

FREQUENCY OF ENCEPHALOPATHY IN CHILDREN WITH ENTERIC FEVER

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Abstract

Objective; To determine the frequency of encephalopathy in children with enteric fever presenting at a tertiary care hospital. **Patients and methods;** This descriptive, cross-sectional study was conducted at Department of Pediatric Medicine Services Hospital Lahore from January 2015 to December 2016. A total of 100 patients with enteric fever were recruited in our study. **Results;** Of these 100 study cases, 59 (59%) were boys and 41 (41%) were girls. Mean age of our study cases was 7.99 ± 3.28 years. Majority of the study cases with enteric fever i.e. 56 (56%) were age more than 7 years. Mean Temperature was 102.30 ± 0.45 F⁰. Mean disease duration (enteric fever) was 5.47 ± 1.18 days (with minimum disease duration was 4 days while maximum duration of fever was 8 days). Of these 100 study cases, 51 (51%) belonged to the rural areas and 49 (49%) were from urban territories. While majority of these children belonged to the families having poor socio-economic status 67 (67%), middle income socio-economic status was reported by 26 (26%) and 07 (7%) were from higher socio-economic status. Encephalopathy was seen in 18 (18%) of our study cases. **Conclusion;** Our study results have indicated that frequency of encephalopathy is high among children hospitalized due to enteric fever. Majority of our study cases belonged to poor socio-economic status families living in slum areas where poor sanitation facilities. Encephalopathy was significantly associated with disease duration, increasing age in male gender and lower age groups in female gender.

Keywords; Enteric fever, Encephalopathy, children.

Introduction;

Enteric fever, a systemic infection, is caused by Salmonella, including *S. enterica* serotype Typhi (*S. Typhi*) and serotype Paratyphi (*S. paratyphi*)¹⁻⁵. Enteric fever leads to significant rise in pediatric mortality as well as morbidity particularly in developing countries worldwide. The highest burden of this systematic infection is harbored in Asia particularly in major urban subsets. Encephalopathy, in children, is a life threatening complication of enteric fever so this study was conducted to document its frequency in our hospitalized children due to enteric fever as there is no such study done previously in Pakistan. This disease being transmissible by faeco-oral route, is usually an illness of those regions where overcrowding due to increased population, with poor sanitation facilities and consumption of contaminated water are major problems⁶. Enteric fever is a severe debilitating as well as potentially life threatening systemic infectious disease. It is generally one of the most

challenging problems. The clinical presentations of enteric fever among children vary greatly and usually atypical manifestations lead to significant diagnostic issue¹. Generally its symptoms start developing after 1 – 3 weeks of exposure of pathogen which may range from mild to severe including high grade fever, diarrhea, headache, constipation, red spots on chest, malaise, enlarged spleen and liver. Symptoms usually develop 1–3 weeks after exposure, and may be mild or severe. They include high fever, headache, malaise, constipation or diarrhea, rose-colored spots on the chest and enlarged spleen and liver. Acute infection may also lead to healthy carrier state². The most commonly reported complications of severe enteric fever in pediatric population are “intestinal perforation, hemorrhage and extra-intestinal manifestations, including encephalopathy”. Some reports from countries like United states, Nigeria, India, and Bangladesh reveal that approximately 75 % hospitalized cases of typhoid fever may develop varying neuropsychiatric exacerbation such as encephalopathy³. Encephalopathy is a common feature of severe enteric fever, which manifested as altered level of consciousness, such as disorientation, confusion, delirium and coma⁷⁻⁹. The reported incidences of enteric encephalopathy vary between 10% and 30%¹⁰. In the absence of appropriate treatment the case fatality from enteric encephalopathy is as high as 56%¹⁰.

Enteric fever remains an important health issue of many developing countries like Pakistan¹¹. It is estimated that 22 million cases and 216000 deaths occur worldwide each year⁶. Enteric fever is endemic in developing countries². Estimates of its worldwide burden suggests its annual rise of more than 12 million persons of which around 75 % exist in Africa and South-East Asia¹¹. Surveillance in India, Indonesia, Pakistan, Vietnam and China have been conducted by the International Vaccine Institute (IVI) observed it to be more common infection of childhood having its burden equally distributed among pre-school and school going ages^{12, 13}. community-based studies reported from South Asian countries have indicated that its age-specific burden may be more among children of less than 5 years of age, and there are comparatively higher rates of associated complications and hospitalization¹⁴.

In a study conducted by Leung DT et al³, total 323 patients with positive blood culture for salmonella Typhi were studied. Of these 43 patients (21%) fulfilled the clinical criteria of encephalopathy at the time of admission.

The study was planned to be conducted to document the frequency of encephalopathy among targeted population because extensive research revealed that there is no such study conducted in Pakistan. The results of this study have generated useful data of our population at national level because database was missing from this part of world. The results of this study will be helpful for the researchers to design more advanced studies in future by using baseline data of our results. The results will also help in early diagnosis and proper management of this disease which will provide relief to the suffering families.

Materials & Methods

Children admitted in pediatrics unit with enteric fever (more than 101 F for more than 3 days) and positive typhidot test were registered while patients with meningitis and cerebral malaria, Metabolic encephalopathies i.e. Hepatic, Uremic, hypertensive, Diabetic Ketoacidosis were excluded from our study. Informed consent was taken from the parents. The demographic information including name, age, sex, address was recorded in a pre-designed proforma. Investigations were sent to a single laboratory of Services Hospital, Lahore to overcome bias. Lumbar puncture after fundoscopy for exclusion of meningo-encephalitis was done in all patients with altered mental status. The children were labeled as having enteric encephalopathy if there was altered mental status (GCS <15) with positive typhidot IgM. All collected data was entered in SPSS version 17 and analyzed. The quantitative data like age and temperature were presented as mean and standard deviation. The qualitative data gender (male/female), encephalopathy (yes/no), typhidot IgM (positive/ negative), GCS < 15 (yes/no) were presented as frequency & percentages. Effect modifiers were controlled by stratification of data with regard to age & gender of patients through chi-square test. P-value ≤ 0.05 was taken as significant.

Results;

Our study included 100 patients with enteric fever meeting inclusion and exclusion criteria of this study. Of these 100 study cases, 59 (59%) were boys and 41 (41%) were girls. Mean age of our study cases was 7.99 ± 3.28 years. Majority of our study cases i.e. 56 (56%) were age more than 7 years. Mean Temperature was 102.30 ± 0.45 F⁰. Mean disease duration (enteric fever) was 5.47 ± 1.18 days. Our study results have indicated that majority of our study cases i.e. 84 (84%) had duration of fever between 3 – 6 days. Of these 100 study cases, 51 (51%) belonged to the rural areas and 49 (49%) were from urban territories. While majority of these children

belonged to the families having poor socio-economic status 67 (67%), middle income socio-economic status was reported by 26 (26%) and 07 (7%) were from higher socio-economic status. Encephalopathy was seen in 18 (18%) of our study cases while it was not observed in 82 (82%) of the study cases.

Table No. 1
Stratification of encephalopathy with regards to gender.

Gender	Encephalopathy		P- Value
	Yes (n=18)	No (n=82)	
Male (n=59)	10	49	0.795
Female (n=41)	08	33	
Total	100		

Table No. 2

Stratification of encephalopathy with regards to age.

Age groups	Encephalopathy		P- Value
	Yes (n=18)	No (n=82)	
1 – 7 Years (n=44)	08	36	1.00
More than 7 Years (n=56)	10	46	
Total	100		

Table No. 3 Stratification of encephalopathy with regards to disease duration (enteric fever).

Disease duration	Encephalopathy		P- Value
	Yes (n=18)	No (n=)	
3 – 6 days (n=84)	06	78	0.000
More than 6 days (n=16)	12	04	
Total	100		

Table No. 4 Stratification of encephalopathy with regards to residential status.

Residential status	Encephalopathy		P- Value
	Yes (n=18)	No (n=82)	
Rural (n=51)	12	39	0.194
Urban (n=49)	06	43	
Total	100		

Table No. 5 Stratification of encephalopathy with regards to socio-economic status.

Socioeconomic status	Encephalopathy		P- Value
	Yes (n=18)	No (n=82)	
Poor (n=67)	14	53	0.249
Middle Income (n=26)	02	24	
Rich (n=07)	02	05	
Total	100		

Discussion;

Enteric fever leads to significant rise in pediatric mortality as well as morbidity particularly in developing countries worldwide. The highest burden of this systematic infection is harbored in Asia particularly in major urban subsets. Encephalopathy, in children, is a life threatening complication of enteric fever so this study was conducted to document its frequency in our hospitalized children due to enteric fever as there is no such study done previously in Pakistan. Our study included 100 patients with enteric fever meeting inclusion and exclusion criteria of this study. Of these 100 study cases, 59 (59%) were boys and 41 (41%) were girls. Hussain et al¹⁵ reported 62 % boys were having enteric fever showing male gender predominance which is close to our study results. Iqbal et al¹⁶ reported 63 % boys having enteric fever which is also in accordance with that of our study results. Lakhany et al¹⁷ from Karachi reported male to female ratio being 2:1 which is similar to our findings and Fazil et al¹⁸ reported the same results.

Mean age of our study cases was 7.99 ± 3.28 years (with minimum age was 2 years while maximum age was 13 years). Our study results have indicated that majority of our study cases i.e. 56 (56%) were age more than 7 years. Fazil et al¹⁸ reported 5 ± 3 years age of children with enteric fever which is close to our study results. Khurshid et al¹⁹ reported 6 years mean age of the children with enteric fever these findings are close to our study results. Similar results have been reported by Lakhany et al from Karachi¹⁷ and Iqal et al from Lahore¹⁶. Mean disease duration (enteric fever) was 5.47 ± 1.18 days (with minimum disease duration was 4 days while maximum duration of fever was 8 days). Our study results have indicated that majority of our study cases i.e. 84 (84%) had duration of fever between 3 – 6 days.

Socio-demographic distribution plays a key role in the epidemiology of the enteric fever, people living in slum areas where there are poor facilities or drainage, sanitation and personal hygiene are more prone to these illnesses. Of our 100 study cases, 51 (51%) belonged to the rural areas and 49 (49%) were from urban territories. While majority of these children belonged to the families having poor socio-economic status 67 (67%), middle income socio-economic status was reported by 26 (26%) and 07 (7%) were from higher socio-economic status. Leung et al³ also reported same trends of poor socio-economic status and that of living in slum areas with poor sanitation facilities. Encephalopathy was seen in 18 (18%) of our study cases while it was not observed in 82 (82%) of the study cases. A study conducted by Leung et al³ reported 21 % encephalopathy associated with enteric fever, these findings are very close to our study results.

Conclusion;

Our study results have indicated that frequency of encephalopathy is high among children hospitalized due to enteric fever. Majority of our study cases belonged to poor socio-economic status families living in slum areas where poor sanitation facilities. Encephalopathy was significantly associated with disease duration, increasing age in male gender and lower age groups in female gender. Further studies are suggested on this topic from different parts of Pakistan to document its exact magnitude from different population subsets particularly in underdeveloped areas of Pakistan where problem seems worst.

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