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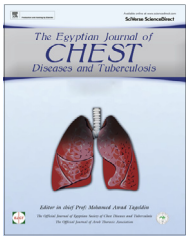

ORIGINAL ARTICLE

Pattern of community and hospital acquired pneumonia in Egyptian military hospitals

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KEYWORDS

Community acquired pneumonia (CAP);
Hospital acquired pneumonia (HAP);
Ventilator-associated pneumonia (VAP)

Abstract *Background:* Community-acquired pneumonia (CAP) is one of the most common infectious diseases addressed by clinicians. CAP is an important cause of mortality and morbidity worldwide.

Aim of the work: The aim of this study was to identify the causative bacteria, antibiotic sensitivity and antibiotic resistance of community and hospital acquired pneumonia in a group of Egyptian military hospitals.

Patients and methods: This study included 239 patients who were admitted to five major Egyptian Military Hospitals (Kobbry El kobba, El-Maadi, Masr Elgadida, El-Galaa and Ghamra) during the period from March 2012 to August 2012 and were selected due to suspicion of developing pneumonia either community or acquired due to hospital stay according to clinical, laboratory and/or radiological evidence.

Results: This study consists of (239) patients, (187) patients were CAP and (52) patients were HAP divided in five hospitals. The obtained results showed insignificant relationship between type of organisms and concomitant illness of these patients with the highest incidence in patients below 60 years (71.6% in CAP and 44.2% in HAP), patients receiving immunosuppressive drugs (40.1% in CAP and 22.3% in HAP) and diabetics (40.4% in CAP and 40.3% in HAP).

Conclusion: Our study showed that Gram positive organisms were the most prevalent in CAP especially *Streptococcus pneumonia* followed by *Staphylococcus aureus*, while *Klebsiella* was the

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most prevalent Gram negative organism. On the other hand our study showed that Gram negative organisms were the most prevalent in HAP especially *Klebsiella* followed by *Pseudomonas aerginosa*, while *Staphylococcus haemolyticus* was the most prevalent Gram positive organism.

Introduction

Community-acquired pneumonia (CAP) is one of the most common infectious diseases addressed by clinicians. CAP is an important cause of mortality and morbidity worldwide. A number of pathogens can give rise to CAP. Typical bacterial pathogens that cause the condition include *Streptococcus pneumoniae* (penicillin-sensitive and -resistant strains), *Haemophilus influenzae* (ampicillin-sensitive and -resistant strains), and *Moraxella catarrhalis* (all strains penicillin-resistant). These three pathogens account for approximately 85% of CAP cases [14]. In 1995, the American Thoracic Society (ATS) published a consensus statement defining hospital-acquired pneumonia (HAP) as a pneumonia that is not incubating at the time of hospital admission and begins more than 48 h after admission. HAP occurs relatively frequently and is associated with a high mortality rate [5]. There are 300,000 cases of HAP annually, and it carries an associated mortality of 30–70% (1). HAP lengthens the hospital stay by 7–9 days and is associated with a higher cost of medical care [19].

Aim of the work

The aim of this study was to identify the causative bacteria, antibiotic sensitivity and antibiotic resistance of community and hospital acquired pneumonia in a group of Egyptian military hospitals aiming to put a hand on local guidelines for management depending on identification of the commonest pathogens and draw a map about antimicrobial sensitivity and resistance in community and hospital acquired pneumonia in the Egyptian military hospitals contributing to the constitution of national guidelines for treatment of respiratory tract infections.

Patients and methods

This study included 239 patients who were admitted to five major Egyptian Military Hospitals (Kobbry El kobba, El-Maadi, Masr Elgadida, El-Galaa and Ghamra) during the period from March 2012 to August 2012 and were selected due to suspicion of developing pneumonia either community or acquired due to hospital stay according to clinical, laboratory and/or radiological evidence. Sputum, endotracheal aspiration (EA), blood culture, pleural fluid aspiration were carried out to determine the source and causative organism of pneumonia. *Criteria of Selection of patients who were suspected to develop hospital acquired pneumonia:* The study was carried on patients in selected hospitals mentioned before whom showed the following criteria 48 h after admission: *New or progressive infiltrate on the chest X-ray with one of the following:* Fever, Purulent sputum and Leucocytosis.

All the patients were subjected to the following:

(1) *History:* Taking from patients or relatives stressing on:Previous history of smoking, Previous history of ICU admission, Previous history of assisted mechanical ventilation.
(2) *Physical examination:* Both general and local chest examination.
(3) *Routine monitoring:* Of mechanically ventilated patient.
(4) *Routine laboratory investigations:* Which included (complete blood picture, kidney function tests, liver function tests, ESR, CRP and Procalcitonin). The follow up of some of these laboratory investigations was done to follow up the case.
(5) *Chest radiography:* Plain chest X-ray anteroposterior view to diagnose and then follow up for any new or progressive infiltrate on chest radiography.
(6) *Swabs:* From medical personnels (physicians, nurses), air-conditioning systems, water systems, ventilators, media and instruments around the patients.
(7) *Protected samples:* From the patients (sputum, tracheal aspirate, blood culture, pleural fluid, if the case is complicated with effusion).
   (A) *Sputum:* Morning samples were collected from the studied patients. The expectorated sputum was collected into sterile, wide mouthed plastic containers before starting antibiotic treatment. Sputum samples were incubated at 370 °C for 1 h and liquefied mechanically by shaking with sterile glass beads using vortex mixer. Films were made and stained by Gram stain and Zeihl–Neilsen stain and examined microscopically.
   (B) *Endotracheal aspirate (EA):* Under complete aseptic condition 20 ml of saline 0.9% was injected into the endotracheal tube of patients, then retrieved by a catheter applied to a suction apparatus, obtained specimen were sent immediately to the microbiology department then the specimens cultured on different media.*Zeihl–Neilsen stain* also was done to a part of the specimen to detect mycobacterium tuberculosis if present.Also for each isolate, *antibiotic sensitivity testing* was done using the following drugs: Amoxicillin, Aminoglycosides (gentamycin), Imipenem, 2nd generation cephalosporins (cefouroxime and Cefoxitin), 3rd generation cephalosporins (Cefotaxime, Cefoperazone, Ceftazidime), Fluoroquinolones (Ciprofloxacin, Ofloxacin), Macrolides (Clarithromcyin) and Vancomycin.
   (C) *Blood culture:* It was carried out in 95 patients (76 CAP and 19 HAP) with elevated temperature, prior to placing it on antibiotics to collect or after they have been off antibiotics for at least 2–3 days.
   (D) *Pleural fluid:* Thoraccentesis is aspiration of fluid from the pleural space by percutaneous insertion of a small bore needle or catheter through the

chest wall. The obtained specimen is then sent for bacteriological examination and pH to determine impending empyema at pH less than 7.2.

(8) *Bacteriological study:* On swabs and protected samples (Gram stain, ZN stain and cultures). Sputum, endotracheal aspiration (EA), blood culture, pleural fluid was obtained from each patient accordingly under complete aseptic conditions. Sputum, endotracheal aspiration (EA), blood culture, pleural fluid were cultured using different microbiological media the resulting colonies were identified by the standard microbiological techniques then the sensitivity of the isolated strains to different antibiotics was determined.Cases were differentiated according to recently hospitalization. CAP included patients who have not recently been hospitalized develop an infection of the lungs (pneumonia). While HAP include patients who is not incubating at the time of hospital admission and begins more than 48 h after admission.

Statistical analysis

The obtained data were represented statistically using the terms of count, maximum, minimum, mean ± standard deviation (SD) and percentage. Comparison between the different groups in the present study was done using student *t* test for parametric data and chi square test for non parametric data, value less than 0.05 is considered statistically significant. All statistical calculations were done using Microsoft Access version 11 and SPSS program.

Results

This study consisted of patients who were admitted to the largest five Egyptian Military Hospitals (Kobbry El kobba, El-Maadi, Misr Elgadida, El-Galaa and Ghamra) during the period from March 2012 to August 2012 and were selected due to suspicion of developing pneumonia according to clinical, laboratory and/or radiological evidence. Sputum, endotracheal aspiration (EA), blood culture, pleural fluid aspirations, Swabs from medical personnel (physicians, nurses), airconditioning systems, water systems, ventilators, media and instruments around the patients were done to determine the source and the causative microorganism of community or hospital acquired pneumonia.

This study consists of (239) patients, (187) patients were CAP and (52) patients were HAP divided in five hospitals as follow:

Kobbry el koba shows the largest number of cases as it service wide range of military persons from soldiers to generals and their families on one hand. On the other hand it includes the military respiratory center which receives cases from different military units and hospitals of the Egyptian army.

The current study was performed in the period between March till August 2012 and the number of cases admitted in each month is shown in Table 2 and Fig. 1.

This study was done on patients of both *sexes* and of variable ages (Table 2 and Fig. 2) ranges from 14 to 87 years old. 20 patients were subjected to assisted mechanical ventilation due to different etiologies (medical or surgical).

The demographical characteristics of age and sex distributions were as in (Figs. 3 and 4). More than half of the patients had significant pre-existing medical illness (Fig. 4a), and diabetes mellitus was the single most common illness (21%).

In cases of CAP the most common microorganism identified was *S. pneumonia* (36.4%). The other major groups of pathogens were *Staphylococcus aureus* (7%), *Klebsiella bacilli* (4.8%), *Pseudomonas aerginosa* (2.1%), *Escherichia coli* (1.6), *Staphylococcus* spp. (1.6), *Streptococcus hominis* (1.6), *Streptococcus pyrogen* (1.6) (Table 4).

On the other hand in cases of HAP the most common microorganism identified was *Klebsiella pneumonia* (23.1%). The other major groups of Pathogens were *P. aerginosa* (17.3%), *E. coli* (11.5%), *Acintobacter* (7.7%), *Staphylococcus haemolyticus* (7.7%), MRSA (5.8%), *Candida* (5.8%) (Table 5).

Table 1 Distribution of pneumonia among different military hospitals.

Item	Number of patients	CAP	HAP
Kobbry el koba	160	141	19
Misr ElGedida	21	18	3
ElGalaa	21	4	17
Elmaadi	19	15	4
Ghamra	18	9	9
Total	239	187	52

Table 2 Number of cases according to months.

Month	CAP	HAP
March	70	11
April	38	12
May	27	3
June	19	7
July	16	11
August	17	8

Table 3 Age and sex distribution among the studied group.

Items	Studied group (N = 239)			
	CAP		HAP	
	No.	%	No.	%
Sex				
Male	173	92.5	34	65.3
Females	14	7.5	18	34.7
Age				
Above 60	53	28.3	23	44.2
Below 60	134	71.7	29	55.8
X ± SD	43.95 ± 19.66			

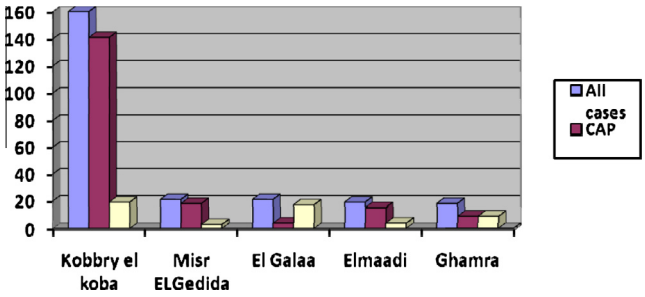

Figure 1 Distribution of patients according to the hospitals.

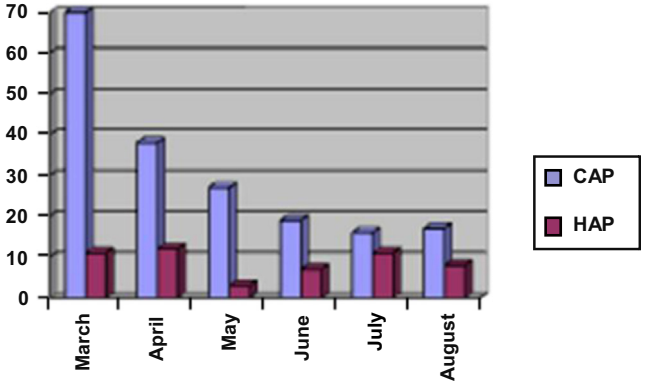

Figure 2 Number of cases according to months.

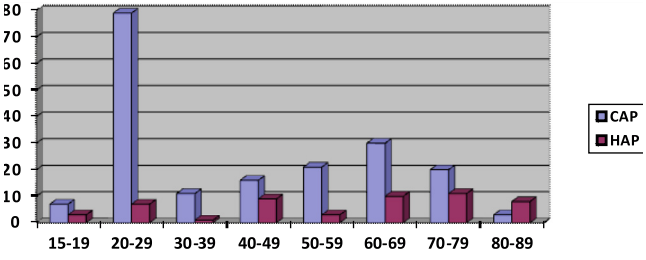

Figure 3 Demographical data of patients with community acquired pneumonia needing hospitalization.

A number of features were found to be useful in differentiating the various groups of pathogens (Fig. 5). Patient who were infected with *S. pneumoniae* tended to have higher total white cell count and absolute neutrophil count, though this was not statistically significant (ANOVA, $p = 0.02$). Patients with *S. aureus* pneumonia had higher urea levels (ANOVA, $p = 0.0004$), but creatinine levels were not elevated. No other features were found to be significantly different amongst the different groups of pathogens. There were no associations between any group of medical illness and causative organisms. This study showed different risk factors (Table 6) to these patients to develop community and hospital acquired pneumonia: in CAP 76 (40.6%) were medical, 111 (59.4%) were surgical, 40 (21.3%) had local chest disease, while 147 (78.7%) did not have, 75 (40.1%) received immunosuppressive drugs (steroids), while 112 (59.6%) did not receive, 180 (96.2%) were conscious, while 7 (3.8%) were unconscious), 3 (1.7%) had bed sores, while 184 (98.9%) did not have, 3 (1.7%) were aspirated, while 184 (98.9%)were not, 75 (40.1%) were diabetics, while 112 (59.9%) were not, 52 (27.9%) had impaired liver functions, 59 (31.6%) had impaired renal functions. On the other hand in HAP 21 (40.4%) were

Table 4 Distribution of causative microorganisms causing CAP.

Organisms	No. of cases	%
Streptococcus pneumonia	68	36.4
Candida	30	16
No sputum	28	15
No growth	20	10.7
Staphylococcus aureus	13	7
Klebsiella	9	4.8
Pseudomonas aerginosa	4	2.1
Dead cases	3	1.6
Escherichia coli	3	1.6
Staphylococcus spp.	3	1.6
Streptococcus hominis	3	1.6
Streptococcus pyrogen	3	1.6
Total	187	100

Table 5 Distribution of causative microorganisms causing HAP.

Organisms	No of cases	%
Klebsiella	12	23.1
No sputum	11	21.1
Pseudomonas aerginosa	9	17.3
Escherichia coli	6	11.5
Acintobacter	4	7.7
Staphylococcus haemolyticus	4	7.7
MRSA	3	5.8
Candida	3	5.8
Total	52	100

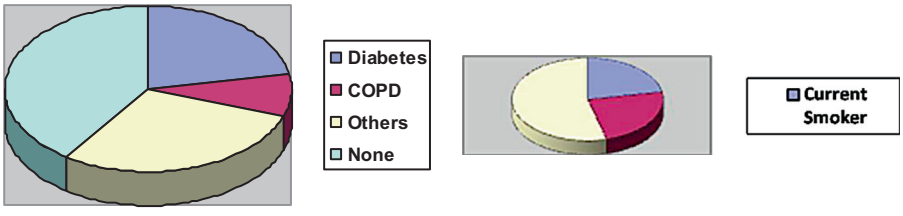

Figure 4 Distribution of (a) pre-existing illness and (b) smoking history.

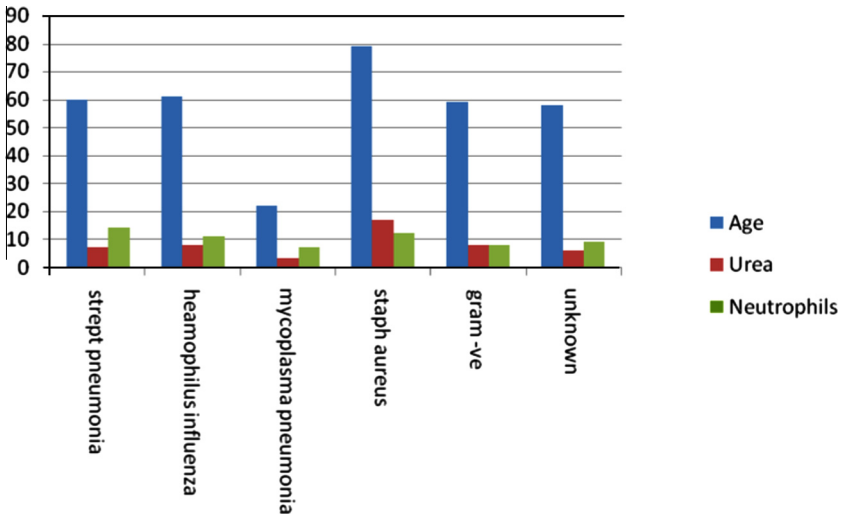

Figure 5 Comparison of different groups of organisms for (a) age, (b) urea level and (c) neutrophil count.

medical, 31 (59.6%) were surgical, 12 (23.1%) had local chest disease, while 40 (76.9%) did not have, 22 (42.3%) received immunosuppressive drugs (steroids), while 30 (57.7%) did not receive, 33 (63.4%) were conscious, while 19 (36.6%) were unconscious, 18 (43.6%) had bed sores, while 34 (65.4%) did not have, 20 (38.4%) were aspirated, while 32 (61.6%)were not, 21 (40.3%) were diabetics, while 31 (59.7%) were not, 27 (52%) had impaired renal functions, 30 (57.7%) had impaired liver functions.

The obtained results showed insignificant relationship between type of organisms and concomitant illness of these patients with the highest incidence in patients below 60 years (71.6% in CAP and 44.2% in HAP), patients receiving immunosuppressive drugs (40.1% in CAP and 22.3% in HAP) and diabetics (40.4% in CAP and 40.3% in HAP).In this study blood cultures only done for patients who have fever more than 38 °C. This study consists of 239 cases divided as 187 (78.2%) cases as CAP and 52 (21.8%) cases as HAP. Among CAP cases only 76 (40.6%) cases were feverish did blood cultures but only 4 (2.1%) cases gave results and the rest of cases 72 (37.9%) gave no growth. Also 111 (59.4%) have no fever and cultures not done. On the other hand among HAP cases only 19 (36.5%) cases were feverish and did blood cultures but only 6 (11.5%)cases gave results and the rest of cases 13 (25%) gave no growth .Also 33 (63.5%) have no fever and cultures not done.

Discussion

On one hand, this is the first prospective survey of community acquired pneumonia needing hospitalization in the largest five Egyptian military hospitals, and provides important information on the pattern of causative organisms and differentiating features on routine investigations. The essential feature for the diagnosis of pneumonia in our study was the presence of new radiographic pneumonia consolidation. In common with nearly all the other described series, the largest group of patients had no identifiable organism's accounting for pneumonia. This may in part be due to pre-hospitalization treatment with antibiotics prescribed by general practitioners and the lack of sensitivity of convential laboratory investigations. The proportion of undiagnosed is comparable to other studies, showing undiagnosed proportion between 33% and 51% [15,26,7,18,2]. In our survey, *S. pneumonia* was the most commonly identified causative organism causing pneumonia acquired in the community and the organism identified most commonly, as in accordance with the observations in the other parts of the world. Sputum culture detected less than half of the cases of *S. aureus*, confirming that it is an insensitive test, as had been observed in previous studies [15,2] as likely that the true incidence of *S. pneumoniae* infection was higher as the sensitivity of the assay has been reported to be about 80%. Gram-negative organisms accounted for about 8.6% of all the cases, a frequency that appeared higher than most other reported series. The British Thoracic Society survey of 25 British hospitals reported an incidence of only 3% [25]. Another multi-center study in Spain found less than 5% of community acquired pneumonia were due to Gram-negative organisms. Studies in the USA found incidence ranging from 2.4% [26]. The higher incidence seen in our study may truly represent the pattern of local flora, not surprisingly, as some of the Gram-negative bacilli (such as *P. aerginosa*) were endemic in North Africa and would be important implications in the choice of antibiotics therapy. Antibiotics resistance in Gram-negative organisms can develop rapidly [4] such that the emergences of multi-resistant strains have been seen in many other parts of the world. More than third of the patients had pre-existing illnesses, with diabetes mellitus being most common. The prevalence of diabetes mellitus being most common in Egyptian military hospitals was less than 5% in a recent population-based survey [17]. The fourfold increase in prevalence of diabetes in our population suggests that diabetic patients are predisposed towards pneumonia in the community. Increased susceptibility to pneumonia may be related to impaired granulocyte phagocytic functions found in diabetic patients [17]. In diabetic patients, the frequency of tuberculosis was no more than the other organisms. The survey was only over the period of six months, and thus some pathogens may be under-represented to seasonal variations. On the other hand, nosocomial infections (NIs) now concern 5–15% of hospitalized patients and can lead to complications in 25–33% of

Table 6 Risk factors of pneumonia among the studied group.

Risk factors	Studied group (N = 239)			
	CAP		HAP	
	No = 187	%	No = 52	%
Age (years)				
Below 60	134	71.6	23	44.2
Above 60	53	28.4	29	55.8
Underlying disease				
Medical	76	40.6	21	40.4
Surgical	111	59.4	31	59.6
Local chest disease				
Present	40	21.3	12	23.1
COPD	24		7	
Bronchiectasis	16		5	
Absent	147	78.7	40	76.9
Immunosuppressive drugs				
Present	75	40.1	22	42.3
Absent	112	59.9	30	57.7
Consciousness level				
Conscious	180	96.2	33	63.4
Unconscious	7	3.8	19	36.6
Bed sores				
Present	3	1.7	18	34.6
Absent	184	98.3	34	65.4
Aspiration				
Present	3	1.7	20	38.4
Absent	184	98.3	32	61.6
Mechanical ventilation				
Yes	3	1.7	17	32.7
No	184	98.3	35	67.3
DM				
Present	75	40.1	21	40.3
Absent	112	59.9	31	59.7
Liver functions				
Normal	135	72.1	22	42.3
Elevated	52	27.9	30	57.7
Kidney functions				
Normal	128	68.4	25	48
Elevated	59	31.6	27	52

those patients admitted to ICUs. The most common causes are pneumonia related to mechanical ventilation, intra-abdominal infections following trauma or surgery, and bacteremia derived from intravascular devices [5]. In 1995, the American Thoracic Society published a consensus statement defining hospital-acquired pneumonia (HAP) as a pneumonia that is not incubating at the time of hospital admission and begins more than 48 h after admission. HAP occurs relatively frequently and is associated with a high rate of mortality; therefore, it is important to prevent, promptly diagnose, and effectively treat this infection. High incidence and case fatality rate of nosocomial infections of the respiratory tract due to aerobic Gram-negative and -positive bacteria are considered as a major problem, particularly in patients bedded in intensive care units. Patients in intensive care units are a small subgroup of all hospitalized patients, they account for approximately 25% of all hospitalized infections. Nosocomial infection rates among ICU patients are 5–10 times higher than ward patients. ICU infection rates are higher due to complex interactions between the underlying diseases, severity of illness, type of ICU, duration of stay and invasive devices used [30,31]. This increased incidence is due to the fact that patients located in an ICU often require mechanical ventilation, and mechanically ventilated patients are 6–21 times more likely to develop HAP than are non-ventilated patients. Mechanical ventilation is associated with high rates of HAP because the endotracheal tube bypasses upper respiratory tract defenses, allows for pooling of oropharyngeal secretions, prevents effective cough, and infection. The development of HAP in mechanically ventilated patients portends a poor prognosis, with a rate of mortality 2–10 times greater for this group than for mechanically ventilated patients without HAP [6]. Among 187 patients of CAP there were 53 (28%) cases above 60 years, 134 (71.7%) cases below 60 years. Among 52 patients of HAP there were 23 (44.2.8%) cases above 60 years, 29 (55.8%) cases below 60 years. Most elderly patients with pneumonia have a longer stay in hospital with coexisting illness and more likely to develop nosocomial infection, pneumonia in the elderly is influenced by age related alteration in lung structure function in the form of decreased clearance; aging of the immune system, decreased cell mediated immunity and decreased macrophage function in addition to concomitant illness [8]. This result show agreement with Holzapfel et al. [13] statement who said that pneumonia is ''a friend of the aged''. He recognized that pneumonia is more likely to develop in elderly and paid attention to the rising rate of mortality from pneumonia with age.

Also this result show agreement with the study done by Guerra and Baughman [12] demonstrate that most patients with HAP were above 65 years old. In our study 3 (5.8%) patients with *MRSA* were of young age because they have many risk factors such as bed sores, urinary tract infections, and septic foci such as osteomyelitis. These results were in disagreement with the study done by Bradly and Colleagues who found that patients infected with (MRSA) were often older and are significantly more likely to develop a previous chronic lung disease, previous antibiotic and steroid therapy [28]. Our study showed that in CAP, 173 cases (92.5%) of the studied were males in comparison to 14 (7.5%) cases were females. In HAP 34 cases (65.3%) of the studied group were males in comparison to 18 (34.7%) cases were females .This could be explained by more risk in males in developing different diseases most probably due to smoking habits which is more prevalent in males than females [23]. Also El-gazzar [9] whom states that among 30 of studied patients (who develop hospital acquired pneumonia) they were 19 (64%) males and 11 (34%) females (110). In the present study there were 40 cases (21.3%) with underlying chronic chest disease (COPD: 24 cases, Bronchiectasis: 16 cases) on CAP. On HAP 12 cases (23.1%) with underlying chronic chest disease (COPD: 7 cases, and bronchiectasis, 5 cases). Mucus hypersecretion, which is the hallmark of chronic bronchitis, is associated with increased affinity of bacteria to adhere to mucous, and delay the mucociliary clearance, also there is loss of ciliated cells and replaced by goblet cells. Thus, bacteria that are inhaled or aspirated into the bronchial tree may utilize stagnant mucous as the first step to colonize the mucosa [21]. This result agrees with Paterson and coworker [22], the origin, course, diagnosis and treatment aspects of pneumonia have been studied in 394 patients with chronic bronchitis and 158 asthmatic bronchitis. It was found that patients with chronic lung diseases,

especially chronic bronchitis are referred to as high risk for developing pneumonia, and El-gazzar [9] which stated that among 30 of studied patients (who develop ICU acquired pneumonia) there were 10 cases of COPD (33%) 7 cases of interstitial pulmonary fibrosis (23%), 3 cases of cerebrovascular stroke (10%), 5 cases of bronchiectasis (17%), 2 cases of bronchial asthma (7%) and 3 cases of Pickwickian syndrome. As regard level of consciousness, in the present study 7 (3.8%) cases had neurological insult that affect the level of consciousness on CAP. On HAP 19 (36.6%) cases had neurological insult that affect the level of consciousness (Tables 1 and 3). This agreed with, Ewig et al. [27] who studied pneumonia in patients with traumatic and medical head injury they found that the incidence of initial colonization in at least one sample was 39/47 (83%).In this study on CAP 75 (40.1%) patients of the studied group were diabetics. On the other hand on HAP 21 (40.3%) patients of the studied group were diabetic. This in agreement with the study done by El-gazzar [9], which stated that most patients were diabetics (16 of 30). Fifty nein (31.6%) had impaired renal function on CAP. On HAP 27 (52%) had impaired renal function. This result shows agreement with the study done by Sopena and Sabrià [20], who stated that 8 cases (4.8%) of the studied group which develop ICU acquired pneumonia give history of renal failure. 75 (40.1%) patients gave history of prolonged steroid therapy on CAP. While 22 (42.3%) patients gave history of prolonged steroid therapy on HAP. This result shows agreement with the study done by Sopena and Sabrià [20] which states that about one third of the studied group which develop ICU acquired pneumonia give history of prolonged steroid therapy. In this study 3 (1.7%) cases were subjected to mechanical ventilation while 184 (98.3%) were not subjected to mechanical ventilation on CAP. In HAP 17 (32.7%) cases were subjected to mechanical ventilation while 35 (67.3%) were not subjected to mechanical ventilation on CAP, in agreement with [22]. This correlate with this prospective study done by Antonelli and coworkers [3] who concluded that HAP developed in 27 of 223 patients (12.1%) receiving MV but in only 1 of 135 patients (0.7%) not receiving MV. Our study showed that Gram positive organisms were the most prevalent in CAP especially *S. pneumonia* followed by *S. aureus*, while *Klebsiella* was the most prevalent Gram negative organism as follow and also showed that Gram negative organisms were the most prevalent in HAP especially *Klebsiella* followed by *Pseudomonas aeruginosa* then *E. coli* and *Acintobacter*, while *S. aureus* was the most prevalent Gram positive organism as follow. These results agree with study done by El-gazzar [9] who found that *S. aureus* is the most Gram positive organism causing HAP. In another study done Queenan et al. [24] suggested that *P. aeruginosa* and *Klebsiella* species were the most prevalent organisms in pathogenesis of HAP and together they accounted for approximately half of all organisms. Also this study showed agreement with the study done by Johanson et al. [16], which suggested that approximately 40% of all infections in HAP involved mixed flora with more than one potentially pathogenic species. Tracheal or bronchial colonization with *P. aeruginosa* included length of hospitalization of >10 days, prior use of third-generation cephalosporins, surgical emergencies, and alcoholism. Multivariate analysis revealed two risk factors for pseudomonal pneumonia: treatment with metronidazole and COPD. Talon and colleagues [29] prospectively assessed rates of colonization with *P. aeruginosa* among 190 patients requiring MV in a surgical ICU. During the ICU stay, *P. aeruginosa* grew from tracheal aspirates of 44 patients (23%), 13 of whom developed pneumonia. Consistent with other studies, the lower respiratory tract (not the GI tract) was the first site of colonization, and the contribution of environmental sources was small. In CAP our study showed that *S. pneumonia* infections were more common below 60 years [68 cases of 187 (36.4%)] while *S. aureus* [13 cases of 187 (7%)] and *Klebsiella* [9 cases of 187 (4.8%)] were more common above 60 years. In HAP our study showed that *Klebsiella* infections were more common below 60 years [12 cases of 52 (23.1%)] while *P. aerinosa* [9 cases of 52 (17.3%)] and *E. coli* [6 cases of 52 (11.5%)] were more common above 60 years. This shows partial agreement with the study done by El-solh and coworker [1], which showed that *S. aureus* (29%), Gram-negative enteric bacilli (15%), *S. pneumoniae* (9%), and *P. aeruginosa* (4%) accounted for most isolates in patient with HAP above 75 years old, 14 cases (37.5%) of the studied group died due to different causes during the study (Heart failure, Liver failure, Myelodysplastic syndromes (bone marrow abnormalities leading to anemia, low platelet counts, and low white blood cell counts) and Respiratory failure. 6 cases were due to *S. aureus* and 5 cases were due to pseudomonas and 3 cases due to MRSA. Torres et al. [30,31] demonstrated that the worsening of respiratory failure, the presence of an ultimately or rapidly fatal underlying condition, the presence of shock, inappropriate antibiotic therapy, and/or type of ICU were factors that negatively affected the prognosis of VAP. Thus, those authors emphasized the complex relationships among the severity of underlying disease leading to ICU admission and treatment with MV, the severity of pneumonia itself, and the adequacy of initial antibiotic treatment .The prognosis for aerobic, Gram-negative bacilli (GNB) VAP is considerably worse than that for infection with Gram-positive pathogens, when these organisms are fully susceptible to antibiotics. Death rates associated with *Pseudomonas* pneumonia are particularly high, ranging from 70% to more than 80% in several studies). According to one study, mortality associated with *Pseudomonas* or *Acinetobacter* pneumonia was 87% compared with 55% for pneumonias due to other organisms. Concerning Gram-positive pathogens, in a study done by [10] comparing VAP due to methicillin-resistant *S. aureus* (MRSA) or methicillin-sensitive *S. aureus* (MSSA), mortality was found to be directly attributable to pneumonia for 86% of the former cases versus 12% of the latter, with a relative risk of death equal to 20.7 for MRSA pneumonia .Our study showed that pseudomonas infections [9 cases of 52 (17.3%)] and staphylococcal (MSSA) infection [4 cases of 52 (7.7%)]) were more common in surgical patients while *Klebsiella* infection [12 cases of 52 (23.1%)] were more common in medical patients. This shows agreement with the study done by McClelland et al. [18], which shows that most surgical [117 of 490 (23.8)] patients who develop ICU acquired pneumonia were infected by pseudomonas bacteria. Our study showed that ventilators are the most common source of infection in medical [14 cases of 32 (43.8%)] and surgical [18 cases of 32 (56.3%)] patients .his result show agreement with the study done by Andrews et al. [2], which states that ventilators are the most common source of infection in medical and surgical patients. Our study showed that ventilators are the most common source of infection in patients above 60 years [4 cases of 32 (12.5%)] and below 60 years [28 cases of 32 (87.5%)]. This

result show agreement with the study done by González et al. [11] which states that ventilators are the most common source of infection in elderly and young patients.

Conclusion

Our study showed that Gram positive organisms were the most prevalent in CAP especially *S. pneumonia* followed by *S. aureus*, while *Klebsiella* was the most prevalent Gram negative organism. On the other hand our study showed that Gram negative organisms were the most prevalent in HAP especially *Klebsiella* followed by *P. aerginosa*, while *S. haemolyticus* was the most prevalent Gram positive organism.

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