

# The pattern of sensitivity of a *Dermatophilus congolensis* (*D. congolensis*) strain to various antibiotics *in vitro*, in Nigeria

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## RÉSUMÉ

### Sensibilité *in vitro* d'une souche de *Dermatophilus congolensis* (*D. congolensis*) à divers antibiotiques, au Nigeria

L'auteur a étudié la sensibilité *in vitro* d'une souche de *Dermatophilus congolensis* (*D. congolensis*) à divers antibiotiques. Les résultats montrent que cet organisme est sensible aux antibiotiques à large spectre tel la tétracycline, oxytétracycline et la bacitracine, suivis par les antibiotiques du groupe des néomycines alors que la majorité des sulphonamides n'ont donné aucun résultat.

Il y a là une solide indication pour que l'utilisation *in vivo* des antibiotiques à large spectre puisse donner des résultats positifs dans la lutte contre la dermatophilose.

Ces résultats étaient ceux récemment publiés par Iemobade qui constate que l'oxytétracycline est effective en une seule injection contre la dermatophilose généralisée tant du fait de son activité propre que de l'action prolongée de ce médicament.

## INTRODUCTION

Cutaneous streptothricosis is an economically important disease of cattle and other ungulates characterised by an acute or chronic, local or progressive and sometimes fatal exudative dermatitis. The disease is prevalent across West Africa where it causes serious losses through hide damage, impaired growth, lowered production, increased culling and death due to general debility and toxæmia. The causative organism is a bacterium *Dermatophilus congolensis* in the group of Actinomycetes. In Nigeria, various strains of *D. congolensis* have been identified by MACADAM (4) to affect cattle and these have been shown to be antigenically and serologically homogenous (6).

Because of the constraint of this infection on animal production, various studies are in progress to understand the pathology, pathogenesis, the biology of the infective agent, as well as its chemotherapy and chemoprophylaxis.

This paper records the sensitivity of the organism, *D. congolensis*, to various antibiotics, *in vitro*.

## MATERIALS AND METHODS

Scabs from lesions in 14 infected cattle at Kawo cattle farm, Kaduna, were removed with forceps and put into sterile universal bottles.

The scabs were ground into a fine suspension with about 0.5 ml of sterile distilled water,

from which thin smears were prepared, stained by Gram and examined microscopically. The organisms were cultured for 48 hrs on blood agar under CO<sub>2</sub> enriched atmosphere. Mixed cultures of the organisms were subcultured again on blood agar for re-isolation from the contaminants and discrete colonies were subcultured twice to obtain a pure culture of the organisms.

A loopful of the *D. congolensis* organisms from the pure cultures was added to 4 ml of Tryptose Soya Broth (TSB) and incubated for 24 hrs and later uniformly poured into the blood agar plates. The plates were inverted to dry for 15 min. Different concentrations of oxid sensitivity discs shown in table I were then placed on the agar plates and incubated at 37 °C for 48 hrs in CO<sub>2</sub> enriched atmosphere. The plates were later examined and zones of inhibition measured in millimetres using a pair of callipers.

## RESULTS

The results are shown in table 1. The various antibiotics either completely inhibited the growth of *D. congolensis* organisms or had no effect *in vitro*, as judged by the presence or absence of zones of inhibition on solid media.

The most active antibiotics were tetracycline, oxytetracycline and bacitracin, i.e. according to the diameter of the zone of inhibition. Neomycin, streptomycin, chloramphenicol, fusidic acid, lincomycin, penicillin G, ampicillin and nitrofurantoin were also moderately active. Sulfamethoxazole/trimethoprim, erythromycin and chlortetracycline were slightly active while methicillin, novobiocin, nalidixic acid, furazolidone, compound sulphonamides, colistin sulphate and sulphadiazine were inactive or resistant.

TABLE 1-Multodisk <sup>(R)</sup> Sensitivity Test for *D. congolensis*

Disc. N°	Antibiotic symbol	Antibiotic Agent	Concentration (µg)	Diameter of zone of inhibition in mm	Sensitive (S) Resistance (R)
1	TE	Tetracycline	50	26 mm	S
2	OT	Oxytetracycline	50	24 mm	S
3	B	Bacitracin	5	24 mm	S
4	N	Neomycin	30	20 mm	S
5	S	Streptomycin	25	20 mm	S
6	C	Chloramphenicol	10	20 mm	S
7	FD	Fusidic acid	10	19 mm	S
8	MY	Lincomycin	2	19 mm	S
9	P	Penicillin G	2	18.5 mm	S
10	PM	Ampicillin	2	18 mm	S
11	F	Nitrofurantoin	200	17 mm	S
12	SXT	Sulfamethozadole Trimethoprim (Co-trimoxazole)	25	15 mm	S
13	E	Erythromycin	50	14 mm	S
14	CH	Chlortetracycline	5	12.5 mm	S
15	CB	Methicillin	10	Nozone	R
16	NV	Novobiocin	5	"	R
17	Na	Nalidixicacid	30	"	R
18	FR	Furazolidone	10	"	R
19	S <sub>3</sub>	Compound Sulphonamides	300	"	R
20	CT	Colistin Sulphate	10	"	R
21	SD	Sulphadiazine	50	"	R

Multodisk <sup>(R)</sup> Nos. 1788E 3866E (Oxoid Limited, England).

## DISCUSSION

Different investigators that had studied the sensitivity of *D. congolensis* to antibiotics have obtained variable results. PLOWRIGHT (7) found that *D. congolensis* was very sensitive *in vitro* to many antibiotics such as aureomycin, chloramphenicol, penicillin, streptomycin and terramycin, in that order, while BALABANOV (2) showed that the penicillins were the most active *in vitro* although their activity *in vivo* was limited. This latter finding is contrary to that of the current study where the penicillins were only moderately active while the most active to *D. congolensis in vitro*, on the basis of the diameter of the zone of inhibition, were the tetracyclines and bacitracin.

The results of ABU-SAMRA (1) were similar to ours, except that they observed that *D. congolensis* is not sensitive to bacitracin. This difference may be explained by the fact that they used a concentration of 0.1 µg while a concentration of 5.0 µg was used by us. The sensitivity of *D. congolensis* to bacitracin in this study is consistent with our earlier suggestion (5) that the *Bacillus* species found to be preponderant on the skin of the N'Dama may be related to *Bacillus subtilis*, which is known to produce the antibiotic bacitracin and that this agent probably inhibits *D. congolensis* organisms and therefore aid in explaining the resistance of the N'Dama cattle to dermatophilosis infection.

The observations of VANBREUSEGHEM (9) that erythromycin was the most active anti-

biotic even at a concentration of 2 µg and those of ROBERTS (8) reporting the organism to be most sensitive to streptomycin (even at low levels) and neomycin are at variance with our reported findings even when they were used at higher concentrations.

The differences in the sensitivity of *D. congolensis* to various antibiotics may probably be related to strain variations of the organisms causing the infection in various locations.

Thus, although the effects of these antibiotics *in vivo* were not determined in the present study, there is a strong indication from the results that the broad-spectrum antibiotics could be the effective cure of the dermatophilosis due to the various strains of *D. congolensis* identified by MACADAM and ODUYE (4, 6) to be causing the infection in cattle in Nigeria. If this is so, then our *in vitro* result strengthens the recent finding of ILEMOBADE (3) who tested a Pfizer preparation, Terramycin/LA in cattle *in vivo* and observed that it was highly effected in a single dose against generalized cutaneous dermatophilosis.

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## SUMMARY

Dermatophilosis infection, an economically important skin disease of cattle and other ungulates caused by a bacterial organism *D. congolensis* is very prevalent across West Africa and attempts at effective treatment and control by various investigators are continuing.

The present study was undertaken to test the *in vitro* sensitivity of cultures of the organism to a variety of antibiotics.

The results showed that the organism was most sensitive to the broadspectrum antibiotics (tetracycline, oxtetracycline and bacitracin). These were followed by the neomycin-nitrofurantoin group while majority of the sulphonamide group were refractory.

There is a strong indication from these results that the broadspectrum antibiotics could be the effective cure of the infection in the country. The results strengthen the recent observations of ILEMOBADE (3) that a long-acting oxy-tetracycline (\*\*\*\*) is effective in a single dose against generalized dermatophilosis infection.

(\*\*\*\*) Terramycin (Pfizer Nigeria limited).

## RESUMEN

Sensibilidad *in vitro* de una cepa de *Dermatophilus congolensis* para con varios antibióticos, in Nigeria

El autor estudió la sensibilidad *in vitro* de una cepa de *Dermatophilus congolensis* para con varios antibióticos.

Los resultados muestran que este germen reacciona con los antibióticos de amplio espectro tal como la tetraciclina, la oxitetraciclina y la bacitracina, seguidos por los antibióticos del grupo de las neomicinas mientras que la mayor parte de los sulfonamidos no dieron ningún resultado; lo que indica que la utilización *in vivo* de los antibióticos de amplio espectro podría dar resultados positivos en la lucha contra la dermatofilia.

Dichos resultados apoyan los recientemente publicados por Ilemobade que constata que una sola inyección de oxitetraciclina es eficaz contra la dermatofilia generalizada a causa de su acción prolongada.

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