Antimicrobial and Bacteriological Study for Men Patients with Respiratory Disorder Diseases

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Abstract

The current study aimed to designation and investigation for bacteria in the respiratory secretions 40 sputum samples form men patients which found after laboratory examination 40 samples infected with pathogenic bacteria in respiratory disorder diseases patients infected with lung cancer and pneumonia, the results included of Gram Positive Bacteria isolated were: Staphylococcus epidermidis had the most presence with 24 (60%), followed by Streptococcus pyogenes with 5 (12.5%), followed by 3(7.5%) for Staphylococcus aureus, and about Streptococcus pneumonia represented the lowest percentage 2(2.5%), while the Gram Negative Bacteri were Klebsiella spp. and Escherichia coli have the same percentage had the equal presence with2(5%), while Mycobacterium tuberculosis with 2(5%), also the study had been included the determination of the antibiotic effected of (Key: AMC=Augmenting/Amoxicillin, E=Erythromycin, CIP=Ciprofloxacin, AZM=Azithromycin, CN=Gentamycin, CRO=Ceftriaxone, AM=Ampicillin, P=Penicillin) on bacterial pathogen isolates from respiratory disorder diseases, they were found: resistance to Azithromycin, Augmenting/Amoxicillin, Ciprofloxacin, Ampicillin and Penicillin were showed by most for bacteria, while most isolated have been found to be sensitive to Gentamycin with Ceftriaxone. Mycobacterium tuberculosis and Streptococcus pneumoniae species showed resistance to most of antibiotics, Kellbesilla spp. showed resistance to most of antibiotic agents except Ceftriaxone while Streptococcus pyogenes which isolates displayed sensitive for most antibiotics except for Augmenting/Amoxicillin, Ampicillin and Penicillin. Generality of the isolates were Escherichia coli showed best sensitivity to Gentamycin just but resistance for all antibiotics in the study, Staphylococcus epidermidis had to be sensitive for Augmenting/Amoxicillin, Gentamycin and Ceftriaxone which Staphylococcus aureus had to be sensitive for antibiotics agents Gentamycin and ceftriaxone. Conclusions: The respiratory disorder diseases are a serious problem and healthy issue in any community that might refer to elevation diseases of males than females. Also the most common bacteria accompanying in (Lung cancer, pneumonia) are Staphylococcus epidermidis, Streptococcus pyogenes and Staphylococcus aureus respectively from patients in Babylon province. Although the proper antibiotics had been used were the Gentamycin and Ceftriaxone which give high sensitivity for studied bacterial species.

Keywords: Respiratory; Disorder; Diseases; Lung; Cancer; Pneumonia; Respiratory; Allergic; Antibiotic.

Introduction

The respiratory tract begins from the larynx and consists of the oropharynx and nasopharynx in addition to the sinuses, the middle ear and finally extends to the lungs. Furthermore the infection of the respiratory tract is one of the commonest illnesses in the general population and results in significant morbidity [1]. Over 50 million deaths around the world are caused by respiratory tract infections, which are the main cause for clinic visits and antibiotics prescription. Poor immunity and malnutrition are the main causes for the high incidence of respiratory tract infections [2]. Lower respiratory infection starts via microorganism's infection to epithelium at airway through; these consisted of the aerosolized droplets or by the oral excretions aspiration. A crucial stage into these operation was and so on the oropharyngeal mucosal surfaces colonization by respiratory
microorganisms and the shedding attached bacteria of those superinfeces in tangent excretions which then pollute the lower respiratory tree [3]. In addition, there has a belief that infectious agents are the reason of chronic inflammatory diseases of unknown aetiology and cause the cancer is not new; the information had been suggested a duty to one or much infecting factors in the had following old diseases: A lot of factors are involved usually intended and has either treatment with current antibiotics or are potentially treatment with drugs of antiviral, nutrition, heredity and environment, are critical determinants of disease term with inheritance being the most significant [4].

While the increase of quality of life over the past 50 years is primarily due to the use of antibiotics as antimicrobial chemotherapy. However, antibiotic-resistant bacteria have become a challenging public health problem worldwide, the reason may be due to the side effects accompanying antibiotics systemic administration, such as hypersensitivity reactions, kidney problems, liver problems and gastrointestinal upset [5], about two-thirds of antibiotic prescriptions in general practice are for respiratory tract infections (RTIs) [6].

Antibiotic resistance is a major public-health problem, in particular since resistance of microorganisms increases with the consumption of antibiotics [7]. The majority of antibiotics are prescribed in primary care, mainly for the treatment of acute respiratory tract infections. However, because of their limited effectiveness in only a limited number of infections; primary care guidelines recommend a restrictive use of antibiotics in respiratory infections [8, 9].

A prospective, observational primary care study, conducted in 13 European countries, showed that clinicians could have justified an antibiotic prescription for 71.2% patients according to the guideline from the European Respiratory Society and the European Society of Clinical Microbiology and Infectious Diseases (ERS/ESCMID) with a huge variation between 30.8% in Spain and 97.2% in Hungary [10].

On the other hand, Irish investigators found that the majority (78.05%) of antibiotic prescriptions were not in accordance to national guidelines [11].

Antibiotics are among the most frequently used pharmaceuticals today. Since the development of penicillin, antibiotic use in all parts of the health care system has significantly contributed to reducing the likelihood of dying from an infectious disease [12]. However, consumption tends to deplete the efficacy of the antibiotic in combating bacterial infections because the bacteria develop resistance to the antibiotic [13].

In the United States, it is estimated that up to 50% of antibiotics prescribed for ARTIs in the outpatient setting are unnecessary [14]. The overuse of antibiotics is associated with unnecessary adverse drug effects and increased healthcare costs, and is tied to the growing global crisis of antibiotic resistance [15, 16].

Materials & Methods

The sputum specimens were collected from 40 male patients with Respiratory Tract Infection (RTI) admitted to Merjan Teaching Hospital, Al-Hilla Teaching hospital, the Centre of Tumors and Cancers, the Centre of Allergic and asthma and private clinical in Babylon province from November 2016 to May 2017. The age all of them male patients were (age rang 35–79 years) which had an established bacterial etiology were males.

The samples were collection in cup must be plastic, transparent disposable and always clean and not broken. Wide mouth, closely cover, can written on it by wax pencil. The sample collected in another glass container [17].

Procedure of Examination

Sputum Examination

The specimens are transported for bacteriology laboratory and each specimen is inoculated using direct method of inoculation on media culture such as Blood agar then MacConkey agar incubate at 37 °C for 24-48 hours [18].Within a sterilized waterproof, using a petri dish or disposable malleable cup; at first morning fresh sputum samples are collected the from TB patients and others respiratory disorder diseases in a surrounded space.

The sample choosing depend on the sputum production, nonetheless was encouraged coughing exit sputum by mannitol or aerosol saline might thought in a unwell
Circumstance for has made a isn't produce of sputum [19]. Other performances might comprise a gradually increasing pneumonia or lung nodule together with associated empyema. Nocardiosis can be identified rapidly by 1-inspection of sputum 2-modified acid-fast staining [20].

Sputum is the a material coughed up from lungs, bronchi, trachea, and larynx consists of mucous secreted by respiratory mucosa, products of tissue disintegration due to disease exudates from lesions and materials from nearby structures that might have established communication with respiratory tract [21].

*Culture Media

Preparation of Culture Media

The company had prepared a culture media of the manual procedure that is sterilized at 121 C for 15 minutes in an autoclaving according to the instruction [22,19]. For MacConkey Agar Medium, Mannitol salt agar, Nutrient Broth, Motility Agar Medium, Simmon’s Citrate Agar, Nutrient agar medium( According to manual procedure of HIMEDIA Company ), Klglers’ iron Agar Medium (According to manual procedure of Bio life Company), Eosin Methylene Blue (EMB) Agar Medium , Blood Agar Medium and Mueller-Hinton agar medium (According to manual procedure of OXOID Company).

Culturing Sputum on Medium

The sputum samples were collected in sterile universal plastic containers and diagnostic microbiology laboratory of Merjan Teaching Hospital were analysed. All isolates were diagnosed according to well-known established bacteriological methods [23]. Biochemical identification of bacterial species was performed by standard methods [24].

Antimicrobial Susceptibility Test

The isolates were subjected to susceptibility testing to the commonly used antimicrobial agents by Jean et al method the references for that Zones depended the size and their interpretation (M100S) Performance Standards for Antimicrobial 27th Edition [25], and their results of zone growth inhibition were compared to that in Table 1.

Table 1: Zone size and their interpretation (M100S) Performance Standards for Antimicrobial

<table>
<thead>
<tr>
<th>Antimicrobial Sensitive Agent (symbol)</th>
<th>Disc potency</th>
<th>Diameter of zone inhibition (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sensitive (++)</td>
</tr>
<tr>
<td>Amoxicillin - Clavulanate</td>
<td>20/10 µg</td>
<td>≥18</td>
</tr>
<tr>
<td>Erythromycin</td>
<td>15 µg</td>
<td>≥23</td>
</tr>
<tr>
<td>Ciprofloxacin (CIP)</td>
<td>5 µg</td>
<td>≥21</td>
</tr>
<tr>
<td>Azithromycin (AZM)</td>
<td>15 µg</td>
<td>≥18</td>
</tr>
<tr>
<td>Gentamycin (CN)</td>
<td>10 µg</td>
<td>≥15</td>
</tr>
<tr>
<td>Ceftriazone (CRO)</td>
<td>30 µg</td>
<td>≥23</td>
</tr>
<tr>
<td>Ampicillin (AM)</td>
<td>10 µg</td>
<td>≥22</td>
</tr>
<tr>
<td>Penicillin (P)</td>
<td>10 U</td>
<td>≥47</td>
</tr>
</tbody>
</table>

Statistics

Descriptive statistical analysis (number and percentage) were used to calculate for type of bacterial isolates and their sensitivity results.

Results and Discussion

Figure 1: Distribution of the Bacterium Isolates from 40 Samples
The outcomes from present study was similar with previous study in which appeared a compelling evidence for significance for oral health and micro-ambition is created, by a study in inhabitants of nursing homes, displaying which negligence of oral health measurement leads to a dramatic raise within incidence of and death-rate by pneumonia [26].

Others outcomes showed that oral infections play important role in respiratory disorder diseases such as the study, they reported that, the plurality of contagious laryngitis states have a viral origin, potentially predisposing to bacterial laryngitis, rose by pathogens like Streptococcus pneumoniae, Streptococcus aureus, β-haemolytic streptococci, and Klebsiella pneumonia [27].

Also the present study concerned results with other studies outcomes which explained spread infections from URT to LRT in our studies similarity for Feng et al, Cordonnier et al and Niho et al outcomes studies were reported that Staphylococci was a main reason for contagions worldwide. Extremely, Staphylococcus aureus was secluded from society and hospital contagions, simulating the lower respiratory tract (LRT)[28].

However the current data agreed with previous study in which showed that proportion of Gram –positive bacteria has risen, with Staphylococcus epidermidis being found more frequently than Staphylococcus aureus [29]. In the other hand, some of results of the present study of isolated bacteria were similar with the other study was reported the following bacteria were found: Escherichia coli, Bacillus spp, Staphylococcus aureus, Candida spp., Enterococcus spp.About1 [30].

The table shows association between the respiratory disorder diseases and bacterial infections which found the high infections by Staphylococcus epidermidis in lung cancer about 13(16.25%) following in pneumonia about 11(13.75 %) which high percentage infections by the Gram positive cocci than the Gram Negative bacilli and the Acid fact bacilli. The results were found of bacteria growth in our study was correlated with the mentioned of Joanas et al.,

He showed the lung cancer patients colonized with bacterial infections may have the primary reason to progress the risk factor to be chronic disease then development to be a dangerous cancer, the study mentioned model and clinical inclusions on bronchial bacterial colonization had been most scrupulous on patients together with chronic lung disease, specially a chronic obstructive pulmonary disease. The main goal for Joanas et al study was into limit the hesitation and hazard agents for the bronchial colonisation to the lung cancer patients whom had submitted surgical resection [31].

Our results were the Gram negative bacteria, Gram positive bacteria and Acid Fast Bacilli bacteria were similar with other study done

<table>
<thead>
<tr>
<th>Bacterial Isolates</th>
<th>Lung cancer</th>
<th>Pneumonia</th>
<th>Number of isolated Bacteria(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Staphylococcus epidermidis</strong></td>
<td>13 (32.5%)</td>
<td>11 (27.5%)</td>
<td>24 (60%)</td>
</tr>
<tr>
<td><strong>streptococcus pyogenes</strong></td>
<td>1 (2.5%)</td>
<td>4 (10)</td>
<td>5 (12.5%)</td>
</tr>
<tr>
<td><strong>Staphylococcus aureus</strong></td>
<td>3 (7.5%)</td>
<td>0 (0%)</td>
<td>3 (7.5%)</td>
</tr>
<tr>
<td><strong>streptococcus pneumonia</strong></td>
<td>0 (0%)</td>
<td>2 (5%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17 (42.5%)</td>
<td>17 (42.5%)</td>
<td>34 (85%)</td>
</tr>
<tr>
<td><strong>Kellbesilla. Spp.</strong></td>
<td>1 (2.5%)</td>
<td>1 (2.5%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td><strong>Escherichia. coli</strong></td>
<td>1 (2.5%)</td>
<td>1 (2.5%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2 (5%)</td>
<td>2 (5%)</td>
<td>4 (10%)</td>
</tr>
<tr>
<td><strong>Mycobacterium tuberculosis</strong></td>
<td>1 (2.5%)</td>
<td>1 (2.5%)</td>
<td>2 (5%)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1 (2.5%)</td>
<td>1 (2.5%)</td>
<td>2 (5%)</td>
</tr>
</tbody>
</table>
by Abdul-Munim, he mentioned the result of Gram-positive cocci and was Gram-negative bacilli. Several sputum specimens consisted of more than one bacterium such as the Klebsiella species were the generality prevailing between the Gram-negative bacilli, followed up by Escherichia coli, Streptococcus pneumonia was the generality prevailing between Gram-positive cocci, followed up by Staphylococcus aureus and Streptococcus. [32].

But the results study differed with his results study by the Gram positive bacteria Staphylococcus epidermidis the most prevailing than other bacteria. The present study outcomes was similar to other study for Laroumagne et al which mentioned the hazard agents for bronchial colonization, were centric place for tumour that mentioned the quantitative bacterial culture, sensitivity tests and histological check of samples have completed. Furthermore, bronchial colonization with one prospect pathogenic micro-organism has been established.

The hazard agents to the colonization for bronchia were tumour centric place. The hesitancy of postoperative contagious pulmonary complexities was depressed and no relation has been observed with colonization for bronchia. However, patients together with respected carcinoma of lung was a rise ratio of colonization for bronchia, fundamentally together with possibility of micro-organisms pathogenic. It detach hazard colonization agents into this patients had centric place for tumour and a rise body mass indicator [31].

In our study results found relation such as it mentioned in these study results that bronchial colonization has considerably wrote into the patients together with a lung cancer, and had a possibility influence within management of therapeutic and alert. That pointed for prospect realized to the spread and kind from bronchial colonization into the patients on the timing for lung cancer diagnosing [33].

In our study were found related between microbial infections and respiratory disorder diseases similarity Belda et al and D’Journo et al, Laroumagne et al studies outcomes they mentioned bronchial colonization was played a key of role into the foundation for infections to the pulmonary in the patients together with the lung cancer, and so clear effects for therapeutic administration and perhaps the alert to the cancer infection [34]. Also bronchial colonization enable showed in 10–83% to the patients for lung cancer and might occasion through (PPMs) possibility pathogenic microorganisms Staphylococcus aureus and Streptococcus pneumonia [35, 36]. Found in this study approximately ratio results close for Remiszewski et al outcomes which had been appeared the reality was given a concept on the first phase into advancing into lung cancer meanwhile contagions into the respiratory systems.

The frequency of appearance for contagions into lung cancer patients has rated established on the outcome for bacteriological check of broncho alveolar lavage fluid. Through using this approach, a contagious factor has isolated into 34.3% of patients with Gram-negative rods being the most repeated reason of contagious [37].

Present study found respiratory disorder diseases were the fatal diseases comparing with another diseases; it agreed with Homsi et al results study wrote that little facts occur within contagious mortality in patients together with rigid organ tumors, approximately 50% of these patients were rated to have an contagion as every the essential or an related reason of fate [38].

We found a possible association between our study results with Viscoli et al study results; he reported more than one predisposing agent may occur in a given patient, and those accumulative onuses more carefully reflects the hazard for infection. To some range, but this hazard agents were related with specified contagious pathogens, and perception for every individual hazard agent can assist direct strategies for diagnosis and treat. Patients together with implicit malignancies were at hazard for a vast array for contagious diseases. Bacterial contagions control followed up via fungal contagions [39].

In addition, our study was related with Tang and Wang study have demonstrated that chronic inflammation was related to the development and progression from multiple cancers, included these for lung which wrote that Inflammation not but pushes the oncogenic conversion for epithelial cells down the pressure for previous and old infections
and autoimmune diseases, however encourages the development, advancement and metastatic prevalence for cancers. The tumor-infiltrating inflammatory cells were involved for a varied people from immune cell kinds and myeloid [40].

The association results for our study by this study results with whole outcomes for present-day study through the reality supply on Laroumagne et al that patient, colonization may emerge following up domestic bronchial weakness, for example damaged mucociliary clearance or stenosis, or become raised through more public anomalies, consisting of 1. Malnutrition 2. Chronic obstructive Pulmonary Disease (COPD) 3. Immunosuppression 4. Smoking 5. Chemotherapy. [37]. These results similarity with the outcomes studies for Faden et al and Bogaert et al that showed the risk of developing respiratory contagions appears especially associated to novel conviction for a modern strain [41].

Also was similar with that result study that a status for symbiosis of bacteria, even consisting of possibility for pathogens, might enable protective contra shortened-period contagion and inflammation. Not with standing, load ability progress toward disease of respiratory in a portion of states, a procedure which ability outraged through several exo - or endogenous stimulant [42].

Table 3: Sensitivity patterns of the gram positive & Gram Negative bacteria isolates from sputum from the patients of the respiratory tracts Infections

<table>
<thead>
<tr>
<th>Bacterial isolates</th>
<th>AMC</th>
<th>E</th>
<th>CIP</th>
<th>AZM</th>
<th>CN</th>
<th>CRO</th>
<th>AM</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staphylococcus epidermidis</td>
<td>++</td>
<td>-</td>
<td>-</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Streptococcus pyogenes</td>
<td>-</td>
<td>++</td>
<td>++</td>
<td>++</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
<td>++</td>
<td>+</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Streptococcus pneumonia</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Sensitivity patterns of the gram positive Negative isolates of (RTI) the respiratory tracts infections and lung cancer

| Mycobacterium tuberculosis              | -   | -   | -   | -   | -   | -   | -  | -   |
| Kellbesilla. Spp.                       | -   | +   | +   | +   | +   | +   | -  | -   |
| Escherichia Coli                        | -   | -   | +   | ++  | -   | -   | -  | -   |

| Mycobacterium tuberculosis              | -   | -   | -   | -   | -   | -   | -  | -   |

Key: AMC = Augmenting/Amoxicillin , E=Erythromycin , CIP= Ciprofloxacin , AZM=Azithromycin, CN=Gentamycin , CRO=Ceftriaxone , AM=Ampicillin , P=Penicillin

(++) = Sensitive ) , (+ Intermediate sensitive ) and ( - = Resistance )

Figure 2: Susceptibility of Escherichia coli to antibiotics, shows the antibiotic susceptibility percentages of Escherichia .coli was (Gentamycin)

Figure 3: Susceptibility of Kellbesilla. Spp. to antibiotics shows the antibiotics susceptibility percentages of Kellbesilla Spp. were (Ciprofloxacin, Augmenting/Amoxicillin and Ceftriaxone).
Our results for antibiotic sensitivity had concurred with Denning et al., in which reported that the similarity and definition for antimicrobial sensitivity for pathogenesis of bacteria can help the clinician into selecting the suitable antimicrobial factors for treatment the patients. Gram-negative bacteria isolated appeared rise resistance ratios for various portions for antimicrobials, special between E. coli isolated with multidrug resistant [43].

Furthermore our outcomes study had been related with this study outcomes which showed the theory included the deep-seated inflam diseases actually an unnamed etiology had been resulted from the three pathogens various in the types of: 1) those that oversensitive and are previously recognized but because of their fastidiousness or reduction of estimation of their disease-generated probability are not including in the differentiation diagnosis, and 2) contagious factors earlier has not recognized that thus go undetected. In other ways several time the outputs from the either group could get in the misdiagnosis then poverty of the treat [44]. Other results of our study similar with that study results reported the depending to the biology to the organism and essential and external agents of the organism can generate a chronic inflammation. The pathogens to the third collection had been elicited like an output of autoimmune restraint in the stable inflammation without the insistence of the exciting factor [45].

The present study similar with the results in these studies mentioned that the risk factor Allele and the alterations of tumorigenesis
related genes in non-smokers or smokers which be one of the reasons of cause the lung cancer, pneumonia with respiratory allergic similar which outcomes into another studies which cumulating of sundry variations on tumorigenesis associated genes due to neoplastic bronchial lesions. The appearance for lung cancer into non-smokers which was 15% for was attributed for a union to genetic agents [46], also air pollution including smoking [47], radon gas [48], and asbestos [49].

References


