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EFFECT OF RIFAMPICIN AND GENTAMICIN ON GUINAE PIGS EXPERIMENTALLY INFECTED WITH BRUCELLA MELITENSIS

(With 2 Tables)

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تأثير الريفامبيسين والجنتاميسين على خنازير غنيا
المعرض للاصابة بميكروب البروسيلا

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أجريت هذه الدراسة على عدد ١٢ من الخنازير الغينية حيث تم تقسيمها الى ثلاث مجموعات متساوية أ ، ب ، ج تم حقن هذه الحيوانات بميكروب البروسيلا مليتنسز النوع الثالث ١٠×١٥ تحت الجلد. بعد ثلاثة أسابيع تم جمع عينات دم من هذه الحيوانات لاختبارها بواسطة التليد الشريحي السريع وكانت جميعها ايجابية. بعد أربعة أسابيع من العدوى تم اعطاء حيوانات المجموعة أ عقار الريفاميسين ٢٠ مجم /ك جم من وزن الحيوان عن طريق الفم يوميا ولمدة ١٠ أيام بينما تموحقن حيوانات المجموعة ب بعقار الجنتاميسين ٢٠ جم/ك جم من وزن الحيوان في العضل يوميا ولمدة ١٠ أيام. أما حيوانات المجموعة ج فتركت كضابط للتجربة . بعد ٦ أسابيع من العدوى تم جمع عينات دم وذبح جميع الحيوانات أظهرت الاختبارات السيرولوجية أن مستوى الاجسام المناعية في حيوانات المجموعة أ ، المجموعة ب كانت أقل ١٥١ ماقورنت بحيوانات المجموعة ج. وأظهرت نتائج العزل البكتريولوجي أن مستوى العدوى في الحيوانات المعالجة بالريفامبيسين أو الجنتاميسين كانت أقل بكثير من الحيوانات الغير معالجة المجموعة ج وكانت بعض الحيوانات المعالجة خالية من ميكروب البروسيلا بالزرع البكتريولوجي . كان معامل الاصابة في المجموعات أ، ب، ج ٥٪، ١٠٪، ٥ر٢٢٪ على الترتيب .

SUMMARY

In this study 12 brucellosis free guinea-pigs were divided into 3 equal groups (A,B and C). All guinea-pigs were inoculated S/C with $1x10^5$ cells of 2-days old **Brucella Melitensis** biotype 3 in smooth form. Three weeks later blood serum of all animals reacted positively to the plate agglutination test (PAT). Four weeks post infection, group A animals were orally adminstered by 20 mg/Kg, B.W. rifampicin daily for 10 days, while group B animals, were injected I/M by 20 mg/Kg, B.W. gentamicin daily for 10 days. Animals in group C were kept as control. Six weeks post infection, blood was collected and all guinea-pigs were sacrificed. The sera were tested by the PAT, Rivanol test and complement fixation test. Internal organs and Lymph nodes were subjected to bacteriological

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examination for brucella isolation. Serological examination revealed that animals treated with rifampicin or gentamicin showed marked lowere serum titres as compared with animals in the control group. Bacteriological examination and infectivity index indicated that rifampicin and gentamicin reduced the level of infection and could produce clearance of some guinea-pigs from brucella organisms. Infectivity index in groups A,B and C, were 5%, 10% and 22% respectively.

INTRODUCTION

Brucella organisms can survive in the phagocytic cells of the reticuloendothelial system, therefore they are protected form the lethal effect of antibodies, complement as well as antibiotics. Resistance of these organisms to the destructive action of phagocytes and even their ability to multiply within them is attributed to the presence of an immunogenic substance in the cell wall of brucella organisms (SMITH and FILZGEORGE, 1968). Difficulty in the therapy of brucellosis is attributed to the inability to mantain a theraputic level of drugs inside the cells where brucella organisms are located.

This work was carried out to study the therapeutic effect of some antibiotics, rifampicin and gentamicin on guinea-pigs experimentally infected with **Brucella metilensis** biotype 3.

MATERIAL and METHODS

Material :

Lab animals : 12 brucellosis free (serologically negative by plate agglutination test) guinea-pigs (250-300 gm), were employed.

Brucella strain : Brucella melitensis biotype 3 locally isolated from an aborted ewe.

Antigens for PAT and Rivanol test were obtained from Animal and Plant Health Inspection Service, USA.

Antigen for CFT : obtained from Merieux Institute, France.

Media : albimi agar media, for isolation, identification and typing of brucella organisms from inoculated animals.

Monospecific sera : antibrucella abortus and antibrucella melitensis sera were obtained from welcome Research laboratories, Beckenham, England.

Brucella phage (Tb): Brucella phage at Routin test dilution (RTD) and 1 x 10^4 RTD obtained from central Veterinary Laboratory, Weybridge, England.

Rifampicin (Rifampin): 20 mg/Kg, B.W. orally, was obtained from MISR co. for PHARM. MATARIAL, CAIRO, A.R.E.

Gentamicin (Garamycin): 20 mg/Kg. B.W., I/M., was obtained from Memphis Co., Cairo, A.R.E.

Methods :

- PAT and Rivanol test were carried out according to the methods described by National Veterinary Research Laboratories Ames Iowa, USA (1984).

- CFT was carried out according to ALTON and JONES (1967).

- Isolation and identification of brucella organisms was carried out according to the methods recommended by ALTON et al. (1975).

- Infectivity index was calculated according to KAITMAZOVA and OSTROVASKAYA (1967) as follows:

$$X = \frac{a \times 100}{bxc}$$ where

X = Infectivity index
a = No of brucella isolates
b = No of examined organs and lymphnodes of each animal
c = No of animals, in group.

RESULTS

Results are shown in Tables 1 and 2.

Table (1): Serological examinations of blood serum of Guinea pigs 6 weeks post infection.

	Group	MEAN TITRE		
		PAT	RIVANOL TEST	CFT
A	Rifampicin	1/50	1/50	1/10
B	Gentamicin	1/100	1/100	1/10
C	Control	1/400	1/200	1/40

PAT: Plate agglutinaion test. **CFT:** Complement fixation test.

DISCUSSION

Serological examination of sacrificed guinea-pigs 6 weeks post infection revealed that animals treated with rifampicin or gentamicin showed a lower serum titres as compared with the control infected non treated group. This may be attributed to the suppression of agglutinins and complement fixins due to inhibition of bacterial growth and interferance with the hosts immune response as reported by TRAN DINH TU (1982).

Bacteriological examination of sacrificed guineapigs 6 weeks post infection, revealed that animals in group A (treated with rifampicin) showed a lower level

Table (2): Bacteriological examinations of sacrificed guinea-pigs 6 weeks post-infection

Group		Spleen	Liver	Heart	Lung R	Lung L	Kidney R	Kidney L	Mesenteric L.n.	Hepatic L.n.	Pulmonary L.n.	No. of isolated	Infectivity Index
A	1	+	-	-	-	-	-	-	-	-	-	1	
Rifampicin	2	-	-	-	-	-	-	-	-	-	-	-	
	3	-	-	-	-	-	-	-	-	-	-	-	
	4	+	-	-	-	-	-	-	-	-	-	1	
												Total (2)	$\frac{2\times100}{4\times10} = 5$
B	5	+	+	-	-	-	-	-	-	-	-	2	
	6	+	-	-	-	-	-	-	-	-	-	1	
Gentamicin	7	-	-	-	-	-	-	-	-	-	-	-	
	8	+	-	-	-	-	-	-	-	-	-	1	
												Total (4)	$\frac{4\times100}{4\times10} = 10$
C	9	+	+	-	-	-	-	-	+	-	-	3	
	10	+	+	-	-	-	-	-	-	+	-	3	
	11	+	+	-	-	-	-	-	-	-	-	2	
Contol	12	+	-	-	-	-	-	-	-	-	-	1	
												Total (9)	$\frac{9\times100}{4\times10} = 22.5$

+ ; Brucella melitensis was isolated & identified

- ; No isolation.

of infection as shown by 5% infectivity index as compared with the control group 22.5% infectivity index. Moreover brucella organisms could not be recovered from 2 guinea-pigs in this treated group as proved by bacteriological examination. This can be attributed to the antibacterial effect of rifampicin on brucella organisms CORBEL (1972) and also may be due to intracellular penetration of rifampicin where brucella organisms are located as proved by STUART (1982).

The results of bacteriological examination of group B guinea-pigs (treated with gentamicin), revealed 10% infectivity index compared with the control group 22.5%. This may be due to the high sensitivity of brucella organisms to gentamicin, as mentioned by CHARANAYO et al. (1983) who found that brucella organisms were sensitive to gentamicin.

In the present study, bacteriological examination and infectivity index indicated that rifampicin and gentamicin reduced the level of infection and could produce clearance of some guinea - Pigs from brucella organisms.

The results obtained in this study open theway for new trials in the future to study the effect of such drugs whose power of penetration is high for the treatment of brucellosis or elimination of brucella carriers.

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