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Prevalence, Clinico-haemato-biochemical Studies on Mange in Buffalo

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ABSTRACT

Background: Mange is responsible huge economic losses due to reduced milk production, degradation of hide.

Methods: A total 302 buffalo were screened for mange for a period of six month (August 2023 to January 2024) in Rajasthan state in India and the animal were subjected through physical and clinical examination. Skin scrapping sample were collected for mange identification. Blood sample were also collected for haemato-biochemical parameter investigations.

Result: Overall prevalence of mange was found 5.62 per cent and the per cent distribution of sarcoptic mange was higher (58.82 per cent) as compared to psoroptic mange (41.17 per cent). Age group-wise prevalence of mange was recorded highest in buffalo below 6 months age, followed by 6 months to 3 years age group and lowest in buffalo above 3 years of age. Female animals were more affected with mange than the male animals.Clinical examination revealed pruritus was a common clinical sign of mange. There was highly significant (p<0.01) difference in Hb, PCV, TEC, lymphocyte, eosinophils, total protein, albumin, globulin in mange affected buffalo as compared to healthy control.

Key words: Blood, Buffalo, Haemato-biochemical, Prevalence.

INTRODUCTION

Mange mite dispersion is a worldwide phenomenon that varies according on the mite and host species (Bochkov *et al.,* 2014; Fentanew *et al.,* 2015). The management of the herd and the environment have an impact on the mange infection (Asmare *et al.,* 2016). Mange infestation in buffalo causes significant economic harm due to the disintegration of affected organs and the consequent decrease in milk and meat production. Mange affects the skin more than any other organ of the body (Agumas *et al.,* 2015). In buffalo, mange is still the most common, endemic and often ignored ectoparasitic infestation that can lead to repeated endemics. The mite's burrowing and feeding behaviors result in mechanical damage, irritating chemical release, or immunological hypersensitivity to the mite's foreign antigen, which produces inflammation and severe itching (Nazir *et al.,* 2014; Rathore *et al.,* 2024). Mange mite infestation not only causes a decrease in skin quality from an aesthetic point of view, but also leads to economic losses in the form of shortened grazing, resulting in reduced milk production and poor weight gain. Mange also has zoonotic significance, as the infection can be transmitted to humans (Sharma *et al.,* 2021; Rathore *et al.,* 2024).

MATERIALS AND METHODS

Study population

In this study, total 302 buffalo were screened which included 57 calves below 6 months of age, 105 buffalo aged between 6 months and 3 years and 140 buffalo over 3 years of age from various organized and unorganized farms of Udaipur district, irrespective of age and sex. Among them, 204 were female and 98 were male. The current investigation was carried out for a period of 6 month from August 2023 to January 2024, in the Department of Veterinary Medicine, College of Veterinary and Animal Science, Navania, Udaipur (RAJUVAS, Bikaner). Buffalo of different age and sex were examined. Ten apparently healthy buffalo (n=10) with basic clinical and haemato-biochemical parameter for the comparison and analysis.

Collection and examination of skin scrapings

Each buffalo was subjected to thorough physical and clinical examination as per the methods described by Radostitis *et al.* (2007). It includes body temperature, heart rate, respiratory rate, general behavior, eating, drinking, urinating, defecation, posture, gait and physical condition were recorded. All of the animals skin coats was thoroughly inspected in the daylight for alopecia, erythema, crust,

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scab, nodule, pruritis, wrinkling, colour, distribution and number of lesions, as well as the condition of the hair coat. Skin scrapings were collected from buffalo showing skin lesions and examined under microscope for presence of mites, after treating with 10% KOH as per the procedure described by Soulsby (1982). Identification of mites was done on the basis of characteristic morphological features as described by Lapage (1962).

Collection and analysis of blood samples

Blood samples were drawn from mange affected buffalo along with control animals in order to assess haemato-biochemical parameters. Ten apparently healthy cattle were selected to have base line data on basic clinico-haemato-biochemical parameters for the comparison and analysis. Packed Cell Volume (PCV), Haemoglobin (Hb), Total Erythrocyte Count (TEC), Platelet Count, Total Leukocyte Count (TLC) and Differential Leukocytes Count (DLC) were determined using the techniques stated by Feldman *et al*. (2000). Biochemical parameters *viz*. serum total protein (TP), serum albumin, serum globulin, aspartate transaminase (AST), alanine transaminase (ALT), blood urea nitrogen (BUN), total bilirubin and serum glucose were estimated by using automated serum biochemistry analyzer (Biogen biochemistry analyzer).

Statistical analysis

The data obtained in the research work were statistically analyzed and compared using standard formula given for mean and standard error as per statistical methods described by Snedecor and Cochran (1996).

RESULTS AND DISCUSSION

Overall prevalence

Out of total 302 buffalo, 17 buffalo were found affected with mange. Thus the overall prevalence of mange in buffalo was found to be 5.62 per cent. Almost similar prevalence (5 per cent) has also been noted by Ali *et al.* (2021) in buffalo at Malakand Division, Pakistan. Rathore (2024) reported 7.14 per cent prevalence of mange in cattle in Udaipur, Rajasthan.

Under present investigation, *Sarcoptes scabies* var*bovis*and *Psoroptes bovis* mites were observed during examination of skin scrapings of buffalo. The prevalence of sarcoptic and psoroptic mange was 3.33 (10/302 and 2.31 (7/302) per cent, respectively. The findings of present study closely correlated with that of Ramesh (2014), Nazir *et al*. (2014) and Rathore *et al.* (2024).

This higher prevalence of mange might be attributed to the types of management practices and weather condition of the area (Kebede and Hirpa, 2022)

Age group-wise prevalence

Age group-wise prevalence of mange in buffalo was 7.01 per cent in 0-6 month age group, 5.71 per cent in 6 months to 3 years age group and 5 per cent in animals above 3 years of age. Highest prevalence of mange was observed in buffalo below 6 months age group (5.71 per cent), followed by 6 months to 3 years age group. The lowest prevalence of mange was seen in buffalo above 3 years of age (5 per cent).

Thus, it was revealed that prevalence of mange decreased with advancement of age in buffalo. Similar findings have also been reported by Thakar (2004), Kazmi *et al*. (2009), Kotb and Abdel-Rady (2011), Vishe *et al*. (2012) and Nazir *et al.* (2014) in buffalo. Kebede and Hirpa (2022) and Rathore *et al*. (2024) found similar finding in cattle. In contrary to present findings, Elkhtm and Mousa (2016) found higher prevalence of mange in adult buffalo and Haggag *et al*. (2018) and Sitotaw *et al*. (2018) found higher prevalence of mange in adult cattle.

Higher incidence of mange in buffalo calves could be due to soft tender skin, dense hairs, poor hygienic condition, close confinement, overcrowding, negligence towards skin ailments and relatively low levels of immunity (Hazarika *et al.,* 1995 and Thakar, 2004).

Sex-wise prevalence

Sex-wise prevalence of mange was 5.88 per cent in female buffalo and 5.10 per cent prevalence in male buffalo. Higher prevalence of mange was recorded in female buffalo as compared to male buffalo. Similar findings were obtained by Nazir *et al*. (2014) have also reported that females were more susceptible to mange (4.07 per cent) as compared to males. Singh (2018), who found higher prevalence of sarcoptic mange in female cattle in and around Jabalpur as compared to male animals. Rathore *et al.* (2024) reported higher prevalence of mange was 7.17 per cent in female cattle and 7.07 percent prevalence in male cattle. While some workers reported higher incidence of mange in male buffalo (Thakar, 2004; Kazmi *et al.,* 2009 and Vishe *et al.,* 2012).

The prevalence of mange mite was higher in females than males. This might be due to factors such as pregnancy and lactation which can lower a female animal's immune system which can increase the females vulnerability to mite infection (Kebede and Hirpa, 2022).

Clinical findings of mange

To ascertain the characteristic clinical picture in sarcoptic and psoroptic mange in buffalo and buffalo calves, frequency and distribution of lesions, nature of lesions and their distribution over the body along with clinical symptoms manifested by the animals were taken in to consideration.

Frequency and distribution of lesions

The occurrence of the lesion in sarcoptic and psoroptic mange in buffalo and buffalo calves was varying in individual animal. The severity of the lesion as well as its extent also differed from one animal to another. The lesions were either in the form of alopecia at focal area, papular lesions with intense local erythema, extensive pruritus, acute dermatitis, scales and scabs over local region to diffused lesion covering larger area of the body.

Table 1: Clinical findings of sarcoptic and psoroptic mange in buffalo.

Clinical finding	Sarcoptic mange (n=10)		Psoroptic mange (n=7)		Overall percentage (%)
	Number of affected buffalo	Percentage (%)	Number of affected buffalo	Percentage (%)	(n=17)
Alopecia	9	90	5	71.42	82.35
Pruritus	10	100	6	85.71	90.90
Wrinkling of Skin	7	70	5	71.43	64.70
Thickeningof skin	4	40	2	28.57	35.29
Erythema	6	60	2	28.57	47.05
Scab or crustformation	8	80	2	28.57	58.82
Anorexia	3	30	1	14.28	17.64

Table 2: Distribution of lesions of sarcoptic and psoroptic mange in buffalo.

Site of lesions	Sarcoptic mange (n=10)		Psoroptic mange (n=7)		Overall percentage (%)
	Number of affected buffalo	Percentage (%)	Number of affected buffalo	Percentage (%)	(n=17)
Neck	8	80	2	28.57	58.82
Tail	1	10	5	71.42	35.29
Shoulder	1	10	7	100	47.05
Legs	6	60	2	28.57	47.05
Brisket	2	20	5	71.42	41.17
Face	3	30	1	14.28	23.52
Back	9	90	5	71.42	82.35
Ventral abdomen	1	10	1	14.28	11.76

Nature of lesion

Distribution of various types of lesions as per their nature in buffalo affected with sarcoptic and psoroptic mange is recorded in Table 1.

Microscopic examination of skin scrapings tested positive for sarcoptic mange in 10 buffalo out of total 302 buffalo. Of all affected buffalo, 9 buffalo that were positive for sarcoptic mange showed alopecia (90 per cent). All 10 buffalo showed pruritus (100 per cent). Of all affected buffalo, 7 cases (70 per cent) showed wrinkling of skin. Thickening of the skin was observed in 40 per cent of cases. Six buffalo (60 per cent) had erythema. Scab or crust formation on the surface of skin was found in 8 percent of cases. Anorexia was also observed in 3 buffalo (30 per cent) with sarcoptic mange.

Microscopic examination of skin scrapings revealed only 7 buffalo were found positive for psoroptic mange out of 302 buffalo. On clinical examination, all affected buffalo, five buffalo that were positive for psoroptic mange showed alopecia (71.42 per cent) (5/7). Six affected buffalo (85.71 per cent) had pruritus (6/7). The clinical symptom of thickening of skin, erythema and formation of scab or crust over the skin each was recorded in 28.57 per cent cases (2/7). Only one buffalo (14.28 per cent) had anorexia out of 7 psoroptic mange affected buffalo (1/7).

Thus, it was found that pruritus was a common clinical finding recorded in all mange-infested buffalo (90.90 per cent), followed by alopecia (82.35 per cent), skin wrinkling (64.70 per cent) (Table 1). Buffalo crust or scab formation (58.82 per cent) and skin erythema (47.05 per cent) of mange affected cases. Other clinical findings of mange observed in buffalo were skin thickening (35.29 per cent) and Anorexia (17.64 per cent).

Anatomical distribution

Microscopic examination of skin scrapings tested positive for sarcoptic mange in 10 buffalo. Of all sarcoptic mange affected buffalo, 8 buffalo that were positive for sarcoptic mange showed lesion over the neck (80 per cent) (8/10) and tail (10 per cent) (1/10). Of all affected buffalo, one cases (10 per cent) showed lesion over shoulder (1/10). Six cases (60 per cent) showed lesion over leg (6/10), two cases (20 per cent) showed lesion over brisket (2/10), three cases (30 per cent) showed lesion over face (3/10), nine cases (90 per cent) showed lesion over back (9/10) and one cases (10 per cent) showed lesion over ventral abdomen (1/10). The lesions were found mostly on the back and neck.

Microscopic examination of skin scrapings revealed that only 7 buffalo were found positive for psoroptic mange. Of all affected buffalo, two cases showed lesion over the neck (28.57 per cent) (2/7), five cases showed lesion over the tail (71.42 per cent) (5/7), seven cases (100 per cent) showed lesion over shoulder (7/7), two cases (28.57 per cent) showed lesion over leg (2/7), five cases (71.42 per cent) showed lesion over brisket (5/7), one cases (14.28 per cent) showed lesion over face and ventral abdomen (1/

Table 3: Mean±SE values of various haemato-biochemical parameters in buffalo affected with manage and control animals.

Parameters	Control group (n=17)	Mange affected buffalo (n=10)
Packed cell volume (PCV)** (%)	35.11±0.52	24.75±0.83
Haemoglobin (Hb)**(gm/dl)	11.78±0.17	7.26±0.25
Total erythrocyte count (TEC)** (10^6/µl)	7.31±0.17	6.23±0.25
Platelet count (10^3/µl)	304.6±0.40	288.47±0.29
Total leucocyte count (TLC) (103/µl)	9.4±0.72	8.39±0.37
Lymphocytes**(%)	60.45±2.50	52.55±1.34
Neutrophils**(%)	34.17±1.95	29.38±1.70
Monocytes (%)	3.25±0.55	3.55±0.21
Eosinophils**(%)	2.9±0.60	4.76±0.32
Basophils (%)	0.10±0.10	0.11±0.08
Serum totalprotein**(gm/dl)	7.33±0.34	5.85±0.29
Serumalbumin**(gm/dl)	2.73±0.20	1.89 ±0.18
Serumglobulin**(gm/dl)	3.90±0.12	2.91 ±0.16
Alanine transaminase (ALT) (U/L)	30.63 ± 2.55	31.16± 1.12
Aspartate transaminase (AST) (U/L)	69.63±3.54	74.20±1.41
Blood urea nitrogen (BUN) (mg/dl)	19.72 ±0.97	17.99 ±0.61
Total bilirubin (gm/dl)	0.28±0.04	0.32±0.03
Serum glucose (mg/dl)	59.28± 3.35	56.39±2.23

**Significantat 1% level (p<0.01).

7) each and five cases (71.42 per cent) showed lesion over back (5/7). The lesions were found mostly on the shoulder.

Thus, the frequency distribution as per the involvement of anatomical area in mange-infested buffalo, lesion were mostly over back (82.35 per cent) followed by neck (58.82 per cent), shoulder and legs (47.05 per cent each), brisket (41.17 per cent), tail (35.29 per cent), face (23.52 per cent) and ventral abdomen (11.76 per cent) (Table 2).

Similar findings were also reported by Thakar (2004), Kazmi *et al*. (2009) and Nazir *et al*. (2014) in sarcoptic and psoroptic mange affected in buffalo. They observed intense itching accompanied by hair loss, crusting and thickening of the skin in mange-affected buffalo.

Inflammation of varying degrees of severity occured caused due to sarcoptic mange penetrating deeper into the stratum corneum layer of skin. Accumulation of body secretions, saliva and faeces in it stimulates the immune system of the host, causing typical inflammatory lesions. Accompanying symptoms: itching, scratching and rubbing against hard objects or against each other, resulting in hair loss (Mal *et al.,* 2000; Thakar, 2004 and Rathore, 2022).

Haematological investigation

Haematological investigations revealed that haemoglobin (Hb), packed cell volume (PCV) and total erythrocyte count (TEC) were significantly (p<0.01) decreased in mange affected buffalo (Table 3). The present findings are similar with that of Vishe *et al*. (2012), Kumar *et al*. (2022) and Rathore *et al.* (2024). The decrease in mean value of packed cell volume, haemoglobin and total erythrocytes in mange affected buffalo may be due to reduced feed intake of the buffalo due to constant itching, which further leads to lack of essential nutrients required for haematopoiesis. This may be due to the ability of mite to consume blood from the host and bleeding from skin lesions caused by burrowing nature of the mite (Patel, 1999 and Thakar, 2004). Eosinophils were significantly (p<0.01) increased in affected buffalo. Similar findings have also been reported by Thakar (2004) and Vishe *et al*. (2012). They observed eosinophilia in mite infested buffalo. A high eosinophilic response is a common response in diseased tissues and organs that contain high concentrations of mast cells, such as the skin. Tissue damage caused mast cell degranulation with histamine release, which caused eosinophilic chemotaxis, triggering an increased eosinophilic response (Ahmed *et al.,* 1995 and Thakar, 2004). Although lymphocytes were significantly (p<0.01) reduced, which could be relative in nature with neutrophils and eosinophils that were increased in mite infested buffalo (Thakar, 2004). Almost similar findings were reported by Thakar (2004). He found lymphopenia in cases of mange in buffalo. In contrast to present findings, Vishe *et al.* (2012) recorded increased lymphocyte. Changes in the mean value of platelet count, total leukocyte count, neutrophil, basophil and monocytes were statistically non-significant in buffalo affected with mange as compared to control animals.

Biochemical investigation

Among biochemical parameters, serum total protein, serum albumin and serum globulin were significantly (p<0.01) reduced in buffalo affected with mange (Table 3). Vishe *et al.* (2012) recorded decreased level of serum total

protein, serum albumin and serum globulin in mange in buffalo which also corroborates with persent study. The decrease in total serum protein in buffalo may be related to reduced grazing time due to severe pruritus of mange, which leads to poor nutritional status of the affected animal (Radostatis *et al.,* 2007). This may also be due to the loss of plasma proteins in dermatitis. Non-significant differences were observed in other parameters *i.e*., ALT, AST, BUN, total bilirubin and serum glucose. Vishe *et al*. (2012) found reduction in serum total protein level in mange. The lower serum total protein, albumin and globulin level in cattle with mite infestation might be due to poor nutritional status as a consequence of reduced feed intake and anorectic condition in diseased animal.

CONCLUSION

It was concluded that, there was considerable, variations in the prevalence of mange affected buffalo with age and sex. Further, alteration in haemato-biochemical parameters in mange affected buffalo. The determination of clinico-haemato-biochemical alteration will facilitate the selection of an appropriate therapeutic approach.

Conflict of interest

There was no conflict of Interest.

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