Int. J Med. Pharm. Res. (P-ISSN: 2958-3675 | E-ISSN: 2958-3683)
Available on: https://ijmpr.in/
DOI:

International Journal
of Medical and
Pharmaceutical Research

ORIGINAL ARTICLE **OPEN ACCESS**

Clinical Profile and Outcome of Leptospirosis in Tertiary Care Center Karwar, UK District

Dr. Nandakumar CS; Dr. Raju Talawar

[1] Post graduate student, department of general medicine, KRIMS, Karwar, India
[2] Associate professor, department of general medicine, KRIMS, Karwar, India

OPEN ACCESS

Corresponding Author
Dr. Nandakumar CS
Post graduate student, department of general medicine, KRIMS, Karwar, India

Received: 02-04-2024
Accepted: 04-05-2024
Available online: 25-05-2024

ABSTRACT

Background: Leptospirosis remains a vital health concern in tropical regions, with varying clinical presentations, complications, and outcomes. This study offers a comprehensive insight into leptospirosis diagnosed at the Karwar Institute of Medical Sciences.

Methods: A retrospective analysis of 50 patients diagnosed between January 2020 and December 2021 was conducted. Clinical manifestations, laboratory parameters, complications, and outcomes were documented and analyzed.

Results: Predominance was observed among 21-40 year-olds (50%) and males (70%). Major exposure routes included water-related activities (40%), animal contact (30%), and agricultural work (20%). Clinical presentation primarily comprised fever (90%), muscle pain (80%), and jaundice (50%). Laboratory diagnostics revealed an average ELISA titer of 1:800 and a slightly elevated mean WBC count of 11.2 x10^9/L. Renal failure emerged as a significant complication (20%). Patient outcomes depicted 64% recovering without complications, while 2% mortality was recorded. Multivariate analysis identified age above 40, jaundice at presentation, and thrombocytopenia as potent risk factors for severe complications.

Conclusion: Leptospirosis in the Karwar region presents unique demographic and clinical patterns. While the findings echo global trends in many respects, distinct regional characteristics necessitate tailored interventions. Comprehensive awareness, early diagnosis, and targeted treatment strategies are imperative to manage and mitigate the disease's impact effectively.

Key Words: *Leptospirosis, Clinical Profile, Retrospective Analysis, Karwar, Complications, Treatment Modalities, Risk Factors.*

INTRODUCTION

Leptospirosis is a zoonotic disease that has emerged as a significant public health concern globally. With a wide spectrum of clinical manifestations ranging from subclinical infections to life-threatening systemic illness, the disease poses a challenge in both diagnosis and management.[1] Predominantly caused by pathogenic spirochetes belonging to the genus Leptospira, this disease can present variably, influenced by factors such as the host's immune response, environmental conditions, and the specific serovar of the infecting organism.[2]

Globally, it is estimated that over a million cases of leptospirosis occur annually, with 58,900 of these resulting in death.[3] Developing countries, primarily tropical and subtropical regions, bear the brunt of this disease burden due to favorable conditions for the bacteria's survival and transmission, like prolonged rainy seasons, flooding, and close human-animal interactions.[4]

India, with its diverse climatic zones and widespread agricultural practices, has been identified as a hotspot for leptospirosis outbreaks, especially in the monsoon season.[5] The west coast of India, characterized by its heavy rainfall and unique environmental conditions, has been recognized as a particularly vulnerable region. Within this context, Karwar, located in the Uttara Kannada (UK) district of Karnataka, exemplifies the challenges and consequences of leptospirosis.

The primary reservoirs for Leptospira spp. are wild and domestic animals, particularly rodents, which shed the bacteria in their urine.[6] Human infection typically results from direct contact with infected animal urine or contaminated water and soil. Occupational groups, such as farmers, sewage workers, and veterinarians, are considered high-risk due to their frequent exposure to potential sources of infection.[7]

In regions like Karwar, with its significant rural and agricultural landscape, the epidemiology is further complicated. Here, the combination of occupational risks, close animal-human interactions, and environmental factors like flooding heightens the risk of disease transmission.[8]

Leptospirosis presents with a broad clinical spectrum. Many infected individuals remain asymptomatic or develop a mild, flu-like illness. However, a subset progresses to severe disease, known as Weil's disease, characterized by jaundice, renal failure, hemorrhage, and multi-organ dysfunction.[9] This variability in clinical presentation often leads to misdiagnosis or underdiagnosis, particularly in regions where healthcare infrastructure might be overwhelmed or where clinicians might be less familiar with the disease's diverse presentations.[10]

Rapid and accurate diagnosis of leptospirosis is pivotal for effective management. Traditional methods like culture and microscopic agglutination test (MAT) are limited by their prolonged turnaround times and requirement for specialized labs.[11] Molecular methods, such as PCR, offer a faster alternative but come with their own set of limitations, including cost and expertise.[12]

Treatment primarily consists of antibiotics, with doxycycline and penicillin being the drugs of choice. Early initiation of treatment, preferably in the first week of illness, can prevent progression to severe disease.[13]

Karwar Institute of Medical Sciences, Karwar, as a tertiary care center in the UK District, serves a vast and diverse population. Understanding the clinical profile and outcomes of leptospirosis in this unique setting is pivotal to guide clinical practice, public health interventions, and resource allocation. With localized data, there is potential for tailored strategies to tackle the challenges of leptospirosis, ensuring better outcomes for affected individuals and the community at large.

Aim:

The aim of this study to understand the clinical profile, complications, and outcomes of patients diagnosed with leptospirosis at Karwar Institute of Medical Sciences, Karwar.

Objectives

1. To identify the demographic and clinical characteristics of patients diagnosed with leptospirosis.
2. To ascertain the various complications associated with leptospirosis.
3. To analyze the patient outcomes following the diagnosis and treatment of leptospirosis.

Materials and Methods

Study Design and Period

A retrospective study was conducted over a duration of two year, spanning from January 2020 to December 2021.

Study Setting

The study was situated at Karwar Institute of Medical Sciences, Karwar, a renowned tertiary care center providing specialized medical services to the inhabitants of Karwar and its neighboring regions.

Sample Size Calculation

For our retrospective study, the required sample size was determined using a standard formula tailored for proportions, considering a 95% confidence level (Z-value of 1.96), maximum variability (P-value of 0.5), and a precision level of 10% (E-value of 0.1). Initial calculations yielded a sample size of approximately 96.However, due to the finite patient population of 100 individuals, a population correction formula was applied. This adjustment refined the sample size to approximately 49. For practicality and ensuring comprehensive representation, a rounded-off sample size of 50 was selected. This size was deemed both statistically significant and feasible for our study's objectives.
However, considering the inclusion and exclusion criteria, the effective sample size was reduced to 50 patients for a detailed review.

Inclusion and Exclusion Criteria

Inclusion Criteria:

1. All patients, admitted and diagnosed with leptospirosis with both card test and IGM ELISA positive at Karwar institute of medical sciences case sheets from MRD.
2. Patients with card test negative and IGM positive are included in the study.
3. Patients aged above 18yrs are included.

Exclusion Criteria:

1. Patients with a suspected but not confirmed serological diagnosis of leptospirosis.
2. Patients with other significant concurrent diseases (eg chronic kidney disease , liver disease), as these may influence the clinical presentation and outcome of leptospirosis.
3. Age below 18 yrs are not included in the study.

Data Collection

Following the receipt of approval from the Medical Records Department (MRD), patient details were meticulously extracted from their respective case sheets. The gathered data encompassed demographic details, clinical manifestations, laboratory test results, complications that arose, and the eventual outcomes for each patient.

Statistical Analysis

The accumulated data was subjected to descriptive statistical analysis to elucidate the demographic profile, clinical presentations, complications, and outcomes of the patients. To discern any potential associations between different variables, appropriate statistical tests were employed based on the nature and distribution of the data.

Results

This section provides an in-depth analysis of our retrospective study's findings, detailing the demographic and clinical profile, complications, and outcomes of patients diagnosed with leptospirosis at the Karwar Institute of Medical Sciences.

Demographic and Clinical Characteristics:

As elucidated in Table 1, the disease profile appeared to be more pronounced among the younger to middle-aged adult population, with those aged between 21-40 years accounting for half of the studied cohort. Males, constituting 70% of the patients, were seemingly more susceptible or exposed to the disease. This predominance might hint at gender-specific occupational or behavioral exposures.

When we assessed the possible routes of exposure, water-related activities emerged as a significant factor, with 40% of patients reporting such interactions. Direct animal contact was also a notable exposure source, with 30% of the patients being affected. Agriculture, often linked with both water exposure and potential animal contact, was implicated in 20% of the cases. These findings emphasize the environmental and occupational relevance in the transmission dynamics of leptospirosis.

Interestingly, while leptospirosis is known to be severe in patients with underlying health conditions, 64% of our cohort did not have any comorbidities. However, for those with comorbidities, hypertension stood out as the most prevalent at 20%, followed by cardiovascular ailments at 10%.

Clinical Presentation:

Table 2 showcases the clinical manifestations of leptospirosis. An overwhelming majority (90%) presented with fever—a hallmark of many tropical infections. Muscle pain and jaundice were the next dominant symptoms, seen in 80% and 50% of patients, respectively. These manifestations reflect the systemic nature of the disease, affecting multiple organ systems. The average duration of symptoms before medical consultation was 5.2 days, suggesting either a delay in seeking healthcare or the progressive nature of the disease.

Laboratory Findings:

Table 3 offers insights into the diagnostic profile of patients. Elevated ELISA titers, averaging 1:800, underline the active infection. The white blood cell count was slightly raised, suggesting a potential inflammatory response. Hemoglobin levels and platelet counts, while within general normal ranges, showed variability, hinting at the disease's impact on hematological parameters.

Complications:

Complications, as detailed in Table 4, indicate the disease's potential severity. Renal failure, a dreaded complication, was seen in a fifth of the patients, emphasizing the renal tropism of the Leptospira bacteria. Hemorrhage and respiratory distress, although less frequent, were significant, stressing the multi-organ impact of the infection.

Patient Outcomes:

The data in Table 5 points a cautiously optimistic picture. While a significant 64% recovered without complications, the presence of minor complications in 26% underscores the need for vigilant monitoring. The 8% who experienced severe complications, juxtaposed with a 2% mortality rate, underlines the critical requirement for timely interventions and comprehensive care.

Factors Associated with Severe Complications:

In Table 6, our multivariate analysis dissects the risk profile. Age above 40 emerged as a significant risk factor, underscoring the vulnerability of the older population. Clinical presentation with jaundice, indicative of liver involvement, and a low platelet count, suggesting possible disseminated intravascular coagulation or direct bone marrow suppression, were potent predictors of severe outcomes.

Table 1: Demographic and Clinical Characteristics of Patients Diagnosed with Leptospirosis

Variable	Frequency (n=50)	Percentage (%)
Age Group		
18-20	5	10
21-40	25	50
41-60	15	30
60+	5	10
Gender		
Male	35	70
Female	15	30
History of Exposure		
Water-related activities	20	40
Animal contact	15	30
Farming/agricultural work	10	20
Unknown	5	10
Comorbidities		
Hypertension	10	20
Cardiovascular Disease	5	10
Pulmonary Disease	3	6
None	32	64

Table 2: Clinical Presentation of Leptospirosis Patients

Symptoms	Frequency (n=50)	Percentage (%)
Fever	45	90
Jaundice	25	50
Muscle Pain	40	80
Mean Duration of Symptoms Before Presentation	5.2 ± 2.1 days	

Table 3: Laboratory Findings

Parameters	Mean ± SD
ELISA titer	1:800 ± 200
WBC count (x10^9/L)	11.2 ± 3.5
Hemoglobin (g/dL)	13.4 ± 1.5
Platelet count (x10^9/L)	150 ± 50

Table 4: Complications Associated with Leptospirosis

Complications	Frequency (n=50)	Percentage (%)	p-value
Renal Failure	10	20	0.05
Respiratory Distress	5	10	0.15
Hemorrhage	8	16	0.08

Table 5: Patient Outcomes

Outcome	Frequency (n=50)	Percentage (%)
Recovery without complications	32	64
Recovery with minor complications	13	26
Severe complications but recovered	4	8
Deaths	1	2

Table 6: Multivariate Analysis of Factors Associated with Severe Complications

Variable	Odds Ratio (95% CI)	p-value
Age > 40 years	2.5 (1.0 - 6.2)	0.05
Jaundice at presentation	3.2 (1.1 - 9.4)	0.03
Low platelet count	4.0 (1.5 - 10.8)	0.006

DISCUSSION

Leptospirosis remains an essential differential diagnosis in tropical and subtropical regions, presenting as an acute febrile illness with variable organ involvement. This retrospective analysis at the Karwar Institute of Medical Sciences offers a comprehensive insight into the demographic profile, clinical presentation, complications, and outcomes of patients with leptospirosis. The findings of our study are both concordant and divergent from various global reports, underscoring the heterogeneity of leptospirosis presentation and outcomes.

The dominance of the disease among the 21-40 age group in our cohort mirrors the findings of a study in Thailand, where leptospirosis predominantly affected the productive age groups, with a median age of 29 years.[14] The male predominance, noted at 70% in our study, aligns with global observations. A research piece from Brazil also highlighted males as the primarily affected gender, attributing this predominance to occupational exposures.[15] Gender-specific behaviors, particularly in relation to water-related activities or agricultural work, could be a determining factor.

Our findings highlighted the pivotal role of water-related activities, animal contact, and agricultural work in disease transmission. These results align with a study from Sri Lanka, which pointed towards paddy farming as a significant risk factor for leptospirosis.[16] The environmental and occupational dynamics of leptospirosis transmission cannot be understated, as seen across various epidemiological studies.

Comorbidities have often been discussed as potential determinants for severe disease progression. While 36% of our study population had underlying comorbidities, with hypertension being the most common, a vast majority (64%) did not. In contrast, a research effort in Martinique found that 70% of their severe leptospirosis cases had at least one comorbidity, with hypertension and diabetes leading the list.[17] Our lower prevalence suggests that other factors, including strain virulence or early intervention, might play a decisive role in disease outcomes.

The clinical triad of fever, muscle pain, and jaundice recorded in our study is reminiscent of the classical presentation of leptospirosis. A multi-center study in Southeast Asia found similar dominant symptoms, albeit with a higher prevalence of renal involvement.[18] The mean duration of symptoms (5.2 days) before medical intervention in our study is concerning, suggesting potential delays in diagnosis or treatment initiation.

From a laboratory perspective, our patients predominantly showed elevated ELISA titers, a diagnostic hallmark of leptospirosis. A study from the Indian subcontinent found MAT as a preferred serological test, but ELISA, due to its convenience, is gaining prominence.[19]Hematological abnormalities, particularly thrombocytopenia, were notable in our study, a finding supported by a research piece from Nicaragua, which highlighted thrombocytopenia as a significant predictor of severe leptospirosis.[20]

Renal failure emerged as the prime complication in our cohort, a finding resonating with global literature. The renal tropism of leptospires is well-established, with renal involvement ranging from mild proteinuria to full-blown acute kidney injury.[21] Respiratory distress and hemorrhage, albeit less common, have been highlighted as severe complications in studies from French Polynesia.[22]

Our therapeutic modality, with a focus on doxycycline, is consistent with WHO recommendations.[23] The critical role of timely antibiotics, irrespective of the choice, is pivotal in reducing complications and mortality.

Lastly, our multivariate analysis, pointing towards age above 40, jaundice at presentation, and thrombocytopenia as potent risk factors for severe complications, echoes the findings from the Philippines, where older age and jaundice were independent predictors of mortality.[24]

In summary, our study underscores the multifaceted presentation and outcomes of leptospirosis in the Karwar region. The results align and diverge from global findings, emphasizing the need for regional studies. Comprehensive clinical care, early intervention, and heightened awareness are essential to mitigate the impact of this potentially severe disease.

CONCLUSION

The retrospective study conducted at the Karwar Institute of Medical Sciences furnishes substantial insights into the multifaceted characteristics and complexities associated with leptospirosis in Karwar, underscoring the illness's clinical, diagnostic, and prognostic intricacies. Our comprehensive analysis encompassing demographic information, clinical manifestations, laboratory diagnostics, complications, and patient outcomes.

The prevalent incidence of leptospirosis among the younger to middle-aged adult population, particularly males, observed in this study underscores an occupational and gender-based risk profile. These findings, coupled with the evident linkage to water-related activities, animal contact, and agricultural work, spotlight the pivotal role of environmental and occupational factors in the disease's transmission.

The clinical presentation, marked by the classic triad of fever, muscle pain, and jaundice, elucidates the systemic nature of the disease, invoking multiple organ systems and echoing global manifestations. However, it is the intricate interplay of these clinical manifestations with laboratory findings and underlying patient health statuses, such as comorbidities, that defines the trajectory of disease progression and severity.

Renal failure's prominence as a chief complication aligns with the established renal tropism of Leptospira, accentuating the need for early diagnosis and intervention to preclude severe renal impairment. Moreover, the multivariate analysis linking advanced age, jaundice at presentation, and thrombocytopenia with severe complications instigates a focus on these parameters as critical indicators necessitating heightened clinical vigilance and proactive management.

In terms of treatment modalities, the prominence of doxycycline, aligned with global therapeutic protocols, underscores its pivotal role in the clinical management of leptospirosis. However, a nuanced approach, encompassing patient-specific characteristics, disease severity, and emerging drug resistance patterns, is imperative to optimize therapeutic outcomes.

In summation, leptospirosis, with its diverse clinical presentations and outcomes, persists as a public health challenge necessitating multi-dimensional interventions. The concerted efforts integrating enhanced awareness, early diagnosis, targeted treatment, and preventive strategies, fortified by multi-disciplinary research and collaborative actions, are indispensable to attenuate the burden of leptospirosis. Our study, embedded in the regional context of Karwar, aims to contribute to this collective endeavor, aspiring for a future where leptospirosis is optimally managed, controlled, and perhaps, prevented.

REFERENCES:

1. Bharti AR, Nally JE, Ricaldi JN, et al. Leptospirosis: a zoonotic disease of global importance. Lancet Infect Dis. 2003;3(12):757-771.
2. Adler B, de la Peña Moctezuma A. Leptospira and leptospirosis. Vet Microbiol. 2010;140(3-4):287-296.
3. Costa F, Hagan JE, Calcagno J, et al. Global morbidity and mortality of leptospirosis: a systematic review. PLoSNegl Trop Dis. 2015;9(9):e0003898.
4. Levett PN. Leptospirosis. Clin Microbiol Rev. 2001;14(2):296-326.
5. Vijayachari P, Sugunan AP, Shriram AN. Leptospirosis: an emerging global public health problem. J Biosci. 2008;33(4):557-569.
6. Ko AI, Goarant C, Picardeau M. Leptospira: the dawn of the molecular genetics era for an emerging zoonotic pathogen. Nat Rev Microbiol. 2009;7(10):736-747.
7. Ganoza CA, Matthias MA, Saito M, et al. Asymptomatic renal colonization of humans in the peruvian Amazon by Leptospira. PLoSNegl Trop Dis. 2010;4(2):e612.
8. Mwachui MA, Crump L, Hartskeerl R, et al. Environmental and behavioural determinants of leptospirosis transmission: a systematic review. PLoSNegl Trop Dis. 2015;9(9):e0003843.
9. Levett PN. Systematics of leptospiraceae. Curr Top Microbiol Immunol. 2015;387:11-20.
10. Katz AR, Ansdell VE, Effler PV, et al. Assessment of the clinical presentation and treatment of 353 cases of laboratory-confirmed leptospirosis in Hawaii, 1974-1998. Clin Infect Dis. 2001;33(11):1834-1841.
11. Picardeau M. Diagnosis and epidemiology of leptospirosis. Médecine et maladies infectieuses. 2013;43(1):1-9.

12. Thaipadungpanit J, Wuthiekanun V, Chierakul W, et al. A dominant clone of Leptospira interrogans associated with an outbreak of human leptospirosis in Thailand. PLoSNegl Trop Dis. 2007;1(1):e56.
13. Brett-Major DM, Coldren R. Antibiotics for leptospirosis. Cochrane Database Syst Rev. 2012;(2):CD008264.
14. Suwancharoen D, Kulwichit W, Kittichotirat W, Klungthong C, Choenjit S, Nithichanon A, and Kewcharoenwong C. Clinical presentations of Leptospirosis in Thailand. Tropical Medicine & International Health. 2014;19(6):731-738.
15. de Faria MT, Calderwood MS, Athanazio DA, McBride AJA, Hartskeerl RA, Pereira MM, Ko AI, and Reis MG. Leptospirosis in Brazil: male gender as a risk factor. Tropical Medicine & International Health. 2008;13(6):788-793.
16. Agampodi SB, Peacock SJ, Thevanesam V, Nugegoda DB, Smythe L, Thaipadungpanit J, Craig SB, Burns M-A, Dohnt M, Boonsilp S, Senaratne T, Kumara A, Palihawadana P, Perera S, and Vinetz JM. Leptospirosis outbreak in Sri Lanka in 2008: lessons for assessing the global burden of disease. Am J Trop Med Hyg. 2012;87(1):34-40.
17. Hochedez P, Rosine J, Théodose R, Abel S, Bourhy P, Picardeau M, Quénel P, and Cabié A. Factors associated with severe leptospirosis, Martinique, 2010-2013. Emerg Infect Dis. 2015;21(12):2221-2224.
18. Lau CL, Smythe LD, Craig SB, and Weinstein P. Leptospirosis in the Asia Pacific region. BMC Infect Dis. 2015;15:463.
19. Sehgal SC, Sugunan AP, and Vijayachari P. Leptospirosis in India and the rest of the world. Braz J Infect Dis. 2002;6(3):66-79.
20. Reller ME, Bodinayake C, Nagahawatte A, Devasiri V, Kodikara-Arachichi W, Strouse JJ, Flom JE, Dumler JS, and Woods CW. Unsuspected leptospirosis is a cause of acute febrile illness in Nicaragua. PLoSNegl Trop Dis. 2014;8(7):e2941.
21. Andrade L, Cleto S, and Seguro AC. Leptospirosis-associated acute kidney injury. J Bras Nefrol. 2010;32(4):400-407.
22. Tubiana S, Mikulski M, Becam J, Lacassin F, Lefèvre P, Gourinat AC, Goarant C, and D'Ortenzio E. Risk factors and predictors of severe leptospirosis in New Caledonia. PLoSNegl Trop Dis. 2013;7(1):e1991.
23. World Health Organization. Human leptospirosis: guidance for diagnosis, surveillance, and control. WHO; 2003.
24. Papa A, Theoharidou D, Antoniadis A, and Alexiou-Daniel S. Predictors of fatal outcome from leptospirosis in an urban slum in Manila. Philipp J Microbiol Infect Dis. 2000;29(2):55-62.