ORIGINAL ARTICLE

Comparative Seropositivity Against Leptospirosis Between Rice Cultivators and Non Rice Cultivators

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ABSTRACT

Leptospirosis is an important disease of all vertebrates including humans. Infection and/or disease may be caused by any of the 250 pathogenic serovars of the species *leptospira interrogans* arranged into 24 serogroups. The spirochete survives and propagates in the neutral or alkaline water. The occupational groups like veterinarians, butchers, sewer workers, farmers working in the rice paddy fields, hunters, fishermen soldiers and all others working in water are at the highest risk in contracting the disease. The organism enters the body through mucous membranes and causes fever, septicemia, arthralgia, cataract and abortion. Treatment can be possible by administring doxycycline 100mg twice daily for 7-10 days. Vaccine is also available. The disease is prevalent worldwide and five important pathogenic serovars are comprising of *L. canicola, L. grippotyphosa, L. hardjo, L. icterohaemorrhagiae and L. Pomona.* A study was undertaken to understand the status of serovars distribution in the rice field workers. For this purpose five rice growing districts, i.e; Sheikhupura, Gujranwala, Narowal, Okara & Sahiwal were selected. From each district, 25 rice field workers and 25 matched non-rice field workers were selected. After venipuncture 5 ml blood serum was collected and used for slide macro agglutination test (SMAT) against five important serovars of L. interrogans (as mentioned above). A seropositivity rate of 80%, 92%, 72%, 88%, and 84% was observed in rice field farmers in the Sheikhupura, Gujranwala, Narowal, Okara & Sahiwal districts respectively. In contrast to that a seroposItivity rate in non-rice growing farmers of Sheikhupura as 20%, Gujranwala 44%, Narowal 40%, Okara 48% & Sahiwal 60% was observed. The results revealed that cumulative infection rate/seropositivity rate was higher in the rice field paddy workers as compared to non-rice field paddy workers. It may be concluded that the contaminated water with leptospira was the main source of risk for all those exposed to water, mixed with the urine of rodents, domestic and/or wild animals.

Keywords: Leptospirosis, humans, seropositivity, weil's disease, rice growing farmers, Punjab,

INTRODUCTION

Leptospirosis is a water borne disease of humans and has worldwide distribution among wide variety of domestic and wild animals. About one hundered and thirty years ago in 1886, Adolf weil, a German physician introduced the classical clinical picture of weil's disease in humans now called leptospirosis[1]. The bacteria are called spirochetes which may survive in the alkaline fresh water for several weeks at an optimum temperature of 28c[2,]. Although the dogs and rats are the major carriers, however, several domestic and wild animals[1] also act as carriers[3,4]. It is considered as an occupational disease of persons engaged in agriculture, sewage work, forestry and animal slaughtering[5]. Rice field water mixed with infected rat urine is considered as the major reservoir in the dissemination of pathogenic organisms to humans[6]. *Leptospira interrogans* species has more than 250 pathogenic serovars arranged in 24 serogroups. Any single and/or multiple serovars may enter in the human body through mucous membranes, conjunctivae, cuts and abrasions[7] etc. After entry into the body it multiples in the blood causing septicemia and as a result the disease is produced, characterized by high grade fever, headache, arthralgia, myalgia, meningitis followed by jaundice (icterus) and renal failure[8]. The disease is zoonotic in nature because it is easily communicable from animals to humans by contaminated water by the urine of carrier animals[9]. The disease varies in pathogenicity depending upon the type of infecting serovar[10,11].

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MATERIALS AND METHODS

Through an active disease surveillance a total of 250 subjects from five districts of rice growing area i.e., Sheikhupura, Gujranwala, Narowal, Okara & Sahiwal were selected. From each district one union council was selected randomly in the first stage of sampling.

In the second stage of sampling 25 subjects involved in the rice cultivation and 25 subjects who were not involved in the rice cultivation were selected randomly from each union council. As a consequence 125 adult male working in the rice paddy fields for the last ten years and matched 125 adult male who never worked in the rice paddy field were subjected to aspetic collection of 5 ml blood serum through venipuncture. Each serum sample was tested against each of the five antigens against the serovars i.e.' *Leptospira interrogans var canicola, grippotyphosa, hardgo, icterohaemorrhagiae and Pomona* by the slide macro agglutination test (SMAT) as described by Lysons. The results were interpreted as negative in the absence of no agglutination, followed by mild agglutination and strong agglutination.

RESULT & DISCUSSION

A total of 125 blood/serum samples of farmers involved in rice cultivation for the last ten years or more, from five districts of Punjab, were subject to (SMAT) test. 21(17%) farmers were found negative whereas 65(52%) farmers were mildly positive and 39(31%) were found strongly positive. The control and matched comparative group of subjects (n=125) who were never involved in the cultivation of rice during their past life, were selected from the same village from where the rice cultivators were selected and were subject to SMAT test. As a result, 72(58%) farmers were found sero-negative ($p<0.05$), 50(40%) farmers were mildly positive ($p<0.05$) and only 2(8%) were strongly sero-positive ($p<0.05$).

The results are comparable to the report pertaining residents of California during 2003 in which 59% to 85% subjects acquired Leptospira infection during their 20 past year's exposure to the fresh water contaminated by the urine of infected animals, rodents and wild animals[13]. It is interesting to note that Hawaii had the highest incidence of human leptospirosis in the U.S. Human infections are reported by exposing to the contaminated water through cuts, scrapes, conjunctivae and mucous membranes[14,15]. An epidemic of leptospirosis was reported in Florida, United State of America (USA), in 2005 where out of 200 participants of adventure racers[16] in water, a total of 192(96%) were found sick due to leptospirosis. The risk factors were swallowing of untreated river water, swallowing of untreated swamp water, head and body immersed in water[17,18].

Leptospirosis is a water borne public health environmental zoonotic problem widely prevalent in the hot, humid climate of tropical and sub-tropical areas of the world[19,20] particularly in developing country like Pakistan[19,20]. The burden of disease is attributable to the countries where water is contaminated by rats, domestic as well as wild animals mixed in water[21]. During cultivation of rice the farmers are exposed to contaminated water during implanting the rice in mud paddy fields, where they have to stand in water for several hours in a day.

Table: Seropositivity against any of the five serovars of leptospira Interrogans* of rice growing farmers in five districts of Punjab

Districts	Seropositivity against One or More* Serovars**									
	n	Rice Growing Farmers				n	Non Rice Growing Farmers			
		Negative	Mild	Strong	Total +ve		Negative	Mild	Strong	Total +ve
Sheikhupura	25	5(20%)	8(32%)	12(48%)	80%	25	20(80%)	4(16%)	1(4%)	20%
Gujranwala	25	2 (8%)	12(48%)	11(44%)	92%	25	14(56%)	11(44%)	0(0)	44%
Narowal	25	7 (28%)	10(40%)	8(32%)	72%	25	15(60%)	10(40%)	0(0)	40%
Okara	25	3 (12%)	15(60%)	7(28%)	88%	25	13(52%)	11(44%)	1(4%)	48%
Sahiwal	25	4 (16%)	20(80%)	1(4%)	84%	25	10(40%)	14(56%)	1(4%)	60%
Total (N)	125	21(16.8%)	65(52%)	39(31.2%)	83.2%	125	72(58%)	50 (40%)	3(2%)	42.4%

** Five Serovars, **L. interrogans: L. pomona, L. canicola, L. icterohaemorrhagiae: L. hardjo and L. grippotyphosa.*

CONCLUSION

This study sufficiently establishes the existence of leptospirosis in Punjab, Pakistan. However, it would be essential to carry out wider scale study to know the magnitude of the problem so that suitable diagnosis, treatment and preventive strategies could be adopted to control its incidence/ re-surgence.

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