Risk Factors of Enteric Fever and Dysentery in Jaffna District

Shivaganesh. S[a], Suganja. S[b], Devanesan. E[c], Thiripuwanasundari. G[d]
[a,c]*RDHS office, Jaffna,* [b] *aculty of Medicine, Jaffna,* [d]*MOH,Nalur*

Abstract - In Sri Lanka of the, 4795 dysentery cases,1067 were from Jaffna; and 1032 reported were enteric fever cases, 321were from Jaffna in 2014. In Jaffna, among 3958reported notifiable diseases 1428 were food and waterborne diseases (Epidemiology unit, 2015). To determine the risk factors of enteric fever and dysentery in Jaffna district, a case control study was conducted in teaching hospital Jaffna, during March to September 2015 with 205cases and 205 controls using an interviewer administered questionnaire. Ethical clearance was obtained from the ethical review committee of Faculty of Medicine, Jaffna. Median age of the subjects (403) were 5 years, 59% were male and 48% were non-school going aged children. Age, water source, safe water, hand washing before meal, past history of food/water-borne disease and knowledge about typhoid transmission had statistically significant association with enteric fever or dysentery. Unsafe water source, no hand washing with soap before meal, no past history of food/water borne disease and poor knowledge of typhoid transmission had shown significant association in multivariate analysis.

Keywords - enteric fever, dysentery, Jaffna, risk factor

I. Introduction

Incidence of some infectious diseases is on the rise in developing countries. According to World health statistics 2012, age-standardized mortality rates for Communicable diseases were 14 per 100000 population in Austria, and 1060 per 100 000 population in Central African Republic [1]. People suffer from diseases due to contaminated food or water. It was estimated that each year food borne diseases causes approximately 76 million illnesses, 325000 hospitalizations, 5000 deaths in the USA and 2 366 000 cases, 21 138 hospitalizations, 718 deaths in England and Wales [2].

According to the Epidemiology Unit, Sri Lanka, in 2015, out of 4795 reported dysentery cases, 1067 were from Jaffna (22.3%) and out of 1032 reported enteric fever cases 321 were from Jaffna (31.1%). In Jaffna, among 1678 reported cases of common notifiable diseases 925 were (55.1%)_food and waterborne (dysentery, enteric fever and food poisoning) diseases in 2011 and they were 3958&1428 respectively in 2014 [3]. These data were generated from inward patients of government hospitals mainly. Relatively high number of patients with the diseases may be managed in private hospitals and OPDs of government hospitals. Same time there was a gap between the data derived from IMMR and reported through notifications [4].

Immunization is a short term solution for the control of food and water borne infections. Factors affecting the food and water safety must be studied and sustainable interventions should be planned according to the findings. Though Sri Lanka has a system to monitor both food and water quality through local government authorities and health department we could not maintain a better food and water quality in all parts of the island due to issues in the respective places. Though there are enough literature about risk factors for water/food borne diseases [5], [6],we need to study what are the factors predominantly play role in the transmission of disease in our areas. Then only it's easy to plan effective interventions to minimize the incident of the diseases in our areas.

Our aim/objective was to determine the risk factors/ associated factors of enteric fever and dysentery among patients admitted to 5 major hospitals in Jaffna district.

II. Methodology

A case control study was conducted by prospectively collecting information regarding cases of enteric fever and dysentery from all four base hospitals (Pointpedro, Chavakacheri, Thellipalai and Kayts), teaching hospital and households (persons) in Jaffna district, during March to September 2015. The sample size was calculated by using the "WinPepi" software with 5% significant level, 80% power, 0.66 exposure (using un-boiled water for drinking) in cases and Odds ratio 2. The computed sample size was 368(184+184). Adding 10% non-response rate,

the final sample size was 410.Trained interviewers (One pre-intern doctor and one nursing graduate) collected data using an interviewer administered questionnaire and systematic random sampling was used to select the cases from the 5 major hospitals. All cases with the final diagnosis as dysentery or enteric fever by the clinician were considered as cases, except persons who stay temporarily and those cannot give the information due to physical or mental status. Persons without any faeco-oral diseases within past 6 months were taken as controls who were selected from the same area of the patient/ case. First patient from the ward discharge/diagnosis book was taken and every third case was taken from THJ; one out 5 neighbouring house was selected by lottery method and the 1st person above 6 month of age according to the English alphabetical order was selected from the house as control. Ethical clearance was obtained from the ethical review committee of Faculty of Medicine, University of Jaffna. The informed written consent was obtained from the participant or guardian; the privacy was maintained while obtaining data by gathering at separate place individually. Demographic data were analyzed by simple descriptive statistics. Crude OR and confidence interval were calculated to all independent variables. The significant variables were included in multivariate analysis.

III. Results and Discussion

Background data

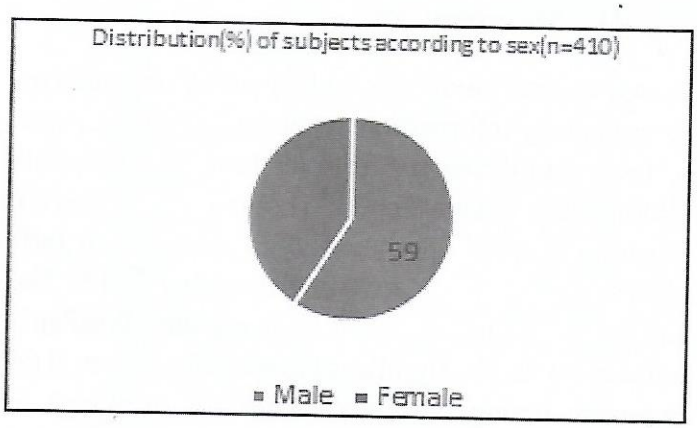

Figure 1:Distribution of subjects according to sex

The median age of the subjects (403) was 5 years and mean was 8.98 years (SD=13.035). Fifty nine percentages of the subjects were male (Fig.1). Most of the subjects were non-school going aged children (Fig.2).

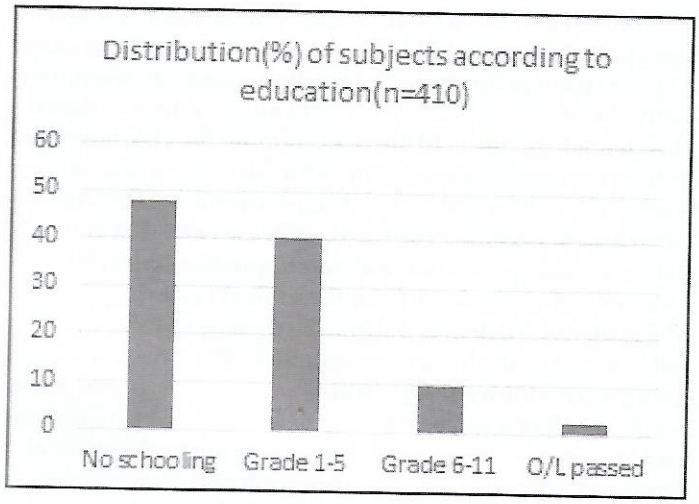

Figure2:Distribution of subjects according to education

Risk factors for Enteric Fever and Dysentery

Out of the studied variables following variables had statistically significant association with enteric fever or dysentery (Table 1)

1. Compared to the children aged between 6 months to 10 years, children aged above 10 years had 1.85 times(95% CI=1.117-3.060) more risk factors for getting enteric fever or dysentery.
2. Compared to persons who used non- improved water source, persons who used improved water source had 0.54 times (95% CI=0.36-0.80) less risk for getting enteric fever or dysentery.
3. Compared between to persons who used unsafe water, and persons who used safe water the latter had 0.60 times (95% CI=0.40-0.89) less risk for getting enteric fever or dysentery.
4. Compared between persons who practiced poor habit of hand washing before meal, and persons who practiced the habit of hand washing with soap before meal the latter had 0.57 times (95% CI=0.37-0.86) less risk for getting enteric fever or dysentery.

5. Compared between children who did not had past history of food/water-borne disease, and children with past history of same disease the latter had 0.53 times (95% CI=0.31-0.91) less risk for getting enteric fever or dysentery.
6. Compared between the respondents with poor knowledge about typhoid transmission, and those with good knowledge of typhoid transmission the latter had 0.22 times (95% CI=0.07-0.64) less risk for getting enteric fever or dysentery.

Other variables (sex, education level, occupation, outside eating habit (within one month),household food safety, safe toilet, hand washing with soap after defecation, refuse in the environment, knowledge of typhoid, knowledge of dysentery agent, knowledge of dysentery transmission) did not show statistically significant association with enteric fever or dysentery (Table1).

Unsafe water source, no hand washing with soap before meal, no past history of food/water borne disease and poor knowledge of typhoid transmission had shown significant association in multivariate analysis (table 2).

Table 1: Factors associated with enteric fever / Dysentery

Variable				Odds ratio	95% Confidence Interval		Significant
Lower Upper		Cases	Controls				
Age in years (403)	>10	49	30	1.848	1.117	3.060	*0.017**
	0.5-10	152	172				
Sex(410)	Male	118	124	0.886	0.598	1.314	0.547
	Female	87	81				
Education level(214)	Grade 1-5	75	90	1.600	0.936	1.688	0.152
	>Grade 5	28	21				
Occupation(332)	Student/work	109	122	0.948	0.594	1.514	0.824
	No work	49	52				
Water source (404)	Improved	94	128	0.539	0.362	0.801	*0.002**
	Non improved	105	77				
Drinking water (399)	Safe water	72	102	0.596	0.400	0.889	*0.011**
	Unsafe water	122	103				
Outside eating habit (within one month)(406)	Yes	79	63	1.460	0.969	0.989	0.071
	No	122	142				
Household food safety(410)	Satisfactory	198	203	0.279	0.057	1.358	0.114
	Not satisfactory	7	2				
Toilet(406)	Water sealed	191	199	0.576	0.205	1.615	0.294
	Not water sealed	10	6				
Hand washing with soap after defecation(406)	Yes	191	196	0.877	0.349	2.206	0.780
	No	10	9				
Hand washing with soap before meal(406)	Yes	55	82	0.565	0.372	0.858	*0.007**
	No	146	123				
Past history of food/water borne disease (404)	Yes	25	43	0.529	0.309	0.905	0.020*
	No	176	160				

Refuse in the environment(404)	Yes	46	35	1.425	0.872	2.327	0.158
	No	155	168				
Knowledge of Typhoid Agent(346)	Yes	1	3	0.407	0.042	3.951	0.438
	No	154	188				
Knowledge of Dysentery Agent(354)	Yes	2	4	0.630	0.114	3.484	0.596
	No	154	194				
Knowledge of Typhoid Transmission(345)	Yes	4	21	0.216	0.072	0.643	*0.006**
	No	150	170				
Knowledge of Dysentery Transmission(358)	Yes	12	23	0.617	0.297	1.282	0.196
	No	148	175				

Table 2: Multivariate analysis of Factors associated with enteric fever / Dysentery

Exposure	Beta	SE	OR	95% CI		P value
				Lower limit	Upper limit	
Unsafe Water source	0.59	0.23	1.80	1.14	2.84	0.011
No Hand washing with soap before meal	0.73	0.26	2.07	1.25	3.41	0.005
No Past history of food/water borne disease	0.78	0.34	2.18	1.12	4.24	0.021
Poor Knowledge of Typhoid Transmission	1.21	0.58	3.36	1.09	10.44	0.036

Model Chi square- 30.14, df- 4 and p value -<0.001. Model Nagelkerke's R square- 0.12

IV. Discussion

These findings were in consistency with other investigated outbreaks of typhoid in Bangladesh where contaminated drinking water was found as risk factors. Environmental condition around open well supported the possibilities of its contamination. Faecal contamination seen in water samples, provided additional evidence for the source of infection [7]. Same findings were observed in Kenya also. But there the age group at risk was below 10 years [8]. Children 2–4 years old had the highest incidence in an Indian study also [9].

Another study in Bangladesh revealed that young children, persons who consumed un-boiled water and area with poor drainage were at higher risk of developing typhoid [10]. Same findings were observed in China also [11].

A study demonstrated that highly localized clustering of typhoid fever during an epidemic in an urban African setting suggested the targeted intervention [12].

V. Conclusion and discussion

Persons with age above 10 years had more risk for getting enteric fever or dysentery. So it's recommended to do more awareness programs to secondary school children in both_government and private education institutions.

- Persons with improved water source had less risk for getting enteric fever or dysentery. So the government or non-government organizations need to take measures to improve the water sources as this is a known problem in Jaffna district.
- Persons with safe drinking water had less risk for getting enteric fever or dysentery. So the people must be educated to use safe drinking water.
- Persons with the habit of hand washing with soap before meal had less risk for getting enteric fever or dysentery. Hence its essential to promote hand washing with soap before meal in both personal and public settings.
- Children with the past history of same disease had less risk for getting enteric fever or dysentery. It shows that the children with the past history of the disease had some opportunity to improve their context. It indirectly tells that general public health education should be improved.

- Persons with good knowledge of typhoid transmission had less risk for getting enteric fever or dysentery. This is also indirectly tells that general public health education need to be improved.
- Unsafe water source, no hand washing with soap before meal, no past history of food/water borne disease and poor knowledge of typhoid transmission had shown significant association in multivariate analysis(table2).So, in long-term, safe water supply, proper hand washing practice and improvement of knowledge about waterborne diseases need to be ensured by the relevant authorities for a greener future of our young generation.

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