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## Mixed Infections of *Vibrio cholerae* O<sub>1</sub> Ogawa EL Tor with *Shigella dysenteriae*

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**Abstract:** Mixed infections caused by enteric pathogens such as bacteria, virus, protozoa and helminthes were reported in different literatures. This report also describes the co-infections caused by *Vibrio cholerae* O<sub>1</sub> Ogawa EL Tor with *Shigella dysenteriae* in a patient. A 36-year-old man was admitted in Fatemeh Zahra Hospital of Bushehr Iran with fever, vomiting and dysentery. His stool sample was cultured, for identification purposes TCBS, XLD and other media were used. *V. cholerae* and *S. dysenteriae* were identified. Both species were resistant to ampicillin and sensitive to nalidixic acid and trimethoprim-sulfamethoxazol. *Shigella* was resistant to tetracycline. The results of the study showed that places where diarrheal diseases especially cholera are endemic, it is better to examine for those patients with dysentery for the presence of the *V. cholerae* O<sub>1</sub>. That will prevent the spread of pathogenic organism in the community.

**Key words:** *Vibrio cholerae*, *Shigella dysenteriae*, ogawa, mixed infections, co-infections, Iran

### INTRODUCTION

O<sub>1</sub> serotype of *Vibrio cholera* caused acute watery diarrhea with morbidity and mortality in all age group especially in developing countries. Severe Dehydration is the most frequent cause of death in such patients (Nelson *et al.*, 2009). Dysentery is bloody diarrhea that cause by *shigella* species, *Campylobacter jejuni*, enteroinvasive *Escherichia coli*, *Salmonella* sp. and *Entamoeba histolytica* (Guerin *et al.*, 2004). In diarrheal disease usually one organism cause illness and more than one enteric pathogen are uncommon. Mixed infections of *V. cholera* with other diarrheal pathogens such as *Shigella* species (Faruque *et al.*, 1994), *Salmonella* species (Enzensberger *et al.*, 2005), *Campylobacter* species, viruses (Faruque *et al.*, 1994; Enzensberger *et al.*, 2005), Protozoa and Helminthes (Mukherjee *et al.*, 2009; Harris *et al.*, 2009) were reported in literatures. This report describes the co-infections caused by *Vibrio cholerae* O<sub>1</sub> Ogawa EL Tor with *Shigella dysenteriae* in an Iranian patient.

### CASE REPORT

A 36-year-old man was admitted on August 2005 in to the Hospital University of Bushehr Fatemeh Zahra in Bushehr, Iran with fever, vomiting and severe diarrhea. Hematological test such as White Blood Cell, Hemoglobin, Hematocrit and Platelet were normal, biochemical tests showed the following results: Blood

Nitrogen Urea, 9 mg dL<sup>-1</sup>; Sodium, 139 me L<sup>-1</sup>; Potassium, 4.6 me L<sup>-1</sup>. Stool examination confirmed the presence of only pus cells and Red Blood Cell but no evidence of parasite manifestation such as Protozoa and Helminthes were observed. Occult Blood test was positive.

The feces collected by cotton swab in cary-blair transport medium for bacteriologic culture. Enrichment media and selective-differential media such as alkaline peptone water, xylose-lysine-deoxycholat agar (XLD) and Thiosulfate-Citrate-Bile Salts Agar (TCBS) were used for isolation of bacteria. The sample was cultured on XLD agar and alkaline peptone water and was sub-cultured after 8 hours from alkaline peptone on TCBS agar. Small and colorless colonies were grown on XLD agar (Fig. 1), that colonies were gram negative rod. Oxidase, string test and Hemolyze on blood agar were negative, this bacteria was non motile and Triple Sugar Iron Agar was alkaline/acid with no production of Hydrogen Sulfur and other Biochemical tests such as Lysine Decarboxylase, Simmon's Citrate, Indole, Voges Prousqer, Urease were negative. This bacterium on serological typing with shigella antisera was agglutinated with Group A antiserum and finally *S. dysenteriae* was identified. Yellow colonies were grew on TCBS agar after 24 h, those colonies were gram negative rod and oxidase, string test and Hemolyze on blood agar were positive. This bacteria was motile and Triple Sugar Iron Agar was acid/acid with no production of gas and hydrogen sulfur and other biochemical tests such as lysine and ornithine decarboxylase, simmon's citrate, indole, voges prousquer, were positive and

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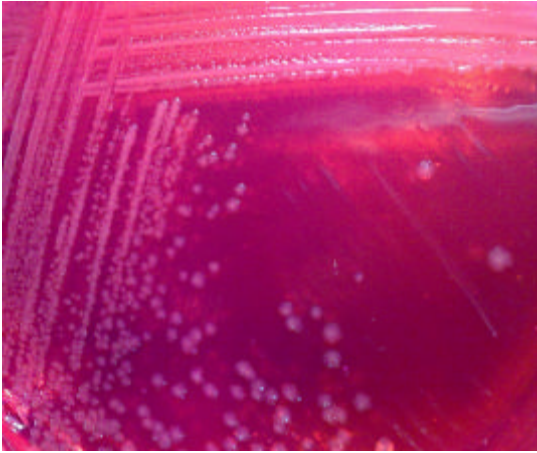


Fig. 1: Small and colorless colonies of *Shigella dysenteriae* on XLD agar

arginine dihydrolysis, urease and bile esculin were negative. This bacterium on serological typing with antiserum was agglutinated with *V. cholera* O<sub>1</sub> polyvalent and Ogawa monovalent antisera. *V. cholera* O<sub>1</sub> Ogawa biotype EL Tor and *Shigella dysenteriae* were isolated and were antibiogrammed by Kirby-Bauer disk diffusion method, *V. cholerae* was resistant to ampicillin and was sensitive to nalidixic acid, furazolidone and trimethoprim-sulfamethoxazole. *S. dysenteriae* was resistant to ampicillin, tetracycline and gentamicin and was sensitive to nalidixic acid and trimethoprim-sulfamethoxazole. The patient was given IV fluids in hospital and was discharged and after follow up he was given proper treatment with furazolidone.

## DISCUSSION

Cholera is an acute infection with rice watery diarrhea which can be mild to very severe and lethal (Islam *et al.*, 2004; Agtini *et al.*, 2005). Mixed infections cholera with other enteric pathogens can be changed to typical clinical manifestation and intensify illness or produce bloody diarrhea. Dysentery in some of the patients with cholera was reported in the literature. In an incident of epidemic in the Gorgan, Iran the presence of blood in 33% of patients was reported which the *V. cholerae* had been isolated from their stool culture (Khodabakhshi *et al.*, 2001). In other report on the study of patient infected with *V. cholerae* confined in the Bou Ali hospital of Ghazvin, Iran, two patients with *V. cholerae* were recognized with having bloody diarrhea (Talebi *et al.*, 1999), in other study in north Jakarta, Indonesia 4% of patients with cholera, had bloody stool (Agtini *et al.*, 2005) also a Bangladeshi researcher has found a mixed diarrheal infection of

*V. cholerae* O<sub>1</sub> with other enteric pathogens in 4.2% of the patients (Faruque *et al.*, 1994). Mixed infections *V. cholerae* with bacteria such as enterotoxigenic *E. coli*, *Shigella* sp., *Campylobacter jejuni*, *Aeromonas* sp. (Faruque *et al.*, 1994), *Salmonella paratyphi* A, *Campylobacter coli*, Hepatitis A (Enzensberger *et al.*, 2005), *Brachyspira pilosicoli*, *Brachyspira aalborgi* (Nelson *et al.*, 2009), *V. cholerae* non O<sub>1</sub> (Ramamurthy *et al.*, 1993) and parasite and virus such as *Entamoeba histolytica*, *Giardia lamblia*, *Cryptosporidium* sp, Ascaris, Hookworm, Trichuris (Mukherjee *et al.*, 2009; Harris *et al.*, 2009) and Rotavirus (Unicomb *et al.*, 1996; Faruque *et al.*, 1994), were reported. Our patient had bloody diarrhea and *V. cholerae* O<sub>1</sub> Ogawa EL Tor with *S. dysenteriae* were isolated and has no evidence of parasite and other pathogenic enteric bacteria. Therefore the results of cases reported in literature above conforming our findings such as the presence of blood in the stool and isolation of *Shigella dysenteriae* from patient under the study. The incidence of *S. boydii* and *S. dysenteriae* were lower than other species of shigella. *S. flexneri* and *S. sonnei* were the most isolated species of shigella in developing countries (Kotloff *et al.*, 1999). Therefore, the occurrence of mixed infection of *S. dysenteriae* with other pathogenic bacteria is rare. Both isolates were resistant to ampicillin and were sensitive to trimethoprim-sulfamethoxazole however now a day's most of the serotype of shigella and *V. cholerae* are resistant to co-trimoxazole and ampicillin (Asghar *et al.*, 2002; Jonaidi Jafari *et al.*, 2007; Agtini *et al.*, 2005).

Mixed infections of cholera with other enteric pathogens have been observed in places when there is cholera in the form of epidemic or endemic. Poor individual and public sanitation and also lack of access to the safe drinking water are the two factors which intensify the risk of incidence of this kind of co-infection. Therefore with regards to increasing growth of antibiotic resistance of enteric pathogens such as *V. cholerae* O<sub>1</sub> and *Shigella*, complete identification of the pathogens is necessary and antibiotic sensitivity pattern of the pathogens and rational use of antibiotic for treatment of such patient must be considered. Also, it is important to know that incomplete treatment of such infections, will cause resistance to antibiotics and the spread of these pathogens to the others with the new resistance pattern will be its consequences.

## CONCLUSION

Therefore it is recommended that in the case of cholera epidemic in any place, the bloody diarrhoeal

samples must be suspected for the presence of the mixed infections of *V. cholerae* O<sub>1</sub> with other enteric pathogens. This will prevent the spread of pathogenic organism in the community.

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