

MDR in Association with Shigellaosis

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ABSTRACT

In the Present Study the samples from gastrointestinal disorder during the period of 2014-2016 were collected. Out of total 663 samples 245 samples were found positive for Shigella isolation. After the isolation the antimicrobial susceptibility were carried out. In the screening process total 176 samples were found resistant while 34 samples were sensitive and remaining becomes intermediate. In the antimicrobial sensitivity, Imipenem was the most effective antibiotic found while Cefixime and Cephaloridine (85%) were the least effective antibiotic.

Keywords: Shigellosis, GIT, MDR

I. INTRODUCTION

Shigella belongs to the family enterobacteriace (Rezaee MA et al.,2014). This family belongs to enterobacteriace associated with the gastrointestinal tract. Many reports suggested that the causative agent for diarrhea mostly belongs to the family enterobacteriace. The aim of the proposed work to find out the impact of Shigella on diarrhea (bacillary dysentery) (Njunda AL.,2012). More than three mucosal or in some cases bloody or loose motion in a day referred as dysentery (Sang WK et al., 2012). The annual number of shigellosis episodes throughout the world is estimated to be 164.7 million, with 69 per cent of all episodes and 61 per cent of all deaths attributable to shigellosis involving children <5 yr of age (Kotloff KL1999). In this study the shigella was isolated from the patients who is having the enteric disorder. Followed by the study of antimicrobial susceptibility pattern of isolated samples.

II. MATERIAL AND METHODS

Total 663 stool samples from patients were collected visiting to hospitals with some enteric disorder during the period of 2014-2016. The samples were carried out in transport media like carry Blair and proceed further for isolation. The different media like Hektone enteric agar, XLD agar, SSA and blood agar were used for the selective isolation of Shigella. On the basis of Morphological, cultural and biochemical characterization the organism was separated. After

isolation the antimicrobial susceptibility were done by Kirby Bauer disc diffusion method.

III. RESULTS AND DISCUSSION

In the collection period of 2014-2016 total 663 samples were collected out of them 245 samples were positive for Shigella isolation.

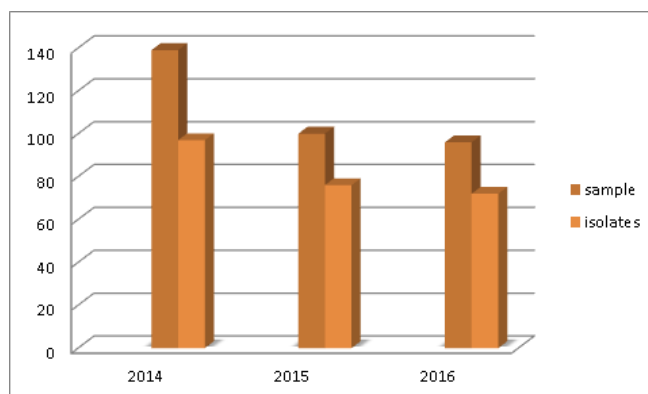


Chart 1. Year wise distribution of shigella

In the Present study out of total 663 samples collected 245(36.95%) samples were found positive for Shigella. While in the Year wise distribution in 2014 out of total 283 samples 97(34.27%). In the 2015 out of 192 samples 76(39.58%) were positive and from total it is 663 samples (11.46%). Similarly in 2016 out of total 188 samples 72 (38.29%) were positive while out of total 663 samples (10.85%) were positive.

Amin OM 2011, study the contribution of pathogenic bacteria in GI symptoms in that out of total 60 patients 21 male and 39 female during August to December 2010. All cultures proved to be positive for 2 or 3 of 5 species of pathogenic bacteria (Enterobacteriaceae), including, *Escherichia coli* (prevalence of 100%), *Klebsiella sp.* (72%), *Proteus vulgaris* (33%), *Citrobacter freundii* (25%), *Pseudomonas aeruginosa* (7%), and 1 fungus species, *Candida sp.* (5%) Sang WK et al 2012, Isolated and studied the resistance pattern of diarrheogenic pathogens from the different regions of Kenya during the period of October 2007 to September 2008 in which total 6510 samples were collected out of which 23.9% of isolated from Malendi, 12.9% from New Nyanza, 12.1% from Mbagathi while 7.2% from Alupe. Nath R et al 2013, studied a resistance in *Shigella* from north east India during January 2008 to November 2010 the 1411 stool samples tested, *Shigella* species was isolated in 71 cases (5.03%).

Njunda AL et al 2012, from Cameroon perform a systemic study on epidemiological, antibiotic susceptibility pattern of shigellosis during the period of April to December 2010 and out of 223 stool samples 10(4.5%) samples were positive for *Shigella*.

In the present study for Ampicillin, AMP¹⁰, 80% resistance rate is observed which is much lower than the 100% resistance rate observed in several studies like Tawfick MM et al 2016, Manikandan C and asmath A 2013, and Amsalu A et al 2017, followed by 86.4% resistance noted by Mostafavi N et al 2016 while the lower resistance also noted in number of studies like 70% resistance given in Njunda AL et al 2012 study followed by 57.6% in Inderbinen MN et al 2016, study, 56% by Rahman M et al 2007, 53% by Wilson G et al 2006 and 31% by Sire JM et al 2008.

With the combination of two antibiotics in Amoxyclav, AMC³⁰, 20% resistance is noted which is lower than the resistance observed to Amsalu A et al 2017, which is 40% and 25% resistance observed to Tawfick MM et al 2016, and lower resistance observed to Sire JM et al 2008, which is 13%.

For Cephaloridine, CR³⁰, 85% Resistance rate was observed in our study which is much lower than the

findings of Rahman M et al 2007, who reported 14% resistance rate.

Similarly for Cefuroxime, CXM³⁰, 70% resistance rate was observed in our study, while in Tawfick MM et al 2016, reported 40.9% resistance rate which is much lower than our findings.

In the present study for Cefixime, CFM⁵, 85% resistance rate was observed while in Sadeghabadi AF et al 2014, reported 95.8% resistance which is higher than our findings while 74.2% resistance was recorded by Mostafavi N et al 2016, and 58.8% by Manikandan C and asmath A 2013, which is much lower than our findings.

Similarly for Cefotaxime, CTX³⁰, 80% resistance rate was observed in our study, while 54.8% resistance was recorded by Mostafavi N et al 2016, and 37.5% by Tawfick MM et al 2016, which is much lower than our findings.

For Ceftazidime, CAZ³⁰, 60% resistance rate was observed in our study, while 21.9% resistance was recorded by Tawfick MM et al 2016, which is much lower than our findings. Similarly for Ceftizoxime, CZX³⁰, also 5.8 % resistance in (1995-99) and 29.75% resistance in (2009-13) was reported by Rezaee MA et al 2014, which is much lower than our findings that is 75%.

In this study for Ceftriaxone, CTR³⁰, 30% resistance rate was observed while 100% resistance was reported by Sadeghabadi AF et al 2014, and 70.4% resistance by Mostafavi N et al 2016, as well as 57.1% by Amsalu A et al 2017, which is higher than our findings while 20% resistance rate was reported by Njunda AL et al 2012, which is lower than our findings.

Imipenem, IPM¹⁰ was the most sensitive antibiotic found in the present work none of the sample was found resistant.

Similarly for Amikacin, AK³⁰, 15% resistance rate was observed while 31.3% resistance was reported by Tawfick MM et al 2016, which is higher than our findings.

While for Gentamicin, GEN¹⁰, 25% resistance rate was observed while 66.7% resistance was reported by Amsalu A et al 2017, as well as 65.6% by Tawfick MM et al 2016, 55.4% by Wilson G et al 2006, and 40% by Njunda AL et al 2012, which is higher than our findings while the lower resistance was reported by Rahman M et al 2007 that is 4%.

Similarly for Streptomycin, S¹⁰, 35% resistance was recorded in our study while the much higher resistance than our results was reported by Sire JM et al 2008, that is 94% while, 81% by Rahman M et al 2007, and 72% by Inderbinen MN et al 2016, which is higher than our findings.

In this study for Co-trioxazole, COT²⁵, 25% resistance rate was observed while 100% Sadeghabadi AF et al 2014, 90% Njunda AL et al 2012, 85.7% Amsalu A et al 2017, 80.7% Wilson G et al 2006.

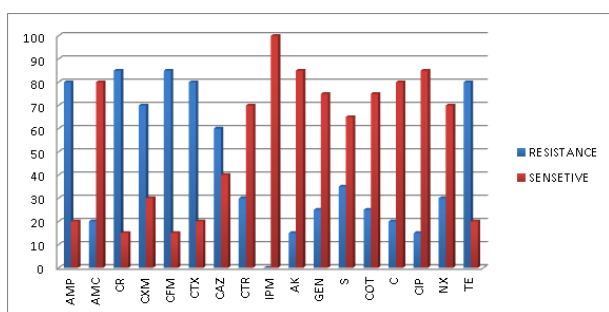


Chart 2. Antimicrobial activity of Shigella.

For Chloramphenicol, C³⁰, 20% resistance was reported in our study while the higher resistance than our findings that is 85.7% resistance reported by Amsalu A et al 2017, 65.6% by Tawfick MM et al 2016, 42% by Rahman M et al 2007, 40% by Njunda AL et al 2012, 29.4% by Manikandan C and asmath A 2013 as well as 27% by Sire JM et al 2008 while the lower resistance than our findings that is 8% reported by Inderbinen MN et al 2016.

In our study for Ciprofloxacin, CIP⁵, 15% resistance was reported while the higher resistance than our findings that is 55.8% resistance reported by Sadeghabadi AF et al 2014, 42.9% by Amsalu A et al 2017 and 18.8% by Tawfick MM et al 2016. while the lower resistance than our findings that is 2.4% by Wilson G et al 2006 and 00% that is 100% susceptibility was reported by Njunda AL et al 2012.

Similarly for Norfloxacin, NX¹⁰, 30% resistance was recorded while the higher resistance than our findings that is 75% by Amsalu A et al 2017 reported.

In this study for Tetracycline, TE³⁰, 80% resistance rate was reported while the higher resistance that is 97.3% in the study carried out in (2009-2013) while 95% in (1995-99) by Rezaee MA et al 2014 followed by 94% by Sire JM et al 2008 and 79% by Rahman M et al 2007. The lower resistance is also reported by some studies like 74.7% resistance by Wilson G et al 2006 and 52% by Inderbinen MN et al 2016.

IV. CONCLUSION

From the above study it is concluded that total percentage of incidence for Shigella infection increases which indicate the increase in pollution in drinking water, unhygienic and improper sanitation. While in antimicrobial sensitivity the imipenem was the only antibiotic found having completely sensitive for this type of infections. Worldwide the resistance to Shigella increases dramatically and the new alternative medical line of treatment still not developed. It's time to utilize the present data, for molecular resistance gene isolation in different areas and by using systemic and proper guideline to cure the problem. It is the need of the day to improve our immunity to combat with these powerful pathogens. It can be suggested that to improve immunity probiotic measures may be adopted.

V. REFERENCES

- [1]. Amin OM (2011). The Contribution of Pathogenic Bacteria to GI Symptoms in Parasite-Free Patients. *Amin J Bacteriol Parasitol* 2011, 2:2 1-4.
- [2]. Amsalu A, Geto Z, Asegu D and Eshetie S (2017). Antimicrobial resistance pattern of bacterial isolates from different clinical specimens in Southern Ethiopia: A three year retrospective study *Afr. J. Bacteriol. Res.* 9(1), 1-8
- [3]. CLSI(2016). Performance standards for antimicrobial susceptibility testing. 26th ed. CLSI supplement M100S. Wayne (PA): The Institute 62.
- [4]. El-Moghazy AN, Tawfick MM and El-Habibi MM (2016) Prevalence, Antimicrobial Susceptibilities and Molecular Characterization of

- Enteric Bacterial Pathogens Isolated from Patients with Infectious Diarrhoea in Cairo, Egypt *Int.J.Curr.Microbiol.App.Sci* 5(4): 553-564
- [5]. Kotloff KL, Winickoff JP, Ivanoff B, Clemens JD, Swerdlow DL, Sansonetti PJ, et al. Global burden of Shigella infections: implications for vaccine development and implementation of control strategies. *Bull World Health Organ* 1999; 77 : 651-66.
- [6]. Manikandan C and Amsath A(2013). Antimicrobial resistance of enteric pathogens isolated from children with acute diarrhoea in Pattukkottai, Tamil Nadu, India. *Int. J. Pure Appl. Zoo.*, 1(2): 139-145,
- [7]. Mostafavi N, Bighamian M, Mobasherizade S, Kelishadi R (2016) Resistance of Shigella strains to extended-spectrum cephalosporins in Isfahan province *Med J Islam Repub Iran* 30(428); 1-5.
- [8]. Nath R, Saikia L, Choudhury G and Sharma D (2013). Drug resistant Shigella flexneri in & around Dibrugarh, north-east India. *Indian J Med Res.* 137; 183-186
- [9]. Njunda AL, Assob JCN, Nsagha DS, Kamga HLF, Awafong MP and Weledji EP (2012). Epidemiological, clinical features and susceptibility pattern of shigellosis in the Buea Health District, Cameroon. *BMC Research Notes*, 5:54 1-5.
- [10]. Nuesch-Inderbinen M, Heini N, Zurfluh K, Althaus D, Hächler H and Stephan R (2016) Shigella Antimicrobial Drug Resistance Mechanisms, 2004–2014
- [11]. Rahman M, Shoma S, Rashid H, Arifeen SE, Baqui AH, Siddique AK, Nair GB, and Sack DA (2007). Increasing Spectrum in Antimicrobial Resistance of Shigella Isolates in Bangladesh: Resistance to Azithromycin and Ceftriaxone and Decreased Susceptibility to Ciprofloxacin *J Health Popul Nutr* ;25(2):158-167
- [12]. Rezaee MA, Abdinia B, Abri R, Kafil HS (2014). Comparison of the antibiotic resistance patterns among Shigella species isolated from pediatric hospital between 1995-1999 and 2009-2013 in North-West of Iran. *J Anal Res Clin Med*, , 2(3): 118-22.
- [13]. Rezaee MA, Abdinia B, Abri R, Kafil HS (2014). Comparison of the antibiotic resistance patterns among Shigella species isolated from pediatric hospital between 1995-1999 and 2009-2013 in North-West of Iran. *J Anal Res Clin Med*, , 2(3): 118-22.
- [14]. Sadeghabadi AF, Ajami A, Fadaei R, Zandieh M, Heidari E, Sadeghi M, Ataei B, Hoseini SG (2014). Widespread antibiotic resistance of diarrheagenic Escherichia coli and Shigella species. *Res Med Sci*;19:S51-S55
- [15]. Sang WK, Oundo V, Schnabel D (2012). Prevalence and antibiotic resistance of bacterial pathogens isolated from childhood diarrhoea in four provinces of Kenya. *J. Infection in Developing Countries*, 6(7): 572–578
- [16]. Sire JM, Macondo EA, David J, Claude PG, Siby T, Bahsoun I, Seck A and Garin B (2008). Antimicrobial Resistance in Shigella Species Isolated in Dakar, Senegal (2004 - 2006) *Jpn. J. Infect. Dis.*, 61, 307-309,
- [17]. Taneja N and Mewara A(2016). Shigellosis: Epidemiology in India. *Indian J Med Res* 143, 565-576
- [18]. Wilson G, Easow JM, Mukhopadhyay C and Shivananda PG (2006). Isolation & antimicrobial susceptibility of Shigella from patients with acute gastroenteritis in western Nepal *Indian J Med Res* 123, 145-150