



## A CLINICAL STUDY ON THE EFFECT OF LIVER CIRRHOSIS ON TESTICULAR STRUCTURE AND FUNCTION.

### General Medicine

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### ABSTRACT

**Introduction:** Hypogonadism occurs in majority of men affected with cirrhosis due to alcoholism. They have been found to have a reduced production of testosterone with low total plasma testosterone concentrations. Testicular atrophy begins to occur as early as the onset of the disease and progresses with duration. **Aims And Objective:** The aim of the present study was to determine the effect of end stage liver disease (Alcoholic Liver Cirrhosis) on Testicular morphology & functioning leading to Testicular atrophy and to correlate these changes and the severity of the disease with the occurrence and severity of hypogonadism. **Materials And Methods:** This observational study was conducted in the Department of Medicine, Akash Institute of Medical Sciences & Research Centre, Devanahalli, Bengaluru, Karnataka. The study was conducted in 30 male cirrhotic patients with history of alcoholism, who were admitted to the in-patient department of Akash Hospital with complaints of jaundice and ascites in whom cirrhosis is diagnosed after clinical and laboratory investigations. The size and volume of testicle is measured with the help of Testicular Ultrasound and few Testicular volumes were calculated using the formulae for prolate ellipsoid, prolate spheroid and lamberts formula. Serum Testosterone levels is also measured wherever required. They were also examined for Clinical features of hypogonadism such as gynecomastia, reduced body hair, History of impotency and reduced testicular size. **Results:** A review of the current evidence shows that Testicular Atrophy begins to occur as early as the onset of cirrhosis and its severity increases with the progression of the disease. In patients with chronic liver cirrhosis, signs of clinical hypogonadism can be evidenced and may be attributed to severe reduction in testosterone levels. **Conclusion:** Men with chronic liver cirrhosis often develop clinical signs of hypogonadism and feminization. Testicular functional and morphological changes start to occur as early as the onset of cirrhosis. Development of testicular atrophy begins as early as the occurrence of cirrhosis and it runs in parallel with the worsening severity of liver cirrhosis. Therefore with the early identification of both morphological and functional changes in the testis and with appropriate intervention in the form of testosterone therapy, we can prevent or delay the occurrence of overt hypogonadism or feminization in cirrhotic men.

### KEYWORDS

#### INTRODUCTION:

Alcohol consumption has for a very long time been part of everyday life in many societies and it will most likely continue to be so in the future. Hypogonadism which is characterized by low testosterone levels and relative hyperestrogenism, occurs in almost 90% of men affected with cirrhosis due to alcoholism. Cirrhosis disrupts the hypothalamic-pituitary-gonadal axis causing low testosterone levels which manifest as reduction in prostate size, loss of libido, impotence, oligospermia, infertility and loss of weight. Kinetics studies have shown that atrophic testes in cirrhosis produce only one quarter of the normal amount of testosterone. Additionally 15% of testosterone produced in this man is not derived from the testes but from peripheral conversion of circulating Androstenedione. Thus the production of testosterone by the testes in cirrhotic men is paltry.

#### Aim:

The aim of the present study is to determine the effect of end stage liver disease (Alcoholic Liver Cirrhosis) on Testicular morphology & functioning leading to Testicular atrophy and to correlate these changes and the severity of the disease with the occurrence and severity of hypogonadism.

#### Objectives:

A study is done in 30 Male cirrhotic patients with history of alcoholism, who were admitted to the in-patient department of Akash Hospital with complaints of jaundice, ascites and edema in whom cirrhosis is diagnosed after Clinical and Laboratory investigations. The size and volume of the testicle (absolute weight, length, width and height) is measured with the help of Testicular Ultrasound and few Testicular volumes were calculated using the formulae for prolate ellipsoid, prolate spheroid and lamberts formula. Serum Testosterone levels is also measured wherever required. The data collected is then tabulated.

All objectives stated have been achieved.

#### Methodology:

The present study was conducted with 30 alcoholic patients after asse

#### RESULT:

The testicular volumes changes in all the 30 men with chronic cirrhosis

is presented in Table.1. There is significant reduction in the testicular volumes in all the 30 men.

As the duration of cirrhosis progresses, both the right scrotal volume ( $5.5 \pm 1.4g$ ) and left scrotal volume ( $5.4 \pm 1.5g$ ) are significantly reduced ( $p < 0.05$ ) when compared to the testicular volume of a normal healthy male [10-15g] (15).

The correlation between duration of cirrhosis with the Right and Left scrotal volume is moderately negative {right ( $r = -0.615$ ,  $p < 0.05$ ), left ( $r = -0.576$ ,  $p < 0.05$ )}. Hence, as the duration of cirrhosis increases, both the right and left scrotal volumes decrease.

**Table 1 Persons Correlation**

|                       | Rt. Scrotal volume (r) | P value | Lt. Scrotal volume (r) | P value |
|-----------------------|------------------------|---------|------------------------|---------|
| Duration of cirrhosis | -0.615                 | <0.05   | -0.576                 | <0.05   |

The serum concentration of testosterone was measured in three patients with severely reduced testicular volumes. It was below the normal range in all three cases. Two out of the three men tested for serum testosterone levels, have Gynaecomastia, history of impotency, reduced body hair and decreased testicular size. The third patient only presented with reduced testicular size and Gynaecomastia.

Testicular size is significantly decreased in 9 men with chronic liver cirrhosis. The percentage of total men with significantly reduced testicular volume is 30% of the total, showing testicular atrophy. This has been illustrated in Table 2 & Fig 1.

**Table 2**

| Crosstab              |                               |                           |      |        |
|-----------------------|-------------------------------|---------------------------|------|--------|
|                       |                               | Decreased Testicular Size |      | Total  |
|                       |                               | No                        | yes  |        |
| duration of cirrhosis | 1 Count                       | 6                         | 0    | 6      |
|                       | Expected Count                | 4.2                       | 1.8  | 6.0    |
|                       | %within duration of cirrhosis | 100.0%                    | 0.0% | 100.0% |

|       |                                    |        |        |        |
|-------|------------------------------------|--------|--------|--------|
|       | % within Decreased testicular size | 28.6%  | 0.0%   | 20.0%  |
| 2     | Count                              | 8      | 0      | 8      |
|       | Expected Count                     | 5.6    | 2.4    | 8.0    |
|       | % within duration of cirrhosis     | 100.0% | 0.0%   | 100.0% |
|       | % within Decreased testicular size | 38.1%  | 0.0%   | 26.7%  |
| 3     | Count                              | 7      | 9      | 16     |
|       | Expected Count                     | 11.2   | 4.8    | 16.0   |
|       | % within duration of cirrhosis     | 43.8%  | 56.2%  | 100.0% |
|       | % within Decreased testicular size | 33.3%  | 100.0% | 53.3%  |
| Total | Count                              | 21     | 9      | 30     |
|       | Expected Count                     | 21.0   | 9.0    | 30.0   |
|       | % within duration of cirrhosis     | 70.0%  | 30.0%  | 100.0% |
|       | % within Decreased testicular size | 100.0% | 100.0% | 100.0% |

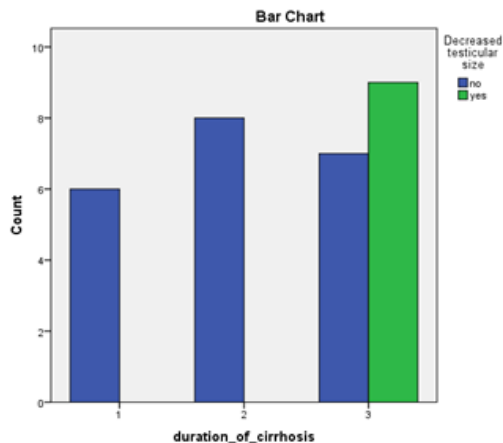


Fig 1.

Significantly reduced body hair was noted in 4 out of the 30 patients with chronic cirrhosis. The total percentage of men with reduced body hair is 13.3%. This is represented in Fig. 2.

**Table 3**  
**Crosstab**

|                       |                                |                                | Reduced body hair |        | Total  |
|-----------------------|--------------------------------|--------------------------------|-------------------|--------|--------|
|                       |                                |                                | no                | yes    |        |
| duration of cirrhosis | 1                              | Count                          | 6                 | 0      | 6      |
|                       |                                | Expected Count                 | 5.2               | .8     | 6.0    |
|                       |                                | % within duration of cirrhosis | 100.0%            | 0.0%   | 100.0% |
|                       |                                | % within Reduced body hair     | 23.1%             | 0.0%   | 20.0%  |
|                       | 2                              | Count                          | 8                 | 0      | 8      |
|                       |                                | Expected Count                 | 6.9               | 1.1    | 8.0    |
|                       |                                | % within duration of cirrhosis | 100.0%            | 0.0%   | 100.0% |
|                       |                                | % within Reduced body hair     | 30.8%             | 0.0%   | 26.7%  |
|                       | 3                              | Count                          | 12                | 4      | 16     |
| Total                 |                                | Expected Count                 | 13.9              | 2.1    | 16.0   |
|                       |                                | % within duration of cirrhosis | 75.0%             | 25.0%  | 100.0% |
|                       |                                | % within Reduced body hair     | 46.2%             | 100.0% | 53.3%  |
|                       | Count                          |                                | 26                | 4      | 30     |
|                       | Expected Count                 |                                | 26.0              | 4.0    | 30.0   |
|                       | % within duration of cirrhosis |                                | 86.7%             | 13.3%  | 100.0% |
|                       | % within Reduced body hair     |                                | 100.0%            | 100.0% | 100.0% |

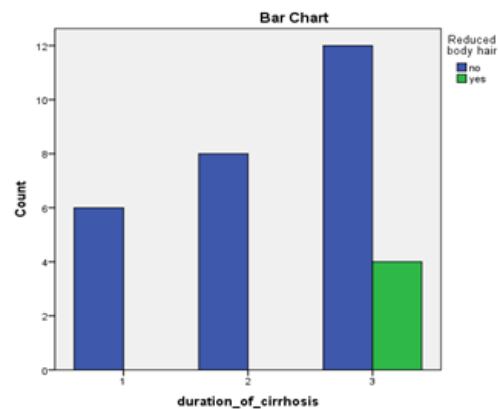


Fig. 2

History of impotency was noted in 2 patients out of the total 30 patients studied. The percentage of total men with history of impotency is 6.7%. Illustrated in Figure 3.

**Table 4**  
**Crosstab**

|                       |                                |                                | H/o impotency |        | Total  |
|-----------------------|--------------------------------|--------------------------------|---------------|--------|--------|
|                       |                                |                                | no            | Yes    |        |
| duration of cirrhosis | 1                              | Count                          | 6             | 0      | 6      |
|                       |                                | Expected Count                 | 5.6           | .4     | 6.0    |
|                       |                                | % within duration of cirrhosis | 100.0%        | 0.0%   | 100.0% |
|                       |                                | % within H/o impotency         | 21.4%         | 0.0%   | 20.0%  |
|                       | 2                              | Count                          | 8             | 0      | 8      |
|                       |                                | Expected Count                 | 7.5           | .5     | 8.0    |
|                       |                                | % within duration of cirrhosis | 100.0%        | 0.0%   | 100.0% |
|                       |                                | % within H/o impotency         | 28.6%         | 0.0%   | 26.7%  |
|                       | 3                              | Count                          | 14            | 2      | 16     |
| Total                 |                                | Expected Count                 | 14.9          | 1.1    | 16.0   |
|                       |                                | % within duration of cirrhosis | 87.5%         | 12.5%  | 100.0% |
|                       |                                | % within H/o impotency         | 50.0%         | 100.0% | 53.3%  |
|                       | Count                          |                                | 28            | 2      | 30     |
|                       | Expected Count                 |                                | 28.0          | 2.0    | 30.0   |
|                       | % within duration of cirrhosis |                                | 93.3%         | 6.7%   | 100.0% |
|                       | % within H/o impotency         |                                | 100.0%        | 100.0% | 100.0% |

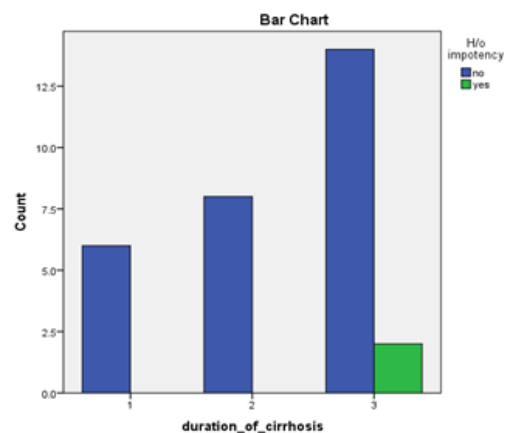


Fig. 3

## DISCUSSION:

The study was carried out on 30 male cirrhotic patients. In the study, the largest age groups were in the ranges 40-50 years and 55-60 years (33.3% each). Testicular atrophy was seen in all the patients included in the study. However, the levels of atrophy varied in the patients depending upon the duration of liver cirrhosis. Reduction in testicular volume was in parallel with the worsening severity of liver cirrhosis.

Although testicular atrophy was seen in all of these men, reduction in testicular size was seen in 30% of the men. When all 30 subjects were grouped into three categories depending on the duration of cirrhosis, with the first category being the least duration of cirrhosis and the third category being the longest duration of cirrhosis, it was noted that the severity of clinical hypogonadism features were higher in the third category.

Cirrhotic men are known to have deranged testicular morphology, presenting as testicular atrophy and a decrease in testicular functioning which decreases testosterone production. This in toto leads to clinical hypogonadism that present as abnormalities in the form of decreased testicular size, history of impotency, reduced body hair, gynaecomastia. The data from our study correlates well with other studies like LELLAND J. RATHER, M.D. who formed a report on the correlation between hepatic cirrhosis and testicular atrophy.

Thus, with the identification of these derangements early during the start of cirrhosis and with proper initiation of treatment, we can prevent overt hypogonadism.

### CONCLUSION:

Men with chronic liver cirrhosis often develop clinical signs of hypogonadism and feminization. Testicular functional and morphological changes start to occur as early as the onset of cirrhosis. There is reduction in the testicular size and function with the onset of cirrhosis and it progresses with the duration of the disease. Development of testicular atrophy begins as early as the occurrence of cirrhosis and it runs in parallel with the worsening severity of liver cirrhosis. Therefore with the early identification of both morphological and functional changes in the testis and with appropriate intervention in the form of testosterone therapy, we can prevent or delay the occurrence of overt hypogonadism or feminization in cirrhotic men.

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