staph coagulase negative	66 ± (7.3)	9	4.3%
Proteus	68 ± (1.7)	3	1.4%
Streptococcus pneumonia	62.7 ± (2.49)	7	3.3%
Enterobacter	66.8 ± (11.86)	5	2.3%
Candida	66 ± (4.18)	5	2.3%
No growth	62.07 ± (1.7)	26	12.4%
Total		210	
Prevalence		100%	
Sig		0.003	

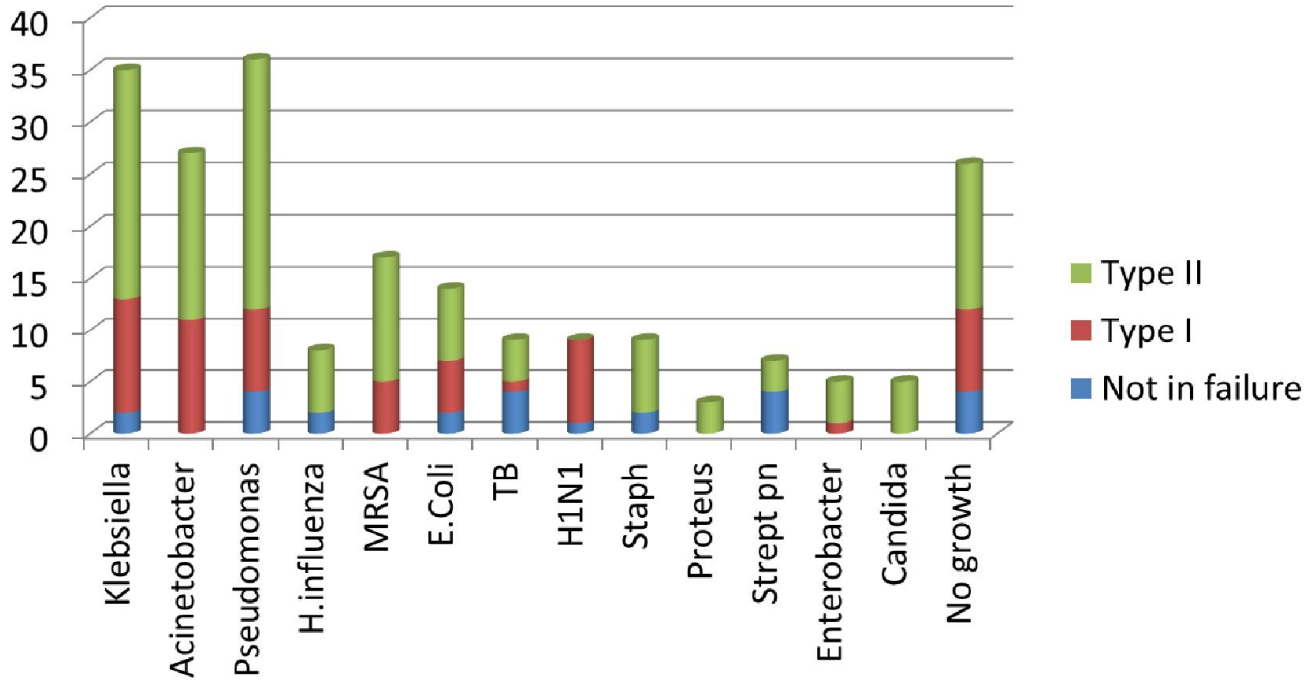

Fig 3. Shows relation between causative organisms and respiratory failure.

Table 8. Distribution of the causative organisms among different groups.

Organism	CAP	HAP	VAP	Non-pneumonic	Total	Prevalence
Klebsiella pneumonia	8	10	15	2	33	15.7%
Acinetobacter	3	9	14	3	30	14.2%
Pseudomonas	6	8	13	3	33	15.7%
H.influenza	9	0	0	7	17	8%
MRSA	0	7	10	0	17	8%
E-Coli	2	3	5	1	11	5.3%
TB	9	0	0	0	9	4.3%
H1N1	8	0	0	1	9	4.3%
Staph coagulase negative	0	4	5	0	9	4.3%
Proteus	2	0	2	1	3	1.4%
Streptococcus pneumonia	3	0	0	9	13	6.2%
Enterobacter	1	2	0	2	5	2.4%
Candida	0	0	5	0	5	2.4%
No growth	0	0	0	26	26	12.4%
Total	49	42	60	59	210	100%
Prevalence	23.4%	20%	28.6%	28%	100%	100%
Total cases				210		
Prevalence				100%		
Sig				0.123		

DISCUSSION

In this work, lower respiratory tract infection was studied in 210 elderly patients (≥ 60 years) hospitalized at different departments and intensive care units at Ain Shams university Hospitals. Patients aged from 60 to 82 years with mean age 65.366 years old representing different types of lower respiratory tract infection namely:

Group1: Community acquired pneumonia (CAP): 49 patients 23%.

Group 2: Hospital acquired pneumonia (HAP): 42 patients 20%.

Group 3: Ventilator associated pneumonia (VAP): 60 patients 29%.

Group 4: Non pneumonic lower respiratory tract infection: 59 patients 28%.

The demographic data of the present work are matched with the study of Fantin et al,[15] who studied management of CAP in 100 elderly patients in a tertiary center in France. The mean age of the patients was 65 years; male to female ratio was 2:1. Yet, it disagreed with Kothe et al, (2008) who studied multicenter prospective study initiated by the German Competence Network for Community-Acquired Pneumonia. Patients with community-acquired pneumonia (n=2,647; 1,298 aged <65 yrs. and 1,349 aged ≥65 yrs.) were evaluated, of whom 72.3% were hospitalized and 27.7% treated in the community and the difference was in age and the great number of studied group.

In the present study, 23.4% of cases had community acquired pneumonia and were infected by H. Influenza and TB (18.3%) followed by klebsiella pneumonia and H1N1 (16.3%), pseudomonas aeroginosa (12.2%), streptococcus pneumonia (8%), E-coli and proteus (4%) then Enterobacter (2%). The results of the present study are matched with Mandell et al,[17] who studied CAP in 200 patients in tertiary hospital in the united states found that H. influenza was isolated in about 20% of all cases. Also, Muhairi et al,[18] who studied CAP in 100 patients in multicenter hospitals in United Arab Emirates found that H.influenza is the most common cause of CAP occurring in 20% of patients, other bacteria include streptococcus pneumoniae, Staphylococcus Aureus, Klebsiella pneumoniae and other Gram negative bacilli. The results of the present study are not matched with the microbiological results of Ortqvist et al,[19] who

investigated 204 patients with CAP by performing fiberoptic bronchoscopy to get specimens for cultures in Respiratory Diseases Branch, Centres for Disease Control and Prevention, Atlanta, an etiologic pathogen was not identified in 28% of cases. The disagreement could be due to large number of studied cases in comparison to this study.

In the present study, the antibiotic sensitivity testing of organisms causing CAP showed that H. Influenza was sensitive to macrolide alone in 44% of cases infected by H.influenza and sensitive to macrolide in combination with other group of antibiotic in11%. It was sensitive to Amoxicillin+ clavulonate in11% and in combination with other group of antibiotic 11%. Also, it was found to be sensitive to Co-trimoxazole in 11% and sensitive to Co-trimoxazole in combination with other group of antibiotic in11%of cases.

The results of the present study are matched with Bochud et al,[20] who studied CAP in 100 patients in respiratory center diseases in Baltimore and found that the most common pathogens identified from recent studies of CAP were H. influenzae and Streptococcus pneumoniae. Also, American Thoracic Society and Infectious Disease Society of America[21] stated that macrolides have long been commonly prescribed for treatment of outpatients with CAP with comorbidities such as COPD, because of their activity against H. influenzae and the atypical pathogens. The results of the present study were not matched with Fantin et al[15] results who found that Streptococcus pneumoniae was the most common pathogen found in CAP patients and amoxicillin was the most frequently prescribed antibiotic for patients with CAP without risk factor, followed by amoxicillin/Clavulanic acid, oral cephalosporins, flouroquinolones and macrolides. Meanwhile, Raafat,[22] studied lower respiratory tract bacterial infection in Ain Shams University hospitals and found that Streptococcus pneumoniae in patients with CAP were highly sensitive to third generation cephalosporins (cefotaxime, ceftazidime, cefoperazone and ceftriaxone), fluroquinolones, aminoglycosides and amoxicillin/clavulanate and showed considerable resistance to macrolide antibiotic (erythromycin).

In the present study, HAP patients were 42 patients (20% of studied group) with mean age 70 ±8years, 12patients (28.6%) were males and 30 patients (71.4%) were females. These figures were matched with Aavitsland et al,[23] results, who studied HAP in respiratory centers in Norway and found that the prevalence of hospital acquired pneumonia in his study was 24.0% with mean age of 72±8years. On the other hand, Ippolito et al,[24] studied 1200 cases of HAP in15 Italian hospitals in 2003 and found that the prevalence of HAP was 38.0%. This higher percent could be explained by the larger number of Ippolito and colleagues studied group.

In the present study, 20% of patients were diagnosed as HAP and were mostly infected by acinetobacter (21.8%) followed by klebsiella pneumonia (24.4%) pseudomonas aeroginosa (19%), MRSA (6.6%), staph coagulase negative (9.3%), E-coli (7.1%) and Enterobacter (4.7%). The results were matched with Amyes and Gemmell,[25] results who studied antibiotic resistance in hospital acquired pneumonia in tertiary center in Turkey, Istanbul. It was reported that Gram negative bacilli were considered the most common organisms causing nosocomial pneumonia. Likewise, Fagon et al,[26] studied invasive and noninvasive strategies for management of nosocomial pneumonia: a randomized trial in respiratory center diseases in Baltimore and found that the most common organisms causing nosocomial pneumonia are Gram negative bacilli including Pseudomonas aeruginosa, Klebsiella pneumoniae, and recently Staphylococcus aureus. On the other hand, Lina[27] studied nosocomial lower respiratory tract infection in a period of 6 years in Ain Shams University hospitals and found that the most common organisms causing nosocomial pneumonia was: Staphylococcus aureus (25.3%), followed by MRSA (23.4%), K pneumoniae (21.9%), Pseudomonas aeruginosa (16.6), E coli (12.1%) and then Streptococcus pneumoniae (11%). The disagreement between these results and the results of the present study might be due to prolonged duration of her study and variation in the organisms since 2001 till the time of our study.

In this study, the antibiotic sensitivity testing of organisms causing HAP showed that Klebsiella pneumonia was sensitive to aminoglycosides in combination with other group of antibiotic in 22.2% of cases, Imipenem in 22.3% of cases, Carbapenem in 11% and Carbapenem with other group of antibiotic in 11%, Co-trimoxazole in combination also, to third generation cepahlosprines with other groups of antibiotics in 11%. However, Acinetobacter aeroginsosa was sensitive to third generation cephalosporinesin in 22% of cases, Quinolones in12% of cases, Imipenem in 12%, Carbapenem in 10% of cases and to Carbapenem in combination with other antibiotic in 11%, Aminoglycosides in combination with other antibiotic in 11% and sensitive to co-trimoxazole in combination with other antibiotic in 22%. While Pseudomonas aeroginosa was sensitive to third generation cephalosporines in 25% of cases, and in combination with other group of antibiotic in 37.5%, Imipenem in 12.5% and aminoglycosides in combination with other group of antibiotic in 12.5%. MRSA was sensitive to vancomycin in all cases but Staphylococcus coagulase negative was sensitive to vancomycin in 75% of cases and vancomycin in combination with other antibiotic in 25%.

These results are in agreement with the results of Infection Control Department Census,[28] which studied HAP in Ain Shams University Specialized Hospital and found that the most common organisms causing HAP were gram negative organisms including klebsiella pneumonia and

pseudomonas aeroginosa followed by MRSA and staphylococci. The isolates of Kebsiella pneumoniae and the isolates of Pseudomonas aeruginosa were sensitive to aminoglycosides and the isolates of MRSA and staphylococci were sensitive to vancomycin. Similarly, Zain,[29] studied the nosocomial pneumonia in Cairo university hospitals and reported that the isolates of Pseudomonas aeruginosa and K. pneumoniae were sensitive to aminoglycosides. In the present study, Imipenem was found effective in treating gram negative organisms, as found by Ruiz et al,[30] who studied nosocomial pneumonia in 150 patients in respiratory center diseases in Illinois and found that treatment with Imipenem was effective in selected Gram negative organisms causing HAP especially Klebsiella pneumoniae and Pseudomonas aeruginosa. On the other hand, Emori and Gaynes,[31] studied nosocomial pneumonia in chest hospital in Brazil and reported high failure rate in case of treating Gram negative organisms causing HAP with Imipenem and was found to be highly sensitive to Quinolones. The discrepancy might be due to variation of virulence of organisms from 1993 to 2009.

In the present study, 29% of studied cases were VAP with mean age of 74 ±8years, 40 patients (71.4%) were males and 20 patients (28.6%) were females. Likely, Jean-Louis[32] studied VAP in geriatric ICU in Belgium and found that the prevalence of VAP ranges from 35.0% mainly in males (80%) with mean age 71 ± 5 years. On the other hand, AbdLatif et al,[33] studied nososcomial pneumonia and antibiotic use at a Geelong university Hospital, Victoria, Australia and found that the prevalence of VAP was 17.4% of 250 cases.

In the present study, the microbiological results in the VAP group revealed that 25% were infected by klebsiella pneumonia followed by acinetobacter (23.3%), pseudomonas aeroginosa (21.6%), MRSA (8.3%), E coli (8.3%), candida (8.3%), staphylococcus coagulase negative (6.6%), and proteus (3.3%). Likely, Ibrahim et al, (34) who studied the microbiology of VAP in elderly patients in a community hospital in the Pulmonary and Critical Care Medicine Division at Washington University School of Medicine. They found that 28% of cases of VAP were infected by klebsiella pneumonia followed by acinetobacter (22%). Contrarily, Samah,[35] studied ICU acquired pneumonia in police hospitals and found that the most common organisms isolated were MRSA (22%) followed by Acinetobacter (20%), klebsiella pneumonia (18%), pseudomonas aeroginosa (15%). Timing of the microbiological sampling may be one explanation of this variation in the results of different studies. In early onset VAP, the so called core pathogens include community pathogens such as methicillin sensitive Staphylococcus aureus, Streptococcus pneumoniae and H influenzae as well as Gram negative enteric bacilli. Conversely, in late onset VAP, MRSA, Pseudomonas aeruginosa and Acintobacter are frequently encountered.[36]

In the present study, 25% of VAP cases were infected by Klebsiella pneumonia. 5.8% of cases infected by klebsiella pneumonia were sensitive to Quinolones and 3.5% were sensitive to Quinolones in combination. 11.2% were sensitive to Imipenem and 17.6% were sensitive to Imipenem in combination to other group of antibiotic. 5.8%were sensitive to Carbapenem in combination with other antibiotics.17.6% were sensitive to Tazobactam + pipercillin and 29.4% were sensitive to tazobactam + pipercilin in combination with other antibiotic.17.6% were sensitive to Aminoglycosides in combination with other antibiotic. Also, 14.2% of cases infected by Acinetobacter aeroginosa were sensitive to Quinolones in combination with other group of antibiotic, 7% were sensitive to Imipenem in combination with other group of antibiotic,21.4% were sensitive to Carbapenem in combination with other antibiotic group, 21.4% were sensitive to Tazobactam + pipercillin in combination with other antibiotic goup. 37.5% were sensitive to Aminoglycosides in combination with other antibiotic group. Moreover, pseudomonas aeroginosa represented 21.6% of patients with VAP. 20% of these patients were sensitive to third generation cephalosporines in combination with other group of antibiotic. 7% were sensitive to Quinolones and 20% were sensitive to Quinolones in combination with other group of antibiotic.7% were sensitive to Imipenem and 20% were sensitive to Teinam in combination with other group of antibiotic. 7% were sensitive to Carbapenem in combination with other antibiotic and 20% were sensitive to tazobactam + pipercillin in combination with other antibiotic. And 6% were sensitive to Aminoglycosides in combination with other antibiotic group. In the present study, MRSA represented 16.7% of patients with VAP and were 50% sensitive to vancomycine and 50% were sensitive to vancomycine in combination.

These results were matched with Thornsberry and Yee,[37] who studied bacterial isolates in ventilator associated pneumonia from the Ilinois University Hospitals, and found that the most common organism causing VAP was klebsiella pneumoniae and was sensitive to Imipenem, Aminoglycosides and Quinolones. Also, results were consistent with the results of Ibrahim[38] who studied the pattern of lower respiratory tract infection in non tuberculous hospitalized patients in Abbasseya chest hospital and found that the gram negative organisms were the most prevalent with VAP and were sensitive to Quinolones.

On the other hand, Adair et al[39] studied ventilator-associated pneumonia in ICU of Baltimore University Hospitals and found that MRSA was the most prevalent organism with VAP and sensitive to vancomycin. These results are not in agreement with the results of this present study which might be explained by the virulence of organisms in the two different communities.

In the present study, patients of non-pneumonic lower respiratory tract infection were 59 patients (28%), 47 males (84.8%) and 12 females (15.2%) with mean age 67 ± 3years. Similarly, Ozyilmaz et al,[40] who studied lower respiratory tract infection in 100 elderly patients in pulmonary Unit and Geriatrics Department in a health care center in Turkey. (26%) were with non-pneumonic lower respiratory tract infection with mean age of 65+\-3years, (87%) were males and (13%) were females. 74% of patients were suffering from hospital acquired pneumonia. Contrarily, Lieberman et al[41] who studied lower respiratory tract infection in elderly patients admitted in Pulmonary Unit and Geriatrics Department in Soroka university in Israel, 35%of patients were suffering from non-pneumonic lower respiratory tract infection and most of studied group were females(56%) with mean age mean age of 68 ± 5 years.

In the present group, there were 26 cases (48%) received empirical antibiotics prior to culture and sensitivity. The most common organism found was Streptococcus pneumonia (16%) followed by H.influenza (15.2%), pseudomonas (5%), acinetobacter (5%), klebsiella (3.3%), enterobacter (3.3%) proteus, E-coli, and H1N1 (1.4%) each. Likewise was found by Ewig et al,[42] who studied the antimicrobial treatment of non-pneumonic lower respiratory tract infection in Peru university hospitals and found that (45%) out of 20 patients included in this study gave negative results of all microbiological investigations used. While a negative microbiological diagnosis showed that Streptococcus pneumoniae was the most common isolated pathogen from 10 patients (20.3%), Staphylococcus aureus was the second common organism isolated from 5 patients (15.1%), then Pseudomonas aeruginosa and Moraxella catarrhalis are isolated from 3 patients (9%) each. Finally, Klebsiella pneumoniae and MRSA organisms were isolated from 2 patients (6%) each. On the other hand, Monso et al,[43] studied bacterial infection in elderly patients using bronchoscopy and found that the commonest pathogen was H. influenzae (46%) followed by S. pneumoniae (23%), Staphylococcus aureus, Pseudomonas aeruginosa, Moraxella catarrhalis and Acinetobacter species (8%) each. This discrepancy could be due to the low prevalence of pneumococcal vaccination in our patients, also another explanation in this variation is that we lack in our hospital the isolation of atypical organisms.

In the present study, antimicrobial sensitivity testing of organisms causing non pneumonic lower respiratory tract infection shows that (48%) received empirical antibiotics prior to cultures and showed no antibiotic sensitivity testing. Similar study reported that the microbiological results of the patients showed (40%) of cases had negative results of all microbiological investigations.[22]

In the present group, the most common pathogen isolated was S. pneumoniae representing (16%) of non-pneumonic lower respiratory tract infection cases, 22.2% of cases infected with S. pneumonia were sensitive to macrolide alone and 55.6% were sensitive to macrolides in combination with other antibiotic and 22.2% were sensitive to amoxicilline + clavulonate in combination with other antibiotic. Similar results showed high sensitivity to macrolides.[42,44] Yet, others found that most of streptococcus pneumonia isolates were resistant to macrolides.[38]

In the present study, there were 102 diabetic patients representing (48.5%) of studied patients. Fifty nine patients (28%) were not controlled and 43 patients (20.5%) were controlled. Twelve cases (20.3%) of non-controlled patients were infected by klebsiella pneumonia followed by pseudomonas aeroginosa in 11 cases (18.4%), tuberculosis in 9 cases (15.2%) and Acinetobacter in 8 cases (13.5%). Likewise, Kornum et al,[45] found that 52% of studied patients were uncontrolled diabetics and microbiological results revealed klebsiella pneumoniae in 22% of cases followed by pseudomonas aeroginosa in15% of cases. Yet, McAlister et al,[46] found that 24% of the 470 diabetic patients studied were infected by Pseudomonas aeroginosa followed by acinetobacter (10%), MRSA then klebsiella pneumonia.

RECOMMENDATION

From this study, we can recommend the following:

- A large, multi-center, population based studies are needed for more identification of the most common pathogens causing CAP in our community, and to be a main source for establishing a guideline for treatment of CAP in Egypt.

- Similarly, more microbiological studies with a larger number of subjects are needed for more accurate identification of the common pathogens causing acute exacerbation of COPD.

- A great effort should be done for early and accurate identification of the offending organism/s in patients with suspected nosocomial pneumonia, including patients with suspected VAP, through a preset program for microbiological sampling. Sampling is preferred to be bronchoscopic, and thorough microbiological investigations, to start, as early as possible, a specific therapy recommended by these studies especially in patients with co-morbidities. Utilization of Non-invasive ventilation should be increased, as it is an attractive alternative for patients with acute hypoxemic respiratory failure, to decrease incidence of VAP.

- Nosocomial pathogens may be part of the host´s endogenous flora, or may be acquired from other patients, staff, devices, or the hospital environment. Stress on the following simple infection control measures is recommended:
  - Establishing infection control team especially in ICU.
  - Staff education and involvement in infection prevention.
  - Conduct a good surveillance system for nosocomial infection especially inside the ICU.
  - Good sterilization or disinfection and maintenance of equipments and devices.
  - Good hand hygiene and insisting on hand washing from patient to patient.
  - Wearing gloves for handling respiratory secretions or objects contaminated with respiratory secretions of any patient and changing gloves and hand washing between contacts with different patients.
  - Oropharyngeal cleaning and decontamination.
- Our results call for further epidemiological studies to define the exact role of klebsiella pneumonia in the hospital community.
- Newer diagnostic methods are needed to improve our ability to define the etiologic pathogens especially viral, atypical pathogens and anaerobes.

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