

**Comparative Treatment of Scaly Face (Mange) Mites in Budgerigars  
(*Melopsittacus undulatus*) by ointment prepared from *Calvatia craniiformis***

**mushroom powder with Promectine**

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**Abstract**

In this study, thirty Budgerigars (*Melopsittacus undulatus*) with *Knemidocoptes pilae* infection were treated with three ointments in different concentrations prepared from *Calvatia craniiformis* mushroom in comparison with common antiparasitic drug promectine locally. Each concentration (0.12.5, 0. 25 and 0.5)% was applied to 5 Budgerigars from the first group each 72 hours at 12 days intervals. Also the promectine was injected subcutaneously twice to 15 Budgerigars(second group) at 12 intervals. Clinical signs in all birds of both groups disappeared at 13-35 days after treatment. The 0.5% was significantly different at ( $p < 0.05$ ) from other concentrations when compared with promectine. No side effects were seen.

**Key Words:** *knemidocoptes pilae*, Scaly face mite, *Calvatia craniiformis*, promectine.

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مقارنة علاج حلم الوجه القشري (الجرب) في طيور الحب *Melopsittacus undulatus*  
بالمزهر المحضر من مسحوق الفطر *Calvatia craniiformis* و promectin

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فرع الأحياء المجهرية - كلية الطب البيطري - جامعة ديالى - العراق

الخلاصة

عولج ثلاثون طير حب Budgerigars من النوع *Melopsittacus undulatus* في هذه الدراسة كانت مصابة بالنوع *Knemidocoptes pilae* المسبب للجرب بثلاثة تراكيز تم تحضيرها من الفطر *Calvatia craniiformis* موضعياً بالمقارنة مع عقار البرومكتين promectin الشائع استخدامه في علاج الطفيليات. أضيف كل تركيز (0.5, 0.25, 0.125) % موضعياً لخمسة طيور من المجموعة الأولى كل 72 ساعة لفترة 12 يوم. كذلك أن طيور المجموعة الثانية البالغة 15 حقنت بالبرومكتين تحت الجلد مرتين خلال فترة 12 يوم. أختفت الأعراض السريرية من طيور كلا المجموعتين بعد إعطاء العلاج بفترة 13-35 يوم. كان التركيز 0.5% مختلف معنوياً ( $p < 0.05$ ) عن باقي التراكيز عند مقارنته مع البرومكتين. لم يلاحظ أي تأثيرات جانبية.

الكلمات المفتاحية: *knemidocoptes pilae*، حلم الوجه القشري، *Calvatia craniiformis*، البرومكتين

Introduction

Scaly face is a term used for an infestation of burrowing or scaly face mites (*Knemidocoptes pilae*) (Georgi and Georgi, 1991). *Knemidocoptes pilae* is responsible for scaly face mange in budgerigars (*Melopsittacus undulatus*) and causes proliferative, spongy like typical lesions on the cere, beak and around the eye (Hochleitner, 1992 ; Urquhart *et al*., 1987). It is recorded that *K. pilae* infection may remain latent for considerable time until stress occurs, such as chill or movement to a strange cage (Urquhart *et al*., 1987). This parasite has been reported from various countries including Turkey. The females of this mite species are round-shaped and measure about 0.4 millimetre x 0.3 millimetre. Like scaly leg mites, they are invisible to

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the naked eye (Tüzer *et al.*,1995). Unlike scaly leg mites, however, *Knemidocoptes pilae* affect not only the face but also the beak, the eyes, legs and the area around the vent. The mites apparently spend their entire life cycle on the host. The mites burrow and feed on keratin of the cornified epithelium and form pouch-like cavities. The method of transmission of the mite is not known, but prolonged contact appears to be necessary(Wade,2006). One theory on transmission of the mite suggests that they can be transmitted only in the nest to the featherless offspring. Another theory suggests that susceptibility is a genetically linked, immune related condition. Some investigators believe multiple predisposing factors are necessary for expression of the disease and that clinical disease may occur later in life, long after exposure. Cases have been documented where highly infected budgies did not transmit the disease to their cage mates, even after long exposure(Margaret, 2006). There are also reports where birds isolated for many years suddenly develop characteristic lesions. Burrowing mites are transmitted mainly in the nest box during feeding; i.e. during direct body contact from parents unto the chicks. A transmission between adult birds has also been observed, although this rarely happens. Thus special attention should be paid in pairs of birds and flocks if an infection with burrowing mites has occurred. A couple of years can pass between the time of infection and the appearance of first symptoms. In most cases, however, a mite infestation in a budgie occurs between its 6th and 12th month of life; thus often shortly after the bird has been bought(Georgi and Georgi ,1991).

Many treatments are described toward killing the mites as Benzyl benzoate, Dettol® , Ivermectin and Crotamiton( Gary and Beck,1993). Individual birds should be treated with oral or topical ivermectin , 10% sulphur solution , or 5% sodium fluoride( Allen *et al.*,2010). One should take precautions when treating scaly face lesions. Treatment of valuable birds should be done only under the direct supervision of a veterinarian as several of the drugs commonly used may cause irritation and damage to the eyes and may be toxic if ingested.

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This study aims to evaluate the efficiency of the ointment prepared from *Calvatia craniiformis* mushroom powder in treatment of scaly face (mange) mites in Budgerigars in topical using in comparison with common antiparasitic drug as Promectine 1% in subcutaneous injection.

**Materials and Methods**

**Identification of the parasite:**

Thirty budgerigars (*Melopsittacus undulatus*) weighing 35-40 gm and having lesions of various severity and evidence of itching were brought to my veterinary clinic between May 2015 and late June 2015. The sick birds divided to two groups, each group contain fifteen birds were treated with different substance. Skin scrapings were taken from the lesions and macerated in 10% KOH (Krantz, 1978). The identification of the parasite seen in the scrapings was based on its morphological peculiarities. According to the information gained from the owners and my observations, the infections had appeared in some cases in conjunction with dirty place, bad ventilation and crowdedness which are led to suppress birds immunity so, the figures(1,2) were reveals the crowdedness in the nests and dirty places.

**.Preparation of the medications:**

- a) Preparation of a topical ointment.** Fruiting body of *Calvatia craniiformis* mushroom is dried completely and crushed in sterile Petri dish to obtain a yellow-brown powder. By using a balance Weight, three weights (0.12.5, 0.25, and 0.5 gm) each one singly alone. Each weight is completed to 100 gm of Vaseline to reach (0.12.5% 0.25% and 0.5%) concentration. Five sick birds from the first group were treated by each concentration every 72 hours topically. The (figure 3-a) reveals the *Calvatia craniiformis* mushroom which discovered in Hibhib city and Bani saad city- Diyala province for first time in Iraq according to the diagnosis of laboratory of fungus researches and plant disease in the

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college of Agriculture- Baghdad university(Jameel *et al.*,2014). The figure(3-b) reveals the national diagnostic mushroom .

**b) Promectine or Ivermectin(DCI)** is manufactured in Invesa Group, Barcelona, Spain (Active constituent: 200µg / ml)with dose ( 1 ml \ 50 Kgs. B. wt.) was used. Three to four drops of ivermectin was injected subcutaneously in the neck(in the region behind the head ) equal to (6-8 µg) per bird ( it's weight 35-40 gm) calculated according to the weight of the birds. Drug was given twice to 15 birds at 11 days intervals. The evaluation of medications efficacy was based on clinical improvement. Spectacly, the birds were examined after treatment with 10 days intervals to evaluate the efficacy of the preparation.

#### **Statistical Analysis**

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

#### **Results**

Before treatment, the microscopic examination of skin scrapings confirmed the presence of *Knemidocoptes pilae* (Males and Female) which displayed in the figure (4). Clinical inspection showed that all the birds had itching and proliferative, spongy-like lesions of various severity. The lesion localized on cere and beak and around eyes and the figures (5a and 5b) were revealed the common infected areas in all treated groups and the figure of infected budgerigars takes from scientific sources respectively. The ointment applied on the affected areas to induce it's effect and the figures (6a and 6b) were represent the affected bird under treatment and the recovered respectively.

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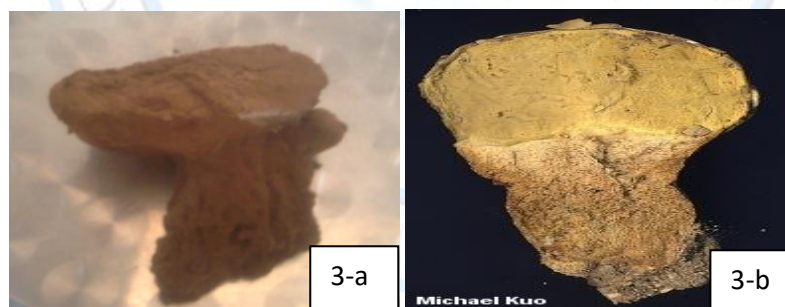
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**Figure-1: Reveals the crowdedness of the nests in infected cage by mites.**

**Figure-2: Reveals the accumulation of the feathers and feces in the cage.**

The mushroom used in this study is puffball mushroom, belongs to Basidiomycota division, Lycoperdaceae Family, *Calvatia* genus, *craniiformis* species figure (3-b) (Okuda and Fujiwara, 1982). *Calvatia craniiformis* mushroom is edible when it is young, firm and white in color (Boa , 2004). Perhaps the most frequently collected puffball in Kansas, southern and eastern north America(Baseia, 2003).



**Figure - 3a: represent the longitudinal section of the mushroom in the Iraq**

**3b : represent the longitudinal section of the mushroom nationally.**

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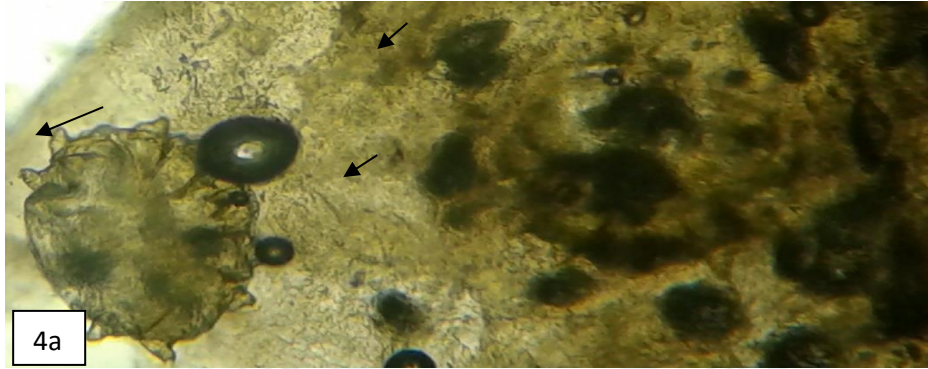


Figure-4a: Reveals the aggregation of causative agent *Knemidocoptes pilae*(Female and males).



Figure-4b: Reveals the ventral view of *Knemidocoptes pilae*(Female).



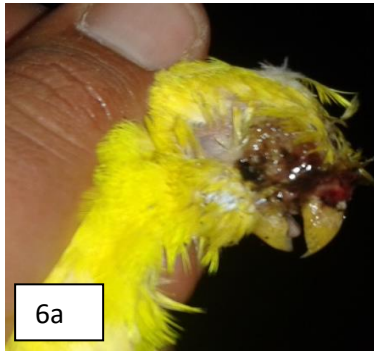
Figure-5a: Reveals the infected area by scaly face mange in my vet. clinic.

5b: Reveals the infected area by scaly face mange in scientific sources(BLI,2012).

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**Figure-6a: Show the application of the ointment onto the bird lesion.**

**6b: Revealed the recover bird treated by the ointment 0.5% after 13 days.**

The table (1) was revealed the two types of medications will be used in treatment of scaly face mange in Budgerigars and their numbers ,the time and the rate of clearance of the lesions .

<b>The kind of medications and the concentration</b>	<b>Number of treated birds</b>	<b>Time of clearance \ Days</b>	<b>Rate of the recovery\ %</b>
<b>12.5% <i>C. craniiformis</i> mushroom ointment</b>	<b>5</b>	<b>30-35</b>	<b>100</b>
<b>0.25% <i>C. craniiformis</i> mushroom ointment</b>	<b>5</b>	<b>17-23</b>	<b>100</b>
<b>0.5% <i>C. craniiformis</i> mushroom ointment</b>	<b>5</b>	<b>13-18*</b>	<b>100</b>
<b>1% Promectine</b>	<b>15</b>	<b>22-27</b>	<b>100</b>

(p <0.05)\*



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**Discussion**

After treatment, it was observed that there was difference between one and two applications of my preparations in all concentrations for treatment of this mange. The itching disappeared within 5 days after the treatment was started, while complete recovery of lesions took a period of 13- 30 days depending on the severity of the lesions and concentration of the ointment so, the table(1) was revealed the ointment concentrations and time of removal of the lesion scales till the feathers were appeared in comparison with promectine .The concentrations (0.5)% was gave significant differences at ( $p < 0.05$ ) in the time of recovery ranging from(13-18) days when compared with the effect of ivermectin which needs to (22-27) days started from stoppage of itching , scales degradation and feathers appearance had been shown in the figure(6). The medical analysis of the powder of mushroom proved the presence of three components; the first is calvatic acid which has chemical formation P-carboxyphenyl-azoxycarbonitrile (Okuda and Fujiwara,1982). This calvatic acid reveals strong action against the yeast and fungi like *Saccharomyces cerevisiae* and some *Candida* species and *Trichophyton asteroides* (Hamao *et al.*,1976) . The second components from chemical analysis and spectroscopic means of the mushroom powder is hydroxyphenylazoformamide derivatives which has three chemical compounds, 4-hydroxyphenyl-1azoforamid, 4-hydroxyphenyl-ONN-azoforamid and 2-methylsulfonyl-4-hydroxy-6-methylthiophenyl-1-azoforamid, it is known craniformin (phenolic tautomer of rubroflavin). The hydroxyphenylazoformamide derivatives or craniformin have phenolics in its formation which are endowed with interesting biological activities as abroad spectrum bactericidal and fungicidal effect represented by *Candida albicans*, *Aspergillus niger* (Takaishi *et al.*,1998). Also the chemical analysis of mushroom powder which is done in White Fields Company for Chemical and Engineering Studies and Consultations in Baghdad – Iraq proved the presence of different materials as gallic acid and ergothioneine and others. Gallic acid is a trihydroxybenzoic acid, a type of phenolic acid (Reynolds and Wilson,1991). The two analysis of the powder of the mushroom had been

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proved presence of phenolics. The mode of action of phenolics is protein coagulation. They destroy selective permeability of cell membranes and leakage of cell constituents results. They are effective against bacteria, fungi, and some viruses. When repeated and prolonged skin exposure may cause accumulation in tissue and eventual toxic effects, such as neurotoxicity (Wanamaker and Massey, 2004). This neurotoxicity lead to parasite paralysis status and fell down from the skin. The extract could be inter inside the body of the mites and left it effect by three ways; the first is through the spiracles that is found in the thorax and abdomen. The second is through the respiratory orifices and the third, is through the mouth parts (Hujazi, 2000). The bioactive materials extracted from the mushroom used to control mites simply by terminating their feeding process are classified as antifeedants (Danielson, 2006). Antifeedants are substances leading to temporary or permanent cessation of feeding when tasted by arthropods (Klocke *et al.*, 1989). Our study agree with Habeeb, (2010) who is refer to toxic effect of some plant extracts by their capability in reducing tick feeding, molting, fecundity and viability of eggs. Also agree with Ghosh *et al.* (2007) who refer to the activity of bioactive plant compounds such as phenolics, and alkaloids were known to possess insecticidal, growth inhibiting, antimolting, and repellent activities. Also agree with Georgi and Georgi (1991) which were refers to the usage of orthophenyl phenol in treatment of scaly face mange in Budgerigars. Ergothioneine (ET) which is an unusual sulfur-containing derivative of the amino acid, histidine. It may be represent a new vitamin whose physiologic roles include antioxidant cytoprotectant (Paul and Snyder, 2010). The synergistic effect of phenolics and ergothioneine really killed the mites and promote the growth of feathers from their pterylae and the figure(6) elicits this illustration. In this study, the efficacy of subcutaneous injection of the ivermectin in the neck of the infected birds by knemidocoptic mange was tested with one or two applications of this drug had been more effective than one application in a period ranging from (22-27) days. This study agreed with Tüzer *et al.*(1995) who was report the use of ivermectin intramuscularly, and Kummerfeld and Schafer-Nolte(1987) have been reported the use of ivermectin locally and spot-on be effective against this mange. Mallo(1990) was

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refer to the using of ivermectin mixed with a few drops of DMSO in treatment of this mange. Ivermectin binds with high affinity to glutamate-gated chloride channels which occur in invertebrate nerve and muscle cells, causing an increase in the permeability of the cell membrane to chloride ions with hyperpolarization of the nerve or muscle cell. Hyperpolarization results in paralysis and death of the parasite either directly or by causing the worms to starve (Gaytt *et al.*, 1997). In general, the plant extract is preferable than chemicals to treat scaly face (Mange) mite.

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