

## INCIDENCE OF *STREPTOBACILLUS MONILIFORMIS* IN LABORATORY RATS AND MICE

AL- Hadithi , Hadeel , T.

Department Of Biology , College of Science ,University Of Basrah , Basrah , Iraq

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### ABSTRACT

Conjunctiva of thirty rats and ten mice were examined for the presence of the normal flora *Streptobacillus moniliformis* which is the causative agent of rat-bite fever in man . 60 % of each rats and mice were found to harbor this bacteria suggesting a potential source for human infection . biochemical characterization revealed occurrence of biotypes which are valuable in tracing epidemics . A test for pathogenicity was carried out on rabbit .

### INTRODUCTION

*Streptobacillus moniliformis* is a normal resident of the oropharynx and conjunctiva of wild or laboratory rats , mice and other rodents ( 1,2 ) . it is a nutritionally fastidious Gram negative zoonotic bacteria that is potentially pathogenic for human and some laboratory animals . It is usually transmitted to human via biting or blood ( 3,4 ) . Infections have also occurred in persons working or living in rat infested building without reference to direct animal contact ( 5,6 ) . the disease produced in human has been known as Haverhill fever ( 7 ) . when it is not associated with a rodent bite and rat-bite fever ( RBF ) when associated with a rodent bite ( 8,9 ) . RBF is an acute febrile prostrating illness with significant mortality ( up to 10 % when untreated ) . Approximately one - half of patients develop a non supportive polyarthritis which is a hall mark of this disease ( 10 ) .

The incidence of *S. moniliformis* in rats and mice and its medical significance is still unexplored in our country . Therefore , as a first step , the aim of the present study is to determine the extent to which *S.moniliformis* is an indigenous in laboratory rats and mice .

## MATERIAL AND METHODS

Thirty rats and ten mice ( Albino – Balb ) in the Biology Department animal house – college of science , not under any experimental research were examined . culture specimens were obtained by wiping the conjunctiva with a sterile moistened cotton – tipped applicator dipped in sterile brain heart infusion broth . specimens were immediately streaked onto blood agar base ( Oxoid ) supplemented by 20 % sheep blood and incubated aerobically at 37c . All colony types from primary cultures grown after 24-72 hrs . were Gram stained and characterized for catalase , oxidase and oxidation – fermentation activities . Small , round , gray and translucent colonies which give rise to Gram negative , highly pleomorphic rods occurring in chains or long filaments and were negative for catalase and oxidase ( 2,11 ) , were further characterized for their ability to produce acid from glucose and fructose and for gelatin and starch hydrolysis .

### Test for pathogenicity

Rats harboring *S.moniliformis* were allowed to share normal , healthy , non experimental rabbits in their cages and were examined daily . Diagnosis was made by slide agglutination test ( 12 ) .

## RESULTS AND DISCUSSION

Table ( 1 ) illustrates percentage recovery of various bacterial group in conjunctiva of laboratory rats and mice . Bacterial groups have shown almost the same patterns of recovery : 70 % were Gram negative cocci comprising the genera : Staphylococci , Streptococci and Diplococci . The second major group ( 60 % ) was *Streptobacillus moniliformis* the only species of the genus ( 5,3 ) . The least recovery was for both *Neisseria* and *Pseudomonas* ( 10 % each ) . However , yeasts were only recovered in mice ( 20 % ) .

Although *S.moniliformis* is a normal flora but their percentage recovery in our laboratory rats and mice is rather higher than that recovered in Japan ( 14 ) and U.S.A. ( 12,15 ) suggesting a potential source for human infection ( 10 ) . Informations concerning incidence , geographic and racial data are not readily available , yet further research studies are required . When *S.moniliformis* isolates were further characterized for a number of tests ( 5 ) , variability amongst isolates was detected : all isolates from both type laboratory animals were able to produce acid but not gas from glucose and fructose which agreed with the finding of Edward and Finch ( 16 ) contrary to the report of Cohen and Whittler ( 17 ) . 15 % and approximately 70 % of the isolates from rats and mice respectively were able to hydrolyze gelatin and only 10 % of rats isolates and non from mice isolates were able to hydrolyze starch which disagree with Slotnick ( 5 ) who reported that *S.moniliformis* is able to hydrolyze starch but not gelatin . These variabilities

amongst isolates of the same batch of mice and rats are interesting and might indicate emergence of various biotypes or the lack of stability of these characteristics ( 16 ) . However , further characterization tests should be conducted to evaluate these results .

#### **Test of pathogenicity**

Healthy animal carriers of *S.moniliformis* do not play any apperent role in the transmission of the disease among themselves ( 18 ) . However , When these animal carriers were left in rabbit cages , a deep red indurated lesions were abserved at thighs ( the bite site ) of 10 out of 14 rabbits after 3 days from being left with animal carrier . Infected rabbits were unable to stand and remained recombent although they continued to eat and drink sparingly . Serum of the bitten rabbits was checked for the presence of *S.moniliformis* by slide agglutination test ( 12 ) . All the infected rabbits have demonstrated the *Streptobacillus* agglutinins in high titer . In addition , *S.moniliformis* was successfully isolated by routin blood culture ( 1,19 ) . Few days later , regional lymph nodes swell were observed which become tender and painful . A measles like rash were eventually covered all the body and the ten rabbits died within 10 days .

A comparable result was reported by Savage *et. al.* ( 18 ) who inoculated 10 mice with 105 organisms intravenously , and eight died within 14 days .

Although rat – bite fever is not a reportable disease but reporters from Canada ( 15 ) have described nine cases of *Streptobacillus* Rat Bite Fever ( SRBF) in technicians and physicians after bites by laboratory rats . Furthermore , three cases have been traced to bites by laboratory rats in a single institution within a six month period ( 10 ) making this disease an important consideration in febrile illness among laboratory workers .

Table 1 : Incidence of bacterial groups recovered from the conjunctiva of laboratory rats and mice

Bacterial Group	Rats		Mice	
	n ( 30 )	% recovery	n ( 10 )	% recovery
Gram positive cocci ( Staphylococci , Streptococci , Diplococci )	21	70	7	70
Gram positive Diphtheroides	2	7	-	-
<i>Streptobacillus moniliformis</i>	20	60	6	60
<i>Neisseria</i>	3	10	1	10
<i>Pseudomonase</i>	3	10	-	-
Gram positive Bacilli	12	40	-	-
Yeasts	-	-	2	20

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#### تردد الجرثومة *Streptobacillus moniliformis* في الجرذان والفئران المختبرية

هديل توفيق الحديثي

قسم علوم الحياة ، كلية العلوم ، جامعة البصرة ، البصرة ، العراق

#### الخلاصة

فحصت عينات من ملتحمه ثلاثون جرذاً وعشرة فئران مختبرية لدراسة وجود جرثومة *Streptobacillus moniliformis* الموجوده طبيعياً فيهما ولكنها تسبب مرض حمى عضة الجرذ عند الانسان . وجد ان 70 % من كلا الجرذان والفئران حامله لهذه الجرثومة مما يؤكد ان هذه الحيوانات المختبرية تعتبر مصدراً محتملاً لنقل المرض للانسان . وعند اجراء عددا من الفحوصات الكيموحيوية امكن الكشف عن وجود انماط حيويه ولذلك اهميته البالغه في تتبع الحالات الوبائيه . اجري اختبار الامراضيه على الارانب .

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