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ANALYTICAL, CLINICAL AND EPIDEMIOLOGICAL STUDY ON SOME SKIN DISEASES IN HORSE WITH TREATMENT TRIALS

(With 5 Tables and 4 Figures)

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دراسات تحليلية - إكلينيكية وبائية على بعض الأمراض الجلدية في الخيول مع محاولات علاجية

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أجريت هذه الدراسة بين يناير ١٩٩٩ ويناير ٢٠٠٠ على الخيول في نادي سموحة بالأسكندرية والتي تشتمل على ١٥٣ حصان ، حيث تم تحليل النتائج الوبائية والإكلينيكية مع مناقشة طرق العلاج المختلفة لبعض الأمراض الجلدية في الخيول. وجد أن ١٢ من الخيول (٧,٨%) كانت مصابة بالحساسية لحشرة الكيوليكويدز ، وكانت نسبة الإصابة أعلى في الخيول الإنجليزية عنها في العربية وبدأ ظهور معظم الحالات في فصل الصيف ، وكذلك زادت نسبة الإصابة في الخيول الأكبر سناً. وسجل مرض الجرب في ١٤ حيوان (٩,٢%) ولم يكن هناك أي تأثير للطقس أو السلالة أو العمر على نسبة حدوث المرض وكان جرب السوروبتك هو الأكثر إنتشاراً. ظهر مرض القراع في ٦ من الخيول (٣,٩%) ٥ منهم كانت أمهر صغيرة السن وحالة واحدة سجلت في فرس كبيرة السن. وتم تسجيل ٢٢ حالة (١٤,٤%) من مرض الأكزي بويل كلها كانت في الصيف والربيع. وقد تم عزل بكتريا الكورينيباكتيريوم أوفز والإستفيلو كوكاس أوريس من هذه الحالات . وبالفحص الميكروسكوبي للدم وجد أن هناك زيادة معنوية في عدد الإزينوفيل في حالات الجرب والحساسية ضد حشرة الكيلوليكويدز. كما وجد نقص في البروتين والألبيومين في حالات الإصابة بالجرب بينما وجد زيادة معنوية في الجلوبيولين في حالات الإصابة بالأكزي بويل.

SUMMARY

A study was carried out between January 1999 and January 2000 on some skin diseases in horses belonging to Smouha club, Alexandria Governorate contained information on 153 horses. The results of the epidemiological survey were recorded, the main clinical signs observed are described and the various therapeutic approaches and control

methods are analyzed. The study showed that 12 horses (7.8%) were affected with sweet itch (culicoides hypersensitivity) with higher incidence rate in English than in Arabic breeds. The number of horses affected with sweet itch rose with increasing age. Mange was recorded in 14 horses (9.2%) of all horses included in this study. No breed, season or age difference was observed in the occurrence of mange in horses. Psoroptic mange was the most common cause of mange in horses' (7) cases. Ringworm was recorded in 6 horses (3.9%), five of them were young foals and one case was observed in 13 years old mare. Acne-boil was recorded in 22 horses (14.4%); all of them were in summer and spring. Bacterial isolates were identified from the lesions. 41 bacterial isolates were identified where *Corynebacterium ovis (pseudotuberculosis)* was the most common isolate (19) followed by *Staphylococcus aureus* (5 isolates). Microscopic examination was done for total and differential leukocytic count. Eosinophilia was observed in sweet itch and mange infestation. Biochemical serum analysis for total protein, albumin, globulin and A/G ratio revealed hypoproteinemia and hypoalbuminaemia in case of mange. Significant increase in globulin in horses with acne-boil was observed.

Key words: *Epidemiological study, Skin diseases, Horse.*

INTRODUCTION

The skin, the largest organ in the body is the anatomical and physiologic barrier between animal and environment. It provides protection from physical, chemical and microbiologic injury.

Dermatosis caused by ectoparasites are the most common skin disorders of large animals. Animal suffering through annoyance, irritation, pruritus, disfigurement, secondary infection and myiasis (Scott, 1988) A syndrome characterized by mane and tail rubbing has been recognized in horses throughout the world and named summer itch, sweet itch summer eczema or culicoides hypersensitivity. Affected horses have allergic reaction to the bites of culicoides insects (Kurotaki et al., 1994). Culicoides hypersensitivity while not life-threating, can be debilitating economically to the owner. Often the discomfort and the disfiguration associated with the disease prevent the animal from being used for show or riding. Affected horses are sold for less than their worth. The possible hereditary implications can cause financial losses by removing valuable animals from breeding program. These factors

coupled with the cost of topical and systemic therapy are discouraging. Also mange is a devastating pruritic disease of animals including horse caused by mite ectoparasite (Pascoe and Knottenbelt, 1999).

Dermatophytosis is a disease caused often by infection of horse skin and hair follicles with dermatophytes belonging to fungi (Schmidt, 1996). Although it is not fatal, it has long been known as an important factor in the health maintenance of horse (Connole, 1990) Once dermatophytes develop, it can spread widely by direct contagion due to contact with other horses or by indirect transmission via harness (Shimozawa et al., 1997)

Bacteria are a major cause of skin diseases in horses. (Scott, 1988). Identification of bacteria from skin lesions may provide important information to the cause of cuetaneous infection. The presence of normal skin flora may confuse interpretation of these studies. It is essential to remember that damaged skin provides a medium for proliferation of many bacteria. Only by correlation the clinical appearance of the lesion with the bacteriologic data can one reach the proper decision concerning the presence of bacterial disease (Hungerford, 1990).

The study was designed to:

1- Quantity the types of skin affections encountered in horses with special reference to the epidemiological pattern of summer eczema, mange, ringworm and acne in horses in including breed season and age influence.
2- To demonstrate the clinical signs, therapeutic trials and prognostic features of these skin diseases in horse
3- To clarify the bacteriological causes of dermatosis in horse.
4- To determine the changes in total and differential leukocytic count as well as total serum protein, albumin and globulin in horses affected with some skin diseases.

MATERIAL and METHODS

Animals:

The record of horses with a diagnosis of sweet itch, ringworm, acne boil and mange presented in Smouha club, Alexandria Governorate, Egypt between January 1999 and January 2000 were reviewed. The total number of horses during this year was 153. Diagnosis was based on history, clinical signs, bacteriological examination and microscopic examination for dermatophytes and mites. Methods of treatment were recorded or each case.

Skin scraping for mite and dermatophytes examination:

The scraping was performed with No. 10 scalpel blade. Before the skin is scraped, the blade was dipped in a drop of mineral oil. The skin was scraped until a small amount of capillary blood oozes from the area scraping materials was added to a drop of 10% potassium hydroxide solution. A coverslip was added and the slide was gently heated until clarification. Then the slide was microscopically examined by 10X (low power) magnification as described by (Handrix, 1998) for mites and by 10X40 magnification as described by Schmidt (1996) for detection of dermatophyte spores.

Bacteriological examination:

Samples from skin were incubated in nutrient broth overnight at 37^0 C. The centrifuged broth sediment were cultivated on nutrient agar, blood agar and McConky agar plates. Incubation was done at 37 ^{0}C for 48 hours and suspected colonies were identified according to the procedures described by Cruikshank et al. (1975) depending on culture character, hemolysis, bacterial morphology and biochemical reactions.

Blood samples:

Blood with anticoagulant was collected for total leukocytic count and for preparing blood films stained with Giemsa stain for differential leukocytic count using the four field meander system (Coles, 1980). Blood samples without anticoagulant were collected for obtaining clean non hemolytic serum for determination of total protein, albumin and globulin spectrophotometery using chemical kits supplied by (Bio-analytic, Florida, USA) after the method of Henry and Webster (1964).

Statistical analysis:

The results obtained were statistically analyzed according to Snedecor and Cochran (1980).

Treatment trials:

Horses proved to be affected with skin diseases were treated as shown in Table (1)

RESULTS

The diagnosis of sweet itch was made from observation of the characteristic clinical symptoms (Itching and consequent rubbing resulting in broken hair, localized hair loss, thickening of the skin with ulceration and superficial secondary infection), together with known exposure to culicoides spp and exclusion of ectoparasites such as lice or mange mite. Fig. (1) shows animal suffering from sweet itch in mane (a) and tail (b).

Table (2) shows that 12 horses, (7.8%) were affected with Sweet itch. 8 cases started in summer, one in autumn and 3 in spring. There were significantly higher prevalence of the disease in English breeds (9 cases) compared with Arabic one (3 cases). The age distribution of horses suffering from sweet itch was analyzed relative to that of the corresponding healthy individuals. The mean age of horses suffering from allergic dermatitis was significantly greater (10.5, 12 horses) than that of healthy individuals (6.3, 141 horse).

Mange was observed in 14 cases (9.2%) of which 7 cases were psoroptic mite, 2 cases were sarcoptic and 5 were chorioptic mite.

Animals showed pruritus, papules, crusts excoriation and alopecia. Animals affected with chorioptic mange showed crusts on the lower part of legs with stamping and rubbing the affected areas in walls and fences. Some animals showed minimal clinical signs, ie, increased scales only. Fig (2) shows horses suffering from mange

Diagnosis of ringworm was based on observation of clinical signs including circular areas of alopecia with scaling and crusting. No itching was observed. Diagnosis was confirmed by microscopic examination of skin scraping to observe the spores of fungi. Fig (3) shows horses affected with ringworm.

The incidence rate of ringworm in horse was 3.9% where 6 animals were affected with ringworm ((Table 2). Five cases were recorded in foals and one case was observed in 13 years old mare

Diagnosis of contagious acne-boil was based on clinical signs where animals showed painful papules and nodules. The nodules often ulcerate and drain a creamy greenish pus. The condition was most common on saddle area. (Fig 4)

Table (2) showed that 22 horses were affected with contagious acne (14.4% of total horses examined). English breeds (18 cases) were more affected than Arabic horses (4 cases) All cases started to occur in summer and spring (Table 2). Bacteria isolated from cases of folliculitis and furunculosis are shown in Table (3) where 41 isolates were identified as in most cases mixed infections were observed. *Corynebacterium ovis* were isolated from 19 cases, *staphylococcus aureus* was isolated from 5 cases, *streptococci sp.* from 4 cases, *staphylococcus hyicus* from 2 cases.

The results of total and differential leukocytic count in control and diseased groups are summarized in table (4) and biochemical serum analysis of proteins are summarized in Table (5).

A reasonable relief of pruritus and skin lesions was observed after treatment of cases of sweet itch, but the condition started to return again few days after treatment ceases.

Horses suffering from mange responded favorably to treatment with disappearance of itching and healing of skin lesions and the general health condition of the animals improved. No live mites were found in skin scrapings from any of the horses at follow up examination. Clinical signs resolved with no history of relapse in the 4 months following treatment.

The efficiency of treatment of cases of ringworm with workalin was found to be highly effective with complete clinical recovery with the appearance of hairs by 32 days after the commencement of therapy. Dermatophytes could not be isolated up to the 5th week after treatment. Horses treated with herbal drug showed less clinical improvement and dermatophytes were recovered from 2 out of 3 cases at third week post treatment and the lesions extended to another areas of the body. These horses were retreated with workalin.

A marked improvement was observed in horses affected with acne-boil after treatment with complete healing of the lesions 10 days after treatment.

DISCUSSION

Sweet itch is a seasonal recurrent chronic dermatitis of horse caused by hypersensitivity to culicoides biting and it is a well documented entity occurring throughout the world (Littlewood, 1998). The dermatitis usually localized to the mane, tail and withers and it is associated with urticaria, intense pruritus and self excretion which may result in open wound and secondary infection (Brostrom et al., 1987). The pathogenesis of the culicoides hypersensitivity is complex. The saliva of the biting flies contains many proteins that could be antigenic leading to immediate hypersensitivity (Type I hypersensitivity) (Marti et al., 1992, Turataki et al., 1994).

The present study was undertaken to establish the incidence of sweet itch among horses. Out of 153 horse, 12(7.8%) were affected with sweet itch (Table 2). Data collected in other countries have revealed a high incidence in various breeds (16.6%) in horses in Sweden (Brostrom et al., 1987); of 391 horse, 17.6% in Norway (Stefania and Larsen, 1991); in Germany, 20% were affected (Unkel, 1984); disease prevalence of 26% of horses surveyed in British Colombia, Canada

(Andersen et al., 1991) and 21.8% in various breeds in Israel (Braverman et al., 1983).

The results of this survey confirmed a high incidence of sweet itch in English horses compared to Arabic horses. The association between a high prevalence of allergic dermatitis and certain breeds and certain geographical areas has been described in numerous reports (Reik, 1953; Beaker, 1964; McCaig, 1973 and Unkel. 1984). However, Anderson et al. (1988) could not find breed susceptibility in his survey in Canada. It was suggested that there is a hereditary influence in the pathogenesis of sweet itch (Brostrom et al., 1987). Marti et al. (1992) suggested that dermal hypersensitivity due to insect bites in horse is influenced by genetic factors related to major histocompatability complex (MHC), therefore it was suggested that insect bit dermal hypersensitivity is a multifactorial diseases including hereditary and environmental factors in its pathogenesis.

The present study showed that the number of horses affected with sweet itch increased with the age of horse. This agrees with earlier reports (Braverman et al., 1983; Unkel, 1984 and Brostrom et al., 1987) who reported that the allergic dermatitis usually appears during the third or fourth grazing season. Previous reports stated also that horses develop the diseases between 2-4 years (McCaig, 1973; Braverman et al., 1983) or as early as 18 months (Bake and Quinn, 1978) but the condition has also been observed in horses less than one year of age (Anderson et al., 1991). Stefania and Larsen (1991) suggested that the increase of incidence of summer eczema in older horses is not due to age itself but to other factors predisposing for the onset and development of the allergy as animals need certain period of sensitization by the exposure to the biting culicoides to develop the disease (Brostrom et al., 1987 and Stefania and Larsen, 1991).

In this study, cases of sweet itch were treated with systemic anti-pruritic agent (Predef 2X), with application of local anti-inflammatory cream as advised by (Fadok, 1987 and Scott, 1988). The pruritus stopped and the lesion healed again with regrowth of hair, but unfortunately, the condition returned again in most cases due to difficulty in insect control when treatment stopped. and its ability to pass through mosquito mesh screen. In previous reports, treatment by hyposensitization has been attempted in horses with hypersensitivity (Rozenkranzy and Griffin, 1986, Fadok, 1986) Aqueous whole insect antigens were used to inject horses subcutaneously for several times with different doses but few horses appeared to respond. In another

therapeutic approach, Hasslacher, (1991) used 10% salicylic steroid free solution in 32 horses with sweet itch. In 90% of patient the condition improved and in 40% of cases the eczema healed completely. Also, benzyl benzoate solution was also used topically twice daily with reasonable control of the disease (Littelwood , 1999).

Out of 153 horse examined in this study, 14 were affected with mange (Incidence rate 9.2%). The diagnosis was made by clinical features and confirmed by microscopic examination of skin scraping. There were no apparent age, breed or sex predilection. The main clinical signs observed were pruritus, papules, crusts, excoriation and alopecia. The lesions started at different areas of the body including head, neck and hindquarters (Fig 2).

Microscopic examination of the skin scrapings showd that 7 cases (50%) were affected with psoroptic mange. Many previous reports showed that psoroptes equi cause body mange in equines (Fadok and Mullowney, 1983; Kral and Schwartzman, 1964 Patid, 1967 and Soulsby 1982). Psoroptes cuniculi causes ear mange in horses (Montali, 1976; Pascoe, 1980 and Fadok, 1984), but no case of ear mange was observed in this study.

Sarcoptic mange was detected in 2 cases (14.3%) although sarcoptic mange is generally considered to be rare in horse (Scott, 1988; Blood and Radostits, 1989).

Chorioptic mange was seen in 5 cases (35.7%) in fetlock area, Although chorioptic mange in horse is often localized to the fetlock, pastern and tail as described by Arundell, (1978), Thomsett, (1979) and Wood, (1970). However, Boersema, (1978) described.widespread lesion of this type of mange.

Demodectic mange was not detected in this study but it has been reported in horses in previous reports with clinical signs of asymptomatic alopecia and scaling over face, neck, shoulders and forelimb.

Animals were treated with Ivermectin by injection although there are no available published trails of its injection effect in horses. The drug was injected intramuscularly as it causes severe inflammation when injected subcutaneosly

In previous studies sarcoptic mange in horse was treated with 2% lime sulfer at least two treatments at a 14 day interval (Loomis, 1983) Ivermectine 200Mg/Kg given orally (repeated in two weeks) was used in chorioptic mange in horses (Fadok, 1987). Littelwood et al., 1995 used oral Ivermectine at a dose of 0.1 mg/Kg daily for five days for the

treatment of chorioptic mange in horses. Significant reduction in the number of mites was observed but no complete elimination. Selenium sulfide has recently been shown to be a safe and effective treatment for chorioptic mange (Curtis, 1999).

Superficial mycosis have high prevalence in domestic animals including equine (Schmidt, 1996). The disease is known as ringworm or dermatophytosis, *Tricphytopn equinum; Tricophyton verrucosum; Microsporum equinum; Microsporum canis* and *Microsporum gypeium* have been reported as causal fungi of dermatophytosis among horses (Connole, 1990; Shimizu; 1991 and Shimozawa, 1997). *Trichphyton equinum* was reported to be the most common cause of ringworm in horses (Schmidt, 1996).

In this study, ringworm was observed in (3.9%) of animals included in this study. This ratio is lower than that observed by Moretti et al. (1998) who found that 9% of 200 horses was infected by dermatophytosis. There were no breed or seasonal effect on the occurrence of ringworm in horses, which agree with Petrovich (1978) who found no particular seasonal occurrence of the disease. He also found that either sex or breeds nor coat colour affected the occurrence of ringworm in horses. However, Pascoe, 1979 and Scott, 1988) reported a higher incidence of ringworm in hot humid climate than in a cold dry climate.

Animals affected with ringworm in this study showed discrete circular areas of alopecia with severe crusting and scaling. In addition to theses findings, other studies reported also suppuration and ulceration or multifocal to generalized scaling without alopecia (Stannard, 1976).

In this study different therapeutic approaches were used including Workalin which is a rubefacient counterirritant with mild blistering properties. Medicinal plants were also used which may not give good therapeutic effect Best results obtained with Workalin which may be due to its high content of iodine which is known to be antifungal. Topical solution of 1-5% thiabendazole was currently reported to be beneficial in equine dermatophytosis (Blank and Rebell, 1965). Marechal (1979). Noted that Miconazole was found to be very effective in localized infection.

Folliculitis is inflammation of hair follicles. When inflammatory process breaks through the hair follicles and extends into surrounding derms and subcutes, the process is called furunculosis. When multiple areas of furunculosis coalesce, the resultant focal areas of induration and fistulous tracts is called carbuncle (boile) (Scott, 1988). The condition is

caused mainly by staphylococcus spp and corynebacterium spp (Pascoe, 1984; Scott and Manning, 1980). The condition is recorded under variety of names including contagious acne-boil, Canadian horse pox, acne, heat rash, summer rash, summer scab, sweating eczema of saddle, saddle scab and saddle boil (Hopes, 1976; Pascoe, 1973 and Mullowney and Fadok, 1984).

In this study, contagious acne was diagnosed clinically and bacteriologically in 22 horses (14.4%). The condition was most common in spring and summer which agree with (Scott, 1988) who mentioned that 90% of cases began in spring and summer where this period coincides with higher temperature and humidity and increased insect population. There was also no breed influence of the incidence rate of acne, which was also reported by Scott (1988). The author mentioned that there is no apparent age, breed or sex predilection the incidence of acne in horses.

The clinical picture of acne in this study showed clinical papules and nodules (Fig4a)., which were often painful The lesions tend to ulcerate and drain creamy greenish-white pus Leaving ringworm like alopecia (Fig 4b).

The bacteriological examination of the skin lesion of acne showed that *Corynebacterium ovis* was the most frequently isolated bacteria (19 isolates) followed by *Satphylocovccus aureus* (5 isolates), although previous studies reported that staphylococcus aureus is the most common cause of folliculitis and furunculosis in equines (Devriese et al., 1985 and Shimozawa, 1997).

Staphylococcus hyicus was isolated from 3 cases in this study. In previous study *Staphylococcus hyicus* was isolated from pastern Folliculitis (Devriese et al., 1983) and from cases of dermatitis in horse (Devriese et al., 1985 and Shimozaua 1997).

Also streptococal spp which was isolated in this report (4 isolates) was also isolated from cases of Folliculitis and furunculosis in horses (Thomsett, 1979).

Other bacteria isolated as shown in table 2 may be bacterial contaminant of skin as there is no report of their role in skin diseases in equine.

The changes in total leukocytic count were not significant in cases of sweet itch, ringworm and acne-boil. Eosinophilia was observed in sweet itch and mange which agree with Baker and Quinn (1973); Baker (1983); Kleider and Lees (1984); Foster et al. (1995, 1997); Abdel-Salam, (1998) and Mckelvie et al., 1999). who found that horses

with insect hypersensitivity have peripheral eosinophilia. Eosinophils are attracted and activated by histamine and cytokines released in case of hypersensitivity (Tizard,1992 and Mckelivie et al., 1999). The function of eosinophils is to suppress inflammation by destroying histamine released as it produce diamine oxidase which act as histaminase (Tizard, 1992). Also eosinophils are attracted to the area to phagocytose the allergic substances produced in culicoides hypersensitivity and mange (Mckelivie et al., 1999) The leukopenia and neutropenia observed in mange mite agree with Abdel-Salam, (1998) who explained it as a reflection of suppressive effect of external parasitic infection with mange.

Animals affected with mange showed significant decrease in total serum protein and albumin (table 5). This hypoproteinemia and hypoalbuminemia may be due to rapid breakdown of serum total protein resulting from continuos movement during rubbing of the skin lesions due to sever itching (Abdel-Salam, 1998).

Animals suffering from acne boil showed marked increase in globulin concentration in their serum. The increase in globulin in bacterial infections has been observed before (Coles, 1980; Abdel-Salam et al., 1995).

Finally, affections of the skin can be produced by myriad agents, including external irritants, allergens, trauma and bacterial, viral, fungal and parasitic infection. The most common signs are scratching, followed by skin lesions that progress from edema and erythema to papules, vesicles, oozing and crusting or scaling. Secondary infection may occur. Since palliative measures rarely effect a cure, a thorough history should be taken, noting the progression and involvement of other animals and any prior treatment. Physical examination should define the areas affected. Diagnostic tests such as skin scrapings for ectoparasites and skin culture for bacteria and fungi should be employed when indicated. Until the underlying causes are diagnosed, both topical and systemic therapy may be used. Improvement of stable hygiene and washing all affected gear, saddle, cloths and grooming equipment should be done.

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Table 1: Treatment trials for horses affected with skin diseases

Diseases	Drug used	No of horses	Method of application
Sweet itch	Predef 2X[1] Betaderm[2]	12	Predef 2X was given by intramuscular route at a dose of 20 mg/animal for 3 days. Betaderm was applied topically after cleaning of the lesion with worm water.
Mange	Ivomec[3]	9	intramuscular injection of Ivomec 1ml/50Kg body weight for one dose.
	Sulfer ointment 10%	5	Painting the affected leg with chorioptic mange daily for 5 successive days after cleaning of the lesion and removal of crusts.
Ringworm	Workalin[4]	3	Affected area was cleaned thoroughly with water and soap then application of Workalin for 3 successive days.
	Herbal drug[5]	3	Acacia Arabia was used for cleaning the infected areas of the body before the application of the herbal drug for 5 successive days.
Acne-boil	Streptopenicid[6] Betadine[7]	22	Two vials of streptopenicid were injected intramuscularly daily for 3 days with washing of the skin by Betadine antiseptic daily.

1- Predex-2X 1m contain 2 mg isoflupredone acetate in an aqueous suspension (Upijhon s.a.- Puurs Belgium).
2- Betaderm each 100gm contains betamethasone 100 mg (Egyptian International pharmaceutical Industries Co. A.R.E.).
3- Ivomec each ml contains 10 mg avermectine (Merck&co. Inc., Whithouse Station. N.J., USA).
4- Workalin contain (Mercuric chloride0.3%, Turpentine oil5.0%, Campher 10%, iodine12%, potassium iodide 2.6%, isopropyl alcohol, 60%, water to 100%) (Roswell Livestock and farm supply, Roswell N.M.
5- Herbal drug preparation contains garlic extract, onion extract, lemon extract, Turmeric (Curucuma longa) and Campher powder according to Sharma and Dwivedi, (1990).
6- Streptopenicid (Procaine penicillin. 1200000 IU, penicillin G sodium. 400000 and streptomycin 2 gram (Chemical Industries Development, A.R.E.)
7- Betadine antiseptic contains 10% povidone iodine (The Nile Company for chemical $ pharmaceutical industries A.R.E.)

Table 2: Prevalence of sweet itch. Mange, ringworm and acne-boil in horses relative to seasons

Disease	No of animals affected									
	Summer		Autumn		Winter		Spring		Total	
	No	%	No	%	No	%	No	%	No	%
Sweet itch	8	5.2	1	0.6	0	0.0	3	1.96	12	7.8
Mange	4	2.6	4	2.6	4	2.6	2	1.3	14	9.2
Ringworm	3	1.96	1	0.6	2	1.3	0	0.0	6	3.9
Acne	14	9.2	0	0.0	0	0.0	8	5.2	22	14.4

The case was recorded at the start of the disease

Table 3: isolation of bacteria from the skin lesions of horses suspected of acne-boil.

Bacteria	No of isolates	Percentage
Corynebacterium ovis	19	46.34
Corynebacterium kutscheri	2	04.87
Corynebacterium ulcerans	1	02.44
Staphylococcus aureus	5	12.20
Staphylococcus hyicus	2	04.87
Streptococcus zoepidemicus	2	04.87
Streptococcus equi	1	02.44
Streptococcus agalactea	1	02.44
Escherichia coli	4	09.77
Enterobacter aerogenas	1	02.44
Serratiamarcescens	3	07.32
Total	**41**	**100**

Table 4: Total and differential leukocytic count in clinically normal horses and horses affected with sweet itch, mange, ringworm and acne-boil.

Groups	No of animals	WBCs X 10^3/Ml	Neutro %	Lympho %	Eosino %	Basophe %	Mono. %
Healthy	10	08.73^{b*} ± 0.19	59.67^{b} ± 0.75	35.35^{a} ± 0.66	02.26^{a} ±0.18	01.01^{a} ± 0.20	01.71^{a} ± 0.17
Sweet itch	12	8.82^{b} ±0.23	54.70^{b} ±1.03	30.66^{a} ±1.61	12.11^{b} ±0.14	00.79^{a} ±0.18	01.74^{a} ±0.11
Mange	14	05.67^{a} ±0.96	43.84^{a} ±0.80	32.88^{a} ±1.27	14.65^{b} ±2.97	01.21^{a} ±0.18	02.42^{a} ±0.28
Ringworm	6	08.67^{b} ±0.91	57.85^{b} ±1.87	37.15^{a} ±1.96	02.95^{a} ±0.73	00.85^{a} ±0.16	01.20^{a} ±0.13
Acne-Boil	22	08.61^{b} ±0.36	55.26^{b} ±1.24	35.78^{a} ±1.93	03.52^{a} ±0.98	00.82_{a} ±0.19	04.62^{a} ±0.53

* Values within the same column with different superscript are significantly different ($P \leq 0.01$)

Table 5: The average total protein, albumen, globulin and albumin/globulin ratio in clinically normal horses and horses affected with sweet itch, mange, ringworm and acne-boil

Group	No of animals	Total protein (g/L)	Albumin (g/L)	Globulin (g/L)	A/G ratio
Healthy	10	70.62^{b*} ±2.64	29.70_{b} ±1.54	40.92^{a} ±2.64	0.73^{a} ±0.06
Sweet itch	12	71.94^{b} ±1.21	27.72^{b} ±1.43	44.23^{a} ±2.20	0.63^{a} ±0.13
Mange	14	64.02^{a} ±1.43	20.68^{a} ±0.88	43.34=a ±2.75	0.48_{a} ±0.08
Ringworm	6	70.29^{b} ±3.19	28.71^{b} ±2.09	41.58^{a} ±4.29	0.69^{a} ±0.16
Acne-boil	22	71.39^{b} ±3.41	26.54^{b} ±2.15	44.77^{b} ±3.37	0.59^{a} ±0.08

* Values within the same column with different superscript are significantly different ($P \leq 0.01$)

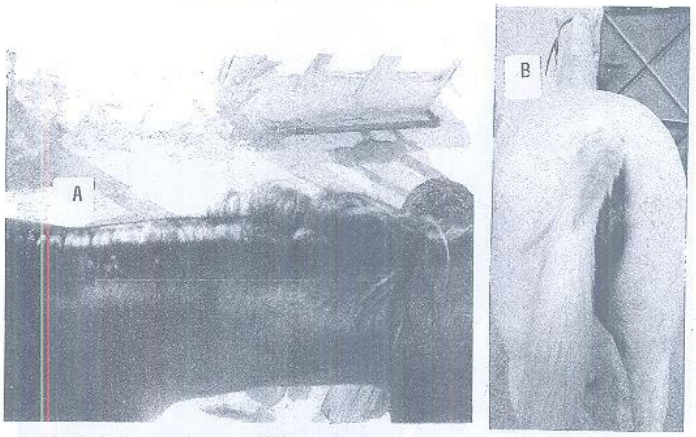

Fig (1) Culicoides hypersensitivity in horses with localization of the lesion in mane (A) and tail (B)

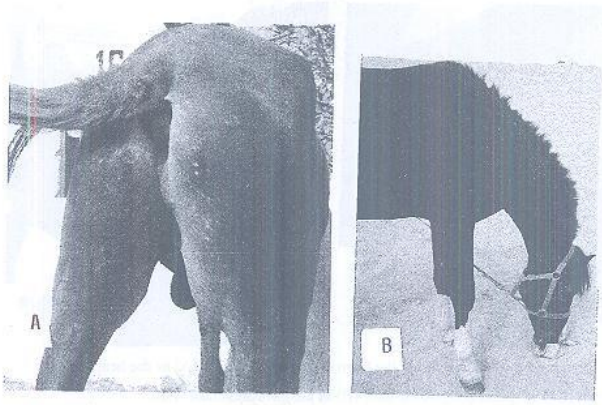

Fig (2) Mange in horse: (A) alopecia, papules and crusts in perineal region, (B) areas of crust and alopecia in head and neck

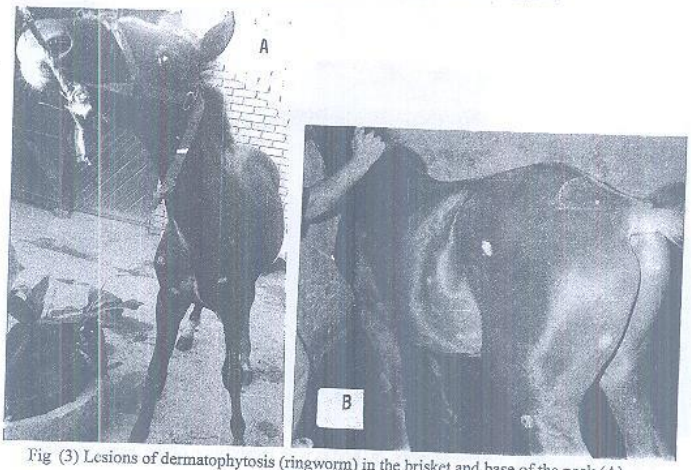

Fig (3) Lesions of dermatophytosis (ringworm) in the brisket and base of the neck (A) and in the hind quarters (B).

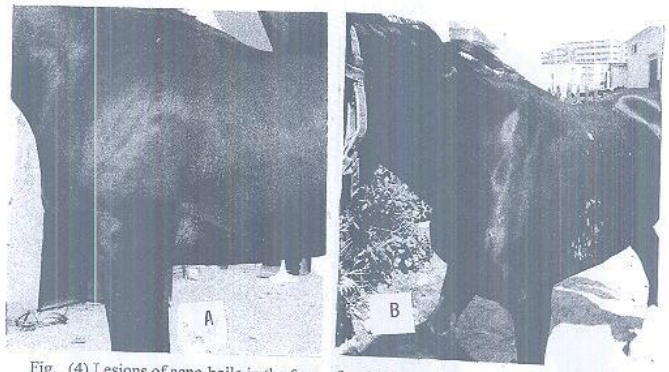

Fig. (4) Lesions of acne-boile in the form of multiple papules (A) or the healing stage with areas of alopecia (ringworm-like) (B) in the girth and chest wall.