

## Research article

# Overview of major cutaneous and subcutaneous skin problems in horses and their associated risk factor in and around Bishoftu town

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Received: 08 March, 2023

Accepted: 10 July, 2023

Published: 11 July, 2023

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Keywords: Bishoftu; Horse; Risk factors; Skin problem

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## Abstract

Horses are the most important animals in the packing and transport systems of Ethiopia. Though disease and related problems are significant impediments to their performance, their socioeconomic contribution is frequently undervalued; as a result, their welfare is severely jeopardized. As a result, this cross-sectional study was carried out to identify the major skin problem of working horses in and around Bishoftu town, as well as associated risk factors. A total of 414 working horses were considered for the study. Selected horses were clinically examined for visible skin lesions, and a questionnaire survey was performed simultaneously. The overall prevalence of skin problems was found to be 60%. In decreasing order, the skin problems recorded in the study were wound (41.3%), epizootic lymphangitis (16.4%), and sarcoids (1.9%). There was a significant difference ( $\chi^2 = 15.66, p = 0.05$ ) in the prevalence of wounds among different body condition scores; horses in poor body condition were more exposed to wounds than horses in better body condition. There was a significant difference ( $p = 0.05$ ) in the prevalence of wound up by age group, indicating that horses in their senior years were particularly vulnerable. Injuries caused by an improper harness and saddle design were more prevalent ( $\chi^2 = 409.93, p = 0.000$ ). A slightly higher proportion of wounds was encountered in the chest area of the body (24%). There was a significant difference ( $\chi^2 = 4.0028, p = 0.05$ ) in the prevalence of epizootic lymphangitis depending on the type of work that indicated that cart horses were more highly affected than pack horses. But there was no significant difference based on age, body condition score, or housing system. There was a significant difference in the prevalence of sarcoids between horses that had been sheltered and those that had not; the non-sheltered horses had a significantly higher prevalence than the sheltered horses. The anatomical distribution of the occurrence of wounds on the horses was found to indicate an association between areas of harnessing, packing, and inappropriate hobbling. This study showed wounds as a major skin problem for working horses in the region. A comprehensive equine health programme should be implemented in order to alleviate the prevailing problem.

## Introduction

More than 72% of the world's horse population is found in developing countries, specifically kept for draught purposes. Ethiopia has more than 1.9 million horses [1]. Horses are important animals for resource-poor communities in Ethiopia's rural and urban areas, providing traction power and low-cost transportation. The use of horses in door-to-door transport services also provides urban dwellers with the opportunity to generate income [2]. Horses earn money for their owners directly by working in a range of sectors. They transport people and goods, provide agricultural traction, and alleviate the burden on women. In Ethiopia, the use of horses for transportation will continue for years to come because of the rugged terrain characteristics that make it inaccessible for

modern road transportation facilities, as well as the absence of well-developed modern transport networks and the prevailing low economic status of the community [3]. Working horses are usually used for carting goods and people, carrying packs, riding, plowing, weeding, and tourism [4].

Despite their invaluable contributions, horses in Ethiopia are the most neglected animals and accorded low social status, particularly the male working horses. Horses involved in pulling carts often work continuously for 6 to 7 hours per day, carrying 3 to 4 persons (195–260 kg) in a single trip. This lack of recognition has led horses to suffer from several problems like insufficient feeding, overloading, clinical overworking, a lack of treatment for disease conditions, and others [5]. The horse's integumentary system is well organized and

functional, protects horses from mechanical injury, and acts as an immunologic sentinel for the body. It is clear that horses can acquire various immunologically based skin diseases. A horse's skin provides an anatomic and physiologic barrier between the external and internal environment; aids in thermoregulation; perceives heat, cold, pain, pruritus, touch, and pressure; and provides pigmentation [6].

A horse's skin is its largest body organ, ranging from 12–24% of the animal's weight, depending on age. The most common sign of dermatitis is some form of scratching as the horse rubs the affected body part against fences, walls, or posts. Next comes some swelling and redness, followed by raised or bumpy spots on the skin. As the problem progresses, there might be oozing, crusting, and scaling. Horse skin disease can be usefully divided into infectious and noninfectious diseases. The infectious include viruses, bacteria, fungi, protozoa, and internal and external parasitic conditions. Traumatic and allergic or immunological skin disease, as well as developmental or genetic conditions, endocrinologic changes, and neoplastic disease, are examples of noninfectious conditions [7]. The most common non-infection problems in working horses are skin pathologies. A large proportion of horses sustain wounds of varying severity as a result of inappropriate harnesses, hobbles, saddle design, hyena bites, horse bites, car accidents, and injury due to beating [8]. Despite being a significant problem and health effects there have been a few research studies on the major skin disease of Horses and its associated risk factors in the study area. so this study needed to be accessed and mitigate the effect of skin disease on the horse.

#### The objectives of this study were:

- To determine the major cutaneous and subcutaneous problems in working horses in and around Bishoftu town
- To identify the most prevalent cutaneous and subcutaneous pathological conditions in this population of working horses and
- To identify risk factors associated with the presence of work-related skin wounds.

## Methodology

### Description of the study area

The study was conducted in Bishoftu town. Bishoftu is about 45 kilometres southeast of Addis Ababa, right on the escarpment of the Great Rift Valley, and its geography is defined by creator lakes. It is found at 9° N latitude and 40° E longitude and at an altitude of 1850 metres above sea level in the central highlands of Ethiopia. It has a human population of about 95,000. It experiences a bimodal pattern of rainfall, with the main rainy season extending from June to September (of which 84% of the expected rain is expected) and a short rainy season from March to May with an average annual rainfall of 800 mm. The mean annual minimum and maximum percentages of the temperatures are 12.3°C and 27.7°C, respectively, with an overall average of 18.7°C. The mean relative humidity is 61.3 [9].

## Study animals and design

A cross-sectional study design was conducted on working horses of all ages that visited the SPANA clinic on scheduled dates. Both a clinical examination and a questionnaire survey were conducted at the same time.

### Sample size

A number of 414 working horses presented for treatment at the SPANA (Society for the Protection of Animals Abroad) Clinic from December 1, 2015, to March 30, 2016, were purposively selected and evaluated.

### Sampling methodology

**Clinical examination:** All horses were examined for health problems and then thoroughly examined for body lesions. Animals with signs of cutaneous pathology underwent a special physical examination. After the visual exam from a distance (a couple of meters), the skin was examined more closely and palpated, and the general distribution of lesions was recorded according to the location of the problems. Information regarding the general body condition of horses and their dermatological problems, type, kebele, age categories, and body condition scores was properly recorded in the data collection format. The body condition score was determined according to the criteria described by [4] and animals were examined from all sides. The horse's body condition was graded on a scale of 0 to 5, with 0 indicating very thin, 1 indicating thin, 2 indicating fair, 3 indicating good, 4 indicating fat, and 5 indicating very fat. However, for the purpose of data analysis, body condition scores 0 to 5 were categorised into 3 distinct groups: categories 0, 1, and 2 were grouped as poor, category 3 was defined as medium, and body condition scores 4 and 5 were categorised as good. Animals' ages were estimated according to dentition by examining incisor occlusal appearance. The animals were divided into three groups: "young" (5 years old), "adult" (5 years old), and "elderly" (15 years old).

Sarcoids were classified using the clinical classification scheme proposed by [10] that consisted of fibroblastic, nodular, occult, verrucous, mixed, and malevolent. They may appear singly or in clusters, most commonly around the eyes, ears, muzzle, and face, but also occasionally on the genitals and lower legs. The growths do not appear to cause any pain or discomfort. A wound is considered when any grossly visible skin lesion or tissue damage located on any part of the body is seen. Epizootic lymphangitis was characterized by a cord-like appearance of the subcutaneous lymphatic vessels, especially of the limbs, neck, and different body parts, and the development of a series of pyogranulomas, the discharge from which contains yeast-like cells of the pathogen.

**Questionary survey:** A semi-structured interview was done with each working horse owner in addition to the direct physical clinical examination to extrapolate information regarding the owners' general knowledge of horse management practices (housing system and type of work).



**Ethical clearance:** Since the study was done on domestic animals, ethical approval was obtained from Jimma University College of Agriculture and Veterinary Medicine Minutes of Animal Research Ethics and Review Committee. Each research site's clinic managers were consulted before the questionnaire was surveyed and the horse was overviewed. Also, the willingness of the owners was taken into account and each of the owners verbally consents. All situations that induce pain in humans are considered to similarly cause discomfort in chickens.

### Data management and analysis

All relevant data were recorded, Edited, and coded in an Excel spreadsheet and the statistical analysis was done. The associations among variables collected during this study time were computed using various statistical tools in SPSS version 20 (IBM) software [11]. To determine the frequencies and percentages, a preliminary descriptive analysis was conducted. The association between the disease and risk factors was assessed by logistic regression chi-square ( $X^2$ ). Non-significant terms ( $p > 0.05$ ) were eliminated from the model. The test result was considered significant when the calculated p-value was less than 0.05.

### Results

This study revealed that out of 414 working horses examined in the study area, 41.3%, 16.4%, and 1.9% were suffering from different types of wounds, epizootic lymphangitis, and sarcoids, respectively Table 1.

There was a statistically significant difference ( $\chi^2 = 15.6618$ ,  $p = 0.000$ ) in the prevalence of wounds among different body condition scores. Wound problems were found to be more prevalent in horses with poor body condition (54.8%) than in horses with other body condition scores. Also, there was a statistically significant difference ( $\chi^2 = 32.0771$ ,  $p = 0.05$ ) in the prevalence of skin problems based on the age group that indicated horses in old age were highly affected. This study also showed that the prevalence of wounds was significantly associated with the condition of the housing system ( $\chi^2 = 4.5869$ ,  $p = 0.032$ ). According to the housing system, horses that are not housed have a higher risk of wounding (54.5%) than horses that are housed (39.3%). Injuries caused by an improper harness and saddle design were significantly higher ( $\chi^2 = 409.9288$ ,  $p = 0.000$ ) than other causes of injuries.

The distribution of injuries on body parts showed significant variation ( $\chi^2 = 371.4708$ ,  $p = 0.000$ ) (Tables 2-4). When total animals were considered, the proportion of injured chests (24%) was significantly higher than that of other injured body parts. girth (17.5%). Whip or stick injuries were recorded on the inguinal (5.3%) and thigh (5.3%), and falling and wounds on the carpal joints (4.1%).

There was a statistically significant difference in the prevalence of epizootic lymphangitis depending on the type

of work ( $\chi^2 = 4.03$ ,  $p = 0.05$ ), indicating that cart horses were more affected than pack horses. But there was no significant difference based on age, body condition score, or housing system. Lymphangitis was recorded in 68 (16.4%) of the horses. The distribution of the lesions was statistically significantly affected by the body region ( $\chi^2 = 321.1868$ ;  $p = 0.000$ ) and the front limb 24 (35.3%) and the hind limb 21 (30.9%) were more affected than the neck region [12] (17.6%), ventral abdomen (4.9%), and 10 (10.3%) in different body parts. Table 5.

There was a statistically significant difference in the prevalence of sarcoids between horses that had been sheltered and those that had not; the non-sheltered horses had a significantly higher prevalence than the sheltered horses, but there was no significant difference in the other factors.

Sarcoid prevalence varies by anatomical location, with the neck (50%) having the highest proportion, followed by the limb (37.5), and the ear (12.5). Table 6.

**Table 1:** Association of risk factors with the prevalence of wounds.

Factors	categories	No. examined	No. affected	prevalence	Chi-square	P - value
Age	Young	78	14	18%	32.07	0.000
	Adult	244	101	41.4%		
	Old	92	56	61%		
BCS	Good	77	22	28.6%	15.66	0.000
	Medium	224	86	38.4%		
	Poor	113	63	55.8%		
Housing	In shelter	359	141	39.3%	4.58	0.032
	Off shelter	55	30	54.5%		
type of work	Cart horse	375	149	39.8%	4.05	0.044
	Pack horse	39	22	56.4%		

**Table 2:** Association of risk factors with the prevalence of epizootic lymphangitis.

Factors	categories	No. examined	No. affected	prevalence	Chi. square	P - value
Age	young	78	19	24.3%	5.13	0.077
	Adult	244	33	13.5%		
	Old	92	16	17.4%		
BCS	Good	77	11	14.3%	1.78	0.410
	Medium	224	34	15.2%		
	Poor	113	23	20.3%		
Housing	In shelter	359	57	15.9%	0.59	0.442
	Off shelter	55	11	20%		
Type off work	Cart horse	375	66	17.6%	4.03	0.045
	Pack horse	39	2	5.1%		

**Table 3:** Association of risk factors with the prevalence of sarcoids.

Factors	categories	No. examined	No. affected	prevalence	Chi-square	P - value
Age	Young	78	2	2.5%	2.33	0.311
	Adult	244	6	2.4%		
	Old	92	0	0		
BCS	Good	77	2	2.5%	0.94	0.625
	Medium	224	5	2.2%		
	Poor	113	1	0.8%		
Housing	In shelter	359	5	1.4%	4.15	0.042
	Off shelter	55	3	5.4%		
Typing of work	Cart horse	375	7	1.8%	0.09	0.763
	Pack horse	39	1	2.5%		

**Table 4:** Distribution of wounds on various body parts.

Location of injuries	No. affected	Prevalence
Girth	30	17.5%
Chest	41	24 %
Shoulder	10	5.8 %
Prescapular	12	7.01 %
Thigh	9	5.3 %
Under tail	10	5.8 %
Back	14	8.2 %
Withers	12	7.01 %
Mixed	12	7.01 %
Carpal	7	4.1 %
Ventral abdomen	5	3 %
Inguinal	9	5.3 %
Total	171	100%

**Table 5:** Distribution of epizootic lymphangitis in different body parts.

Location of the lesion	No. affected	Prevalence
Front limb	24	35.3%
Hind limb	21	30.9%
Neck	12	17.6%
Ventral abdomen	4	5.9%
Different body parts	7	10.3%
Total	68	100%

**Table 6:** Distribution of sarcoids on various body parts.

Location of problems	No. affected	prevalence
Neck	4	50%
Limb	3	37.5%
Ear	1	12.5%
Total	8	100%

## Discussion

The study revealed that the overall prevalence of skin problems in horses was (60%) in the study area. The majority of the study horses (41.3%) had wounds, followed by epizootic lymphangitis (16.4%), and sarcoids (1.9%). The overall prevalence of cutaneous pathological conditions (including skin wounds) was 60%. This prevalence is lower than those reported by [13] (71%) and higher than those reported by (18) (34.3%). This discrepancy might be due to variations in the husbandry and management practices of horse owners in different geographic areas.

In this study, it was observed that all horses were used for work, mainly for packing and transport. Similar reports were done by [14] in Hawassa town, where all horses are mainly kept to transport people and goods in order to assure their owners' daily income. The overall prevalence of wounds in working horses was 41.4% in the current study, which was consistent with the prevalence reported in central Ethiopia by [8] (40%), but it was lower than the prevalence of 64% in [15] at

Kombolcha town and 65% in [5] at Hawassa town. This variance is attributed to differences in husbandry and management practices among farmers across different geographic areas.

In the present study, the overall prevalence of wounds in working horses was 41.4 %, which was in agreement with the prevalence reported in central Ethiopia by [8] (40%). However, this finding was lower than the prevalence of 64% in [15] Kombolcha Town and 65% in [5] Hawassa Town. This variation might be due to the skin of equine being highly affected by wounds due to inadequate packing or by strap holding the load (i.e. harness and husbandry related). Regarding wound distribution, chest sore (24%) and girth sore (17.5) were identified with greater frequency; also, tail base sore (5.8%), back sore (8.2%), withers sore (7.01%), shoulder sore (5.8%), prescapular sore (7.01%), inguinal sore (5.3%), thigh sore (5.3%), and carpal sore (4.1%) were among the major types of wounds identified in the area. This probably coincides with poorly designed and ill-fitting carts and straps, which are manufactured by unskilled artisans, and girth sores and chest sores might correlate with improper use of girth ropes and chest ropes by the cart owners. This finding was similar to previous reports made by [8] and [5].

Horses in poor body condition developed wounds at a higher rate than those in good body condition ( $2 = 15.66, p = 0.000$ ). This is in line with the reports by Herago, et al. [13] in Wolaita Soddo Zuria, Mekuria, et al. [11] in Hawassa Town, and Pearson, et al. [8] in central Ethiopia. These could be due to dehydration, which reduces skin elasticity in poor-condition animals, and bone prominence, which leads to easy skin injury. Furthermore, poor body condition could be due to other factors like poor management, a shortage of nutrients because of the scarcity of feed, or a lack of supplemental diets.

The present finding has shown that a higher prevalence of wounds was observed in older horses ( $x^2 = 32.07, p = 0.000$ ) than in any other age group. This finding was in agreement with the report of [16,17] in Wolaita Soddo Zuria, who stated that older horses had greater wound risk than other age groups. This might be due to more exposure to work and carrying heavy loads over a long distance, fewer owners' attention to wound management, and the immune defense mechanism of an animal also reducing with age.

There was a significant difference in the prevalence of wounds between horses that had been sheltered and those that had not ( $x^2=4.59, p = 0.032$ ). The unsheltered had a significantly higher prevalence than the sheltered. This might be due to the horses' exposure to predators during the night and other factors. This finding was in agreement with reports by [18]. In this study, unsympathetic drivers' attitudes towards horses were predisposing factors for wounds on the carpal joints and inguinal regions. Falling and the subsequent wounds on the carpal joints could have occurred when animals were forced to pull loads greater than their pulling power or gallop on rough roads. This finding was in agreement with reports from [19].

The prevalence of sarcoidosis in the study area was 1.9%. Comparable findings (2.5%) were recorded by [18] in Mekelle,



and (3%) were recorded by [19] in Debrezeit. Sarcoids were most commonly found on the neck (50%) followed by the limbs (37.5%) and the ears (12.5%). The presence of continuous injuries and irritation caused by bad head harnesses or grooming tools may account for the highest prevalence on the neck (50%). These findings are consistent with those mentioned by [20]; also, the sarcoids that occur around the ear are due to the area being preferable for flies to feed.

In this study, there was a significant difference in the prevalence of sarcoids between horses that had been sheltered and those that had not been sheltered ( $\chi^2 = 4.15$ ,  $p = 0.042$ ). The unsheltered had a significantly higher prevalence than the sheltered. This might be due to the fact that the horses, which were not sheltered, cohabited in places with animals of the bovine species, and this seems to confirm the intimate relation between the bovine papillomavirus (BPV-DNA) and the pathogenesis of equine sarcoids. This is consistent with [7] findings.

In the present study, sarcoids were recorded in horses at young and adult ages, which was the same finding reported by [21]. Although other studies found an incidence peak between 3 and 6 years of age [12,22], Sarcoids can occur at any age, according to other studies [23]. However, all results showed that sarcoids are predominantly found in young adults, but they can occur at any age.

In this study, the overall prevalence of epizootic lymphangitis was 16.4%. [24] reported the same finding in Nekemte town at 15%, which is lower than the finding reported by [25] in southwest Shewa at 24.9%. Furthermore, [26] recorded an average prevalence of 21.1% in East Shewa. This variation might be due to the altitude, temperature, and humidity of the area. The lesions were predominantly found on the limbs. Because limbs are prone to trauma, the fungus can easily gain access and infect the horses. Also, the lesions occur around the neck, ventral abdomen, and different body parts. This result was consistent with the findings of [27].

This study showed that there was a statistically significant difference ( $\chi^2 = 4.0028$ ,  $p = 0.05$ ) in the prevalence of epizootic lymphangitis depending on the type of work, which indicated that cart horses were highly affected. This finding was attributed to the interchangeable use of carts by the owners. This result was consistent with the findings of [27].

## Conclusion

From the present study, it is possible to conclude that there is a high prevalence of skin disorders in horses. A large proportion of horses suffered various degrees of wounds, epizootic lymphangitis, and sarcoids. Open wounds, in particular, have been found to affect more people than other skin problems. The occurrence of wounds has been found to be associated with harnessing, loading, hobbling, body condition status, and general husbandry practices of working horses. This showed that skin problems are a major health constraint for horses' performance in the study area. The care and management system followed for working horses is undoubtedly poor. It is

critical to educate local hobble and saddle makers and farmers on how to make better fitting and less traumatic hobbles and saddle harnesses. Animals should be used to improve body condition, harness use, hobbling, loading, and management of both healthy and sick horses. The creation of awareness among farmers and schools in villages about animal welfare and horse handling and management will have a long-term impact on advancing animal welfare in society, and training community animal health workers who are locally accessible to treat wounds can help intervene in the problem practically at the grassroots level. Despite teaching farmers to stop using carts interchangeably. Detailed investigations should be carried out on skin disorders covering a wider area of the region to plan appropriate control measures regionally.

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