

**CLINICO HAEMATOLOGICAL STUDIES ON PARASITIC DERMATITIS
IN CANINES AND ITS THERAPY**

BY

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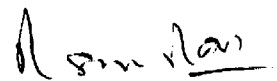
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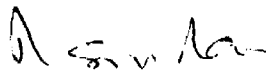
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No part of the thesis has been submitted for any other degree or diploma. The published part has been fully acknowledged. All the assistance and help received during the course of the investigation have been duly acknowledged by the author of the thesis.



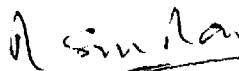
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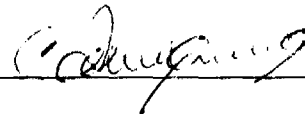
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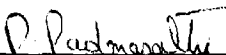
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ABSTRACT

A survey of hospital record at Veterinary Hospital Bhoiguda, Secunderabad was carried out for the last 3 years to know the incidence of various skin diseases in canines with a particular reference to parasitic dermatitis. Investigations were also carried to study the incidence, epizootiology, haematological and biochemical variation along with a therapeutic trails using oral, topical and injectable parasitocidal drugs.

Dogs brought to the Veterinary hospital with a history of skin troubles were analysed. Out of 1392 dogs, 425 animals suffered with parasitic dermatitis giving an incidence of 36.52 per cent.

The incidence of parasitic dermatitis was significantly ($P < 0.05$) associated with younger age group of animals since 63.33 per cent animals suffered were below 3 years in age.

Sex could not influence on the incidence of parasitic dermatitis ($P < 0.05$). Out of 60 positive cases, 32 (53.33%) were males and 28 (46.67%) were females.

The breed of the animal was also found to be associated ($P > 0.01$) with incidence of parasitic dermatitis; 60.00 per cent of the incidence was reported in pure breed dogs; 16.67 per cent in cross breed and 23.33 per cent in non-discript dogs.

The season was observed to influence ($P < 0.01$) the incidence of parasitic dermatitis in canines. Of the 60 animals, 40 were reported in cold season and only 20 were observed in hot climate.

Clinical signs in the dogs affected with parasitic dermatitis were as follows-pruritus, alopecia, self-biting, erythema, ulceration and pale mucous membranes.

The haematological studies of the affected dogs showed slight increase in counts of total leucocytes, neutrophils and eosinophils and decrease in lymphocytes and haemoglobin content of the blood.

The biochemical estimation indicated slight decrease in protein, albumin and increase in globulin in the affected dogs.

Amongst three drugs used for the therapeutic trial in parasitic dermatitis, the cypermethrin topical spray yielded the highest (93.33%) results followed by 86.67 per cent with Ivermectin and only 20.00 per cent with closentel therapy.

LIST OF ABBREVIATIONS

B	Basophils
Cmm	Cubic millimeters
dl	Decilitre
DLC	Differential leucocyte count
E	Eosinophils
EDTA	Ethylene diamine tetra acetic acid
fig	Figure
g	Gram
Hb	Haemoglobin
Kg	Kilogram
L	Lymphocytes
lb	Pounds
M	Monocytes
mg	Milligram
ml	Millilitre
N	Neutrophils
No.	Number
OD	Optical Density
Pcv	packed Cell Volume
P	Probability
Soln	Solution
spp	Species
S/C	Subcutaneously
TLC	Total Leucocyte Count
viz	Namely
V/S	Versus
<	Lesser
>	Greater

INTRODUCTION

CHAPTER I

INTRODUCTION

In canines, the ectoparasitic infestations by ticks, mites, fleas and lice produce dermatitis characterized by intense itching, scratching, rubbing and self-biting along with hair loss. The severe infestation by these parasites may lead to anaemia and some times paralysis of hind legs and even death in few cases (Verma, 1994). The chronic cases which suffer from recurrent infestations may exhibit permanent back line scratching, thickening and pigmentation which can become bizarre (elephant hide) and owners of such cases sometimes doubt that ectoparasites could cause such a disfiguring skin condition (Bagnall, 1984). In addition, these ectoparasites serve as vectors or intermediate hosts in transmitting bacterial, protozoal, rickettsial and viral diseases to other animals including human beings.

Although the acaral skin diseases are not fatal in nature oftenly, some of them are of zoonotic significance and they cause lot of distress and discomfort to the affected animal and lot of worry and anxiety to its owner. In spite, the recent advances in therapeutic approach, the skin disorders remain refractory and as such frustrate the practising veterinarians in the field.

Of late, some new generation acaricidal drugs with toll claims by the manufacturers are made available in the market. But no sufficient data is available about their effectiveness. Therefore, the comparative efficiency of some of them is studied in the present programme. It has been shown experimentally that immunosuppressed pups are likely to suffer more oftenly with skin diseases (Bagnall, 1984). Hence, an attempt was also made to study the protein and globulin status of the affected animals. Thus, with the above objectives, the following parameters were proposed in the present investigation.

1. To study the incidence of skin ailments in canines along with its epizootiology in relation to age, sex, breed and season.
2. To study the clinical signs.
3. To study the haematology, total serum, proteins, albumin and globulin.
4. To find out the comparative efficacy of new generation acaricidal drugs oral, topical and parenteral with antihistaminic and immunomodulator drugs.

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

2.1 INCIDENCE

Gaafar et al (1958) have noticed the presence of *Demodex* spp in the skin of 5.4 per cent clinically normal dogs.

Stoeneseu et al (1973) have reported mange mites in 146 German Shepherds (39.6%) out of 368 animals in one of the kennels.

Santos Matos et al (1982) examined the skin scrapings of 294 dogs with various skin disorders between 1975 to 1980 and observed ectoparasites in 87 animals yielding 29.5 per cent incidence.

Murthy (1991) reported 9.61 per cent incidence of various skin disorders in canines of Hyderabad city.

Patel and Dave (1996) have studied the distribution of ectoparasites in buffaloes and reported 39.0 per cent infestation in general and of 174 animals. 15 had ticks, 96 lice, 11 fleas , 20 animals mites and 32 animals had mixed infestation and ticks played an important role of transmission of ringworms in buffaloes.

2.1.1 Age

Muller and Kirk (1969) stated that age is an important factor dermatologically as some disorders are age related such as demodectic usually begins in young dogs before sexual maturity whereas allergies tend to appear in more matured dogs.

Baker et al (1970) reported that demodecosis was a disease of young dogs of 18 months or below and the resolution occurring naturally with advancing age and many of them remaining as carriers of the infection.

Grant (1983) while studying the parasitic skin disease in dogs reported that the dermatitis affected all the dogs irrespective of any age group.

Murthy (1991) reported significant ($P < 0.01$) association of age with the parasitic dermatitis and the dogs of younger age were more vulnerable.

2.1.2 Sex

Kouzes (1954) stated that out of 507 positive cases of dogs showing demodecosis, 260 (52.2%) were females and 247 (48.8%) were males.

Muller and Kirk (1969) reported that sex obviously limits certain skin problems but is specially important in

sex hormonal imbalance. In females the incidence of mange may be lesser compared to males since the estrogenic hormones decrease sebum production, thereby decreasing available food for the mites where as androgens increase the sebum production.

Avallini et al (1970) observed no difference in the incidence of dermatitis between male and female dogs.

Chakrabarti and Misra (1979) reported that the demodectic mange was higher (73.3%) in male than in female (26.7%) dogs.

2.1.3 Breed

Muller and Kirk (1969) reported that breed predilection determines the incidence of some skin disorders. Seborrheic dermatitis is common in Cocker spaniels where as Acanthosis nigricans usually occurs in Dachshund breed of dogs.

Chakrabarti and Misra (1979) observed the skin disease being more common in short haired than long haired breeds of dogs.

Murthy (1991) noticed the higher incidence of dermatitis in non discript dogs when compared to pure breed dogs.

Ihrke (1995) stated that the breed predilection for many skin diseases are becoming increasingly apparent. Some skin diseases even may be breed specific also. The Golden retriever, Dalmation, and many small Terrier breeds are at increased risk for the development of atopy. The chinese shar peiseems are predisposed to pyoderma and demodecosis.

2.1.4 Season

Chakrabarti and Misra (1979) observed that demodecosis in canines was most prevalent between September and March with higher number of lesions in November.

Murthy (1991) noticed close association ($P < 0.01$) of cold climate with the higher incidence of skin disease when compared with the hot season.

2.2 CLINICAL SIGNS

Muller and Kirk (1969) stated that ticks injure animals by the irritation of their bites, by serving as vector for bacterial, rickettsial, viral and protozoal diseases and by producing tick pralalysis through their poisonous secretion.

In acaral lick dermatitis - Muller and Kirk (1969) observed the dog constantly licking the lesion, there was alopecia, ulceration and epitheliomatous hyperplasia.

Backer (1970) observed the local alopecia with hyperkeratinization followed by erythema with thickening and fissuring of the skin in sarcoptes dermatitis. Where as lice infestation results in pruritus, erythema, excoriation and loss of hair. Anaemia may occur as a result of the effects of sucking lice.

Thoday (1980) observed the papular primary lesion with complication of scaling and alopecia. Severe skin damage might result in acute moist dermatitis. In long standing cases, the skin became acanthotic, hyperkeratinized and hyperpigmented in flea infested cases. Where as in mange affected animals the skin became thickened and lichenified.

Yathiraj et al (1991) have observed alopecia, erythema, pruritus, oedema, seborrhoea and pyoderma in canine demodecosis cases.

Shanthkumar and Suryanarayana (1995) reported that mange affected calves were poor in condition, debilitated, listless and most of the hair, fallen and showed bare and reddened skin even from a distance.

Arlion et al (1995) in their experimental studies on mange infection in dogs reported scaly skin, hairloss, pruritus, erythema and crusting (hyperkeratosis) as the clinical signs in infected animals.

2.3 PARASITOLOGICAL STUDIES

Thoday (1980) while studying canine pruritus reported the sarcoptes mites as one of the causes and the diagnosis rests on the demonstration of the parasite or its eggs in deep skin scrapings.

Sastri (1991) in his study on efficacy of Ivermectin against lice infestation, for detection on lice infestation, hairs as well as skin scrapings were collected from different parts of the body for parasitological examination.

2.4 HAEMATOLOGICAL STUDIES

Guttman (1948) reported leucocytosis accompanied by Neutrophilia in non-specific dermatitis in dogs. He suggested that it might be due to secondary bacterial infection.

Jennings (1952) while studying the peripheral blood picture in some disease of animals has observed eosinophilia in cases of dermatitis in animals.

Muller (1970) and Ramakrishnan et al (1972) reported low levels of haemoglobin in clinical cases of non-specific dermatitis in canines.

Thoday (1981) stated that eosinophilia was an useful indicator of various types of skin conditons which might be due to the raised plasma histamine concentration that resulted in release of eosinophils in circulation.

Gowda et al (1982) reported low glucose, low calcium, high cholesterol, high leucocyte count, lymphopenia, eosinophilia, monocytosis and anaemia in dogs suffering with dermatitis.

Murthy (1991) studied the haematology of dogs with skin infection and reported an increase in the number of leucocytes, neutrophils and eosinophils in such animals.

Patel et al (1991) have recorded the haematological changes in canine pyoderma affected animals as reduced TEC, lymphocytes, Hb and PCV and increase in TLC, monocytes and eosinophils.

Shobhamani et al (1994) have reported slight decrease in TEC, Hb and PVC and increase in TLC and eosinophilic counts in rabbits affected with mange.

Shanthkumar and Suryanarayana (1995) stated that among the haematological values, there was reduction in TEC, lymphocytes and Hb, whereas TLC, neutrophils and eosinophils were found increased in mange affected calves.

Arlion et al (1995) reported significantly ($P < 0.01$) lower average haemoglobin, increased WBC and neutrophils concentration and insignificant increase of eosinophils in mange infected dogs.

Rich and Coles (1995) reported that the neutrophilia is seen in early inflammation where absolute count of neutrophils increase with shift to left and it is due to tissue damage with excess release from storage pool of bone marrow. Similarly they have observed anaemia in parasitic dermatitis and it is due to chronic blood loss since the parasites suck blood and this type of anaemia is responsive in nature for treatment.

2.5 BIO-CHEMICAL STUDIES

Sakakibara (1976) observed increased total serum proteins and globulin and decreased albumin/globulin ratio in dogs affected with skin diseases.

Bagnall (1984) showed experimentally that immunodepressed pups are likely to suffer more oftenly with skin diseases.

Pathak and Bhatia (1985) made biochemical studies in dogs with dermatitis and reported hypoproteinaemia, hypoalbuminaemia, decrease in albumin-globulin ratio and increase in globulin fraction.

According to Murthy (1991) the biochemical estimations were mild decrease in protein and albumin and increase in globulin in the blood of the dermatitic dogs.

Inokuma et al (1993) studied experimentally by infecting tick saliva into tick free cattle and observed the reduced nitrogen response in those animals. Immunosuppression effect of ticks is a factor in pathogenesis of tick borne diseases.

Rich and Coles (1995) in their tables of abnormal values reported that hyperglobulinaemia is seen in parasitic skin diseases.

Shanthkumar and Suryanarayana (1995) reported the biochemical profiles as increase in serum proteins in mange affected calves.

Shakir et al (1996) have reported an overall decrease in the albumin and increase in globulin and total serum proteins in dogs affected with skin disorders.

2.6 THERAPY

Pakhomov (1983) had studied the effect of levamisole on clinical, haematological and immunological findings in calves and noticed that the treatment could increase haematological values, the bactericidal activity of serum, Lysozyme content and phagocytic activity.

Costa et al (1985) carried out the test of 25% cypermethrin applied to the skin of the back in the treatment of dogs naturally infected with fleas and ticks and obtained satisfactory results.

The therapeutic use of limonene, piperonyl butoxide and cypermethrin given as a bath for ectoparasites in dogs and cats could eliminate fleas, ticks and sarcoptic mange mites without leaving any toxic effects to the host. (Tonelli, 1989).

Over 2 years, of 100 household dogs, Mallo (1990) used a single S.C. dose of 0.05 ml 1% Ivermectin per kg live weight, all were found to be free from ticks within 78 hours. Duration of the acaricidal effect was estimated at around 22 days. No toxic signs were observed, even in Collies, a breed reported to be sensitive to Ivermectin. No resistance to Ivermetin appeared.

Shastri (1991) While studying the efficiency of Ivermectin against Lice infestation in cattle, buffaloes, goats and dogs reported that one subcutaneous injection at the dose rate of 1 ml per 50 kg Bwt was effective in treatment of blood sucking lice.

Murthy et al (1993) obtained 86.66 per cent therapeutic response using Amitraz topically and 80.0

per cent response using Ivermectin parenterally in canine mange cases.

Kamboj et al (1993) reported Amitraj 93.5%, Deltamethrin 80.0% and Ivermectin 71.4% effective in canine demodecosis.

Shanthkumar and Suryanarayana (1995) studied the comparative efficacy of Amitraz and Butox daily for 14 days and Ivermectin S/C injection @ 1 ml per 50 kg B.wt. three times at weekly interval in mange affected calves and reported 90% cure rate with Butox and 80% each with Amitraz and Ivermectin.

Vishwakarma et al (1996) have reported succesful treatment of canine dermatitis due to sarcoptes and demodex mites with Ivermectin at the dose rate of 250 µg/kg body weight given one to three subcutaneous injections at weekly interval.

Ghosh and Nanda (1997) evaluated the therapeutic efficacy of Butox (Deltamethrin) in cattle and obtained complete clinical and parasitological recovery within 20 days of first application. They observed that Butox was safe and provided larger residual effect which prevented reinfection.

Hayat et al (1997) have evaluated the acaricidal efficacy of Diazinon and Ivermectin for the control of scabies in camels in Pakistan; Ivermectin proved 98.7% effective followed by Diazinon with 53.0% efficacy.

MATERIALS AND METHODS

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CHAPTER III

MATERIALS AND METHODS

3.1 INCIDENCE

In order to find out the incidence of various skin affections including dermatitis in canines, the out patient record of the Veterinary Hospital, Bhoiguda, Secunderabad formed the source of present data. The total number of dogs treated for various skin ailments during the last three years, from January, 1994 to December, 1996 were taken into account to calculate the per cent incidence of various dermatological ailments including dermatitis.

3.2 SELECTION OF CLINICAL CASES

Dogs brought to the Veterinary Hospital Bhoiguda with a history of skin troubles such as scratching, rubbing, selfbiting and with ectoparasites were selected and investigated for haematological changes, biochemical alterations and therapeutic trials.

3.3 CLINICAL EXAMINATION OF PATIENT

After taking the medical history and noting the clinical signs in an individual score-sheet specially prepared for this programme (Appendix-A) the patient is examined physically in normal day light, to record the morphology of the skin lesion (macule, papule, pustule,

wheals, scales, crusts excoriation, ulcers, lichenification, hyperpigmentation, hyperkeratosis, alopecia, and erythema and the distribution pattern of skin lesions (unilateral, bilateral, symmetrical and asymmetrical) as described by Muller and Kirk (1969).

3.4 COLLECTION OF CLINICAL MATERIAL

Clinical material such as skin scrapings, larger ectoparasites and blood samples were collected to establish the diagnosis accurately, to confirm the clinical findings and to provide a logical basis for successful therapeutic management.

3.5 PARASITOLOGICAL STUDIES

Some parasites live on the skin surface (biting lice), some live on the skin surface but periodically penetrate the skin (sucking lice and ticks) and still others live under the skin (mange mites) producing more severe cutaneous manifestations requiring microscopic examination.

3.5.1 Examination of skin scrapings

Is carried out to identify the microscopic ectoparasites causing dermatitis using standard procedures (Soulsby, 1982). The deep skin scrapings were collected using a blunt scalpel after applying a drop of mineral oil to trap the parasites. The scrapings were taken from 2 to 3

different affected sites and transferred to a test tube and treated with 5 ml of 10 per cent potassium hydroxide solution and heated gently. Then the material was centrifuged at 1000 rpm for two minutes. A drop of sediment was examined under the microscope for the presence of mites. Skin scrapings were examined before commencement of experiment and thereafter at weekly interval upto 4 weeks. Infested untreated controls were also examined at the same intervals.

3.5.2 Examination of larger ectoparasites

Larger extoparasites such as tick, lice and fleas are collected after spraying with Alcohol and carefully picked off the surface of the skin with a forcep. They were placed in 70 per cent alcohol in a vial to insure death and were identified in the laboratory using a dissecting microscope (20 x to 40 x magnification) as described by Muller and Kirk, (1969).

3.6 HAEMATOLOGICAL STUDIES

3.6.1 Collection of blood samples

Two blood samples were collected from each animal using a 20 guage scalp vein needle into sterile vial and sterile test tube as per the method described by Schalm *et al.* (1975). About 2 ml of blood was collected in a vial

containing an anticoagulant, Ethylene Diamine Tetra Acetic acid (EDTA) disodium salt, added at the rate of one mg per ml of blood ; Another blood sample was collected in a test tube without adding any anti-coagulant to separate the serum.

The haematological studies were carried out within an hour of collection. Blood samples were collected before the commencement of treatment and from the recovered animals. Whole blood was used for the estimation of Haemoglobin concentration, total leucocyte count and differential leucocyte count.

3.6.2 Haemoglobin concentration (Hb)

For estimation of haemoglobin, Sahlis Acid haematin method, according to the procedure of Schalm et al. (1975) was followed and the values were expressed as g/dl.

3.6.3 Total leucocyte count (TLC)

Total leucocyte count was done as per the procedure described by Schalm et al, (1975) and the values were expressed as Thousands per ul ($\times 10^3/\text{cmm}$).

3.6.4 Differential leucocyte count (DLC)

Differential leucocyte count was made after staining the air dried blood smear with Leishman's stain

(Scham et al., 1975) and the count was expressed as percentage of DLC.

3.7 BIOCHEMICAL STUDIES

3.7.1 Separation of serum

About 5 ml of blood was collected into sterile test tubes (without any anti-coagulant), allowed to clot completely by keeping them in slanting position undisturbed and the serum was separated for the estimation of total serum proteins, albumin and globulin. Samples were tested before and after treatment given.

3.7.2 Total serum protein, albumin and globulin

Estimation of total serum proteins; albumin and globulin were carried out by using a diagnostic kit supplied by Span Diagnostics Pvt. Limited, Udhana (Surat), Photoelectric colorimeter (Systronics) was used and the values were expressed as g/dl (Appendix-B).

3.8 THERAPY

Sixty dogs positive for parasitic dermatitis were selected and divided randomly into four groups each containing fifteen animals for therapeutic trials.

Group I : These dogs were given closantel (15%) (Zycloz)¹ oral suspension at the dose rate of one ml per 15 kg B.Wt. as a single dose. If necessary second dose is repeated after 15 days interval.

Group II : The whole body of these dogs was sprayed topically with cypermethrin (Ektomin)² diluted at the rate of one ml solution in one litre of water using a hand sprayer. Second spray is repeated after 15 days interval if necessary.

Group III : These dogs were injected with Ivermectin (Ivomec)³ subcutaneously at the dose rate of one ml per 50 kg B.Wt. diluted with equal quantity distilled water to reduce the irritation at the site of injection. Second injection is repeated where ever necessary after 15 days interval.

Group IV : These animals were given only placebo treatment by injecting two ml distilled watter subcutaneously and served as untreated infected control.

In addition, all the animals were given supportive therapy using antihistaminic (Cadistin)⁴ 2 ml intramuscular and immunomodulator drug (Helmonil-C)⁵ at the dose rate of 2.5 mg per kg B.Wt S/C once only. The therapeutic response of each case was assessed based on the clinical improvement

of the dermatological lesions and absence of ectoparasites. All the cured cases were observed further for a period of two months following the treatment to record the recurrence of dermatitis and ectoparasites on the skin, if any.

3.9 STATISTICAL ANALYSIS

a) Chi-square (χ^2) test was carried out to test the significance of incidence between age, sex, breed and season.

b) Mean and standard error was calculated for the haematological and biochemical parameters.

1. A product of M/s Cadila Health Care, Ahmadabad-52, Each ml of suspension containing 150 mg closantel.
2. A product of M/s. Hindustan ciba-Geigy Limited Mumbai-20.
3. A product of M/s. Glaxo India Limited Bombay-25.
4. A product of M/s. Cadila Health care Ahmadabad-52 each ml containing 10 mg of chlorpheniramine maleate.
5. A product of M/s. Alved Pharma and Foods Pvt. Ltd. Madras-92 each ml containing 5 mg of Levamisol Hydrochloride.

RESULTS

CHAPTER IV

RESULTS

4.1 INCIDENCE

In the present study, to find out the incidence of various types of skin ailments/disorders in canines, the case records of the last three years (1994 to 1996) belonging to Veterinary Hospital, Bhoiguda, Secunderabad were scrutinized. During that period, a total number of 36.300 canine cases were registered and amongst them 1392 dogs suffered with various dermatological disorders yielding an overall incidence of 3.83 per cent as projected in table-1 and figure-1. Among the various skin ailments, the parasitic dermatitis was noticed in 425 dogs with 36.53 per cent incidence followed by alopecia in 286 (20.58%) dogs, eczema in 254 (18.25%) animals, pyoderma in 220 (15.80%) and non-specific dermatitis in 207 (14.87%) animals.

4.1.1 Age

To find out the association of age with the parasitic dermatitis in canines the total number of cases examined individually, during the study period, were taken into account. As shown in the table 2 and figure 2, a total of 270 dogs were examined and of them 60 were found to have parasitic dermatitis. Among the positive cases, 38 (63.33%) were upto 3 years in age, 19 (31.67%) animals were between 3

Table 1 : Incidence of various skin ailments in canines

S.No.	Skin ailment	Year			Per cent incidence based on		
		1994	1995	1996	Total	Total No. of cases registered	Total No.of skin ailment
1.	Eczema	92	82	80	254	0.70	18.25
2.	Non-specific Dermatitis	66	69	72	207	0.57	14.87
3.	Parasitic Dermatitis	120	145	160	425	1.17	36.53
4.	Pyoderma	85	72	63	220	0.60	15.80
5.	Alopecia	86	90	110	286	0.79	20.55
Total		449	458	485	1392	3.83	100.00

* Total number of cases registered during three years period (36,200)

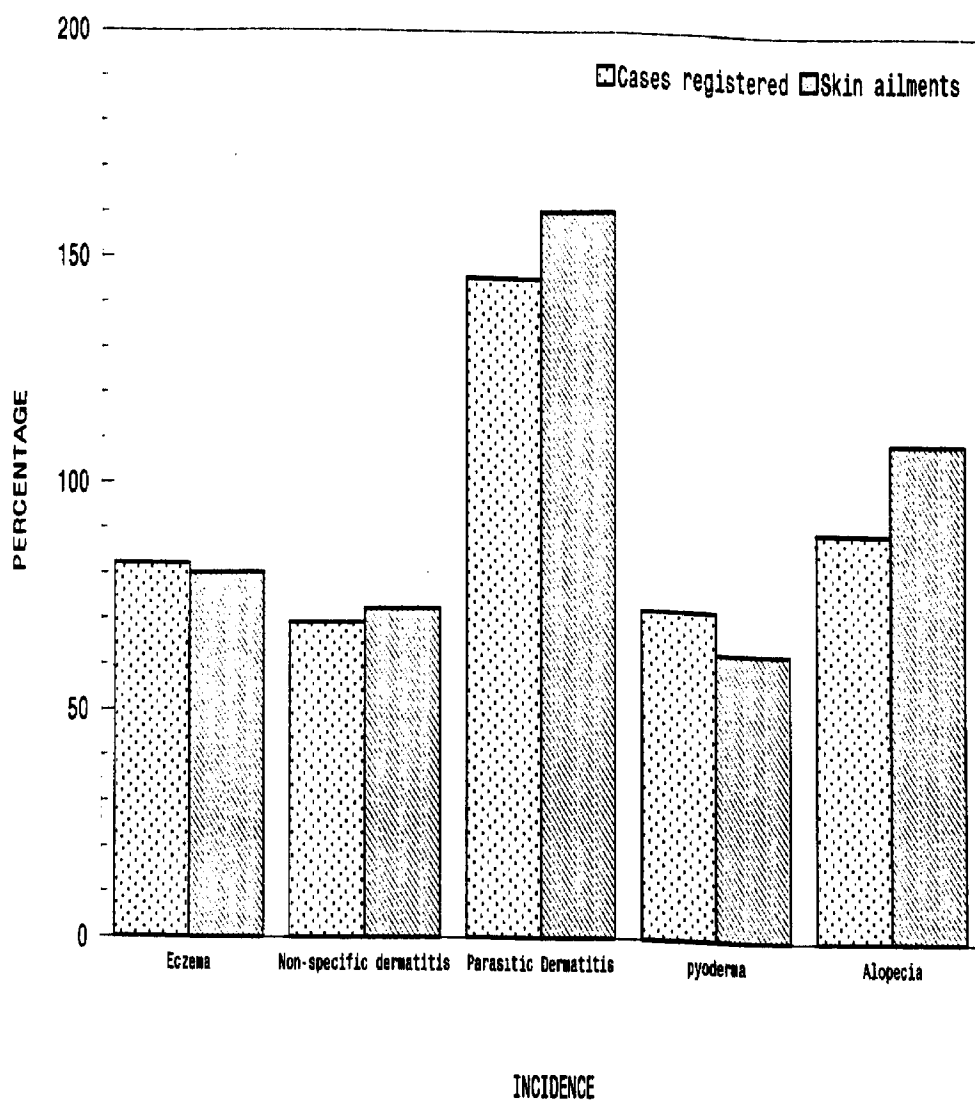


Fig. 1 : HISTOGRAM SHOWING INCIDENCE OF VARIOUS SKIN AILMENTS IN CANINES

Table 2 : Incidence of parasitic Dermatitis in Relation to age of the animal

S.No.	Age group	No. of Dogs		Per cent incidence based on	
		Examined	Positive	Total No. of dogs examined	Total No. of positive cases
1.	Upto 3 years	120	38	14.07	63.33*
2.	3 to 6 years	100	19	7.04	31.67
3.	Above six years	50	3	1.11	5.00
Total		270	60	22.22	100.00

* Significant at 5% level ($P < 0.01$)

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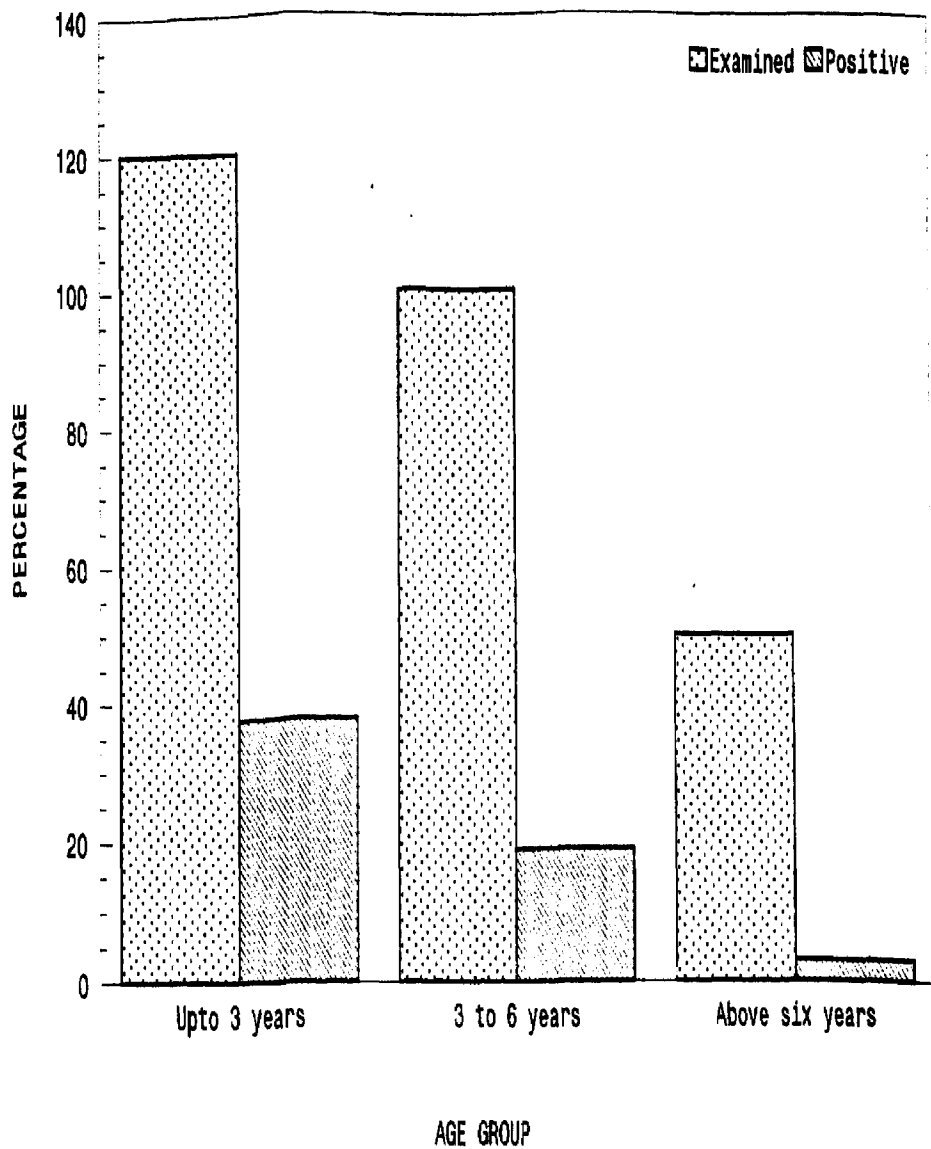


Fig. 2 : HISTOGRAM SHOWING INCIDENCE OF PARASITIC DERMATITIS IN RELATION TO AGE OF THE ANIMAL

to 6 years and only 3 (5.00%) of the infected dogs were aged above six years. The association of age with skin ailments was found significant ($P < 0.05$) statistically.

4.1.2 Sex

The incidence of parasitic dermatitis in relation to sex is tabulated in table 3 and figure 3. Of the 60 positive cases for parasitic dermatitis, 32 (53.33%) were males and 28 (46.67%) were females. Though the involvement of males was slightly higher over the females, the difference was insignificant ($P > 0.05$) statistically.

4.1.3 Breed

Of the 60 positive cases of parasitic dermatitis studied, 36 (60.00%) dogs were pure breed category comprising of German shepherd, Pomeranian, Labrador, Dobermann, Dachshund and Dalmation followed by 10 (16.67%) dogs of cross breed variety which included crosses of above breeds and lastly 14 (23.33%) affected dogs were of non-descript group. The high incidence among the pure breed dogs was highly significant ($P < 0.01$) statistically. The results are projected in table 4 and figure 4.

4.1.4 Season

The incidence of parasitic dermatitis in relation to season is analysed in table 5 figure 5.

Table 3 : Incidence of parasitic Dermatitis in Canines in relation to sex of the animal

S.No.	sex	No. of Dogs		Per cent incidence based on	
		Examined	Positive	Total No. of dogs examined	Total No. of positive cases
1.	Male	144	32	11.85	53.33N.S
2.	Female	126	28	10.37	46.67
Total		270	60	22.22	100.00

N.S. = Not significant ($P>0.05$)

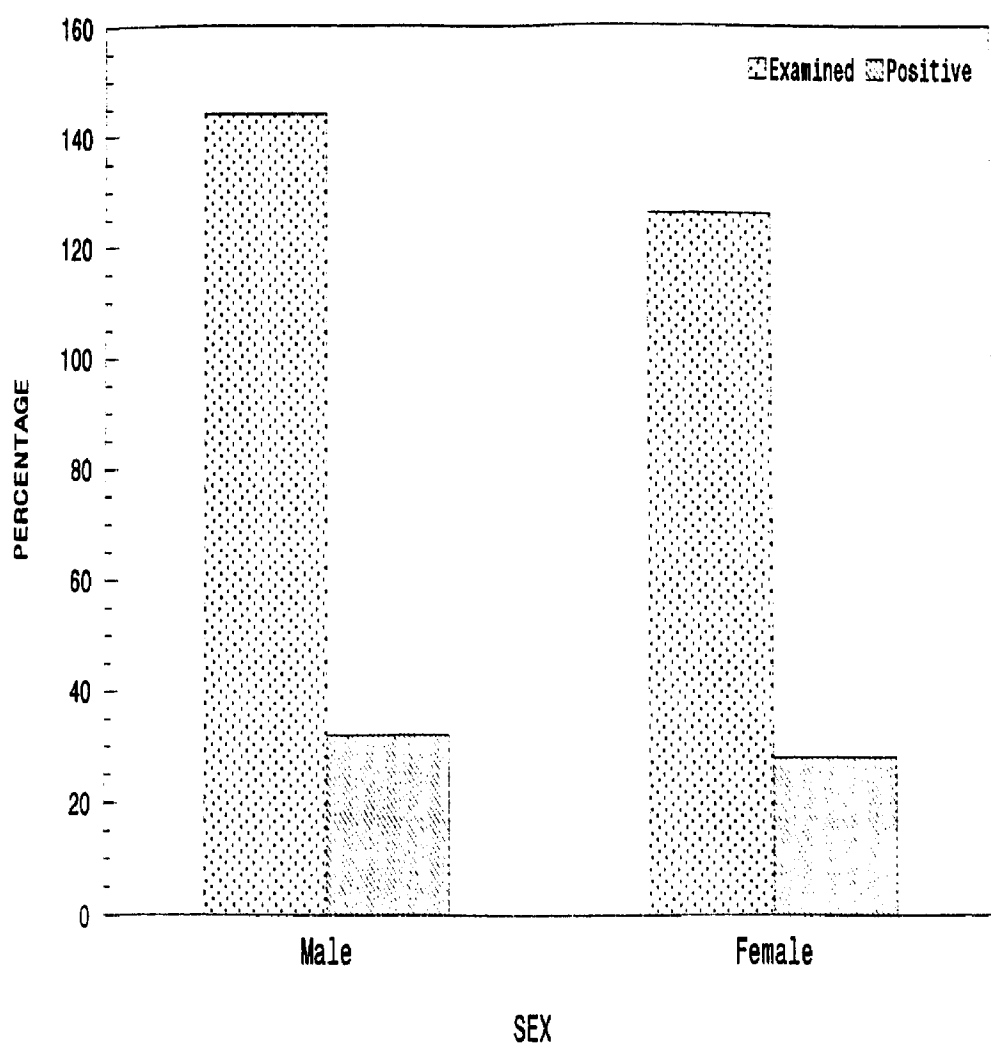


Fig. 3 : HISTOGRAM SHOWING INCIDENCE OF PARASITIC DERMATITIS IN CANINES IN

Table 4 : Incidence of Parasitic Dermatitis in relation to breed of the animal

S.No.	Breed	No. of Dogs		Per cent incidence based on	
		Examined	Positive	Total No. of dogs examined	Total No. of positive cases
1.	Pure Breed	165	36	13.33	60.00**
2.	Cross Breed	44	10	3.70	16.67
3.	Non discript	61	14	5.19	23.33
Total		270	60	22.22	100.00

** Significant at 1% level ($P < 0.01$)

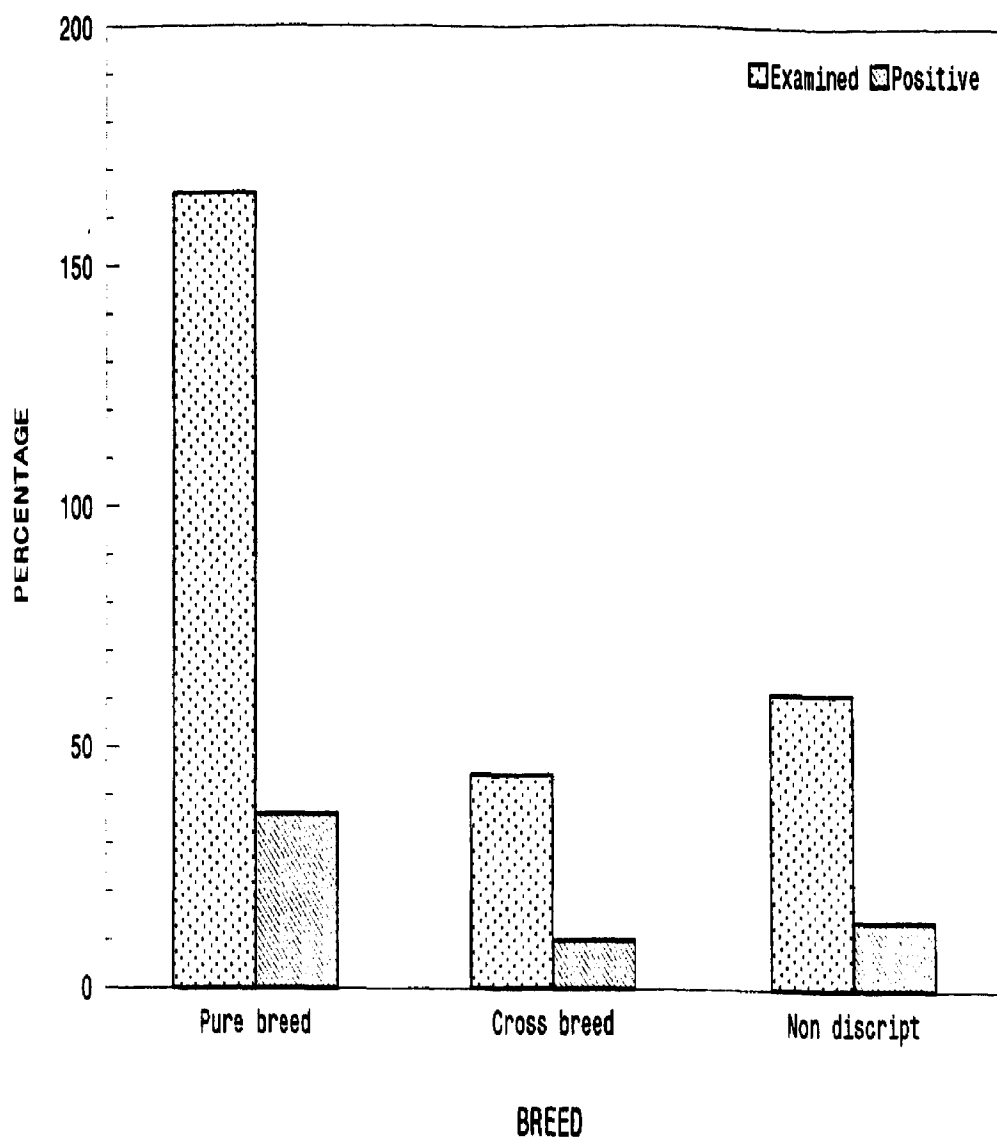


FIG. 4. HISTOGRAM SHOWING INCIDENCE OF BABESIOSIS IN

Table 5 : Incidence of parasitic dermatitis in relation to season of the year

S.No.	Season	No. of Dogs		Per cent incidence based on	
		Examined	Positive	Total No. of dogs examined	Total No. of positive cases
1.	Cold Season	150	40	14.81	66.67**
2.	Hot Season	120	20	7.41	33.33
Total		270	60	22.22	100.00

** Significant at 1% level ($P < 0.01$)

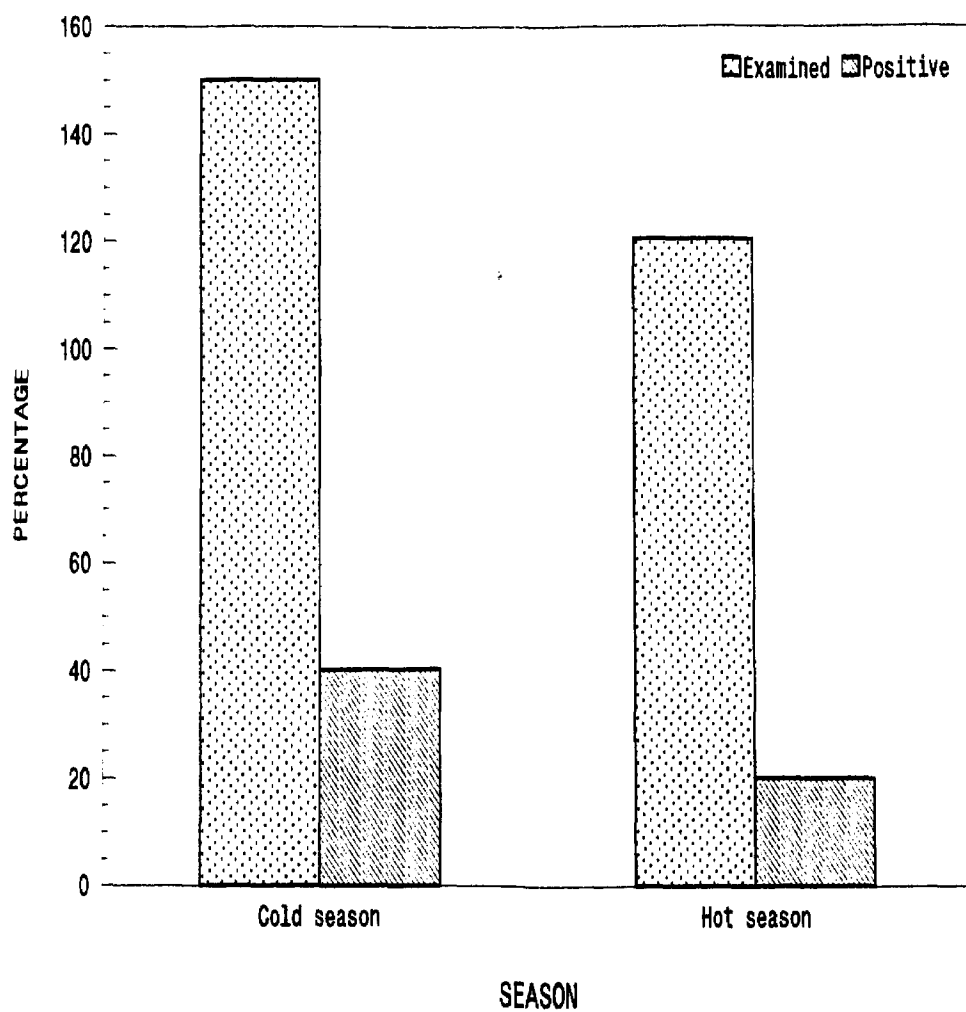


Fig. 5 : HISTOGRAM SHOWING INCIDENCE OF PARASITIC DERMATITIS IN RELATION TO SEASON OF THE YEAR

Out of 60 positive cases of parasitic dermatitis 40 (66.67%) were reported during the season having cold climate and remaining 20 (33.33%) cases were reported during the hot climate. The association of cold season with the incidence of parasitic dermatitis was highly significant ($P < 0.05$).

4.2 CLINICAL SIGNS AND CLINICAL EXAMINATION OF PATIENT

During physical examination of the dogs with parasitic dermatitis none of them showed any rise of body temperature, pulse and respiration.

The frequency of various clinical signs observed in them are tabulated in table 6 and figure 6. Of the 60 dogs observed with parasitic dermatitis, most of the animals (70.00%) had pruritus, about 61.67 per cent of them had alopecia, about 50.00 per cent self-biting, about 31.67 per cent erythema; about 26.67 per cent ulceration and crusting, pyoderma and pale mucous membranes were seen uniformly in about 10.0 to 11.0 per cent of positive cases.

4.3 PARASITOLOGICAL STUDIES

The microscopic examination of skin scrapings revealed the presence of ticks in 41.67 per cent cases, mites in 28.33 per cent animals, fleas in 3.33 per cent and

Table 6 Frequency of clinical signs in dogs affected with
parasitic dermatitis

S.No.	Clinical Sign	Frequency (%) (n =60)
1.	Alopecia	61.67
2.	Pruritus	70.00
3.	Self-biting	50.00
4.	Erythema	31.67
5.	Ulceration	26.67
6.	Crusting	10.00
7.	Pyoderma	11.67
8.	Pale m.m.	10.00

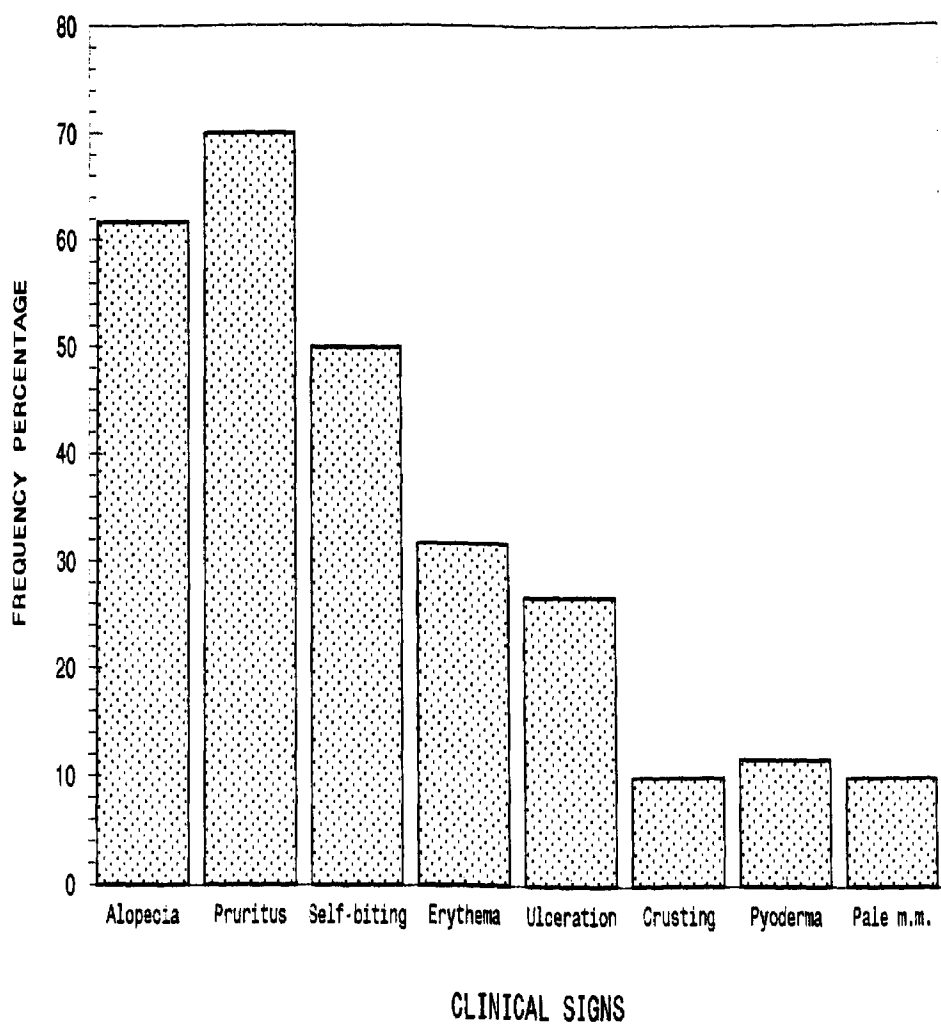


Fig. 6 : HISTOGRAM SHOWING FREQUENCY OF CLINICAL SIGNS IN DOGS AFFECTED WITH

Table 7 : Frequency of ectoparasites associated with parasitic dermatitis in canines

S.No.	Ectoparasite	Frequency
1.	Ticks	41.67
2.	Mites	28.33
3.	Flcas	3.33
4.	Lice	5.00
5.	Mixed infestation	21.67

		100.00

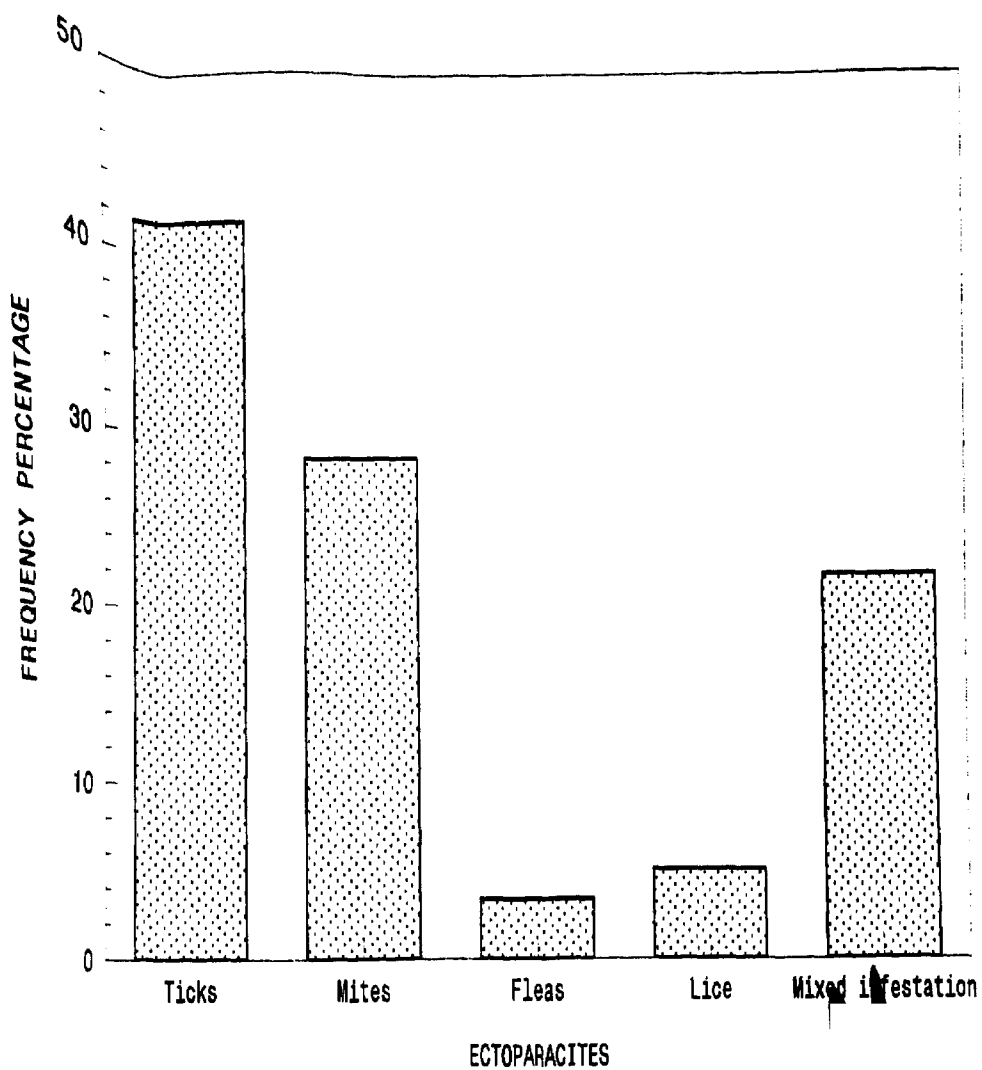


Fig. 7 : HISTOGRAM SHOWING FREQUENCY OF ECTOPARASITES
WITH PARASITIC DERMATITIS IN CANINES

lice in 5.00 per cent of the positive animals where as 21.67 per cent animals had mixed infestation of different ectoparasites as shown in table 7 and figure 7.

4.4 HAEMATOLOGICAL STUDIES

The results of haematological values of the affected dogs, before therapy and after therapy and control animals pertaining to haemoglobin, total leucocyte count and differential leucocyte count are presented in table 8.

4.4.1 Haemoglobin (Hb)

The mean haemoglobin levels in affected dogs before therapy and after therapy and control animals were 11.92 ± 1.4 ; 14.21 and 11.10 grams per cent (Table 8) respectively.

4.4.2 Total leucocyte count (TLC)

The average total leucocyte count before therapy, after therapy and control animals were 15.85 ± 2.34 , 11.30 ± 2.45 and 16.57 ± 1.87 respectively as shown in table 8.

4.4.3 Differential leucocyte count (DLC)

The average percentage of differential leucocyte count in affected animals before therapy, after therapy and control animals was as follows Neutrophils 72.00 ± 3.48 ; 63.60 ± 4.53 and 73.5 ± 3.88 ; Lymphocytes 18.2 ± 3.56 ;

Table 8 : Haematological values in dogs affected with parasitic dermatitis

S.No.	Parameter	Affected dogs		Control animals	Normal values *
		Before Therapy	After Therapy		
1.	Hb (g/dl)	11.92±1.40	14.21±1.30	11.1±1.99	15.0
2.	TLC ($\times 10^3$ /ul)	15.85±2.34	11.30±2.45	16.57±1.87	11.5
3.	DCL (%)				
	Neutrophils	72.00±3.48	63.60±4.53	73.50±3.88	70.0
	Lymphocytes	18.20±3.56	27.75±4.95	16.87±4.89	20.0
	Eosinophils	6.58±1.82	2.67±1.56	6.20±1.60	4.0
	Monocytes	3.13±1.28	2.27±1.62	3.20±1.04	5.0
	Basophils	Nil	Nil	Nil	Nil

* Values given by Sastry, (1985).

27.75 \pm 4.95 and 16.87 \pm 4.39 Eosinophils 6.58 \pm 1.82 ; 2.67 \pm 1.56 and 6.2 \pm 1.6 and Monocytes 3.13 \pm 1.28 ; 6.2 \pm 1.62 and 3.2 \pm 1.04 respectively. None of the blood samples of the affected animals showed presence of basophils as indicated in table 8.

4.5 BIOCHEMICAL STUDIES

The biochemical estimations in affected dogs before therapy, after therapy and control animals are exhibited in table 9.

4.5.1 Total serum protein, albumin and globulin

The values of total serum protein, serum albumin and serum globulin in clinical cases of parasitic dermatitis in affected animals ; treated animals and control animals were as follows- total serum protein 5.92 \pm 0.40; 6.78 \pm 0.59 and 5.85 \pm 0.47 serum albumin were 2.52 \pm 0.49; 3.69 \pm 0.39 and 2.36 \pm 0.66 and serum globulin 3.6 \pm 0.28, 3.15 \pm 0.24 and 3.52 \pm 0.31 respectively.

4.6 THERAPY

The sixty positive cases of parasitic dermatitis were divided randomly into four groups of 15 animals in each. The animals in first group were treated with closantel orally of which only three animals have shown therapeutic

Table 9 : Biochemical values in dogs affected with Parasitic dermatitis

S.No.	Parameter	Affected dogs		Control animals	Normal values *
		Before Therapy	After Therapy		
1.	Total serum protein (g/dl)	5.92±0.40	6.78±0.59	5.85±0.47	6.7
2.	Albumin (g/dl)	2.52±0.49	3.69±0.39	2.36±0.66	3.56
3.	Globulin (g/dl)	3.60±0.28	3.15±0.24	3.52±0.31	3.14

* Values given by Benjamin, (1985).

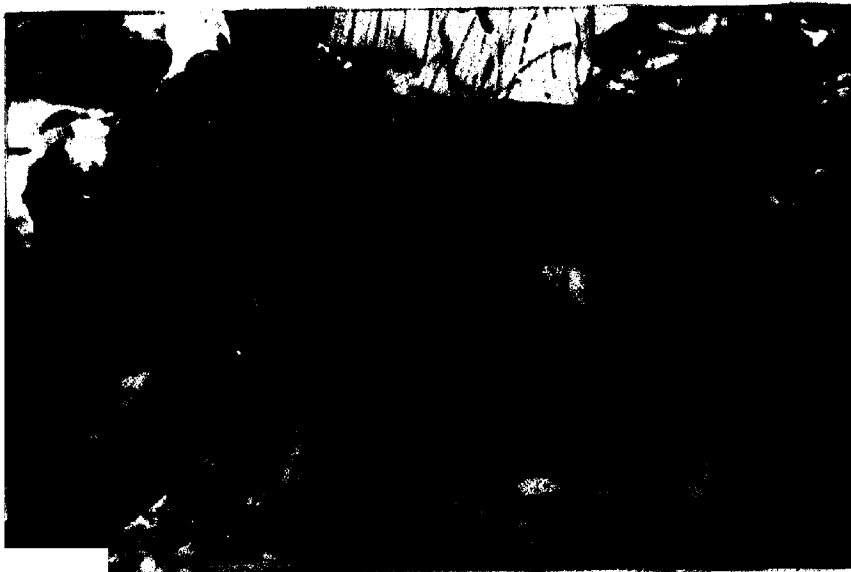
response. In second group of dogs cypermethrin topical spray therapy was given in which 14 dogs showed good response whereas the dogs in third group were treated with injection of Ivermectin subcutaneously in which 13 animals showed therapeutic response. The animals in group four were given placebo treatment, that is, subcutaneous injection of distilled water and none of them showed any therapeutic response and continued to have the dermatitis. The results of therapy are projected in table 10 and figure 8 (a to g).

Table 10 : Comparative efficacy of different drugs in treatment of parasitic dermatitis in canines

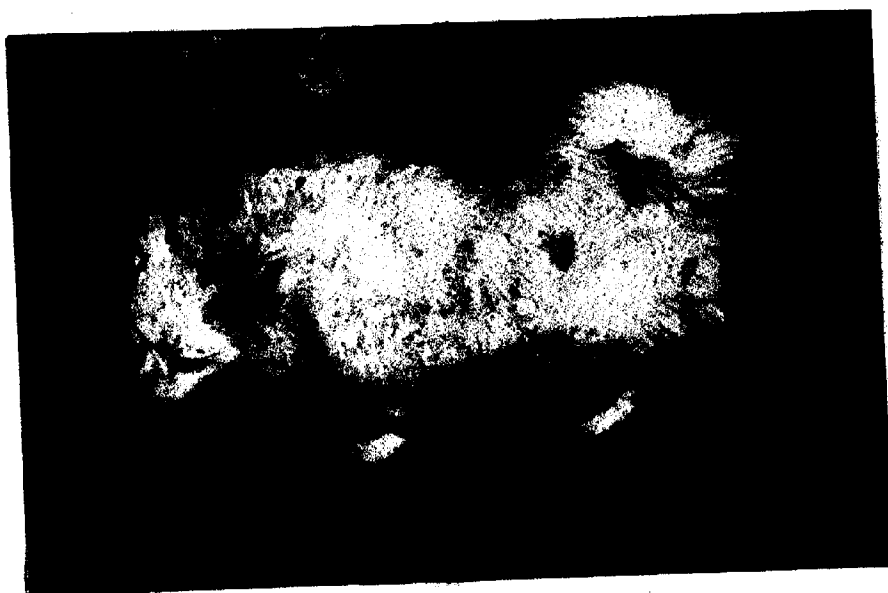
S.No. Treatment given	Affected dogs		Percent response
	Treated	cured	
1. Closantel oral Therapy	15	3	20.00
2. Cypermethrin topical spray Therapy	15	14	93.33
3. Ivermectin parenteral therapy	15	13	86.67
4. Control animals	15	Nil	Nil



8 a) Dog treated with cypermethrin
topical spray (Before therapy)



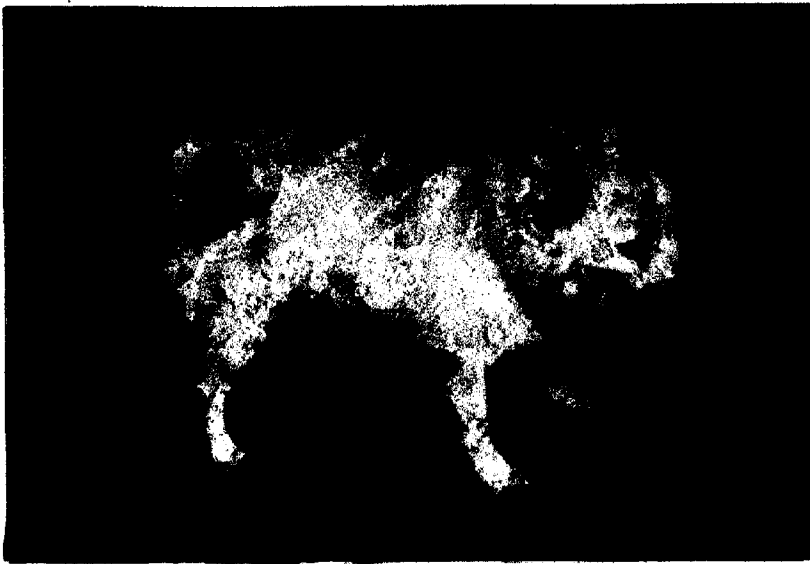
Dog treated with cypermethrin
topical spray (After therapy)



c) Dog treated with Ivermectin
injection (Before therapy)



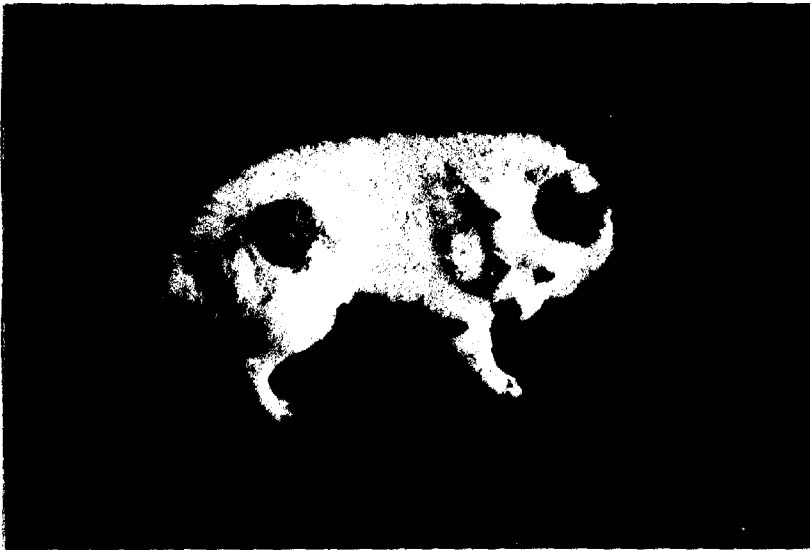
d) Dog treated with Ivermectin
injection (After therapy)



e) Dog treated with closantel oral
(Before therapy)



) Dog treated with closantel oral
(After Therapy)



g) Dogs given placebo therapy
(control)

DISCUSSION

CHAPTER V

DISCUSSION

A survey of the clinical records of the last three years was carried out at veterinary Hospital, Bhoiguda. Secunderabad to study the incidence of various skin disorders in canines with a particular reference to parasitic dermatitis. An investigation was also undertaken to study the epizootiological factors, clinical signs, haematological changes and biochemical profiles in dogs affected clinically with parasitic dermatitis. Therapeutic trails using oral, topical and parenteral parasitocidal drugs, were also carried out.

During the last three years (1994 to 1996), a total of 36300 canine cases were registered and of them 1392 (3.83%) dogs suffered with various dermatological disorders such as parasitic dermatitis, alopecia, eczema, pyoderma and non-specific dermatitis. The parasitic dermatitis was observed in 425 dogs giving an incidence of 36.53 per cent. Earlier the higher incidence of skin ailments was reported by ~~S. Mostols~~ Mostols et al, (1982) and Stoenieseu et al., (1973) where as lower incidence was reported by Gaafar et al. (1958), Murthy (1991) while studying skin infections in canines reported that 9.61 per cent dogs were affected with various skin ailments. However, incidence of parasitic dermatitis in the present study was about 36.53 per cent of

the skin disorders. Earlier Patel and Dave (1996) reported similar incidence of skin disease in buffaloes caused by various ectoparasites. The varied incidence of different skin ailments might be due to the geographical differences of the causative agents.

In the present study, the parasitic dermatitis was found to be significantly ($P < 0.05$) associated with the different age groups. The incidence in the present study decreased along with the advancement in the age. The dogs upto three years aged had significantly higher incidence when compared with those of 3 to 6 years and above six years in age. These results corroborate with the earlier reports of Sarkar et al. (1974) and Murthy (1991); where as Grant (1983) while studying the parasitic skin disease reported that all the dogs irrespective of any age group were affected equally. The decreased incidence along with increased age as seen in the present study might be due to the increased resistance of the animal along with advancement in age and taking care of some managerial factors such as regular bathing and grooming of hair etc.

In the present observation, the sex of the dog did not play any significant ($P > 0.05$) role in the incidence of parasitic skin diseases. These results corresponded with the earlier reports of Koutz (1954) and Avallini et al. (1970);

where as Chakraborti and Misra (1979) and Murthy (1991) reported the contradictory results by reporting higher incidence of skin infections in males than in females and explained the reasons as some hermonal imbalance at maturity in either sexes.

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The incidence of parasitic dermatitis in different breeds was variable. The dogs of pure breeds having long hairs suffered more oftenly when compared with crossbreed and non-discript dogs. These findings are on the lines of Grant (1985), Muller and Kirk (1969) and Ihrke (1995) where as Murthy (1991) observed the higher incidence in non discript dogs when compared to pure breeds. Season was found to be highly ($P < 0.01$) associated with the skin ailments; cold season being more favourable. In this study two thirds of the cases were reported in the cold season alone. Earlier Chakrabarthi and Misra (1979) and Murthy (1991) also recorded the highest number of skin disorders between September to March. The high incidence of parasitic dermatitis during cold climate as seen in the present study, might be due to the fact that the ectoparasites multiply rapidly when the climatic temperature is low with relative high humidity.

The clinical examination of the dogs with parasitic dermatitis was carried out to report any deviation from the normal health by recording body temperature, pulse

and respiration. Most of the infected dogs had pruritus, followed by alopecia, self-biting, erythema, ulceration and crusting along with pyoderma and pale mucous membranes. These signs corroborate with the earlier workers Muller and Kirk (1969), Thoday (1980), Yethi Raj et al. (1991) and Arlion et al., (1995).

The parasitological examination of the skin scrapings revealed the presence of ticks followed by mites, fleas, lice and mixed infestation.

The haematological studies in dogs affected with parasitic dermatitis revealed haemoglobin 11.92 ± 1.40 g/dl which improved after treatment to 14.21 ± 1.30 g/dl indicating that the infested animals had anaemia which further supported by the paleness of the mucous membranes. These findings confirm the earlier reports of Muller (1970), Gowda et al. (1982), Patel et al. (1991), Shobhamani (1994) and Arlion et al., (1995) and the anaemia in parasitic dermatitis might be due to chronic blood loss since the parasites suck blood (Rich and Coles, 1995). The total leucocyte count was also found increased in affected animals which returned to normal in the treated animals. These findings corroborate with the earlier reports of Gutman (1948), Gowda et al., (1982), Murthy (1991), Patel et al., (1991), Shobhamani et al., (1994) and Arlion et al., (1995).

The increase in leucocytes might be due to secondary bacterial infection which usually accompanies the skin lesions of dermatitis. The differential leucocyte count in the affected animals showed increased values of neutrophils and eosinophils. Earlier also Gutman (1988), Jennings (1952), Thoday (1981) Gowda et al, (1982), Murthy (1991), Shobhamani et al., (1994), Arlion et al., (1995) reported similar findings. The increase in neutrophil count in skin dermatitis might be due to tissue damage with excess release from storage pool of bone marrow (Rich and Coles, 1995) and the increase in eosinophilic cells might be due to the raised plasma histamine concentrations that resulted in release of eosinophils in circulation (Thoday, 1981).

The investigations into the biochemical profiles of the affected dogs in the present study indicated hypoproteinaemia, hypoalbuminaemia and hyperglobulinaemia. These findings are on the lines of earlier reports made by Pathak and Bhatia (1985), Murthy (1991) and Shakir et al., (1996). where as Sakakibara (1976) reported increased total serum proteins and globulin and decreased albumin/globulin ratio in dogs affected with skin diseases. All the biochemical profiles in the present study returned to normal range in the recovered animals after therapy.

The therapy of the parasitic dermatitis cases using cypermethrin (Ectomin) topical spray yielded the best results followed by the drug Ivermectin parenteral Therapy. The least effective drug was found closantel oral therapy. The drug cypermethrin being the new type of ectoparasiticide, no data was available to compare the present results. However the efficacy of the ivermectin reported in the present studies is on the lines of the results reported earlier by Sastri (1991), Murthy (1991), and Kamboj et al, (1993). Hayat et al., (1997) reported 98.7% efficacy of the Ivermectin for scabies case in camels. The drug cadistin was used as an antihistaminic to relieve the pruritus and the drug levamisole was used as an immunomodulator agent since it could increase haematological values, the bactericidal activity of serum, lysozyme content and phagocytic activity in the blood (Pakhomov, 1983). The drug cypermethrin earlier was used by Tonelli (1989) as a bath for ectoparasites in dogs and cats, with beneficial results and he did not report any toxic effects to the host. In the present study also the highest therapeutic response was obtained by cypermethrin (Ectomin) topical spray. The drug Ivermectin also yielded better results in parasitic dermatitis, but was costlier comparatively and toxic to some breeds of dogs. All the treated dogs were observed to remain protected from reinfestation upto 60 days of treatment.

indicating the residual effect of drug. Therefore, for treatment of parasitic dermatitis in canines, the topical use of cypermethrin as a spray is advised since it was found safer, economical, non-toxic, non-irritant with long residual effect and broad spectrum in activity (Anon. 1997).

SUMMARY

CHAPTER VI

SUMMARY

A survey was carried out to study the incidence of various skin ailments in canines with a particular reference to parasitic dermatitis. Studies were also made in respect of epizootiological factors, haematological changes and biochemical profiles along with a therapeutic regime.

In the present investigation, 1392 dogs with skin ailments were analysed. Of them, 425 animals suffered with parasitic dermatitis giving an incidence of 36.53 per cent.

The parasitic dermatitis was found to be significantly ($P < 0.05$) associated with the age of the animal, dogs upto 3 years had 63.33 per cent incidence, those between 3 to 6 years had 31.67 per cent incidence, those between 3 to 6 years had 31.67 per cent incidence where as animals above six years in age had the least (5.00%) incidence.

Sex had no influence on the incidence of parasitic dermatitis in canines ($P > 0.05$).

In relation to breed of the dog, 60.00 per cent incidence ($P > 0.01$) was seen in pure breed animals, 16.67 per cent in cross breed dogs and about 23.33 per cent incidence in non-discript animals.

The cold climatic conditions were closely associated ($P < 0.01$) with the incidence of parasitic dermatitis when compared to those in hot season.

The physical examination of the affected dogs revealed the clinical signs such as pruritus, alopecia, self-biting, erythema, ulceration and pale mucous membranes.

Among the haematological values, there was increase in the number of leucocytes, neutrophils and eosinophils and decrease in lymphocytes and haemoglobin concentration.

The biochemical estimation showed a mild decrease in protein, albumin and increase in globulin in the blood of the affected dogs.

For therapeutic purpose, both the drugs cypermethrin and Ivermectin yielded more or less similar results, however cypermethrin topical spray is recommended for routine use in the therapy of parasitic dermatitis in canines.

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APPENDIX

APPENDIX A

COLLEGE OF VETERINARY SCIENCE, RAJENDRANAGAR
DEPARTMENT OF MEDICINE

CASE - SHEET FOR PARASITIC DERMATITIS

1. History of the animal

Case No: Kind of Animal : Sex : M/F

Age : Breed : Season :

2. Name & Address of the owner :

3. Skin scraping Examination :

4. Clinical signs :

5. Haematological studies :

Before therapy After therapy

a) Hb concentration gm/dl

b) TLC (10^3)

c) DLC	N____L____M____	N____L____M____
	E____B____	E____B____

d) Total Serum Proteins gm/dl

Serum Albumins gm/dl

Serum Globulins gm/dl

6. Therapy :

a) Closantel oral

b) Cypermethrin Spray

c) Ivermectin inj

7. Supportive therapy

a) Antihistamines (Cadistin)

b) Immunomodulator Inj (Helmonil-C)

APPENDIX B

ESTIMATION OF TOTAL SERUM PROTEINS AND SERUM ALBUMIN

The total proteins level and albumin in serum was determined by the method of modified Biuret and Dumas (Annino, 1976) using kits and Span Diagnostics, Udha, Surat.

The following reagents were used:

Reagent 1 : Biuret Reagent (Modified)

Reagent 2 : Buffered Dye Reagent

Reagent 3 : Protein Standard

Procedure :

TOTAL PROTEINS

A. For Calorimeter

	Blank (B)	Standard (s)	Test (T)
Serum	(-)	(-)	0.1 ml
Reagent 2 : Protein Standard	(-)	0.1 ml	(-)
Reagent 3 : Biuret reagent (Modified)	5.0 ml	5.0 ml	5.0 ml

The above solutions were mixed well by inversion and allowed to stand at room temperature for 5 minutes. The optical density of standard (s) and test (T) was measured on a photoelectric calorimeter against distilled water with a green filter. The O.D. of test divided by O.D. of standard

multiplied with concentration of vial protein to get the serum total proteins as expressed in grams per cent.

Procedure :

ALBUMIN

B. For Calorimeter

		Blank (B)	Standard (s)	Test (T)
Reagent 2 : Buffered Dye reagent		4.5 ml	4.5 ml	4.5 ml
Serum		(-)	(-)	0.03 ml
Reagent 3 : Protein Standard		(-)	0.03 ml	(-)

The above solutions were examined well by inversion and allowed to stand at room temperature for 1 minute. The optical density of standard (s) and Test (T) was measured on a photoelectric calorimeter against distilled water with a red filter. The O.D. of test divided by O.D. of standard multiplied with concentration of the vial protein to get the serum albumin as expressed in grams per cent.