Assay of Cefotaxime

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Introduction:

Today the medical science is on the edge of a breakthrough in the treatment of diseases. The world is still challenged with one of its oldest problems the infectious diseases. The year 2008 had witnessed the outbreak of 11 infectious diseases in 24 countries. The last outbreak was the cholera outbreak in 2008 to 2009. The infectious diseases outbreaks, infectious diseases effects, and infectious disease costs had been globalized.[1]

Infectious diseases account for 25% of worldwide deaths, 41% of the global disease burden measured in terms of Disability-Adjusted Life Years (DALYS), and 15% of cancer cases.[2] In addition to the human life losses and agony, the infectious diseases consume some of 7 to 14% of gross domestic product (GDP) in developed countries, up to 5% in the better off developing countries, and about 2% in least developed states.[3] Infectious diseases' threat is compound by emergency of drug resistance.[4] The two most important causes of antimicrobial resistance are the use of low-quality antimicrobial[5-7] and the inappropriate use of antimicrobials.

This experiment has been undertaken to investigate the microbial resistance to cefotaxime in Algala pediatric hospital.[11] The assay of the active ingredient of cefotaxime was conducted to check if the pharmaceutical product has the adequate potency or not i.e. if the low dose of the used pharmaceutical was one of reason behind the emergence of microbial resistance against cefotaxime antibiotic.

Materials and methods:

Two used brand names of cefotaxime powder for parenteral use were studied. These two brand names were produced by two different pharmaceutical manufacturing companies. The two products were called company I product and company II product. The active ingredient content was determined using HPLC according to the official specific monographs of British Pharmacopeia 2001 for cefotaxime injection.[10] The assay conditions were optimized before use. For company product five assays were done, 5 injections for each assay. For company II product four assays were done, 5 injections for each assay.

Results:

1- Results of assay condition optimization

Five different methanol in the mobile phase concentrations (300, 310, 315, 318. and 320 ml of methanol in 1000 ml) were used. The resulted retention time and resolution for each of five different methanol in the mobile phase concentrations are shown in Table 1.

Table 1: Changes of retention time and resolution with methanol: mobile phase concentrations.

S.N.	M1 of methanol/1000 ml of mobile phase	Retention time	Resolution
1	300	6.33	2.5
2	310	6.34	3.00
3	315	6.38	3.12
4	318	6.00	3.6
5	320	5.75	3.5

The summery factor chromatogram which was 318 ml of methanol in 1000 ml of mobile phase was 1.3.

2- Results of assay of active ingredient

The results of five assay of company I product and four assays of company II product are included in table 2. The mean percentage content with SD and variation coefficient for both companies products are presented in table 3.

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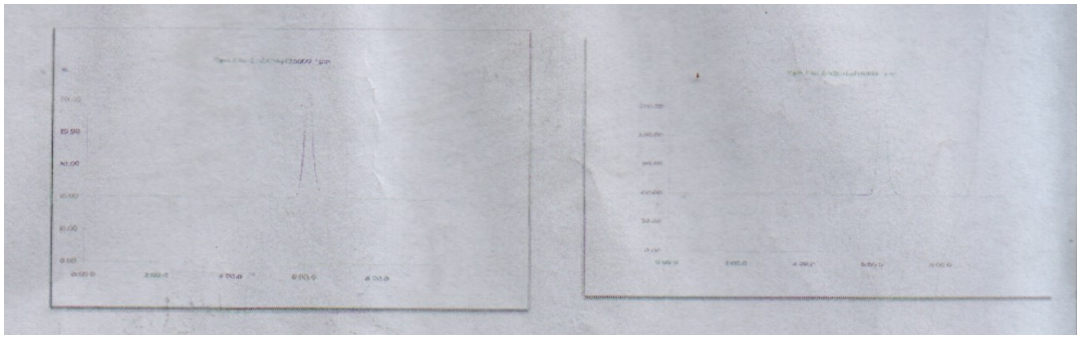
Table 2: Percentage content for % Content of company I product % Content of company II product.

Assay N=g	% Content of company I product	% Content of company II product
1	105.8	96.9
2	104.6	100.5
3	103.7	100.6
4	103.7	9".2
5	106.5	

Table 3: Mean percentage content of company I product and company II product.

Product	Mean % content	SD	% Coefficient variation
company I product	105.2	± 1.26	1.20
company II product	98.8	± 2.02	2.05

Figure 1: Chromatogram for company 1 product. Figure 2: Chromatogram for company I1 product.



Methanol: mobile phase 318:1000 Rt = 6.03 FR 1ml/min

Discussion:

In this study cefotaxime powder for parenteral use was assayed for active ingredient content according to the BP specification monographs. This particular antibiotic was chosen due to emergence of cefotaxime resistance in Algala pediatric hospital Tripoli.[9] Investigating the quality of this used antibiotic is one of the approaches to understand if the antibacterial resistance due to the use of substandard antibiotic or due to some other factors. The two used brand names in Algala hospital (company I product) and (company II product) were studied. These two brand names are produced by two different pharmaceutical manufacturing companies.

This experiment included two stages, the first stage was the optimization of the assay method conditions, and the second stage was the assay of the pharmaceutical products active ingredient.

Five different methanol concentrations in the mobile phase were used as showed in table 1. The methanol concentrations of 318 ml in 1000 ml mobile phase produced chromatogram with retention time of 6 minutes, resolution of 3.6, and symmetry factor of 1.3, this chromatogram parameter considered the optimum required parameters according to the BP specification monographs for cefotaxime powder for parenteral use which is followed in this experiment. So this mobile phase was chosen for me assay.

The assay was carried out on company 1 product and company II product to measure the concentration of the active ingredient in form of cefotaxime. The assay for the company I product as table 2 showed that the average percentage content ≈ 105.4 ± 1.26. The assay for the company II product as table 3 showed that the average percentage content ≈98.8± 2.02. The pharmacopial limit stated that content of cefotaxime, C16H17N507 S2 from 90.0 to 110.0% of the stated amount, this mean both of the companies products comply with pharmacopial specification. So further studies need to be done for more investigation of the

cefotaxime resistance causes. Further studies should include the history of previous used pharmaceutical products in APHT, bioavailability of the company I product and company II product, and antibiotic policy in the hospital.

Acknowledgment:
The authors would like to thank Staff at Algala hospital and Ms Sakeena Bara from the faculty of pharmacy for the help and support.

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