Study of enteric fever and malaria incidence in southern part of Nepal

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This study was done in order to present the incidence of enteric fever and malaria among patients with febrile illness which can play significant role in nation's disease control & prevention efforts. Conventional method of Widal test and Blood culture were done for diagnosis of enteric fever and Kirby Bauer disc diffusion method was applied to find antibiotic sensitivity pattern of the isolate. Thin smear method was performed to detect the malarial parasites. A total of 611 cases attended at hospital complaining febrile illness and 150 people without any symptoms of fever were the subject of study. Among 611, 29.8% (182/611) were found positive with significant titre. Infection rate was found similar between sexes, however, more than 70% incidence were clustered among the age group 11-40 year. No significant difference of Hb was found among positive and negative cases, however, number of neutrophil and TLC was remarkably high among positive cases. Among 60 cases subjected to blood culture 16.7% (10/60) were proven culture positive for *Salmonella* spp. with predominant *S. typhi*. Ciprofloxacin and Ceftriaxone were found promising drugs. Seasonally mid May/April was found peak period of incidence. Among 150 people without any symptoms of fever 28 (18.7%) showed agglutination positive with low titre. As 50% of H & whole O antibody showed the titre of 1:80 & 1:40, local titre value against H & O antigen is 80 and 40, respectively. Malarial parasite detection rate was 3.6% (6/166) with ratio of *P. vivax* & *P. falciparum* 2:1. This finding provide current situation of incidence of malaria and enteric fever with antibiotic susceptibility pattern which enable the physician to tackle the cases very effectively.

Introduction

Enteric fever and Malaria are leading cause of illness worldwide.[1] World Health Organization estimated that global burden of typhoid fever is 16 million new cases and 6,00,000 deaths per year, [1] however, 12-21 million new cases and upto 7,00,000 deaths annually has also been reported[2] but during the year of 2000 more than 200 million illness with 2 million deaths by typhoid fever and more than 54 million illness by paratyphoid fever is documented.[3] South-East Asia and South-Central Asia are the worst affected region.[3] Because of improvement in living condition and exploration of potent antibiotics, morbidity and mortality due to typhoid fever is significantly reduced,[4,5,6] reporting 30% to < 1% mortality rate[7], however, it has still significant public health concern in developing part of Asia, Africa and South America.[4,5,6] Southern belt of Nepal is endemic area of enteric fever and it is one of the leading cases being managed in different hospital of Nepal.[8,9,10,11]

Malaria is a disease of reticuloendothelial system with febrile illness. Worldwide, some 2 billion individuals are at risk; 100 million develop overt clinical disease and 1.5-2.7 million die every year.[12] Nearly 85% of the cases and 90% of the carriers are found in tropical Africa, where in some countries it causes 20-30% of deaths in childhood.[13] In Nepal more than 170 million people are at risk and case finding rate of malaria is reported 4.8% during the year of 2003.[14] It has great role to erode the health and prosperity of people enhancing poverty and economic decline of nation. The aim of this study is to find the current incidence of enteric fever and malaria among patients attending at National Medical College, Birgunj, Parsa, Nepal.

Materials and Methods

Subject and Sample Collection

Patient with febrile illness attending at hospital were included

in this study. A total of 611 clinically suspected patients with either enteric fever or malaria since 16th July 2004 to 15th July 2005 were included in this study. A total of 150 people having no any symptom of febrile illness were chosen for control and indiscriminately performed Widal test to find the local titre value. Aseptically collected blood sample was dispensed on brain heart infusion broth for culture and rest was used for smear preparation.

Sample Analysis

Widal test: The slide agglutination test was done to detect antibodies against O & H antigen of *S. typhi* and H antigen of *S. paratyphi A* and *S. paratyphi B* as described by manufacturer (Span Diagnostic Ltd, India). The sample showing agglutination positive were processed for the significant titre value. Chi-square χ^2 test was done to find the significant difference.

Blood culture: Blood Culture bottles were immediately incubated at 37° C for at least 5 days. Regular subculture was done after overnight incubation on MA, BA and CA. BA & CA were incubated in candle jar to provide require air concentration. Biochemical test and Gram satin of each isolate were done to identify the isolates and if *Salmonella* was suspected, agglutination test was performed using polyvalent sera. Antibiotic sensitivity test was done by Kirby-Bauer disc diffusion method.

Haematology: For the detection malarial parasites and leucocytes count, Giemsa staining was done. Hemoglobin (Hb) was estimated by Sahli's method.

Result

In total, 611 cases of febrile illness were tested for Widal reaction and 60 for blood culture. Among 274 (44.8%) agglutination positive *(Fig. 1)* only 182 (29.8%) had significant titre value 1:320 *(Table 1)*. Positive rate was slightly different between sexes *(Table 1)* but more than 50% positive cases were clustered among the age group of 11-30 *(Table 2)*. Neutrophil number and TLC were remarkably high in positive cases but Hb was not significantly different *(Table 3)*. Seasonally mid May/April was found to be the peak hour of incidence and January/ February to be the lowest *(Table 4)*.Of the 60 cases of blood culture, 10 (16.7%) were positive for *Salmonella* spp. and rest were *E. coli* and coagulase negative *Staphylococcus (Table 5)*. Ciprofloxacin and Ceftriaxone were found promising drugs against *Salmonella* spp. *(Fig. 2)*. Altogether 3.6% (6/166) were found positive for malarial parasites *(Table 6)*.

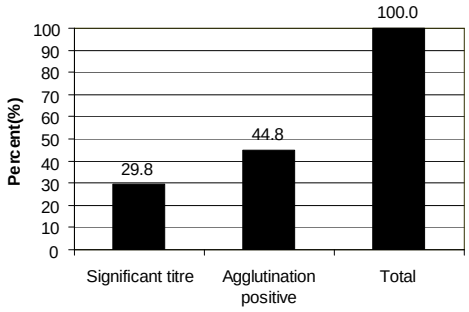

Fig. 1 Widal test

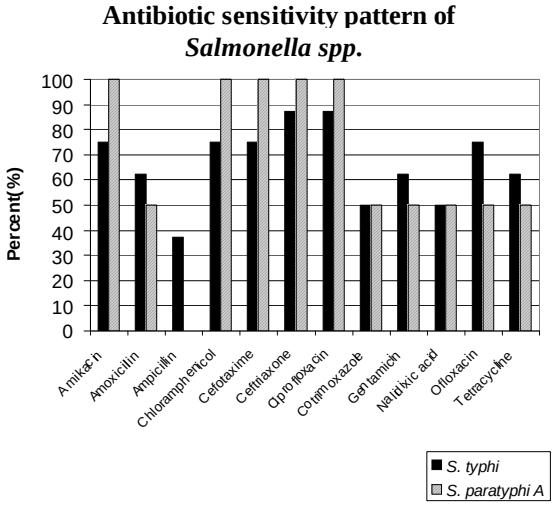

Fig. 2 Antibiotic sensitivity pattern

Among 150 control cases without any symptoms of febrile illness, 18.7% (28/150) were agglutination positive. Surprisingly 4 of them showed significant titre value 1:320, 50% of them were TB-ELISA positive. Among patients with H titre value 1:160 *(Table 7)*, *E. coli* was isolated in 50% cases. Fifty percent control test with positive agglutination had titre value against H antigen is 1:80 and cent percent O had 1:40 *(Table 7)*.

Table 1: Sex wise distribution of Widal positive case

Sex	Total	No. with significant titre	%	p -value
Male	359	101	28.1	P>0.05
Female	252	81	32.1	
Total	611	182	29.8	

Table 2: Age wise distribution of Widal positive case

Age	Positive (182)	%
< 10	10	5.5
11-20	41	22.5
21-30	55	30.2
31-40	33	18.1
41-50	25	13.7
51-60	13	7.1
61-70	5	2.7

Table 3: Neutrophil, TLC and Hb in positive and negative cases

Widal Test	Total	Neutrophil	TLC	Hb
Positive	182	78	11400	11.1
Negative	429	66	9600	11.5

Table 4: Seasonal distribution of Widal cases

2061/62 - 2004/5		Total test	Positive	No. of significant titre	%
Shrawan	July/Aug	79	32 (40.5%)	21	26.6
Bhadra	Aug/Sep	69	36 (52.2%)	26	37.7
Asoj	Sep/Oct	102	43 (42.2%)	32	31.4
Kartik	Oct/Nov	57	22 (38.6%)	10	17.5
Mangsir	Nov/Dec	38	12 (31.6%)	7	18.4
Poush	Dec/Jan	17	9 (52.9%)	5	29.4
Magh	Jan/Feb	12	3 (25%)	1	8.3
Falgun	Feb/Mar	32	16 (50%)	10	31.3
Chaitra	Mar/April	44	24 (54.5%)	15	34
Baisakh	April/May	65	34 (52.3%)	26	40
Jestha	May/June	59	25 (42.4%)	15	25.4
Ashar	June/July	37	18 (48.6%)	14	37.8

Table 5: Types of isolates from blood culture

Total	Negative	Positive (15)			
		S. typhi	*S. paratyphi A*	*E. coli*	Coagula se-ve *Staph.*
60	45	8	2	4	1

Table 6: Test of malarial cases

Total	Negative	Positive (6)	
166	160	*P. vivax*	*P. falciparum*
		4	2

Table 7: Result found among control group

Total	Negative	Positive 28, H (24) O and H (4)						
150	122	Type	H (24)				O and H (4)		
		No.	14	4	2	4	H(2)	H(2)	O(4)
		Titre	1:80	1:40	1:160	1:320	1:160	1:40	1:40

Discussion

This study revealed the incidence rate of enteric fever and malarial cases. A total of 182/611 (29.8%) were Widal positive with significant titre. This finding is consistent with some of the other studies.[11,15] Even though 44.8% agglutination positive, only 29.8 % were found significant titre, so Widal without significant titre is poor value for diagnosis. Blood culture positive 16.7% (10/60) in this study is contrast with other reports[9,10] but predominant isolation of *S. typhi* from culture support the previous study from Nepal,[16] however, somewhere more than 50% of *Paratyphi* A has also been reported.[17] Among 66 patients suspected of malaria, 6 (3.6%) were positive which is slightly lower than the report of Epidemiology and Disease Control Division.[14]

Among 28 agglutination positive in control group, 50% (14/28) had H titre value 1:80 and all O has 1:40, this could be due to past infection of *Salmonella* spp. which is the local titre value, this is similar with the value from Calcutta.[18] Interestingly among those of H value with titre of 1:160, 50% cultures were positive to *E. coli*. This support the strong relatedness of H antigen of *Salmonella* and *E. coli* but the reason of positive TB-ELISA among 50% of H with titre 1:320 is unknown.

There was no significant difference in incidence of enteric fever between male and female but more than 70% of incidence is clustered around the age group of 11-40 years, this is similar with the report of Crump *et al.*[3] in low incidence setting area. Amount of Hb was similar but total leukocyte count and number of neutrophil was remarkably high in positive cases, it could be due to induction of phagocytic action by infection. Ciprofloxacin and third generation of cephalosporin - Ceftriaxone were found potent drugs for enteric fever as previous reports,[9,11] however, it needs further investigation as isolates were very low. Mid April/May was found maximum vulnerable season and mid January/February was least. It could be due to unfavorable temperature to growth of *Salmonella* in food as it is predominantly food borne disease.

Acknowledgments

The authors acknowledge the invaluable support and inspiration of Chairman, Managing Director, Director Medical Education, Principal and Vice-Principal of National Medical College Teaching Hospital (NMCTH), Birgunj, Nepal. We extend thanks to Mr. Dipak Bhargava, Department of Microbiology and staffs of central lab of NMCTH for their cooperation.

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