STUDIES ON DERMATITIS IN CANINES WITH SPECIAL REFERENCE TO MANGE, IN AND AROUND HYDERABAD

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FOR THE AWARD OF THE DEGREE OF

MASTER OF VETERINARY SCIENCE
(MEDICINE)

BY

B. BHAGAVAN REDDY, B.V.Sc. & A.H.

DEPARTMENT OF MEDICINE
COLLEGE OF VETERINARY SCIENCE
ANDHRA PRADESH AGRICULTURAL UNIVERSITY
RAJENDRANAGAR, HYDERABAD-500 030.

CERTIFICATE

Sri B.Bhagavan Reddy, has satisfactorily prosecuted the course of research and that the thesis entitled"**STUDIES ON DERMATITIS IN CANINES WITH SPECIAL REFERENCE TO MANGE, IN AND AROUND HYDERABAD**" submitted, is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that the thesis or part thereof, has not been previously submitted by him for a degree of any University.

Date: 27th April 1968

(Dr. A.A.GAFFAR)
Major Advisor
Professor and Head
Department of Medicine
College of Veterinary Science
RAJENDRANAGAR, HYDERABAD

CERTIFICATE

This is to certify that the thesis entitled "**STUDIES ON DERMATITIS IN CANINES WITH SPECIAL REFERENCE TO MANGE, IN AND AROUND HYDERABAD**" submitted in partial fulfilment of the requirements for the degree of Master of Veterinary Science (Veterinary Medicine) of the Andhra Pradesh Agricultural University, Hyderabad, is a record of the bonafide research work carried out by **Sri B. Bhagavan Reddy** under my guidance and supervision. The subject of the thesis has been approved by the Student's advisory committee.

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

(Dr. A. A. Gaffar)
Chairman of the Advisory Committee

Thesis approved by the Student Advisory Committee.

1. CHAIRMAN : (Dr. A.A.Gaffar)
Professor & Head,
Department of Medicine,
College of Veterinary Science,
Rajendranagar, Hyderabad.

2. MEMBER : (Dr. R.S.Raghavan)
Professor,
Department of Medicine,
College of Veterinary Science,
Rajendranagar, Hyderabad.

3. MEMBER : (Dr. Gopal Yadgirkar)
Associate Professor of Pathology,
AICRP on Poultry for eggs,
Rajendranagar, Hyderabad.

4. MEMBER : (Dr. V.A.Sangvikar)
Resident Veterinary Officer,
Veterinary Hospital,
Bhoiguda, Secunderabad.

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Name of the author	:	B. BHAGAVAN REDDY
Title of the thesis	:	"STUDIES ON DERMATITIS IN CANINES WITH SPECIAL REFERENCE TO MANGE, IN AND AROUND HYDERABAD".
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Guide	:	Dr. A. A. GAFFAR, B.V.Sc.& A.H.,M.S.(USA),Ph.D. PROFESSOR AND HEAD DEPARTMENT OF MEDICINE COLLEGE OF VETERINARY SCIENCE RAJENDRANAGAR HYDERABAD 500 030
University	:	ANDHRA PRADESH AGRICULTURAL UNIVERSITY, HYDERABAD - 500 030
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ABSTRACT

An attempt was made to study the incidence of mange in 540 dogs in and around Hyderabad. Epidemiological and clinical studies, haemato-biochemical investigations and therapeutic trials in clinical cases of Sarcoptic and demodectic mange were also undertaken.

Dogs positive for sarcoptic mange on skin scraping examination were randomly divided into 3 groups of 13 animals each and those positive for demodectic mange were also randomly divided into 3 groups of 5 animals

each for therapeutic trials with Flematic skin oil, Pestoban and Asuntol$^{(R)}$50. Flematic skin oil (undiluted) was applied over affected site daily for 4 consecutive days, when there was no response, 3 more applications were given at the interval of 3 days. Pestoban (1:25 with water) was also used in the same way as Flematic skin oil. Asuntol (0.5% solution) was applied 5 times at an interval of 3 days.

Further, 7 dogs positive for Sarcoptic mange and 5 dogs positive for demodectic mange were employed as untreated control. Skin scraping examination and haemato-biochemical investigations as PCV, Hb, TEC, TLC, DC and serum calcium levels were recorded at periodical intervals.

The survey of 540 dogs revealed 12.59 per cent incidence of mange indicating high susceptibility of dogs to mange infection. Sarcoptic mange alone contributed 8.51 per cent and demodectic mange 4.07 per cent of the dogs examined. The incidence of Sarcoptic ($P < 0.01$) and demodectic mange ($P < 0.05$) was significant in animals in the age group of 3-12 months and decreased with increase in age. The sex had an insignificant ($P > 0.05$) association with mange infestation. The observations in the present study also suggested an insignificant ($P > 0.05$) influence of breed on mange infestation.

The clinical symptoms observed in this study were pale visible mucous membrane, poor appetite, poor body condition, itching, alopecia, erythema, scab and papules. In addition, wrinkling and thickening of skin was also seen in cases of demodectic mange. The lesions were observed mostly over head, neck, abdomen, back and tail.

The relative efficacies of Flematic skin oil, Pestoban and Asuntol against clinical cases of mange infection were evaluated based on the numer of dogs found free of mange mites on skin scraping examination. In Sarcoptic mange affected groups, the efficacies of Flematic and Pestoban were negligible on day 3. Whereas in Asuntol treated group, 15.38 per cent efficacy was observed. On day 6, 15.38 per cent efficacies were found in both Flematic skin oil and Pestoban treated groups and 30.76 per cent efficacy in Asuntol treated group. On day 9, 38.46 per cent efficacies were observed in Flematic and Pestoban treated groups and 61.53 per cent in Asuntol treated animals. On day 12, 69.23 per cent, 61.53 per cent and 92.30 per cent efficacies were noticed in the groups treated with Flematic, Pestoban and Asuntol, respectively. However, on day 15, all the three drugs used were cent per cent effective.

In demodectic mange affected groups, till day 9, there was nil efficacy tor all the three drugs. Whereas on day 12, 20.0 per cent efficacy was recorded in Asuntol treated group when compared to Pestoban and Flematic skin oil. However, 20.0 per cent efficacies by Flematic and Pestoban and 40.0 per cent efficacy by Asuntol was observed on day 15. None of the drugs used was cent per cent effective in curing the demodectic mange. In infected untreated control groups, the skin scrapings were consistantly found to be positive during the entire period of study.

The haematological observations in all the respective three groups of Sarcoptic and demodectic mange before treatment revealed some degree of anaemia as indicated by low levels of PCV, Hb and TEC. In addition, leucocytosis, eosinophilia and slight neutrophilia was also recorded in this study when compared to uninfected controls. Following treatment, there was greater improvement in the haematological values in Sarcoptic mange group when compared to demodectic mange group.

The mean serum calcium values in all the affected animals were lower when compared with that of healthy control dogs. Gradual improvement in serum calcium level was observed in all the treated animals.

Gradual clinical improvement was observed after the treatment with each drug. The symptoms correlated well with the response to treatment.

No apparent toxic effects were observed against any drug used during and after therapy.

LIST OF ABBREVIATIONS USED

DLC	-	Differential leucocytic count
Eff.	-	Efficacy
Fig.	-	Figure
g or gm	-	gram
Hb	-	Haemoglobin
<	-	Less than
MCH	-	Mean Corpuscular haemoglobin
mg	-	Milligram
ml	-	Millilitre
mm	-	Milli Metre
>	-	More than
μl	-	Micro litre
OD	-	Optical density
PCV	-	Packed Cell Volume
%	-	Per cent
±	-	Plus or minus
rpm	-	Revolutions per minute
Sp	-	Species
SE	-	Standard error
TEC	-	Total erythrocytic count
TLC	-	Total leucocytic count
X^2	-	Chi-square

CHAPTER I

INTRODUCTION

CHAPTER I

INTRODUCTION

Dogs have been the subject of interest since antiquity for various reasons. The subject of "Comparative Dermatology" reminds us that the diseases of skin in animals and man have much in common. The multitude and variety of cutaneous diseases of animals have occupied the time and efforts of many Veterinarians and have presented an area as complex as human skin disease. The outstanding contribution to the medical literature has served to stimulate an increased interest in the study of animal and human skin diseases as they relate to one another.

Skin is greatly exposed to environmental influences and probably no other body system is subjected to diseases caused by such a wide range of etiological agents. Animal skin is exposed to attacks by many kinds of animal parasites.

Mange (scabies) is a dreaded and economically important disease not only in large animals but also in small animals (Sharma et al., 1983). Skin diseases constitute a major part of therapeutic activity in the treatment of small animals, out of which different types of marge

pose repeated problems of auto-infection and re-infection. The infestation of mange has its significance for its impact on health and growth of dogs.

Mainly two types of mite species that effect canine are Demodex canis and Sarcoptes scabiei var Canis The mite Demodex canis is part of the normal fauna of canine skin and is present in very small numbers in most of the healthy dogs (Muller and Kirk, 1969). Sarcoptes mange in dogs has become a relatively common cutaneous disease. Sometimes Sarcoptes mange becomes a serious problem in dogs and they may die due to extensive mange lesions.

The disease is also a highly contageous dermatological disease of zoonotic importance with the risk of its transmission to man (Schmidt, 1949; Smith and Claypoole, 1967; Thomset, 1968 and Kutzer and Gunberg, 1969).

The herbal/ayurvedic chemotherapeutic agents have not been extensively studied in dermatological disorders of canines. However, some herbal/Ayurvedic drugs like Himax (Ruprah et al., 1980) and Vederm lotion and Vederm Ointment (Mondal et al., 1983) were used against mange in domestic animals.

Therefore, the present study was undertaken to study the:

1. Incidence of mange in clinical cases of canines in the twin cities of Hyderabad and Secunderabad.

2. Symptomatology and distribution of lesions in positive cases of mange.

3. Haematological values and serum calcium levels in mange affected animals.

4. Comparative efficacy of few commonly available drugs like:

   i) Asuntol$^{(R)}$ 50

   ii) Pestoban

   iii) Flematic skin oil

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

REVIFW OF LITERATURE

2.1 INCIDENCE

Avellini et al. (1970) reported the incidence of Demodex folliculorum in the skin of 33 out of 120 (27.5%) dogs which were apparently free from skin lesions.

Rathore and Lodha (1973) recorded sarcoptic mange in 11% of camels kept under good conditions (by the army) and in 95% of Village camels, kept under poor conditions.

Stoenescu et al. (1973) noticed Demodex canis in 146 German shepherds (39.6%) out of 368 in a Kennel.

Chakraborthy and Mishra (1979) examined 1600 dogs between April 1976 to March 1977 and found demodectic lesions in 45 (2.8%) animals.

Santos motos et al. (1982) examined the skin scrapings of 294 dogs with skin diseases between 1975-80 and revealed Demodex canis in 87 (29.5%), Sarcoptes scabiei in 5 (1.7%) and Psoroptes sp. in one (0.3%).

Chakraborthy and Choudhury (1984) conducted a survey in 500 dogs in West Bengal and reported that 3%

of the dogs examined were infested with mange, mainly due to Sarcoptes scabiei.

Kamyszek (1984) reported that out of 659 dogs whose skin scrapings were examined, Demodex canis was found in 9% dogs and Sarcoptes scabiei var. Canis in 4.5% dogs.

Chakraborthy and Pradhan (1985) conducted survey in 665 dogs from urban and rural areas of West Bengal and reported highest incidence of demodicosis in dogs (3.8%), when compared with other livestock.

Huq et al. (1985) carried out survey in Bangladesh and reported that among 95 dogs with skin lesions 5 were found to be positive for Sarcoptes scabiei on skin scraping examination.

2.2 AGE, BREED, SEX AND SEASON

Unsworth (1946) reported that demodectic mange in dogs was common in short coated dogs and dogs under one year.

Sako (1965) conducted epidemiological studies in dogs infested with demodectic mange and reported that mites were able to survive at a low temperature and high humidity for a long time. They concluded that transmission was by contact, particularly in the suckling period.

Avellini et al. (1970) observed no difference between male and female dogs infested with Demodex folliculorum but long haired and older dogs were frequently infested.

Baker (1970) pointed out that demodectic mange in dogs was a disease of young and short haired dogs.

Rathore and Lodha (1973) reported that the frequency of sarcoptic mange in camels increased with increasing age and it was most frequent during winter.

Chakraborthy and Mishra (1979) observed that demodicosis in canines was most prevalent between September and March with highest number of lesions in November. Dogs betwen the age groups of 6 months to one year were more susceptible and the disease was more common in short haired than long haired breeds and in males than females.

Arlian et al. (1984) observed that low temperature and high relative humidity favoured survival of mites in dogs.

Chakraborthy and Choudhury (1984) studied the incidence of mange in dogs and found higher incidence in the age group of 0-23 months and the sex ratio of males to females was 0.84:1 with peak in winter.

Chakraborthy and Pradhan (1985) who surveyed demodicosis in livestock in West Bengal observed that females were more commonly infested than males and highest infestation (18%) was observed in animals between 36-47 months old and lowest (10%) in those 72 months and above.

Nolte and Ammelounx (1986) noted that 15.5% of the dogs with demodicosis were of 3 or more years of age.

2.3 ZOONOTIC IMPORTANCE

Schmidt (1949) reported that dogs used for hunting and retrieving often act as transmitters of Sarcoptes scabiei from foxes and badgers to domestic animals and man.

Smith and Claypoole (1967) reported 22 cases of human infestations with Sarcoptes scabiei var canis contacted from affected pets.

Thomset (1968) described the mange in man transmitted from dogs in which 48% of the lesions were confined to arms and torso.

Kutzer and Grunberg (1969) have opined that Sarcoptes scabiei can permanently parasitize man.

Dominguez et al. (1977) successfully infested a mongrel dog with Sarcoptes scabiei var. canis obtained from a human patient.

2.4 SYMPTOMATOLOGY AND DISTRIBUTION OF LESIONS

Unsworth (1946) reported head as the main site of predilliction in dogs affected with demodectic mange.

Lodha (1966) studied sarcoptic mange in camels and reported that lesions were distributed on face, neck, axillae and hind toes.

Muller and Kirk (1969) described the signs of Demodex canis as mild erythema, partial alopecia and no pruritis. The lesions were distributed on face, especially periocular areas and commissures of mouth, forelegs and trunk. In sarcoptic mange, the clinical findings were dermatitis which was characterised by erythema, papules and alopecia. External ear was the favourite habitat of mite but all cutaneous areascould be affected.

Dominguez et al. (1977) reported that main areas affected after experimental transmission of Sarcoptes scabiei var. Canis in a dog were axilla, thorax, groin, external ear and elbow.

Chakraborthy and Misra (1979) found demodicosis lesions in canines which were mostly confined to head, neck and forelimbs.

Chakraborthy and Pradhan (1985) reported that the sites of demodicosis in animals were head, neck and face followed by extrimities and body surface.

Mondal and Singh (1985) studied scabies in man and animals and described the symptoms of Sarcoptic mange in animals as intense itching which was characterized by dermatitis having erythema, papule, alopecia and formation of haemorrhagic crusts. The lesions were mostly distributed on less hairy parts of the body such a earflaps, nose tip, neck, buttocks and the extrimities.

Pathak and Bhatia (1986) reported that in a dog suffering from demodicosis the prominent lesions were on head, limbs and hips. Patches of the skin were seen pinkish or reddish in colour with uneven surfaces. Some parts were moist with serum-like fluid. Some parts were hyperkeratinised and wrinkling of skin was observed.

2.5 HAEMATO-BIOCHEMICAL CHANGES

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

Baldelli and Romanelli (1950) recorded high histamine content of the blood in guinea pigs suffering with spontaneous sarcoptic mange when compared with healthy one. They observed that although there was eosinophilia, the histamine levels were not proportional to the number of eosinophils in the blood.

Jennings (1952) reported eosinophilia in cases of dermatitis in animals.

Wiggers (1955) related deficiency of calcium to the hair fall out and eczematous skin condition in dogs.

Dent and Garrotts (1960) observed a transient hypocalcemia in skin diseases which responded well to Vitamin D and calcium gluconate injections. They also concluded that there was strong relationship between skin health and plasma calcium.

Julicher (1964) reported low serum calcium level in chronic skin affections.

Kress and Stockl (1964) found low serum calcium levels in six goats suffering from sarcoptic mange.

Klauder (1964) reported a high calcium, potassium ratio leading to increased cutaneous irritability and vice versa.

Misra and Misra (1964) reported leucocytosis followed by lymphocytosis in cases of non-specific dermatitis in an alsation dog.

Muller (1970) observed low levels of haemoglobin in cases of canine dermatitis.

Ramakrishnan et al. (1972) studied haemogram in dogs with eczema, sarcoptic mange, demodectic mange and ancylostomiasis and reported that in all the conditions there was increase in sedimentation rate and eosinophilic count. In addition there was an increase in neutrophils in eczema and monocytes in sarcoptic mange. They also recorded low levels of haemoglobin in clinical cases of non-specific dermatitis.

Misra et al. (1974) observed low levels of serum calcium in cases of demodectic mange in non-descript dogs.

Prasad et al. (1977) pointed out that there was tendency of fall of serum calcium in cases of non-specific dermatitis in cross bred calves. They also reported that calcium was more effective in the treatment of non-specific dermatitis in calves.

Gowda et al. (1982) reported low levels of calcium and glucose and high levels of cholesterol in dogs affected

with non-specific dermatitis. They also observed anemia, leucocytosis, lymphopaenia, eosinophilia and monocytosis. They opined that these changes pointed to an endocrine disorder, perhaps hypothyroidism.

Prasad (1984) reported that haematological studies of calves and goats suffering from scabies revealed low haemoglobin, PCV and erythrocytic counts indicating emaciation, anaemia and loss of body conditions.

Bhalerao et al. (1986) observed low haemoglobin and haematocrit values in goats infested with sarcoptic mange.

Pathak and Bhatia (1986) studied the haematology of a dog suffering from demodicosis. There was decrease in haemoglobin (9.70 g%), PCV (29.0%), TEC (5.46×10^6 µl) and leucocytosis (12000/µl).

Stromberg et al. (1986) reported that in hereford calves infested with Psoroptes ovis mange there was mild anaemia, lymphopaenia pronounced neutrophilia and variable eosinophilia. The severity of many of the changes were correlated with the extent of dermatitis.

2.6 THERAPEUTIC TRIALS

Perusal of literature revealed scanty information on Asuntol, flematic skin oil and Pestoban in mange in dogs. However, the accessible literature is cited.

Behrenz et al. (1959) conducted trials of Asuntol dips on sheep experimentally infested with blowfly larvae, ticks and keds and observed that the drug was effective.

Choudhury (1963[a]) conducted clinical trials against sarcoptic mange in goats with 0.5% coumaphos and reported that it was as good as 0.05% lindane and better than 0.035% lindane or 0.25% coumaphos.

Choudhury (1963[b]) treated calves heavily infested with demodectic mange after 4 applications of 0.75% Asuntol as a wash. The other calves which were having medium or light infestation were cured with 3 similar applications of 0.5% and 0.25% insecticide respectively.

Mimioglu et al. (1965) successfully treated five of six rabbits with Sarcoptes caniculi by local application of 0.05% - 0.2% Coumaphos (Asuntol).

Gupta et al. (1966) conducted clinical trials of Cedrus deodara oil against sarcoptic mange in buffalo

calves and reported that affected calves were successfully treated and cured with this drug within 6 to 8 days. However, they observed slight blistering and irritation when crude deodara oil was used.

Lodha (1966) reported that 0.05% Coumaphos gave 75% recovery in the treatment of Sarcoptic mange in camels.

Strickland and Gerrish (1966) studied the efficacy of Coumaphos against Psoroptes ovis in sheep and found that dips containing 0.21, 0.24 or 0.25 per cent suspensions eliminated infestation. Those dipped in 0.125% Coumaphos retained infestation.

Das and Misra (1972) studied the comparative efficacy of Malathion, Neguvon and Asuntol and pointed out that two applications of 0.5% Malathion were highly effective against demodectic mange in goats. The drug proved superior to 0.5% neguvon and 0.25% Asuntol.

Srivastava and Khan (1973) reported that dieldrin 0.1 - 0.2%, Asuntol (coumaphos) 0.25 or 0.5% neguvon (trichlorphon) 0.15% and lindane 0.05% were effective for the treatment of Sarcoptic mange in buffaloes.

Jawaharlal et al. (1976) reported that cedrus deodara oil was comparatively more efficacious than benzyl

benzoate or tetmosol against sarcoptic mange in sheep. 95.6% animals were cured on 16th days post-treatment.

Leibische et al. (1978[a]) successfully treated 5 sheep suffering from Psoroptes ovis with 0.05 or 0.1% Coumaphos solution. No livemites were recovered from sheep during the month after treatment.

Leibische et al. (1978[b]) treated Psoroptic and Chorioptic mange in bulls by spraying 0.1% Asuntol and treated Sarcoptic mange in lactating cows with 0.05% Asuntol. In either case 3 applications were given one week apart. No mites were found after 3rd treatment.

Ruprah et al. (1980) artificially infested buffaloes with Psoroptes and successfully treated them by 8 applications of Himax on alternate days.

Li (1981) used 16% Asuntol water emulsion in 53 flocks of sheep affected with Sarcoptic mange and the concentration of Asuntol water emulsion was 0.05%, the results were reported to be satisfactory without reoccurrence of disease.

Narang (1981) conducted Pestoban trials in a dog naturally infected with demodectic mange and reported 65 per cent efficacy after 72 hours of treatment. The low

efficacy was attributed to the fact that demodex is very difficult to treat and as such even 65 per cent results was considered as encouraging.

Satija (1982) conducted clinical trials of Pestoban in pigs suffering from sarcoptic mange and observed that Pestoban as 3% and 4% solutions were found to be effective as all pigs were cured within 20 days of treatment.

Mondal et al. (1983) conducted therapeutic trials with Ayurvedic preparations Vederm lotion and Vederm ointment to treat sarcoptic mange in dogs. They concluded that daily application of the lotion for a period of 15-20 days was sufficient to cure the disease. But ointment was found to be totally ineffective.

Sharma et al. (1983) observed that 16% Asuntol liquid (1:350 dilution) was effective against Psoroptic and Sarcoptic mange in buffalo calves. The calves were sprayed twice at an interval of one week. The treated calves were free from mites two weeks after last application.

Pestoban is a liquid concentrate of various non-poisonous plants and is claimed to have no toxicity to the animals (Anonymous, 1984).

Bhalerao et al. (1986) used different chemotherapeutic drugs to treat Sarcoptic mange in sheep and goats and reported that flematic skin oil and 0.5% Asuntol have given best results in mild and medium cases.

Nooruddin et al. (1986) studied the efficacy of Pestoban against ticks and lice in cattle and buffaloes and observed 75 per cent efficacy after one application and 100 per cent efficacy after 2nd application.

Sharma et al. (1986) revealed that 1:350 concentration of Asuntol(R) 16% liquid was more effective than 1:800 concentration in pigs suffering from Sarcoptes scabiei var. suis.

Sinha et al. (1987) reported that Pestoban was effective against tick infestation in cows, buffaloes, calves, dogs and poultry when applied as 1:20 dilution in water, once daily for 3 consecutive days without washing. They also reported that only one application was effective against lice, fleas, and mites in 1:50 dilution.

Thakur et al. (1988) reported that Pestoban was 100 per cent effective against both ticks and lice when applied at 1 in 10 dilution in calves and poultry respectively.

CHAPTER III

MATERIALS AND METHODS

CHAPTER III

MATERIALS AND METHODS

3.1 COLLECTION OF CLINICAL MATERIAL

Incidence of mange in dogs was studied in and around Hyderabad city by the examination of skin scrapings from December 1985 to May 1986. A total of 540 animals affected with dermititis and admitted in various veterinary hospitals were screened for mange mites by deep skin scraping examination. Of the 68 animals positive for either sarcoptic or demodectic mange, 54 were randomly selected for clinical trials. The skin scrapings were examined by standard techniques for detection of mange mites. Age, sex and breed wise distribution of mange was also recorded.

Dogs positive for sarcoptic mange were randomly divided into three experimental groups each having 13 animals and dogs positive for demodectic mange were similarly divided into three groups each having 5 animals for therapeutic trials with Flematic* skin oil (Extract of Deodar oil and other select vegetable oils), Pestoban** (Ayurvedic ectoparasiticide liquid extract of various medicinal plants) and Asuntol*** (0,0-Diethyl-0-(3-chloro

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* Flematic skin oil, T.T.K.Pharma Private Limited (Animal Welfare Division), Old trunk Road, Madras-600043.

** Pestoban, Indian Herbs Research and Supply Co., Sharda Nagar, Saharanpur (U.P.) 247001

*** (R)

4-methyl-T-Coumarinyl)-phosphorothioate. 50% wettable powder).

Further, 7 dogs positive for sarcoptic mange and 5 dogs positive for demodectic mange were employed as untreated controls. Seven healthy dogs were also used as uninfected controls.

Haemato-biochemical changes were studied before and after treatment in experimental and control groups. Dogs of either sex, different age groups and breeds were included in the study.

The examination of skin scrapings of experimental and infected but untreated control group was carried out on day 0, 3, 6, 9, 12 and 15. In addition, haemato-biochemical observations were recorded on day 0, 6 and 15.

3.2 EXAMINATION OF SKIN SCRAPINGS

The skin scrapings were examined as per the method described by Soulsby (1982).

The skin scrapings were collected (Muller and Kirk, 1969) with blunt scalpel after applying a drop of mineral oil to trap parasites, hair and scales and to facilitate their adherence to the scalpel. Skin scrapings were taken from 2-3 different affected sites and transferred into a test tube and treated with 5 ml of 10 per cent NaOH solution. The material was centrifuged for 2 minutes at 1000 rpm. A drop of sediment was examined under the microscope.

3.3 HAEMATO-BIOCHEMICAL METHODS

3.3.1 Collection of blood:

Blood for haematological studies was collected from the external saphenous vein after cleaning the area into sterile vials containing the Heller and Paul's oxalate mixture at the rate of 0.5 ml/5ml of blood as an anticoagulant.

Haematological studies were carried out within an hour of the collection. Samples were taken from positive cases on day 6 and 15 after treatment. Whole blood was used for the estimation of packed cell volume (PCV), Haemoglobin (Hb), total erythrocytic count (TEC), total leucocytic count (TLC) and differential leucocytic count (DLC).

3.3.2 Packed cell volume:

PCV was estimated by using the microhaematocrit method as described by Schalm et al. (1975).

Oxalated blood was drawn into haematocrit capillary tubes measuring 75 mm in length and 1.1 mm internal diameter by capillary action. After sealing, the capillary tubes were placed in Remi microcentrifuge (RM-12) with the sealed end away from the centre and spun for 5 minutes at 10,000 rpm. The PCV was read in per cent directly with the help of special reader.

3.3.3 Haemoglobin estimation:

Cyanmethaemoglobin method as described by Benjamin (1961) was followed.

A small quantity of blood (0.02 ml) was added to 5 ml of Drabkin's solution containing the following reagent grade chemicals.

Sodium bicarbonate	-	1.0 gm
Potassium cyanide	-	50 mg
Potassium ferricyanide	-	200 mg
Aqua distillata add	-	1000 ml

The contents of tube were thoroughly mixed and allowed to stand for 10 minutes for release and conversion of Hb to cyanmethaemoglobin and then measured for absorbance in Systronics haemoglobinometer (Type 182) at 540 nm. The results were expressed in g/dl.

3.3.4 Total erythrocytic count:

The total erythrocytic counts were made using the method described by Schalm et al. (1975).

3.3.5 Total leucocytic count:

The total leucocytic counts were made using the method described by Schalm et al. (1975).

3.3.6 Differential leucocytic count:

Thin blood smears were prepared from drops of blood collected by ear prick. The smears were subsequently dried and stained by Leishman's stain. The differential count percentage was calculated by examining the stained slides under oil immersion objective and counting the leucocytes by battlement method (Schalm et al., 1975). A minimum of 200 cells were counted to give the values for each cell type of leucocytes in percentage.

3.3.7 Collection of serum:

About 5-10 ml of blood was collected into sterile test tubes kept in slanting position and were allowed to clot for half an hour. The samples were then kept in refrigerator to facilitate the retraction of clot and the serum was separated by centrifuging at a lower speed and collecting the clear supernatant.

3.3.8 Serum calcium estimation:

Serum calcium was estimated as per the method described by Ray Sarkar and Chauhan (1967).

The following reagents (Ethno test*) were used.

Calcium Reagent I	:	Alkaline buffer
Calcium Reagent II	:	O-cresolphthalein complexone tablets
Calcium Reagent III	:	Acid Reagent
Calcium Standard	:	(15 mg/dl)

In this method 1 to 4 dilution test sample and a standard was used.

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* Ethnor Limited, 30, Forjelt Street, Bombay-36

Calcium Reagent II (O-cresolphthalein complexone) was prepared by taking 5 ml of distilled water in a clean and dry tube and then 0.5 ml of calcium Reagent III was added. One tablet of calcium reagent II was then added and dissolved.

Working standard (10 mg/dl) was prepared by diluting two parts of calcium standard (15 mg/dl) with one part of distilled water. This gave a working calcium standard of 10 mg/dl.

Pipetted the reagent into three tubes labled as Test (T), Standard (S) and Blank (B) as shown below:

	Test (T)	Standard (S)	Blank (B)
*Serum diluted 1 to 4	0.1 ml	-	-
**Working standard (10mg/dl) diluted 1 to 4	-	0.1 ml	-
Distilled water	-	-	0.1 ml
Reagent I	3.0 ml	3.0 ml	3.0 ml
Reagent II	1.5 ml	1.5 ml	1.5 ml

* Serum diluted 1 to 4 (0.1 ml serum 0.3 ml distilled water).

** Working Standard (10 mg/dl) diluted 1 to 4 (0.1 ml working standard + 0.3 ml distilled water)

Mixed the contents thoroughly and allowed them to stand at room temperature for 5 minutes. Measured the optical density (O.D) of the test and standard at 575nm against the blank in a Spectronic-20 Spectophotometer (Bausch and Lomb incorporated, New York).

$$\frac{\text{O.D.) test}}{\text{(O.D.) standard}} \times 10 = \text{Calcium conentration in mg/dl}$$

3.4 THERAPEUTIC TRIALS:

The following three drugs were used to determine their comparative efficacy in three different groups for each trial, affected with either sarcoptic or demodectic mange.

Prior to treatment, thick superficial scab and crusts attached to the skin were removed mechanically. Individual drug was applied liberally with the help of cotton swabs.

Group I

Flematic skin oil (without dilution) was applied daily for 4 consecutive days, when there was no response, 3 more applications were given at the interval of 3 days.

Group II

Pestoban (1:25 with water) was applied daily for 4 consecutive days and when the skin scrapings continued to be positive, the treatment was further repeated 3 times at 3 days interval.

Group III

Asuntol(R) (0.5% solution) was applied over affected skin and a total of five applications were given at the interval of 3 days. The applications were discontinued on the day the skin scrapings were found negative for mange mites.

The skin scraping examination was carried out on day 0 before treatment and on day 3, 6, 9, 12 and 15 post treatment. The owners were advised to keep the dogs indoors, preferably on concrete floor and to adopt all hygienic measures as advised.

The percentage of efficacy of the drug was recorded on the basis of number of animals found free of mange mites as determined by skin scraping examination.

3.5 STATISTICAL ANALYSIS:

The statistical analysis of data in respect of parameters was tabulated groupwise. Mean, Standard error and Chi-square values were calculated according to the procedure described by Snedecor and Cochran (1967).

The Chi-Square (X^2) test was employed to find out the association of mange with age, breed and sex of the dogs.

$$\text{Chi square } (X^2) = \Sigma \frac{(fo-fc)^2}{FC}$$

where Σ = Summation

fo = Observed frequencies

fc = Calculated or expected frequencies

CHAPTER IV

RESULTS

CHAPTER IV

RESULTS

4.1 INCIDENCE OF SARCOPTIC AND DEMODECTIC MANGE IN DOGS

4.1.1 Incidence in different age groups

The incidence of sarcoptic and demodectic mange in dogs belonging to different age groups is presented in table 1. Out of 540 animals examied, 46 (8.51 per cent) were found to be positive for sarcoptic mange and 22 (4.07 per cent) for demodectic mange.

The highest incidence (27.27 per cent) of sarcoptic mange was found in the age group of 6-12 months (Fig.1). A low incidence rate of 11.57, 6.97 and 3.44 per cent were found in age groups of 3-6, 12-24 and 24 months and above, respectively. None of the animals examined in the age group of 1-3 months were found to be positive for sarcoptic mange.

The incidene of demodectic mange was found to be 10.52 and 21.81 per cent in the age groups of 3-6 and 6-12 months, respectively. Whereas there was no incidence of demodectic mange in the age groups of 1-3 months and animals above 12 months of age.

Table 1

Incidence of Sarcoptic and Demodectic mange in dogs of different age groups

Age in months	Number of animals examined	Sarcoptes sp.		Demodex sp.		Total infected	
		Animals positive	Incidence (%)	Animals positive	Incidence (%)	Animals positive	Incidence (%)
1-3 months	30	0	-	0	-	0	-
3-6 months	95	11	11.57	10	10.52	21	22.10
6-12 months	55	15	27.27	12	21.81	27	49.09
12-24 months	215	15	6.97	0	-	15	6.97
24 months and above	145	5	3.44	0	-	5	3.44
Total	540	46	8.51	22	4.07	68	12.59

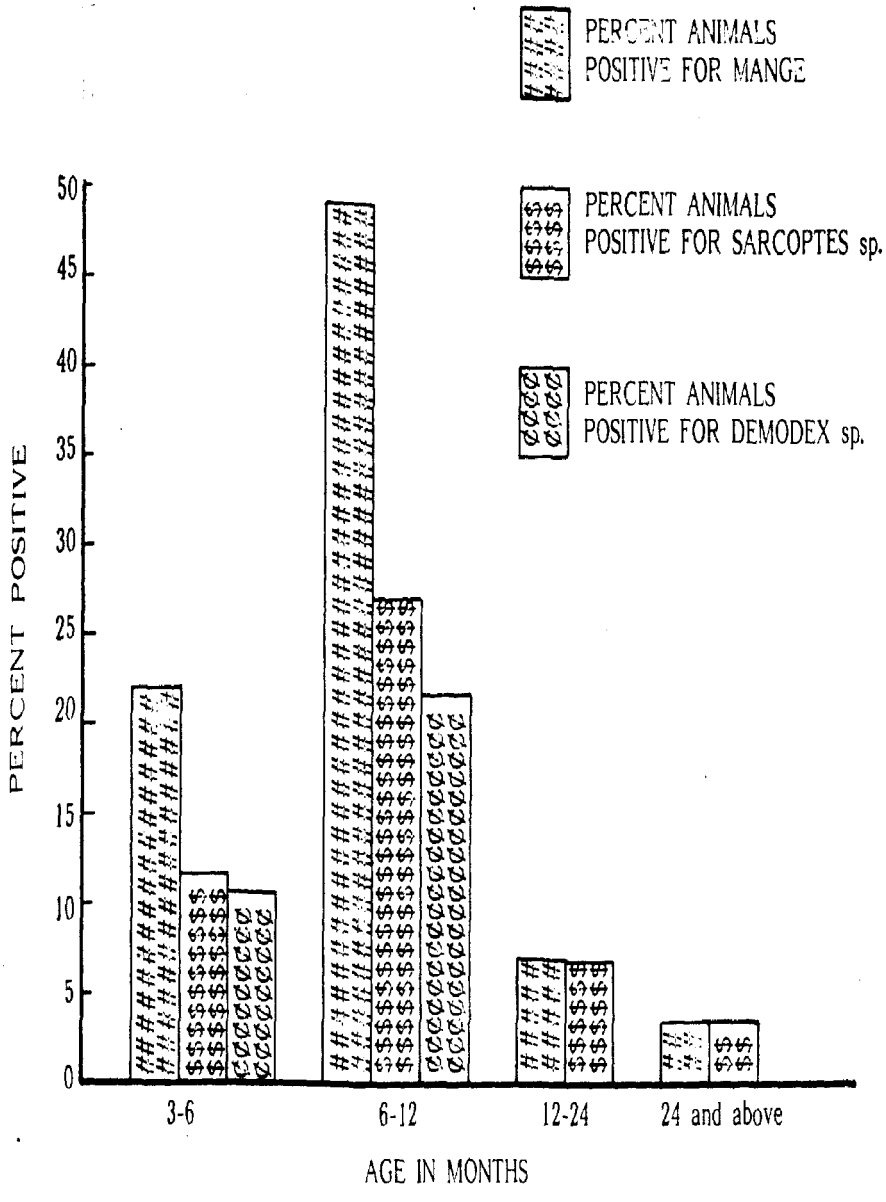


Fig. 1: PERCENT INCIDENCE OF SARCOPTIC AND DEMODECTIC MANGE IN DOGS IN RELATION TO AGE

The chi-square test of the age wise data (Table 4) revealed that the sarcoptic mange (X^2=10.11 > 9.21; P<0.01) and the demodectic mange (X^2=6.00 > 3.84; P < 0.05) were highly correlated with the age of the dog, the most vulnerable period being between 6 months to one year of age which had the highest incidence of the disease.

The incidence of mange including sarcoptic and demodectic was found to be highest (49.09 per cent) in 6 to 12 months age group and lowest (3.44 per cent) in animals above 24 months of age. Out of 30 dogs affected with dematitis, no dog was found to be positive for mange in the age group of 1-3 months.

4.1.2 Incidence in different sex groups

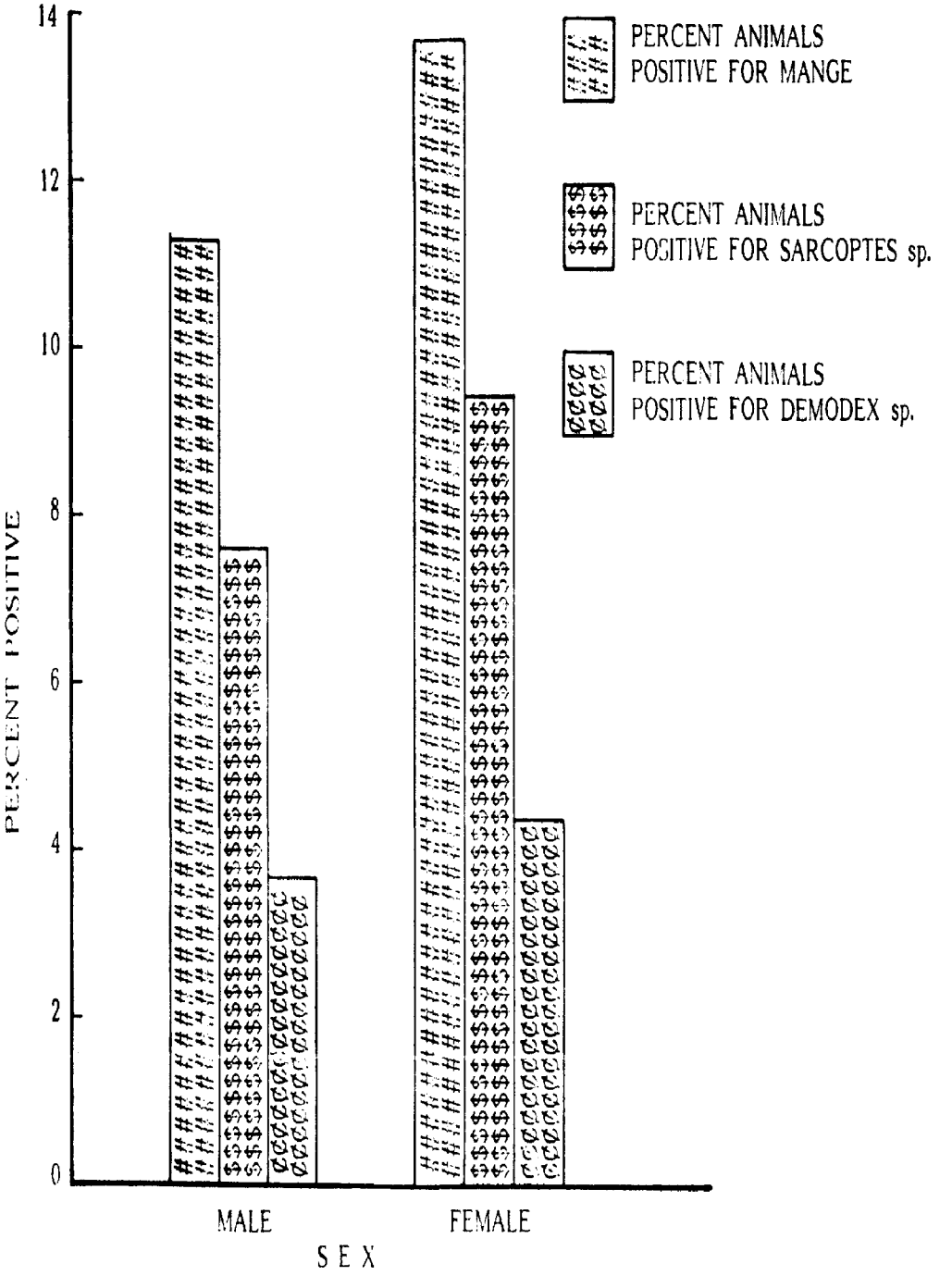
Incidence of sarcoptic and demodectic mange in dogs of different sex groups is shown in table 2. Out of 265 male dogs examined, 7.54 and 3.77 per cent were positive for sarcoptic and demodectic mange respectively. Among the 275 female dogs examined 9.45 per cent were positive for sarcoptic mange whereas demodectic mange was recorded in 4.33 per cent dogs.

Though the percentage incidence of sarcoptes in males and females was 7.54 and 9.45 (Fig. 2), the difference

Table 2

Incidence of Sarcoptic and Demodectic mange in dogs in different sex groups

Sex	Number of Animals examined	Sarcoptes sp.		Demodex sp.		Total infected	
		Animals positive	Incidence (%)	Animals positive	Incidence (%)	Animals positive	Incidence (%)
Male	265	20	7.54	10	3.77	30	11.32
Female	275	26	9.45	12	4.33	38	13.81
Total	540	46	8.51	22	4.07	68	12.59


14
12
10
8
6
4
2
0
PERCENT POSITIVE
MALE
FEMALE
SEX
PERCENT ANIMALS POSITIVE FOR MANGE
PERCENT ANIMALS POSITIVE FOR SARCOPTES sp.
PERCENT ANIMALS POSITIVE FOR DEMODEX sp.

was statistically insignificant (X^2=0.24 < 3.84; P > 0.05) (Table 4). Similarly, in case of demodex also, similar insignificant differences (X^2=0.22 < 3.84; P > 0.05) were noticed indicating that both the sexes were more or less equally susceptible to the mange infection.

4.1.3 Incidence in different breeds

Breed wise distribution of sarcoptic and demodectic mange is presented in Table 3.

The highest incidence rate of 12 per cent sarcoptic mange was recorded in non-descript breeds, followed by Alsatian (7.36 per cent), Dachshund (5.45 per cent) and Pomerania (4.44 per cent).

The incidence of demodectic mange was found to be highest (4.88 per cent) in non-discript breed (Fig.3) followed by Alsatian (4.21 per cent), Dachshund (3.63 per cent) and Pomeranian (2.22 per cent).

Breed of the dog also did not have any influence over the incidence of Sarcoptes (X^2=0.92 < 5.99; P > 0.05) and demodex mange (X^2=0.23 <5.99; P > 0.05) indicating more or less similar pattern of infection amongst all the dogs affected irrespective of the breed.

Table 3

Incidence of Sarcoptic and demodectic mange in dogs in different breeds

Breed	Number of animals examined	Sarcoptes sp.		Demodex sp.		Total infected	
		Animals positive	Incidence (%)	Animals positive	Incidence (%)	Animals positive	Incidence (%)
1. Non-descript	225	27	12.0	11	4.88	38	16.88
2. Alsatian	190	14	7.36	8	4.21	22	11.57
3. Dachshund	55	3	5.45	2	3.63	5	9.09
4. Pomeranian	45	2	4.44	1	2.22	3	6.66
5. Labrador	20	0	-	0	-	-	
6. Cockerspaniel	5	0	-	0	-	0	-
Total	540	46	8.51	22	4.07	68	12.59

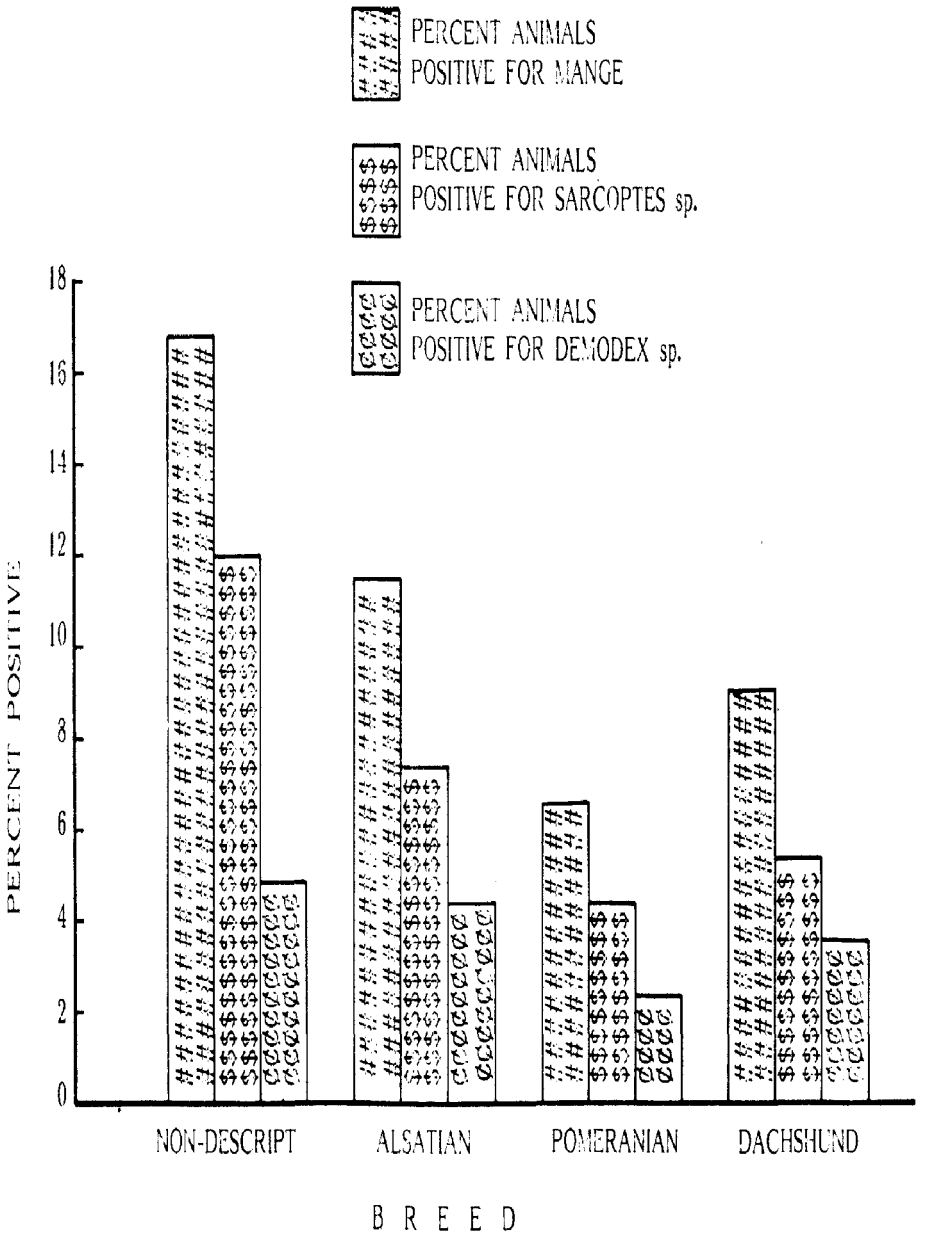


Fig. 3: PERCENT INCIDENCE OF SARCOPTIC AND DEMODECTIC MANGE IN DOGS IN RELATION TO BREED

Table 4

The Chi-square (X^2) values with reference to mange in association with different parameters

S.No.	Parameter	df	X^2-value (calculated)	X^2-value (Table) 0.05	0.01
1.	Age				
	i) Sarcoptes sp.	2	10.11*	5.99	9.21
	ii) Demodex sp.	1	6.00**	3.84	6.63
2.	Sex				
	i) Sarcoptes sp.	1	0.24 NS	3.84	6.63
	ii) Demodex sp.	1	0.22 NS	3.84	6.63
3.	Breed				
	i) Sarcoptes sp.	2	0.92 NS	5.99	9.21
	ii) Demodex sp.	2	0.23 NS	5.99	9.21

*P < 0.01
**P < 0.05
NS = Non-significant

Dogs which were kept inside the house and on cement floors were less prone to mange compared to those kept outside and mud floor

Dogs which were not given bath or given at an interval of 15 days and above were more prone for mange than those given bath at weekly intervals.

Dogs which were given bath with tetmosol soap were less prone to mange.

4.2 CLINICAL FINDINGS IN MANGE INFECTED DOGS

The positive cases of mange were examined in detail for clinical symptoms. Pale visible mucous membranes, poor appetite, general weakness,poor body condition, itching and alopecia were observed in all cases examined. Erythema was seen in sarcoptic as well as demodectic mange. Scab and papules were also observed. Wrinkling and thickening of affected skin was seen in demodectic mange only.

The rectal temperature of affected dogs was in the range of 99° to 103°F.

In dogs affected with sarcoptic mange the lesions were observed over throat and neck region , forelimbs, back and tail, face and abdomen.

In dogs affected with demodectic mange the lesions were seen on forelimbs, back and tail, face and abdomen.

4.3 HAEMATO-BIOCHEMICAL OBSERVATIONS IN UNINFECTED DOGS (CONTROL)

Results of haemato-biochemical observations in uninfected dogs (control) are presented in table 5.

The mean value of PCV in healthy animals was 44.28 ± 0.62 (%), whereas mean values of Hb, TEC, TLC, neutrophils, Lymphocytes, monocytes, eosinophils and calcium were 13.0 ± 0.40 (g/dl) 6.52 ± 0.11 ($X10^6/_{\mu}l$), 11.50 ± 0.10 ($x10^3/_{\mu}l$), 72.42 ± 1.65(%), 18.14 ± 1.21(%), 6.14 ± 0.51(%), 3.28 ± 0.33(%) and 12.20 ± 0.15 (mg/dl), respectively.

4.4 HAEMATO-BIOCHEMICAL OBSERVATIONS IN DOGS INFECTED WITH SARCOPTIC MANGE WITHOUT TREATMENT (CONTROL)

The mean values of haemato-biochemical observations in dogs infected with sarcoptic mange without treatment are presented in table 6. Perusal of the data at different time intervals revealed no significant variation in PCV, Hb, TEC, TLC, neutrophils, lymphocytes, monocytes, eosinophils and calcium till the end of the experiment.

Table 5

Haemato-biochemical observations in uninfected dogs (control)

S No.	PCV (%)	Hb (g/dl)	TEC ($X10^6/\mu l$)	TLC ($X10^3/\mu l$)	DLC(%) N	L	M	E	Ca (mg/dl)
1.	44	13	7.2	11.67	68	20	9	3	12.20
2.	46	12	6.3	11.26	64	24	7	5	12.90
3.	47	15	6.4	11.17	74	18	5	3	11.90
4.	43	12	6.5	11.68	73	20	5	2	12.50
5.	45	12	6.2	11.72	76	15	6	3	12.00
6.	42	14	6.5	11.15	75	16	5	4	12.10
7.	43	13	6.6	11.91	77	14	6	3	12.30
Mean ± SE	44.28 ± 0.62	±3.00 ± 0.40	6.52 ± 0.11	11.50 ± 0.10	72.42 ± 1.65	18.14 ± 1.21	6.14 ± 0.51	3.28 ± 0.33	12.20 ± 0.15

Table 6

Haemato-biochemical observations in dogs infected with sarcoptic mange without treatment (control)

Haemato-biochemical parameters	Day 0	Day 6	Day 15
PCV (%)	36.85 ± 0.47*	36.42 ± 0.44*	36.57 ± 0.34*
Hb(g/dl)	9.61 ± 0.19	9.57 ± 0.16	9.70 ± 0.17
TEC($X10^6/\mu l$)	4.90 ± 0.05	4.94 ± 0.06	4.91 ± 0.08
TLC ($X10^3/\mu l$)	21.63 ± 0.26	21.58 ± 0.29	21.63 ± 0.26
Neutrophils (%)	73.80 ± 0.40	72.39 ± 0.48	73.80 ± 0.22
Lymphocytes (%)	14.50 ± 0.40	17.30 ± 0.54	14.60 ± 0.40
Monocytes (%)	5.15 ± 0.34	5.02 ± 0.25	6.60 ± 0.10
Eosinophils (%)	6.00 ± 0.38	5.28 ± 0.23	5.40 ± 0.12
Calcium (mg/dl)	10.41 ± 0.13	10.28 ± 0.12	10.44 ± 0.11

* Mean values of 7 dogs ± SE

4.5 HAEMATO-BIOCHEMICAL OBSERVATIONS IN DOGS INFECTED WITH DEMODECTIC MANGE WITHOUT TREATMENT (CONTROL)

Results of haemato-biochemical observations in dogs infected with demodectic mange without treatment are presented in table 7. The perusal of the data at time intervals of day 0, 6 and 15 revealed no significant changes in mean values of PCV, Hb, TEC, TLC, Neutrophils,Lymphocytes, Monocytes, Eosonophils and Calcium.

4.6 DRUG TRIALS

4.6.1 Flematic skin oil treated group

4.6.1.1 Haemato-Biochemical findings in dogs affected with sarcoptic mange:

The results of haemato-biochemical estimations in dogs infected with sarcoptic mange and treated with Flematic skin oil are presented in table 8.

The mean value of PCV (%) in infected dogs before treatment was 37.07 ± 0.35 whereas after treatment on day 6 and 15 the values were 41.23 ± 0.42 and 46.46 ± 0.42, respectively.

Table 7

Haemato-biochemical observations in dogs infected with demodectic mange without treatment (control)

Haemato-biochemical parameters	day 0	day 6	day 15
PCV (%)	37.2 ± 0.46*	37.0 ± 0.44*	37.6 ± 0.31*
Hb(g/dl)	9.05 ± 0.17	9.1 ± 0.14	9.1 ± 0.13
TEC($X10^6/\mu l$)	4.47 ± 0.05	4.47± 0.04	4.43± 0.14
TLC ($X10^3/\mu l$)	21.72± 0.24	21.46± 0.2	21.62± 0.3
Neutrophils (%)	74.2 ± 0.30	73.8 ± 0.22	74.4 ± 0.67
Lymphocytes (%)	14.0 ± 0.29	14.6 ± 0.40	13.8 ± 0.24
Monocytes (%)	6.2 ± 0.24	6.6 ± 0.10	6.4 ± 0.77
Eosinophils (%)	5.6 ± 0.32	5.4 ± 0.12	5.8 ± 0.63
Calcium (mg/dl)	10.41± 0.19	10.44± 0.11	10.34± 0.93

* Mean of 5 infected untreated dogs

± Standard error

Table 8

Haemato-biochemical findings in dogs infected with sarcoptic mange and treated with Flematic skin oil

Parameters	Before treatment	After treatment	
		day 6	day 15
PCV (%)	37.07 ± 0.35*	41.23 ± 0.42*	46.46 ± 0.42*
Hb(g/dl)	9.56 ± 0.29	11.76 ± 0.30	13.56 ± 0.21
TEC($X10^6/\mu l$)	4.51 ± 0.09	5.30 ± 0.06	6.92 ± 0.06
TLC ($X10^3/\mu l$)	22.52 ± 0.42	17.66 ± 0.29	11.72 ± 0.24
Neutrophils (%)	73.61 ± 0.67	72.00 ± 0.48	70.15 ± 0.35
Lymphocytes (%)	14.15 ± 0.40	17.69 ± 0.52	21.38 ± 0.48
Monocytes (%)	5.15 ± 0.34	5.00 ± 0.21	4.38 ± 0.20
Eosinophils (%)	6.30 ± 0.38	5.30 ± 0.20	4.07 ± 0.13
Calcium (mg/dl)	10.41 ± 0.13	11.48 ± 0.09	12.32 ± 0.05

* Mean values of 13 dogs ± SE

Hb (g/dl) was 9.56 ± 0.29 before treatment and 11.76 ± 0.30 and 13.56 ± 0.21 on day 6 and 15 respectively, after treatment.

TEC ($X10^6/\mu l$) was 4.51 ± 0.09 before treatment and 5.30 ± 0.06 on day 6 and 6.92 ± 0.06 on day 15 after treatment.

TLC ($X10^3/\mu l$) was 22.52 ± 0.42 before treatment whereas the values were 17.66 ± 0.29 and 11.72 ± 0.24 on day 6 and 15, respectively, after treatment.

Neutrophils (%) were 73.61 ± 0.67 in infected dogs before treatment. After treatment on day 6 and 15 the values were 72 ± 0.48 and 70.15 ± 0.35, respectively.

Lymphocytes (%) were found to be 14.15 ± 0.40 before treatment and 17.69± 0.52 and 21.38 ± 0.48 on day 6 and 15, respectively, after treatment.

Monocytes (%) were 5.15 ± 0.34 before treatment and 5.0 ± 0.21 and 4.38 ± 0.20 on day 6 and 15, respectively, after treatment.

Eosinophils (%) were 6.3 ± 0.38 before treatment whereas the values after treatment were 5.3 ± 0.20 and 4.07 ± 0.13 on day 6 and 15, respectively.

Calcium (mg/dl) was 10.41 ± 0.13 before treatment and after treatment the values were 11.48 ± 0.09 on day 6 and 12.32 ± 0.05 on day 15.

4.6.1.2 Haemato-biochemical findings in dogs affected with demodectic mange:

The results of haemato-biochemical findings in dogs affected with demodectic mange are presented in table 9.

The mean value of PCV (%) in demodectic mange infected dogs before treatment was 37.00 ± 0.63 whereas after treatment on day 6 and 15 the values were 37.40 ± 0.45 and 37.40 ± 0.45 respectively.

Hb (g/dl) was 9.92 ± 0.26 before treatment and 10.32 ± 0.24 and 10.46 ± 0.19 on day 6 and 15 respectively after treatment.

TEC ($X10^6/\mu l$) was 4.40 ± 0.17 before treatment and 4.47 ± 0.17 on day 6 and 4.41 ± 0.10 on day 15 after treatment.

TLC ($X10^3/\mu l$) was 21.70 ± 0.83 before treatment whereas the values were 21.69 ± 0.49 and 21.70 ± 0.59 on day 6 and 15 respectively after treatment.

Table 9

Haemato-biochemical findings in dogs infected with demodectic mange and treated with Flematic skin oil

Parameters	Before treatment	After treatment	
		day 6	day 15
PCV (%)	37.0 ± 0.63*	37.40 ± 0.45*	37.40 ± 0.45*
Hb(g/dl)	9.92 ± 0.26	10.32 ± 0.24	10.46 ± 0.19
TEC($X10^6/\mu l$)	4.40 ± 0.17	4.47 ± 0.17	4.41 ± 0.10
TLC ($X10^3/\mu l$)	21.70 ± 0.83	21.69 ± 0.49	21.70 ± 0.59
Neutrophils (%)	74.8 ± 2.37	74.6 ± 1.08	74.20 ± 0.86
Lymphocytes (%)	13.4 ± 1.59	12.80 ± 0.52	13.00 ± 0.28
Monocytes (%)	6.0 ± 1.09	6.20 ± 0.71	6.20 ± 0.59
Eosinophils (%)	5.8 ± 0.33	6.40 ± 0.35	6.60 ± 0.21
Calcium (mg/dl)	10.53 ± 0.15	10.57 ± 0.18	10.64 ± 0.19

* Mean values of 5 dogs ± SE

Neutroophils (%) were 74.8 ± 2.37 in demodectic infected dogs before treatment. After treatment on day 6 and 15 the values were 74.6 ± 1.08 and 74.20 ± 0.86, respectively.

Lymphocytes (%) were found to be 13.4 ± 1.59 before treatment and 12.80 ± 0.52 and 13.0 ± 0.28 on day 6 and 15, respectively, after treatment.

Monocytes (%) were 6.0 ± 1.09 before treatment and 6.20 ± 0.71 and 6.20 ± 0.59 on day 6 and 15, respectively, after treatment.

Eosinophils (%) were 5.8 ± 0.33 before treatment whereas the values were 6.40 ± 0.35 and 6.60 ± 0.21 on day 6 and 15, respectively, after treatment.

Calcium (mg/dl) was 10.53 ± 0.15 before treatment and after treatment the values were 10.57 ± 0.18 and 10.64 ± 0.19 on day 6 and 15, respectively.

4.6.2 Pestoban treated group

4.6.2.1 Haemato-biochemical findings in dogs affected with sarcoptic mange

The results of haemato-biochemical estimation in dogs affected with sarcoptic mange are given in table 10.

Table 10

Haemato-biochemical findings in dogs infected with Sarcoptic mange and treated with Pestoban

Parameters	Before treatment	After treatment	
		day 6	day 15
PCV (%)	37.00 ± 0.21	42.69 ± 0.27*	45.92 ± 0.31*
Hb(g/dl)	9.83 ± 0.13	11.65 ± 0.22	13.55 ± 0.18
TEC($X10^6/\mu l$)	4.47 ± 0.07	5.36 ± 0.08	6.82 ± 0.07
TLC ($X10^3/\mu l$)	21.75 ± 0.33	17.53 ± 0.23	11.64 ± 0.27
Neutrophils (%)	76.23 ± 0.70	73.53 ± 0.35	70.53 ± 0.30
Lymphocytes (%)	11.15 ± 0.97	15.00 ± 0.53	20.30 ± 0.35
Monocytes (%)	6.38 ± 0.52	5.53 ± 0.33	5.00 ± 0.28
Eosinophils (%)	6.61 ± 0.25	5.76 ± 0.15	4.15 ± 0.14
Calcium (mg/dl)	10.45 ± 0.16	11.59 ± 0.09	12.44 ± 0.07

* Mean values of 13 dogs ± SE

The mean value of PCV (%) in sarcoptic mange infected dogs before treatment was 37.0 ± 0.21 whereas after treatment on day 6 and 15 the values were 42.69 ± 0.27 and 45.92 ± 0.31, respectively.

Hb (g/dl) was 9.83 ± 0.13 before treatment and 11.65 ± 0.22 on day 6 and 13.55 ± 0.18 on day 15, respectively after treatment.,

TEC ($X10^6/\mu l$) was 4.47 ± 0.07 before treatment and 5.36 ± 0.08 on day 6 and 6.82 ± 0.07 on day 15 after treatment.

TLC ($X10^3/\mu l$) was 21.75 ± 0.33 before treatment whereas the values were 17.53 ± 0.23 and 11.64 ± 0.27 on day 6 and 15, respectively, after treatment.,

Neutrophils (%) were 76.23 ± 0.70 before treatment. After treatment on day 6 and 15 the values were 73.53 ± 0.35 and 70.53 ± 0.30, respectively.

Lymphocytes (%) were 11.15 ± 0.97 in sarcoptic affected dogs before treatment. After treatment on day 6 and 15 the values were 15.0 ± 0.53 and 20.30 ± 0.35 respectively.

Monocytes (%) were 6.38 ± 0.52 before treatment and 5.53 ± 0.33 and 5.0 ± 0.28 on day 6 and 15, respectively, after treatment.

Eosinophils (%) were 6.61 ± 0.25 before treatment whereas the values were 5.76 ± 0.15 on day 6 and 4.15 ± 0.14 on day 15 after treatment.

Calcium (mg/dl) was 10.45 ± 0.16 before treatment and after treatment the values were 11.59 ± 0.09 and 12.44 ± 0.07, respectively.

4.6.2.2 Haemato-biochemical observations in dogs affected with demodectic mange

The results of haemato-biochemical observations in dogs affected with demodectic mange are shown in table 11.

The mean value of PCV (%) in demodectic mange infected dogs before treatment was 37.6 ± 0.45 and on day 6 and 15 the values were 39.0 ± 0.69 and 40.2 ± 1.37, respectively, after treatment.

The Hb (g/dl) mean value before treatment in affected dogs was 8.94 ± 0.48 and after treatment the values were 9.44 ± 0.52 and 10.2±0.76 on day 6 and 15, respectively.

Table 11

Haemato-biochemical findings in dogs infected with demodectic mange and treated with Pestoban

Parameter	Before treatment	After treatment	
		day 6	day 15
PCV (%)	37.60 ± 0.45	39.00 ± 0.69	40.20 ± 1.37
Hb(g/dl)	8.94 ± 0.48	9.44 ± 0.52	10.20 ± 0.76
TEC($X10^6/\mu l$)	4.30 ± 0.12	4.72 ± 0.30	4.85 ± 0.45
TLC ($X10^3/\mu l$)	22.45 ± 0.46	21.26 ± 0.99	21.10 ± 1.96
Neutrophils (%)	76.20 ± 1.73	75.00 ± 1.06	73.20 ± 0.95
Lymphocytes (%)	12.40 ± 2.07	14.00 ± 1.79	15.40 ± 2.13
Monocytes (%)	5.20 ± 0.59	5.00 ± 0.75	5.40 ± 0.78
Eosinophils (%)	6.20 ± 0.52	6.00 ± 0.40	6.00 ± 0.49
Calcium (mg/dl)	10.40 ± 0.12	10.77 ± 0.21	10.98 ± 0.35

Mean values of 5 dogs ± SE

TEC ($X10^6/\mu l$) was 4.30 ± 0.12 before treatment and 4.72 ± 0.30 and 4.85 ± 0.45 on day 6 and 15, after treatment, respectively.

TLX ($X10^3/\mu l$) was 22.45 ± 0.46 in infected dogs before treatment whereas values after treatment were 21.26 ± 0.99 and 21.10 ± 1.96 on day 6 and 15, respectively.

The mean value of neutrophils (%) was 76.2 ± 1.73 before treatment. After treatment the values were 75.00 ± 1.06 on day 6 and 73.20 ± 0.95 on day 15, after treatment.

The lymphocytic percentage was found to be 12.4 ± 2.07 before treatment in infected dogs and after treatment the values were 14.0 ± 1.79 and 15.40 ± 2.13 on day 6 and 15, respectively, after treatment.

The mean value of monocytes (%) was 5.2 ± 0.59 before treatment. The values on day 6 and 15 were 5.0 ± 0.75 and 5.40 ± 0.78, respectively, after treatment.

The eosinophilic percentage was found to be 6.2 ± 0.52 before treatment whereas the mean values were 6.0 ± 0.40 and 6.00 ± 0.49 on day 6 and 15, respectively, after treatment.

The mean value of calcium (g/dl) level was estimated to be 10.40 ± 0.12 in mange infected dogs before treatment. After treatment, the values were 10.77 ± 0.21 on day 6 and 10.98 ± 0.35 on day 15.

4.6.3 Asuntol treated groups

4.6.3.1 Haemato-biochemical findings in dogs infected with sarcoptic mange

The haemato-biochemical findings in sarcoptic mange infected dogs treated with Asuntol are presented in table 12.

The mean PCV (%) was found to be 36.30 ± 0.47 before treatment. After treatment on day 6 and 15 values were 41.30 ± 0.29 and 46.30 ± 0.29, respectively.

The mean Hb (g/dl) value before treatment was 9.19 ± 0.23. After treatment on day 6, it was 11.93 ± 0.26 and on day 15, 14.53 ± 0.17.

The mean TEC ($X10^6/\mu l$) was 4.57 ± 0.09 in sarcoptic mange infected dogs before treatment. The values were 5.56 ± 0.08 and 7.0 ± 0.06 on day 6 and 15, respectively.

The TLC mean value ($X10^3/\mu l$) was found to be 20.97 ± 0.55 before treatment. The values were 17.44 ± 0.34 and 11.53 ± 0.14 on day 6 and 15, respectively, after treatment.

Table 12

Haemato-biochemical findings in dogs infected with sarcoptic mange and treated with Asuntol

Parameter	Before treatment	After treatment	
		day 6	day 15
PCV (%)	36.30 ± 0.47*	41.30 ± 0.29*	46.30 ± 0.29*
Hb(g/dl)	9.19 ± 0.23	11.93 ± 0.26	14.53 ± 0.17
TEC($X10^6$/µl)	4.57 ± 0.09	5.56 ± 0.08	7.00 ± 0.06
TLC ($X10^3$/µl)	20.97 ± 0.55	17.44 ± 0.34	11.53 ± 0.14
Neutrophils (%)	73.76 ± 0.84	72.07 ± 0.52	70.76 ± 0.26
Lymphocytes (%)	12.23 ± 0.72	16.92 ± 0.49	20.61 ± 0.35
Monocytes (%)	7.00 ± 0.36	5.46 ± 0.31	4.61 ± 0.17
Eosinophils (%)	7.30 ± 0.31	5.53 ± 0.20	4.00 ± 0.10
Calcium (mg/dl)	10.34 ± 0.11	11.63 ± 0.13	12.53 ± 0.06

* Mean values of 13 dogs ± SE

The mean neutrophilic (%) value before treatment was 73.76 ± 0.84 and on day 6, 72.07 ± 0.52 and 0.84 and 70.76 ± 0.26 on day 15, after treatment.

Mean value of the percentage of lymphocytes in dogs before treatment was 12.23 ± 0.72 whereas on day 6 it was 16.92 ± 0.49 and on day 15, 20.61 ± 0.35 after treatment.

Monocytes (%) were 7.0 ± 0.36 before treatment and 5.46 ± 0.31 and 4.61 ± 0.17 on day 6 and 15, respectively, after treatment.

Mean value of eosinophils (%) was 7.30 ± 0.31 before treatment and 5.53 ± 0.20 and 4.0 ± 0.10 on day 6 and 15, respectively, after treatment.

Mean calcium (mg/dl) level was found to be 10.34 ± 0.11 in the serum of infected dogs before treatment. The levels were 11.63 ± 0.13 and 12.53 ± 0.06 on day 6 and 15, respectively, after treatment.

4.6.3.2 Haemato-biochemical findings in dogs affected with demodectic mange

The haemato-biochemical findings in dogs of this group are given in table 13.

Table 13

Haemato-biochemical findings in dogs infected with demodectic mange and treated with Asuntol

Parameters	Before treatment	After treatment	
		day 6	day 15
PCV (%)	36.40 ± 0.83*	37.60 ± 1.28*	32.00 ± 1.81*
Hb(g/dl)	8.90 ± 0.08	9.66 ± 0.41	10.38 ± 0.81
TEC($X10^6/\mu l$)	4.43 ± 0.17	4.67 ± 0.28	4.91 ± 0.43
TLC ($X10^3/\mu l$)	21.96 ± 0.25	20.69 ± 1.07	19.75 ± 1.86
Neutrophils (%)	74.60 ± 0.67	73.60 ± 0.87	73.80 ± 0.91
Lymphocytes (%)	13.20 ± 0.43	14.40 ± 1.31	14.40 ± 1.54
Monocytes (%)	5.40 ± 0.21	5.40 ± 0.35	5.80 ± 0.33
Eosinophils (%)	6.80 ± 0.33	6.20 ± 0.33	5.80 ± 0.52
Calcium (mg/dl)	10.41 ± 0.13	10.66 ± 0.27	10.87 ± 0.39

* Mean values of 5 dogs ± SE

The mean PCV (%) was found to be 36.40 ± 0.83 before treatment and on day 6 it was 37.60 ± 1.28 and on day 15, 32.0 ± 1.81, after treatment.

The mean Hb (g/dl) value before treatment was 8.90 ± 0.08. After treatment on day 6 it was 9.66 ± 0.41 and on day 15, 10.38 ± 0.81.

The mean TEC ($X10^6/\mu l$) was 4.43 ± 0.17 in demodectic mange infected dogs before treatment. The values were 4.67 ± 0.28 and 4.91 ± 0.43 on day 6 and 15, respectively, after treatment.

The TLC ($X10^3/\mu l$) mean value was 21.96 ± 0.25 before treatment. After treatment the values were found to be 20.69 ± 1.07 and 19.75 ± 1.86 on day 6 and 15, respectively.

Mean neutrophilic (%) value before treatment was 74.6 ± 0.67 whereas the findings after treatment were 73.6 ± 0.87 and 73.8 ± 0.91 on day 6 and 15, respectively.

Lymphocytic (%) value was 13.2 ± 0.43 before treatment. After treatment the values were 14.4 ± 1.31 on day 6 and 14.4 ± 1.54 on day 15.

Mean value of monocytes (%) was 5.40 ± 0.21 before treatment. The values were 5.40 ± 0.35 and 5.8 ± 0.33 on day 6 and 15, respectively, after treatment.

The mean value of eosinophils (%) before treatment was 6.8 ± 0.33. After treatment they were 6.20 ± 0.33 and 5.80 ± 0.52 on day 6 and 15, respectively.

The mean value of calcium level (mg/dl) in infected dogs before treatment was 10.41 ± 0.13 whereas on day 6 and 15 the values were 10.66 ± 0.27 and 10.87 ± 0.39, respectively, after treatment.

4.6.4 Comparative efficacies of Flematic skin oil, Pestoban and Asuntol

4.6.4.1 Against sarcoptic mange

Comparative efficacies of Flematic skin oil, pestoban and Asuntol against sarcoptic mange at different post treatment intervals are presented in table 14.

Assessment was done by periodical examination of skin scrapings.

The perusal of the data indicated that none of the animals treated with Flematic skin oil and Pestoban examined on day 3 post treatment were negative for sarcoptic

Table 14

Comparative efficacies of Flematic skin oil, Pestoban and Asuntol against Sarcoptic mange at different post treatment intervals as determined by the examination of skin scrapings

Drugs used	Number of dogs treated	Animals found negative for mange mites in skin scrapings									
		day 3		day 6		day 9		day 12		day 15	
		Number	% eff.	Number	% eff.	Number	% eff.	Number	% eff.	Number	% eff.
.ematic skin .l	13	Nil	-	2	15.38	5	38.46	9	69.23	13	100
:stoban	13	Nil	-	2	15.38	5	38.46	8	61.53	13	100
:untol(R)	13	2	15.38	4	30.76	8	61.53	12	92.30	13	100

mange mites. However, 2 (15.38 per cent) out of 13 animals treated with Asuntol were found negative for mange mites on the very 3rd day of treatment.

On day 6, 2 (15.38 per cent) animals in each group treated with Flematic skin oil and pestoban were negative for sarcoptic mange mites. Whereas 4 (30.76 per cent) animals treated with Asuntol were found negative on skin scraping examination.

The results also indicated 61.53 per cent efficacy with Asuntol on day 9 as against 38.46 per cent efficacy with Flematic skin oil and pestoban. The efficacy in Asuntol treated group on day 12 was found to be 92.30 per cent when compared to 61.53 and 69.23 per cent efficacies in pestoban and Flematic skin oil treated groups, respectively. On day 15, however, all the three drugs used were equally effective. Asuntol was found to be more effective compared to Flematic skin oil and pestoban in that order (Fig. 4).

4.6.4.2 Against demodectic mange

Comparative efficacies of Flematic skin oil, pestoban and Asuntol against demodectic mange at different post treatment intervals are presented in table 15.

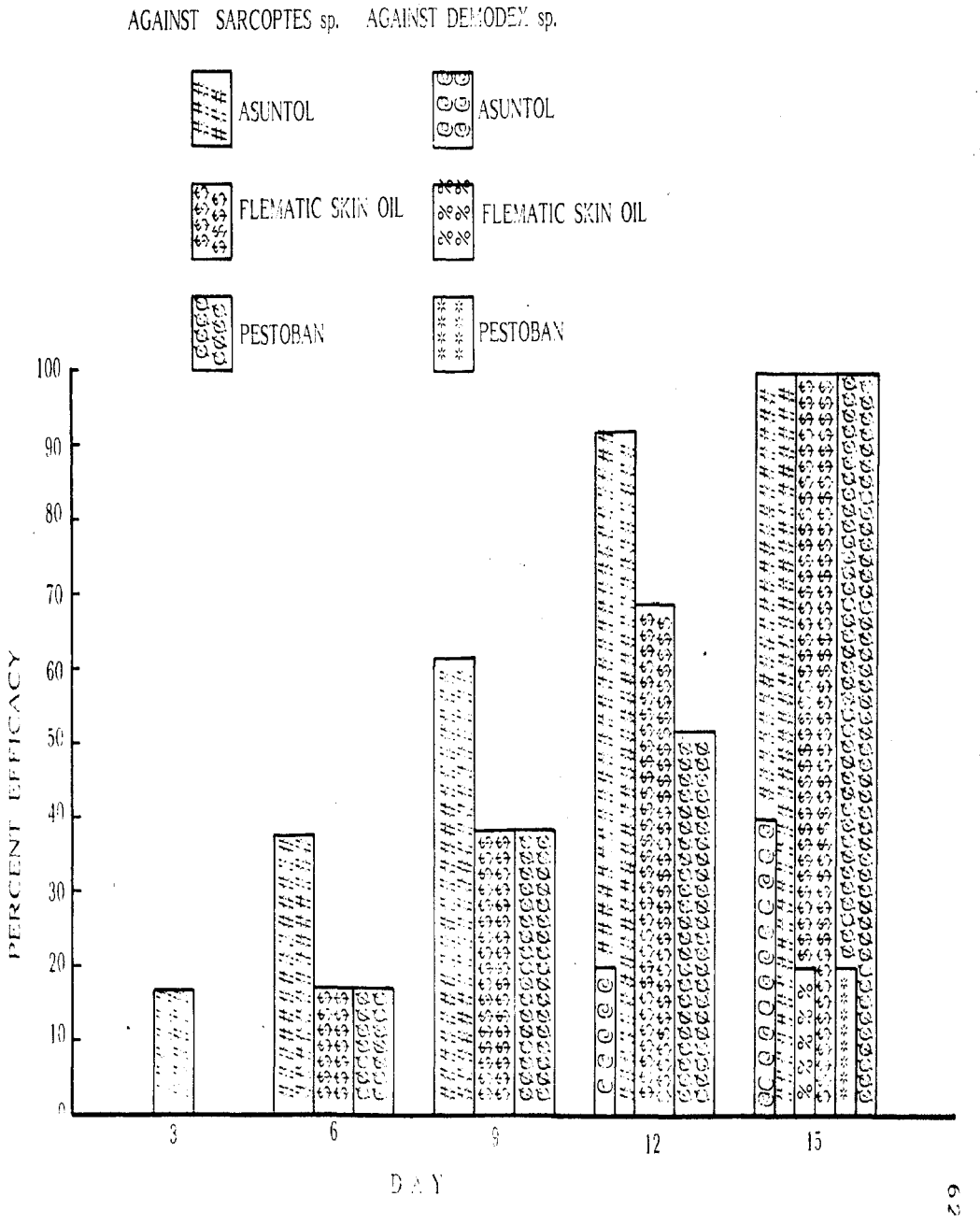


Fig. 4 : COMPARATIVE EFFICACIES OF ASUNTOL, FLEMATIC SKIN OIL AND PESTOBAN AGAINST SARCOPTIC AND DEMODECTIC MANGE AT DIFFERENT POST TREATMENT INTERVALS

Table 15

Comparative efficacies of Flematic skin oil, Pestoban and Asuntol against demodectic mange at different post treatment intervals as determined by the examination of skin scrapings

Drugs used	Number of dogs treated	Animals found negative for mange mites in skin scrapings									
		day 3		day 6		day 9		day 12		day 15	
		Number	% eff.	Number	% eff.	Number	% eff.	Number	% eff.	Number	% eff.
Flematic skin oil	5	Nil	-	Nil	-	Nil	-	Nil	-	1	20
Pestoban	5	Nil	-	Nil	-	Nil	-	Nil	-	1	20
Asuntol	5	Nil	-	Nil	-	Nil	-	1	20	2	40

In all the three groups treated with Flematic skin oil, pestoban and Asuntol there was no response to treatment on day 3, 6 and 9 as none of the animals were found free of mites. However, one (20per cent), out of five animals treated with Asuntol was found to be negative on day 12, whereas no response was noticed in other two groups. On day 15, the efficacy in Asuntol treated group was 40 per cent when compared to 20 per cent in pestoban as well as Flematic skin oil treated groups.

None of the drugs used against demodectic mange was totally effective in all the animals under trial (Fig.4).

Gradual clinical improvement was observed after the treatment with each drug. At the end of the effective treatment, there was complete recovery. The symptoms correlated well with response to the treatment.

No apparent toxic effects were observed against any drug used during and after therapy.

CHAPTER V

DISCUSSION AND CONCLUSIONS

CHAPTER V

DISCUSSION & CONCLUSION

The present study was an attempt to survey the incidence of mange in dogs in and around Hyderabad and to study the epidemiology, symptametology and haemato-biochemical profile in natural mange infection in dogs. Therapeutic trials on 3 most commonly used drugs : Flematic skin oil, Pestoban and Asuntol(R) were also undertaken and critically evaluated.

In the present investigation of 540 dogs, 12.59 per cent incidence of mange was observed indicating a high susceptibility of dogs to mange infection. Sarcoptic mange contributed as much as 8.51 per cent and demodectic mange was recorded in 4.07 per cent animals examined. Similar investigations were carried out earlier by Chakraborthy and Choudhury (1984) who reported mange in 3.0 per cent of 500 dogs in West Bengal. Similar findings regarding demodectic mange were also reported by Chakraborthy and Misra (1979) and Chakraborthy and Pradhan (1985) who reported an incidence of 2.8 per cent and 3.8 per cent, respectively. Other workers (Avellini et al., 1970; Stoenescu et al.,1973 Santos motos et al., 1982 and Kamyszek, 1984) have reported higher incidence of demodectic mange in dogs,

while Santos motos et al. 1982; Kamyszek, 1984 and Huq et al. 1985 have reported lower incidence of Sarcoptic mange in dogs.

The incidence of mange was significant in younger animals in the age group of 3-12 months and decreased with the increasing age. Both Sarcoptic and demodectic mange was high in this age group. The present study indicated a significant influence of age on the incidence of sarcoptic ($P < 0.01$) and demodectic mange ($P < 0.05$). Similar findings have been reported by Unsworth (1946), Baker (1970) and Chakraborthy and Misra (1979) who observed that demodectic infection was higher in dogs below 12months age. Chakraborthy and Choudhury (1984) observed that animals including dogs below 23 months were more prone to mange infestation, while other workers (Avellini et al., 1970; Chakraborthy and Pradhan, 1985 and Nolte and Ammelounx 1986) have reported higher incidence of demodectic mange in older dogs. The reason for higher incidence in younger group could not be fully explained. However, youth, poor condition and debility have been attributed as predisposing factors for scabies infection (Soulsby, 1982).

In the present survey, 7.54 per cent male dogs were found to be positive for sarcoptic mange and 3.77

per cent for demodectic mange. Whereas 9.45 per cent female dogs were found to be positive for sarcoptic mange and 4.33 per cent infected with demodectic mange. The results indicated a insignificant ($P > 0.05$) influence of sex on mange infestatation. Similar findings have been reported by Avellini et al. (1970). Whereas Chakraborthy and Pradhan (1985) observed that female dogs were more commonly infested than males. Similar higher incidence of mange in female dogs was also observed by Chakraborthy and Choudhury (1984). Whereas Chakraborthy and Misra (1979) recorded higher incidence of demodicosis in males than female dogs.

The observations on the breed wise incidence of mange were inconclusive, possibly because of less number of other breeds examined. The incidence of sarcoptic mange in non-descript breed of dogs, which were usually short coated, was higher (12.0 per cent) when compared to Alsatian (7.36 per cent), Dachshund (5.45 per cent) and Pomeranian (4.44 per cent). Whereas there was not much difference in the incidence of demodectic mange among the above breeds. The results indicated an insignificant ($P > 0.05$) influence of breed on mange infestation. Similar results of higher incidence of mange infection in short coated dogs were recorded earlier by Unsworth (1946), Baker (1970) and Chakraborthy and Misra (1979).

It was observed in this survey that the higher incidence of mange was prevalent in the months between December to March. Similar results were recorded by Chakraborthy and Misra (1979) and Chakraborthy and Choudhury (1984) in canine demodicosis. Rathore and Lodha (1973) reported similar observations in camels. This might be due to the lower temperature and higher relative humidities during this period where the mites were able to survive (Sako, 1965 and Arlian et al., 1984).

It was observed that dogs with a history of indoor housing with good flooring and regular cleaning were mostly free of mange infection compared to dogs frequently exposed to outdoor environment. These dogs might have gained infection either from soil or from contact with street dogs. Dogs which were given bath regularly were less prone to mange infection. This might be due to the healthy skin and better hygienic conditions.

The clinical features recorded during the present investigations were almost consistant with the observations of the earlier investigators (Muller and Kirk, 1969 and Pathak and Bhatia, 1986). Mondal and Sawai Singh (1985) observed similar symptoms in man and animal scabies. The distribution of lesions, in mange affected dogs was in

agreement with the observations noted by Unsworth (1946), Muller and Kirk (1969), Chakraborthy and Misra (1979) and Pathak and Bhatia (1986). Whereas Dominguez et al. (1977) recorded axilla, thorax and groin as main areas affected. Lodha (1966) recorded sarcoptic mange over neck and toes.

In Flematic skin oil treated group, number of animals found free of sarcoptic mites post treatment increased on day 3, 6, 9 and 12, compared to the pre-treatment results. Thereafter, on day 15 skin scrapings of all the 13 treated animals were found negative, while in control group all were positive. The results indicated cent per cent efficacy on day 15 as evident by absence of mites in skin scrapings. Though comparable literature in respect of drug trials with flematic skin oil against mange infection in canines was not accessible, the perusal of the literature indicated that this drug was used against sarcoptic mange in sheep, goats and buffaloe calves.The present observations were favourably comparable to findings of Jawaharlal et al. (1976) who recorded 95.6 per cent efficacy with Cedrus deodara oil in sheep suffering with sarcoptic mange. Similarly, Bhalerao et al. (1986) who treated sarcoptic mange in sheep and goats revealed that flematic skin oil gave best results in mild and medium cases. Similar results were also reported in buffaloe calves by Gupta et al. (1966).

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In pestoban treated group, the pre-treatment skin scrapings of all the 13 dogs were positive for sarcoptic mites. Whereas number of animals positive for mites, in skin scrapings reduced on day 3, 6 and 12. The results indicated cent per cent efficacy on day 15 since none of the animals treated were positive for mange mites. In untreated control dogs, the skin scrapings revealed no change during the period of observation. Though comparable literature in respect of drug trials with Pestoban against mange infection in canines was not accessible, the perusal of the literature indicated that this drug was used against many ectoparasites in other domestic animals. Sinha et al. (1987) reported that pestoban was effective against lice, ticks, fleas and mites in cattle and dogs. Similar findings were reported in pigs with sarcoptic mange (Satija, 1982) and cent per cent efficacy against ticks and lice in cattle (Nooruddin et al., 1986 and Thakur et al., 1988). No side effects were observed during the study and the dogs tolerated well the prescribed dilution. Pestoban was also reported to be a safe, liquid extract of various plants with no toxicity to the animals (Anonymous, 1984 and Sinha et al., 1987).

The other chemotherapeutic agent used in the present drug trial was Asuntol(R) 50. Number of animals found free of sarcoptic mites on skin scraping examinations in Asuntol treated group also increased considerably on day 3, 6,9 and 12, compared to pre-treatment results. Thereafter, on day 15, all the dogs were found negative for mites. In control group all the dogs were positive for mites in their skin scrapings, during the period of the study. These observations indicated 92.30 per cent efficacy on day 12 and 100 per cent efficacy on day 15. Though comparable literature in respect of drug trials with Asuntol against mange in canines was not accessible, the perusal of the available literature indicated that this drug was extensively used against mange in other species of animals. Calves affected with sarcoptic mange were successfully treated by Srivastava and Khan (1973), Leibische (1978[b]) and Sharma et al. (1983). Satisfactory results with the use of Asuntol in sheep and goats against sarcoptic mange were observed by Choudhury (1963[a]), Li (1981) and Bhalerao et al. (1986). Whereas 75 per cent efficacy of Asuntol was obtained by Lodha (1966) against sarcoptic mange in camels. Sarcoptic mange was also effectively treated by Asuntol in 83.3 per cent rabbits (Mimioglu, 1965) and pigs (Sharma et al., 1986). Some other investigators (Strickland

and Gerrish, 1966 and Leibische et al., 1978[b]) used Asuntol against Psoroptes ovis and reported good results.

In the demodectic group treated with Flematic skin oil the skin scrapings of all the dogs remained positive for demodectic mites till day 12. Whereas on day 15 only one out of 5 (20 per cent) animals were negative for mites. Comparable literature in respect of drug trials with Flematic skin oil against demodectic mange in canines was not accessible. In control group all the dogs were positive for demodectic mites during the period of study. All the 5 dogs treated with Pestoban were positive microscopically for demodectic mites till day 12. But on day 15 one among 5 (20 per cent) dogs was free of mites. Higher per cent of efficacy (65 per cent) after 72 hours was reported by Narang (1981). The other chemotherapeutic drug used in the present trial was Asuntol. All the dogs were positive for demodectic mites in their skin scrapings till day 9. However, on day 12, one (20 per cent)dog was found free of mites and on day 15, two (40 per cent) dogs were found free of demodectic mites in their skin scrapings. In untreated control dogs, the skin scrapings revealed no change during the period of observations. Though comparable literature in respect of drug trials with Asuntol against demodectic mange infection in canines was not availabl

the perusal of the literature revealed that this drug was effective in calves in dilutions of 0.75, 0.5 and 0.25 per cent after 3 or 4 applications depending on intensity of lesions (Choudhury, 1963[b]). Whereas Das and Misra (1972) who studied the comparative efficacy of Malathion, Neguvon and Asuntol against demodectic mange in goats, pointed out that Malathion proved superior to Neguvon and Asuntol.

The control of demodectic mange has always been a difficult problem. Many presently available insecticides of the chlorinated hydrocarbon group have not been found to be useful for this purpose.

The present study was also aimed to critically evaluate the relative efficacy of Flematic skin oil, pestoban and Asunton against natural sarcoptic and demodectic mange infection in dogs. Their effectiveness were evaluated based on the number of animals found free of infection (mites) as determined by skin scraping examinations. Perusal of the data indicated that none of the animals treated with Flematic skin oil and Pestoban showed any response to the treatment on day 3 post treatment. However, 2 (15.38 per cent) out of 13 dogs treated with Asuntol were found to be negative for mange mites on the third day of treatment. On day 6, flematic skin oil and Pestoban were effective

in 15.38 per cent animals, whereas 30.76 per cent efficacy was noticed in Asuntol treated group. On day 9, 38.46 per cent efficacies were observed in Flematic skin oil and Pestoban treated groups and 61.53 per cent efficacy in Asuntol treated group. On day 12, 92.30 per cent efficacy with Asuntol was observed compared to 69.23 per cent and 61.53 per cent efficacies in Flematic skin oil and Pestoban treated groups respectively. However, on day 15 all the three drugs used were cent per cent effective against sarcoptic mange as assessed by skin scraping examination. The perusal of the data suggested that comparatively Asuntol was more effective since 92.30 per cent treated animals were free of mange mites followed by 69.23 per cent efficacy in Flematic skin oil treated group and 61.53 per cent efficacy in Pestoban treated group on day 12th day post treatment. None of the drugs used was 100 per cent effective during the entire period of study on all the days of post treatment observations. Though literature in respect of comparative efficacy of present combination of drugs against sarcoptic mange in canines was not accessible, the perusal of the literature indicated that Flematic skin oil was as effective as Asuntol in sheep and goats in mild and medium cases (Bhalerao et al., 1986).

In all the three groups treated with Flematic skin oil, Pestoban and Asuntol against demodectic mange, there was no response to treatment on day 3, 6 and 9 as none of the animals were found free of mites. Whereas 20 per cent efficacy was observed on day 12 in Asuntol treated group compared to nil efficacies in Flematic skin oil and Pestoban treated groups. Lastly on day 15,40 per cent efficacy was recorded in Asuntol treated group compared to 20 per cent efficacies in Flematic skin oil and Pestoban treated groups. None of the drugs used against Demodex canis was highly effectiv. The low efficacy may be attributed to the fact that demodex is very difficult to treat. Though literature in respect of comparative efficacy of present combination of drugs against demodectic mange in canines was not available, the perusal of the literature indicated that 0.25 per cent Asuntol was inferior to 0.5 per cent Malathion against demodectic mange in goats (Das and Misra, 1972).

The present investigation was also undertaken to study certain biochemical aspects of mange in canines.

In the present study, the low levels of serum calcium were observed in all the three groups affected with sarcoptic and demodectic mange. The serum calcium

levels observed in uninfected control dogs were in agreement with the values reported for normal animals by Misra et al. (1974) and Gowda et al. (1982). The serum calcium level was also reported to be lower in goats with sarcoptic mange by Kress and Stockl (1964). The present findings were also in agreement with those of Julicher (1964) who reported low serum calcium levels in chronic skin affections and in dermatitis in non-descript dogs (Misra et al.,1974). Wiggers (1955) related deficiency of calcium to the hair fall out and eczematous skin condition. Dent and Garrotts (1960) related the hypocalcemia to the poor skin health condition and observed that this condition responded well to calcium therapy. Whereas Klauder (1964) reported a high calcium potassium ratio leading to increased cutaneous irritability. While other investigators reported lower serum calcium levels in non-specific dermatitis in cross bred calves (Prasad et al., 1977) and also in dogs (Gowda et al., 1982). The results of the present experiments with regard to serum calcium levels suggested that there was a tendency for the calcium level to fall. The exact cause for the fall in serum calcium could not be determined. However, hypocalcemia in non-specific dermatitis has been attributed to hypothyroidiam in dogs (Gowda et al., 1982).

Although different drugs were used in this study, similar improvement was recorded in serum calcium levels in sarcoptic mange infection following treatment when compared to the values before treatment in each group and comparable with values in uninfected controls. The serum calcium levels observed in control dogs were in agreement with the values reported in normal dogs by Gowda et al. (1982). The improvement in serum calcium level could be due to the elimination of the mange mites by effective treatment irrespective of the drug used. Whereas the mean values of serum calcium levels of the dogs infected by demodectic mange were almost unchanged post treatment as none of the drugs used was much effective in causing parasitological cure of demodectic mange.

In the present study the haematological observations in sarcoptic and demodectic mange infected dogs in all the three groups before treatment revealed some degree of anaemia as indicated by low values of PCV, Hb and TEC counts when compared with uninfected controls.Almost similar findings have been reported by Pathak and Bhatia (1986) who reported decrease in Hb, PCV and TEC with marked reduction in MCH indicating normocytic hypochromic anaemia in a dog with generalized demodicosis. The anaemia observed

in this experiment was also in agreement with the results obtained by other investigators in mange in goats and calves (Prasad, 1984), Sheep and goats (Bhalerao et al., 1986). Ramakrishnan et al. (1972) and Gowda et al. (1982) also recorded low haemoglobin in dogs with non-specific dermatitis.

Although different drugs were used in this study, similar improvement was recorded in PCV, Hb and TEC levels in sarcoptic mange infection following treatment when compared to pre-treatment values in each group and comparable with values in uninfected controls. The improvement in PCV, Hb, TEC levels could be related to the elimination of mange mites by effective treatment irrespective of the drug used. This conclusion was further strengthened by the fact that mean PCV, Hb and TEC post treatment values of the dogs infected with demodectic mange were almost unchanged as none of the drugs used was much effective in eliminating the demodectic mange infection.

The mean total leucocyte count in cases of sarcoptic and demodectic mange, in all the three groups before treatment were higher than the normal values seen in healthy uninfected control. The normal values of total leucocyte count in control group were consistent with the observations

of Schalm et al. (1975). The elevation of leucocytic count observed in the present study is in agreement with the reports of Pathak and Bhatia (1986), who reported leucocytosis in demodectic mange in a dog. Leucocytosis was also reported in non-specific dermatitis in dogs by Misra and Misra (1964) and Gowda et al. (1982). The increase in leucocytic count in mange may be attributed to secondary infection.

In the present study the percentage of neutrophils was found to be slightly higher in all the three infected groups before treatment than the normal values seen in healthy uninfected control. Stromberg et al. (1986) reported neutrophilia in calves affected with mange. Schalm et al. (1975) described neutrophilia in variety of non-infectious conditions, which stimulate the stress reaction. Guttman (1948) observed neutrophilia in non-specific dermatitis and suggested that it was possibly because of secondary bacterial infection. Rama Krishnan et al. (1972) reported an increase in neutrophils in eczema in dogs.The observations in the present study is in variance with that of Gowda et al. (1982) who reported neutropaenia in cases of non-specific dermatitis in dogs.

In the present study, the mean percentage of lymphocytes was found to be lower in cases of sarcoptic

and demodectic mange infected dogs, in all the three groups before treatment when compared to normal values seen in healthy uninfected control. The lower lymphocyte percentage observed in the present study is in agreement with the reports of Stromberg et al. (1986). Lympopaenia was also reported in dogs in non-specific dermatitis (Gowda et al., 1982). Whereas Misra and Misra (1964) reported lymphocytosis in case of non-specific dermatitis in an Alsatian dog. Lymphopaenia may be caused by the stress factor with increase in the level of corticosteroids (Schalm et al., 1975).

In the present study, there was no variation in the monocyte percentage in mange infected dogs in all the three groups, when compared to healthy uninfected dogs. Whereas Ramakrishnan et al. (1972) observed monocytosis in sarcoptic mange in dogs. Other investigator also reported increase in monocytes in non-specific dermatitis in dogs (Gowda et al., 1982).

In the present investigations, the mean percentage of eosinophils in cases of sarcoptic and demodectic mange infections in all the three groups before treatment were higher than the normal values seen in healthy uninfected control. The normal values of eosinophilic percentage in control group were within the range as reported by Schalm et al. (1975). Almost similar observations have been recorded

by the earlier investigators in mange of dogs (Ramakrishnan et al., 1972), calves (Stromberg et al., 1986), non-specific dermatitis of dogs (Jennings, 1952 and Gowda et al., 1982). Baldelli and Romanelli (1950) recorded high histamine content of the blood in guinea pigs affected with sarcoptic mange. Eosinophilia may be associated with the antigen-antibody reactions, release of the histamine from decomposition of the tissues and possibly due to allergic reaction (Schalm et al., 1975).

Although different drugs were used in this study against sarcoptic and demodectic mange, TLC, neutrophils, lymphocytes and eosinophilic counts were in the normal range following treatment and complete parasitological cure. This change in TLC, neutrophls, lymphocytes and eosinophils to normal levels could be due to the elimination of the mange mites by effective treatment irrespective of the drug used. Whereas there was mostly no change in the levels of the above parameters in dogs infected with demodectic mange when compared with pretreatment values, as none of the drugs used was much effective in eliminating the demodectic mange infection.

It was concluded that the haemato-biochemical profile of post-treated animals was directly related to the parasitological and clinical cure, irrespective of the drug used.

The haemato-biochemical values of infected animals before treatment were in comparison with the respective infected but untreated group. The post treatment haemato-biochemical values showed improvement when compared to the respective infected but untreated control animals.

CHAPTER VI

SUMMARY

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SUMMARY

A survey was carried out in 540 dogs to study the incidence of dermatitis with special reference to mange in the twin cities of Hyderabad and Secunderabad. In natural cases of Sarcoptic and demodectic mange, epidemiological and clinical studies and haemato-biochemical investigations were undertaken. Therepeutic trials were also conducted using Flematic skin oil, Pestoban and Asuntol. Suitable controls were used.

The incidence of mange was found to be 12.59 per cent out of which Sarcoptic mange was 8.51 per cent and demodectic mange 4.07 per cent. During 3-12 months of age, the incidence was quite significant (Sarcoptic $P < 0.01$; Demodectic $P < 0.05$) and it decreased with advancing age. Whereas, the sex and breed had no significant association ($P > 0.05$) with mange infestation.

The clinical symptoms observed in this study were pale visible mucous membrane, poor appetite, poor body condition, itching, alopecia, erythema, scab and papules. In addition, wrinkling and thickening of skin was also seen in cases of demodectic mange. The lesions were observed mostly over head, neck, abdomen, back and tail.

Comparative efficacies of Flematic skin oil, Pestoban and Asuntol against Sarcoptic and demodectic mange were studied.

Flematic skin oil and Pestoban were not found effective on 3rd day of treatment in animals affected with Sarcoptic mange. However, 15.38 per cent animals treated with Asuntol were parasitologically cured on the 3rd day. On day 6, 15.38 per cent animals in each group treated with Flematic skin oil and Pestoban were negative for sarcoptic mange mites. Whereas 30.76 per cent animals treated with Asuntol were negative on microscopic examination. The results also indicated 61.53 per cent efficay with Asuntol on day 9 as against 38.46 per cent with Flematic skin oil and Pestoban. The efficacy in Asuntol treated group on day 12 was 92.30 per cent compared to 61.53 and 69.23 per cent efficacies in Pestoban and Flematic skin oil treated groups, respectively. On day 15, however, all the three drugs were equally effective. It was concluded that Asuntol was more effective compared to Flematic skin oil and Pestoban.

In demodectic mange affected groups, no drug used was found to be effective till day 9 post treatment. However, on day 12, 20 per cent efficacy was recorded in Asuntol treated group whereas Flematic skin oil and

Pestoban were ineffective. However, 20.0 per cent efficacies by Flematic skin oil and Pestoban and 40.0 per cent efficacy by Asuntol was observed on day 15. It was concluded that none of the drugs used could be recommended against demodectic mange.

The haemato-biochemical observations in all the animals affected with Sarcoptic and demodectic mange revealed some degree of anaemia as indicated by low levels of PCV, Hb and TEC. In addition leucocytosis, eosinophilia and slight neutrophilia was also recorded. Following treatment, irrespective of the drug used, there was greater improvement in the haematological values in Sarcoptic mange group compared to animals affected with demodectic mange.

The mean serum calcium values in all the affected animals were lower when compared with that of healthy control dogs.

Gradual clinical improvement was observed after the treatment with each drug. The symptoms correlated well with the response to treatment.

No apparent toxic effects were observed against any drug used during and after therapy.

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VITA

I, **Boddi Reddi Bhagavan Reddy**, Son of **Smt.Tharamma** and **Sri Narayan Reddy,** was born on 10th May, 1960 in Garmillapalli Village in Warangal District, Andhra Pradesh, India.

I had my primary school education at my native village and High school education at Govt. Markazi High School, Hanamkonda. I completed my two years Intermediate education at Govt. Junior College, Hanamkonda. I obtained my B.V.Sc. & A.H. degree in 1984 from Andhra Pradesh Agricultural University, Rajendranagar, Hyderabad.

I joined the M.V.Sc., course in Veterinary Medicine in 1984 in College of Veterinary Science, Rajendranagar, Hyderabad. I worked for my research problem under the able guidance of **Dr. A. A. Gaffar**, Professor and Head, Department of Medicine,College of Veterinary Science, Rajendranagar, Hyderabad.

I married **Miss Hema** of Regonda, Warangal District on 7th June, 1987.