

## Frequency of Hyponatremia in Patients with Liver Cirrhosis

MUHAMMAD ASIM MUNIR QURESHI<sup>1</sup>, NOVAIRA ZUBAIR<sup>2</sup>, MUHAMMAD RAFIQ<sup>3</sup>

### ABSTRACT

**Background;** Hyponatremia among patients having liver cirrhosis is a common entity which complicates and worsens the condition and is also predictor for mortality and prolonged hospitalization.

**Aim:** To determine frequency of the hyponatremia in patients having liver cirrhosis so as to ascertain its implications in disease severity and complications.

**Methods;** Our study included a total of 122 patients having liver cirrhosis from OPD of department of medicine, Nishtar Hospital, Multan from February 2016 to May 2016 in this cross – sectional study using non – probability purposive sampling technique. All the patients having liver cirrhosis were enrolled by taking informed consent for participation. Three ml of venous blood sample was taken and tested in the Central laboratory of the Nishtar Hospital Multan for serum sodium levels and any value less than 135 mmol/L were deemed as hyponatremia. All the study data was entered and analyzed by using SPSS (20 version) for relevant statistical tests of significance at 95 % confidence interval.

**Results;** Of these 122 study cases, 77(63.1%) were male patients and 45 (36.9%) were female patients. Mean age of our patients was 51.59±12.18 years (ranging from 36 years to 85 years). Mean age of the male patients was 50.52±11.64 years while that of female patients was 53.89±12.87 years (p=0.112). Diabetes was present in 42(34.4%) and hypertension was noted in 63(51.6%) our study cases. Mean body mass index (BMI) of our patients was 23.89±2.42 kg/m<sup>2</sup> and obesity was present in 15.6 % our patients having liver cirrhosis. Child pugh classification of our patients was as; 6(4.9%) had class A, 81(66.4%) had class B and 35(28.7%) had class C. Mean serum sodium level of our patients was 133.93±3.8 mmol/L (ranging from 127 to 141mmol/L) and hyponatremia was present in 59(48.4%) patients with liver cirrhosis. Among these 59 hyponatremic patients, 36(61%) were male and 23(39%) were female patients, 28(47.5%) were diabetic, 41(69.5%) were known hypertensive patients.

**Conclusion:** Hyponatremia is quite common in our patients having liver cirrhosis as high frequency was noted in our study. Hyponatremia was significantly associated with increasing age, diabetes, hypertension and obesity. All the clinicians treating cirrhotic patients must notice this entity at early stage and should treat them accordingly so as to save these patients from future hardships.

**Keywords:** Hyponatremia, liver cirrhosis, Serum Sodium

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### INTRODUCTION

Cirrhosis, an irreversible scarring of liver, results from a wide variety of chronic injuries from different underlying sources and it is progressive liver disease categorized by fibrosis. Liver fibrosis leads to exacerbation in different hepatic functions due to changes in structure of the organ and is a cause of portal hypertension<sup>1</sup>. It is one of the leading causes of the morbidities and mortality in developed as well as developing countries like Pakistan. In USA 31903 deaths were recorded due to cirrhosis only in 2010 alone. Therefore it demands higher resources and healthcare facilities to decrease disease morbidity and mortality followed by appropriate management<sup>2,3</sup>. Progression of the chronic liver injury and/or superimposed acute insult may lead to the decompensate liver cirrhosis which has higher

mortality rates ranging up to 20% during 1<sup>st</sup> year of the development of decompensation as compared to 7 % in patients having compensated cirrhosis<sup>4-6</sup> and most of the patients develop no symptoms until progression to decompensation<sup>7,8</sup>.

Hyponatremia which is commonly observed electrolyte derangement among critically diseased persons may be potentially life endangering so we need to ascertain its implications but there is still lack of evidence on this issue<sup>9</sup>. Hyponatremia can be present in as much as 22% hospitalized patients and leads to increase in morbidity, longer duration of hospitalization and mortality. It also influences hospital expenditures incurred due to this underlying derangement<sup>10</sup> and its symptoms may involve “nausea and malaise, with mild reduction in the serum sodium levels to lethargy, decreased level of consciousness, headache, seizures and coma”<sup>11</sup>. Acute hyponatremia, in particular, is a cause of significant increase in mortality and longer duration of hospitalization due to worsening conditions when

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<sup>1</sup>MO, Chaudhry Pervez Elahi Institute of Cardiology, Multan.

<sup>2</sup>MO, Basic Health Unit, TatyPur, Multan.

<sup>3</sup>HO, Nishtar Hospital Multan.

Correspondence to Dr. Muhammad AsimMunirQureshi, Email ID: asimmunir@ymail.com Cell. 03370619900

compared with chronic conditions<sup>12,13</sup>. Osmo – receptors having interaction with thirst center and the vasopressin kidney axis control sodium levels in serum under normal conditions. In response to non-osmotic stimuli which leads to the conditions having excessive amount of anti-diuretic hormone (ADH) the intake of hypotonic fluids results in water retention as well as hyponatremia<sup>14</sup>. Hyponatremia is not only commonly seen entity in patients with liver cirrhosis but also leads to significant increase in deaths among cirrhotic patients. It can occur among patients with cirrhosis due to different factors such as increase in the release of arginine vasopressin which is also known as antidiuretic hormone (ADH)<sup>15,16</sup>.

As hyponatremia leads to increase in complication among cirrhotic patients, hence this study was conducted to determine its impact in these patients.

**MATERIAL AND METHODS**

Our study included a total of 122 patients having liver cirrhosis from OPD of department of medicine, Nishtar Hospital, Multan from February 2016 to May 2016 in this cross – sectional study using non – probability purposive sampling technique. All the patients having liver cirrhosis defined as “by presence of coarse parenchymal echogenicity and irregular margins on Ultrasound abdomen performed by consultant radiologist atleast 5 years of experience with Serum Albumin < 3.5g/dL, Serum Globulin >3 g/dL, and reversal of albumin globulin ratio to less than 1” were enrolled by taking informed consent for participation. Patients with history of diuretic use and who had undergone any IV fluid therapy were not included in our study. Three ml of venous blood sample was taken and tested in the Central laboratory of the Nishtar Hospital Multan for serum sodium levels and any value less than 135 mmol/L were deemed as hyponatremia. All the study data was entered and analyzed by using SPSS (20 version) for relevant statistical tests of significance at 95 % confidence interval.

**RESULTS**

Of these 122 study cases, 77(63.1%) were male patients and 45(36.9%) were female patients. Mean age of our patients was 51.59±12.18 years (ranging from 36 years to 85 years). Mean age of the male patients was 50.52 ±11.64 years while that of female patients was 53.89±12.87 years (p=0.112). Diabetes was present in 42(34.4%) and hypertension was noted in 63 (51.6%) our study cases. Mean body mass index (BMI) of our patients was 23.89± 2.42

kg/m<sup>2</sup> and obesity was present in 15.6% our patients having liver cirrhosis. Child pugh classification of our patients was as; 6(4.9%) had class A, 81(66.4%) had class B and 35(28.7%) had class C. Mean serum sodium level of our patients was 133.93±3.8 mmol/L (ranging from 127 to 141mmol/L) and hyponatremia was present in 59(48.4%) patients with liver cirrhosis. Among these 59 hyponatremic patients, 36(61%) were male and 23(39%) were female patients, 28(47.5%) were diabetic, 41(69.5%) were known hypertensive patients. Nineteen (32.2%) of these hyponatremic patients were obese and all of these obese (n=19) had hyponatremia. Patients in child pugh class B had hyponatremia in 24(40.7%) and in class C 35(59.3%) had hyponatremia and results showed that hyponatremia had positive association with disease progression and severity (p=0.000).

Table 1: Cross – tabulation of hyponatremia with regards to gender (n = 122)

Gender	Hyponatremia	
	Yes	No
Male	36	41
Female	23	22

P value: 0.709

Table 2: Cross – tabulation of hyponatremia with regards to age(n = 122)

Age group	Hyponatremia	
	Yes	No
Upto 50 years	19	38
More than 50 years	40	25

P value 0.001

Table 3: Cross – tabulation of hyponatremia with regards to diabetes(n = 122)

Diabetes	Hyponatremia	
	Yes	No
Yes	28	14
No	31	49

P value: 0.004

Table 4: Cross – tabulation of hyponatremia with regards to hypertension(n = 122)

Hypertension	Hyponatremia	
	Yes	No
Yes	41	22
No	18	41

P value: 0.001

Table 5: Cross – tabulation of hyponatremia with regards to Obesity(n = 122)

Obesit	Hyponatremia	
	Yes	No
Yes	19	0
No	40	63

P value; 0.001

## DISCUSSION

Hyponatremia among patients having liver cirrhosis is a common entity which complicates and worsens the condition and is also predictor for mortality and prolonged hospitalization. The purpose of this study was to determine frequency of the hyponatremia in patients having liver cirrhosis so as to ascertain its implications in disease severity and complications. Of these 122 study cases, 77(63.1%) were male patients and 45(36.9%) were female patients. A study conducted in Lahore by Hussain et al<sup>17</sup> has also reported male patients having liver cirrhosis predominating over female patients which is similar to our results. Khan et al<sup>18</sup> from Jamshoro, has also described liver cirrhosis being more common in 65% male patients. A study conducted in Turkey by Topdagiet al<sup>19</sup> has also reported male gender predominance with 58 %. Zuberiet al<sup>20</sup> also documented 60% male gender predominance. Alamet al<sup>21</sup> from Peshawar reported 64 % male gender preponderance in liver cirrhosis, which are similar to our study results

Mean age of our patients was 51.59±12.18 years (ranging from 36 years to 85 years). Mean age of the male patients was 50.52±11.64 years while that of female patients was 53.89±12.87 years (p=0.112). A study conducted in Lahore by Hussain et al<sup>17</sup> has also reported 51.12±6.03 years mean age of the patients with liver cirrhosis which is similar to our findings. Khan et al<sup>18</sup> from Jamshoro reported mean age of the patients with liver cirrhosis was 40.79±7.83 years which is slightly lower than that of our study results. A study conducted in Turkey by Topdagiet al<sup>19</sup> has also reported 55.3±15.9 years mean age of the patients.

Diabetes was present in 42(34.4%) and hypertension was noted in 63(51.6%) our study cases. Mean body mass index (BMI) of our patients was 23.89±2.42 kg/m<sup>2</sup> and obesity was present in 15.6 % our patients having liver cirrhosis. Child pugh classification of our patients was as; 6(4.9%) had class A, 81(66.4%) had class B and 35(28.7%) had class C. Similar results have been reported by Ashgeret al<sup>22</sup> from Lahore. Naveed et al<sup>23</sup> from Lahore reported 70 patients had Child Pugh class B and 30% with Child Pugh class C, these results are similar to our study results.

Mean serum sodium level of our patients was 133.93±3.86mmol/L (ranging from 127 to 141mmol/L) and hyponatremia was present in 59(48.4%) patients with liver cirrhosis. Among these 59 hyponatremic patients, 36(61%) were male, 28(47.5%) were diabetic, 41(69.5%) were known hypertensive patients. Nineteen (32.2%) of these hyponatremic patients were obese and all of these obese 19 had

hyponatremia. Patients in child pugh class B had hyponatremia in 24(40.7%) and in class C 35(59.3%) had hyponatremia and results showed that hyponatremia had positive association with disease progression and severity (p=0.000). In literature variable results regarding hyponatremia in patients with liver cirrhosis have been described, Shaikh et al<sup>24</sup> reported 51.6 % patients with cirrhosis had hyponatremia. Angeliet al<sup>25</sup> reported 57% hyponatremia in patients with liver cirrhosis. Jenqet al<sup>26</sup> reported 28.6% hyponatremia in patients with liver cirrhosis. Our findings of hyponatremia being more common in patients with liver cirrhosis (48.4%) are similar to that of Shaikhet al<sup>24</sup> and Angeli et al<sup>25</sup> however different from that of Jeng et al<sup>26</sup> who described its lower proportion in patients of liver cirrhosis, but still it remains an important factor to be explored in patients having liver cirrhosis.

## CONCLUSION

Hyponatremia is quite common in our patients having liver cirrhosis as high frequency was noted in our study. Hyponatremia was significantly associated with increasing age, diabetes, hypertension, child pugh score and obesity. All the clinicians treating cirrhotic patients must notice this entity at early stage and should treat them accordingly so as to save these patients from future hardships.

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