

Research Article

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## Statically study of third generation Cephalosporin (Cefotaxime) quantities uses in some Iraqi provinces

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### Abstract

#### Keywords

Statically study.  
Cefotaxime .  
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The present study deal with the percentage of quantities uses of Cefotaxime in some Iraqi provincesthe areas of the Middle Euphrates (Babel, Karbala, Najaf, Qadissiyah and Muthanna) and southern Iraq (Basra, DhiQar and Maysan) for the year 2012 based on the data for one of the pharmaceutical companies in Iraq, known as Zentiva a branch of Sanofi French company which is famous stiffly medicine Sefotak<sup>®</sup> a name trade pharmaceutical substance effective Cefotaxime.

The results of present study showed that the highest percentage of the using of this drug were in the provinces of Babylon and Basra 36.21% and 22.16% respectively, compared with other provinces (Karbala 3.94% , Najaf 4.69% , Qadisiyah 9.34% , Muthanna , 1.59% , DhiQar 7.88% and Maysan 14.15%).While the total percentages of whole areas of the Middle Euphrates was highest in use of Cefotaxime compare with southern regions about 55.79% and 44.20%, respectively.

### Introduction

The health condition of the Iraqi population after the Second World War was not satisfactory. Contagious and parasitic diseases commonly occurred (1). Iraq currently suffers from a double burden of disease. Non-communicable diseases like cancer and cardiovascular disease are the leading causes of death but infectious diseases remain major causes of morbidity and mortality. Diarrheal diseases, acute respiratory infections (ARI), measles, mumps, typhoid and leishmaniasis have substantially increased since 1990 and are still leading conditions reported from health facilities and the main cause of morbidity and mortality in children(2).

Microbial infections are the vast growing disorders in the world. Most of the drugs (antibiotics) are used to treat microbial infections disorders (3).Cefotaxime is a

third generation, semisynthetic cephalosporin antibiotic. Cephalosporins are derivatives of 7-aminocephalosporic acid and are closely related to Penicillins in structure. Cephalosporins have a six membered sulfur containing ring adjoining a  $\beta$  lactam ring(4). Cefotaxime is a broad spectrum antibiotic effective against many organisms that have become resistant to Penicillin and aminoglycoside antibiotics. Cefotaxime is used in the treatment of brain abscess, endocarditis, gonorrhea, maningitis, peritonitis, pneumonia, and septicaemia (5). Antibiotics require constant drug level in body for therapeutic effect. This is achieved by taking the medication at regular interval of time throughout the day and night as prescribed (6).

This study aimed to know how much ratio use medication Cefotaxime in Middle Euphrates (Babel,

Karbala, Najaf, Qadissiyah and Muthanna) and southern Iraq (Basra, DhiQar and Maysan), and what are the reasons that led to this widespread use of this antibiotic.

## Materials and Methods

### Data collection

Data were collected according to extent of the use of medication Cefotaxime (In different parenteral routes; IV alone, IM alone and IV/IM vial) to the Middle Euphrates and south of Iraq (Babylon, Karbala, Najaf and Qadisiyah, Muthanna, Basra, DhiQarandMaysan) for the year 2012 based on one of the pharmaceutical companies in Iraq, known as Zentiva (Zentiva is an international pharmaceutical company that develops, manufactures and markets modern quality generic products. Zentiva's mission is to increase the availability of modern high quality affordable medicines to patients through primary care providers by developing, manufacturing and marketing pharmaceutical products that improve the quality of human life. Made up of more than 500 products in the form of 800 drug forms, Zentiva product portfolio covers a wide range of therapeutic areas including products for cardiovascular diseases, pain treatment, disorders of central nervous system, digestion system, urinary tract and genital system, and female healthcare. Since 2009, Zentiva is a member of the Sanofi group) a branch of Sanofi French which is famous stiffly medicine Sefotak<sup>®</sup> (Sefotak<sup>®</sup> is a third-generation cephalosporin antibiotic. Like other third-generation cephalosporins, it has broad spectrum activity against Gram positive and Gram negative bacteria. In most cases, it is considered to be equivalent to ceftriaxone in terms of safety and efficacy. Sefotak<sup>®</sup> sodium is marketed under various trade names including Claforan (Sanofi-Aventis) a

name trade pharmaceutical substance effective Cefotaxime).

### Sefotak<sup>®</sup> doses

Sefotak<sup>®</sup> (Cefotaxime vial) are present in two doses , first one for adult patients at dose one gram in each packet and other for pediatric patients at dose 0.5gmin each packet.

### Ratio calculation

In this study the ratio of each province or region were calculated according to following equation.

Ratio of Sefotak<sup>®</sup> vial uses =

$$\frac{\text{Number of Sefotak}^{\text{®}} \text{ vial use for each province or region}}{\text{Total number of Sefotak}^{\text{®}} \text{ vial uses in all provinces or region}} \times 100$$

### Statistical analysis

Statistical analyses were done using SPSS version 13 computer software (Statistical Package for Social Sciences). The statistical significance of such associations was assessed by Chi-square test. An estimate was considered statistically significant if its P value was less than a level of significance of 0.05(7).

## Results and Discussion

The results of the present study showed that the percentage quantities uses of Cefotaxime in the Babylon province (36.21%) and Basra (22.16%) in comparison with other provinces, as in table (1). While, the percentage quantities uses of Cefotaxime in the Middle Euphrates regions (55.79%) in comparison with southern regions (44.20%) of Iraq, as in table (2).

Table (1):-Number and percentage of quantities uses or consume Cefotaxime vial in Iraqi provinces.

Province	Cefotaxime / Vial Number	Cefotaxime(%)
Babylon	590394	36.21
Karbala	64260	3.94
Najaf	76560	4.69
Qadisiyah	152304	9.34
Muthanna	26036	1.59
Basra	361388	22.16
DhiQar	128560	7.88
Maysan	230732	14.15
Total	1630234	100

Chi-Square (X<sup>2</sup>) test = 1229705.82, Means there is significant difference between provinces at probability of P<0.05.

Table (2):- Number and percentage of quantities uses or consume Cefotaxime vial in Middle Euphrates and South Iraq.

Area	Cefotaxime / Vial Number	Cefotaxime(%)
Middle Euphrates region	909554	55.79
South Iraq region	720680	44.20
Total	1630234	100

Chi-Square ( $X^2$ )test = 21882.37, Means there is significant difference between Middle Euphrates and South Iraq region at probability of  $P < 0.05$ .

Antibiotics have revolutionized the treatment of bacterial infections and have been of great service to humanity. They are the most frequently prescribed drugs(8).The unjustified prescription of antibiotics increases the incidence of unacceptable side effects, and toxicity, as well as development of resistance, risk of super infection, and the wasteful of money (9).

Antimicrobial drug resistance is a rapidly increasing global problem and the prevalence varies widely among countries(10,11).Prevalence of resistance is positively correlated with using drugs obtained without prescriptions, leftover drugs from treatment courses previously prescribed or drugs obtained from relatives or friends. The use of leftover drugs may increase antimicrobial drug resistance in the community by exerting selective pressure in the commensally flora(12).Evidence shows that repeated treatment with antimicrobial drugs exerts greater selective pressure on normal bacterial flora than a single course of treatment(13).Consequently, persons who use leftover antimicrobial drugs repeatedly are at greater risk for colonization and infection with drug resistant organisms(12).

It is possible that self-medication may alter the type of antimicrobial used for good. For example, if agents used solely for urinary tract infection(UTI) were released for self-medication of acute (UTI), then this could result in a lowering of the number of prescriptions of  $\beta$ -lactam agents and trimethoprim which are used systemically for other, sometimes more serious infections. This may be beneficial to the general problem of resistance. Furthermore, the prescription of fewer  $\beta$ -lactams may result in less super-infections with *clostridium difficile* and *Candida spp*(14).

Antimicrobial drugs from all classes were stored at home. High percentages of these drugs were self-prescribed (65%). Only 27% were used for current ailments at time of visiting, large proportion of leftover drugs were stored for future use (15).

One of the studies in Iraq was referred to Penicillins, Cephalosporins, Co-trimoxazole and Erthromycins were widely used for self-medication in Basrah. Higher rates of prevalence of these four drugs in Basrah may be related to the wide use in treatment of community- acquired infections, mostly respiratory and urinary since these drugs are more effective, cheap, and available in authorized an un-authorized drugs outlets. (16,17).

Influenza, diarrhea, upper respiratory tract infections and tonsillitis were the most common reasons for self medications. These diseases and symptoms are highly recurrent in household members. The recurrence of familiar symptoms after an initial diagnosis by a physician is a common trigger for self-medication. If patients are given simple guidelines, it is likely that they could recognize symptoms of a range of simple recurrent infections which a physician would commonly treat with an antibiotic without microbiological evaluation. (14).

Sefotak<sup>®</sup> (Cefotaxime)wide uses against Gram positive and Gram negative bacteria. It does not have activity against *Pseudomonas aeruginosa*. Sefotak<sup>®</sup> works by inhibiting bacterial cell wall biosynthesis. A positive feature of Sefotak<sup>®</sup> is that it display a resistance to penicillinases and is useful to treat infections that are resistant to penicillin derivatives. It indication used to treat gonorrhoea, meningitis, and severe infections including infections of the kidney (Pyelonephritis) and urinary system. Also used before an operation to prevent infection after surgery(18).

The disparity in the ratio of use of Cefotaxime may result from the population distribution of Iraq, where are the provinces of Babil and Basra percentage of 5.4% and 7.1%, respectively, of the population of Iraq, depending on the Central Bureau of Statistics of the Ministry of Planning and thus were higher ratio of use compared with the rest of the studied areas, as in table (1). On the other hand the present study showed that the highest ratio of use of Cefotaxime was in the Middle Euphrates region (Babil, Karbala, Najaf, Qadissiyah and Muthanna) than in the southern areas (Basra, Maysan and DhiQar) studied at 55.79% and 44.20 %, respectively, as in Table (2) This is due to the fact that the ratio of the population distribution in the Middle Euphrates (17.1%) higher than in the studied areas of southern Iraq (15.4%) , depending "on the Central Bureau of Statistics of the Ministry of Planning(19).

One of the other reasons may be due to increase the uses of Cefotaxime may have been caused by the large number of indications that can be used where this antibiotic ( e.g. Respiratory tract infections , Bacteremia, Septicemia , Ear-nose-throat , infections , Bone, joint infections , Skin and soft tissue infections, Central nervous system infections (Meningitis, Ventriculitis), Genito-urinary infections, Uncomplicated gonorrhea and Surgical prophylaxis) (20) with the large number of medical specialties (e.g. Pediatrics , Gynecology and obstrucers , Internal medicine , Orthopedics , General Physician , General Surgery and Ear Nose Throat)that depend on this medication in the treatment of patients and thus led to an increase in the proportion of use and this agrees with the findings of the present study.

Other reasons may be result from prevalence of resistance is positively correlated with prescribed outpatient antibiotic use on a national level(21,22). However, actual consumption of antibiotics may also include self-medication, i.e. using antibiotics obtained without prescription. On the other hand the self-medication may include "left-over" antibiotics from treatment courses prescribed earlier, antibiotics obtained from relatives, friends or other sources. Self-medication with antibiotics may lead to a wrong choice of antibiotics, use of insufficient dosages or unnecessary treatment. This inappropriate use increases the risk of selection of resistant bacteria(23)and may contribute to antibiotic resistance(24).

Resistant bacteria against broad-spectrum antibiotics (example Tetracycline and Macrolide antibiotics) one of causes to use Cefotaxime(25, 26) and the resistance term can be used as microbiological resistance and clinical resistance . The resistance to antibiotics can be a natural phenomenon or a gained one. The mechanisms of gaining resistance in bacteria are genetical or biochemical. Because of the fact that this is an increasing phenomena(27)and this may acquire bacteria immune to antibiotics as a result of misuse, when excessive consumption of antibiotics or when given in doses is not appropriate, or given to the extent required at irregular intervals between doses, or given for a short period is not sufficient for treatment. One of the reasons as well as the inappropriate use of antibiotics in cases did not need to address, but self-heal, and the immune stimulation against antibiotics, bacteria may be normal, where the bacteria create and have the ability to resist certain types of antibiotics or all of them(28).This may explain why the use of Cefotaxime by doctors in hospitals and private clinics and thus led to the increase of using this medication. In addition, many doctors prefer parenteral therapy because it leads to faster recovery compared with the medications that are given by oral administration, which require a long period of healing in other side.

Over-the-counter (OTC) drugs are medicines sold directly to a consumer without a prescription from a healthcare professional, as compared to prescription drugs, which may be sold only to consumers possessing a valid prescription. In many countries, OTC drugs are selected by a regulatory agency to ensure that they are ingredients that are safe and effective when used without a physician's care. OTC drugs are usually regulated by active pharmaceutical ingredients (APIs), not final products. By regulating APIs instead of specific drug formulations, governments allow manufacturers freedom to formulate ingredients, or combinations of ingredients, into proprietary mixtures. The term over-the-counter may be somewhat counterintuitive, since, in many countries, these drugs are often located on the shelves of stores like any other packaged product. In contrast, prescription drugs are almost always passed over a counter from the pharmacist to the customer. Some drugs may be legally classified as over-the-counter (i.e., no prescription is required), but may only be dispensed by a pharmacist after an assessment of the patient's needs or the provision of patient education. In many countries, a number of OTC drugs are available in establishments without a pharmacy,

such as general stores, supermarkets, and gas stations. Regulations detailing the establishments where drugs may be sold, who is authorized to dispense them, and whether a prescription is required vary considerably from country to country (29).

Antibiotics are the almost common used antimicrobial without prescription (i.e. over the counter use), approximately 68% of these drugs were self-prescribed compared to 57% and 27% of antiparasitics and antifungal drugs respectively. Over the count were showed in the following diseases (influenza, upper respiratory tract infections (including sneezing, nasal congestion, runny nose and cold), diarrhea and tonsillitis, Fever, teeth / gum symptoms , cough, skin infections, urinary tract infections, throat symptoms/complaint and ear infections were among the other reasons for self-medication(15).

Many patients take Cefataxime drug directly from the pharmacy or the pharmacist as to the patient without reference to a specialist doctor and this can be considered an important reason to increase the proportion use in the studied areas.

## Conclusion

- 1-The highest percentage of Cefotaxime use in the province of Babylon.
- 2-The highest percentage use Cefotaxime was in the Middle Euphrates than in southern regions.

## Recommendations

- 1- Recommended a study of the percentage of the use of Cefotaxime in all provinces of Iraq and all the companies that sell in the public and private sector.
- 2- An examination of sensitivity to antibiotics prior to use and learn the appropriate antibiotic before asylum to Cefotaxime.

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