

Treatment of Pityriasis versicolor by 2% solution of Copper sulfate

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Abstract

Pityriasis or Tinea versicolor is a skin fungal infection caused by a yeast type of skin fungus called *Pityrosporum orbiculare* . Mineral solution which is prepared from dissolution of copper sulfate powder in distil water in two concentration (1%,2%) is used in treatment of forty patients infected by pityriasis versicolor applied twice daily on infected site.

Statistical analysis reveals the presence of significant correlation ($p < 0.05$) in time of clearance of the lesion between the treated group by 2% concentration and control group which is treated by 1% clotrimazole were be 12 and 45 days respectively.

The rate of cure was be 100% in all treated person who are completes the period of treatment by our preparation but in different periods.

Keyword: copper sulphate, tinea versicolor.

علاج داء السعفة المبرقشة Pityriasis versicolor باستخدام محلول 2% كبريتات النحاس

غسان حمدان جميل , واثق محمد حسين الشمري , رفاه عدي حسين , حيدر عبدالحافظ كرجي

الخلاصة

يعد داء السعفة المبرقشة Pityriasis versicolor من الأمراض الجلدية الفطرية الذي يتسبب بأحد أنواع الفطور الجلدية الذي يسمى *Pityrosporum orbiculare*.

تم استخدام المحلول المعدني المحضر من اذابة مسحوق كبريتات النحاس Copper Sulfate بالماء المقطر بالتركيزين (1%,2%) في علاج ستون شخصا أصيبوا بداء السعفة المبرقشة Pityriasis versicolor وذلك بمسح الأفة المرضية مرتين باليوم.

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أظهر التحليل الإحصائي للنتائج وجود ارتباط معنوي ($p < 0.05$) بالفترة الزمنية لشفاء الآفة المرضية بين مجموعة العلاج بالتركيز 2% ومجموعة السيطرة المعالجة بمحلول 1% Clotrimazole إذ بلغت 12 و 45 يوم على التوالي. بلغت نسبة الشفاء 100% لكافة الأشخاص اللذين أكملوا فترة العلاج باستخدام مستحضراتنا وبفترات زمنية مختلفة.

الكلمات المفتاحية : كبريتات النحاس ، داء السعفة المبرقشة.

Introduction

Pityriasis versicolor is caused by a yeast type of skin fungus called *Pityrosporum orbiculare* and species which is a normal skin flora prefer humid . It starts to grow on the skin surface results in changing of skin color appears as lightly reddish brown on white skin . This is most often seen on the neck , upper chest , upper arms and back. The infection produced no symptoms but some patients get itching especially with sweating (Hunter *et al.*,2002 ; AOCD,2009) .The diagnosis can be confirmed by microscopic examination of skin scraping with 10% KOH .The infection is treated with either topical or systemic medication such as 2.5% Selenium sulphide in detergents bases (selsun shampoo) in topical use imidazole preparation . Wide spread infections are best treated with short courses of Itraconazole at 200mg/ day for 7 days or Fluconazole (Weller *et al.*,2008). Copper sulfate (spelled "Copper Sulphate" in the UK) is the chemical compound with the formula $CuSO_4$. This salt exists as a series of compounds that differ in their degree of hydration. The anhydrous form is a pale green or gray-white powder, whereas the pentahydrate ($CuSO_4 \cdot 5H_2O$), the most commonly encountered salt, is bright blue. Copper has been used as a biocide for centuries [Block,2001]. In ancient Egypt (2000 BC), copper was used to sterilize water and wounds. The ancient Greeks in the time of Hippocrates(400 BC) prescribed copper for pulmonary diseases and for purifying drinking water.

The fungicidal properties of copper were demonstrated in controlled laboratory studies starting in the early 1950s. Copper and copper compounds have been shown to effectively kill a wide range of yeast and fungi such as *Aspergillus niger* (Zhao *et al.*,1998); *Aspergillus carbonarius* (Hubacher *et al.*,2001); *Candida albicans* (Foley,2003); *Aspergillus fumigatus* *Cryptococcus neoformans* , *Epidermophyton floccosum* , *Microsporum canis*(Hostynek and

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Maibach,2003); *Saccharomyces cerevisiae* (Cooney,1995;Fuss et al.,2002); *Torulopsis pintolopesii* (Elanzowska et al.,1995); *Trichophyton mentagrophytes* (Zhao et al.,1998 ;Foley and Blackwell,2003). Thus, copper fungicides have become indispensable and many thousands of tons are used annually all over the world in agriculture (Cooney, 1999 ; Mulligan et al.,2003). For example, copper sulphate and copper hydroxide are employed for the control of downy mildew on grapes and green slime in farm ponds, rice fields, irrigation and drainage canals, rivers and lakes.

Study is designed to address approval efforts to treat pityriasis versicolor by CuSO_4 because of the effectiveness, history of safe use, and low cost of this compound, especially as compared with the approved antifungal agents.

Patient and methods

1-The solutions:

A- 1% copper sulfate solution is prepared by using 1gm of copper sulfate powder dissolved in 100 ml of Distill water.

B-2% copper sulfate solution is prepared by using 2 grams of copper sulfate powder dissolved in 100 ml of Distill water and , figure (1) reveals the solution.

2- The patients :

This study was conducted in dermatology clinic in Baquoba city during period between June 2010 to June 2011 .Sixty patients were examined (30 male and 30 females) ,with age range from (15- 50)years, full history was taken from each patients regarding the duration of the disease, proven treatment and ensured that every patient had stopped any treatment at least one month before starting the present therapy .The patients were divided in to 3 groups:-

Group A :- include 20 patients represent the treatment group ,they advised to use 1% copper sulfate solution twice daily for 30 days .

Group B :- include 20 patients represent the treatment group ,they advised to use 2% copper sulfate solution twice daily for 30 days.

Group C:- represent the control group which includes 20 patients, were advised to use the control treatment 1% Clotrimazole solution twice daily for 2 month .

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**Figure-1: Show the copper sulfate solution.****Statistical analysis**

The differences are compared by using (F-Test) at $p < 0.05$ (Zar,1984).

Results

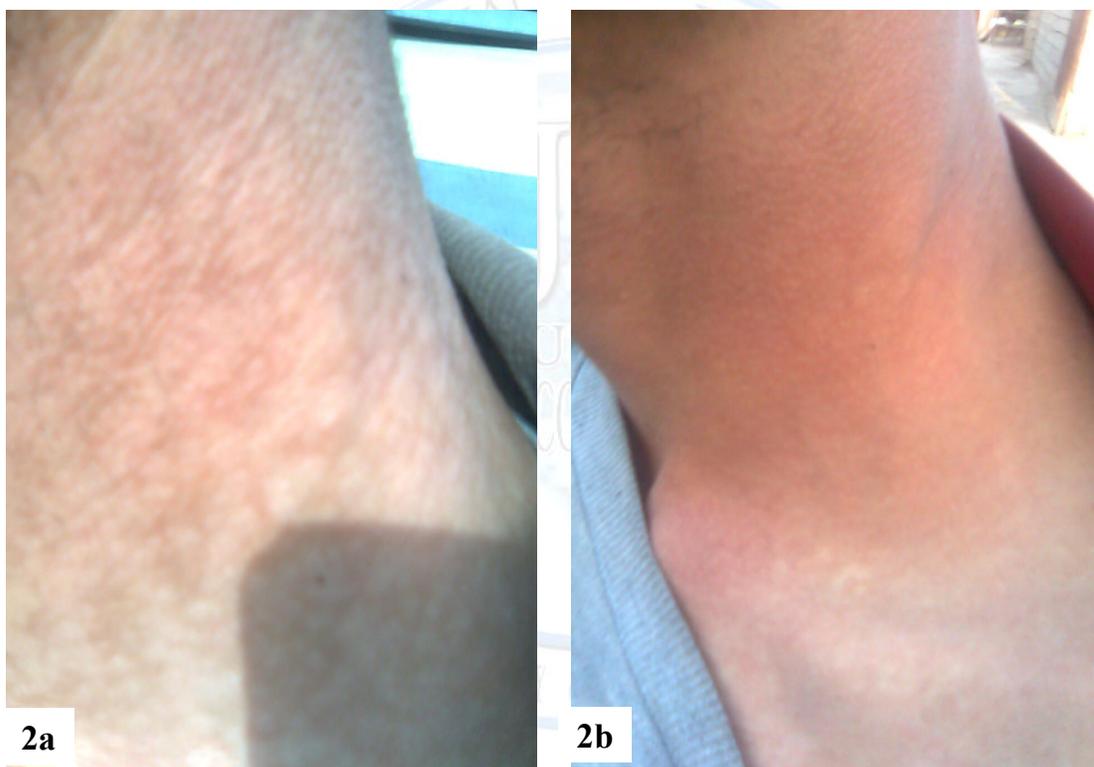
In group A ; 15 patients completed the treatment courses, but 5 patients considered as a defaulter for un known reasons. While group B contains 18 patients completed the course of treatment and 2 patients are dropped. While the control group which is contains 20 patients; 14 patients from them are completes the treatment but 6 are dropped for unknown reason. The Table -1 is revealed the effect of our treatment in group A; also shown the completed clearance of lesion in a period about 33 days, and show the time of clearance of group B which is about 12 days. And the table -1 also reveals the time of clearance of the lesion in control group was about 45 days .The differences between clearance time of treatment groups and control group was statistically significant ($p < 0.05$). The patients in group A and B show minimal side effect such as slightly irritation and this results was be sure by figure -2(a,b)and figure-3(a,b) which are represents the untreated and treated patient respectively .

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Table- 1 :Groups of patients included in this study and the clearance time.

Patients	No.	Treatment	Period of clearance
group A -20	15	1% Copper sulfate	33 days
group B -20	18	2% Copper sulfate*	12 days*
Control group-20	14	1%Clotrimazole	45 days

 $(P < 0.05)$ ***Figure -2a:-** represent untreated patient in white patches .**Figure -2b:-** represent clearance of the lesion after the treatment by the mineral solution.

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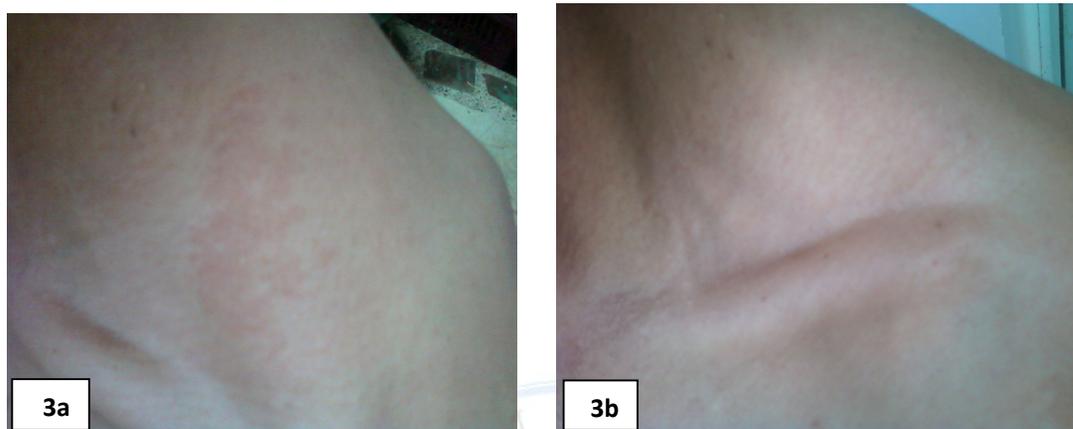


Figure -3a:- represent untreated patient in red patches .

Figure -3b:- represent clearance of the lesion after the treatment by the mineral solution.

Discussion

The medication which was used in this study when compared with other studies using other therapeutics is cheap , available ,easy in preparation and usage . Also it is safe when given to a healthy lactating mothers at a dose 2mg daily as a dietary supplement ,and no adverse effects were be seen (Rock,2000). The copper ,also have another using in cosmetics when mixed with zinc malonate in 0.1% concentration to treat the face wrinkling especially in aging women and giving good results (Ramirez and Faryniarz , 2007) . It has been found that copper impregnated socks may be useful in preventing and treating tinea pedis (Borkow and Gabbay ,2004). Copper and copper compounds have been shown to effectively kill a wide range of yeast and fungi such as *Aspergillus niger* (Zhao *etal.*,1998); *Aspergillus carbonarius* (Hubacher *etal.*,2001); *Aspergillus fumigatus* (Hostynek and Maibach,2003);; *Candida albicans* (Foley,2003); *Cryptococcus neoformans* , *Epidermophyton floccosum* , *Microsporium canis* (Hostynek and Maibach,2003); *Saccharomyces cerevisiae* (Fuss *etal.*,2002; Cooney,1995); *Torulopsis pintolopesii* (Elanzowska *etal.*,1995); *Trichophyton mentagrophytes* (Zhao *etal.*,1998 ;Foley and Blackwell,2003) and *Trichophyton rubrum* (Hostynek and Maibach,2003; Foley,2003).

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Also Mulligan *et al.*, (2003) are using copper sulfate in swimming pools. Copper -8-quinolinolate and some of its derivatives has been shown to be fungicidal to *Aspergillus* spp. at concentration 0.4 mg /ml (Gershon *et al.*, 1989). Also copper -8-quinolinolate has been used to reduce environmental contamination of fungi in hospitals (Weber and Rutala , 2001).

Copper sulfate is not only used in treatment of fungi ,also can be used to improve the safety of food products in low dose because it has antibacterial activity against *Salmonella* and *Escherichia coli* (Ibrahim *et al.*, 2008) , and this using reflect the efficacy of copper sulfate in treatment of contaminated skin diseases .

Copper also displays potent anti-viral activity. Constant exposure to high copper concentration is toxic to microorganisms .In contrast to the antibiotic and other drug-resistant microorganisms that have evolved in less than 50 years of use, resistant microorganisms to copper are extremely rare even though copper has been a part of the earth for millions of years . This resistance may be explained by capacity of copper to damage many key factors in microorganisms in parallel (Elzanowska *et al.*, 1995).

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