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PREVALENCE OF SKIN AND SUBCUTANEOUS NEOPLASM IN BOVINES AT VARIOUS DISTRICTS OF CHHATTISGARH, INDIA

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ABSTRACT

The present study was undertaken to evaluate the prevalence of skin and subcutaneous tumours in bovines. Thirty cases of skin and subcutaneous tumours were studied and examined at the time of presentation and their age, sex, breed, species, clinical observation for the body condition, location, colour of tumour mass, consistency, weight, shape, peduncultion, presence of bleeding were recorded. Most of the animals were middle aged, ranging from 4 to 8 years. Breed wise prevalence was more in crossbred cattle than other breeds. Sex wise higher incidence in male than females. The eye, neck, and limb region (13.34%) were most common tumours. The red and black colour of masses accounted for 10 (33.33%) and weight ranges from 80 to 120 gms affected with skin and subcutaneous tumours were twelve (40%) whereas bleeding and infection found in eleven (36.66%) and eight (26.66%) respectively. On clinical examination, animals with healthy condition (73.34%), tumours with non-pedunculated (broad based) (73.34%). The hard consistency (46.66%) cases along with round shape of tumour mass were found in thirteen (43.34%) cases which contributed maximum number of skin and subcutaneous tumours.

Keywards: *Bubalus bubalis*, buffaloes, prevalence, skin, subcutaneous, neoplasm, cattle

INTRODUCTION

Neoplasm is un-controlled, abnormal structural foreign body present on or inside the body without any specific function. It gradually grown and changed the normal cellular architecture to abnormal one. Initially start with small, tiny structure, take the energy from host cell and converted into large lethal space occupying lesion.

Cancer being a silent killer is a life-threatening ailment and has gained much importance and awareness of people towards animal pain and suffering. Cancer can affect all animals and causes huge economical losses due to decrease in milk yield, carcass condemnation, treatment cost and mortality (Reddy *et al*., 2009). Skin and appendages form a major component of all neoplasms in veterinary practice (Goldshmidt and Hendrick, 2002).

Incidence of tumours was highest in dogs followed by cattle and in cattle and buffaloes is

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relatively increased particularly cutaneous and subcutaneous tumors Harghita and Miercurea (2009). Skin tumours was most common (5 to 6%) of all bovine tumours (Miller *et al*., 1995). In the bovine species, cutaneous papillomatosis is more common than in any other domestic animals. Neoplastic growth one per cent of the bullock population in India and the average age of cattle suffering from horn cancer was 11.33 with higher incidence in males (Udharwar *et al*., 2008).

According to Tyagi and Singh (2006) the horn cancer was generally unilateral and was encountered in cattle in the age group of 5 to 10 years. The highest incidence of horn cancer was found in males than in females (Wangikar, 1997). Neoplasm could lead to weight loss and stunted growth, skin lesions are often located on the udder and impede milking, and hence results in reduced milk yield (Pugliese *et al*., 2014). The clinical manifestation of these disorders could incur serious economic losses, if not detected and treated in due time (Babu *et al*., 2020).

The common sites for the development of cutaneous warts are head, eyelids, ears, neck, dewlap, brisket, shoulders, and legs, occasionally on the back, para-genital region and along the lower line of abdomen (Aiello, 1988).

Sometimes ill effects of tumours may be limited to localized stress at the site of lodgement which may be due to pressing on nerve which cause infection and frequent bleeding.

The bovine population are more in Chhattisgarh and this work was probably first on bovine neoplasm in Chhattisgarh. Hence, the present research work highlighted with objectives of record of the prevalence of skin and subcutaneous neoplasm in bovines, studied at different districts of Chhattisgarh, India.

MATERIALS AND METHODS

Survey and data collection

The present study was conducted on clinically suspected cases of various bovine neoplasm; irrespective of their age, sex and breed which were presented at Government Veterinary Hospitals of various districts of Chhattisgarh for a period of one year. Thirty clinical cases of skin and subcutaneous tumours in bovines of different age groups, species (cattle and buffaloes) and breeds were recorded. All the animals were subjected to routine clinical examination, including general condition of animal, location, colour, consistency, size/weight, shape, peduncultion of tumour, presence of bleeding and infection.

RESULT AND DISCUSSION

Prevalence

The information of skin and subcutaneous tumours in thirty animals with respect to age, sex, breed, and species (cattle and buffaloes) has been summarized in Tables from 1 to 4 and represented in figures from 1 to 4.

Age wise prevalence

Age wise distribution of skin and subcutaneous tumours has been presented in Table 1 and depicted in Figure 1. All the animals treated in the present study were found to be in the Age group of 1 to 16 years. The higher prevalence of skin and subcutaneous tumours was found in 15 (50%) animals of the Age group of 4 to 8 years, 9 (30%) animals were in the Age group of 8 to 12 years, 3 (10%) animals were in each Age group of 12 to 16 years and Age group of 0 to 4 years.

The fact that maximum number of skin

and subcutaneous tumours were encountered in animals above 4 years of age also indicated that age played a pivotal role in the development of skin and subcutaneous tumours. In the present study highest incidence of tumours was observed between 4 to 8 years of age (50%) which is in accordance with the findings of Naik (2010).

In addition, Joshi *et al.* (2009) recorded more incidence in 7 to 10 years age, Giri *et al.* (2011) recorded in 7 to 8 years, Wangikar (1997) recorded in 5 to 10 years, Udharwar *et al.* (2008) noticed in animals above ten years age (58.33%) followed by animals below ten years (41.66%).

Gharagozlou *et al.* (2007) also postulated that the higher incidence in cattle aged 4 to 6 years with an average age of 61.5 months in a study involving 32 ocular tumours. Ocular squamous cell carcinomas were uncommon in cattle younger than five years and rare in cattle younger than three years.

Though, the exact relationship between age and the development of skin and subcutaneous tumours could not be established. However, it might be because of decreased immunity, insufficient detoxifying and elimination process, hormonal imbalance, more opportunity for exposure of carcinogenic agents like chemical fertilizers, weedicides, insecticides, and constant irritation by pressure of bullock carts etc. which might have made the animals more susceptible for development of neoplasm.

Sex wise prevalence

The sex wise distribution of skin and subcutaneous tumours during the study has been presented in Table 2 and represented in Figure 2. The sex wise prevalence of skin and subcutaneous tumours revealed that a majority of the cases were in male accounting for nineteen (63.34%) cases as compared to eleven (36.66%) in females.

In all types of tumours, the occurrence of neoplasm was more in males than in females. The prevalence of skin and subcutaneous tumours was 63.34% in male which was much higher than its percentage in females (36.66%). Similar finding was observed by Tyagi and Singh (2006); Udharwar *et al.* (2008); Joshi *et al.* (2009) recorded more incidence in males than females. Kumar *et al.* (2013) reported 63.90% incidence of connective tissue tumour in males and 36.01% in females.

Rao *et al.* (2014) also suggested higher incidence of tumours in males (56.09%) when compared to females (43.91%). In contradiction to that, Naik (2010) observed that out of 21 tumour cases higher incidence was recorded in females (76.19%) than males (23.81%).

Other than sex dependent tumours like mammary tumours, no specific reason for its higher incidence in males could be traced out. Probably, it might be due to more exposure of males to environmental chemical carcinogens because they are used for drought purpose along with hormones like testosterone, where the chemical structure of testosterone is similar to the benzanthracene and benzypyrene which acts as a potent chemical carcinogen.

Breed wise prevalence

The Breed wise distribution of skin and subcutaneous tumours during the study has been presented in Table 3 and represented in Figure 3. The breed wise prevalence of skin and subcutaneous tumours revealed that the majority of the cases were in Crossbred cattle accounting for eight (26.66%) cases, followed by non-descript cattle seven (23.34%), Crossbred buffalo six (20%), Murrah buffaloes five (16.66%), two (6.66%) in the Gir while one case each in Surti buffalo (3.34%)

and Holstein Friesian (HF) (3.34%) breed.

The incidence was the highest in the crossbred cattle followed by non-descript cattle, crossbred buffalo, Murrah buffaloes, Gir, Surti buffalo and Holstein Friesian (HF). Ozsoy *et al.* (2011) stated that papillomas were more common in cattle than other animals. Similar findings were reported in the present study in cows whereas Khasatiya *et al.* (2008) observed in Holstein cattle, Veena (2001) reported in Jersey cow and Veena and Ravi Kumar (2002) in Jersey calf.

Naik (2010) observed high incidence in HF cross bred cattle and lowest in Hallikar. Breed wise higher incidence was recorded in graded Murrah buffalo (71.43%) followed by Ongole cattle (14.29%), HF-Ongole cross (9.52%) and nondescript cattle (4.76%).

Many researchers like Joshi *et al.* (2009) recorded a higher incidence in Kankrej cattle, Wangikar (1997) in Zebu cattle, Manjunath *et al.* (2007) in Deoni bullocks. In addition, Lall (1994) stated that carcinoma of horn was common in cattle in and around Kandhar.

Swamy (2016) stated that among 21 tumour cases two cases of female graded Murrah buffaloes and one case of nondescript bullock aged 3 to 8 years were presented with a swelling near tip of tail.

Although, specific causes of skin and subcutaneous tumours in bovines could not be ascertained till today. However, hormonal imbalance, inbreeding and poor nutrition have also been postulated for the causation of skin and subcutaneous tumours in bovines by various workers.

In the present study, most of the formers of Chhattisgarh state had crossbred cattle and non-descript cattle. This could be attributed to the preference to a particular breed in that region and might be due to inbreeding in this breed which could make this breed more prone for skin and connective tissue tumours.

Species wise prevalence

The species wise distribution of skin and subcutaneous tumours during the study has been presented in Table 4 and represented in Figure 4. The species-wise prevalence of skin and subcutaneous tumours revealed that the cattle contributed most of the cases i.e. eighteen (60%) cases, followed by buffaloes twelve (40%).

Naik (2010) reported higher incidence of neoplasms in cattle than buffaloes and attributed the same to breed predominance in the region. He recorded horn cancer in approximately one percent of the cattle population in Meerut circle of Uttar Pradesh and Udharwar *et. al.* (2008) in approximately one per cent of the bullock population in India. Swamy (2016) studied that 0.37% of the bovine population in and around the coastal areas of Andhra Pradesh suffer from various types of tumours.

Higher incidence of tumours was observed in cattle (60%) than buffalo (40%). During the study period, it was found that farmers as well as dairy owners have more numbers of cattle as compare to buffaloes and some owner have only cattles. The majority of the cases in cattle might be due to predominance of cattle population in the area of study.

Clinical parameters

General condition of animal

The health wise condition of animals affected with skin and subcutaneous tumours has been presented in Table 5 and represented in Figure 5. It was noted at the time of presentation of animal to the different hospitals. Healthy

animals were found more prone to suffer from skin and subcutaneous tumours comprising of 22 (73.34%) out of total skin and subcutaneous tumours whereas 8 (26.66) animals already in unhealthy condition were affected with skin and subcutaneous neoplasms.

Skin, being the largest protective layer is constantly being exposed to traumatic injuries/ irradiation or environmental chemical carcinogens. Long term exposure causes cellular and structural changes might be playing a key role in the higher frequency for the development of skin and subcutaneous tumours. The tumours were result of long-term exposure of carcinogens.

Location of tumour mass

The location of skin and subcutaneous tumour mass has been presented in Table 6 and represented in figure 6 which were observed in different regions of body surface. The location wise prevalence of skin and subcutaneous tumours revealed that most of the cases were in eye, neck and limb region accounting for four (13.34%) of each, followed by mandibular and abdomen three (10%) of each, oral, nose, horn and brisket two (6.66%) of each case while one (3.34%) case each in ear, thorax, perianal and generalized.

Among these incidences of tumours of neck, eye and limbs was more frequent (13.34%) which was in accordance with the observations of Manjunath *et al.* (2007); Sivaseelan *et al.* (2009).

Kohli and Mashadi (2008) noticed a case in an Iranian buffalo with a small orange sized mass at the dorsum of neck close to the withers with reduced milk yield whereas in the present study neoplasms was observed at different locations along with neck.

Tyagi and Singh (1993) found that a total of four fibromas were recorded involving different regions *viz*., skin of brisket (one case), tail (two cases) and ventro-lateral thorax (one case) constituting second predominant tumour in the present study affecting animals.

In the present findings, papillomas were predominantly seen on forehead, ventral neck **(**Figure 1**4)**, earflaps, lateral aspect of right elbow scapular region and whole body in one case.

Ozsoy *et al.* (2011) calculated predominance of lesions on head (63.2%), neck (16.80%), interscapular region (12.6%) followed by thorax (7.4%).

A case of brisket neoplasm was recorded in four-year-old female graded Murrah buffalo showing difficulty in walking, hot and non-painful to touch, hanging up to knee joint and bigger than football in accordance with the findings of Dabas *et al.* (2012).

Prasuna and Christopher (2002) observed the occurrence of neurofibroma in the form of a bunch of grapes just below the vulva over the perineum region in eight years old female buffalo. Hereditary factors, exposure to sunlight, lack of eyelid pigmentation, altitude and age play a role in the aetiopathogenesis of bovine ocular squamous cell carcinomas (Baniadam *et al*., 2010; Tsujita and Plummer, 2010).

Most of the animals presented with tumour were in good physical condition. No correlation could be established or traced out with literature between location and the prevalence of the tumours. However probably the more exposure of that part to the irritants and carcinogenic agents might have some role for its higher incidence.

Colour of the mass

The colour wise distribution of skin and subcutaneous tumours masses during the study has been presented in Table 7 and represented in

Figure 7. This study revealed that a majority of the masses showed red and black accounting for 10 (33.33%) and 10 (33.33%) respectively, followed by 9 (30%) masses having brown in colour and 1 (3.34%) mass with white in colour.

Sivaseelan *et al.* (2009) suggested that melanin protects the skin from actinic rays of sun. Thus, cutaneous cancers are seldom seen in pigmented animals. If these animals are allowed to survive till older ages, they would invariably develop malignant melanoma.

Similarly, it was observed in the present study that most of the animals were tied outside in an open environment leading to direct and constant exposure of sunlight which might led to expression of different colors of neoplasm. In some cases, it was also differentiated that black color found due to constant irritation like neck region whereas red color might be due to increased blood flow towards the neoplastic lesion.

Consistency of the mass

The consistency wise distribution of skin and subcutaneous tumours during the study has been presented in Table 8 and represented in Figure 8. This study revealed that soft masses 14 (46.66%) were mostly found during observation as compared to masses with semi solid 13 (43.44%) whereas the hard contributed, only 3 (10%).

The consistency of the mass varies from soft to semi solid, semi solid too hard, lobulated and table tennis ball sized (Figure 15) with extensive ulceration and haemorrhages were found in the present work. This type of consistency might be due to location on the body, involvement of the tissue at site and content of the mass which provide the different feeling on palpation of the mass.

Similar findings were recorded by Gulbahar *et al.* (2002) in mixed apocrine sweat gland tumour at the base of tail and Satpute *et al.* (2002) in squamous cell carcinoma near base of tail.

Weight of the masses

The findings with regards to weight of the masses have been presented in Table 9 and represented in Figure 9. Out of 30 animals, 12 (40%) masses showed weight of 60 to 120 grams, 6 (20%) of 120 to 240 grams whereas 15 to 30 grams and 30 to 60 grams contributed only 5 (16.66%) each.

The tumour was the size of a grape located in left nostril near muco-cutaneous junction in an eight-year-old Ongole bullock (Swamy, 2016).

In the present study we found the different weight of tumour mass. The size and weight of the tumour, affecting different parts of the body *viz*., eye, ear, horn, nostrils, forehead, neck, thorax, brisket, abdomen, and tail ranged from peanut to ball size.

Moreover, space on the site, blood circulation on the mass, recurrent irritation and negligence by the animal owner or delayed presentation of the case might also be the reason behind the variation in the weight of the neoplastic growth.

Shape of the masses

The shape of the masses present on all the animals were recorded at the time of observation and it has been depicted in Table 10 and represented in Figure 10. Out of total 30 animals positive for skin and subcutaneous tumours, 13 (43.34%) were in round, 10 (33.34%) of oval, 3 (10%) of disc, 2 (6.66%) of various shaped and 1 (3.33) of each irregular and cone shaped masses examined during the study period.

The shape of the tumour mass ranged from

disc, round (Figure 16), oval, irregular, cone to variable. The variation in the shape might be due to surface area, scarification, muscular contraction by peripheral musculature over the mass. Similar findings were also reported by Dabas *et al.* (2012) who reported two cases of brisket fibroma in 6 to 8 years old Jaffarbadi buffaloes.

Pedunculation of the tumour mass

The findings of the visual examination of tumours have been presented in Table 11 and represented in Figure 11. The majority of skin and subcutaneous tumours 22 (73.34%), non-pedunculated (broad based) only 8 (26.66%) were pedunculated.

In accordance with that a pedunculated growth hanging from shoulder region whereas non-pedunculated (broad based) mass was found on most of the cases in the present study. The variation in different masses might be due to aggregation of the tissue at the site, gravity over the mass which formed neck and broad-based appearance.

Presence of bleeding over the masses

The findings about the presence of bleeding on masses have been presented in Table 12 and represented in Figure 12. The majority of tumour masses showed absence of bleeding 19 (63.34%) and masses with bleeding revealed 11 (36.66%).

In the present study, most of the masses showed intact or bloodless structure whereas some cases were identified with mild to huge bleeding especially in case of horn cancers and nasal granuloma. The obvious reasons of bleeding from the mass were repeated injury by the hard surface, self-mutilation or rubbing on the wall and injury due to fighting with other animals found during questionnaire with animal owner and clinical examination.

Presence of infection on the masses

Infection-wise distribution of skin and subcutaneous tumours has been presented in Table 13 and represented in Figure 13. In the present study, the infection presented on tumour mass was found 8 (26.66%). The low infection rate of skin and subcutaneous tumours was found in 22 (73.34%) animals.

Specially the animals with bleeding, in the present study, showed the signs of infection, fever, pain, profuse foul smelling pus discharge from base of the horn, nasal discharges from the affected side with shaking of head and inclined head towards affected side. The blood is favorable growth media for microorganism, and they grow rapidly in short period causing cellular changes as well as detoriation of the health condition leading to heavy infection with expression of various clinical signs as in the present study. Our findings were supported by Giri *et al.* (2011).

It was concluded that the prevalence of skin and subcutaneous tumours appeared more in middle aged animals, and it was found more in males (19 out of 30). Crossbred cattle were at a higher risk of suffering from skin and subcutaneous tumours. The eye, neck and limb region were more prone to develop the skin and subcutaneous tumours. The prevalence of skin and subcutaneous tumours was maximam in animals with healthy body condition, red to black colour of masses, round shaped, broad based, hard, non-infected type in origin.

REFERENCES

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Table 1. Age wise distribution of animals affected with skin and subcutaneous tumours.

Age (Years)	No. of animals	Percentage (%)
0-4	3	10
4-8	15	50
8-12	9	30
12-16	3	10

Table 2. Sex wise distribution of animals affected with skin and subcutaneous tumours.

Sex	No. of animals	Percentage (%)
Male	19	63.34
Female	11	36.66

Table 3. Breed wise prevalence of skin and subcutaneous tumours in animals.

Breed	No. of animals	Percentage (%)
Murrah buffaloes	5	16.66
Surti buffalo	1	3.34
Crossbred buffalo	6	20
Gir	2	6.66
Holstein Friesian (HF)	1	3.34
Crossbred cattle	8	26.66
Non-descript cattle	7	23.34

Table 4. Species wise prevalence of skin and subcutaneous tumours in animals.

Sex	No. of animals	Percentage (%)
Cattle	18	60
Buffalo	12	40

Table 5. General body condition wise distribution of skin and subcutaneous neoplasms in animals.

Health status	No. of animals	Percentage (%)
Healthy	22	73.34
Unhealthy	8	26.66

Table 6. Location wise distribution of animals affected with skin and subcutaneous tumours.

Location	No. of animals	Percentage (%)
Oral	2	6.66
Mandibular	3	10
Eye	4	13.34
Nose	2	6.66
Ear	1	3.34
Horn	2	6.66
Neck	4	13.34
Brisket	2	6.66
Thorax	1	3.34
Abdomen	3	10
Limbs	4	13.34
Perianal	1	3.34
Generalized	1	3.34

Table 7. Distribution of colour of the mass of skin and subcutaneous tumours in animals.

Colours	No. of animals	Percentage (%)
Red	10	33.33
Brown	9	30
Black	10	33.33
White	1	3.34

Table 8. Distribution on the basis of consistency of tumorous mass.

Consistency	No. of animals	Percentage (%)
Soft	14	46.66
Semi solid	13	43.34
Hard	3	10

Table 9. Weight wise distribution of skin and subcutaneous tumours in animals.

Weight (gms)	No. of animals	Percentage (%)
15-30	5	16.66
30-60	5	16.66
60-120	12	40
120-240	6	20
240-480	1	3.34
Variable weights	1	3.34

Table 10. Shape of skin and subcutaneous tumour masses in animals.

Shapes	No. of animals	Percentage (%)
Disc	3	10
Oval	10	33.34
Round	13	43.34
Irregular	1	3.33
Cone	1	3.33
Variable shaped	2	6.66

Table 11. Pedunculation wise distribution of skin and subcutaneous tumours in animals.

Pedunculation	No. of animals	Percentage (%)
Non-pedunculated	22	73.34%
Pedunculated	8	26.66%

Table 12. Presence of bleeding over the skin and subcutaneous tumours in animals.

Pedunculation	No. of animals	Percentage (%)
Present	11	36.66%
Absent	19	63.34%

Table 13. Presence of infection over the skin and subcutaneous tumours in animals.

Presence of infection	No. of animals	Percentage (%)
Present	8	26.66%
Absent	22	73.34%

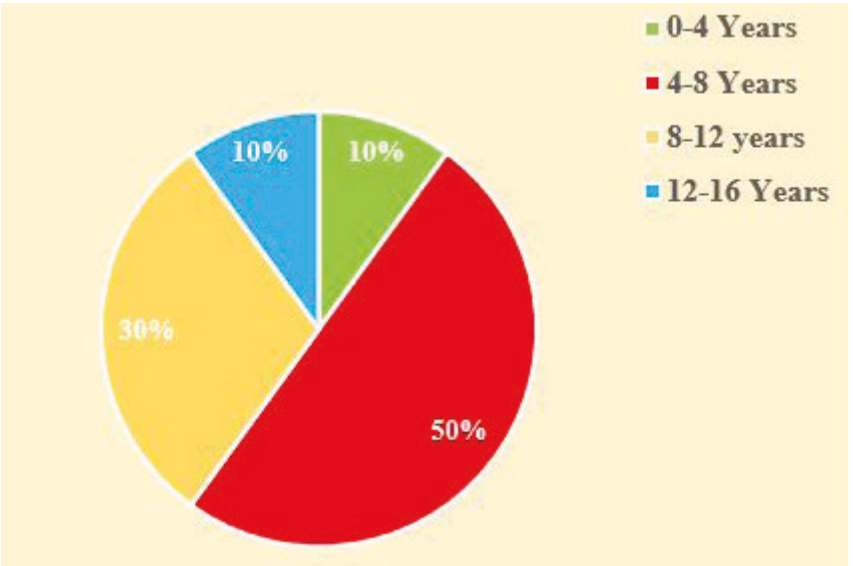

Figure 1. Age-wise distribution of animals affected with skin and subcutaneous tumours (n=30).

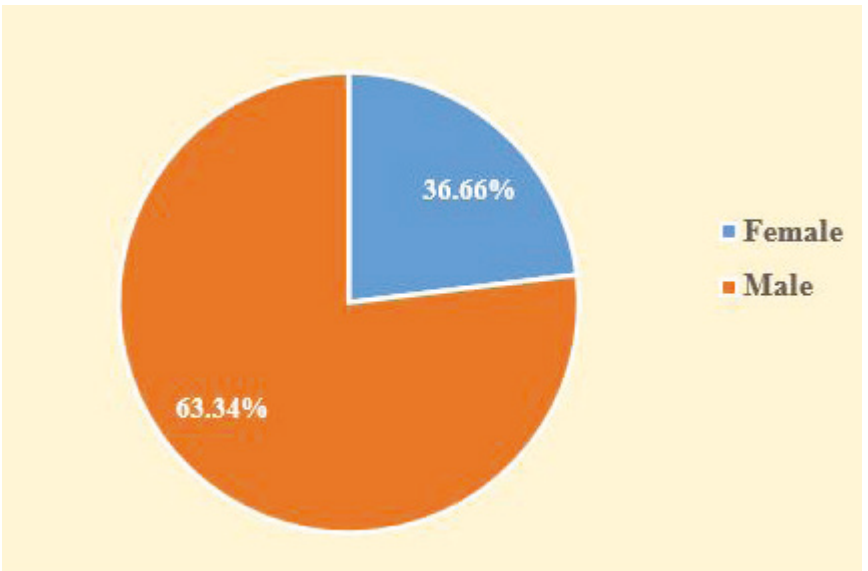

Figure 2. Sex wise distribution of animals affected with skin and subcutaneous tumours (n=30).

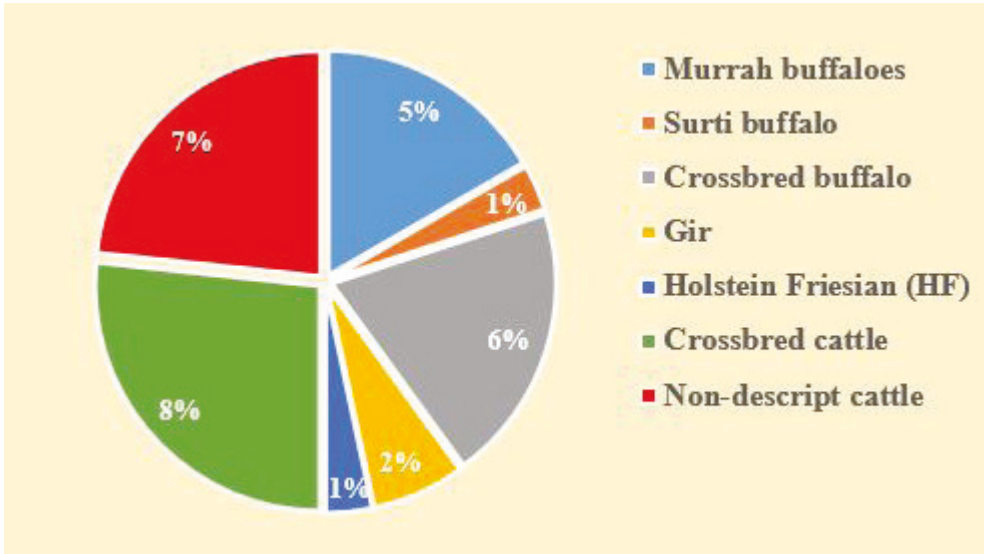

Figure 3. Breed wise prevalence of skin and subcutaneous tumours in animals (n=30).

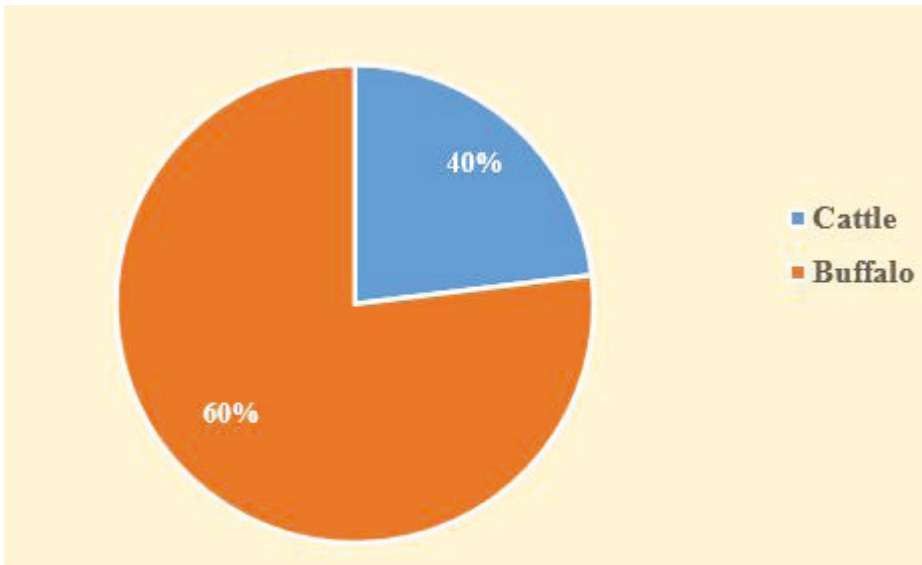

Figure 4. Species wise prevalence of skin andsubcutaneous tumours in animals (n=30).

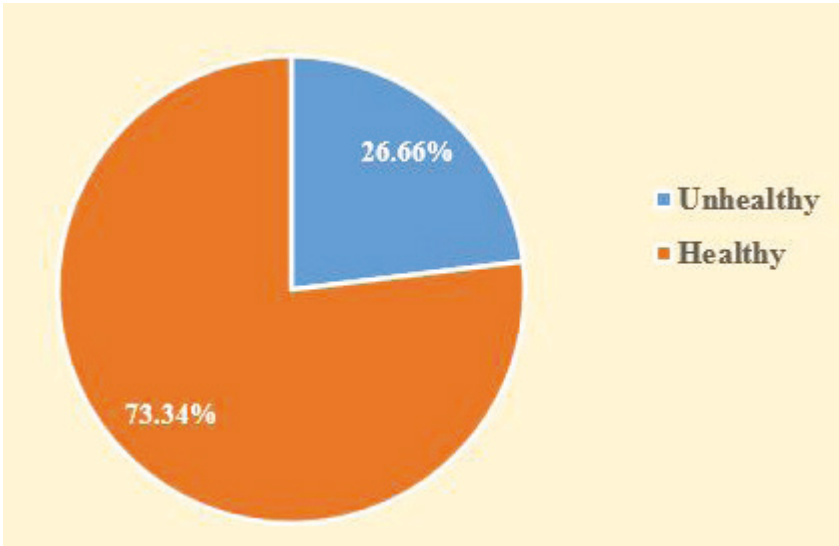

Figure 5. General body condition wise distribution of skin and subcutaneous neoplasms in animals (n=30).

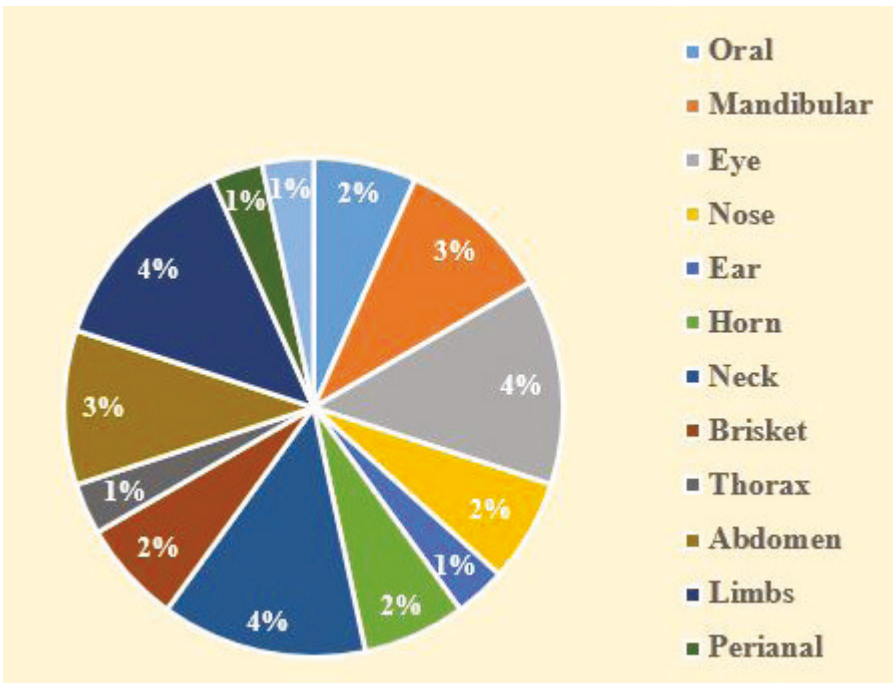

Figure 6. Location wise distribution of animals affected with skin and subcutaneous tumours (n=30).

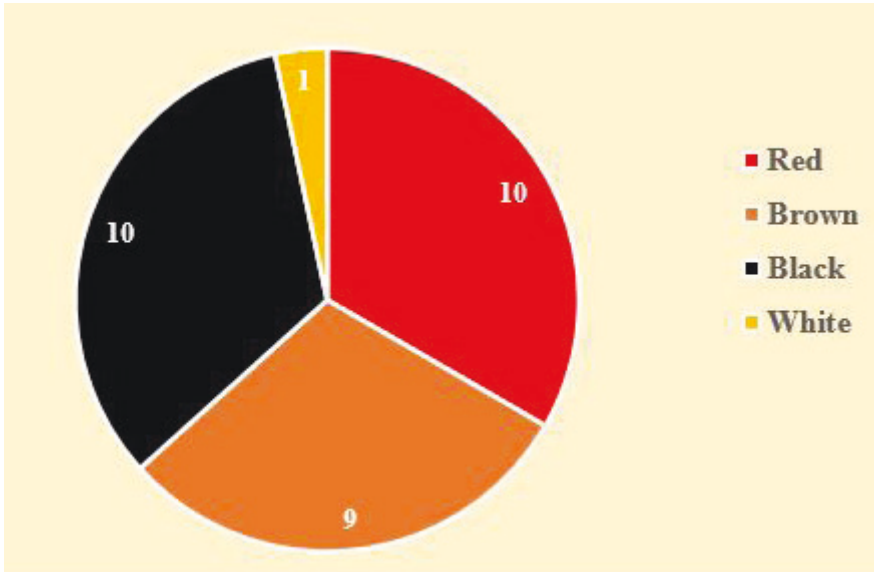

Figure 7. Distribution of colour of the mass of skin and subcutaneous tumours in dogs (n=30).

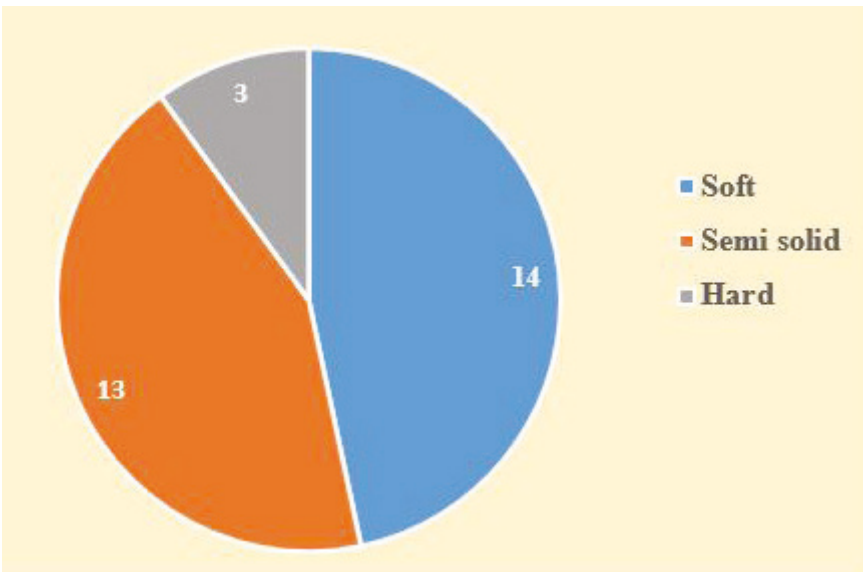

Figure 8. Distribution on the basis of consistency of tumorous mass (n=30).

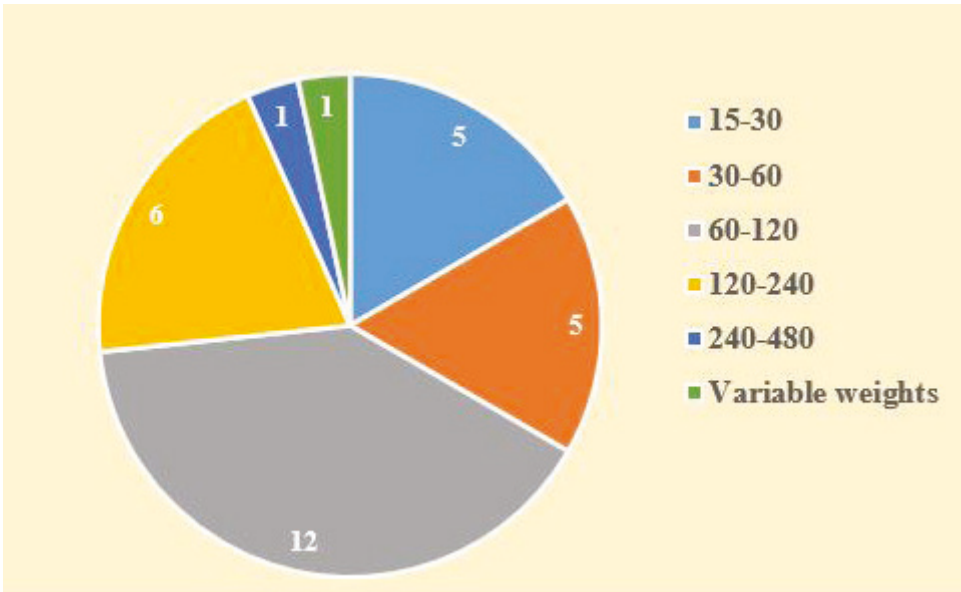

Figure 9. Weight wise distribution of skin and subcutaneous tumours in animals (n=30).

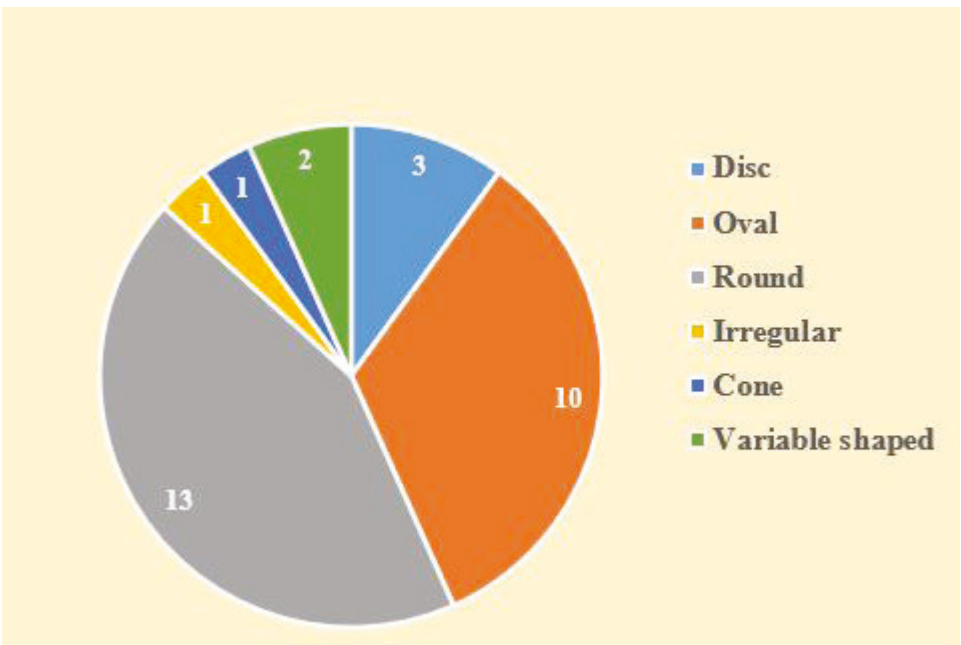

Figure 10. Shape of skin and subcutaneous tumour masses in animals (n=30).

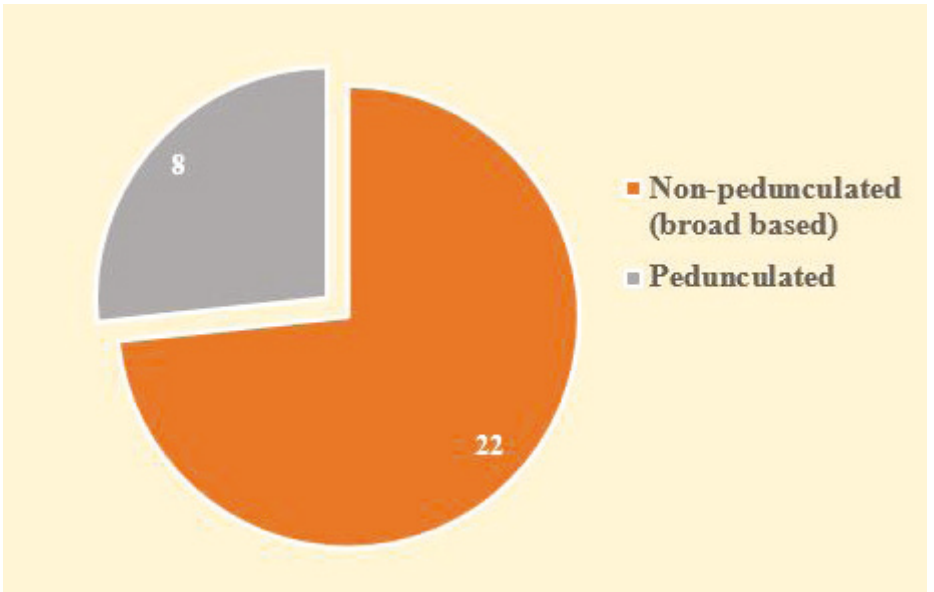

Figure 11. Pedunculation wise distribution of skin and subcutaneous tumours in animals (n=30).

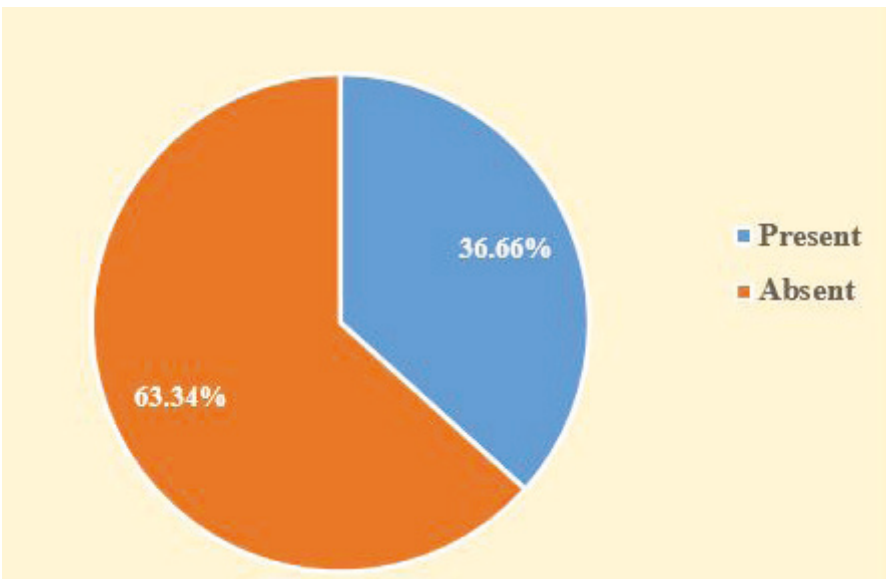

Figure 12. Presence of bleeding over the skin and subcutaneous tumours in animals (n=30).

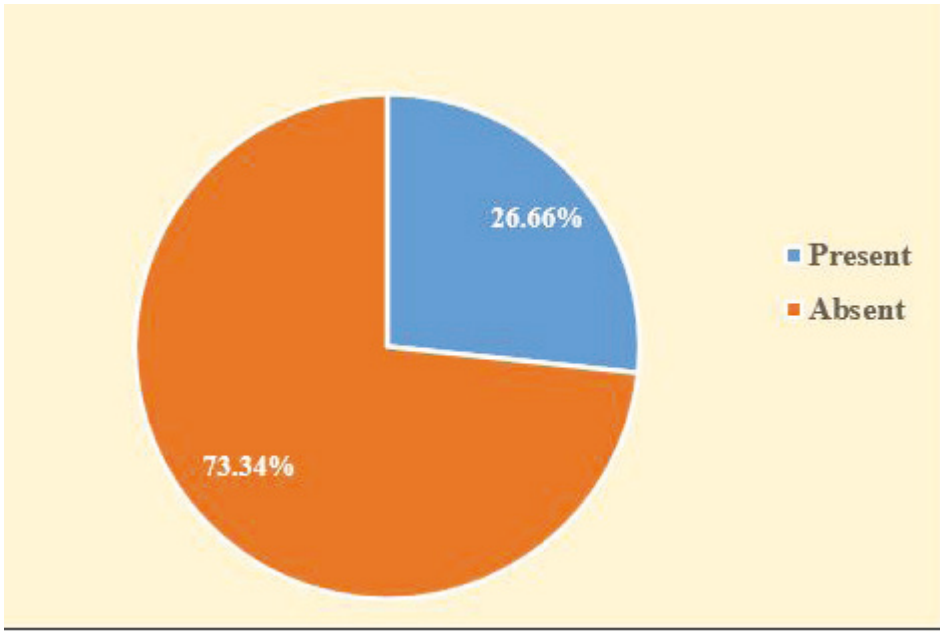

Figure 13. Presence of infection over the skin and subcutaneous tumours in animals (n=30).

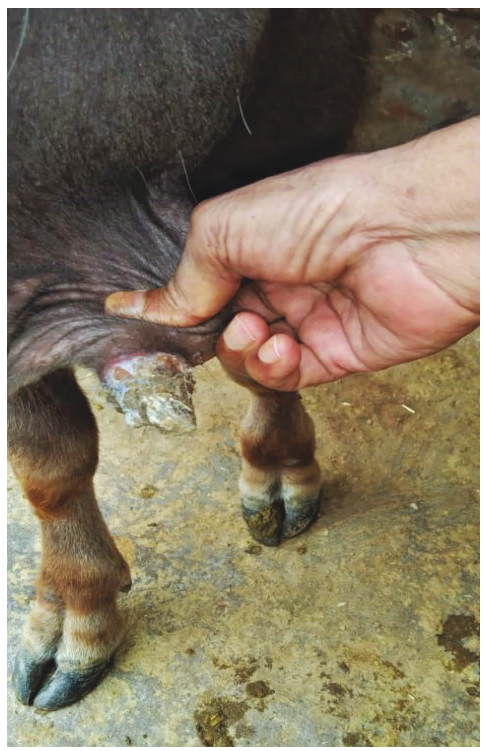

Figure 14. Showing neoplastic mass on ventral neck region.

Figure 15. Hard, tennis ball size mass over the dorsum of neck region.

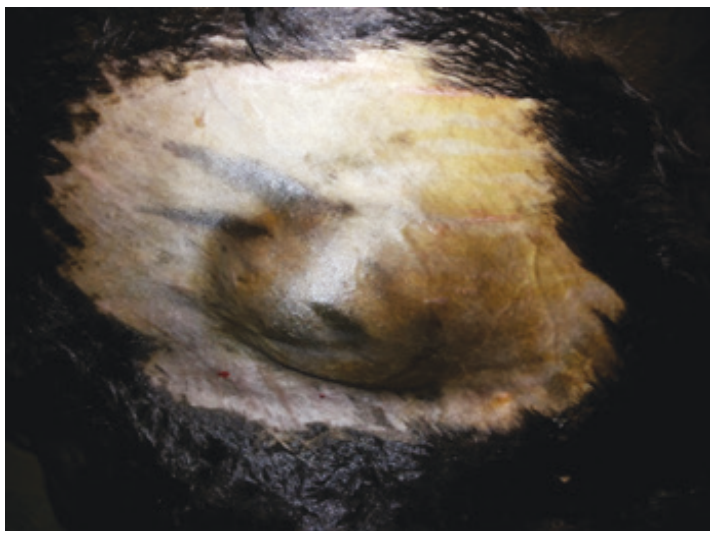

Figure 16. Round shaped neoplastic growth on abdominal wall.

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