EVALUATION OF ANTIDIURETIC EFFECT OF ESCITALOPRAM IN
ALBINO WISTAR RATS

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ABSTRACT

Introduction: Our study evaluated the antidiuretic action of escitalopram, a SSRIs in albino wistar rats. Materials and Methods: albino wistar rats were divided into 3 groups containing 6 animals each. Standard group received vasopressin, control group received distilled water and test group received escitalopram. The test drug was given for a period of five days. On fifth day diuresis was induced in all the groups of animals by giving frusemide. Urine volume and electrolyte concentration was measured at the end of 5 hour observation period. Results & Discussion: the results suggested significant water retaining capacity of the test drug escitalopram. Further tests are required to confirm the antidiuretic activity of escitalopram in humans.

Key words: Escitalopram, anti diuretic, diuretic cage.

INTRODUCTION

Precise regulation of body fluid osmolality is essential. It is controlled by a finely tuned, intricate homeostatic mechanism that operates by adjusting both the rate of water intake and the rate of solute-free water excretion by the kidney i.e., water balance. Abnormalities in this homeostatic system can result from genetic diseases, acquired diseases, or drugs and may cause serious and potentially life-threatening deviations in plasma osmolality. [1]
Diabetes insipidus (DI) is either due to deficient secretion of arginine vasopressin (AVP), also known as antidiuretic hormone (ADH) by the pituitary gland (central diabetes insipidus) or due to renal tubular unresponsiveness to AVP (nephrogenic DI). This leads to polyuria, polydipsia with hyposthenuria, causing dehydration and hypernatremia if the patient is deprived of water. [2]

Vasopressin acts as an antidiuretic by reabsorbing water via the principle cells of collecting ducts and the thick ascending loop of Henle, thereby increasing the plasma blood volume and decreasing the plasma osmolality. [3]

Case report has shown hyponatremia due to SIADH associated with fluoxetine, paroxetine, escitalopram and citalopram in elderly women which improved with discontinuation of the drugs and fluid restriction. [4]

The selective serotonin reuptake inhibitors are now the first choice of drugs for OCD, panic disorder, social phobia, post traumatic stress disorder. Fluoxetine, fluvoxamine, paroxetine, citalopram, sertraline, escitalopram are various SSRIs. [5]

Our study has evaluated the effect of escitalopram as an antidiuretic drug in albino wistar rats. We hypothesize that this particular action of antidiuresis can be due to secretion of anti diuretic hormone.

**MATERIALS AND METHODS**

The experiment has been conducted after obtaining permission from institutional animal ethics committee bearing approval no JSSMC/IAEC/2455/12/November 2013.

Albino rats of either sex of average weight 150-200gms, aged 3-4 months from central animal house of J.S.S. MEDICAL COLLEGE, MYSORE were selected for the study.

**Inclusion Criteria**

Rats that weighed 150-200gms of either sex
Aged around 3-4 months.
Healthy with normal behavior and activity.

**Exclusion Criteria**

Pregnant rats
Diseased rats.
The animals were divided into 3 groups each containing 6 animals. The first group was constituted by the control group receiving 10ml/kg body weight of distilled water. The second was the standard group which received vasopressin 4units/intra peritoneal injection. The third group was constituted by the test group which received the test drug escitalopram 5mg/kg body weight. The test drug was given for a period of 5 days.

On 5th day, one hour after administration of respective drugs in different groups, diuresis was induced in all groups of animals by Furosemide 20mg/kg after they were loaded with normal saline 25ml/kg after overnight fasting. [6] The animals were kept in diuretic cage specially designed to separate faeces and urine at room temperature. The volume of urine collected was measured at the end of 5 hours from each of the group along with sodium, potassium and chloride concentrations.

**RESULTS & DISCUSSION**

**Urine volume in different groups of experimental animals**

<table>
<thead>
<tr>
<th>Group</th>
<th>Dose</th>
<th>Urine volume(ml)</th>
<th>% volume in terms of control group</th>
<th>% volume in terms of standard group</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL (DISTILLED WATER)</td>
<td>5Ml/Kg</td>
<td>5±0.17</td>
<td>100%</td>
<td>500%</td>
</tr>
<tr>
<td>VASOPRESSIN (standard)</td>
<td>4 units I.P</td>
<td>1.0±0.25</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>ESCITALOPRAM (test)</td>
<td>5mg/kg P.O</td>
<td>2.5±0.30</td>
<td>50%</td>
<td>250%</td>
</tr>
</tbody>
</table>

There was a significant reduction in the average urine secreted in the test group when compared to the control group. But the volume of urine excreted in the test group was more than that of standard drug vasopressin group. The urine volume was just 50% in the test group when compared to the control group whereas it was 2.5 times more when compared to the standard group.

**ELECTROLYTE CONCENTRATION IN URINE:**

<table>
<thead>
<tr>
<th>Group</th>
<th>Na+ concentration mEq/l</th>
<th>K+ concentration mEq/l</th>
<th>Cl- concentration mEq/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTROL</td>
<td>120 +/- 2.5</td>
<td>23.7 +/- 1.1</td>
<td>110 +/- 1.8</td>
</tr>
<tr>
<td>STANDARD</td>
<td>246 +/- 3.2</td>
<td>36.8 +/- 0.9</td>
<td>234 +/- 2.7</td>
</tr>
<tr>
<td>TEST</td>
<td>180 +/- 2.8</td>
<td>28 +/- 0.8</td>
<td>156 +/- 2.6</td>
</tr>
</tbody>
</table>

The electrolytes were very much concentrated in the standard group. The levels were almost double than that of the control group suggesting concentration of the urine. The urine sample
of test group was concentrated when compared to the control group but it was less concentrated when compared to the standard group. Similarly the other urinary electrolytes i.e K+ and Cl- levels were high in the standard group but were intermediate in the test group. The levels of electrolytes basically suggest water retention capacity of escitalopram leading to concentrated urine.

The above mentioned results confirm the antidiuretic action of escitalopram. The effect most probably is due to secretion of antidiuretic hormone. There is not much effect on salt excretion though which is reflected in high urinary concentration of electrolytes to compensate for reduction in urine output.

CONCLUSION

Our study shows the antidiuretic action of escitalopram in animal models of drug experimentation for antidiuretic effect of drugs. Escitalopram has shown a significant anidiuretic action in test group of albino wistar rats when compared to control group of animals. Further studies are required to conclude it is really useful antidiuretic drug before it can be used in human subjects.

REFERENCES