



SEROPREVALENCE AND CLINICO-EPIDEMIOLOGICAL PROFILE OF LEPTOSPIROSIS IN A TERTIARY CARE HOSPITAL OF CENTRAL INDIA

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ABSTRACT **INTRODUCTION:** Leptospirosis is an emerging zoonotic disease, but it has been underdiagnosed and underreported in India due to lack of awareness of the disease, inadequate epidemiological data and unavailability of appropriate diagnostic facilities. **AIM:** The aim of the present study was to determine the seroprevalence, clinical and epidemiological profile of leptospirosis. **MATERIALS AND METHODS:** This is a cross sectional study carried out from January 2017 to December 2021. A total of 1587 suspected patients were recruited. Serum samples from each patient were subjected to Leptocheck WB (Zephyr Biomedicals, Goa) to detect Leptospira specific IgM antibodies. Positive patients were studied for their clinical and laboratory parameters. **RESULTS:** Out of 1587 suspected cases, 3.08% were seropositive for Leptospira specific IgM antibodies. Prevalence was more in the age group of 21-40 years (42.85%), with male preponderance (77.55%). Seroprevalence was higher among farmers (42.85%), followed by sweepers (22.44%) and laborers (18.36%). The most common presenting feature was fever (100%), followed by myalgia (85.71%) and headache (81.53%). Jaundice was present in 28.57% cases and decreased urine output in 12.24% cases. The most common complication was liver failure (20.40%) followed by renal failure (12.24%). **CONCLUSION:** All patients with an acute febrile illness, particularly during the monsoon season, should be screened for leptospirosis. There is need of increased awareness among physicians for common clinical manifestation of leptospirosis and early laboratory diagnosis will help reduce mortality and morbidity associated with the disease.

KEYWORDS : Leptospira, zoonosis, Leptocheck WB

INTRODUCTION

Leptospirosis is an emerging zoonotic disease, caused by a bacterium *Leptospira interrogans* which has more than 200 serological variants. Rodents are the major reservoirs of infection. Man acquires infection when water or soil contaminated with urine of an infected animal comes in contact with human skin or mucous membranes [1]. Globally, more than one million cases of leptospirosis occur, with more than 10% mortality. It could be the cause of up to 20% cases of fever of unknown origin [2].

Clinically, the most common syndrome is anicteric leptospirosis, a self-limited illness that occurs in 85 to 90% of the cases. It is characterized by constitutional symptoms like fever, headache, severe myalgia, chills with rigors, and prostration. Icteric leptospirosis or Weil's syndrome is the most severe form of leptospirosis that occurs in 5 to 10% of the cases. It is characterized by conjunctival suffusion, rash, hepatosplenomegaly, evidence of hemorrhage, renal failure, icterus, aseptic meningitis, acute respiratory distress syndrome (ARDS), and pulmonary hemorrhage [3]. Because of its wide spectrum of clinical symptoms and co-infection with other febrile illnesses like typhoid, malaria, scrub typhus and dengue may present diagnostic dilemmas. A high index of clinical suspicion and a sensitive laboratory test is required for accurate diagnosis [4].

Leptospirosis has been underdiagnosed and underreported in India due to lack of awareness of the disease, inadequate epidemiological data and unavailability of appropriate diagnostic facilities in especially in resource limited settings. Diagnosis of leptospirosis can be done by various methods. Isolation of *Leptospira* in cultures is the gold standard method for diagnosis. However, it is laborious and time-consuming, thus making it unsuitable for rapid diagnosis in the early phase of the disease. Molecular and serological (MAT and ELISA) techniques are highly sensitive and specific but their high cost and need for technical expertise often limits their applications in the routine diagnostics in many resource-limited settings [5]. The early diagnosis of leptospirosis is now possible by using various commercially available rapid tests which are mostly immunochromatographic or latex agglutination test. Many of these rapid tests were evaluated by some researchers with good sensitivity and specificity [6,7].

The aim of the present study was to determine the seroprevalence, clinical and epidemiological profile of leptospirosis among patients attending the tertiary care hospital in central India.

MATERIAL AND METHODS

This cross-sectional study was carried out from January 2017 to December 2021 (5 years) at Microbiology Department of a tertiary care teaching hospital of central India. This study was approved by Institutional Ethics Committee. A total of 1587 suspected patients were recruited for this study. A suspected case is defined as a patient with acute febrile illness with headache, myalgia and prostration associated with a history of exposure to infected animals or an environment contaminated with animal urine [8]. A written informed consent was obtained prior to their inclusion into the study. Demographic details of the patients were noted. A thorough history and examination were carried out and the patient's signs and symptoms were documented using a predesigned proforma. Blood specimen (5ml each) was collected from each patient in sterile plain bulb and EDTA bulb. Basic laboratory investigations were performed, including complete blood count, kidney function tests, liver function tests, etc.

Serum samples from each patient were subjected to rapid test Leptocheck WB (Zephyr Biomedicals, Goa). This test detects *Leptospira* specific IgM antibodies. This test was evaluated previously at the Royal Tropical Institute, Amsterdam with overall sensitivity and specificity of 78% and 98% respectively [7]. This test was also evaluated in India with sensitivity and specificity of 84.8% and 37.3% respectively as compared to MAT and 90.7% and 93.4% respectively as compared to IgM ELISA [6]. Tests were performed using manufacturer's instruction and results were noted at the end of 15 minutes. Violet band appearing in the control 'C' line as well as a test 'T' line indicates that the sample is positive. Absence of violet band in test line indicates negative test. The test is invalid if there is no development of violet band in the control line.

Data analysis was done using Microsoft Excel and OpenEpi software. Tables and charts were prepared using Microsoft Word and Excel. Study variables were expressed as percentages.

RESULTS

Out of 1587 suspected cases, 49 (3.08%) were seropositive for *Leptospira* specific IgM antibodies. (Table 1) Leptospirosis was more prevalent in the age group of 21-40 years (42.85%), followed by 41-60 years (30.61%) with male preponderance (77.55%). People living in rural areas were mostly affected (63.26%) as compared to urban population (36.73%). Seroprevalence was higher among farmers (42.85%), followed by sweepers (22.44%) and laborers (18.36%).

(Table 2) Seasonal variation was noted with maximum cases (83.67%) in monsoon season from July to September. (Figure 1)

The most common presenting feature was fever (100%), followed by myalgia (85.71%) and headache (81.53%). Jaundice was present in 14 (28.57%) cases and decreased urine output in 6 (12.24%) cases. These cases were having deranged liver and kidney function tests. (Table 2) The most common complication observed was liver failure (20.40%) followed by renal failure (12.24%) (Figure 2)

TABLE 1: YEAR WISE DISTRIBUTION OF SEROPOSITIVE LEPTOSPIRA CASES

YEAR	NUMBER OF SAMPLES TESTED	NUMBER OF SEROPOSITIVE CASES
2017	251	9
2018	298	11
2019	372	14
2020	311	7
2021	355	8
TOTAL	1587	49 (3.08%)

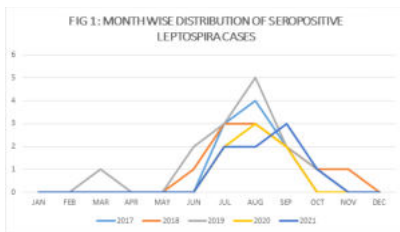
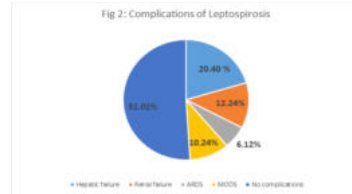


Table 2: Baseline demographic, clinical and laboratory parameters of leptospira positive patients

Parameter	Groups	No. of leptospira positive patients	Percentage
Age (years)	0-20	3	6.12
	21-40	21	42.85
	41-60	15	30.61
	>60	10	20.40
Gender	Male	38	77.55
	Female	11	22.45
Occupation	Farmers	21	42.85
	Sweepers	11	22.44
	Laborers	9	18.36
	Others	8	16.32
Residence	Rural	31	63.26
	Urban	18	36.37
Clinical presentation	Fever	49	100
	Headache	40	81.53
	Myalgia	42	85.71
	Conjunctival suffusion	15	30.61
	Nausea And Vomiting	22	44.89
	Abdominal pain	15	30.61
	Jaundice	14	28.57
	Hepatomegaly	10	20.40
	Decreased urine output	6	12.24
	Cough	5	10.20
Laboratory investigations	Breathlessness	3	6.12
	Hemoglobin < 11mg/dl	22	44.89
	Total leukocyte count >11,000/ul	31	63.26
	Platelets < 1.5 lakhs	19	38.77
	Sr.Bilirubin >1.2 mg/dl	14	28.57
	SGOT, SGPT >50 IU	10	20.40
Urea >20 mg/dl	6	12.24	
Creatinine >1.2 mg/dl	6	12.24	



DISCUSSION

Leptospirosis is now recognized as one of the common cause of acute febrile illness. However, it is underreported due to its nonspecific manifestations, lack of awareness among physicians and unavailability of sensitive diagnostic tests in resource limited settings.

In this study, the overall prevalence of leptospirosis was 3.08%. This is similar to findings of Chitkara et al (4%) [9] from Ludhiana and Agrawal et al (6.47%) [10] from New Delhi. However, Deshmukh et al [11] from Wardha district reported higher prevalence of 12.7%. Prevalence rates reported by other studies from various parts of the country are highly variable with higher rates reported by Sahira et al (11.4%) [12], Prabhakar et al (12%) [13] and Mansoor et al (12.7%) [14], all from South India. Maximum number of cases were seen in monsoon months of July to September. This is similar to many other studies. This is due to large amount of water surfaces and more agricultural activities in this season leading to more contact with contaminated urine of infected animals.

Leptospirosis was more prevalent in the age group of 21-40 years (42.85%) followed by 41-60 years (30.61%) with male preponderance (77.55%). Most of them were farmers (63.26%) followed by sweepers (22.44%). This is consistent with studies conducted by Agrawal et al [10], and Mansoor et al [14]. This may be due to involvement of young male population working in high risk areas like agriculture farms, sewage and mines. The risk of Leptospira increase in this population because of working barefoot in the contaminated water through which Leptospira can easily enter the body through broken skin or mucous membrane. Seroprevalence was higher (63.26%) in people living and working in rural areas because they are more involved in agricultural activities and are more exposed to rodents. This is consistent with many other studies [15, 16]

Most common clinical feature was fever (100%), followed by headache (81.53%) and myalgia (85.71%). Jaundice (28.57%), hepatomegaly (20.40%) and conjunctival suffusion (30.61%) were frequent clinical signs seen. Similar clinical presentations were reported by Sethi et al [15], Chitkara et al [9] and Patil et al [17]. However a study from North eastern states observed headache as most common symptom (84.21%) followed by fever (73%) [18]. Most cases of leptospirosis had leukocytosis (63.26%) and thrombocytopenia (38.77%). Raised liver enzymes was observed in 20.40% cases and impaired renal function was observed in 12.24% cases. Similar laboratory derangements have been reported by many other authors also [9, 13, 17]. Most common complication observed in cases of leptospirosis was hepatic failure (20.40%) followed by renal failure (12.24%). This is consistent with studies conducted by Shivkumar and Krishnakumar [19], Sahira et al [12] and Chitkara et al [9]. In our study mortality rate was found to be 10.20%. This is similar to mortality rates reported by Margarita et al (11%) [20], Mansoor et al (14.81%) [14] and Parmar G et al (16%) [21]. However, Patil et al [17] reported lower mortality rate of 4.34%.

CONCLUSION

Leptospirosis has emerged as an important public health problem in India. All patients with an acute febrile illness, particularly during the monsoon season, should be screened for leptospirosis. Early diagnosis can be done by using rapid immunochromatographic tests after proper evaluation, especially in resource limited settings and peripheral health centers. There is need of increased awareness among physicians for common clinical manifestation of leptospirosis and early laboratory diagnosis will help reduce mortality and morbidity associated with the disease.

CONFLICTS OF INTRESTS: Nil

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