

# Fungal Urinary Tract Infection; A Study Conducted On Patients With Liver Cirrhosis

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## ABSTRACT

**Objective:** To determine frequency of fungal infection of urinary tract in patients with liver cirrhosis

**Design & duration:** This is a cross sectional study. This study was completed in duration of six months.

**Setting:** Study was conducted in Margalla Hospital Gulshan Colony PMO, Taxila.

**Patients & Methods:** Patients admitted in study hospital with liver cirrhosis having child class A, B and C were evaluated for fungal urinary tract infection, belonging to any gender, having age above 40 years. All data was documented and analyzed using SPSS software version-20 and means, frequencies, standard deviation and p-value were calculated. Results presented in the form of tables and graphs.

**Results:** Total 400 cases were evaluated for fungal urinary tract infection having liver cirrhosis admitted in study hospital in given duration of study. Fungal cause of UTI was found in 260 cases including 29.3% male and 70.7% female cases. While other causes were found in 140 cases. According to child classification out of 260 cases with fungal UTI, 11 cases were in class B and 249 cases were in class-C while no case belonged to class-A. Most of the cases (42%) with UTI were in age interval of 40-50 years. Duration of CLD was 2-4 years in most of the cases (30%).

**Conclusion:** Fungal cause of urinary tract infection is very common among patients with liver cirrhosis and older age as these cases have weak immunity

**Key words:** Liver cirrhosis, chronic liver disease, urinary tract infection, fungal infection, immunocompromised

## INTRODUCTION

Liver cirrhosis is 10<sup>th</sup> most common cause of mortality among people of western world and a main cause of decompensated liver failure. In this condition patients have dysfunction of immune system also called cirrhosis associated immune dysfunction.<sup>1</sup> Decreased immunity of patient leads to many opportunistic bacterial and fungal infections. Complications related to chronic liver disease include liver cirrhosis, portal hypertension, encephalopathy, gastrointestinal bleeding, peritonitis, bacterial and fungal infections, sepsis, multiple organ failure ultimately leading to death.<sup>2</sup> Urinary tract infection is found in most of the cases with liver cirrhosis in our set ups. Its causes are low immunity and unnecessary use of antibiotics in patients. Cloudy or foul smelling urine on visual examination of urine does not mean urinary tract infection is present so treatment is not indicated until unless urine culture is done.<sup>3</sup> Urinary tract infection can occur anywhere in urethra, urinary bladder, ureter and kidneys. This is most common among women than men.<sup>4,5</sup> Some studies suggest that in HBV induced liver cirrhosis immunosuppression occurs due to DNA of virus so leading to invasive fungal infections while in HCV induced liver cirrhosis low level of vitamin-D is a risk factor of compromised immunity.<sup>6,7</sup> Infections in patients with chronic liver disease causes acute on chronic liver failure so having increased mortality rate (60-80%) and poor prognosis. Some scoring systems are used to assess severity of disease as well as prognosis and mortality rate.<sup>8</sup> These are Child-Pugh and MELD scoring systems. In our study Child scoring was used to classify the patients in three groups according to severity of disease. Urinary tract infections are usually uncomplicated in majority of cases and can be managed easily by oral antibiotics but in some cases complicated UTI can occur due to resistant pathogens and associated with high rate of treatment failure. Complicated UTI can occur in liver cirrhotic patients due to excessive use of antibiotics which make pathogens resistant.<sup>9</sup> Candida and aspergillosis infections are very common among patients with CLD (candida more common) causing renal, respiratory infections and fungal peritonitis. Other than CLD patients, patients with diabetes or patients on repeated hemodialysis are also prone to fungal infections due to impaired body immunity.<sup>10</sup> Fluconazole, mphoteracin-B and flucytosine can be used in these cases but treatment of candidal urinary tract infection is difficult because antifungal medications achieve limited

urinary concentrations which is insufficient to eradicate the infection. Micanafungin has been proved treatment of choice in fungal UTI due to sufficient urinary concentration of drug is achieved.<sup>11</sup>

## PATIENTS AND METHODS

This is a cross sectional study conducted in Gulshan Hospital PMO taxila. Study was started in January 2019 and completed in June 2019 comprising on 6 months duration. Total 400 cases included in this study irrespective of gender having age 40-75 years with mean age±SD (54.5±7.3). Confidence interval was 95% with 5% margin of error. P-value, frequency, percentages, means and standard deviation calculated. P-value less than 0.05 was taken as significant and more than this insignificant. Results were presented in the form of tables and graphs. Sample calculated using following formula  $z^2p(1-P)/d^2$ . An inclusion and exclusion criteria were designed for including patients in study group.

### Inclusion criteria

Patients having age above 40 years.  
Diagnosed cases of liver cirrhosis  
Having no other co-morbidities  
Male and female both genders

### Exclusion criteria

Patients having co-morbidities  
Patient having diabetes mellitus  
Using antibiotics or antifungal medication for more than two

weeks

Patients not giving consent

Fungal urinary tract infection was defined as >100 CFU (colony forming unit) per ml in non voided urine or more than 10<sup>5</sup> CFU in voided samples of urine. Written informed consent was taken from all cases included in study group and permission was taken from ethical committee of institution where study was conducted. Privacy of patient's data was made sure.

**Statistical Analysis:** Data was analyzed using SPSS software (version-20), frequencies, means, percentages, p-Value, mean and standard deviation determined. Chi square test applied. Confidence interval was 95%. P-value less than 0.05 was significant.

**RESULTS**

Out of total 400 cases 117(29.25%) were male and 283(70.75%) were female cases. Fungal UTI was present in 260(65%) patients.

There were 168(42%) cases having age 40-50 years, 112(28%) between 51-60 years, 87(21.8%) between 61-70 years and 33(8.3%) were above 70 years of age.

(Table-1) distribution of fungal UTI according to age

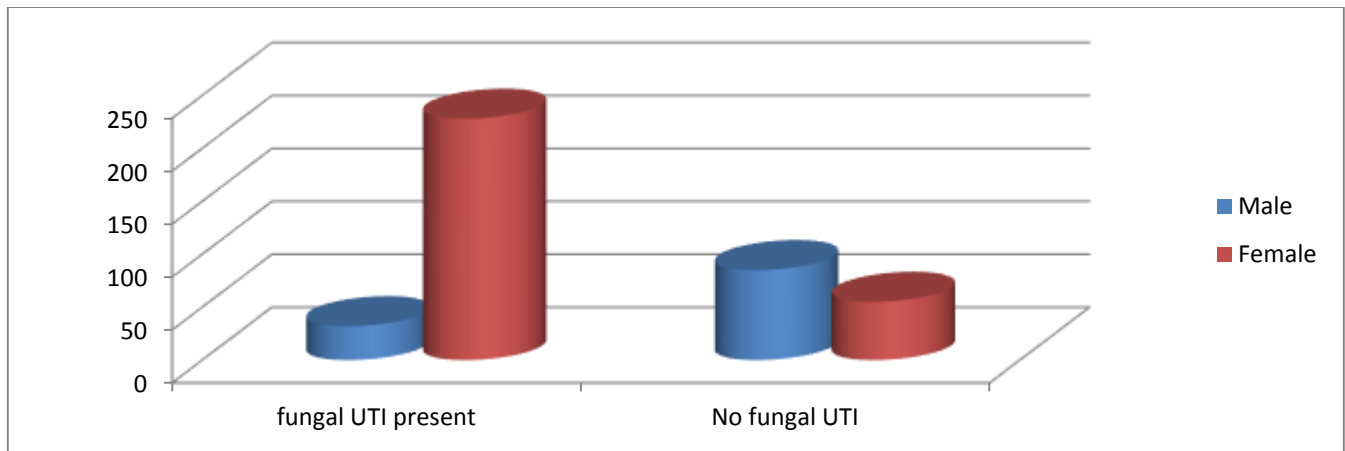
Age (years)	Fungal UTI		Total	P-Value
	Yes	NO		
40-50	110 (27.5%)	58 (14.5%)	168 (42%)	0.001
51-60	73 (18.3%)	39 (9.7%)	112 (28%)	
61-70	59 (22.7%)	28 (7%)	87 (21.8%)	
>70	18 (4.5%)	15 (3.8%)	33 (8.3%)	
Total	260 (65%)	140 (35%)	400 (100%)	

(Table-2) Distribution of Fungal UTI according to severity of disease (Child-Pugh classification)

Child-Pugh classification	Fungal UTI	
	Yes	NO
Class-A	00	18(4.5%)
Class-B	11(2.8%)	58(14.5%)
Class-C	249(62.3%)	64(16%)
Total	260(65%)	140(35%)

(Table-) Distribution of fungal UTI according to gender

Gender	Fungal UTI		Total	P-Value
	Yes	NO		
Male	32(8%)	85(21.3%)	117(29.3%)	0.05
Female	228(57%)	55(13.8%)	283(70.8%)	
>70				
Total	260 (65%)	140 (35%)	400 (100%)	



(Table-4) Distribution of fungal UTI in study group according to duration of CLD

Duration of CLD (years)	Fungal UTI		Total
	Yes	NO	
<2	66(16.5%)	54(13.5%)	120(30%)
2-4	85(21.3%)	37(9.3%)	122(30.5%)
4-6	58(14.5%)	28(7%)	86(21.5%)
>6	51(12.8%)	21(5.3%)	72(18%)

According to Child classification out of 260 cases with fungal UTI, there were 249(62.3%) in class-C , 11(2.8%) cases in class-B and no case in class-A was having fungal UTI. Maximum cases were present in class-C and minimum in class-A.

Most of the cases with CLD and liver cirrhosis were female in our study group. Out of 117 male patients fungal UTI was detected in 32 cases and out of 283 female patients fungal UTI was detected in 228 cases. Mostly female patients with liver cirrhosis were having fungal UTI.

Graph showing comparison of Fungal UTI prevalence among male and female cases

Long duration of chronic liver disease increases prevalence of fungal urinary tract infection as it was obvious in our study in which 72 cases with CLD from more than 6 years, 51 were having fungal UTI. Fungal UTI was present in 16.5% cases with duration

of CLD less than 2 years, 21.3% with duration of 2-4 years, 14.5% with duration 4-6 years and 12.8% cases were having CLD from more than 6 years.

**DISCUSSION**

Patients having liver cirrhosis are immunocompromised hence simple infection may become fatal. Fungal infections are more common than bacterial infections in these cases. Simple infection should not be ignored other wise serious consequences may occur leading to mortality. Fungal urinary tract infections are very common in such patients. Fungus can be isolated in urine examination. This condition is called fungiurea or candidurea if infection is due to candida. A study was conducted on 236 cases in Liaquat hospital Karachi determining frequency of fungal infection among liver cirrhotic patients and determined that most of the

cases in study group were belonged to child class-C (85%) and fungal urinary tract infection was found in 59.7% cases in study group. These results comparable to our results as in our study 78% cases were in child class-C and rate of fungal UTI was 65%.<sup>12</sup> Risk factors of fungal infection in patients with chronic liver disease include urinary catheters inserted in patient, Diabetes mellitus, use of broad spectrum antibiotics, steroids and cytotoxic drugs for prolonged period of time. Fungal UTI is more common among female than male population with CLD. Urinary catheters are placed for prolonged period in patients admitted in ICU so they have more chance to acquire UTI than patients admitted in wards.<sup>13</sup> In our study most of the cases were admitted in general wards with urinary catheter placed for more than a week in most of the cases. In many hospital of united state fungal infections are common among CLD patients with poor prognosis.<sup>14</sup> Among patients with acute on chronic disease bacterial and fungal infections are common. In bacterial infections gram-positive bacteria are common. Risk factors determining 90-days mortality in such patients are WBC count, age, MELD score and secondary infections.<sup>15,16</sup> Incidence of urinary catheter induced infection is 30% in United States. *Candida Albicans* forms a fungal layer on the catheter surface and is most common agent causing fungal urinary tract infection. B-petide mimics of natural antimicrobial peptides are effective in preventing formation of fungal biofilm on the catheter so reducing fungal UTI.<sup>17</sup> A study reported increased incidence of fungal infections among patients admitted in ICU with chronic liver disease (23.8%) as compared to those admitted in ICU with cardiovascular disease (13.9%). No difference in mortality rate has been noted among patients with fungal UTI either they receive anti fungin or not.<sup>18</sup> In our study fungal urinary tract infection was reported in 65% cases out of total 400 cases having UTI. In other cases bacterial cause was found. Studies have reported that 30% patients with liver cirrhosis die in first month and other 30% die in first year due to fungal and bacterial infections. Approach to evaluate causative pathogen of infection in such patients to give proper management and to prevent development of resistance in pathogens by giving excessive improper antibiotics.<sup>19</sup> Infection of multi drug resistant pathogens is common among patients with liver cirrhosis particularly in those patients not responding to broad spectrum antibiotics.<sup>20</sup> Opportunistic fungal infections are common in immunocompromised patients with CLD, after organ transplant, taking radiochemotherapy for malignancy or in patients with neutropenia. Fungal infections occur due to impaired cellular immunity. Abnormal humoral immunity does not predispose to fungal infections.<sup>21</sup> Usually candiduria patients are asymptomatic and few develop candidemia. Candidal urinary tract infections include pyelonephritis, prostatitis, cystitis, epididymo-orchitis. Pyelonephritis and fungemia are associated with poor prognosis and increased morbidity and mortality rate.<sup>22</sup>

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