BURDEN OF MULTI-DRUG RESISTANCE IN SALMONELLA TYPHI ISOLATES OF ENTERIC FEVER.

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Abstract;
Objective: To determine burden of multi-drug resistance among Salmonella typhi isolates of enteric fever at a tertiary care hospital. Material and methods: Consecutive 161 children with enteric fever were included in this study. This cross – sectional study was done at Department of Pediatric Medicine, Nishtar Medical University and Hospital, Multan from June 2017 to December 2018. Venous blood sample (3-5 ml) was drawn and it was immediately transported to Microbiology laboratory of Pathology Department, Nishtar Hospital Multan for blood culture and sensitivity test. Antibiotic drug resistance was determined after measuring diameter of zone of inhibition of a specific drug on Salmonella isolates on Mueller Hinton agar plates by modified Kirby bauer disc diffusion method. Coated tongue, pain abdomen, anorexia and headache was assessed clinically. All the data were entered and analyzed using SPSS-11. Results: Of these 161 study cases, 91 (56.5%) were boys and 70 (43.5%) were girls. Mean age of our study cases was 5.79 ± 2.45 years (with minim age was 2 years while 12 years was maximum age). Previous history of use of antibiotics before 48 hours of the culture and sensitivity test was present in 93 (57.8%) of our study cases. Majority of our study cases having enteric fever presented with abdominal pain 65 (40.4%), headache 28 (17.4%) and diarrhea 17.4 % of our study cases. Chloramphenicol was sensitive in 40 (24.8%) of the Salmonella typhi isolates, Ampicillin was sensitive in 20 (12.4%), Co-trimoxazole in 20 (12.4%), Ciprofloxacin was sensitive in 88 (54.7%) isolates, Ofloxacin was sensitive in 101 (62.7%), Gentamycin was sensitive in 28 (17.4 %), Amoxycillin was sensitive in 36 (22.4 %). Multi – drug resistant strains were 71 (44%) in our study cases. Conclusion: Our study results have indicated that S. typhi isolates of enteric fever showed higher degree of antibiotic drug resistance. Multidrug resistant strains were more prevalent in our study which points towards well directed efforts of our health policy makers to adopt certain guidelines regarding use of these drugs in our population.

Keywords; Enteric fever, Multi drug resistance, Salmonella typhi.
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Introduction;

Typhoid fever is most commonly referred as severe systemic illnesses which are presenting with high fever and abdominal pain. The main causative organisms culprit for this systemic illness may include Salmonella enterica serotype Typhi which was previously known as S. typhi. Other serotypes of Salmonella such as S. enterica serotype paratyphi A, B, or C may also lead to similar type of syndromes a similar syndrome while it is very hard to predict culprit organism on the basis of clinical judgements. Both typhoid fever and paratyphoid fever are commonly referred in a collective term as enteric fever. Salmonella is an important cause of febrile illnesses in over-crowded and impoverished populations having no or poor sanitation facilities, consuming unsafe water and foods and it is human restricted pathogen which is transmitted through feco-oral route. The Global estimates of occurrence of Enteric fever is twenty one million cases causing 216500 deaths every year. Pakistan harbors high burden of the enteric fever showing an annual rate of 413/100, 000 persons per year while more than 90 % of worldwide episodes occur only in Asian countries. However SAARC region countries have...
There was in the age group of 2–7 years. Majority of our study cases having enteric fever presented with abdominal complaints (such as fever, headache, constipation, diarrhea, pain abdomen, hepatomegaly, anorexia coated tongue and splenomegaly) and antibiotic drugs (such as Chloramphenicol, Ampicillin, Co-trimoxazole, Amoxicillin, Ciprofloxacin, Ofloxacin and Gentamicin).

Results;

A total of 161 children suffering from enteric fever with positive isolates of Salmonella typhi meeting inclusion and exclusion criteria of this study were included in this study. Of these 161 study cases, 91 (56.5%) were boys and 70 (43.5%) were girls. Mean age of our study cases was 5.79 ± 2.45 years (range: 2 – 12 years). Mean age of boys was 5.47 ± 2.14 years while those of girls was 6.20 ± 2.75 years (p=0.062) while 104 (64.6%) were in the age group of 2 – 7 years. Majority of our study cases having enteric fever presented with abdominal pain 65 (40.4%), headache 28 (17.4%) and diarrhea 17.4 % of our study cases. Chloramphenicol was sensitive in 40 (24.8%) of the Salmonella typhi isolates, Ampicillin was sensitive in 20 (12.4%), Co-trimoxazole in 20 (12.4%), Ciprofloxacin was sensitive in 88 (54.7%) isolates, Ofloxacin was sensitive in 101 (62.7%),
Gentamycin was sensitive in 28 (17.4 %), Amoxicillin was sensitive in 36 (22.4 %). Multi-drug resistant strains were 71 (44%) in our study cases.

Discussion;

Enteric fever, particularly in underdeveloped countries, is a public health issue. It is a major health problem in tropical regions including Pakistan. Recent emergence of antimicrobial resistance among causative agent (Salmonella typhi) has given rise to some serious concerns in our society as antibiotic drugs provide most effective treatment options in enteric fever. Irrational use of these drugs, readily availability without physician’s prescription have compounded in the emergence of resistance in drugs which were effective against Salmonella.

Different studies have reported male gender predominance in children with enteric fever. Our study results are also in compliance with these findings. Of these 161 study cases, 91 (56.5%) were boys and 70 (43.5%) were girls. Hussain et al also reported male gender predominance in their study i.e. 62 % which is close to our study results. Iqbal et al reported 63 % boys having enteric fever which is again in compliance with that of our study results. Lakhany et al from Karachi reported male to female ratio being 2:1 which is similar to our findings and Fazil et al reported the same.

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Majority of our study cases having enteric fever presented with abdominal pain 65 (40.4%), headache 28 (17.4%) and diarrhea 17.4 % of our study cases. Similar results have been reported by Lakhany et al from Karachi. A study conducted by Rasaily et al reported headache (36.0%), chill and rigor (23.2%), diarrhea (37.2%), anorexia (26.2%), vomiting (23.8%), cough (18.0%) and abdominal pain (19.8%) similar results have been reported by Lakhany et al from Karachi and Iqal et al from Lahore.

Chloramphenicol has been drug of first choice since its introduction in 1948 and is being widely used to treat patients with enteric fever. Amoxicillin and cotrimoxazole are also used as an alternative therapy against S. Typhi but emergence of drug resistance against these drugs (Multidrug resistant S. typhi) have raised serious concerns to treat these infections particularly in South Asian countries. Chloramphenicol was sensitive in 40 (24.8%) of the Salmonella typhi isolates and was resistant in 47.8% of isolates. Mathura et al from Nepal reported 63 % resistance with this drug. Khan et al reported Chloramphenicol 56% resistant, Similar findings have been reported by Imran et al which are close to our findings. In our study, Ampicillin was sensitive in 20 (12.4%) and resistant in 62.1 % of the salmonella isolates while a study conducted by Javed et al reported 23% sensitivity to this drug this decrease in sensitivity in our study points towards increasing drug resistance trends in our population. While Khan et al reported 67 % resistance which is again consistent with previous findings. Kumar et al reported 75% resistance with this drug, these findings are similar to our study results. In our study, Co-trimoxazole was sensitive in 20 (12.4%) and resistant in 67.7 % of the isolates while Khan et al 48 % resistance which also points towards increasing drug resistance trends in our population. Mathura et al reported 85 % resistance with Co-trimoxazole which close to our study results. In our study, Ciprofloxacin was sensitive in 88 (54.7%) and was resistant in 17.4 % of the isolates. Khan et al reported ciprofloxacin was 100% sensitive in children with enteric fever while Javed et al reported 86% sensitivity again showing increasing trends towards drug resistance in our population. In India Ciprofloxacin was resistant in 26 % children with enteric fever which is close to our study results. In our study, Ofloxacin was sensitive in 101 (62.7%) and resistant in 27.3 % isolates while Kumar et al reported 7.2 % drug resistance from India which points towards resistant strains in our population. In our study, Gentamycin was resistant in 26 % children with enteric fever which is close to our study results. In our study, Ofloxacin was sensitive in 101 (62.7%) and resistant in 27.3 % isolates while Kumar et al reported 7.2 % drug resistance from India which points towards resistant strains in our population. In our study, Gentamycin was sensitive in 28 (17.4 %) and resistant in 72.7 % of the isolates. Javed et al reported 90% sensitivity which is much higher than our study findings. Mathura et al reported 82% sensitivity of the Gentamicine. In our study, Amoxicillin was sensitive in 36 (22.4 %) and resistant in 57.8 % of the isolates. Mathura et al reported 63% resistance in this drug which is close to our finding while Amoxicillin was totally sensitive as reported by Javed et al. Kumar et al from India reported 71 % resistance with Amoxicillin which is close to our study results.
Conclusion;

Our study results have indicated that S. typhi isolates of enteric fever showed higher degree of antibiotic drug resistance. Multidrug resistant strains were more prevalent in our study which points towards well directed efforts of our health policy makers to adopt certain guidelines regarding use of these drugs in our population. Irrational use of antibiotic drugs followed by their easy availability and natural adaptation of these pathogens have led to increased drug resistance against those drugs which are commonly used to treat enteric fever. Only ciprofloxacin and Ofloxacin were found to be effective in our study. Burden of enteric fever can be substantially lowered by rapid diagnosis followed by appropriate antimicrobial drug treatment.

References;