Pattern of community acquired pneumonia in pregnant ladies in Ain Shams University hospitals

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Abstract  Background:  Community acquired pneumonia (CAP) is recognized as a common problem that carries a substantial morbidity and mortality. The burden of disease falls mainly on people at the extremes of age and while the occurrence of CAP in young adults is uncommon. Nevertheless, pneumonia in young adults can be severe and fatal. Pneumonia in the pregnant patient is the most frequent cause of fatal non-obstetric infection.

Aim of the work:  The aim of this study was to assess the pattern of community acquired pneumonia among pregnant ladies in Ain Shams University hospitals.

Patients and method:  The present study included 168 pregnant ladies with community acquired pneumonia, who were selected from out patient’s clinics of obstetrics and gynecology department, Ain Shams University (ASUH).

Results:  The present study included 168 pregnant ladies with community acquired pneumonia, who were selected from out patient’s clinics of obstetrics and gynecology department, Ain Shams University (ASUH). Their ages ranged from 18-42 years old with mean age of 25.32 years old (±4.20 SD).

Conclusion:  Morbidity and mortality in pregnant patients with pneumonia continue to present a significant challenge. Early recognition of the diseases process and prompt treatment are required to ascertain an optimal outcome. The treatments in the gravid patients generally follow standard guidelines for the treatment of pneumonia in adults. Concern for fetal outcome should not delay treatment as improvement in maternal oxygenation and status is the best way to ensure fetal protection.

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Introduction

Community acquired pneumonia (CAP) is recognized as a common problem that carries a substantial morbidity and mortality. The burden of disease falls mainly on people at the extremes of age and the occurrence of CAP in young adults...
is uncommon [24] and Adel et al. [1]. Nevertheless, pneumonia in young adults can be severe and fatal [27]. Pneumonia in the pregnant patient, is the most frequent cause of fatal non-obstetric infection [16].

Alterations in cellular immunity have been widely reported and are aimed primarily at protecting the fetus from the mother. These changes include decreased lymphocyte proliferative response, especially in the second and third trimesters, decreased natural killer cell activity, changes in T cell populations with a decrease in numbers of circulating helper T cells, reduced lymphocyte cytotoxic activity, and production by the trophoblast of substances that could block maternal recognition of fetal major histocompatibility antigens [4].

The difficulties in diagnosis during pregnancy reflect the complexity of distinguishing between symptoms related to physiological changes and more sinister symptoms of disease. Patients themselves may attribute symptoms of pneumonia to pregnancy and hence defer consultation. Chest discomfort may also occur in the later stages of pregnancy, possibly due to the mechanical effects of the uterus on the diaphragm. It may be difficult to distinguish it from other causes of chest discomfort [7].

**Aim of the work**

The aim of this study was to assess the pattern of community acquired pneumonia among pregnant ladies in Ain Shams University hospitals

**Patients and methods**

The present study included 168 pregnant ladies with community acquired pneumonia, who were selected from out patient’s clinics of obstetrics and gynecology department, Ain Shams University hospitals (ASUH).

All the patients were subjected to the following:

1. History taking: The diagnosis of CAP which was done in the out patients clinics of the chest department ASUH and was based on the presence of selected clinical features (e.g., cough, fever, sputum production, dyspnea, and pleuritic chest pain) and was supported by imaging of the lung, (chest radiography).
2. Thorough clinical examination: Both general and local examination of the chest which were done in the chest department ASUH to establish the diagnosis of community acquired pneumonia and to exclude any other chest diseases.
3. Plain chest X-ray (CXR): A chest radiograph was required for the routine evaluation of patients who were likely to have pneumonia, to establish the diagnosis. But, it is estimated that radiation doses to the mother from a standard departmental posteroanterior chest radiograph, performed with a grid to reduce scatter and a peak voltage for the beam of 90–120 kV, is 5–30 m Rad. The absorbed dose for the uterus and fetus is 100 times less (about 300 μ Rad). A lateral chest radiograph results in greater exposure (maternal dose 150–250 m Rad) and was not usually required [3].
4. Laboratory Investigations: It was done in clinical and chemical department ASUH. Complete blood picture using auto mated coulter, total leucocytes count, (TLC), hemoglobin concentration. Blood film to demonstrate differential white blood cells count (WBCs) and morphology of red blood cells (RBCs), Erythrocyte sedimentation rate (ESR) using Western Green method. Liver function test (alanin transaminase (ALT), aspartate transaminase (AST), alkaline phosphatase (ALP) total and direct bilirubin total proteins and albumin-gamma glutamines (GGT). Kidney function test, (creatinine and urea) Fasting blood sugar, Post prandial (2 h) blood sugar.

5. Microbiological investigations: They were performed in Microbiology and Immunology department, faculty of medicine. Ain Shams University (ASU).

A. Pretreatment sputum samples were obtained from all patients. Good quality samples (having fewer than 10 squamous epithelial cells and more than 25 neutrophils per low power field) are subjected to the followings:

1-Direct smear stained with Gram stain and Zielh Neelsen stain (to detect acid fast bacilli).
2-Aerobic culture for bacteria using conventional culture media: blood agar, chocolate agar, MacConkey agar and Lowenstein Jensen media.
3-PCR to detect nucleic acids of *Chlamydia pneumoniae* and *Mycoplasma pneumoniae*.

B. Urine samples were obtained from all patients to detect *Legionella pneumophila* Ag using DFA (Direct fluorescent ab) test.

**Ethical aspects**

The study was explained to the pregnant patients and their husbands giving them a clear idea about the investigations done to them and that they have the right to withdraw from the study at any time.

**Statistical methods**

All data were collected, summarized, and analyzed by using an appropriate statistical package program (SPSS, 13). For quantitative data which were normally distributed and summarized by mean and standard deviation. For qualitative data were summarized by number and percentage.

**Results**

The present study included 168 pregnant ladies with community acquired pneumonia, who were selected from out patient’s clinics of obstetrics and gynecology department, Ain Shams University hospitals (ASUH). Their ages ranged from 18–42 years old with mean age of 25.32 years old (± 4.20 SD).

As regarded history taking of the 168 pregnant ladies, there was 121 cases complaining of fever (72.2%), cough was present in 151 cases (89.9%), sputum production was present in 112 cases (66.6%), dyspnea was present in 111 cases (66.6%), pleuritic chest pain was present in 59 cases (35.11%), and non respiratory complains in the form of nausea, vomiting, myalgia and headache was found in 65 cases (38.69%) (Table 1).
Pattern of community acquired pneumonia in pregnant ladies in Ain Shams University hospitals

There were 26 cases using tocolytic agents because of obstetric problems in presenting 15.47%.

Chest X ray radiography was done in all cases to establish the diagnosis and to exclude any other chest diseases. Within normal CXR was present in 71 cases (42.26%), pulmonary infiltrate was found in 41 cases (25.00%), atelectasis was detected in 16 cases (9.52%), pleural effusion was found in 4 cases (2.38%), pneumonitis was detected in 9 cases (5.42%), and 15 cases of pulmonary oedema (8.92%) (Table 1).

Table 2 shows that Streptococcus pneumonia in 55 cases (32.74%) was the most common organism followed by Haemophilus influenza in 35 cases (20.83%), M. pneumonia in 20 cases (11.90%), Staphylococcus in 15 cases (8.93%), Chlamydia pneumonia in 13 cases (7.74%), L. pneumophila in 14 cases (8.33%), Klebsiella pneumonia in 3 cases (1.79%), Pseudomonas aeruginosa in 1 case (0.60%), Mycobacterium tuberculosis (TB) was not found in any cases (0.00%), and in 12 cases of microbiological analysis showed No bacteriological agent (7.14%).

Discussion

Community acquired pneumonia (CAP) is recognized as a common problem that carries a substantial morbidity and mortality. The burden of disease falls mainly on people at the extremes of age and the occurrence of CAP in young adults is uncommon. Nevertheless, pneumonia in young adults can be severe and fatal [27]. Pneumonia the pregnant patient, pneumonia is the most frequent cause of fatal non-obstetric infection [16,13].

Alterations in cellular immunity have been widely reported and are aimed primarily at protecting the fetus from the mother. These changes include decreased lymphocyte proliferative response, especially in the second and third trimesters, decreased natural killer cell activity, changes in T cell populations with a decrease in numbers of circulating helper T cells, reduced lymphocyte cytotoxic activity, and production by the trophoblast of substances that could block maternal recognition of fetal major histocompatibility antigens [4,22].

In addition, hormones prevalent during pregnancy-including progesterone, human chorionic gonadotropin, alpha-fetoprotein and cortisol-may inhibit cell mediated immune function. These changes could theoretically increase the risk from infection, particularly by viral and fungal pathogens [17].

Mortality of 5.7% was reported in a BTS multicentre study of hospitalized adults aged 16–74 years compared with 0–1% in young ambulatory adults with CAP. Mortality from pneumonia in pregnancy is similar to rates in non-pregnant adults [18].

There is persuasive evidence to indicate that fetal outcome is affected by maternal pneumonia. Mothers with pneumonia are significantly more likely to deliver before 34 weeks gestation, with preterm delivery occurring in up to 43% of cases. Prostaglandin production or the host’s inflammatory response to infection may be responsible [5]. In addition, infants have been born to mothers with pneumonia weight significantly less. One study found a difference of 150 g in the birth weight of infants born to mothers with pneumonia compared with controls. Similarly, the frequency of low birth weight infants (2500 g or less) was higher in cases than in controls (16% vs. 8%) [10]. There is no firm evidence of any difference in perinatal mortality based on studies conducted over the last two decades. Mothers with pneumonia are more likely to deliver early and have infants of lower birth weight than other pregnant women [30].

The present study included 168 pregnant ladies with community acquired pneumonia, who were selected from out patient’s clinics of obstetrics and gynecology department, Ain Shams University hospitals (ASUH). Their ages ranged from 18–42 years old with mean age of 25.32 years old (± 4.20 SD).

As regarded history taking of the 168 pregnant ladies, there was 121 cases complaining of fever (72.2%), cough was present in 151 cases (89.9%), sputum production was present in 112 cases (66.6%), dyspnea was present in 111 cases (66.6%), pleuritic chest pain was present in 59 cases (35.11%), and non respiratory complains in the form of nausea, vomiting, myalgia and headache was found in 65 cases (38.69%).

In agreement with Halm and Teristein [12], who stated that, the evaluation of community acquired pneumonia is initiated based on patients symptoms of bacterial pneumonia in pregnancy are the same as in nonpregnant individuals. Mild upper respiratory complains preceding symptoms that include cough

Table 1 Demographic data for the pregnant ladies with CAP.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Number</th>
<th>Percent %</th>
</tr>
</thead>
<tbody>
<tr>
<td>History C/O</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fever</td>
<td>121/168</td>
<td>72.02</td>
</tr>
<tr>
<td>Cough</td>
<td>151/168</td>
<td>89.98</td>
</tr>
<tr>
<td>Sputum</td>
<td>112/168</td>
<td>66.66</td>
</tr>
<tr>
<td>Dyspnea</td>
<td>111/168</td>
<td>66.07</td>
</tr>
<tr>
<td>Pleuritic chest pain</td>
<td>59/168</td>
<td>35.11</td>
</tr>
<tr>
<td>Non respiratory complains</td>
<td>65/168</td>
<td>38.69</td>
</tr>
<tr>
<td>Associated diseases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asthma</td>
<td>9/168</td>
<td>5.35</td>
</tr>
<tr>
<td>Anemia</td>
<td>99/168</td>
<td>58.92</td>
</tr>
<tr>
<td>Tocolytic agents</td>
<td>26/168</td>
<td>15.47</td>
</tr>
<tr>
<td>Chest X ray</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>71/168</td>
<td>42.26</td>
</tr>
<tr>
<td>Pulmonary infiltrate</td>
<td>51/168</td>
<td>30.35</td>
</tr>
<tr>
<td>Atelectasis</td>
<td>16/168</td>
<td>9.52</td>
</tr>
<tr>
<td>Pleural effusion</td>
<td>4/168</td>
<td>2.38</td>
</tr>
<tr>
<td>Pneumonitis</td>
<td>11/168</td>
<td>6.54</td>
</tr>
<tr>
<td>Pulmonary oedema</td>
<td>15/168</td>
<td>8.92</td>
</tr>
</tbody>
</table>

Table 2 Prevalence of organisms found in studied CAP in pregnant ladies.

<table>
<thead>
<tr>
<th>Organism</th>
<th>Number of cases</th>
<th>Prevalence %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Streptococcus pneumonia</td>
<td>55</td>
<td>32.74</td>
</tr>
<tr>
<td>Haemophilus influenza</td>
<td>35</td>
<td>20.83</td>
</tr>
<tr>
<td>Mycoplasma pneumonia</td>
<td>20</td>
<td>11.90</td>
</tr>
<tr>
<td>Staphylococcus</td>
<td>15</td>
<td>8.93</td>
</tr>
<tr>
<td>Chlamydia pneumonia</td>
<td>13</td>
<td>7.74</td>
</tr>
<tr>
<td>Leigonella pneumophilia</td>
<td>14</td>
<td>8.33</td>
</tr>
<tr>
<td>Klebsiella pneumonia</td>
<td>3</td>
<td>1.79</td>
</tr>
<tr>
<td>Pseudomonas aeruginosa</td>
<td>1</td>
<td>0.60</td>
</tr>
<tr>
<td>Mycobacterium tuberculosis (TB)</td>
<td>0</td>
<td>0.00</td>
</tr>
<tr>
<td>No bacteriological agent</td>
<td>12</td>
<td>7.14</td>
</tr>
<tr>
<td>Total</td>
<td>168</td>
<td>100.00</td>
</tr>
</tbody>
</table>
in more than 90%, sputum production in 66%, dyspnea in 66% and pleuritic chest pain 50%, and non respiratory symptoms including headache, fatigue, myalgia, sweat and nausea. Also Kasper et al. [15], stated that, clinical symptoms of pneumonia including fever, cough, pleuritic chest pain, rigors, chills, and dyspnea. During pregnancy 59.3% of patients reported cough, 32.2% shortness of breath and 27.1% reported pleuritic chest pain.

Maternal asthma was found in nine cases (3.39%) and anemia was detected in 99 cases (58.92%). In agreement with [19] reported that 24% of patients with patient’s antepartum pneumonia had an underlying maternal illness. And [21], maternal asthma (odds ratio 5.3%) and anemia (odds ratio 9.9%) are significantly associated with the development during pregnancy. Briggs et al. [6] and also, [26], comorbid conditions such as asthma, liver diseases, chronic obstructive pulmonary diseases and pregnancy increase the susceptibility of pneumonia and its complications Tarek et al. [28].

In our results, there were 26 cases using tocolytic agents because of obstetric problems presenting 15.47%. Munn et al. [21], said that, tocolytic agents given to induce labour have been associated with the development of pneumonia. They also increase the risk of respiratory insufficiency due to pneumonia through the promotion of pulmonary oedema. It has therefore been recommended that they are not used in pregnant patients with pneumonia [14,25].

Chest X-ray radiography was done in all cases to establish the diagnosis and to exclude any other chest diseases. Within normal CXR was present in 71 cases (42.26%), pulmonary infiltrate was found in 51 cases (30.35%), atelectasis was detected in 16 cases (9.52%), pleural effusion was found in four cases which was mild (2.38%), pneumonitis was detected in 11 cases (6.54%), and 15 cases of pulmonary oedema (8.92%). (Table 1) [21], demonstrated that, 98% of patients with antipartum pneumonia had positive chest radiography with finding infiltrate, atelectasis, pleural effusion, pneumonitis or pulmonary edema. Also [26], stated that CXR performed in patients in whom pneumonia is suspected lobar consolidation, cavitations and pleural effusion are shown in typical bacterial lobar pneumonia [29,8].

Our results showed that, S. pneumoniae in 55 cases (32.74%) was the most common organism followed by H. influenzae in 35 cases (20.83%), M. pneumoniae in 20 cases (11.90%), Staphylococcus in 15 cases (8.93%), C. pneumoniae in 13 cases (7.74%), Legionella pneumophila in 14 cases (8.33%), K. pneumoniae in 3 cases (1.79%), P. aeruginosa in 1 cases (0.60%), M. tuberculosis (TB) was not found in any cases (0.00%), And in 12 cases of microbiological analysis showed No bacteriological agent (7.14%). In agreement with Lim et al., 2003, who found the most common bacterial agent identified in pregnancy include streptococcus pneumonia in 17% of cases and H. influenzae identified in 6% of cases. Also in agreement with [11] who found the most common single pathogen is streptococcus pneumonia which is responsible for 30–50% of identified cases followed by H. influenzae and M. pneumoniae. But [23,9], found M. pneumoniae is another common cause of pneumonia in pregnancy [20,2].

**Conclusion**

Morbidity and mortality in pregnant patients with pneumonia continue to present a significant challenge. Early recognition of the diseases process and prompt treatment is required to certain an optimal outcome. The treatments in the gravid patients generally follow standard guide lines for the treatment of pneumonia in adults. Although concern for fetal outcome should not delay treatment as improvement in maternal oxygenation and status is the best way to ensure that fetus will be protected.

**References**


