Original article

Carrier rate of escherichia coli o157:h7 among apparently healthy people in ondo state and its antibiogram

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Abstract

Background: *E.coli* O157:H7 is a pathogenic bacterium that can be found in faecal contaminated foods and water. The organism causes special kind of diarrhoea known as haemorrhagic diarrhoea and highly resistant to many antibiotics. Our aim therefore is to know the prevalence rate in Ondo State and the antibiotics sensitivity pattern of the isolates.

Methods: Five hundred (500) diarrhoeic stool samples were collected from apparently healthy individuals in the State. The samples were brought to the lab immediately and cultured on eosin Methylene blue agar overnight. Colonies with blue black colour were sub-cultured into sorbitol MacConkey agar a differential medium for the growth and differentiation of *E. coli*, biochemical analysis was done to ascertain the organism`s identity. Moreover, the sensitivity pattern of the isolates to conventional antibiotics was also carried out.

Results: Out of 500 diarrhoeic stool samples examined in the cause of this research work, two hundred and thirty five were males, while two hundred and sixty five were females. Eighty (16%) were positive for *E. coli* O157:H7. Forty seven (20%) out of the males sampled were positive for the organism, while thirty three (12.5%) of the females sampled were positive. In relation to age group, the carrier rate was higher in age group 71-80 years in which fifty per cent (50%) were positive. The isolate were sensitive to the following antibiotics in an increasing order as follows: Septrin (0%), ampicillin (0%), Nalidixic acid (2.5%), augmentin (5%), ciproflox (5%), Peflacine (16.25%), tarivid (16.25%), Ceporex (16.25%), streptomycin (33.75%) and gentamycin (81.25%). The significance of these results was discussed.

Conclusion: This result has been able to show that the prevalence of *E. coli* O157:H7 in Ondo State is low and gentamycin is the antibiotic that can be used to contain the infection in the communities. People also must be made to know the importance of hygiene in preventing the infection with the pathogen.

Keywords: *Escherichia coli O157:H7, carrier rate, antibiogram*

Introduction

Escherichia coli O157:H7 is an entohemorrhagic strain of the bacterium *Escherichia coli* and a cause of food borne illness (1, 10, 9). Infection often leads to hemorrhagic diarrhoea, and occasionally to kidney failure, especially in young children and the elderly. Most illness has been associated with eating undercooked contaminated ground beef, drinking unpasteurized milk, swimming in drinking contaminated water, and eating contaminated vegetables (2, 8,). This organism has raised a lot of concern in the developed countries such as USA where the incidence is very high (3) however, there is no information on the carrier rate in Nigeria. This investigation was therefore designed to know the carrier rate of this pathogen in this part of the world especially in Ondo State and the antibiotics that can be used to treat the infection caused by the organism.

Method

Collection of specimen: five hundred (500) stool samples were collected from apparently healthy individuals in Ondo State. Questions were asked in respect to gender, age, occupation, water and toilet facilities used by the individuals. The samples were immediately brought to the laboratory for culturing.

Culturing of the specimen for *E. coli* O157:H7

This was done according to the method of (2). Collected samples were immediately brought to the laboratory and cultured on eosin methylene blue

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agar and then on sorbitol MacConkey agar, in order to isolate the organism. Already solidified agar was inoculated with the collected stool samples one specimen per plate and incubated at 37°C for 24hrs. Green metallic sheen colonies were transferred onto plates of sorbitol MacConkey agar and incubated at 37°C for 24hrs; colourless colonies were taking as *E. coli* O157:H7.

Antibiotics sensitivity assay

This was done according to the method (4,7). Mueller Hinton agar was used for the antibiotic sensitivity assay. Solidified agar plates were inoculated with the broth culture of *E. coli* O157:H7 and antimicrobial disc that contained tarivid (10mcg), peflacin (10mcg), augmentin (30mcg), gentamycin (10mcg), streptomycin (30mcg), Ceporex (10mcg), Nalidixic acid (10mcg), Septrin (30mcg), ampicillin (30mcg) and ciproflox (10mcg) was ascetically placed on the culture plates and incubated at 37°C for 24hrs. Zones of inhibition were measured after 24hrs of incubation.

Results

Out of the 500 individuals sampled during the course of this research work, 80 (16.0%) were positive for *E. coli* O157:H7. Out of the 235 males sampled, 47 (20.0%) were positive while 33 (12.5%) were positive for the female gender. So, a higher proportion of the carriers was found among the male (Figure 1).

The relationship between percentage carrier rate and age group can be seen in Figure 2. The percentage carrier rate was higher in age group of 71-80 years (50.0%), followed by age group 21-30 years (20.3%), age 1-10 (19.7), age group 51-60 (17.9%), age group 31-40 (15.7%), age group 61-70 (10.)%) and age group 41-50 has the lowest carrier rate of (8.0%).

The relationship between the percentage carrier rate and occupation is seen in Figure 3. The percentage carrier rate was highest among the farmers (21.7%), followed by traders (21.2%), students (19.8%), pupils (19.3%), police (12.2%), apprentice (8.3%) and teachers (7.1%). The least carrier rate was found among the public servants (3.6%).

The water used by individuals also had influence on the carrier rate (Figure 4). The percentage carrier rate was higher among those using well water 41 (19.1%), followed by borehole 31 (15.4%). The lowest percentage carrier rate was found among those using sachet-water 8 (9.5%).

The relationship between the toilet facility and the percentage carrier rate can be seen in Figure 5. The percentage carrier rate was higher among individuals that defecate on dunghills 29 (18.6%), followed by those using pit latrine 26 (15.0%). The lowest percentage carrier rate was found among those using water closet 25 (14.6%).

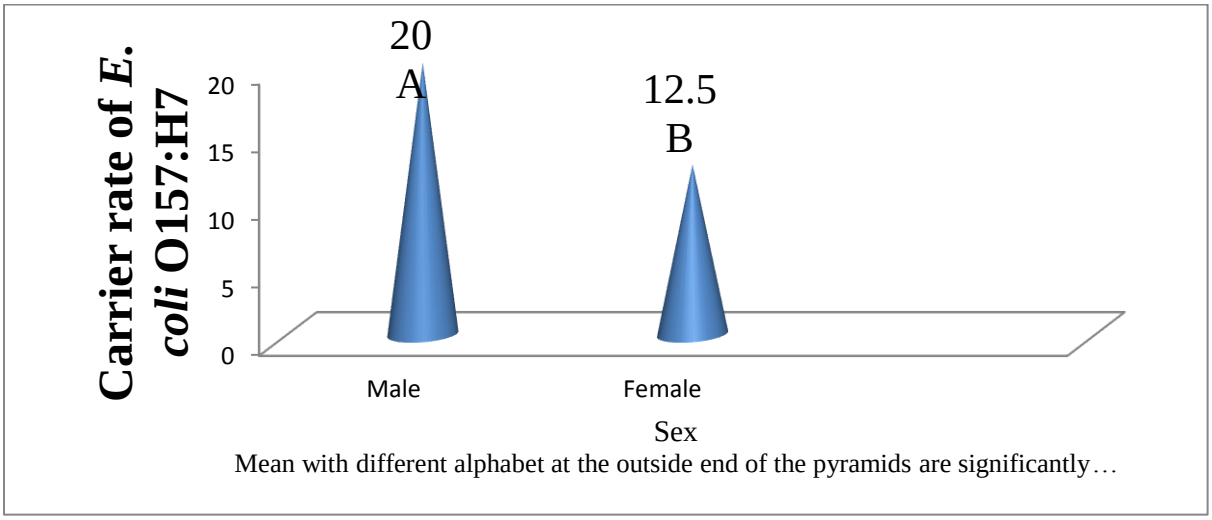


Figure 1: Percentage carrier rate of *E. coli* O157:H7 based on gender among the people sampled in Ondo State.

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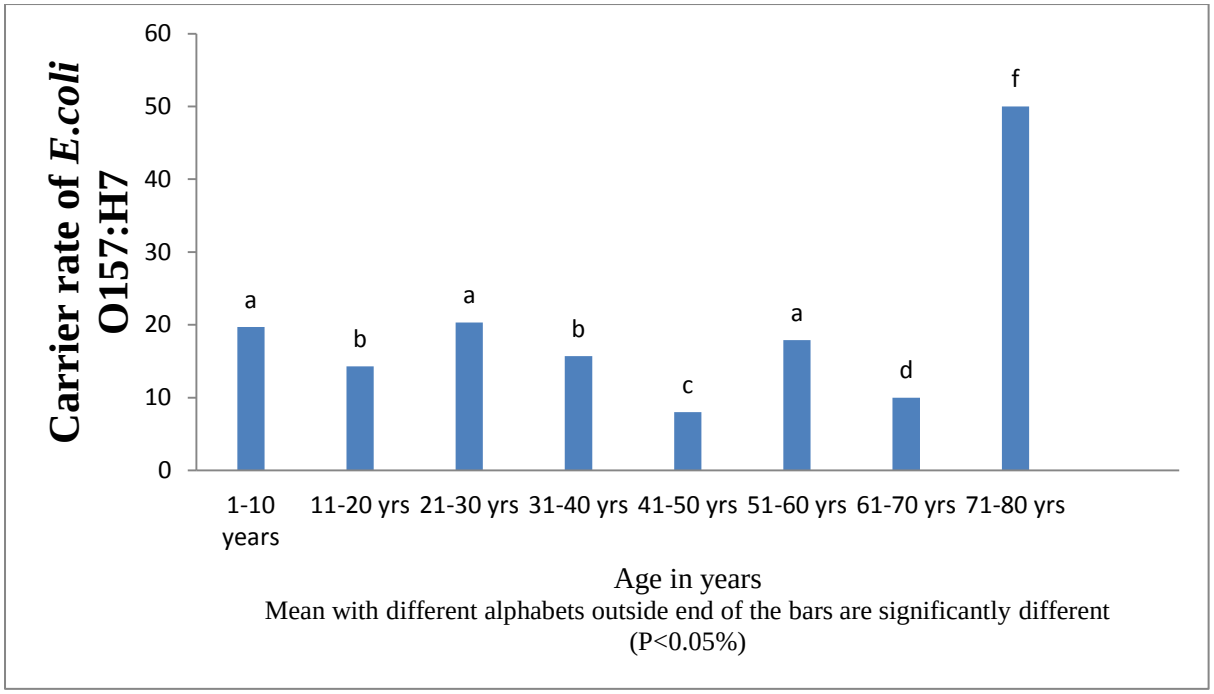


Figure 2: Percentage carrier rate of *E. coli* O157:H7 based on age group among the people sampled in Ondo State.

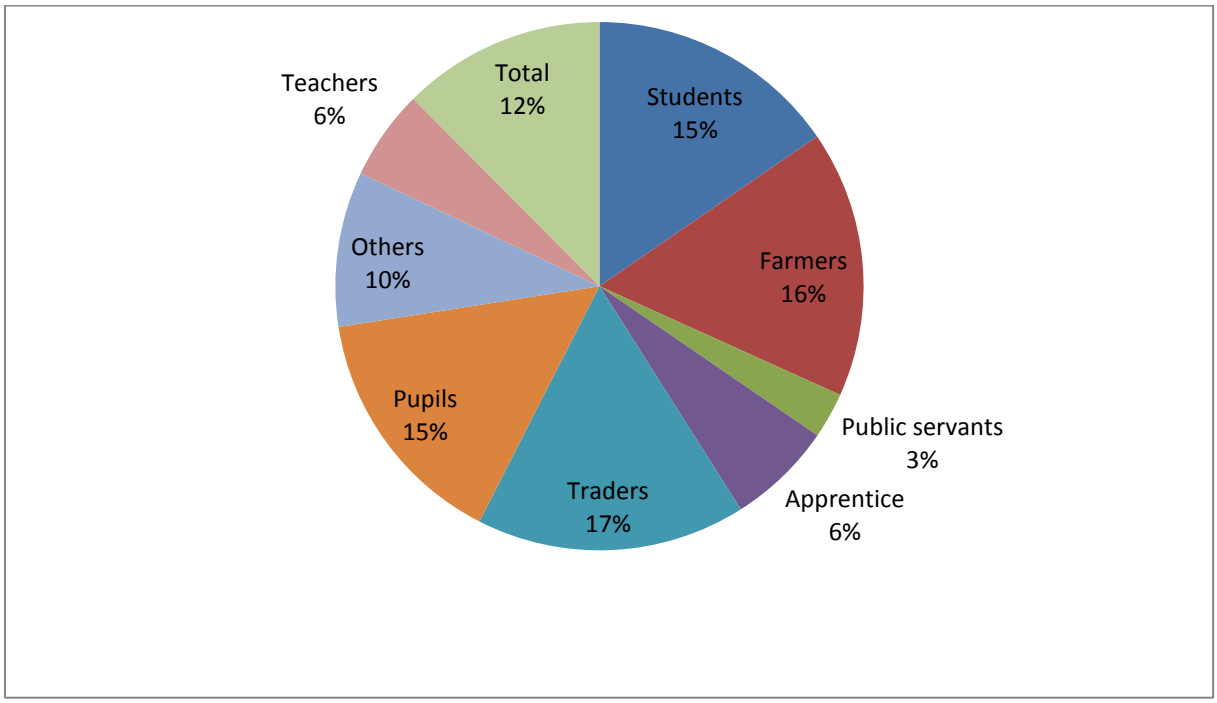


Figure 3: Relationship between occupation and the percentage carrier rate of *E. coli* O157:H7 in Ondo State (P<0.05%)

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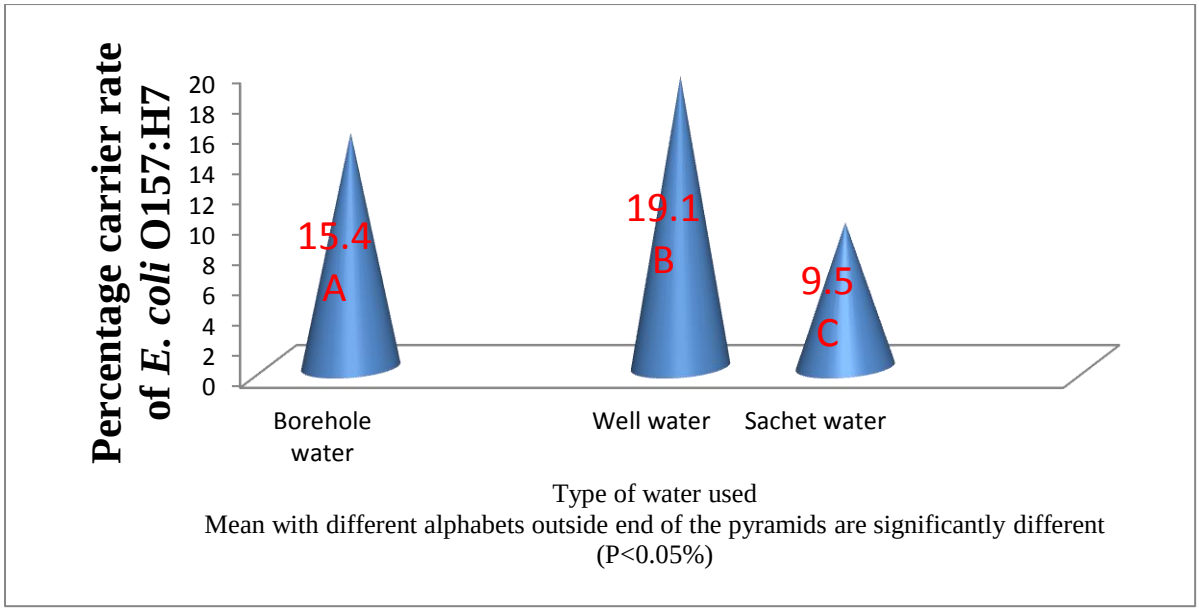


Figure 4: Relationship between the type of water used and the percentage carrier rate of *E. coli* O157:H7 in Ondo State.

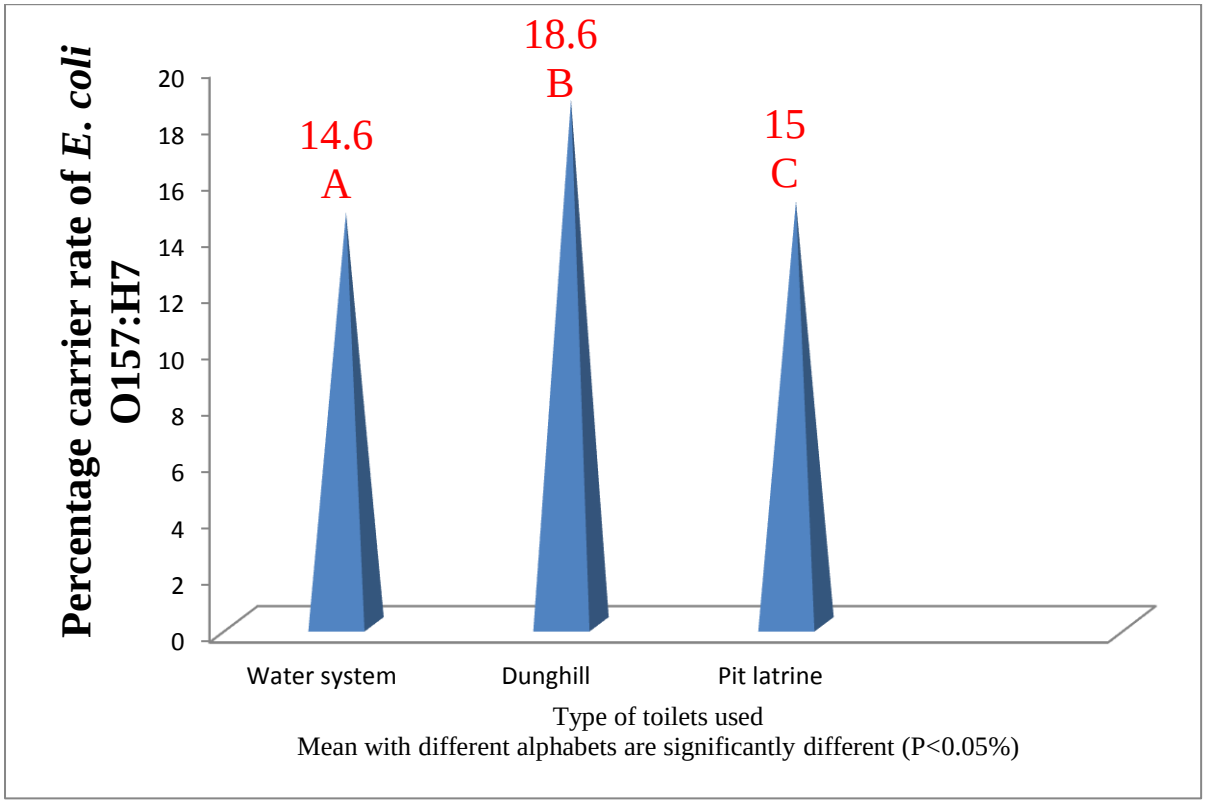


Figure 5: Relationship between toilet facility and the carrier rate of *E. coli* O157:H7 in Ondo State.

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Table 6: Total percentage of the isolates that were sensitive to different antibiotics

Antibiotics	No of isolates that were sensitive	% sensitivity
Tarivid	13	16.25
Peflacine	13	16.25
Ciproflox	4	5
Augmentin	4	5
Gentamycin	65	81.25
Streptimycin	27	33.75
Ceporex	13	16.25
Nalidixic acid	2	2.5
Septrin	0	0
Ampicilin	0	0

Note: 10mm zone of inhibition is sensitive according to Betty *et al*, 2007

Discussion

The carrier rate of *E. coli* O157:H7 was carried out among apparently healthy individuals in Ondo State. It was found that 16% were potential carrier of *E. coli* O157:H7. This rate, however, is higher than that reported in US, which was 5% (5, 6). The discrepancy was probably due to difference in the source of the organism, while the *E. coli* O157:H7 examined in this study was got from the stool of apparently healthy individuals, the later were from clinical samples of patients that had haemolytic uremic syndrome in the US. The higher incidence in males than in females, however, was probably due to the fact that the numbers of female using water closet as toilet and borehole water was more than their male counterpart. Moreover, most males live a carefree live and do not observe strict hygienic practises such as washing of hands before eating or in between meals. This study showed that apparently healthy individuals harbour *E. coli* O157:H7 in their intestine. Moreover, from the result of the susceptibility test to commonly available antibiotics conducted, this organism is resistant to all the antibiotics used except gentamycin that mediated 81.25% effectiveness against the organism. This is serious, because this means that if there is an outbreak of the infection, only gentamycin can be used for therapeutic purposes and since it cannot be administered orally it means that only qualified medical personnel can handle it. So if there is an outbreak in rural communities where basic medical facilities are rare, the teeming population there will become highly susceptible to the complication of the infection. Efforts therefore should be made to make sure that the outbreak of the infection is prevented.

Conclusion

E. coli O157:H7 has been found to inhabit gastro-intestinal tract of apparently healthy individuals in Ondo State and that gentamycin is the only antibiotic that can be used to treat the diseases caused by the organism. There is therefore the need to discourage unhygienic ways of processing food and water supply which are the major routes of infection (Karch *et al*, 2005).

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