Original Article

ISSN (0): 2663-8290; ISSN (P): 2663-8282

Clinical Profile of Patients with Rickettsial Infection: Descriptive Study

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Abstract

Background: Rickettsiae along with their public health implications. They have addressed the co-circulation of differentspecies and genotypes of rickettsiae within the same endemic areas and how these observations may influence, correctly or incorrectly, the trends and conclusions drawn from the surveillance of rickettsial diseases in humans. **Subjects and Methods:** A total of 60 subjects, satisfying the inclusion and exclusion criteria were included in the final analysis. The sample size was calculated assuming the expected proportion of rickettsial infection as 11% among fever cases as per previously published studies, with a precision of 8% and 95% confidence level. **Results:** Among people with a tick bite, 3 (12.5%) people had 80 overall Weil-Felix titre. The number of people with 160, 320 and 640 overall Weil Felix titre was 4 (16.66%), 10 (41.66%) and 7 (29.16%) respectively in people with a tick bite. Among people without tick bite higher proportion of people had 80 and 160 titre. None of them had 640 titre. Statistical significant could not be tested due to zero number of subjects in one of the cells. **Conclusion:** Among people with pain abdomen 11 (23.91%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 15 (32.60%), 13 (28.26%) and 7 (15.21%) respectively in people with pain abdomen. Among people without pain abdomen higher proportion of people had 80 and 160 titres. None of them had 320 and 640 titres. Statistical significant could not be tested due to zero number of subjects in one of the cells.

Keywords: Rickettsial Diseases, Weil-Felix Titre, Pain Abdomen.

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Received: July 2019
Accepted: July 2019

Introduction

Rickettsial diseases are some of the most covert re-emerging infections of the present times. They are generally incapacitating and notoriously difficult to diagnose and untreated cases can have fatality rates as high as 30-35% but when diagnosed properly, they are often easily treated.[1]

Rickettsiae are obligate intracellular bacteria which are transmitted to vertebrates by arthropod vectors, primarily by fleas and ticks which are part and parcel of the environment. Their role in disease transmission is very important and following reviews are described the same.

In a review by Eremeeval M.E. et. al.[2] the vector habits of the Rickettsiae were well explained. The depiction was that "most rickettsiae circulate in diverse sylvatic or peridomestic reservoirs without having obvious impacts on their vertebrate hosts or affecting humans. In analysis of the complex invertebrate interactions and strategies that have permitted survival and circulation of divergent rickettsiae in nature, they have found that Rickettsiae were found in association with a wide range of hard and soft ticks, that fed on very different species of large and small animals. Maintenance of rickettsiae in these vector systems is driven by both vertical and horizontal transmission strategies, but some species of Rickettsiae are also known to cause detrimental effects on their arthropod vectors.[3]

They have also mentioned that the role of vertebrate animal hosts in the maintenance of rickettsiae was poorly understood. Some clearly play only the essential role of providing a blood meal to the tick while other hosts may supply crucial supplemental functions for effective agent transmission by the vectors. This review summarized the importance of some recent findings with known and new vectors that afford an improved understanding of the eco-epidemiology of Rickettsiae along with their public health implications. They have addressed the co-circulation of differentspecies and genotypes of rickettsiae within the same endemic areas and how these observations may influence, correctly or incorrectly, the trends and conclusions drawn from the surveillance of rickettsial diseases in humans.[4]

Not pertaining to the entomological factors there is also a lead role played by common ecological factors, particularly those driven by adverse climate conditions and changes, some surveillance methodologies and human population explosion with added adoption of homes in new horizons and behavioral changes like recreation, association with nature may all be the contributing factors to this phenomenon.[5,6]

Subjects and Methods

Study Design

The study was a prospective observational study.

Study Population

The study population included all the patients presenting fever, rash and were diagnosed with rickettsial disease by clinical examination.

Inclusion Criteria

Clinical features consistent with rickettsial infection and positive weilfelix test.

Exclusion Criteria

- Subjects who do not consent to the study.
- Cases with other established causes of infection.

Sample Size

A total of 60 subjects, satisfying the inclusion and exclusion criteria were included in the final analysis. The sample size was calculated assuming the expected proportion of rickettsial infection as 11% among fever cases as per previously published studies, with a precision of 8% and 95% confidence level, using the following formula.

= 2 (12−)

Where n = Sample size
Z = Z statistic for a level of confidence= 1.96
P = Expected prevalence of proportion
(If the expected prevalence is 11% then P= 0.11)
d = Precision (If the precision is 8% then d=0.08).
The required sample size, as per the above mentioned calculation was 59. To account for a 5% nonparticipation rate it was decided to sample 63 subjects, so that final analysis can include not less than 59 subjects. The final analysis has included 60 subjects at the end of data collection period.

Sampling Method

All the eligible study subjects, satisfying inclusion and exclusion criteria were recruited into the study by convenient sampling.

Results

Table 1: Descriptive analysis for age in study population (N=60)

Parameter	Mean ±STD	Median	Min	Max	95% C.I. for EXP(B)	
					Lower	Upper
Age(years)	36.75 ± 17.81	35.00	13.00	75.00	32.15	41.35

The mean of age was 36.75 years with a standard deviation of 17.81. The youngest person was 13 years old and the oldest person was 75-years-old.

Table 2: Descriptive analysis of respiratory system in study population (N=60)

Respiratory System	Frequency	Percentage
No Pleural effusion	50	83.33%
Pleural effusion	10	16.67%

Among the study population, 50(83.33%) people had no Pleural effusion and 10 (16.67%) people had Pleural effusion.

Table 3: Descriptive analysis of overall Weil-Felix titre in study population (N=60)

Overall Weil-Felix titre	Frequency	Percentage
80	21	35.00%
160	19	31.67%
320	13	21.67%
640	7	11.67%

Among the study population, 21 (35%) people had 80 titres any positive weilfelix. The number of overall Weil Felix titre 160, 320 and 640 Overall Weil Felix titre was 19 (31.67%), 13 (21.67%) and 7 (11.67%) respectively.

Table 4: Comparison of tick bite with overall Weil-Felix titre (N= 60

Overall Weil-Felix Titre	Tick Bite	
	Yes(N=24)	No(N=36)
80	3(12.5%)	18(50%)
160	4 (16.66%)	15(41.66%)
320	10(41.66%)	3(8.333%)
640	7 (29.16%)	0(0%)

Among people with a tick bite, 3 (12.5%) people had 80 overall Weil-Felix titre. The number of people with 160, 320 and 640 overall Weil Felix titre was 4 (16.66%), 10 (41.66%) and 7 (29.16%) respectively in people with a tick bite. Among people without tick bite higher proportion of people had 80 and 160 titre. None of them had 640 titre. Statistical significant could not be tested due to zero number of subjects in one of the cells.

Table 5: Comparison of fever with overall Weil-Felix titre of study population (N=60)

Overall Weil-Felix Titre	Fever
	Yes(N=60)
80	21(35%)
160	19(31.66%)
320	13(21.66%)
640	7(11.66%)

Among people with fever 5 (12.5%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 overall Weil Felix titre was 15 (37.5%), 13 (32.5%) and 7 (17.5%) respectively in people with fever.

Table 6: Comparison of rash with overall Weil-Felix titre of study population(N=60)

Overall Weil-Felix Titre	Rash	
	Yes(N=55)	No(N=5)
80	17(30.90%)	4(80%)
160	18(32.72%)	1(20%)
320	13(23.63%)	0(0%)
640	7(12.72%)	0(0%)

*No statistical test was applied considering "0" subjects in one of the cells

Among people with rash 17 (30.90%) people had 80 overall Weil-Felix titre. The number of people with 160, 320 and 640 overall Weil Felix titre was 18 (32.72%), 13 (23.63%) and 7 (12.72%) respectively in people with a rash.Among people without a rash higher proportion of people had 80 and 160 titre. None of them had 320 and 640 titres. Statistical significant could not be tested due to zero number of subjects in one of the cells.

Table 7: Comparison of pain abdomen with Overall Weil-Felix titre of study population (N=60)

Overall Weil-Felix Titre	Pain Problem	
	Yes(N=46)	No(N=14)
80	11(23.91%)	10(71.42%)
160	15(32.60%)	4(28.57%)
320	13(28.26%)	0(0%)
640	7(15.21%)	0(0%)

*No statistical test was applied considering "0" subjects in one of the cells

Among people with pain abdomen 11 (23.91%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 15 (32.60%), 13 (28.26%) and 7 (15.21%) respectively in people with pain abdomen. Among people without pain abdomen higher proportion of people had 80 and 160 titres. None of them had 320 and 640 titres. Statistical significant could not be tested due to zero number of subjects in one of the cells.

Table 8: Comparison of mean systolic blood pressure across study groups (N=60)

Overall Weil-Felix titer	Systolic BP Mean ± SD	Mean Difference	95 % Confidence Interval for Mean		P Value
			Lower Bound	Upper Bound	
80	111.33±9.13				
160	106.63±9.19	4.70	-1.28	10.68	0.121
320	96.15±11.93	15.1±8	8.51	21.85	<0.001
640	81.43±3.78	29.90	21.66	38.15	<0.001

The mean systolic blood pressure in the 80 titre was 111.33 ± 9.13, it was 106.63 9.19 in 160 titre , 96.15 ± 11.93 in 320 titre group and 81.43 ± 3.78 in 640 titre group. The mean difference of systolic BP 4.70 in 160 titre group was statistically not significant (p value0.121), 15.18 in 320 titer group was statistically significant (p value<0.001) and in 640 titre group 29.90 was statically significant. (P- Value<0.001)

Table 9: Comparison of mean diastolic blood pressure across study groups(N=60)

Overall positive Weil-Felix	Diastolic BP Mean ± SD	Mean Difference	95 % Confidence Interval for Mean		P Value
			Lower Bound	Upper Bound	
80	72.38±5.39				
160	69.47±6.21	2.91	-0.85	6.66	0.126
320	6046±6.54	11.92	7.74	16.10	<0.001
640	54.29±5.35	18.10	12.92	23.27	<0.001

The mean diastolic blood pressure in the 80 titre was 72.38 ± 5.39, it was 69.47±6.21 in 160 titre, 60.46 ± 6.54 in 320 titre group and 54.29 ± 5.35 in 640 titre group. The mean difference of diastolic BP 2.91 in 160 titre group was statistically not significant (p value0.126), 11.92 in 320 titre group was statistically significant (p value<0.001) and in 640 titer group 18.10 was statically significant.

Discussion

Among people with rash, 17 (30.90%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 18 (32.72%), 13 (23.63%) and 7 (12.72%) respectively in people with rash. Among people without rash higher proportion of people had 80 and 160 titre. None of them had 320 and 640 titre. Statistical significant could not be tested due to zero number of subjects in one of the cells. Thomas R. et. al., found rash associated with fever in 54.2% cases.[7]This is higher when compared to the results reported by Mathai E. et. al., where they observed the same in only 22% of the cases.[8]

Alike this study, 28.4% has had rashes in a study by Chang K. et. al.[9] Of the people with myalgia**,** 1 (10%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 19 (31.66%), 13 (21.66%) and 7 (11.66%) respectively in people with myalgia. Contradictory to this IgG levels 1:64 showed increased signs of arthralgia and myalgia in the study by Lindblom. et. Al.,[10] in addition to the predominance of nymphal stage of tick during bite period and some had Borrelia serology positivity. In one study the reported joint pain, bone pain and myalgia was 14.8%, 7.4% and 28.4% respectively.[9]

Among people with headache, 18 (31.57%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 19 (33.33%), 13 (22.80%) and 7 (12.28%) respectively in people with headache. Among people without headache higher proportion of people had 80 titre. None of them had160, 320 and 640 titre. Headache is the least prominent symptom associated with rickettsial fever though IgGtitre of 1:64 were positively correlated with headache manifestation in one study.[10] Figures from Chang K. et. al., have shown a higher prevalence of headache (51.9%) among the participants.[9]

Of those with cough, 15 (27.77%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 19 (35.18%), 13 (24.07%) and 7 (12.96%) respectively in people with cough. Among people without cough higher proportion of people had 80 titre. None of them had 160, 320 and 640 titre. Though chest symptoms were rarely reported, one study has had about 25.9% of cases with non-productive cough in it.[9]Of those people with pain abdomen, 11 (23.91%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 15 (32.60%), 13 (28.26%) and 7 (15.21%) respectively in people with pain abdomen. Among people without pain abdomen higher proportion of people had 80 and 160 titre. None of them had 320 and 640 titre. Studies disclosing this symptom are very minimal. In those subjects with congestion of eyes, 17 (30.35%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 19 (33.92%), 13 (23.21%) and 7 (12.5%) respectively in people with congestion of eyes. Among people without the congestion of eyes higher proportion of people had 80 titre. None of them had 160, 320 and 640 titre. Of the people with bleeding manifestations**,** 1 (4.545%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 7 (31.81%), 7 (31.81%) and 7 (31.81%) respectively in people with bleeding manifestations. Among people withoutbleeding manifestations higher proportion of people had 80, 160 and 320 titre. None of them had 640 titre. Among people with eschar**,** 6 (50%) people had 320 overall Weil-Felix titre and 6 (50%) had 640 Overall Weil-Felix titre. Among people without eschar higher and low

proportion of people had 80 and 160 titre.

The mean systolic blood pressure in the 80 titre was 111.33 ± 9.13, it was 106.63±9.19 in 160 titre, 96.15 ± 11.93 in 320 titre group and 81.43 ± 3.78 in 640 titre group. The mean difference of systolic BP 4.70 in 160 titre group was statistically not significant (p value = 0.121), 15.18 in 320 titre group was statistically significant (p value<0.001) and in 640 titre group 29.90 was statically significant. The mean diastolic blood pressure in the 80 titre was 72.38 ± 5.39, it was 69.47 ± 6.21 in 160 titre 60.46 ± 6.54 in 320 titre group and 54.29 ± 5.35 in 640 titre group. The mean difference of diastolic BP 2.91 in 160 titre group was statistically not significant (p value 0.126), 11.92 in 320 titre group was statistically significant (p value<0.001) and in 640 titre group 18.10 was statically significant. (P- Value<0.001).

Among people with lymphadenopathy**,** 5 (12.5%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil felixtitre was 15 (37.5%), 13 (32.5%) and 7 (17.5%) respectively in people with lymphadenopathy. Among people without lymphadenopathy higher proportion of people had 80 and 160 titre. None of them had 320 and 640 titre. Studies disclosing similar results are scarce and without any conclusions. Among people with hepatosplenomegaly, 6 (14.28%) people had 80 Overall Weil-Felix titre. The number of people with 160, 320 and 640 Overall Weil Felix titre was 16 (38.09%), 13 (30.95%) and 7 (16.66%) respectively in people with hepatosplenomegaly. Among people without hepatosplenomegaly higherproportion of people had 80 and 160 titre. None of them had 320 and 640 titre. Abdominal sonographic findings showed gall bladder wall thickening (15%) and fatty liver (50%) in a study by Chang K. et. al.[9]

Conclusion

This study has insisted the suspicion of Rickettsial infection when a person presents with fever with rashes and associated constitutional symptoms like headache, congestion of eyes, cough, myalgia. Clinical findings like hepatosplenomegaly, lymphadenopathy, icterus, bleeding manifestations were also moderately correlated with the disease condition while pleural effusion was least correlated.

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How to cite this article: Shivaprasad, Naik KK. Clinical Profile of Patients with Rickettsial Infection: Descriptive Study. Acad. J Med. 2019;2(2):42-45.

DOI: dx.doi.org/10.21276/ajm.2019.2.2.12

Source of Support: Nil, **Conflict of Interest:** None declared.