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Occurrence of dermatological disorders and Haemato-biochemical alteration, treatment of Demodicosis in dogs

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Abstract

Dermatological affections are among the one of the most common encountered problems in dogs. The present investigation was conducted to study the prevalence of different dermatological affections in dogs and haemato-biochemical alteration and therapeutic efficacy of moxidectin and ivermectin in canine demodicosis. The prevalence study was undertaken from January 2019 to December 2019. Total 2248 cases were recorded, out of which 613 (27.26%) cases were found dermatologically affected. The sarcoptic mange infestation was found to be most prevalent (31.48%) dermatological affections followed by ticks, lice, mite infestations, pyoderma and allergic dermatitis. Most of the skin disorders were recorded during rainy season (33.69%) followed by summer season (21.14%). The dermatological affections were more (54.49%) in males as compared to females (45.51%). The high (36.38%) prevalence of dermatological affections was recorded in dogs of age between 1-3 years and low (16.64%) prevalence was recorded in dogs of age more than 5 years. The hemato- biochemical study revealed the significantly decrease in Hb, PCV, TEC and albumin and significantly increase in TLC, neutrophils, eosinophils, total protein, albumin, ALT and AST in dogs suffered from demodicosis as compared to healthy dogs. The therapeutic study revealed that moxidectin and ivermectin were found equally effective against in canine demodicosis and complete recovery were observed on 14th day after treatment.

Keywords: Dermatological disorders, Dogs, Demodicosis, Moxidectin, Ivermectin

Introduction

The history of human-dog companionship is very old at least fourteen thousand years. The dogs are considered the most intelligent and loyal pet animal to the human. Dogs have found increasing popularity with changing socio-economic scenario in our country and are considered an integral part in scores of households. During their service to the mankind, dogs suffer with so many ailments. Out of these ailments, skin affections contribute a lot to their suffering. Skin is considered as the mirror of health as there are several systemic diseases that may clinically be reflected by some skin abnormalities. Skin is home to an immense range of natural living things. The skin is the most sensitive part of dog's body, which has aesthetic virtues to pet owners. An inflammatory condition of the skin irrespective of the cause is described as dermatitis. The canine dermatology is a very challenging field. It requires a very wide knowledge of different topics including bacteriology, mycology, parasitology, immunology, endocrinology, oncology etc. In canine practice, it has been estimated that in on an average 20% to 75% of the case have skin problems as a main or concurrent owner complaint. The skin diseases are of many kinds such as infectious, non infectious, congenital and hereditary diseases, immunological diseases, endocrine skin disorders, psychogenic dermatoses, environmental diseases, nutritional skin diseases, neoplastic diseases and miscellaneous diseases. Dogs are at more risk of infectious causes include parasites, bacteria, fungi and virus. These organisms stay alive on the outside of skin alongside different skin extremities like hair follicles, sebaceous and sweat organs of the mectoparasites infestation in dogs are very devastating and difficult to control and require long term of treatment^[1]. Some of the skin infections are capable of transmitting to human. Mange is one of the contagious canine skin affections which maintain to pose troubles for dog lovers and veterinarians. Numerous mange mites encompass demodex and sarcoptes inflicting demodicosis and scabies, respectively and reason pores and skin problem have already been isolated from the dogs. Sarcoptic or demodectic mange, as a result of mites is a pivotal and common skin disorder of dogs. Dogs are usually infested with many ecto-parasites making them

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miserable due to consistent scratching, intense itching, irritation and reduction of health and wellbeing of dogs through their blood sucking behaviors resulting to sever anemia, dermatitis which can lead to lifestyles-threatening allergy [3]. These conditions end up worse in hot and humid weather consequently becoming hard to resolve. Several studies from India and overseas have indicated that skin affections make up a substantial percentage of the small animal caseload [12] [16] [19]. The feeding habit of ectoparasites results within the alteration of numerous blood parameters. These hematological and biochemical parameters assist in diagnosing the severity of infestation and additionally helps to control infested dogs. Impacts of ecological elements, sex and age on event of ectoparasitic skin maladies in dogs were examined and detailed.

Material and Methods

The present study was carried out in the Department of Veterinary Medicine, College of Veterinary science and Animal Husbandry, Kanke, Ranchi during the period from January 2019 to December 2019. Dogs presented to the department with clinical signs suggestive of dermatological problems were included in the study. Information such as

history, clinical signs, age, sex etc. was recorded. Analysis of collected data was done to determine occurrence of various skin disorders in dogs. Skin scrapings suspected for mite infestation was collected from the dogs and examined by the method of Soulsby (1982) [24]. The scrapings were also collected from the 'recently rubbed' or 'appeared raw' lesions. Examination of skin scrapings for detection of the mite were done by direct method or by using 10% potassium hydroxide solution. A total of 12 dogs positive for *D. canis* were selected for the evaluation of comparative efficacy of Moxidectin and Ivermectin injection. These dogs were randomly divided into 2 treatment groups (G-1 and G-2) and each group having 6 dogs. The dogs of G-1 and G-2 were treated with moxidectin (Inj. Cydectin, Bayer Healthcare Division) @ 0.5mg/Kg b wt. and ivermectin (Inj. Neomac, Intas Pharmaceutical ltd.) @ 0.2mg/kg b wt. respectively. The treatment groups were also given supportive therapy Inj. Chlorpheniramine maleate (Anistamin- Intas pharmaceutical Ltd. Ahmadabad) @ 30mg/kg b. wt., i.m., multivitamin (Zipvit shyrup, Intas Pharmaceuticals) and omega fatty acid (Nutricoaat advances yrup, Petcare Pharmaceutical). The dogs of group G-3 kept as healthy control and consisting of 6 healthy dogs and no any medicine was given (Table 1).

Table 1: Treatment schedule

Group	No. of animals	Drug used	Dose	Days of treatment
1	6	Moxidectin	0.5mg/KG b.wt.; s/c	Once in a week for three weeks
2	6	Ivermectin	0.2 mg/KG b wt.;s/c	Once in a week for three weeks
3	6	Healthy control	--	--

Collection of samples

The samples of the dogs were collected first on day 0 i.e. pre therapy and then after 21st day of post therapy in all groups to evaluate the effect of the treatment. About 2 ml of blood sample was collected from cephalic vein of each dog, immediately after collection, blood was transferred to EDTA vials for the analysis of blood cellular components. The blood samples were analysed within 2 hours of blood collection for following parameters, deploying standard laboratory procedures. Packed cell volume (PCV), haemoglobin (Hb), total leucocyte count (TLC), total erythrocyte count (TEC) and differential count was measured by standard methods. Another 5 ml of blood was collected in serum vial for the separation of serum from the blood for the estimation of biochemical test. Extreme care was taken to prevent hemolysis. The serum, thus collected, was stored in deep freeze at minus 20 °C in glass vials which were properly capped and labelled. The blood sugar, total protein, albumin, ALT and AST was estimated by standard methods.

Results and Discussion

During the present investigation 2248 dogs were examined, of them 613 (27.26%) dogs suffered from different

dermatological affections. Khurana *et al.*, 2016 [15] reported 21.34 % cases affected with skin diseases during a study period of 5 years whereas Shyma and Vijayakumar (2011) [23] reported 12% dermatological problems in one year in dogs. Scott *et al.*, 2001 [20] and Hill *et al.*, 2006 [12] reported the prevalence of skin disorders ranging from 15-25% in dogs. Increasing trend of dermatological disorders discovered during this study might most likely result to updated information in identification and diagnosis of skin diseases, increasing population of pets, hyperbolic awareness among pet house owner sor because of amendment in climate conditions. The higher prevalence of dermatological disorders could also be because of season, environmental conditions factors and management factors adopted in a very explicit space as expressed by Sharma *et al.*, (2008) [22]. The prevalence of sarcoptic mange infestation (31.48%) was higher followed by tick-infestation (25.12%), lice infestation (18.43%), demodectic mange infestation (13.38%), pyoderma (6.03%), allergy/eczema dermatitis (3.76%) and others skin problems (1.79%) (Fig 1). Khurana *et al.*, 2016 [15] recorded sarcoptic mange infestation as a major dermatological problem in dogs, which was in accordance with present study.

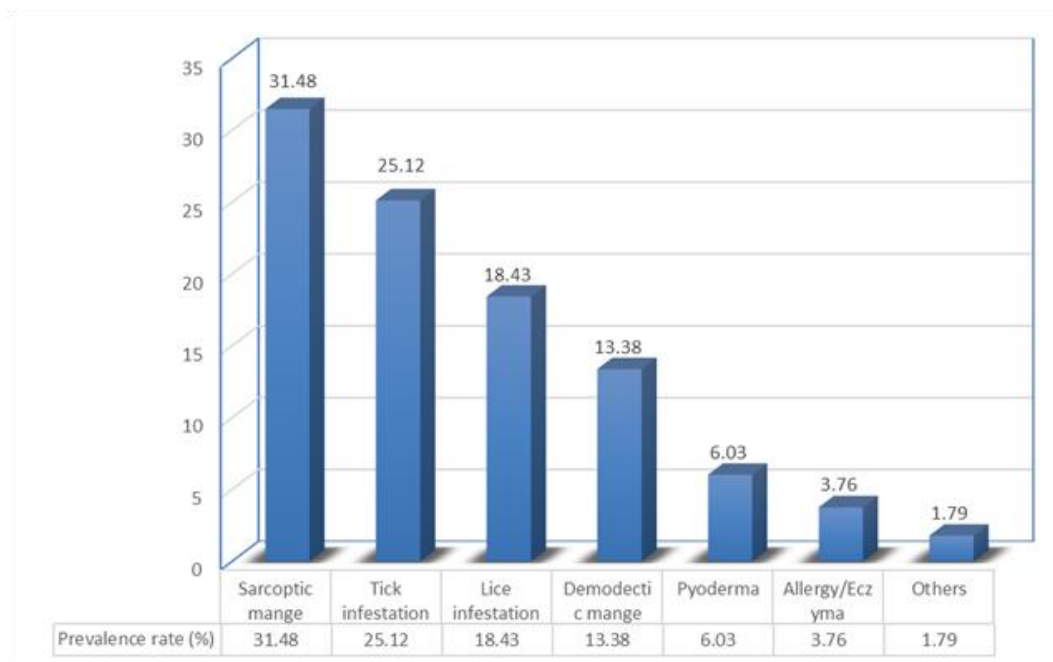


Fig. 1: Prevalence of dermatological disorders in dogs

Month-wise prevalence of different dermatological disorders (Fig 2) revealed maximum number of cases (17.78%) in the month of August followed by April (10.93%). In the month of

January, least number of cases (4.40%) was recorded. Kumar *et al.* (2006) [16] and Sharma *et al* (2018) [21] also reported the similar findings.

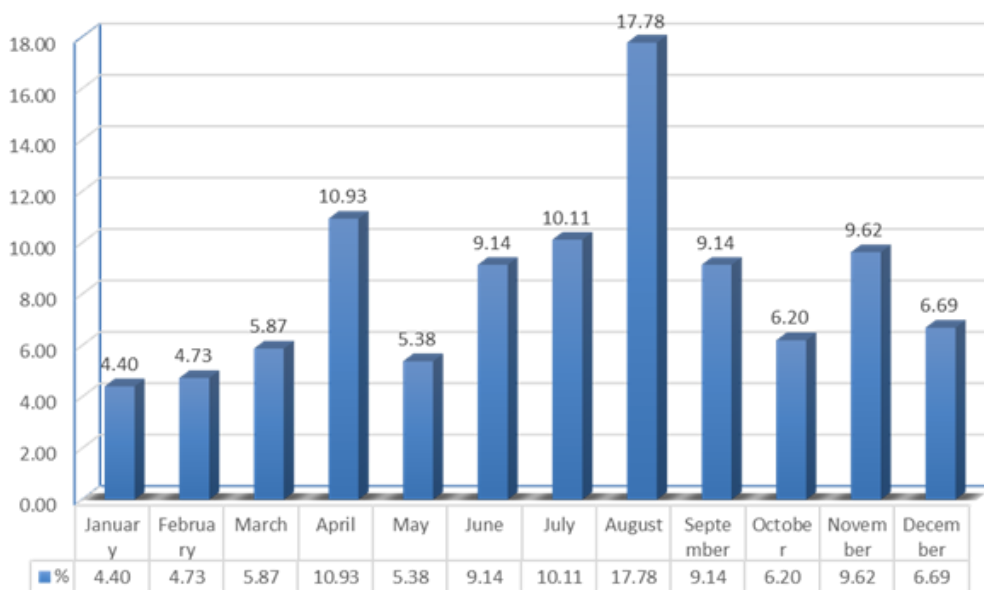


Fig. 2: Month-wise dermatological disorder in dogs

A year was broadly divided into four seasons; winter (January to March), summer (April to June), rainy (July to September) and autumn (October-December). There was a positive correlation amongst the different skin affections with monthly ambient temperature. Almost throughout the year dermatological disorders were recorded but more cases were recorded in rainy season followed by summer, autumn and then winter (Fig 3). Dimri and Sharma (2004) [7] and Kumar *et*

al., 2006 [16] also reported maximum cases of skin diseases during summer and rainy months of the year. Cases of sarcoptic mange, demodectic mange and pyoderma were maximum in rainy season whereas in summer season, maximum cases were of pruritus and flea allergy dermatitis. Similar to the observations of the present study was also observed by Dimri and Sharma (2004) [7].

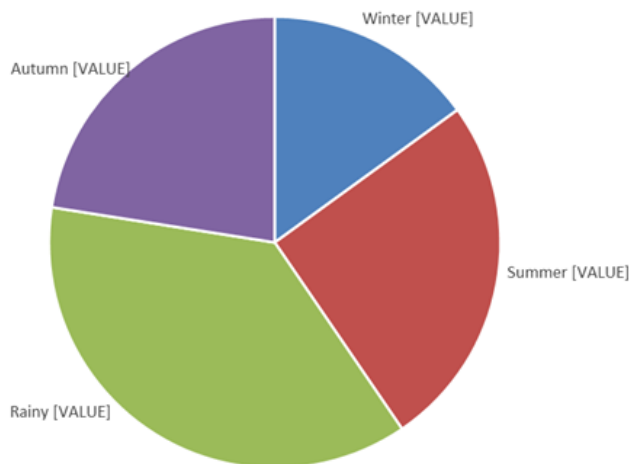


Fig. 3: Seasonal pattern of dermatological disorders in dogs

Amongst the dermatological disorders affected dogs, 54.49% male dogs were found to be infected with dermatological disorders as compared to females 45.51%. Gender wise occurrence of dermatological disorders of dogs is shown in Fig. 4. These findings of this study are well supported by

Chen *et al.*, (2012)^[5], Khurana *et al.*, (2016)^[15] and Sharma *et al.*, (2018)^[21]. This gender-wise differentiation might be ascribable to the fact that higher number of male dogs was present in this study.

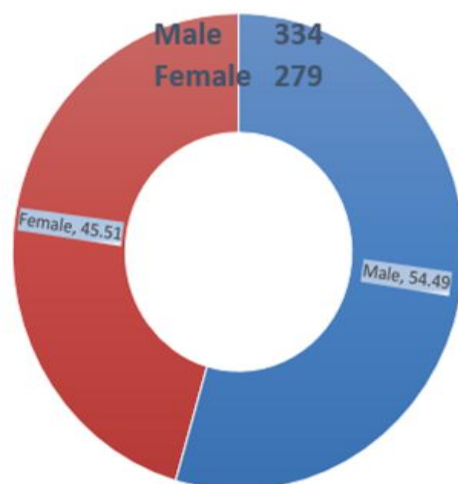


Fig. 4: Gender-wise dermatological disorders in dogs

The percentage of sarcoptic mange, tick infestation, lice infestation, demodectic mange, pyoderma, allergic dermatitis was 56.48%, 59.09%, 48.67%, 52.44%, 43.24%

and 60.86%, respectively in male dogs (Fig 5). The findings of this study are consistent with the findings of different workers^[13]^[15]^[16].

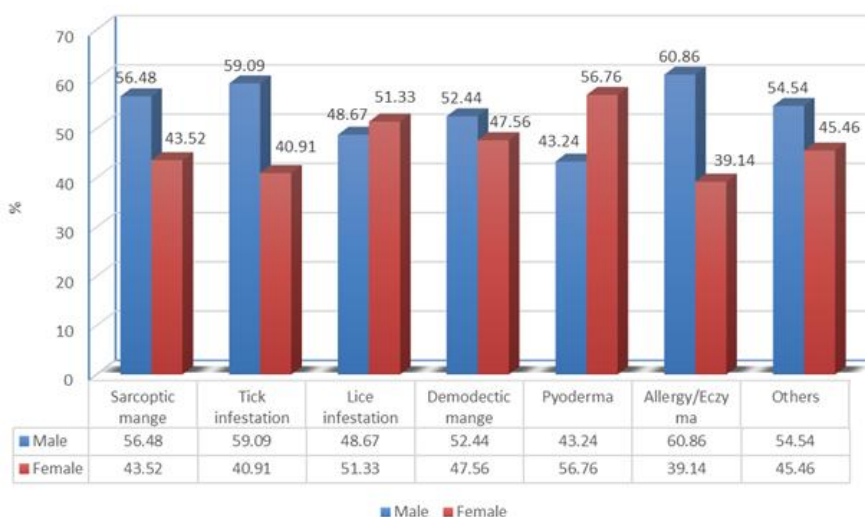


Fig. 5: Sex wise dermatological disorders in dogs

Age wise occurrence of dermatological disorders of dogs is given in Fig 6. Highest per cent of infection was noticed in dogs of age 1 to 3 years (36.38%), followed by 0 months to 1 year (28.71 %), 3 to 5 years (18.27 %) and above 5 years (16.64 %). These findings are similar to the findings of Sharma *et al.*, (2018) [21]. Sarcoptic mange, tick infestation

and eczema were more in dogs of less than one year of age where as flea allergy and demodectic mange was more in dogs of 1-3 years of age. Delay in the development of host immunity inclined the young animals to dermatological disorders [8].

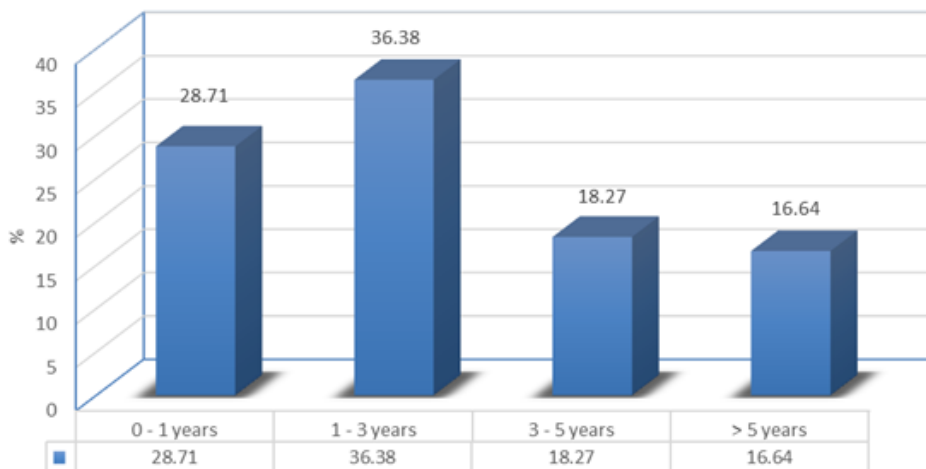


Fig. 6: Age wise dermatological disorders in dogs

Haematological alterations

Haemoglobin values (gm/dl) in healthy control dogs and demodicosis affected dogs (G-1, G-2 and G-3) were 9.58 ± 0.58 , 9.4 ± 0.16 and 13.01 ± 0.68 , respectively on day 0 which clearly indicated that the level of haemoglobin was significantly lower in dogs that were affected with demodectic mange (Table 2). PCV and TEC values in G-1 were 29.96 ± 0.81 & 5.67 ± 0.64 and in G-2 were 28.3 ± 0.35 & 6.01 ± 0.25 respectively which shows a decrease in both of the values in

the affected group of dogs (Table 2). These findings verified with the findings of Lodh and Das (2014) [17] and Prathibha (2000) [18]. Reduction in haemoglobin, PCV and TEC values is indicative of anaemia and deteriorated conditions of the affected dogs, which may lead to reduced food intake, illness, septicaemia and toxemia caused by demodicosis [23]. These values came to normal on 21st day of treatment in G-1 and G-2 (Table 2). Non-significant difference in haematological values were observed on 21st day of treatment.

Table 2: Haematological values of healthy and demodicosis dogs

Parameters	Group	0 th Day	21 st Day
Hb (g/dl)	1	9.58 ± 0.58^b	12.94 ± 0.81
	2	9.4 ± 0.16^b	12.76 ± 0.18
	3	13.01 ± 0.68^a	13.62 ± 0.16
PCV (%)	1	29.96 ± 0.81^b	40.06 ± 0.27
	2	28.3 ± 0.35^b	39.97 ± 0.32
	3	42.67 ± 0.92^a	41.13 ± 0.34
TEC ($10^6/\text{mm}^3$)	1	5.67 ± 0.64^b	7.02 ± 0.62
	2	6.01 ± 0.25^b	7.13 ± 0.14
	3	7.12 ± 0.31^a	7.26 ± 0.29
TLC ($10^3/\text{mm}^3$)	1	18.33 ± 0.96^b	12.29 ± 0.36
	2	18.94 ± 0.44^b	11.96 ± 0.63
	3	11.09 ± 0.52^a	12.06 ± 0.58
Neutrophils ($10^3/\text{mm}^3$)	1	77.18 ± 0.93^b	71.09 ± 0.36
	2	79.13 ± 1.08^b	72.61 ± 0.71
	3	71.67 ± 0.76^a	72.66 ± 0.41
Lymphocytes ($10^3/\text{mm}^3$)	1	17.46 ± 0.77^b	22.48 ± 0.54
	2	16.84 ± 0.71^b	21.08 ± 1.41
	3	22.58 ± 0.73^a	23.14 ± 1.83
Monocytes ($10^3/\text{mm}^3$)	1	1.39 ± 0.07^b	2.39 ± 0.09^a
	2	1.14 ± 0.23^b	2.16 ± 0.13
	3	2.33 ± 0.22^a	2.31 ± 0.31
Eosinophils ($10^3/\text{mm}^3$)	1	3.38 ± 0.33^b	2.01 ± 0.07
	2	3.65 ± 0.42^b	1.69 ± 0.23
	3	1.94 ± 0.19^a	2.01 ± 0.02
Basophils ($10^3/\text{mm}^3$)	1	1.49 ± 0.22^a	1.17 ± 0.06
	2	1.32 ± 0.04^a	1.27 ± 0.04
	3	1.68 ± 0.21^a	1.54 ± 0.06

Total leucocyte count (G-1; 18.33 ± 0.96 & G-2; 18.94 ± 0.44), neutrophil count (G-1; 77.18 ± 0.93 & G-2; 79.13 ± 1.08) and eosinophils (G-1; 3.38 ± 0.53 & G-2; 3.65 ± 0.42) was significantly elevated whereas lymphocyte values (G-1; 17.46 ± 0.77 & G-2; 16.84 ± 0.71) were significantly decreased in affected dogs in this study (Table 2) on day 0 which is in accordance with the findings of Thapa and Sarkar (2018) [9]. The mean values of eosinophil, monocytes and basophils have no effect. This result agreed with the findings of some researchers [2]. Gera *et al.*, 2012 [10] also reported elevated level of neutrophils in dermatological disorders which might be due to the injury to the cells resulting into the release of leukotoxins and leucocytosis which causes the release of more neutrophils in the blood stream [17]. Eosinophilia might be due to irritation of the skin tissues resulting in the stimulation of mast cells to release histamine. Hence histamine is chemotactic for eosinophils, eosinophilia develops [4].

Biochemical Alterations

Significant increase in serum glucose (G-1; 57.76 ± 0.98 & G-2; 59.62 ± 2.21), total protein (G-1; 8.62 ± 0.17 & G-2; 8.73 ± 0.13), alanine amino transferase (G-1; 106.15 ± 1.2 & G-2; 101.57 ± 1.15), aspartate amino transferase (G-1; 78.71 ± 1.84 & G-2; 81.63 ± 1.62) and significant decrease in serum albumin (G-1; 1.73 ± 0.09 & G-2; 1.49 ± 0.23) values were recorded in affected dogs than the healthy dogs in this study (Table 3) on day 0. Increased serum total protein may be due to increased immunoglobulins, inflammatory responses and circulatory immune responses [23]. Gupta and Prasad, (2001) [11] also reported a significant increase in total proteins in both mange and scabies. Jani *et al.* (2004) [13] and Chhabra *et al.* (2000) [6] also reported lower glucose values in parasitic infestation *Demodicosis* in dogs. The increased liver specific enzymes may be due to the hepatic damage caused by the toxic byproducts of tissue breakdown [14]. All the biochemical values in this study came to normal on 21st day of treatment in G-1 and G-2 (Table 2). Non-significant difference in biochemical values were observed on 21st day of treatment.

Table 3: Biochemical values of healthy and demodicosis dogs

Parameters	Group	0 th Day	21 st Day
Glucose (mg/dl)	1	57.76 ± 0.98^b	82.58 ± 1.39
	2	59.62 ± 2.21^b	83.13 ± 1.08
	3	94.75 ± 1.69^a	91.9 ± 0.36
Total protein (g/l)	1	8.62 ± 0.17^b	6.23 ± 0.25
	2	8.73 ± 0.13^b	6.85 ± 0.36
	3	6.51 ± 0.08^a	7.01 ± 0.25
Albumin (g/l)	1	1.73 ± 0.09^b	2.76 ± 0.03
	2	1.49 ± 0.23^b	2.81 ± 0.12
	3	2.81 ± 0.05^a	2.62 ± 0.07
ALT (IU/l)	1	106.15 ± 1.26^b	49.56 ± 1.91
	2	101.57 ± 1.15^b	54.41 ± 1.59
	3	56.49 ± 1.30^a	55.63 ± 1.17
AST (IU/l)	1	78.71 ± 1.84^b	46.82 ± 0.92
	2	81.63 ± 1.62^b	42.57 ± 0.77
	3	46.25 ± 1.58^a	49.71 ± 0.53

Comparative efficacy of treatment

Comparative efficacy of moxidectin and ivermectin for the treatment of demodicosis in dogs showed non-significant variations between both the treatment groups. Both the drugs showed equal effective against demodectic mange. The reduction in mites count were recorded on 7th day after the treatment and skin scrapings were found negative for mite on

14th day of post treatment and all clinical signs were vanished in on 21st day of post treatment (Table 4).

Table 4: Skin scraping examination of affected dogs (n-6)

Group	Day 0	7 th Day	14 th Day	21 st Day
G-1	++++	++	-ve	-ve
G-2	++++	++	-ve	-ve

Conclusion

The pervasiveness of summed up dermatological disorder represented 27.26% among different dermatological disorders. The age-wise pervasiveness showed most elevated event in 1 - 3 year, with male power. Itching of skin, alopecia, outside layers and pruritus were the most watched clinical signs. It is critical to basically assess dermatological infection during every assessment with the correct pattern demonstrative testing. All in all, dermatosis related with parasitic invasion is of major and chief worry to canine species. A noteworthy change in hemato-biochemical parameters were distinguished which ought to be mulled over to improve the helpful administration, maintain a strategic distance from significant confusions and accelerate the anticipation.

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