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# Leptospirosis, Focus on Related Acute Kidney Injury among Albania Patients

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***Abstract:*** **The aim: Describing hospital epidemiological finding, clinical, laboratory results and outcome focus on renal complications of the patients diagnosed with leptospirosis..**
**Background: Leptospirosis is a zoonosis caused by spirochete genus Leptospira. Its clinical symptoms range from mild, self-limited disease to life threatening complications such as acute kidney injury, liver failure and bleeding.**
**Materials and methods: 119 consecutive patients enrolled in the study from 2010-2015. They were admitted at Infection Diseases Department and Nephrology Department of U.H.C: Mother Teresa" in Tirana. Data are collected retrospectively from patient charts. Statistical analysis was performed using Medcalc 14.8.1 and IBM SPSS 20. Leptospirosis infection was detected by enzyme-linked immunosorbent assay (ELISA).**
**Results: There was a total of 119 patients diagnosed with the condition from 2010-2015. 8% were female, 92% male. Age ranged from 15 to 78, mean 48.2 ± 15.4. 51 % developed AKIN III, 48 % F stage according to RIFLE. Mean length of stay was 14.1±7.4 days. Mortality was 8.4 % (10 patients) in our cohort. The number of cases peaked in June through the study years.**
**Conclusion: Leptospirosis is a zoonosis with a clinical picture ranging from mild to severe. Severe cases are associated with high mortality in the Albanian population. AKI is a frequent complication of leptospirosis in our study cohort. Multidisciplinary approach and timely intervention may help prevent complications and reduce mortality.**

***Keywords:*** **leptospirosis, AKI, Albania.**

## 1. INTRODUCTION

Leptospirosis is a rather frequent zoonosis. It is caused by Leptospira spirochetes. It is a widespread infection throughout the world, ranging from the tropical regions to lower temperature areas, with a up to 10 times higher incidence in the tropics. It is estimated that there around 900.000 case worldwide per year with approximately 49.000 deaths.(1,2)

It is mostly spread by rodents but other animals, domestic or not, are not excluded. Human get infected by direct or indirect exposure to infected animals or body fluids. There are infection risk factors which are described in detail elsewhere.(3,4)

Clinical manifestations of leptospirosis are quite diverse, ranging from mild to severe cases; wich can lead to underreporting of the condition or eventually death (5). A high index of suspicion is required to establish an early diagnosis. The hallmarks are bleeding, muscle pain, electrolyte imbalances, and thrombocytopenia. The combination of liver and renal failure is called Weil's disease. Renal failure is usually characterized by preserved urine output and associated hypokalemia. Low urine output and hyperkalemia are indicators for poor prognosis. Early and Daily hemodialysis reduce the mortality risk (6,7). Pulmonary disease with bleeding is another serious complication of the condition (8).

## 2. MATERIAL AND METHODS

119 consecutive patients were enrolled in the study from 2010-2015. They were admitted at Infection Diseases Department and Nephrology Department of U.H.C: Mother Teresa" in Tirana. Patients under age of 14 years were excluded from the study. Data were collected retrospectively from patient charts. Statistical analysis was performed using Medcalc 14.8.1 and IBM SPSS 20. Leptospirosis infection was detected by ELISA.

Relevant clinical and laboratory data were recorded. Classification of acute kidney injury was based according to RIFLE and AKIN criteria.

## 3. RESULTS

Among the total subjects studied (119), 8% of the them were female, 92% male. Age ranged from 15 to 78, means age for male and female was 48.8±14.9, 41.5±19.8 respectively. Mean length of stay was 14.1±7.4 days.

Infection frequency according to age groups and M/F is shown in the chart below.

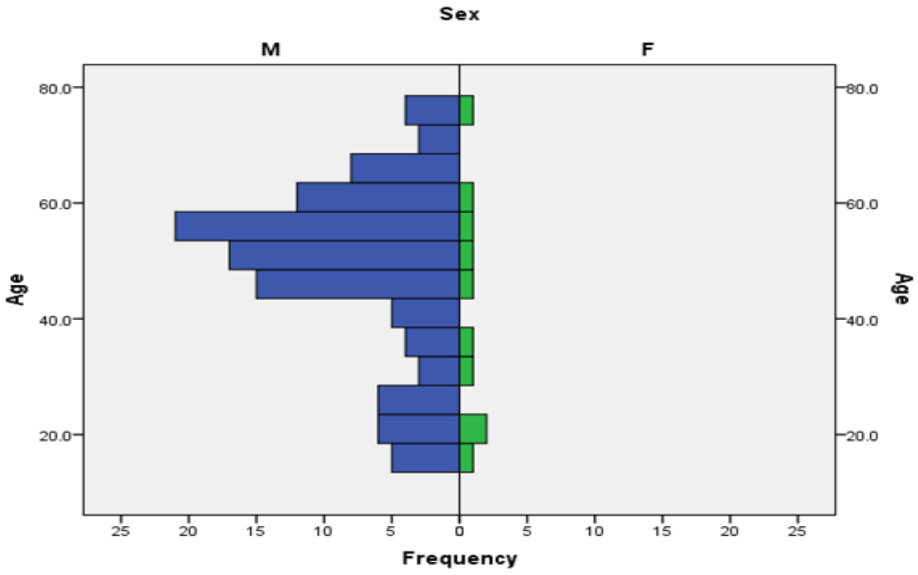


**Figure 1**

The number of cases peaked during June through the study period. There was also a peak in 2014. This is shown in the following charts.

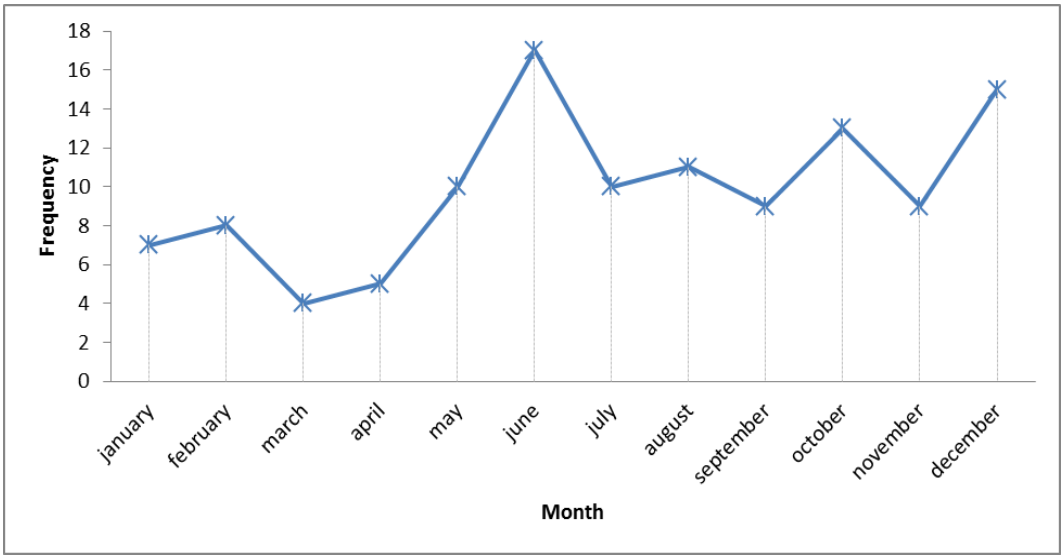


**Figure 2.**

Clinical symptoms related to the infection were fever, malaise, myalgia, arthralgias, headache, nausea in the majority of cases. Patient clinical characteristics are shown in the table below.

**Table 1. General, clinical characteristics and laboratory test of the study population**

| | | |
|---|---|---|
| Age—yr | 48.2 | ±15.4 |
| Male— no (%) | 109 | 91.6 |
| Female— no (%) | 10 | 8.4 |
| LOS —days | 14.1 | ±7.4 |
| **Occupational distribution— no (%)** | | |
| Farmer | 43 | 36.1 |
| Communal worker | 26 | 21.8 |
| Shepherd | 24 | 20 |
| Fishermen | 10 | 8.4 |
| Other | 7 | 5.8 |
| Tourist | 6 | 5 |
| Beekeeper | 3 | 2.5 |
| **Mortality— no (%)** | 10 | 8.4 |
| **Clinical sign and symptoms** | | |
| Fever— no (%) | 117 | 98.3 |
| Malaise— no (%) | 113 | 95 |
| Myalgia —no (%) | 108 | 90.8 |
| Headache— no (%) | 65 | 54.6 |
| Abdominal pain— no (%) | 44 | 37 |
| Vomiting— no (%) | 41 | 34.5 |
| Conjuctival suffusion | 41 | 34.5 |
| Low urine output— no (%) | | |
| Back pain— no (%) | 21 | 17.6 |
| **Laboratory test on admission** | | |
| Urea— (mg/dl) | 122.7 | ±84.7 |
| Creatinine— (mg/dl) | 3.3 | ±2.3 |
| Potassium— (mEq/l) | 3.47 | ±0.5 |
| Hemoglobin— (g/dl) | 11.9 | ±1.9 |
| Hematocrit— (%) | 35.6 | ±6.06 |
| WBC— (/µL) | 12.1 | ±10.4 |
| PLT— (/µL) | 76.4 | ±42.0 |
| Bilirubin — (mg/dl) | 9.8 | ±10.3 |
| AST— (IU/L) | 127.7 | ±143.2 |
| ALT— (IU/L) | 98.4 | ±69 |
| Albumin — (g/dl) | 2.8 | ±0.4 |
| LDH— (IU/L) | 574.7 | ±1130 |

Plus-minus values are means ±SD.

Patient distribution according RIFLE and AKIN are shown in figure below:

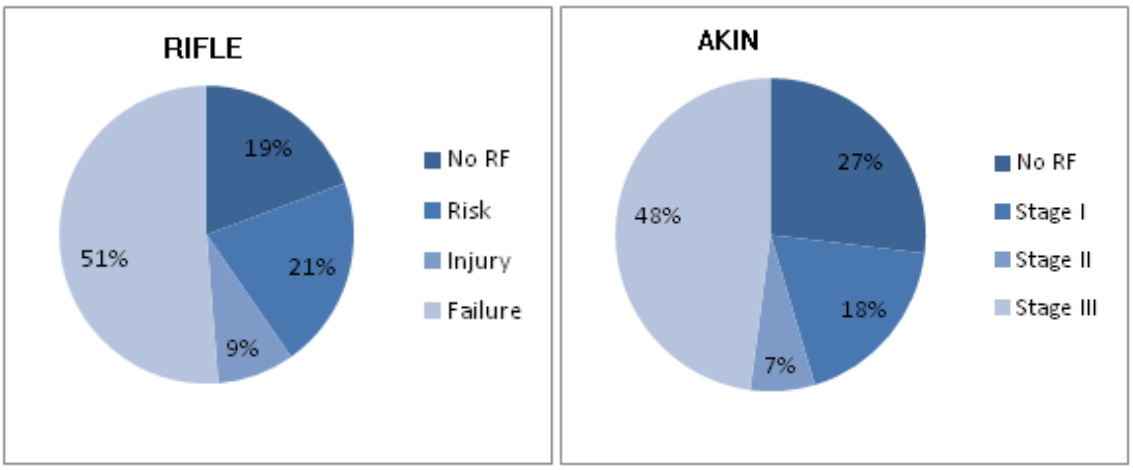


**Figure 3. Patient distribution according RIFLE and AKIN classification**

51 % F stage according to RIFLE, 48 % developed AKIN III. 9.2% (11 patients) of patients underwent dialysis treatment. The rest was managed conservatively. There were 10 deaths. 3 of them had undergone dialysis.

Patients with severe acute kidney injury were older, less hemodinamically stable, had more pulmonary complications and stayed longer at the hospital.

## 4. DISCUSSION

Leptospirosis is a zoonosis quite present in Albania. The majority of patients developed classical signs of the infection and had a positive history highly suggestive of leptospirosis. Young patients were excluded due to infrastructure regulations. They are treated by the paediatric department. The majority of patients were male (92%), due to the fact of their professional activities which exposed them to different infectious sources (fig.1). The highest number of cases was observed in April-June during the five year period of the study (fig.2). This may be explained in part by the wet and warm season which is well known to favor the spread of infection from animals to human++(**9**,10)

Conjuctival suffusion accompanied by the clinical triad of fever, malaise and myalgia (table 1)**(11).** This clinical constellation of findings accompanied by a suggestive occupational history should alert physicians to highly consider the possibility of leptospirosis infection in their differential diagnosis.

We focused on related acute kidney injury since it is maybe the only complication for which there is a specific intervention to address it and there was a high incidence in our cohort. Patients were classified according to AKIN and RIFLE criteria to better understand the infection impact on renal function. 48% of patients according to AKIN and 51% of them according to RIFLE developed severe kidney injury during the course of disease. A total of 73% and 81% according to AKIN and RIFLE criteria respectively developed some degree of renal injury during the hospital stay.

It has to be noted that milder and self limited cases are not referred to our tertiary centre, thus a bias toward more severe disease exists in our study. This may explain the relatively higher incidence of AKI in our patients in comparison to the 40-60% occurrence in previous reports (12, 13).

A characteristic finding in our patients was hypokalemia and preserved urine output even in patients with acute kidney injury (14). There was a trend towards not very high levels of potassium in patients with advanced stages of acute renal failure. This is pathophysiologically explained by the tubular dysfunction that occurs at the early stages of the infection (12, 15).

An integrated approach by a team of experts in the respective areas is important in preventing and addressing accompanying complications.

The mortality rate in our cohort was 8.4% (10 patients) (16, 17).

Preventive measures, early reporting and referral algorithms have been established by public health organizations in our country.

## 5. CONCLUSION

The three main clinical symptoms of leptospirosis in our country were fever, malaise and myalgia. The majority of patients were male related to their occupation. Leptospirosis remains a severe infectious disease in Albania with a high incidence of acute kidney injury in our cohort. Approximately half of cases in our study manifested stage III or F AKI according to AKIN and RIFLE criteria respectively. 11 patients required dialysis treatment.

Prevention measures and probably a vaccine in the future will help reduce its spread from animal to humans. Despite better knowledge of the disease, antibiotics and multidisciplinary approach it is associated with a relatively high mortality rate in severe cases.

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