Misuse of Antibiotics among Pneumonia Patients in Medical Wards at Al-Thawrah Hospital in Sana’a City, Yemen

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ABSTRACT

Background: Antimicrobial resistance is a major threat to human health worldwide. It is a growing problem that is related to the use of antibiotics. Irrational prescribing is a habit which is difficult to counteract, so this may lead to ineffective treatment and health risks.

Objective: The aim of this study is to determine the prevalence of antibiotic misuse among pneumonia patients in Medical Wards as well as to identify the association between antibiotics misuse and influencing factors.

Methods: A retrospective cross-sectional study was carried out from January to December 2013. The study was conducted using patient’s records among Pneumonia patients in medical wards at Al-Thawrah hospital in Sana’a city, Yemen. The data collected from the patient’s records were analyzed using SPSS Version 20.

Results: A total of 127 patients who had admission records in hospital were reviewed. The mean age of the study sample was 49.6 (SD = 18.9). Pneumonia was the highest disease (78.7%), the duration of therapy was > 7 days (53.5%). The majority nature of the disease was acute (58.3%). The misuse of antibiotics according to American method was 39.7%. There was a statistically significant association between type of disease and misuse of antibiotics at P-value = 0.008. The highest prevalence of the misuse of antibiotics was among patients with pleural effusion followed by pneumonia with pleural effusion patients and pneumonia patients.

Conclusion: The prevalence of antibiotic misuse among pneumonia patients in the medical wards at Al-Thawrah hospital was high. This needs to be addressed immediately to prevent an increase in the incidence of antibiotic resistance in the future.

KEY WORDS
antibiotics, misuse, resistant, pneumonia, hospital

INTRODUCTION

Antimicrobials are one of the most common groups of drugs prescribed in hospitals. It had been estimated that up to one third of all patients receive at least one antimicrobial agent during hospitalization. Drug misuse refers to the use of a drug for purposes in which it was not intended for or the use of a drug in excessive quantities. The irrational use of antibiotics has become common practice in developing countries as the prevalence of infectious disease burden is aggravated by uncontrolled access to antibiotics. Irrational prescribing is a habit which is difficult to counteract and this may lead to ineffective treatment and health risks. Yemen is a developing country that has an inappropriate, ineffective and inefficient use of drugs, especially antibiotics in hospitals. Past studies in the literature have found that exploring the factors that could influence the prescribing practice of antibiotics will effectively improve the use of antibiotics.

Similarly, inappropriate drug prescribing is a global problem. Misuse of drugs occurs in all countries. Misuse of antibiotic therapy includes failure to complete therapy, skipping doses, reuse of leftover antibiotics, inappropriate choice of antibiotics, inappropriate combinations, imperfect dose regimens and prolonged duration of drug usage. There are many factors influencing irrational prescribing such as patients, prescribers, the workplace environment, supply system, government regulations, drug information and misinformation. Many prescribing characteristics are responsible for behaviors and motivations in antibiotic misuse in the community. These characteristics have been identified as mainly due to many factors related to doctors and patients that lead to misuse of antibiotics.

Irrational drug use leads to a reduction in the quality of drug therapy, wastage of resources, increased treatment costs, increased risk of adverse drug reactions and emergence of drug resistance. The excessive and indiscriminate use of the antibiotic has led to the emergence and dissemination of resistant organisms. This puts drug efficacy in danger. The major problems encountered were an increasing number of pathogens as well as unavailable and unreliable diagnostic tests of infections and laboratory investigations.

Nevertheless, there are a limited number of studies conducted in different countries regarding the misuse of antibiotics. In Egypt, a study showed that about 20% of patients were considered to be receiving inappropriate antibiotic therapy. The type of misuse in the highest frequency was the inappropriate combination which represented 50% of the total, followed by the wrong dose regimen which represented about 20% in total. In Malaysia, a study revealed that the majority of the admitted patients (53.6%) received two or more antimicrobials in different combinations for their treatments. The intravenous route was the most preferred method (57.3%) used to administer the antimicrobials. In India, one study found that the highest percentage of antimicrobials most commonly prescribed was levofloxacin followed by cefuroxime (28%, 22%) in the Yemen Thamar Province, there was a study that showed only 48% of doctors depended on laboratory investigations and all of the doctors’ prescriptions (100%) in this study were without cul-
tured sensitivity tests. The rationality of its major importance because of the need for more expensive second-line drugs and longer hospital stays associated with therapy failure. Diagnostic tests for infections are commonly unreliable and expensive. In the case of antibiotic prescribing, since inappropriate prescriptions or overuse of antibiotics can contribute to the emergence of antibiotic-resistant bacteria, antibiotic resistance is a major health problem worldwide and international efforts are needed to counteract its emergence. Respiratory infections which are a common burden to the health like pneumonia patients are also becoming increasingly common in the elderly, and it is associated with significant morbidity and mortality compared to younger adults. Pneumonia affects approximately 450 million people globally per year, seven percent of population, and results in about 4 million deaths, mostly in developing countries.

The purpose of this study was to determine the prevalence of antibiotic misuse among pneumonia patients in Medical Wards and to identify the association between antibiotic misuse and its influencing factors (demographic factors, socioeconomic factors, duration of therapy, type and nature of disease).

MATERIALS AND METHODS

This study was a retrospective cross sectional study. The population of this study was obtained using hospital data (medical records) of admitted pneumonia patients who were receiving antimicrobial therapy in the medical wards at Al-Thawrah Hospital, which is one of the major hospitals in Sana'a city, Yemen. The sampling method used was simple random sampling. The total number of admitted pneumonia patients' records from the medical wards at Al-Thawrah hospital was 230 in 2013. A total of 127 patients' records were taken by the simple random method from 16th August to 16th September 2014. The sample size was calculated using the formula Kish Leslie, 1965: N = (1.96)^2 *P * (1 - P) / W^2; where: W = the width of confidence interval 5%, P = the expected proportion (0.91). This proportion was calculated from a previous study in Thailand. The inclusion criteria included admitted pneumonia patients of either sex of age ≥ 18 years. Children and patients in other wards were excluded.

Data collection was done from January to December in the year 2013. Data was collected based on a questionnaire. Medical records of patients were reviewed and data was transferred into the questionnaire. All medication records of the patients (patient's files) were investigated and compared with standard guidelines of antibiotic therapy. The questionnaire was divided into three sections, (a) Demographic and socioeconomic characteristics, (b) History of disease (severity of pneumonia among patients), and (c) Misuse prescribing of antibiotics. The questionnaire contains patient's details including demographic variables which include inpatients that are ≥ 18 years, the age groups are as follows (18-39, 40-64, ≥ 65), and if they were male or female. The marital status of admitted patients were divided in to single, married, widowed and divorced.

Secondly, the socioeconomic variables of the data were included. The education level of patients was illiterate, able to read and write, primary school, secondary school and bachelor. The economic status was divided into poor, moderate and good. The occupation was the patient's jobs such as house wife, farmer, worker and retired. The residence area was divided into two sections, Sana'a and governorate. The governorate patients area of living such as Thamar, Amran, Sada'a, etc. But from these governorates patients came to Al-Thawrah hospital and were admitted to treatment.

Thirdly, misuse characteristics of the antibiotics. Specific issues related to the antimicrobial used included name of antimicrobials, course of antibiotics, combination of antibiotics, route of administration, generic name, type and nature of disease, duration of therapy, availability, cost effectiveness, and culture investigation. The names of antibiotics were ceftriaxone, clarithromycin, levofloxacin, amoxicillin with clavulanate, and ceftazidime. The course of antibiotics was divided into completing the dose, skipping or stopping the dose and leftover the dose. The combination of antibiotics was divided into combination or not. The routes of administration were oral and parenteral (intravenous and intramuscular). The antibiotics were prescribing by the scientific name or trade name. The nature of disease was divided into chronic or acute. The type of disease was divided into pneumonia, pneumonia with pleural effusion, and pleural effusion. The duration of therapy was divided into less than 7 days, 7 days, and more than 7 days. The blood culture investigation was divided into whether the patient had undergone culture investigation before prescribing antibiotics or not. The drug availability was divided into whether the antibiotics which were prescribed according to drug availability or not and whether the cost affected it or not.

Fourthly, the independent variables about the misuse of antibiotics according to American method were use of antibiotic for purposes in which it was not intended, inappropriate choice and dose, irrational and overuse or underuse of antibiotics. Misuse of antibiotics was divided into two groups of yes or no. Yes, if medication records of patients were different or deviated from guidelines. No, if medication records of patients were similar to guidelines.

The data were entered into the computer-based Statistical Program-Statistical Package for the Social Sciences (SPSS) Version 20 for analysis. Chi-square test was used to identify the association between the variables and misuse of antibiotics.

RESULTS

A total of 127 treatment charts of admitted patients were reviewed. Table 1 summarizes the socio-demographic characteristics of the patients. This study results showed that ceftriaxone 89 (70.1%), clarithromycin 70 (55.1%), levofloxacin 24 (18.9%), amoxicillin with clavulanate (Augmentin) 22 (17.3%), and ceftazidime 19 (15%) were the most frequently used antimicrobials across the medical wards of the hospital and highest percentage of prescribed antibiotics (Figure 1).

Pneumonia was the main (78.7%) disease found. Most of the therapy was in the category of more than 7 days (53.5 %) and the highest percentage of nature of the disease was acute (58.3%). Highest percentage of antibiotics was the combination category (79.5%) with intravenous route being the most preferred method (96.9%) used to administer the antimicrobials. The percentage of antimicrobials prescribed by generic name was 73.2%. In this study, it was identified that there are three factors could influence prescription in the hospital including the socio-economic status of patients, availability and cost of drugs. 91.3% of antimicrobials were prescribed according to their availability at the hospital and the highest proportion of misuse of antibiotics according to the American method was 39.7%.

Table 2 showed the association between misuse prescription and socioeconomic factors, type and nature of the disease and duration of therapy. There is no significant association between misuse of antibiotics and socio-demographic factors, nature of the disease and duration of therapy. The highest prevalence of misuse of antibiotics among pleural effusion patients was 72.2%. It was followed by pneumonia with pleural effusion patients at about 44.4%. There was a significant association between misuse of antibiotics and type of disease (p value = 0.008).

DISCUSSION

Antibiotics are one of the major causes of drug-related problems. The misuse of antibiotics are a major threat to widespread bacterial resistance. So, the present study focuses on antibiotic misuse among pneumonia patients in medical wards at the Al-Thawrah hospital in Sana'a and its influencing factors. In the present study, results revealed that a majority of the admitted patients were males, which is similar to a Malaysian study conducted by Seikh Farid et al.11 but in contrast from other previous studies.10 The majority of patients were in the age group of 40-64 years which was similar to an Indian study where the largest age group was between 41 and 60 years old.12 The highest percentage of education level among admitted patients was half illiterate which is similar to previous studies in the Thomar province from a Yemeni study.13 But, the Thomar study was done among outpatients. The majority income group category was almost poor which indicates the percentage of socio-economic status among admitted patients in Al-Thawrah hospital. In the Malaysian study, the socio-economic status of patients is one of the factors influencing the prescribing of antibiotics in the hospital.11 The study results revealed the great diversity of antimicrobials used for the treatment of admitted pneumonia patients in the medical wards of the selected hospital. The top most frequently used antimicrobials were ceftriaxone followed by clarithromycin, levofloxacin and amoxicillin with clavulanate (Augmentin). Ceftriaxone was the most commonly prescribed antibiotic in our study which is in contradiction to other studies.12,13,21.
In the present study, pneumonia was the highest disease which is similar to other previous studies in Malaysia and India. Majority of the nature of the disease was mostly acute. This result was higher than previous other studies whereby it was found that 37.7% of patients were admitted due to an acute condition whereas 62.3% of patients were known to have chronic diseases. For the duration, majority of therapy was more than 7 days. This result is higher than other studies done in Egypt but was in contradiction with other previous studies conducted in India.

The intravenous route was the most preferred method used to administer the antimicrobials in our study which was higher than previous studies. This result was high compared to studies done in departments other than respiratory medicine. A percentage of antimicrobials were almost prescribed by generic name. This result is similar to previous studies but in contrast with studies done in India. Majority of patients do not undergo culture and sensitivity tests before being prescribed antibiotics, similar to studies conducted in Yemen. This study identified the factors usually contributing to prescribing practices in the hospital (socio-economic status, availability and cost of drugs). The majority of antibiotics were prescribed according to their availability at hospital, similar to studies conducted in Malaysia and also the highest percentage of cost effectiveness, which is similar to previous studies. Many times, the physicians were prescribing inappropriate antibiotics because the availability and the cost effects are the major factors influencing antibiotic prescribing at hospitals. The majority of misuse of antibiotics according to the American method was (39.7%) higher than what studies conducted in Egypt (20%) considered receiving as the inappropriate antibiotic therapy. The highest prevalence of misuse of antibiotics was among pleural effusion patients. It followed by pneumonia with pleural effusion patients and finally the pneumonia patients. There was a significant association between the misuse of antibiotics and type of disease. However, this study did not find any significant association between the misuse of antibiotics and socio-demographic factors, nature of the disease and duration of therapy.

CONCLUSION

This study shows that the prevalence of antibiotic misuse was high among pneumonia patients in the medical wards at Al-Thawrah hospital with high percentage of patients not undergoing sensitivity and bacterial resistance tests before being prescribed antibiotics.

The reason for a high percentage of antibiotic misuse was the socioeconomic status of poor patients. Additionally, the number of antibiotics prescribed according to drug availability was high. Results also showed that supply of the types of antibiotics which was necessary in the medical wards was not enough. This lead to most physicians prescribing antibiotics according to availability in the hospital which sometimes were inappropriate.

So, it is recommended for physicians to perform culture and sensitivity investigations to determine the type of bacteria and examine the antibiotic resistance of patients before prescribing antibiotics to avoid the occurrence of bacterial resistance and maintain the patient’s immunity.

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REFERENCES