UV spectrophotometric assay of different brands of cephradine

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Citation

Abstract
Cephradine, one of the most prescribing and widely used antibiotics in Pakistan, is available in capsule, dry suspension and IV injection dosage form. It is used for the treatment of upper respiratory and urinary tract infection for treating majority of the causative organisms. In our study we have done comparative assay of different brands of cephradine available in Pakistan. The assay is based on the ultraviolet UV absorbance maxima at 254 nm wavelength of Cephradine using water as solvent. A sample of drug was dissolved in water to produce a solution containing 100 ppm cephradine. Similarly, a sample of different brand were dissolved in water 100 ppm solution were made. The absorbance of sample preparation was measured at 254 nm against the solvent blank. The assay was determined by comparing with the absorbance of available brand. The % assay of 4 available brands have been done and by applying t-test it is concluded that there is no significant difference among three local and one brand leader so they are interchangeable where compliance may occur due to un-affordability of cost to suppress other non compliance issues.

1. Introduction

To treat bacterial infection various antibiotics are used. -lactams (β-LCs), tetracyclines (TCs), macrolides (MCs), aminoglycosides (AGs), amphenicols (AMPs), quinolones (Qs)/fluoroquinolones (FQs), sulfonamides (SAs), lincosamides (LCs), glycopeptides (GPs) and polyether ionophores (IPhs) are the groups of antibiotic used in human and veterinary infections [Moreno-Bondi M]. Penicillins and cephalosporins are the most prescribing drugs among β-lactams group[1].

With high potency against gram negative organisms,Cephalosporins are broad spectrum antibiotics[1,2]. They are widely used to cure bacterial infection [2,3]. They show maximum resistance against deactivation due to β-lactamas enzyme released by organism[4]. They are prescribed usually against urinary and upper respiratory tract infection causing organisms[2].

Cephradine (fig1) is included in cephalosporins first class[5,]. It is one of the semisynthetic cephalosporin series and posses broad spectrum against variety of organisms[2,5]. Cefalexin and cephradine has parallel spectrum of activity[5]. Cephradine being antibiotic of the cephalosporin first group (I group) acts bactericidal agents against organisms [6]. It acts by trussing to explicit penicillin-binding receptor(PBP’s) positioned inside bacterial cell was which inturns inhibits third and last stage of bactericial synthesis of cell wall[4,7]. It is effective for the management of infections origined by the following microorganisms:All types of gram positive microorganism, Streptococcus pneumoniae, Beta-hemolytic streptococcus, Staphylococcus (coagulase-negative/ positive, penicillinase-producing strains), Escherichia coli, Proteus mirabilis, Klebsiella species, Moraxella (Brachamella)
Cephalosporins First-generation including cephradine, has an excellent effect when used for the treatment of skin and soft tissue infections caused by S. aureus and the S.pyogenes [9,10].

Cephradine is available in different dosage forms such as capsule, dry suspension and IV intravenous injection. From previous research it is reported that cephradine itself quite stable at pH 4 [11,12]. Our research group has done this type of assay for different drugs and they were helpful for selection of drugs [13].

Figure 1. Cephradine structure

For the determination of cephradine a novel method has been developed by using sodium nitroprusside as a chromogenic reagent [14]. Cephradine, cefotaxima and ceftriaxone has been determined in pharmaceutical formulation15-16], urine[15,17-18 and in serum of human[19] as well. A rapid development of chromatographic determination method for pharmaceutical is also been established which is used for the detemination of cephradine in a given pharmaceutical formulations [20]. A novel accurate simple and sensitive spectrophotometric method by using O-phthaldhyde as a reagent is developed for the determination of Cephradine in dosage forms and bulk [21].

The aim of the study was to develop a simple spectrophotometric method for the determination of cephradine in pharmaceutical preparations. As different pharmaceutical brands are available in market as cephradine and it is one of the most prescribing drug among antibiotics so another so the intention was to determine that either those different brands are interchangeable or not, in order to remove non compliance issues due to lack of cost effectiveness in population.

2. Methodology

For the measurement of spectra UV visible 1601 Shimadzu double beam spectrophotometer was used. The water was used as solvent.

2.1. Wavelength Selection

In water 100 ppm of cephradine was prepared exactly. 200-40nm UV region was selected for scanning. Lambda max was found at 254 nm wavelength, which was used for the absorbance of drug.

2.2. Standard Stock Solution

100 ml solution was prepared by dissolving 10mg of cephradine available dosage form.

2.3. Sample Preparation

From different medical store located in Karachi, four different brands infexin, velod, velos, star were purchased. Each brands was drawn from one marketed batch and contained 500mg per capsules. Each brand was given a serial number for identification and average weight of capsule was taken and powder containing 10mg of cephradine was drawn from each brand capsule and transferred in 10ml of water and dissolved. After dissolving drug volume was makeup to 100ml with water.

3. Procedure

By preparing standard and sample solution having strength of 100ppm/100ml and dilutions, absorbance was taken by using 1cm cell at maximum wavelength 254nm. By applying formula quantity of cephradine (mg) present in each capsule was calculated.

4. Results and Discussion

Pharmaceutical assay of cephradine four available brands was conducted by using spectrophotometer; Table 1 shows average weight, weight of 100 ppm solution and absorbance at wavelength 254 nm and in last column % assay of drug is calculated. Table 2 is indicating the retail price of all available brands per 12 capsules, which basically clarifies the major difference between price of cephradine available brands. Table 3 explains the non significant difference in %assay of all available brands as it is more than 0.05 indicating that all 3 local brand are having similar % assay as of brand leader. 99.7% is found to be the mean value. . Our research group has done these types of assay for different commonly used generic and their brands.

Statistical results shows non significant results t value t=0.286 with 95% Confidence Interval upper limit is 0.597 and lower limit is -1.19. These studies are very helpful for pharmacist, doctors and drug prescribers to choose best drug21-27.

5. Conclusion

Since cephradine is one of the most prescribing antibiotic in health care system as it covers majority of the infection usually occurring in population. In this study we have determined the % assay of 4 available brands and by applying t-test it is concluded that there is no significant difference among three local and one brand leader so they are interchangeable where compliance may occur due to un-
affordability of cost to suppress other non compliance issues.

### Table 1. Average weight, Absorbance and assay of all brands

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Average wt of tablet mg</th>
<th>Wt for 100 ppm</th>
<th>Absorbance at 254nm</th>
<th>% assay</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infex</td>
<td>557</td>
<td>11.14</td>
<td>2.655</td>
<td>99.4</td>
</tr>
<tr>
<td>Velod</td>
<td>549</td>
<td>10.99</td>
<td>2.672</td>
<td>100.1</td>
</tr>
<tr>
<td>Velos</td>
<td>597</td>
<td>11.94</td>
<td>2.669</td>
<td>100</td>
</tr>
<tr>
<td>Star</td>
<td>595</td>
<td>11.91</td>
<td>2.66</td>
<td>99.6</td>
</tr>
</tbody>
</table>

### Table 2. Price/12 Tablets

<table>
<thead>
<tr>
<th>Brand Name</th>
<th>Retail Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infex</td>
<td>180.85</td>
</tr>
<tr>
<td>Velod</td>
<td>189.33</td>
</tr>
<tr>
<td>Velos</td>
<td>212.75</td>
</tr>
<tr>
<td>Star</td>
<td>75.19</td>
</tr>
</tbody>
</table>

### References


[13] Hua Zhang, Ling Li Wu, Quan Min Li Xin Zhen Du, A novel method for the spectrophotometric determination of cefradine by using sodium nitroprusside as chromogenic reagent, Chinese Chemical Letters - CHIN CHEM LETT 01/2008; 19(12):1470-1474. DOI: 0.1016/j.ccl.2008.09.014


