Rickettsial Diseases: An Urgent Need to Upgrade Diagnostic Facilities

Anuradha Sood[*], Smriti Chauhan[1], S C Jaryal[2], Kamlesh Thakur[3], Lata Chandel[4]

[*]Assistant Professor, [1,2,3,4] Department of Microbiology, Dr. R. P. Government Medical College, Kangra at Tanda, Himachal Pradesh, INDIA.

[*]Corresponding Address:

soodanuradha72@yahoo.com

Research Article

Abstract: The presence of rickettsial diseases in India has been documented in the subhimalayan region of the country. Mortality due to these infections is reported to occur in 1% to 30% of untreated cases. Diagnosis & surveillance of this disease is problematic due to the absence of reliable advanced laboratory techniques. This study was a retrospective analysis of Weil-Felix data collected from Janauary 2008 to December 2011. The number of patients clinically suspected of rickettsial diseases has been steadily increasing each year with the maximum cases seen in rainy season. The number of samples of Weil-Felix test with titres ≥ 1:80 is highest with OXK and lowest with OX19. Though Weil-Felix test is inexpensive but it is seen that it has a low sensitivity. Our results indicate that Rickettsial diseases are a serious public health problem in our state, so we recommend that laboratory facilities be upgraded so that mortality and morbidity can be decreased by timely and accurate diagnosis.

Keywords: Rickettsia, Weil-Felix test, Titre, Scrub Typhus, IgM ELISA.

Introduction

The families Rickettsiaceae are small, obligate intracellular parasites comprising of the genera Rickettsia, Orientia, Coxiella and Ehrlichia. The genus rickettsia is currently divided into antigenically distinct groups: the typhus group and the spotted fever group.[1] These diseases usually manifest as fever, rashes and vasculitis. Mortality due to these infections is reported to occur in 1% to 30% of untreated cases. Rickettsial diseases have been reported from states of Jammu and Kashmir, Himachal Pradesh, Uttaranchal, Rajasthan, Assam, West Bengal, Maharashtra, Kerala and Tamil Nadu[2]. Timely and accurate diagnosis of rickettsial diseases followed by administration of an appropriate antibiotic may save precious lives. But diagnosis & surveillance of disease is problematic due to the absence of reliable advanced laboratory techniques which are expensive tests. Our hospital is a five hundred bedded tertiary care rural hospital catering to six districts of Himachal Pradesh. There is a great influx of patients presenting with fever, rash, headache, myalgia, and gastrointestinal disturbances simulating common flu especially during the rainy season in the months of July- October. The characteristic eschar and rash of rickettsial diseases is also present in some of the patients. The aim of this study was to analyze the data of Weil Felix test to provide an insight to the problem of Rickettsial diseases in our part of the state.

Materials and Methods

This was a retrospective analysis of data collected from January 2008 to December 2011. From all those patients clinically suspected to be suffering from rickettsial diseases in Dr.Rajendra Prasad Medical College, Kangra at Tanda, serum was collected and subjected to Weil-Felix test. The antigen for Weil-Felix assay (Proteus vulgaris OX19, OX2 and OXK) was obtained from Central Research Institute, Kasauli. Weil Felix test was done by the tube agglutination method. For each sample dilutions from 1:20 to 1:640 were put up. As the baseline titre for Weil Felix has not been determined in this region or in the surrounding region till now the significant value for a positive sample was taken to be 1:80 [3].

Results

The results as depicted in table 1 show that the number of patients clinically suspected of rickettsial diseases have been steadily increasing each year. Infact, it can be seen that patients have doubled from year 2010 to 2011.The male to female ratio was 1:2 and the patient age ranged from 3 years to 68 years. The maximum number of cases was seen in rainy season i.e from July to September. The number of samples of Weil-Felix test with titres ≥ 1:80 is highest with OXK and lowest with OX19.

Table 1: Shows titre of 1:80 or more for OXK, OX19, OX2 in Weil Felix Test from 2008-2011.

Year	No. of samples	OX K	OX 19	OX 2	OX 2+ OX 19	OX19+ OX K	OX K + OX 2	OX K+ OX19 +OX2
2008	158	15(9%)	10(6.3%)	27(17%)	5(3%)	17(10.7%)	19(12%)	13(8.2%)
2009	73	7(9.5%)	0(0%)	19(26%)	0(0%)	0(0%)	19(26%)	0(0%)
2010	411	68(16.5%)	0(0%)	65(15.8%)	3(0.7%)	5(1.2%)	153(37.2%)	23(5.5%)
2011	819	190(23.9%)	0(0%)	153(18.6%)	0(0%)	0(0%)	283(34.5%)	65(7.9%)

Discussion

The Rickettsial diseases are endemic in Southeast Asia, Northern Australia and pacific islands.[4]Amongst Rickettisiosis scrub typhus is most common and is endemic in the tropical and subtropical regions of the Asian continent. The presence of rickettsial diseases in India have been documented in subhimalayan region of the country like the states of Jammu and Kashmir, Himachal Pradesh, Uttaranchal and Haryana.[4] Reports from states of Assam, Rajasthan,West Bengal,Maharashtra, Kerala and Tamil Nadu are also documented[5,6,7]. These diseases are caused by bacteria of family Rickettsiaceae which are small; obligate intracellular, gram negative, non-flagellate, pleomorphic coccobacilli. Orientia tsutsugamushi is the causative agent for scrub typhus and is known to be transmitted by bite of larval stage of trombiculid mites or chiggers. Spotted Fever Group on the other hand can be tick, mite and flea borne infections. Diagnosis of rickettsial diseases is problematic especially in our region due to lack of advanced laboratory techniques. Isolation of Rickettsiae from clinical specimens requires biosafety level 3 containment and the results are not available in time to guide clinical management. Serology still remains the main tool for diagnosis. There are variety of tests available in the market namely Weil-felix, Immunofluorescence assay (IFA), microimmunofluorescence, latex agglutination, indirect hemagglutination, immunoperoxidase assay, complement fixation test, enzyme linked immunosorbent (ELISA), latex agglutination, western immunoblot and line probe assay. In most of the laboratories in India, Weil Felix test is used which relies on agglutination of the somatic antigens of non-motile Proteus species. Although Weil-Felix test is inexpensive and can give results overnight it is seen that it has a low sensitivity[7]. An indirect fluorescent antibody(IFA) uses fluorescent anti-human antibody to detect specific antibody from patient serum bound to a smear of scrub-typhus antigen and is currently the reference standard .This test is more sensitive with results being available in a couple of hours but is available only in certain reference laboratories. Also, the test is expensive and requires special equipment and technical expertise. In Indirect immunoperoxidase fluorescein is substituted by peroxidase and the results can be seen under the light microscope. The sensitivity and specificity obtained by immunoperoxidase assay for the serodiagnosis of scrub typhus resemble those obtained by IFA. ELISA for detection of IgG and IgM antibodies is also available for diseases like Rocky Mountain Spotted fever and scrub typhus. In a study done in Sri Lanka by Kularatne et al it was concluded that the Weil Felix Test demonstrated low sensitivity (33%) in diagnosing acute rickettsial infections and low specificity, with a positive titre of 1:320 seen in 54% of healthy volunteers and 62% of non-rickettsial fever patients[8]. Keeping this in view the use of the Weil Felix Test should be discouraged in the diagnosis of acute rickettsial infections. Our results indicate that there is prevalence of one or more rickettsial diseases in our area of the state and they pose a serious public health problem when not diagnosed or misdiagnosed. So seeing the number of cases which are increasing multifold in our state it is urgently required that the facilities in our part of the state be upgraded at the earliest, so that early diagnosis of patients can be made.This will not only guide the clinicians to provide early and correct treatment but will also help in reducing morbidity and mortality in the state due to rickettsial diseases.

References

1. Kovacova E and Kazar J.Rickettsial diseases and their serological diagnosis.Clin Lab 2000; 46, 239-245.
2. Mahajan SK, Kashyap R, Kanga A, Sharma V, Prashar BS, Pal LS.Relevance of Weil-Felix Test in diagnosis of scrub typhus in India. J Assoc Physic India 2006;54:619-21.
3. Marmion BP,Worswick DA.Coxiella burnetti and other medically important members of the family Rickettsiaceae.In: Collee JG,Fraser AG, Marmion BP,Simmons A,editors.Mackie & McCartney's practical medical microbiology.14th ed.London:Churchill Livingstone Elsevier;2006.p.573-88.
4. Chaudhary D, Garg A, Singh I, Tandon C, Saini R. Rickettsial diseases in Haryana: Not an uncommon entity. J Assoc Physic India 2009; 57.
5. Mathai E , Lloyd G, Cherian T, Abraham OC, Cherian A M. Serological evidence of continued presence of human rickettsiosis in southern India. Ann Trop Med Parasitol 2001; 95: 395-8.
6. Sundhira BK, Vijaykumar S, Kutti AK. Rickettsial spotted fevers in Kerala. Natl Med j India 2004;17:51-2.
7. Batra H V. Spotted fevers and Typhus fever in Tamil Nadu-commentary.Indian J Med Res 2007;126:101-3.
8. Kularatne SAM, Gawarammana IB. Validity of the Weil-Felix test in the diagnosis of acute rickettsial infections in Sri Lanka.Transactions of the royal society of Tropical medicine and Hygiene 2009;103: 423-4.