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# SEROPREVALENCE OF YERSINIA ENTEROCOLITICA "O:3 AND / OR O:9" IN ANIMALS IN EGYPT WITH REFERENCE TO ITS SEROLOGICAL CROSS-REACTIONS WITH BRUCELLA ABORTUS

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## SUMMARY

In this study 400 blood samples were collected from apparently healthy animals (100 Cows, 100 Buffaloes, 100 Sheep and 100 Pigs) for screening of serogical prevalence of *Y. enterocolitica* agglutinins. 172 ((43%) strongly displayed antibodies agianst Y. enterocolitica seovars o:3 and / or 0:9. Among these Yersinia positive sera, 164 (41%) were indeed against *Y. enterocolitica* after elimination of 8 sera samples which demonstrated cross-reactivity with B. abortus. The rather high antibody prevalence was seen in buffaloes and sheep 46% each. While in pigs and cows was 43% and 37% respectively. It is believed that this is the first report on serological features of *Y. enterocolitica* in animals in Egypt.

## INTRODUCTION

*Yersinia enterocolitica* infections are now seen with some concern in both human and veterinary medicine (Morris and Feeley, 1976). The infections due to *Y. enterocolitica*, affecting animals first and then man, have been spreading dramatically since 1961(WHO Chronicle, 1980).

Ahvonen (1972) Detected IgM antibodies by passive haemagglutination or bacterial agglutination from eight to ten days after the onset of illness. Maeland and Digranes (1975) used the indirect haemagglutination test for the detefction of the antibodies against *Y. enterocolitica* serovars 0:3 and 0:9 (most pathogenic serovars).

The serum antibody did not affect the termination of the faecal excretion of *Y. enterocolitica* (Ueno et al., 1981). The antibodies of IgA class usually are formed early in the enteric infection,

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sometimes before IgM and IgG (Larsen et al., 1985). Y. enterocolitica serovar 0:3 strains were inhibited to colonize in the intestines of mice producing faecal immunoglobulin - A (IgA) (Shimono et al., 1989).

Fernandez-lago et al., (1991) observed a signficant response of immunoglobulin G (IgG), IgA and IgM antibodies in sera from rabbits orogastrically infected with virulent. *Y. enterocolitica* 0:9 strains. This immune response was stronger and persisted longer than those obtained with the corresponding avirulent strains. Franzin and Curti (1993) reported that the immunologic response to Yersinia infection has proven to be of value for establishing the diagnosis of yersiniosis in association with appropriate symptomatology.

*Y. enterocolitica* 0:9 is an organism of great significance in veterinay medicine largely as a result of its cross-reaction with *Brucella abortus* (Mittal et al., 1985). It is suggested that buffaloes having a diagnostically significant serum antibody titer against *B. abortus* agglutinating antigen and a history of abortion, did not necessarily indicate brucellosis infection as similar factors also operated in the *Y. enterocolitica*-associated abortion (Das and Paranjape, 1988).

To date, information on the prevalence of antibodies to serovars 0:3 and/or 0:9 of *Y. enterocolitica* in animals is scarce. To our knowledge, no reports exist on the serology of *Y. enterocolitica* infection in animals in Egypt. It is therefore of importance to determine the prevalence of *Y. enterocolitica* agglutinins in selected animal species to elucidate further serological features of this bacterium. The opportunity is inviting in this serological survey of *Y. enterocolitica* to point out a preliminary idea about its cross-reaction with *B. abortus*.

## MATERIAL AND METHODS

A total of 400 Blood samples were collected from apparently healthy animals (100 Cows, 100 Buffaloes, 100 Sheep and 100 Pigs) almost sent for salughter at Basattin abattoir in Cairo.

For screening *B. abortus* agglutinins, all sera were subjected to Rose Bengal Plate Test (RBPT) according Morgan et al., (1969). RBPT - positive sera were tested using the standard tube agglutination test (SAT) according to Alton et al., (1975).

For screening *Y. enterocolitica* agglutinins, Cellognost Yersiniosis combipack was used for determination of antibodies to *Y. enterocolitica* with the aid of indirect haemagglutination (IHA). The kit supplied by BEHRING (Ouiu 11) and approved by Paul-Ehrlich-Institute, Federal office for sera and Vaccines, Germany. According to Baier et al., (1981), the reagents were used for qualitative and quantitative detection of antibodies to *Y. enterocolitica* serovars 0:3 and 0:9.

## RESULTS

The prevalence of antibodies to serovars 0:3 and/or 0:9 of *Y. enterocolitica* in 400 samples from 4 selected animal species is shown in Table

(1). The antibody titer of seropositive animals is shown in Table (2).

Of the 400 animal sera screened for *B. abortus* agglutinins (Table 3), fifteen had agglutinins against *B. abortus*, of these sera 8 were positive *Y. enterocolitica* antibodies. Comparison of the antibody profile of the survey categorized to contain Brucella-Yersinia agglutinins (Table 4), suggested that 7 sera positive for *B. abortus* agglutinins showed serological cross-reaction with *Y. enterocolitica* antigen.

Table (1): Prevalence of antibodies to serovars 0:3 and/or 0:9 of *Y. enterocolitica* in seclected animal species.

| Animal Species | No. of Sera Tested | No. (%) Positive* |
|---|---|---|
| Cows | 100 | 37 (37) |
| Buffaloes | 100 | 46 (46) |
| Sheep | 100 | 46 (46) |
| Pigs | 100 | 43 (43) |
| Total | 400 | 172 (43) |

* A titer of 1/160 or above was considered positive by IHA (Manufacturer circular)

Table (2) : Antibodiy titers of *Y. enterocolitica* serovors 0:3 and/or 0:9 of seropositive animals.

| Animal Species | Reciprocal serum titers* | | | | | | Total |
|---|---|---|---|---|---|---|---|
| | 160 | 320 | 640 | 1280 | 2560 | 5120 | |
| Cows | 3 | 12 | 17 | 5 | - | - | 37 |
| Buffaloes | 6 | 15 | 13 | 9 | 3 | - | 46 |
| Sheep | 5 | 22 | 16 | 3 | - | - | 46 |
| Pigs | 2 | 17 | 15 | 6 | 2 | 1 | 43 |
| Total | 16 | 66 | 61 | 23 | 5 | 1 | 172 |

* Reciprocal of titers.

Table (3): Distribution of *B. abortus* (SAT) and *Y. enteroclitica* (IHA) antibodies in 400 examined animal sera.

| | Sera had *B. abortus* agglutinins | Sera negative* for *B. abortus* agglutinins | Total |
|---|---|---|---|
| Sera positive for *Y.enterocolitica* antibodies | 7 (+) [8] 1(D) | 164 | 172 |
| Sera negative for *Y.enterocolitica* antibodies | 4 (+) 1(D) [7] 2(-) | 221 | 228 |
| Total | 15 | 385 | 400 |

* No detectable agglutinins

(+) Titer was ≥ 1/40

(D) Titer was 1/20

(-) Titer was < 1/20

Table (4): Comparison of the antibody profile of the survey sera categorized to contain *Brucella/Yersinia* agglutinins.

| *Y. enterocolitica** titer | *B. abortus* titers* | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | <10 | 10 | 20 | 40 | 80 | 160 | 220 | |
| < 160 | 221 | 2 | 1 | 3 | 1 | - | - | 228 |
| 160 | 12 | - | 1 | 1 | 2 | - | - | 16 |
| 320 | 63 | - | - | - | 1 | 2 | - | 66 |
| 640 | 60 | - | - | - | - | - | 1 | 61 |
| 1280 | 23 | - | - | - | - | - | - | 23 |
| 2560 | 5 | - | - | - | - | - | - | 5 |
| 5120 | 1 | - | - | - | - | - | - | 1 |
| Total | 385 | 2 | 2 | 4 | 4 | 2 | 1 | 400 |

*.Reciprocal of titers

## DISCUSSION

The purpose of this study was to demonstrate antibody levels against the most important serovars 0:3 and/or 0:9 of *Y. enterocolitica*. Both of which engender a marked antibody response (Szita and Svidro, 1976 and Olsovsky et al., 1975). In this work, the cut-off point for definition of seropositive of ≥ 1/160 (manufacturer circular of applied kit) is used.

Of 400 serum specimens tested which were taken from apparently healthy animals, 172 (43%) strongly displayed antibodies against *Y. enterocolitica* serovars 0:3 and/or 0:9 (Table 1). Among these Yersinia positive sera, 164 (41%) were indeed against *Y. enterocolitica* after elimination of 8 sera samples demonstrated cross-reactivity with *B. abortus* (Table 3). It means that all 164 animals had exposure experience of *Y. enterocolitica* and infection may be current.

The rather high antibody prevalence was seen in buffaloes and sheep 46% in each while in pigs and cows were 43% and 37% respectively (Table 1). The result conforms with (Adesiyun et al., 1986 and Okoroafor et al., 1988. The former reported that the difference between antibody prevalence to *Y. enterocolitica* in animals is of epidemiological significance. They pointed out that cross-infection by Y. enterocolitica between animals can not be ignored.

No conclusive remarks can be given in relation to these varied titers (Table 2), as the presence of specific antibodies in the absence of disease may be difficult to interpret, being presumable indicative of past exposure with the antigen. The antibodies against Yersinia can persist for a certain period of time (Granfors, 1979 and Marks et al., 1980). Moreover, inapparent infections my occur without diagnosis (Franzin and Curti, 1993).

Monitoring of *B. abortus* agglutinins in connection with *Y. enterocolitica* antibodies in the 400 sera of animals in question (Table 3) showed that 7 sera were categorized as Brucella-Yersinia positive since they had detectable agglutinins against both *B. abortus* and *Y. enterocolitica* with a variable titers. This result indicates that the seroprevalence of *Y. enterocolitica* associated brucellosis as 4.1 % (7 of 172) suggesting serological cross-reactions between *Y. enterocolitica* and *B. abortus*.

In this concern, many investigators confirmed the cross-reactions between *B. abortus* and *Y. enterocolitica* serovar 0:9 such as: Corbel, 1975; Mittal et al., 1985 and Das and Paranjape 1988.

Comparing the Brucella SAT and Yersinia IHA titers of the 7 sera categorized as Brucella - Yersinia positive (Table 4) revealed that there were parallel rise in anti-Yersinia and anti-Brucella antibody titers even though their figures were variable. Although these cases were too low to evaluate the diagnostic significance of the SAT and IHA, the effeciencey of the latters in distinguishing the two infections remains to be elucidated. This finding appears to interfere and complicate bovine Brucella serolgical reactions. Mittal and Tizard (1980 and 1981) considered that

the animals with anti-Brucella titers of 1/100 or greater were Brucella positive and any suggestion as to their Yersinia status was irrelevant. They devised the use of a test for antibodies to Yersinia flagellar antigen for the differentiation of Yersinia-Brucella positive sera.

The serological results can give a valuable contribution, however, it must be emphasized, only be used in conjunction with a thorough clinical, bacteriological and epidemiological analysis of the problem situation. To our knowledge, this work is considered the first serological assay on *Y. enterocolitica* agglutinins in Egypt.

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