تأثير بعض المطهرات شائعة الاستعمال على نووعين من الفطريات الجلدية

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الملخص

لدراسة التأثير المميت لبعض المطهرات المتوا فرة فى الأسواق المصرية تم اختيار عترتين من فطرى الترايكوفايتون فيتاجروفايت والميكروسيوردم جيسيوم . ولقد وجد أن المطهرات العضوية أقوى فى تأثيرها على الفطريات عن المطهرات غير العضوية حتى مع التركيزات العالية . كما وجد أن مقاومة المنتاجروفايت للتأثير المميت للمطهرات المختلفة كانت أعلى منها عن الجبسيوم .

وقد ثبت أن الباروبزول يمثل مطهر فعال لتطهير حظائر الحيوانات كما يمكن خلط روث ومخلفات الحيوانات قبل التخلص منها بكميات كبيرة من الجير المطفأ المحضر حديثا بتركيز ٢٠٪ .

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FUNGICIDAL ACTION OF SOME COMMON DISINFECTANTS ON TWO DERMATOPHYTES (T. MENTAGROPHYTES & M. GYPSEUM)

(with 2 Tables)

BY

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SUMMARY

To find out the actual fungicidal value of some disinfectants available on the Egyptian market, tow strains (Trichophyton mentagrophytes and Microsporum gypseum) were selected to perform this study. It has been found that the organic disinfectants showed an effective fungicidal action,when compared with inorganic compounds even at higher concentrations. Moreover, the resistance of Trichophton species to the lethal effect of different distinfectants was found to be higher than that of Microsporum.

Bardisol (Nile Co) which is a phenolic compound in a 0.5% solu tion was found to be an excellent fungicides for disinfection practice incide animal enclosures. However, a 20% freshly prepared suspen sion of slaked lime (milk of lime) may be mixed with the manure, bedding and other waste materials in liberal quantitites before their disposal.

INTRODUCTION

Over a preiod of many years, disinfection was the subjecte of extensive studies. There is an abundance of literature reporting the testing of commonly used antisepetic compounds against the different types of bacteria. Many phenolic compounds and surface active agents show only effectiveness in test procedures designed more to evaluate bactericides than fungicides.

Trichophyton and Microsporum species as causative agents of diseases are widely distributed in nature. The soil is consisered as the most important reservoir (AJELLO *et al.*, 1965; AKD-ELKARIM, 1968 and ABOU-GABEL and ABD ELRAHEIM, 1973).

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M. gypseum was incriminated in mycotic infections of rabbits(DVORAK and OTCENASEK, 1964); in dogs (FISHMAN *et al.*, 1966); in horses (PEPTIN and AUSTWICK, 1968); and in cattle (GUPTA *et al.*, 1970).

T. mentagrophytes was recorded to be the aetiologic agent in many cases of fungal infections in man and animals. GEORGE *et al.* (1957) isolated this species from dogs; SHARAFOV (1962) from sheep; COTTELLAR and CHRISTIANE (1967) from horses; PEPTIN and AUSTWICK (1968) from goats; MANTOVANI and MORGANIT (1971) from cattle and by EVOLCEANU and ALTERAS(1971)from rabbits. In Egypt,ABD ELNOOR recorded the isolation of T. mentagrophytes form mycotic affections in man and cattle.

Phenol and its derivatives have been suggested for the control of dermatophytosis. WOODWARD *et al.* (1933) found that halogination of phenolic compounds leads to a potentiation of their antifungal effectiveness. WEIRICH and POKORNY (1942) recommended cresol as an antimycotic agaent.

A proposed method for testing fungicides against Trichophyton was described by EMMONS (1945). He found that a 1.5% dilution of phenol destroyed the fungus within 10 minutes at 20° C. KLARMANN and WRIGHT (1954) stated that a 2% of phenol was required to destroy Trichophyton in 10 minutes.

LAWRNECE (1950) reported that 1 : 500 aqueous quaternary ammonium compounds were staisfactory fungicides within 5 minutes. SPAULDING (1961) stated that a strong aqueous solution of formaline (3-8%) and cresol soap mixtrues (1-3%) showed satisfactory fungicidal effect.

Bleaching powder in 0.5-1% solution was found by LLYMELYN and CLIFFORS (1966) to be a powerful but unstable compound.

Although some of the widely used disinfestants were standerdized as excellent compounds against bacteria, however they may not be efficient against pathogenic fungi. The aim of this work is to test a number of disinfectant compounds commonly used in veterinary practice against some pathogenic fungi causing diseases among man and animals, to find out to what extent each disinfectant can be depended upon in the destruction of both bacteria and fungi contaminating animal enclosures.

MATERIAL AND METHODS

Fungal strains·

Identified isolates of Trichophyton mentagrophytes and Microsporum gypseum were provided by BACTERIOLOGY dept., Faculty of Medicine, Assiut Univeristy.

Test disinfectants:

I. *Organic compounds:*

1.—Anti-Germ (Pfizer): It combines two quatenary ammonium compounds and high isopropyl aclohol content. Its active ingredients are as follows:

n-allkyl (60% C_{16}, 30% C_{14}, 5% C_{12}, 5% C_{18}) Dimethyl benzyl ammonium chloride 25%

n-alkyl (50% C_{12}, 30% C_{14}, 17% C_{16}, 3% C_{18}) Dimethyl ethyl henzyl ammonium chloride 25%

Isopropyl alcohol 30%

Inert ingredients 20%

2.—Bardisol (Nile) : Its chemical fomula is 2-4 Dichloro, 3-5 Dimethyl phenol.

3.—Compound solution of cresol : It is a mixture of cresol with soap manufactured by jeyes Sanitary Compounds, London.

II. *Inorganic disinfectants:*

1.—Slaked lime (Calcium hydroxide):

Milk of lime was prepared by adding one part of freshly slaked lime to four parts of water (20%).

Lime wash was prepared by mixing thoroughly one part milk of lime with 9 aprts of water.

2.—Washing soda (Sodium carbonate): It is used mostly in the preparation stage before disinfection.

3.—Bleaching powder (Calcium hypochlorite) Judex, Lab. reagent, England): It is a commercial compound contains about 30% available chlorine.

4.—Chloramine: Its chemical name is sodium p-toluene sulfonchloramide. It yields about 25% avialable chlorine.

The fungicidal effect of each disinfectant against each of the previously mentioned fungal strains was studied in vitro as follows:

1.—The disinfectant was thoroughly mixed, then different dilutions from 0.1 % up to 10% were prepared, except slaked lime from which only two dilutions (2 and 20%) and from 30% up to 35% dilutions of formaline were prepared using distilled water.

2.—To 5 ml of each dilution in stoppered sterile test tubes, 3 loopfuls from Sabauroud agar culture of the respestive fungus were added and mixed thoroughly.

3.—At intervals of 15 minutes up to 3 hours, a loopful from each suspension was streaked on Sabauroud agar plate.

4.—The plates were incubated at 37°C for 48 hours, after which those plates showed any evidence of growth were reocrded, while the plates in which no growth occured, were re-incubated for three more days at 37°C.

5.—As control, tubes containing fungal suspensions in sterile distilled water were similarly treated.

6.—During the test, the inoculated tubes were held at room temperature (23- 25°C).

7.—The time at which the organism died was recorded from the plates showed no evidence of growth.

RESULTS AND DISCUSSION

Various compounds of known disinfecting value have been used in this study in order to evaluate their effectiveness as agents in the control of mycotic infections among animals. The data presented in Table 1 show that Bardisol (Nile Co.) which is a phenolic compound was much more satisfactory for control measures than any other disinfectant employed, since a minimal concentraction of 0.5% in water at room temperature (23 + 2°C) killed T. mentagrophytes within 30 minutes, while 0.2% could destory M. gypesum within 15 minutes. These results support the work of WOODWARD *et al.* (1933 and 1943), EMMONS (1945) and KLAMRANN and WRIGHT (1954).

However, a relatively higher concentrations of compound solution of cresol required for disinfestion purposes, since a 1% solution of cresol was found to be necessary for the destruction of T. mentagrophytes and M. gypseum after 45 and 30 minutes respectively (Table one). These results agree with those found by WEIRICH and POKORNY (1942) and SPAUDLING (1961).

Anti-Germ 50 (Pfizer), which is a quaternary ammonium compound in a concentration of 1% could destroy T. mentagrophytes within 2½ hours, however at this concentration Anti-Germ 50 was efficient against M. gypseum after only 60 minutes. These data are condsidered higher than those previously reported by LAWRENCE (1950) in respest to quanternary ammonium compounds.

T. mentagriphytes could resist the germicidal action of 3% formaline up to 90 minutes, but destroyed after 2 hours, while M. gypseum was destroyed after only 30 minutes exposure. to this concentration of formaline. These results tend to agree with those obtained by SPAUDLING (1961). The best organic disinfestants against most micro organisms was recommended by ISMAIL (1967) to be formaline 3% and compound solution of cresol in 2 % dilution that could be appiled with safety to effect disinfection of all parts of the stable.

TABLE 1. Minimal lethal dilution of organic disinfectants on Trichophyton and Microsporum species

Disinfectant	T.mentagrophytes		M.gypseum	
	Dilution%	Time/min.	Dilution%	Time/min
Compound solution of cresol	1.0	45	1.0	30
Bardisol (Nile)	0.5	30	0.2	15
Anti Germ 50 (Pfizer)+	1.0	150	1.0	60
Formaline	3.0	120	3.0	30

TABLE 2. The effect of inorganic compounds on Trichophyton and Microsporum species

Disinfectants	T. mentagrophytes		M. gypseum	
	Dilution %	Time/min.	Dilution %	Time/min
Bleaching powder . . .	9	60	9	45
Sodium carbonate . . .	10	NE	10	NE
Chloramine	9	45	3	30
Slaked lime				
Milk of lime . . .	20	90	20	60
Lime wash	2	NE	2	NE

NE = Non - effective up to 3 hoursexposure.

On the other hand, the fungicidal action of inorganic compounds was generally found to be much weaker + han that of organic disinfectants (Table 2). Both bleaching powder and chloramine in higher concentrations (9%) could only destroy T. mentagrophytes after 60 and 45 minutes respectively. However, this concentration of bleaching powder was effective against M.

gypseum after 45 minutes, while a 3% solution of chloramine could destroy this fungus after 30 minutes. However, these chlorinated lime compound-were found by LLYWELYN and CLIFFORD (1966) to be unstable, destructive to colours and chlorine odour might be taken up by milk when used in dairy stables.

Freshly prepared suspension of 20% slaked lime (milk of lime) needed 90 and 60 minutes for destroying T. mentagrophytes and M. gypseum respectively. However, a 2% suspension (lime wash) failed to give any suggestive response to the destruction of fungi which, could not be taken as of practical value in control measures. However, ISMAIL (1967) concluded that compining disinfectants with lime wash will assure much benefit in the control practice, while the best disinfectant for bedding and earth floor was found to be milk of lime.

Sodium carbonate (washing soda) was found to be practically devoid of any fungicidal activity against both strains, since a 10% solution could not destroy the organismms till 3 hours exposure.

Therefore, from the results obtained it can be concluded that:

1.—The resistance of Trichophyton species to the lethal effect of different disinfectants was found to be higher than that of Microsporum.

2.—When choosing a disinfestant for use as both fungicide and bactericide in the stable, it is advisable to use compounds of organic origin (phenolic derivativs or emulsified coal tar disinfestants) that could be sprayed to effect disinfection of all parts of the stable. Moreover, the fungi may contaminate the yards or litter which allow the pathogens to survive saprophytically in the absence of animals. Milk of lime may be mixed with the manure or other waste materials in liberal quantities and allowed to remain in contanct with these discharges before their disposal.

Therefore, it is recommended that the control of mycotic infections among domestic animals should be based on the clearing of all litter, during, bedding and other waste materials from housing and yard before use, and thoroughly cleaned, preferably finishing by scrubbing walls, floors and fittings with a detergent and then sprayed with the disinfectant.

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