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Utilization Rate of Antibiotics in Governmental Hospitals Out-Patient Clinics and Primary Health Care Centers in Al-Nasiriya City At 2017.

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Abstract

Background: Antibiotic over prescription is a worldwide problem. It represents a major factor for the development of bacterial resistance and treatment failure. Treating those resistant bacterial infections requires expensive and limited antibiotics.

Objectives: Measure the extent of antibiotic prescription in hospitals out-patient clinics and primary health care centers.

Materials and Methods: An observational cross-sectional analytical study was carried out on 688 patients of both genders and different ages according to Dobson's formula, excluded patients with TB. The study was done in almost all the out-patient clinics in Al-Nasiriya governmental hospitals including (Al-Hussein Teaching Hospital, Bint Al-Huda Teaching Hospital and Al-Habboobi Teaching Hospital) along with fifteen randomly selected primary health care centers from the 2nd of January, 2017 to the 1st of October, 2017. The prevalence of the problem (46%) took from the research pilot study. Statistical Package for Social Sciences (SPSS) was used for analysis, P value less than 0.05 was considered as significant.

Results: The results showed a high prescription rate of antibiotics (61%), cephalexin was the most frequently prescribed antibiotic (18.9%), while nitrofurantoin, amikacin and doxycycline were the least prescribed drugs with a prevalence of (0.2%) each.

Conclusion: A high prescription rate was an obvious result in this study. Giving the fact that cephalexin was the most prescribed antibiotic.

Keywords: Antibiotic, over prescription, bacterial resistance.

1.1. Introduction

Antimicrobials, specially antibiotics are probably one of the most important forms of chemotherapy that revolutionized in the history of modern medicine as infections are extremely common and causing a large number of diseases affecting human health in a bad way. Most of infections are caused by bacteria which can be treated by antibiotics[1]. Many infections, specially respiratory infections are caused by viruses.[2,3] Thus the benefit from antimicrobials is minimal. There's a strong evidence that antibiotics are frequently administered for upper respiratory tract infections[4,5] which is contributing to the development of resistant strains of bacterial pathogens and placing a burden on the economy of the health care system[6,7]. Over prescription is a global threat. It refers to prescribing an antibiotic in greater amounts or on more occasions than necessary[8]. About 80–90% of antibiotics are prescribed for oral use in primary care. Half of these are prescribed for respiratory infections and one-sixth are for urinary tract infections[9]. Many general practitioners prescribe for mild infections like sore throat or otitis media in order to avoid the risk of developing complications such as quinsy or mastoiditis, but there is little evidence that antibiotics have a major effect on duration or severity of symptoms[10]. Over prescription, as mentioned, is not only a local problem, it is also found in many neighboring countries. This problem should be taken seriously and efforts should focus on minimizing the rising rate of antibiotic over prescription through following standard guidelines, proper investigations for patients to identify the causative bacteria and culture and sensitivity testing are also very crucial to avoid the emergence of bacterial resistance[1].

1.1.1Historical Overview:

Many substances that we use for the treatment of various infections had been used in the past[11]. For example, moulds containing penicillin had been applied to wounds hundred years ago; mercury was introduced to treat syphilis (16th century); and the use of cinchona bark for the treatment of malaria (17th century)[11,12]. However, the revolution of appropriate chemotherapy did not begin until Ehrlich discovered that aniline dyes stained bacteria selectively in tissue preparations, which could be killed selectively[11]. The next revolutionary event occurred in 1928, when Alexander Fleming discovered by accident the long-known activity of *penicillium* fungus to inhibit bacterial culture growth[11] .

Selman Waksman was the first one that used the word *antibiotic* as a noun in 1941 describing any small molecule synthesized by a microbe that antagonizes or inhibit the growth of other microbes. From 1945–1955 the development of penicillin, along with streptomycin, tetracycline and chloramphenicol which were made by soil bacteria, ushered in the antibiotic age[13].

The Most important event is the discovery of penicillin by Alexander Fleming[12]. History of antibiotics can be divided into two segments; early and modern history:

Early History:

During ancient times; Indians and Greeks tried moulds and other special plants to cure infections[14]. In Serbia and Greece, they used mouldy bread for infections and wounds[14,15]. In Russia warm soil was used by farmers to treat infected wounds[15]. Mixture of beer soup, snake skins and turtle shells was used by Sumerian doctors to manage wound infections[15]. Ancient doctors in Babylon used a mixture of sour milk and frog bile to heal eye infections. Army of Sri Lanka used oil cake as an antibacterial and desiccant.[12]

Modern History:

In 1640, England, John Parkington recommended to use mold in his pharmacology book[16]. In 1870, also in England, Sir John Scott Burdon-Sanderson observed that fluid culture covered with mold did not grow bacteria[16]. In France 1877, Louis Pasteur, based on his postulations, said that bacteria can kill other bacteria (anthrax bacilli)[15,16], and Guinea pigs were treated from typhoid infections using the mold Penicillium glaucium by Ernest Duchesne[12,16]. In 1928, England, Alexander Fleming discovered from the fungus Penicillium notatum the antibiotic substance penicillin[12]. **1.1.2.Rationale**

Antibiotic over prescription is a global issue that require immediate attention and intervention as its consequences are inevitable and have a great impact on the people's general health and cost-effectiveness. Development of bacterial resistance due to irrational antibiotic usage is the most important complication as it render the causative microorganism resistant to available drugs. Also inventing or making a new antibiotic is not an easy task, it requires many years and facilities with enormous finances. Here, in this study the researcher spots the light on our hospitals and PHC clinics regarding how much doctors are prescribing antibiotics for patients with different presentations.

1.2.Literature Review

1.2.1.Definitions:

The World Health Organization (WHO) has defined medicines rational use in 1985 as:

drugs' rational use requires that patients receive medicines that are appropriate to their clinical needs, in doses that are optimum to their own individual requirements in an adequate time period, and at the least expensive cost[17].

1.2.2. Antibiotic overuse:

Excessive or irrational use of antibiotics can lead to many significant clinical and economic problems[18]. The emergence of bacterial resistance is one of these important consequences and a factor of treatment failure[19]. It may lead to alteration in or destruction of the body's beneficial bacterial flora, which is crucial for the host body function.

Antibiotics can be considered as pollutants, because a major part of them is excreted essentially unchanged into the environment by human waste. It may reach millions of metric tons in a year[20]. Another important consequence of unjustified use of antibiotics is the possibility for the patient to develop side effects ranging from mild rash and hives to life-threatening instant anaphylaxis. One of these serious side effects is *c. difficile*-associated diarrhea, which is now rising in incidence specially after using broad-spectrum antibiotics which have the greater effect on changing intestinal flora[21]. Adding to the clinical problems mentioned above, the cost and slow rate of developing new antibiotics are significant obstacles[22].

1.2.3. Epidemiology:

Antibiotic overuse is a global threat, and a very important challenge for health care providers, and studying the pattern of consumption is an important step to solve this problem[23] .

Figure (1-1) shows the top 10 countries with the highest rate of antibiotic usage. The countries are ranked according to the overall volume of prescribed antibiotics[24].

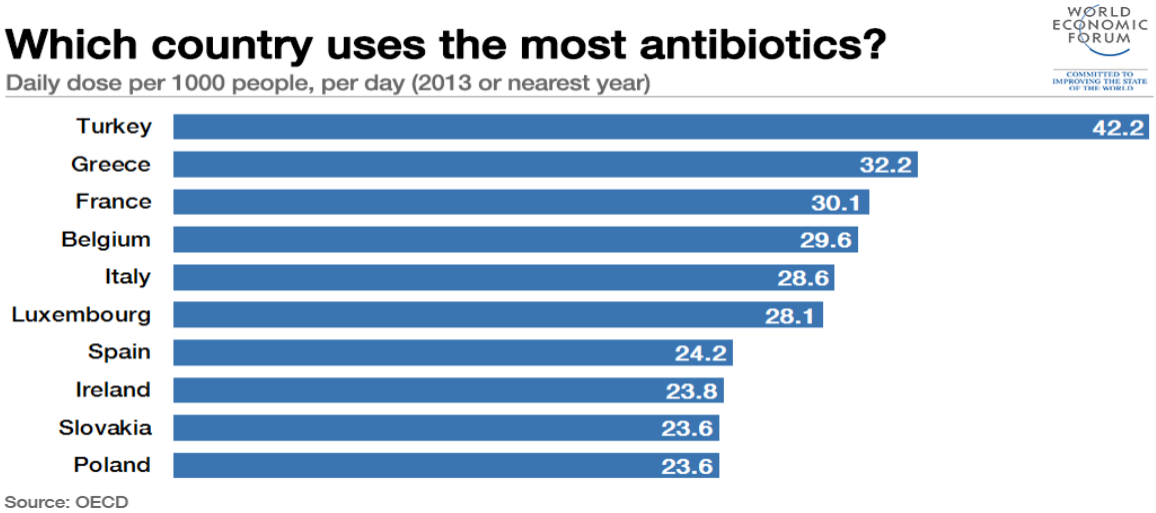

Figure (1-1): The top 10 countries with the highest rate of antibiotic usage

A study conducted in six Iranian hospitals in 2011 showed that 99% of outpatients were prescribed at least one antibiotic. And in Kuwait, a study, carried out in 2010, documented that half of 270 patients with upper respiratory tract infections were prescribed antibiotics, while truly indicated cases were only eight[25]. More recently, in Jordan, a study conducted in 2016 stated that antibiotics were prescribed to 78.4% children with respiratory tract infections, of those patients, 69.2% were not indicated to receive antibiotics[26].

Moreover, in the Middle East, antibiotics are easily obtained over the counter. For example, a study in Saudi Arabia in 2010, found that almost half of the medications that consumers bought from community pharmacies without a prescription were actually prescription-only medications, and 45% of the participants did not tell the pharmacist of the prescribed medication(s) that they were using at home(27). In Iraq, a study conducted in the Holy City of Al-Najaf in 2016 revealed that more than 21 million of defined daily doses (DDDs)* were distributed in the city in one year; about 54.2% (mostly penicillins) were prescribed by governmental health care settings[28].

DDDs is the average maintenance dose in a day for any drug used for its main indication in adults. It is a technical unit of measuring drug consumption[29].

Patient compliance to treatment with antibiotics is as important as over prescription by physicians. A patient survey in 11 countries all over the world found that 22.3% of patients who received antibiotic medication for acute infections admitted not finishing the treatment course[30] .

1.2.4.Classification:

Antibiotic misuse: refers to using the drug in an incorrect way. May include less dosing, overdosing, or incorrect timing[31].

Overuse: using antibiotics excessively or too frequently[32].

Over prescription: prescribing an antibiotic in greater amounts or on more occasions than necessary[8].

1.2.5.Use of Antibiotics:

According to World Health Organization (WHO) estimation, more than half of all pharmaceutical products are inappropriately prescribed, distributed, and sold and more than half of all patients use the medicines prescribed for them incorrectly[33].

The general principal is that the choice of the antibiotic should be based on the microbe type and susceptibility tests. This usually takes time, so therapy, at least for the serious infections, is usually started empirically[34].

1.2.5.1.General Guidance:

Medicines should be prescribed only when they are necessary, and in all cases the benefit of administering the medicine should be considered in relation to the risk involved. This is particularly important during pregnancy, when the risk to both mother and fetus must be considered.

It is important to discuss treatment options carefully with the patient to ensure that the patient is content to take the medicine as prescribed[35]. In particular, the patient should be helped to distinguish the adverse effects of prescribed drugs from the effects of the medical disorder. When the beneficial effects of the medicine are likely to be delayed, the patient should be advised of this[35].

Difficulties in adherence to drug treatment occur regardless of age. Factors contributing to poor compliance with prescribed medicines include:

-prescription not collected or not dispensed,

-purpose of medicine not clear,

-perceived lack of efficacy,

-real or perceived adverse effects,

-patients' perception of the risk and severity of side effects may differ from that of the prescriber,

-instructions for administration not clear,

-physical difficulty in taking medicines (e.g. swallowing the medicine, handling small tablets, or opening medicine containers),

-unattractive formulation (e.g. unpleasant taste),

-complicated regimen[35].

Here are some of the basic principles for prescribing antibiotics in out-patient settings:

We should take in consideration regarding empiric antibiotic prescription the shortest duration possible, the narrowest spectrum, cost effective and standard local guideline-based antibiotic[34].

1.2.5.1.1.Obtaining an accurate infectious disease diagnosis:

Diagnosis is usually obtained by identifying the site of infection, the host (e.g., immunocompromised, elderly, diabetic), and the causative agent if possible. It is crucial to isolate the causative pathogen especially in serious life-threatening infections. Also,

when a patient being treated with antimicrobials chosen on the basis of his clinical presentation, further investigations are required to identify the etiologic agent or rule out noninfectious diagnoses. To obtain an accurate pathogenic diagnosis, physicians should make sure that specimens are properly obtained and promptly submitted to the microbiology laboratory, preferably before administering antimicrobial therapy[36]. Although the infections diagnosis is ideally obtained by bacterial culture and serologic testing, frequently the "most likely" etiologic pathogen can be inferred from the clinical symptoms and signs[36]. For example, cellulitis is usually assumed to be caused by staphylococci or streptococci, and antibacterial treatment can be given without a positive culture[36]. Similarly, community-acquired pneumonia that is not indicated for hospitalization can also be treated empirically with a macrolide or fluoroquinolone antibiotic[37] .

1.2.5.1.2. Timing of initiation of antimicrobial therapy:

Initiating antimicrobial therapy is guided by the urgency of the situation. In life-threatening conditions, e.g. in septic shock, febrile neutropenia, and bacterial meningitis, empirical treatment should be given immediately after or simultaneously with collection of diagnostic specimens because results are usually not available for 24 to 72 hours. In more stable patient presentations, treatment with antibiotics should be deliberately postponed until appropriate specimens have been collected and cultured. For example subacute bacterial endocarditis and vertebral osteomyelitis/diskitis[34]. Early administration of antimicrobial therapy in these conditions can suppress bacterial growth, hence reducing the opportunity to make an accurate pathogenic identification, which is critical in managing these patients, who need weeks to months of directed antimicrobial therapy to achieve cure[34].

1.2.5.1.3. Interpretation of antimicrobial susceptibility testing results:

When a specific microorganism is identified in clinical cultures, the next step should be performed is antimicrobial susceptibility testing (AST). The aim of AST is predicting the clinical success or failure of the antibiotic being tested against a specific microorganism. Minimum inhibitory concentration (MIC) is usually used to interpret data in most laboratories, it represents the lowest concentration of an antibiotic that inhibits visible bacterial growth, and are referred to by the laboratory as "susceptible", "resistant" or "intermediate" according to Clinical and Laboratory Standards Institute criteria[34].

1.2.5.1.4. Drug combinations:

Most infections can be treated with a single drug. However, there are situations in which more than one antibiotic is prescribed concurrently:

- Broadening antibacterial spectrum. Use of more than one agent broadens the antibacterial spectrum of the empirical therapy and thus ensures that at least one agent will cover the infecting organism. It has been shown by clinical studies that initial appropriate antibiotic choice is one of the most important determinants of mortality in critically ill patients[38,39,40]. Patients infected with resistant organisms are more likely to get delayed appropriate antibiotic and subsequently mortality increases[41,42]

- And for synergistic effect (e.g. using co-trimazole in the treatment of pneumocystis carinii pneumonia)[43].

- Emergence of resistance

- Adding gentamicin to penicillin has shown bactericidal activity, while penicillin alone is only bacteriostatic and gentamicin when used alone shows no significant activity[44].

1.2.5.1.5. Host factors should be considered in selecting antimicrobial agent:

It's usually helpful for physicians to be familiar with some specific antimicrobial agents, but a "one size fits all" approach is not accurate in antibiotic selection[34]. Several host factors to consider are:

- ✓ Hepatic and renal function:

The liver and kidney are the main organs that eliminate drugs, so it's crucial to know that they are functioning well in order to administer antimicrobial agent(s). usually dose reduction may be required to avoid accumulation and toxicity in patients having impaired renal and/or hepatic function. However, in some cases higher doses are required to avoid underdosing usually in young healthy patients and rapid hepatic metabolism owing to enzyme inducers such as concurrent use of phenytoin or rifampicin[34].

- ✓ Age:

Extremes of age handle drugs differently, mainly due to different body sizes and kidney function. pediatric drug dosing is usually administered according to weight. In elderly patients, to assess kidney function; the creatinine clearance should be estimated by factoring in weight and age for such patients[34].

- ✓ Genetic variation:

Genetic susceptibility to some antimicrobials adverse effects has been demonstrated in some cases and it's significant enough to alarm for testing prior to administer certain drugs[45]. For example in cases of glucose-6-phosphate dehydrogenase (G6PD) deficiency patients, can suffer from hemolysis when are exposed to certain antimicrobials, such as

nitrofurantoin, dapsone, and primaquine . These agents should be avoided in this condition, and it is advisable to test for this enzyme deficiency in patients who might be at a higher risk of having G6PD deficiency (e.g. African Americans) before giving these drugs[34] .

- ✓ Pregnancy and lactation:

Special attention must be paid before prescribing an antibiotic for a pregnant woman, as it can affect both the mother and fetus. The most commonly used antibiotics in pregnancy and are considered to be safe include penicillins, macrolids and cephalosporins. On the other hand, certain drugs have well-described fetal adverse effects and should be avoided during pregnancy, like tetracycline and chloramphenicol[34],[46].

- ✓ History of an allergy or intolerance.
- ✓ History of recent use of an antibiotic:

Recent antimicrobial use by the patient (approximately 3 months) can help in choosing an appropriate antimicrobial therapy, since the causative organism is likely to be resistant to that drug or its class if it is used in less than the period mentioned above and an alternative antibiotic should be used[34].

1.2.5.1.6. Duration of treatment:

Many studies were done trying to figure out the optimal course for treating infections with special emphasis on short courses of treatment. For example, treatment of uncomplicated UTI in women is best to be limited to 3 days[47] and 5 days for treating community-acquired pneumonia [48].

1.2.6.Bacterial resistance:

The resistance of bacterial populations to antibiotics is constantly changing and can become a serious clinical problem, rendering previously useful antibiotics inactive. Although most multiresistant bacteria have developed in hospitalized patients, the majority of antibiotic prescribing takes place in primary care. Therefore, current guidelines emphasize the following points[49]:

a. No antibiotic prescribing for cough and colds or viral sore throats;

b. Limit prescribing for uncomplicated cystitis to three days for otherwise fit women, and

c. Limit antibiotic prescription for non-face-to-face consultations to exceptional cases.

1.2.7.Mechanisms of drug resistance:

- Inactivation of the antibiotic either by disruption of the chemical structure (e.g. penicillinase) or by addition of a modifying group that inactivates the drug (e.g. chloramphenicol).

- Restriction of drug entry into the bacterium by altered permeability or efflux pump (e.g. sulphonamides, tetracyclines).

- Modification of the bacterial target (e.g. erythromycin)[49]

Objectives :

1. To measure the utilization rate of antibiotic prescription in out-patient governmental hospitals out-patient clinics and several PHC centers.

2. To test the association between antibiotic overuse and risk factors for it, like respiratory infections, PHC centers, general practitioners or medical assistants and no proper investigations before giving the right antibiotic.

2.1. Methodology

2.1.1.Study design :

An observational, cross-sectional analytical study was carried out in out-patient clinics of Al-Hussein Teaching Hospital, Al-Habboobi Teaching Hospital and Bint Al-Huda Teaching Hospital, and some randomly selected primary health care centers in Al-Nasiriya City from the 2nd of January 2017 to 1st of October 2017. The first two months involved formulating the study questionnaire and the research proposal. In March and April, the pilot study was done, and in May, June and July, the data collection took place. In August and September, we wrote the whole research.

2.1.2.The study population:

It includes any patient attended the hospital out-patient clinics or primary health care centers of any presentation.

2.1.3.Sampling and sample size:

2.1.3.1. Sample size calculation:

The sample size was estimated by the following equation:

$N= \{(Z^2*PQ)/D^2\} * 1.8$

Where:

N= sample size

Z= 1.96 which is the level of significance

P= the estimated prevalence rate of the problem obtained from the pilot study of this research (46%)

Q= (1-P)

D= maximum tolerated error, 0.05 was chosen to represent an acceptable limit

So the sample equals to:

$$N= \frac{(1.96)^2 * 0.46 * 0.54}{(0.05)^2} * 1.8$$

≈ 688 patients

2.1.3.2. Sampling process:

The sample was divided according to the number of patients attending the included medical facilities during May 2017, as it was the month preceding the time of data collection. There are 2 health sectors in Al-Nasiriya City. The 1st one involves Al-Shamiya quarters and it includes 9 primary health care centers; while the 2nd sector involves Al Jazeera area and includes 15 primary health care centers. Three centers from the first sector and six from the second one where chosen by simple random sampling (lottery) in order to cover the area geographically. Almost all the out-patient clinics in governmental hospitals were included in the study. They were surgical, internal medicine, orthopedic, respiratory, urology, neurology, dermatology and breast clinics from Al-Hussein Teaching Hospital. From Al-Haboobi hospital ENT, ophthalmological and gynecological clinics were also included in this study, while the pediatric clinic was from Bint Al-Huda teaching hospital.

The chosen percentage of sample size from each clinic was approximated to 3% of the monthly number of patients attended the clinic a month earlier. It was calculated by dividing by the sample size (688) by the total number of patients estimated to attend outpatient hospital clinics and the PHC centers in June according to May records (24,681) patients.

688/24681= 0.28≈ 3%, which represents the number of patients selected from each medical facility.

Table (2-1): The number of patients attended hospital out-patient clinics in May 2017

Clinic Name	Monthly No. Of Patients	The No. Chosen For The Sample	Sampling Fraction
Surgery Clinic	584	18	3%
Respiratory Clinic	670	19	3%
Neurology Clinic	839	20	3%
Urology Clinic	1172	35	3%
Internal Medicine Clin	1498	41	3%
Orthopedic Clinic	975	29	3%
Breast Clinic	465	12	3%
Dermatology Clinic	1586	43	3%
Ophthalmology Clinic	3000	70	3%
E.N.T Clinic	2230	66	3%
Gynecology Clinic	1499	40	3%
Pediatric Clinic	841	24	3%
TOTAL	15359	417	

While, Table (2-2) shows the number of patients attended the randomly selected PHC centers in May 2017

Sector	Phc Name	Monthly No. Of Patients	The No. Chosen For The Sample	Sampling Fractic
1st	Al-Rasool	1070	32	3%
1st	Al-Karrar	501	15	3%
1st	15th Sha'aban	530	16	3%
2nd	Al-Razi	1222	37	3%
2nd	Um Al-Baneen	640	17	3%
2nd	Al-Sadr	1900	55	3%
2nd	Sumer	988	27	3%
2nd	Arido	1236	35	3%
2nd	Al-Salhiya	1235	37	3%
Total	9	9322	271	

So:

417+ 271 = 688 patients

*Some of the numbers were adjusted to match the sample size number.

*The source of those data was from the hospital and PHC center records.

The researcher sat in the doctor's secretory room and waited the doctor in charge to finish the examination of the patient and his prescription is written, then the researcher asked for permission to take the patient personal data, his current symptoms and examination of possible signs.

2.1.4.Inclusion criteria: any patient attending the hospital outpatient clinic or PHC centers of any presentation and at any age.

2.1.5.Exclusion criteria: patients taking anti-tuberculosis drugs as part of tuberculosis treatment along with the psychiatry clinic and infertility center. Muhammed Al-Mosawy Pediatric Hospital and the gynecology clinic in Al-Habboobi Teaching Hospital were also excluded as the sample was chosen randomly to be taken from Bint Al-Huda Teaching Hospital which involved both the pediatric and gynecology clinics.

2.1.6.Ethical consideration: including self-identification and taking the patient's consent with permission was also considered.

2.1.7.Refusal rate was zero as the purpose of the study was elaborated and the interview takes only few minutes from the patient's time.

2.1.8.Study tools:

2.1.9.Pilot study:

A pilot study was carried out from February 2017 to March 2017 to test the feasibility of the questionnaire, the appropriate time and cost for this research. It included 50 patients selected randomly from Al-Hussein Teaching Hospital out-patient clinics prior to the proper study. The results showed that 23 (46%) patient were prescribed at least one antibiotic. This result was used to calculate the sample size in Dobson's formula mentioned above. All of the fifty patients were included in the proper study.

2.1.10.Definition of variables:

2.1.10.1.Age:

All age groups were included in this study. The patient's age was taken directly by asking the patient and documented in the questionnaire forma as the number of years. Age classification was took from Ministry of Health/ Thi-Qar directorate of Health/ section of Health Statistics[50]. The classification was as follows:

- >1 year
- 1-4 years
- 5-9 years
- 10-14 years
- 15-19 years
- 20-44 years
- 45-65 years
- ≥ 65

2.1.10.2. Gender:

Male or female

2.1.10.3. Current occupation classified into: [51]

1. Employed by others
2. Self-employed
3. Retired
4. Unemployed
5. Student

6. Housewife
7. Child (if younger than 6 years)

2.1.10.4. Educational level classified into: [51]

1. Child
2. Illiterate
3. Primary school
4. Intermediate school
5. Secondary school
6. Basic college and above

2.1.10.5. Marital status classified into: [51]

1. Married
2. Single
3. Divorced
4. Widow/ widower
5. Child till 15 unless married

2.1.10.6. The socioeconomic status:

It was classified into three categories; low, moderate and high socioeconomic status according to the following scoring system[51]:

- Residence:

A: living in an owned or a rented house scored as (1)
B: living in an illegal house scored as (0)

- Power supply of the house:

A: if having at least 2 sources scored as (1)
B: if having 3-5 power sources scored as (2)
C: 6 and more power sources scored as (3)

- Private car:

A: if he has a private car scored as (1)
B: if there's no car scored as (0)

So the socioeconomic status for each patient was calculated as the following[51]:

- If the score is equal or less than 2 , refers to a low socioeconomic status
- If the score is between 3 and 4, indicates a moderate socioeconomic status.
- If it is more than 4, refers to a high socioeconomic status.

2.1.10.7. Patient symptoms:

Taken directly from the patient and documented in the questionnaire form. They were divided according to the system involved; constitutional symptoms, respiratory, gastrointestinal, urinary, neurological, skin problems, E.N.T., ophthalmological, gynecological, orthopedics, breast and surgical problems. **Signs and symptoms of infection and inflammation** are also taken from the patient and examined if possible, like fever, tachycardia and local signs if present in case of an abscess collection, an

infected burn, an animal bite like swelling, redness, hotness, tenderness and pain along with any visible discharge if present.

2.1.10.8.Any **comorbid disease** and immune debilitating conditions that render the patient more liable for infections are also taken from the patient's history and documented in the questionnaire form. For example diabetes, cardiac problems, previous and current malignancies … etc.

2.1.10.9. The **scientific name of the prescribed antibiotic** if any, is taken from the prescription paper and documented in the questionnaire form.

2.1.10.10. The **dosage form of the antibiotic** prescribed is also taken from the prescription paper whether it is a capsule, a tablet, an ointment or cream, an injection, a drop or a syrup.

2.1.10.11. The **number of the antibiotics** prescribed is also documented whether it is single or combined antibiotic therapy.

2.1.10.12. The **route of administering** the drug whether it's topically applied or systemically administered.

2.1.10.13. **By whom the drug was prescribed**: whether it is a specialist doctor, general practitioner, medical assistant or a permanent resident doctor.

2.1.10.14. The **medical facility** from which it was obtained: whether it was a hospital or primary health care center.

2.1.11.Statistical analysis:

It was done by Statistical Package for Social Sciences (SPSS) version 22. Descriptive statistics, frequencies, percentages, associations, test of significance (Chi-square test was used for analysis of categorical variables). Correlation and logistic regression analysis were performed to recognize the independent variables of antibiotic prescription. A p-value < 0.05 was considered statistically significant.

3.1. Results

Table (3-1) shows the socio-demographic characteristics of the studied population. More than half of the studied population was falling within the age group 20-44 years old and the minority (1.5%) were less than one year old. More than one-third of them (39.1%) were urban residents. Regarding occupation, majority of males were self-employed while females were housewives. One third of the studied population were illiterate and a third were at the level of primary education. Half of them were married and (58.5%) from low social class.

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Table (3-1): Socio-demographic characteristics of the studied population.

Variables	Males No.(%	Females No.(%)	Total	X^2	P
Age				13.299	0.0001
< 1 Year	7 (2.7)	2 (0.4)	9 (1.4)		
1 - 4 Years	36 (13.8)	28 (6.5)	64 (9.3)		
5 - 9 Years	30 (11.5)	21 (5.0)	51 (7.4)		
10 - 14 Years	26 (10.0)	20 (4.6)	46 (6.6)		
15 - 19 Years	14 (5.4)	53 (12.3)	67 (9.7)		
20 - 44 Years	71(27.4)	200(46.7)	271(39.3)		
45 - 64 Years	62(23.9)	88(20.5)	150(21.8)		
≥ 65	13(5.0)	17(4.0)	30 (4.5)		
Total	259(100)	429(100)	688(100)		
Residency*				1.745	0.418
Urban	104(41.0)	155(37.3)	259(38.7)		
Suburban	92(36.2)	147(35.5)	239(35.7)		
Rural	58(22.8)	113(27.2)	171(25.6)		
Total	254(100)	415(100)	669(100)		
Occupation				345.626	0.0001
Employed	32(12.3)	19(4.4)	51 (7.4)		
Self Employed	70(27.0)	11(2.6)	81 (11.7)		
Retired	21(8.1)	5(1.1)	26 (3.7)		
Unemployed	20(7.8)	0 (0.0)	20 (3.0)		
Student	57(22.0)	62(14.5)	119(17.3)		
Housewife	0(0.0)	288(67.1)	288(41.0)		
Child	59(22.8)	44(10.3)	103(15.0)		
Total	259(100)	429(100)	688(100)		
Educational Level				42.350	0.0001
Illiterate	49(19.0)	159(37.0)	208(30.2)		
Primary School	93(36.0)	134(31.2)	227(33.0)		
Intermediate Scho	28(10.8)	55(12.9)	83(12.1)		
Secondary School	15(5.7)	28(6.6)	43(6.2)		
Basic College A Above	20(7.7)	14(3.2)	34(5.0)		
Child	54(20.8)	39(9.1)	93(13.5)		
Total	259(100)	429(100)	688(100)		
Marital Status**				54.619	0.0001
Married	117(45.3)	252(58.8)	369(53.7)		

Single	**39(15.1)**	**62(14.5)**	**101(14.7)**		
Divorced	**1(0.4)**	**5(1.1)**	**6(0.9)**		
Widow	**3(1.2)**	**40(9.3)**	**43(6.3)**		
Child	**98(38.0)**	**70(16.3)**	**168(24.4)**		
Total	**258(100)**	**429(100)**	**687(100)**		
Socioeconomic Status* **				**0.182**	**0.913**
Low	**148(58.2)**	**244(58.8)**	**392(58.6)**		
Medium	**101(39.8)**	**161(38.8)**	**262(39.2)**		
High	**5(2.0)**	**10(2.4)**	**15(2.2)**		
Total	**254(100)**	**415(100)**	**669(100)**		

*missed cases 19. **missed cases 1.***missed cases 19**.**

Table (3-2) shows the frequency of the current symptoms of the studied population. The common symptoms were constitutional (16.4%), followed by respiratory (14.9%) and ENT problems; while the least were the breast symptoms.

Table (3-2): Frequency and percentage of the current symptoms of the studied population.

Current symptoms	No.	%
Constitutional symptoms	**110**	**16.4**
Respiratory symptoms	**102**	**14.9**
ENT problems	**85**	**12.4**
Gastrointestinal symptoms	**80**	**11.6**
Urinary symptoms	**78**	**11.3**
Ophthalmological problems	**73**	**10.6**
Skin problems	**71**	**10.3**
Orthopedic and rheumatologic problems	**64**	**9.3**
Gynecological problems	**50**	**11.6**
Central nervous symptom	**30**	**4.4**
Surgical problems	**24**	**3.5**
Breast symptoms	**14**	**2.0**

*Some cases had more than one system involved.

Table (3-3) shows the frequency and percentage of different variables in the prescription paper, culture and sensitivity and patient's medical history. Majority of the studied population (79.8%) did not have co-morbidity. The prevalence of prescription of antibiotic in the present study was (61.0%). Hundred percent of antibiotic prescriptions was done without culture and sensitivity. The number of prescribed antibiotics distributed as (64.3%) with one antibiotic, (33.3%) with two antibiotic and (2.4%) with three antibiotics. Around one third of the prescribed antibiotics (30%) were tablets, (27.2%) capsules, (18.6%) injections and the least prescribed form was drops (1.1%). Most of the prescribed antibiotics were systemic (91.7%), while minority (8.3%) were prescribed locally. Regarding the signs and symptoms of inflammation, more than half (56.2%) of the studied sample had no signs and symptoms. About (61.3%) of the sample from the hospitals, and (38.7%) from the primary health care centers. More than half (57.3%) of the prescription papers were done by a specialist doctor, and the least (4.0%) was by a resident doctor.

Table (3-3): Frequency and percentage of different variables in the prescription paper including name, number, dosage form, route of administration, culture and sensitivity, patient medical history, where the drug was prescribed and by whom.

Variables	No.	%
Co-Morbid Disease:		
Yes	139	20.2
No	549	79.8
Total	688	100
Prescription Of Antibiotic Now:		
Yes	420	61.0
No	268	39.0
Total	688	100
C/S Before Prescribed Antibiotic:		
Yes	0	0
No	420	100
Total	420	100
Number Of Prescribed Antibiotics:		
1	270	64.3
2	140	33.3
3	10	2.4
Total	420	100
Dosage Form:		
Capsule	158	27.2
Tablet	176	30.3
Ointment /Cream	43	7.4
Injection	108	18.6
Drop	6	1.1
Syrup	89	15.4
Total	580	100
Route Of Administration:		
Local	48	8.3
Systemic	532	91.7
Total	580	100
Signs And Symptoms Of Inflammation:		
Present	300	43.8
Absent	388	56.2
Total	688	100
Where The Paper Was Prescribed:		
Hospital	422	61.3
Primary Health Care Center	266	38.7
Total	688	100
By Whom The Paper Was Prescribed?		
Specialist Doctor	394	57.3
General Practitioner	106	15.4
Medical Assistant	160	23.3
Resident Doctor	28	4.0
Total	688	100

Table (3-4) shows the frequency of the prescribed antibiotics according to their names. The most common three first prescribed antibiotics were cephalexin (18.9%) followed by Amoxicillin (16.2%) and Gentamycin (15.5%), while the least prescribed antibiotics were Amikacin (0.2%) and nitrofurantoin (0.2%).

Table (3-4): Frequency and percentage of the prescribed antibiotics according to their name.

Name Of Antibiotics	No.	%
Cephalexin	110	18.9
Amoxicillin	94	16.2
Gentamycin	90	15.5
Co-Amoxiclav	78	13.5
Trimethoprim-Sulphamethoxazole	49	8.4
Metronidazole	44	7.6
Fucithalmic Acid	35	6.0
Azithromycin	29	5.0
Erythromycin	14	2.4
Cefixime	14	2.4
Ciprofloxacin	6	1.1
Ampiclox (Ampicillin-Cloxacillin)	6	1.1
Ceftriaxone	4	0.7
Tetracycline	2	0.3
Clarithromycin	2	0.3
Doxycycline	1	0.2
Nitrofurantoin	1	0.2
Amikacin	1	0.2
Total	580	100

Table (3-5) : combination of two antibiotics, showing that (Cephalexin + garamycin) is the highest rate (14.5%), followed by (Garamycin + trimethoprim-sulphamethoxazole) by (13.1%), the least combinations prescribed are (Amoxicillin + fucithalmic acid, Ceftriaxone + metronidazole, Azithromycin + ciprofloxacin, Co-amoxiclav + amikacin, Cefixime + tetracycline, Co-amoxiclav + tetracycline, Amoxicillin + erythromycin, Cephalexin + ampiclox, Cephalexin + ceftriaxone, amoxicillin vial + amoxicillin cap + Metronidazole) with (0.7%) each.

Table (3-5) : **Antibiotic combination , two drugs:**

Antibiotics	No.	%
Cephalexin + Garamycin	21	14.5
Co-Amoxiclav + Fucithalmic Acid	11	7.6
Cephalexin + Metronidazole	10	6.9
Azithromycin + Co-Amoxiclav	2	1.4
Azithromycin + Amoxicillin	4	2.8
Cephalexin + Fucithalmic Acid	7	4.8
Amoxicillin + Fucithalmic Acid	1	0.7
Amoxicillin + Metronidazole	11	7.6
Co-Amoxiclav + Metronidazole	2	1.4
Ceftriaxone + Metronidazole	1	0.7
Azithromycin + Ciprofloxacin	1	0.7
Co-Amoxiclav + Garamycin	4	2.7
Ciprofloxacin + Garamycin	2	1.4
Co-Amoxiclav + Amikacin	1	0.7
Co-Amoxiclav + Ampiclox	2	1.4
Azithromycin + Garamycin	4	2.7
Cefixime + Tetracycline	1	0.7
Co-Amoxiclav + Tetracycline	1	0.7
Garamycin + Metronidazole	3	2.0
Amoxicillin + Co-Amoxiclav	2	1.4
Amoxicillin + Garamycin	10	6.9
Amoxicillin + Erythromycin	1	0.7
Garamycin + Trimethoprim-Sulphamethoxazole	19	13.1
Cephalexin + Trimethoprim-Sulphamethoxazole	2	1.4
Cephalexin + Ampiclox	1	0.7
Cephalexin + Ceftriaxone	1	0.7
Metronidazole + Trimethoprim-Sulphamethoxazole	2	1.4
Garamycin + Fucithalmic Acid	5	3.4
Amoxicillin + Ampiclox	2	1.4
Amoxicillin Cap + Amoxicillin Vial	6	4.1
*Amoxicillin Vial + Amoxicillin Cap + Garamycin	4	2.7
*Amoxicillin Vial + Amoxicillin Cap + Metronidazole	1	0.7
TOTAL	145	100

*considered as two antibiotics

Table (3-6): combinations of three antibiotics given for patients, (Cephalexin + garamycin+ metronidazole) is frequently prescribed by (40%), and the remaining combinations including (Cephalexin + ciprofloxacin + garamycin, Amoxicillin + garamycin + metronidazole, Garamycin + metronidazole + nitrofurantoin) with a rate of (20%) each.

Table (3-6) : Antibiotic combination, three drugs:

Antibiotics	No.	%
Cephalexin + Ciprofloxacin + Garamycin	1	20
Cephalexin + Garamycin+ Metronidazole	2	40
Amoxicillin + Garamycin + Metronidazole	1	20
Garamycin + Metronidazole + Nitrofurantoin	1	20
TOTAL	5	100

Table (3-7): Distribution of socio-demographic data according to the prescription of antibiotics. It was noticed that there was a significant association between the prescription of antibiotic with each age group and address (p-value less than 0.05), while there was no significant association with gender, occupation, educational level, marital status and socioeconomic status (p-value ≥ 0.05).

Table (3-7): Distribution of socio-demographic data according to the prescription of antibiotics.

Variables	Prescribed Antibiotic No.(%)	Prescribed N Antibiotic No.(%)	Total	X^2	P
Age				13.392	0.037
< 1 Year	6(1.42)	3(1.1)	9(1.3)		
1 - 4 Years	46(11.0)	18(6.7)	64(9.3)		
5 - 9 Years	36(8.57)	15(5.6)	51(7.41)		
10 - 14 Years	30(7.14)	16(6.0)	46(6.68)		
15 - 19 Years	44(10.47)	23(8.6)	67(9.73)		
20 - 44 Years	163(38.9)	108(40.2)	271(39.38)		
45 - 64 Years	83(19.8)	67(25.0)	150(21.8)		
≥ 65 Years	12(2.9)	18(6.7)	30(4.4)		
Total	420(100)	268(100)	688(100)		
Gender				0.623	0.430
Male	163(38.8)	96(35.8)	259(37.65)		
Female	257(61.2)	172(64.2)	429(62.35)		
Total	420(100)	268(100)	688(100)		

Address*				**6.959**	**0.031**
Urban	**158(38.82)**	**101(39.0)**	**259(38.71)**		
Suburban	**158(38.82)**	**81(33.9)**	**239(35.72)**		
Rural	**91(22.4)**	**80(46.8)**	**171(25.57)**		
Total	**407(100)**	**262(100)**	**669(100)**		
Occupation				**4.695**	**0.584**
Employed	**33(7.9)**	**18(6.7)**	**51(7.41)**		
Self Employed	**46(11.0)**	**35(13.0)**	**81(11.77)**		
Retired	**14(3.3)**	**12(4.5)**	**26(3.78)**		
Unemployed	**13(3.1)**	**7(2.6)**	**20(2.90)**		
Student	**77(18.3)**	**42(15.7)**	**119(17.29)**		
Housewife	**168(40.0)**	**120(44.8)**	**288(41.86)**		
Child	**69(16.4)**	**34(12.7)**	**103(14.98)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Educational Level				**7.323**	**0.198**
Illiterate	**116(27.6)**	**92(44.2)**	**208(30.2)**		
Primary School	**146(34.8)**	**81(35.7)**	**227(33.0)**		
Intermediate School	**53(12.6)**	**30(36.1)**	**83(12.1)**		
Secondary School	**22(5.2)**	**21(48.8)**	**43(6.25)**		
Basic College Ar Above	**20(4.8)**	**14(41.2)**	**34(4.94)**		
Child	**63(15.0)**	**30(32.3)**	**93(13.51)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Marital Status**				**8.949**	**0.062**
Married	**215(51.3)**	**154(57.5)**	**369(53.7)**		
Single	**64(15.3)**	**37(13.8)**	**101(14.7)**		
Divorced	**3(0.7)**	**3(1.1)**	**6(0.9)**		
Widow	**21(5.0)**	**22(8.2)**	**43(6.2)**		
Child	**116(27.7)**	**52(19.4)**	**168(24.4)**		
Total	**419(100)**	**268(100)**	**687(100)**		
Socioeconomic Status***				**1.319**	**0.517**
Low	**245(60.0)**	**147(56.3)**	**392(58.6)**		
Medium	**153(37.5)**	**109(41.7)**	**262(39.2)**		
High	**10(2.5)**	**5(2.0)**	**15(2.2)**		
Total	**408(100)**	**261(100)**	**669(100)**		

missed cases 19. **missed cases 1.*missed cases 19.*

Table (3-8) shows the association of prescription of antibiotics with the current symptoms. It was seen that there was a significant association between the prescription of antibiotic and all the studied current symptoms (p-value less than 0.05) except with constitutional symptoms, gastrointestinal symptoms, skin and breast symptoms (p-value ≥ 0.05).

Table (3-8): Distribution of the patient symptoms according to the prescription of antibiotics.

Symptoms	Prescribed Antibiotic No.(%)	Prescribed Antibiotic No.(%)	Total	X^2	P
Constitutional Symptoms				**0.211**	**0.646**
Yes	**65(15.5)**	**45(16.8)**	**110(15.9)**		
No	**355(84.5)**	**223(83.2)**	**578(84.1)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Respiratory Symptom(S)				**15.220**	**0.0001**
Yes	**80(19.1)**	**22(8.2)**	**102(14.8)**		
No	**340(80.9)**	**246(91.8)**	**586(85.2)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Urinary Symptom(S)				**27.805**	**0.0001**
Yes	**69(16.4)**	**9(3.4)**	**78(11.3)**		
No	**351(83.6)**	**259(96.6)**	**610(88.7)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Gastrointestinal Symptom(S				**1.585**	**0.208**
Yes	**54(12.9)**	**26(9.7)**	**80(11.6)**		
No	**366(87.1)**	**242(90.3)**	**608(88.4)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Surgical Problem(S)				**7.318**	**0.007**
Yes	**21(5.0)**	**3(1.1)**	**24(3.5)**		
No	**399(95.0)**	**265(98.9)**	**664(96.5)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Skin Problem(S)				**1.246**	**0.264**
Yes	**39(9.3)**	**32(12.0)**	**71(10.3)**		
No	**381(90.7)**	**236(88.0)**	**617(89.7)**		
Total	**420(100)**	**268(100)**	**688(100)**		
ENT Problem(S)				**38.483**	**0.0001**
Yes	**78(18.6)**	**7(2.6)**	**85(12.4)**		
No	**342(81.4)**	**261(97.4)**	**603(87.6)**		
Total	**420(100)**	**268(100)**	**688(100)**		

Ophthalmological Problem(S				**48.963**	**0.001**
Yes	**17(4.0)**	**56(20.9)**	**73(10.6)**		
No	**403(96.0)**	**212(79.1)**	**615(89.4)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Orthopedic And Rheumatologic Problem(S)				**38.557**	**0.0001**
Yes	**16(3.8)**	**48(18.0)**	**64(9.3)**		
No	**404(96.2)**	**220(82.0)**	**624(90.7)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Gynecological Problem(S)				**21.339**	**0.0001**
Yes	**45(17.5)**	**5(3.0)**	**50(11.7)**		
No	**212(82.5)**	**167(97.0)**	**379(88.3)**		
Total*	**257(100)**	**172(100)**	**429(100)**		
Breast Symptom(S)				**3.657**	**0.056**
Yes	**12(2.9)**	**2(0.7)**	**14(2.0)**		
No	**408(97.1)**	**266(99.3)**	**674(98.0)**		
Total	**420(100)**	**268(100)**	**688(100)**		
Central Nervous System Symptom(S)				**30.030**	**0.0001**
Yes	**4 (1.0)**	**26(9.7)**	**30(4.4)**		
No	**416(99.0)**	**242(90.3)**	**658(95.6)**		
Total	**420(100)**	**268(100)**	**688(100)**		

***The number represents the total number of females only.**

Table (3-9) shows the distribution of different variables including culture and sensitivity and patient medical history. It was noticed that there was a significant association between the prescription of antibiotics and who prescribed it (p-value less than 0.05), while there were no significant associations with other variables.

Table (3-9): patient medical history, signs and symptoms of inflammation, where the antibiotic prescribed, culture and sensitivity and who prescribed the drug.

Variables	Prescribed Antibiotic No.(%)	Prescribed No Antibiotic No.(%)		Total	X^2	P
Co-Morbid Disease					2.339	0.126
Yes	77(18.3)	62(23.1)		139(20.2)		
No	343(81.7)	206(76.9)		549(79.8)		
Total	420(100)	268(100)		688(100)		
Signs And Symptoms Of Inflammation					120.6	0.000
Present	253(60.2)	47(17.5)		300(43.6)		
Absent	167(39.8)	221(82.5)		388(56.4)		
Total	420(100)	268(100)		688(100)		
Where The Antibiotic Prescribed					0.176	0.674
Hospital	255(60.7)	167(62.3)		422(61.3)		
Primary Heal Care Center	165(39.3)	101(37.7)		266(38.7)		
Total	420(100)	268(100)		688(100)		
By Whom The Antibiotic Prescribed					8.807	0.032
Specialist Docto	245(58.3)	149(55.6)		394(57.3)		
General Practitioner	62(14.8)	44(16.4)		106(15.4)		
Medical Assista	103(24.5)	57(21.3)		160(23.3)		
Resident Docto	10(2.4)	18(6.7)		28(4.0)		
Total	420(100)	268(100)		688(100)		

3.2.Logistic Regression

Significance	Variables	B	P-Valu	Expected (B)	95% CI For Expect (B)	
					Lower	Upper
Significant	Age	1.670	.004	5.313	1.681	16.798
	Address	.577	.027	1.781	1.069	2.966
	By Whom The Antibiotic Was Prescribed	-1.070	.031	.343	.130	.908
	Signs And Symptoms Of Inflammation	1.959	.001	7.091	4.895	10.273
	Respiratory Symptoms	3.211	.001	24.793	5.204	118.114
	Urinary Symptoms	4.426	.001	83.628	16.424	425.822
	Surgical Symptoms	5.022	.001	151.694	18.644	1234.241
	ENT Symptoms	4.713	.001	111.386	21.207	585.045
	Gynecological Symptoms	4.703	.001	110.291	19.334	628.984
Insignificant	Ophthalmological Symptoms	.784	.340	2.191	.437	10.981
	Orthopedic And Rheumatologic Symptoms	.884	.289	2.420	.472	12.404
Excluded	Other Sociodemographic Variables	Non-Significant				

	General Symptoms	
	Gastrointestinal Symptoms	
	Skin Symptoms	
	Breast Symptoms	
	Comorbid Disease	
	Where The Antibiotic Prescribed	

Independent variables including (signs and symptoms of inflammation, respiratory symptoms, urinary symptoms, surgical problems, ENT symptoms and gynecological symptoms) show a very high significant association, while (age, address and who prescribed the antibiotic) showed significant association. Other independent variables including (ophthalmological symptoms and orthopedic problems) were insignificant. The rest of the variables were excluded.

4. Discussion

Results of this study showed that 420 (61%) patients have been prescribed at least one antibiotic. Of this percentage about 43% got antibiotic prescription without obvious signs and symptoms of infection and inflammation and none of them underwent culture and sensitivity testing before taking the antibiotic. Compared to other studies in the Middle East, the prevalence of antibiotic prescription in Syria was (43%)[51]. This variation is mostly due to more strict prescription guidelines, and in Jordan (60%)[52]. In Sudan, a study showed that the prevalence of antibiotic prescription was (73%)[53]. Another survey in Isfahan, Iran, showed that half of patients (51.25%) were prescribed an antibiotic[54]. In the United States, CDC reported that about 30 % of antibiotic prescriptions are unnecessary[55], and a similar prescription rate was recorded in UK during 2011-2013[56]. Over 20% of the population were prescribed antibiotics during 2010 in Sweden[57]. Although the prescription rate in Iraq is high as compared to the US, UK and Sweden, it can be considered reasonable as compared to neighboring countries mentioned above. The age group between 20-44 years were prescribed antibiotic(s) with a percentage of 38.9%, unlike other study in Spain[58] and Sweden[57] which noticed that most of heavy antibiotic prescriptions consisted mainly of children and old adults. This difference couldn't reach an explanation in this study. 64.2 % of females were prescribed an

antibiotic in this study, consistent with other studies in Germany, England and Wales which revealed that women were 27% more likely than men to receive an antibiotic prescription in their lifetimes[59]. Antibiotics for patients with respiratory symptoms constituted (78.4%) from the total number of patients who attended the respiratory clinic, compared to another study in Malaysia which showed that upper respiratory tract infections were responsible for almost one-quarter of all encounters in a general practice[60]. While a study made in Wales and England showed that respiratory tract infections are the reason for (60%) of all antibiotic prescribing in general practice[61]. For patients with UTIs about 88.5% of them received at least one antibiotic, but another study in France 2012, showed that only 20 % of the prescriptions were compliant with the guidelines[62]. About 18.3% of patients having comorbid disease(s) were given an antibiotic, this was less than a study made in UK which showed that 35% had comorbidity[59]. This difference may be due to performing culture and sensitivity testing prior to receiving the antibiotic and our doctors' trends toward giving antibiotics to patients with comorbid conditions. Antibiotic combination (⩾2 drugs) was found in (35.7%) in this study, but in a study made in Pakistan, antibiotic combinations constitutes 13% of the outpatients[63]. Another comparable study in the United States showed that (16.1%) of patients were receiving combined antibiotics, mostly for patients in intensive care units and surgery floors[64]. This difference is probably due to more controlled dispensing and handling of drugs and specially antibiotics, also the sample involved only out-patient clinics . The most frequently prescribed antibiotic was cephalexin (keflex) (18.9%), in comparison to other study in the Holy City of AL-Najaf which showed that penicillin had the highest prescription rate[28]. This is probably due to the difference in distribution and consumption of antibiotics regarding governmental settings. In Isfahan, Iran, The pattern of antibiotic prescribing showed that Penicillins were the most frequently prescribed antibiotics including amoxicillin and penicillin, followed by cefixime and azithromycin[54]. The majority of antibiotic prescriptions were given by specialist doctor (58.3%), it's obviously due to more availability of antibiotics in the hospitals than in PHC centers. Many studies and surveys showed that most of antibiotics over prescriptions were by general practitioners in primary health care settings. In Australia, half of general practitioners reported that they prescribe antibiotics for upper respiratory tract infections to meet patient's expectations[65].

5.Conclusion

1.The study revealed that some antibiotic prescription is inappropriate and doesn't rely on international guidelines as a significant number of patients were given antibiotics without proper investigations and in the absence of obvious signs and symptoms of infection or inflammation.

2. The overall prescription rate was (61%). The most frequently prescribed antibiotic was cephalexin (Keflex) in a rate of (18.9%) which is probably due to lack or shortage of other antibiotics in the governmental hospitals pharmacies.

3.This high rate of prescription represents a major obstacle toward successful management of infectious diseases. (35.7%) of prescriptions involved antibiotic combinations (⩾2) which is a very substantial percentage.

Recommendations:

Over years, irrational use of antibiotics was linked to increased mortality and morbidity. There are several ways, that aim to stop this progression:

1- A signed poster is placed in the examination room of every doctor that allows them to follow standard guidelines for antimicrobial prescription.

2- Culture and sensitivity testing of possible samples drawn from the patient is strongly recommended before prescribing antibiotics to minimize the possibility of bacterial resistance.

3- Increase public awareness about the hazards of unnecessary antibiotic use and their impact on future unresponsiveness to common infections by posters placed in every health facility, hence limit patients' expectation about receiving antibiotics.

4- Social media is a great opportunity to increase people awareness and education about appropriate treatment of simple illnesses and the consequences of antibiotics when taken unnecessarily or too frequently.

5- Advise the patients to complete the course of antibiotic treatment according to the doctor's instructions.

6- More studies to discover the pattern and behavior of doctors about prescribing process should be conducted.

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