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# Prevalence of *Yersinia enterocolitica* infection in Nigerian chickens : cultural and serologic studies

NWOSUH (E. N.), ADESIYUN (A. A.). Incidence de l'infection à *Yersinia enterocolitica* sur les poulets nigériens. Etudes sérologique et en culture. *Rev. Elev. Méd. vét. Pays trop.*, 1987, 40 (3) : 239-241.

L'auteur a recherché la fréquence d'isolement de *Yersinia enterocolitica* à partir de prélèvements par écouvillonnage du cloaque de 800 poulets élevés selon trois systèmes différents (intensif, basse-cour, en liberté). L'incidence des anticorps correspondant à 5 sérotypes a également été déterminée. Cinq poulets sur 800 (0,63 p. 100) ont été trouvés positifs à *Y. enterocolitica* en culture, tous les isolats venant de volailles élevées en liberté. Les cinq souches correspondaient au sérotype 0:12,25, biotype 3 et phage type Xz. Quinze des 800 animaux (1,9 p. 100) possédaient des agglutinines à *Y. enterocolitica*, 4 (soit 0,5 p. 100) pour le sérotype 0:3 et 11 (1,14 p. 100) pour le sérotype 0:9. Parmi les poulets séropositifs 7 avaient un titre de 1/40, 5 de 1/80 et 3 de 1/160. Bien qu'il s'agisse là de la première communication au sujet de l'infection du poulet à *Y. enterocolitica* dans les pays tropicaux, l'incidence de la maladie semble être faible et le risque de transmission à l'homme doit être minime dans l'environnement considéré. *Mots clés* : Poulet - *Yersinia enterocolitica* - Isolement - Sérologie - Nigeria.

## INTRODUCTION

Reports of *Yersinia enterocolitica* infection in a variety of animal species have come predominantly from temperate countries (5, 7, 14). This led to an earlier belief that *Yersinia enterocolitica* infection was limited to cold environments because of the affinity of the organism for low temperatures (13). However of late, reports exist on the isolation of the organism from tropical and subtropical countries. *Yersinia enterocolitica* was isolated from human acute gastroenteritis in Nigeria (4) and Bangladesh (12). In Nigeria, the organism has been documented in pigs (2, 10), cattle (9) and camels (8). To date, information is not available on the status of *Y. enterocolitica* infection in chickens in any tropical environment. Few reports also exist on the serological evidence of *Y. enterocolitica* in animal species. KROGSTAD (6) reported antibody titres to serotype 0:2 infection in a natural outbreak of yersiniosis in Norwegian goats while ADESIYUN *et al.* (1)

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determined the antibody prevalence to three serotypes of *Y. enterocolitica* in 11 species of animals in Nigeria.

The present study was conducted to determine the prevalence of *Y. enterocolitica*, culturally and serologically, in chickens kept under different management systems in Nigeria.

## MATERIAL AND METHODS

### Source of samples

Chickens kept under three types of management systems were used. The extensive (free-range) system contains chickens not under any form of confinement. The semi-intensive (backyard) system comprises chickens in confinement either in cages or deep litter usually with up to 3,000 birds. The intensive system contains chickens confined in cages or deep litter usually numbering over 5,000.

### Sample collection

For cultural study, cloacal swabs were collected from a total of 800 chickens randomly selected from the flocks comprising 400 from free-rangers, 200 each from the semi-intensive and extensive management systems.

All swabs were put in 6 ml of 0.067 M phosphate buffered saline (PBS), pH 7.6 and taken to the laboratory cooled.

For serology, blood was collected at slaughter from 400 free-rangers and 400 chickens from intensively-managed flocks. Harvested sera were stored at -20 °C until needed.

### Isolation and identification of *Yersinia* spp.

The procedure described by AGBONLAHOR *et al.* (3) was used.

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## Serotyping, biotyping and phage-typing of *Yersinia* isolates

The serotype, biotype and phage-type of all isolates were kindly determined by Prof. H. H. MOLLARET of Pasteur Institut, Paris.

### Detection of *Y. enterocolitica* agglutinins

*Yersinia enterocolitica* antigens were prepared from growth cultures of serotypes 0:3, 0:5,27, 0:8 and 0:9 kindly provided by Dr. DEVENISH of Ontario, Canada and 0:12,26 isolated from cattle in Nigeria (3) as earlier described by ADESIYUN *et al.* (1). The tube agglutination test (1) was used to detect *Y. enterocolitica* agglutinins in all serum samples.

## RESULTS

Five (1.3 p. 100) of 400 free-ranging local chickens were positive for *Y. enterocolitica* while none of the 400 chickens from either the semi-intensive or intensive management systems was positive. Overall, the frequency of isolation was 0.63 p. 100.

All five strains of *Y. enterocolitica* isolated were of serotype 0:12,25, biotype 3 and phage-type Xz. Biochemically, most reactions given by isolates were typical.

Fifteen (1.9 p. 100) chickens had agglutinins to *Y. enterocolitica* amongst the 800 tested. The antibody prevalence was 1.5 p. 100 amongst extensively managed chickens and 2.3 p. 100 for those intensively managed. Eleven (1.4 p. 100) of 800 chickens were seropositive for agglutinins for serotype 0:9 but only 4 (0.5 p. 100) for 0:3. All chickens were negative for agglutinins against serotypes 0:5,27, 0:8 and 0:12,26.

For serotype 0:3 agglutinins, 3 had titres of 1/40 while only 1 was 1/80. Four chickens each had titres of 1/40 and 1/80 while 3 had 1/160 against serotype 0:9.

## DISCUSSION

This is the first report of isolation of *Y. enterocolitica* from chickens in any tropical environment. The frequency of isolation (0.63 p. 100) though low, is in agreement with studies in other animals in the environment (3, 8). The low prevalence of *Y. enterocolitica* infection in chickens in Nigeria is hardly a surprise since temperature has been documented to have some effect on the survival of the organism (11). The relatively high environmental temperature experienced throughout the year in most tropical environments coupled with the fact that chickens have a high body temperature (37 °C) are factors to consider.

The role of management system on the prevalence of infection was demonstrated by the absence of isolation from chickens kept under confinement while all five strains of *Y. enterocolitica* came from free-ranging chickens. Such free-rangers are exposed to other livestock in the environment.

That all five strains of *Y. enterocolitica* are of serotypes 0:12,25 is of significance because this serotype had hitherto, never been isolated from animal species in Nigeria. In earlier studies (3) on cattle and pigs in the same environment the predominant serotype was 0:12,26.

The overall prevalence of *Y. enterocolitica* antibodies (1.9 p. 100) is again low but a reflection of the equally low frequency of isolation of the organism from chickens. A limited serological survey of chickens by ADESIYUN *et al.* (1) had reported the detection of *Y. enterocolitica* agglutinins to serotypes 0:3, 0:8 and 0:12,26 in 2 (8.7 p. 100) of 23 free-rangers in Zaria area and in 3 (7.5 p. 100) of 40 chickens kept under the semi-intensive management system.

## CONCLUSION

Based on the very low prevalence of *Y. enterocolitica* infection in chickens in Nigeria, it is concluded that they may not be important in the epidemiology of yersiniosis in human beings in this environment.

The frequency of isolation of *Yersinia enterocolitica* from cloacal swabs of 800 chickens kept under three management systems was determined. The prevalence of antibodies to 5 serotypes of *Y. enterocolitica* in sera of chickens was also determined. Five (0.63 p. 100) of 800 animals were positive for *Y. enterocolitica* culturally with all isolates coming from free-ranging chickens. All 5 strains were serotype 0:12,25, biotype 3 and phage type Xz. Fifteen (1.9 p. 100) of 800 chickens had agglutinins to *Y. enterocolitica*, 4 (0.5 p. 100) against serotype 0:3 and 11 (1.4 p. 100) against serotype 0:9. Amongst seropositive chickens, 7 had a titre of 1/40, 5 had 1/80 while 3 were with titres of 1/160. Although this is the first documentation of *Y. enterocolitica* infection in chickens in any tropical country, the prevalence of infection appears low and the risk to human beings in this environment may be minimal. *Key words*: Chicken - *Yersinia enterocolitica* - Isolation - Serology - Nigeria.

El autor buscó la frecuencia de aislamiento de *Yersinia enterocolitica* a partir de muestras por limpieza de la cloaca de 800 pollos criados según tres sistemas diferentes (intensivo, corral, en libertad). Determinó también la incidencia de los anticuerpos correspondiendo a 5 serotipos. Cinco pollos de 800 (0,63 p. 100) fueron positivos para con *Y. enterocolitica* en cultivo, proviniendo todas las muestras de aves criadas en libertad. Las cinco cepas representaban el serotipo 0:12,25, biotipo 3 y fago Xz. Quince de las 800 aves (1,9 p. 100) tenían aglutininas a *Y. enterocolitica*, 4 (sea 0,5 p. 100) para el serotipo 0:3 y 11 (1,14 p. 100) para el serotipo 0:9. Entre los pollos seropositivos, 7 tenían un título de 1/40, 5 de 1/80 y 3 de 1/160. Aunque se trate de la primera nota a propósito de la infección del pollo por *Y. enterocolitica* en los países tropicales, la incidencia de la enfermedad parece reducida y el riesgo de transmisión al hombre debe de ser menor en el ambiente observado. *Palabras claves*: Pollo - *Yersinia enterocolitica* - Aislamiento - Serología - Nigeria.

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