

Short Research Article

PREVALENCE OF NON TYPHOIDAL *SALMONELLA* AMONG HIV/AIDS PATIENTS AND POULTRY CHICKEN IN EKITI STATE.

ABSTRACT

Salmonella is an important cause of infection in both humans and animals. This study was therefore carried out to identify the Non typhoidal *Salmonella* isolates from poultry chicken which is one of the main animal reservoirs of Salmonellosis and from HIV/AIDS patients in Ekiti State, Nigeria. A total of 200 samples were collected altogether (100 human feecal samples, 50 human blood and 50 feecal samples from broiler chicken) and analysed using standard methods. The antimicrobial susceptibilities were also carried out using disc diffusion techniques. A total of 18 Non typhoidal *Salmonella* isolates were gotten from human samples with prevalent rate of 12% and 4 Non typhoidal *Salmonella* isolates were from poultry broiler-chicken with prevalent rate of 8%. There was no significant difference in number of male and female as there were 10 males and 8 females infected with Non typhoidal *Salmonella* , with a median age of 30 years. Although, almost all the human and Broiler-Chicken non typhoidal *Salmonella* isolates showed resistance to more than one antibiotic but Ampicilin, Tetracycline and Gentamycin showed 100% resistance rate to Broiler-chicken isolates while Ceftriaxone and Ofloxacin showed least resistance among human isolates. The average resistances to seven commonly prescribed antibiotics were more in Broiler-Chicken (78.6%) than in Humans (53.9%). However, the high resistance showed in poultry suggested that there is likely hood of spread of resistance strain of Non typhoidal *Salmonella* in the study environments.

Key words: Salmonellosis, Prevalence, NTS, HIV/AIDS, Nigeria.

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INTRODUCTION

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Salmonella are found worldwide in cold and warm blooded animals (including humans), and in the environment. They cause illnesses like typhoid fever, paratyphoid fever, food borne illness [15] and bacteremia illness [4]. It has also been reported to have caused a huge global burden of morbidity and mortality among both the health and immunocompromised individual [9]. Salmonella infections are zoonotic and can be transferred between humans and non-human animals. Many infections are due to ingestion of contaminated food. However, *Salmonella* serotypes are generally distinguished into two broad classes: typhoidal *Salmonella* and non typhoidal *Salmonella*. A distinction is made between enteritis *Salmonella* and *Salmonella* typhoid/paratyphoid *salmonella*, where the latter, because of a special virulence factor and a capsule protein (virulence antigen) can cause serious illness, such as *Salmonella enteric sub sp.enterica serovar typhi*. *Salmonella typhi* is adapted to humans and does not occur in other animals. The typhoidal *Salmonella* causes typhoid fever and enteric fever with the disease endemicity observed in tropic and sub-tropic and has become a major public health problem in developing countries of the world [20] including Nigeria where they constitute serious sources of morbidities and mortalities [12]. However, on the other hand, Non-typhoidal *Salmonellae* (NTS) are an important cause of infectious diarrhoea world-wide. It also remains an important cause of invasive disease, particularly in developing countries, likely secondary to the high prevalence of coexisting malnutrition, malaria and HIV infection [6]. It is also a leading etiology of community- acquired bacteremia in patients with HIV infection in developed or developing countries [4, 10, 1]

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Non typhoidal *Salmonella* is mainly spread to humans when they eat under-cooked food made from infected animals (meat, poultry, eggs, and their by-products). Spread by 'cross-contamination occurs when *Salmonella* contaminates ready-to-eat food: for example, when food that will not be cooked further is cut with a contaminated knife or via the hands of an infected food handler. *Salmonella* can spread from person-to-person via the hands of an infected person [7]. NTS have a worldwide distribution, there are an estimated 93.8 million episodes and 155,000 deaths each year attributable to NTS [14]. About 142,000 Americans are infected each year with *Salmonella enteritidis* from chicken eggs, and about 30 died [2]. The U.S. Government reported as many as 20% of all chickens were contaminated with *Salmonella* in the late 1990s

and 16.3% were contaminated in 2005. A 2010 study of worldwide burden of *Salmonella* gastroenteritis estimated 2.5 million cases of the disease and 4100 deaths per year in Africa. In Nigeria, morbidity associated with illnesses due to *Salmonella* continues to be on the increase and, in some cases, resulting in death. Thus, the purpose of this study was to identify the non typhoidal *Salmonella* isolates from poultry chicken which is the main animal reservoir of Salmonellosis and from HIV/AIDS patients attending Federal Medical Centre, Ido Ekiti. The antimicrobial resistance pattern was examined to determine the resistance to some commonly prescribed antibiotics.

MATERIALS AND METHODS

Ethical Consideration, Questionnaire and informed consent

The ethical clearance for this research was given by Federal Medical Centre (FMC) Ethical Committee after due processes had been followed. Administration of questionnaires was done to the consented subjects to obtain the demographic data and other relevant information.

Human samples

A total of one hundred and fifty HIV/AIDS patients attending Federal Medical Centre, Ido Ekiti participated in this study. One hundred stool samples and fifty blood samples were collected. Stool samples were pre-enriched in Rappaport vassiliadis soy broth overnight while the blood sample were cultured on Brain heart infusion broth for 7 days and then sub cultured on Bismuth Sulphide Agar and MacConkey Agar. The isolates gotten were identified accordingly using standard methods described by Ochei and Kolkhtar (2000).

Livestock samples

From September, 2013 to February, 2014, a total of 50 feecal samples from broiler-chicken, selected by random Sampling, collected with sterile swab sticks and transported within 1 hour of collection to the laboratory. The swab was pre enriched in Rappaport vassiliadis soy broth overnight and sub cultured on BSA and MacConkey Agar.

86 Antimicrobial Susceptibility testing

87 Antimicrobial susceptibility tests were performed using Mueller-Hinton agar by Disc diffusion
88 method as described by CLSI, (2010). The following antibiotics were tested: ciprofloxacin
89 (5µg), ceftriaxone (30µg), ceftazidime (30µg), ofloxacin (5ug), ampicillin (10µg), tetracycline
90 (30µg), and gentamycin (10µg) and purchased from OXOID company.

91 RESULTS

92 Eighteen human Non typhoidal *Salmonella* isolates were isolated from September, 2013 to
93 February, 2014 at Federal Medical Centre, Ido Ekiti. These isolates were gotten from HIV/AIDS
94 patients with sporadic cases seeking medical attention. It was very difficult to incriminate any
95 particular food associated with the sporadic cases as all the participant identified with the meat
96 and various foods.

97 Among the eighteen human isolates, sixteen *Salmonella* isolates were from feecal samples. The
98 remaining two isolates were from the blood samples (Table 1). There were 10 males and 8
99 females, with a median age of 30 years (table 2). All the patients were immunocompromised
100 with the CD 4 count of < 200 cells/ ul.

101 However, the prevalence of *Salmonella* among the Broiler-chicken in poultry farm in Ekiti State
102 University, Ado-Ekiti showed that out of the 50 feecal samples from broiler-chicken, non
103 typhoidal *Salmonella* were isolated from 4 (8.0 %) of the chicken between September, 2013 to
104 February, 2014 (Table 3).

105 The antimicrobial susceptibilities of the Non typhoidal *Salmonella* were revealed in
106 figure 1. Of the 18 human NTS isolates, 12 (66.7%) isolates showed resistance to Ciprofloxacin
107 and Ampicillin each, 11 (61.1%) isolates showed resistance to Tetracycline, 10 (55.6%) NTS
108 were resistance to Gentamycin while 8 (44.4%) isolates showed resistance to Ceftriaxone and
109 Ofloxacin and 7 (38.9%) NTS isolates were resistance to Ceftazidime with an average resistance
110 to seven tested antibiotics of 53.9% (table 4). However, of the 4 poultry NTS tested with seven
111 antibiotics commonly prescribed, 4(100%) isolates showed resistance to Ampicillin, Tetracycline
112 and Gentamycin, 3 (75.0%) isolates were resistance to Ciprofloxacin and Ofloxacin while 2

(50%) *Salmonella* isolates showed resistance to Ceftriaxone and ceftazidime (figure 1) with an average resistance to seven antibiotics of 78.6% (table 4).

Table 1: Prevalence of Non typhoidal *Salmonella* from human samples (HIV/AIDS patients)

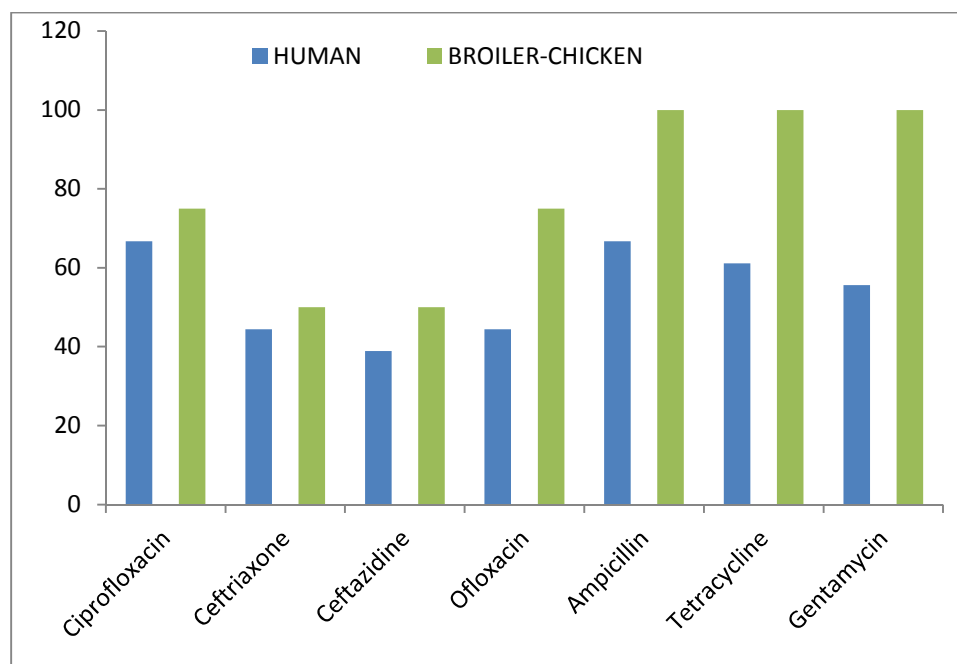
	Faecal	Blood	Total
Positive	16 (16.0)	2(4.0)	18 (12)
Negative	84 (84.0)	48(96.0)	132 (88)
Total	100 (100.0)	50 (100.0)	150 (100)

Table 2: Prevalence of NTS in relation to age and sex among HIV/AIDS patients.

Table 3: Prevalence of NTS from faecal sample of chicken -broiler.

Faecal samples	
Positive	4 (8.0)
Negative	46 (92.0)
Total	50 (100.0)

Fig 1: Antibiotics resistance of Non typhoidal *Salmonella* from both human (HIV/AIDS patients) and animal.



163 Table 4: Average resistance of NTS to seven selected antibiotics.

ORGANISMS	Average resistance to seven antibiotics tested
Salmonella spp (Human) n=18	9.7
%	53.9
Salmonella spp (Poultry) n=4	3.1
%	78.6

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165 DISCUSSION

166 Non typhoidal *Salmonella* isolation from poultry and clinical sources has not received much
 167 attention in Ekiti state, Nigeria. However, the objective of this work was to isolate NTS from
 168 poultry and HIV/AIDS patients, since poultry remains one of the major routes of transmission of
 169 this organism. The result obtained showed varying frequencies in the isolation of Non typhoidal
 170 *Salmonella* in this study. Four (8.0%) out of the fifty broiler-chicken tested had NTS. This may
 171 be due to the fact that most poultry birds were usually given antibiotics which might have lead to
 172 few numbers of isolates gotten in this environment. This agreed with CDC [2000] that reported
 173 the prevalence of NTS among chickens in Michigan as 9.2% .

174 However, the prevalent rate of isolates from human (HIV/AIDS patients) showed a vary
 175 frequencies in feecal sample (16%) and blood 4(4%). This may be due to the fact that faeces
 176 being a non-sterile sample while blood being a sterile sample; which may account for the higher
 177 prevalence of Non typhoidal *Salmonella* in the faecal sample [13].

178 In the demographic data of patients whose stool and blood samples were examined, it was
 179 observed that there was no much difference between infections in male as compared to female.
 180 This may be due to the fact that Humans and warm blooded animals are considered to be the
 181 primary reservoir of Non typhoidal *Salmonella* and subsequent shedding can result in the spread
 182 to humans and their environs [8]. The age distribution of Non typhoidal *Salmonella* isolates
 183 showed a high prevalent in age group 21-30 years with an average median age of 30 years.

184 Almost all the human and broiler-chicken *Salmonella* isolates showed resistance to more than
185 one antibiotic, suggesting that antimicrobial resistance is wide spread in both human and
186 livestock [4]. High resistance rate was seen among the poultry bird especially to antibiotics like
187 Ampicillin, Tetracycline and Gentamycin. This may be due to the fact that the poultry birds were
188 usually given antibiotics and this has created a pressure in antibiotics resistance in human.
189 Reports have indicated that the use of antimicrobials for growth-promotion prophylaxis and
190 treatment of food-animals increases the prevalence of resistance in human pathogens,
191 particularly non-typhoidal Salmonellosis. This practice is common in Asia and the United
192 Kingdom and in some other European countries where fluoroquinolones have been approved for
193 animal use [18, 17]. In this study, the cephalosporin class of antibiotics (Ceftazidime and
194 Ceftriaxone) showed lesser resistance to isolates from poultry. Although, the study conducted by
195 Chenng *et al.* (4) showed no resistance of ciprofloxacin and ceftriaxone to either human or
196 poultry isolates. However, the increasing smuggling of poultry products into our country, as a
197 result of the ban in importation of these products in recent times, might be, among other factors,
198 a likely reason for the emergence of reduced susceptibility to fluoroquinolones and cephalosporins
199 in our environment. There has been a suggestion that the use of antimicrobials in animal growth
200 should be phased out gradually, since similar benefits could be obtained by improving other
201 aspects of animal care, such as hygiene (Witte, 1998). However, the molecular study of these
202 isolates was not done; therefore, it was very difficult to ascertain their epidemiological
203 relatedness. Although many research had shown relatedness in human isolates and that of their
204 environment [15, 4].

205 In conclusion, poultry could be a potential source of Non typhoidal *Salmonella* infection in
206 human especially in HIV/AIDS patients and as such more work need to be done in this area to
207 molecular level to ascertain the possible spread of this organism from poultry bird to human.

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