

# Prevalence of External Injuries in Working Donkeys in and Around Mekelle, Northern Ethiopia

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## Abstract

The study conducted from November 2007-April 2008 in and around Mekelle, to determine the magnitude of external injuries in donkeys was revealed that 39.64 %overall prevalence from 978 randomly selected donkeys. There is a significant variation between two veterinary clinics ( $\chi^2=11.23$ ,  $P<0.05$ ) that influenced the occurrence of external injuries; higher prevalence was recorded in Quiha Veterinary clinic (42.23%, odds ratio 3.94, 95% Confidence Interval [CI] =1.11-4.35) than Mekelle Veterinary clinic (29.81 %). Injuries with age related problem also observed during the study. Higher prevalence was recorded in adult donkeys (47.09%,  $\chi^2=313$ ,  $P<0.05$ , OR=11.09, CL=1.045-1.37) than younger (17.71%). Distribution of external injuries on body parts were showed significant variation ( $\chi^2=239.67$ ,  $P<0.05$ ), back /loin (41.72%) injury was significantly higher than other body parts. Improper harness and saddle design were significantly higher ( $\chi^2=386.687$ ,  $P<0.05$ ) and observed as major cause of external injury at the study area. The study also indicated the intensity of injuries; a significantly higher proportion ( $\chi^2=188.32$ ,  $P<0.05$ ) as severely (62.72%), moderately (27.97%) and (9.84%) mildly injuries. Generally this study showed external injuries as a major health problem of donkeys in the study area. So a comprehensive donkey health and welfare promotion program is important to alleviate the problem.

**Key words:** Prevalence; External injury; Cause; Donkeys; Mekelle;

## Introduction

Even though donkeys have been extensively used by peoples in many areas in the world their uses have been regarded as synonymous with backwardness, under development and low status. However mechanized farming and transport has increased during last century, most farmers who cannot afford neither tractor nor motorized transport still depend heavily on animal power. So small farmers, transporters and women are increasingly use donkeys for transport and income generation mostly in developing country [14].

According to Central Statistical Authority of Ethiopia, Ethiopia has about 7.9 million equines, of which 5.2 million are donkeys [3]. It indicates that one of the highest donkey population in the world next to the china, (10% of the world and 32% of Africa), is in Ethiopia. They are important in the livelihood system of both rural and urban communities for transportation of grains,

charcoal, cow dung, and firewood and agricultural by products and construction materials from place to place. Besides, in the North Western part of the country *equids* have been used not only for transportation but also for agricultural operations thus contributing in agricultural product [7].

The Ethiopian domestic donkey traces its ancestry from the wild asses found in Egypt, Sudan, Somalia and Ethiopia, namely *Equus Asinus Africanus* and *Equus Asinus Somalicus* and then spread to other parts of the world [8]. Humans have used donkeys for work for thousands of years. There are pictures of donkeys on the tombs of Egyptian pharaohs and there are 82 biblical references to donkey.

The ancient Romans used donkeys for pack transport and agricultural. Mules derived from donkey were used in important major military campaigns, from about 2000BC to the First World War. There has also been tradition of use of donkeys as pack-animals among pastoralist in east and west-Africa [11].

During recent wars, guerilla army donkeys kept for supply of food, guns and ammunition. Some rural Ethiopians recall that in famines of the past, they only survived by someone bringing the food on donkeys. The role of donkey in assisting refugees and guerilla fighter is commemorated in northern Ethiopia [14].

The study conducted in Kenya on the use of donkeys indicated that the use of donkey carts is an essential component of the farming system. In highly agricultural production areas practiced by the farmers refer caveat deal of water 70 liters per day for house hold consumption, 200liters per day for cattle and 225 liters per day for poultry. Donkey carts are also used by 60% of the households for marketing maize and potatoes which are sold in local market and by over 50% of the households for the marketing of carrots which are sold in more distant market [11].

Even though donkeys have been described as sturdy animals, they succumb to variety of diseases and a number of other conditions that affect the optimum power they could supply to the country [16]. A large proportion of donkeys suffered various degrees of wound reported that the main sources wounds were inappropriate harness, hobbles and saddle design, hyena bite, donkey bite and car accident, injury by the owners or other people

[15]. Harness related problems were raised from incorrect size, inappropriate fitness, too narrow or too thin, made of unsuitable synthetic materials, poor padding, poor design and synthetic rope to be tried for fit the load problems related with using pack saddle. Though equines provide several advantages, health and welfare is a visible problem. Studies to elucidate the magnitude of this problem are lack at the study area. This paper wants to describe the magnitude of external injuries, as well as identify the causes and associated factors of external injuries problem in donkey populations at the study area.

**Materials and Methods Study Area**

This study was conducted from November 2007 to April 2008 in and around Mekelle city. According to Tigray region Housing Development Agency in 2007/2008, Mekelle city is one of an ancient cities and capital city of Tigray regional state, located at 783 km from Addis Ababa which is capital city of Ethiopia. The total area of the city is estimated to be above 53 km<sup>2</sup>. It is located between altitudes by 2000-2200meters above sea level and has a moderate (Yenadega) zone of climatic condition. Geographically, Mekelle city is found in 39° 38' east 13° 23' north. The average annual rainfall ranges from 150-250 mm and the average mean Temperature is 19°c. The total population of the city is around 200,000 comprising 48.6%male 51.4% female and the average population growth rate is about 4.8% from the total population 91.3%is follower of orthodox Christianity, followed by Muslim 7.7% and the rest are protestant , catholic and other religious. According to Tigray Livestock Development Action, the region is divided into three land masses including the central highlands, the Southern and Eastern low lands and the Northern lOw lands topographically [11]. The altitude of the region varies from below 500meters above sea level in the Eastern Erob, to the highest peak Tsibet Mountain which is above 3100meteres above sea level.

**Study Design**

The study was involved a cross sectional observation of 978 randomly selected donkeys brought to veterinary clinics. Clinical examination of the animal and a questionnaire survey to the owner were carried out simultaneously.

**Data Collection and Analyzing Procedure**

As indicated above a semi-structured questionnaire format was developed to collect data including animal identification (Age, sex...) and injury characterization like type, site, cause intensity and others. Donkeys brought to Mekelle and Quiha veterinary clinics were examined and others. Donkeys brought to Mekelle and Quiha veterinary clinics were examined physically and any grossly visible, injuries were characterized and causes identified. Injuries are categorized as large (>12cm) and small (<12cm). With measuring the length, depth and width of tissue lost.

Also for the sake of clarity, injuries were classified as severe, moderate and mild according to (2) classification. Severe injury, when there was ulceration involving a pronounced contusion in wider areas, tissue hypertrophy and severe complication. Moderate injuries involved coalition of small wounds with tissue

sloughing involving no complication and hypertrophy, and some with chronic courses. Injuries were categorized as mild when they involved with only loss of epidermis and the superficial layer with no further trauma. During data collection, the age of the donkeys also grouped as young (<8years) and adult (>8years) based on owner experience (birth records) and dentation characteristics [8].

Prevalence of external injuries related to specific risk factors was determined as a proportion of injured donkeys out of total examined. Association and influence of injuries was investigated using a JMP-5 *Statistical Analysis Soft Ware*. Relative frequency (RF) of specific category of a given factor was computed as the proportion of cases out of total cases. Odd ratio (OR) was calculated to assess the risk level of category under each risk factor has the ratio of odds injured donkeys. The significance of OR was determined by using a 95% confidence interval (CL).

**Result**

**Prevalence of External Injuries versus Areas (locations)**

In this study area a total of 78 donkey population examined, 386 were found injured with different causes of external injuries at both locations. High percentage prevalence of external injuries was recorded at Quiha veterinary clinic, from (n=760) examined donkey population (42.23%) were recorded. When compared with Mekelle veterinary clinic (n=218,29.81%) (Table1). Statistically indicated that(x<sup>2</sup>=11.23, P<0.05) significantly influenced the occurrence of external injuries Odds Ratio [OR] 58.10, 95% confidence Interval [CI]=1.11-4.35 at this study areas.

**Table 1:** Prevalence of external injures at Mekelle and Quiha Vet clinic

Area	No. of Examined	Injured	Total (%)
Mekelle	218	65	29.81
Quiha	760	321	42.23
<b>Total</b>	978	386	39.64

X<sup>2</sup>=11.23, P<0.05

**Prevalence of External Injures With Age Versus**

The age was found to significantly influence the prevalence of external injuries (X<sup>2</sup> =313, P<0.05) (Table 2). Higher prevalence was found in adult donkeys (47.09%, OR=11.09, C1=-1.045-1.37) than younger (17.71%).

**Table 2:** Prevalence of external injures with age versus

Age	Examined	Injured	T ot al (%)
Young<8year	254	45	17.71
Adult 8year	724	341	47.09
<b>Total</b>	978	386	39.64

X<sup>2</sup> = 313, p<0. 05

**Prevalence of external injuries on body parts**

Distribution of external injuries on body parts were also determined and showed significant variation ( $\chi^2=239.67$ ,  $P<0.05$ ) (Table 3). By considering the total donkeys examined, the presence of back /loin (41.72%) injury was significantly higher than other body parts. similarly injuries on wither (22.09%) and inguinal /scrotal region (17.65%) were common.

**Table 3:** Distributions of External Injures on Various Body parts

Location	Mekelle n (%)	Quiha n (%)	Total n (%)
Back /loin	21(13.04)	140(43.61)	161 (41.72)
Withers	14(16.47)	71(22.11)	85(22.09)
Perineum	11(28.20)	28(8.72)	39(10.17)
Inguinal/ scrotal	13(19.11)	55(17.13)	68(17.65)
Limbs	3(15)	17(5.29)	20(5.23)
Sterna	2(15)	17(5.29)	20(5.23)

$\chi^2 = 239.67$ ,  $p<0.0001$

**Variation in Causes of External Injures**

Table 4 shows main causes of external injuries in area, Mekelle and Quiha veterinary clinics. Injuries by improper harness and saddle design were significantly higher ( $\chi^2=386.68$ ,  $P<0.05$ ). for both areas, Mekelle (10.55 %) and Quiha (34.89%) than other factors. Also overloading and overworking, and hyena bite were the leading causes of external injury at these study area.

**Table 4:** Causes of External Injures in the Study Area

Causes	Mekelle	Quiha	Total n (%)
Improper harness and saddle design	23(10.55)	112(34.89)	135(34.97)
Animal bite	2(3.09)	3(0.93)	5(1.2)
Surgical	5(2.29)	14(4.36)	19(4.92)
Overloading and overworking	11(5.04)	97(30.21)	108(27.97)
Cauterization	2(0.91)	3(0.93)	5(1.2)
Hyena bite	19(8.71)	86(26.77)	105(27.20)
Sharp object	3(1.37)	6(1.8)	9(2.33)

$\chi^2 = 386.687$ ,  $P<0.000$

**Variation in types of wound**

Also the present study conducted; in and around Mekelle reported different types of wound / injuries were recorded (Table 5). Lacerated wound was found significantly influence the prevalence of external injuries (45.33%,  $\chi^2=218.22$ ,  $P<0.0001$ ) than others. Abrasion (39.05%) and incised (23.05) wounds were also reported at both Veterinary clinics.

**Table 5:** Types of Injuries Encountered at Study Area

Type	Total	Percent (%)
Abrasion	152	39.37
Laceration	175	45.33
Incision	45	12.69
puncture	10	2.59

**Prevalence of external injuries based on severity**

The study also tried to indicate the intensity of injuries, at the study area (Table 6). There was a significantly higher proportion of severely injured donkeys (62.72%,  $\chi^2=188.32$ ,  $P<0.0001$ ), 27.97% moderately and 9.84% is mildly infected. **based on**

**Table 6:** Intensity of External Injures

Intensity	Mekelle n (%)	Quiha n (%)	Total n (%)
Severe	34 (52.31)	106(33.02)	240(62.17)
Moderate	21(32.30)	87(27.10)	108 (27.97)
Mild	10(15.39)	28(8.72)	38(9.84)

$\chi^2 = 188.32$ ,  $P<0.0001$

**Nature of external injures**

The finding suggest that external injury prevalence observed from injured donkeys at the study is area is significantly larger (68.39 %.  $\chi^2= 27.373$ ,  $P<0.0001$ ) in size and more tissue defilation (Table 7).

**Table 7:** Nature of External Injures

Size	Mekelle	Quiha	Total
Large	28(17.07)	136(82.92)	264(68.39)
Small	37(30.32)	85(69.67)	122(31.60)
Total	65(29.81)	321(42.23)	386(39.64)

**Discussion**

The study conducted in and around Mekelle on prevalence of external injuries in donkeys, revealed that 39.64% out of totally examined (978) donkey population. This prevalence is relatively higher when compared with a survey done by the Donkey Health and Welfare project in Amhara and Tigray region that has recorded a prevalence of 33.63% in donkey population. However, a report from central Ethiopia, recorded 44% prevalence of external injuries in donkeys which is relatively higher than the present study. Also Demelash and Moges reported 79.4% prevalence in a similar study conducted in Awassa, Southern Ethiopia, which is strongly disagree with present study (its about double higher) [4]. This variation in prevalence may be due to a variation in husbandry and management practices, and the population of donkeys in the study areas.

In this study, the adult donkeys were seen much more affected than younger. This may be due to more exposure to work and carrying, heavy load over long distance for hours. Demelash and Moges also reported that older animals were at about 5 times greater risk than younger equines [4]. The study also revealed that, donkeys were mostly affected by improper harness and saddle designs than any other factor. The present finding is in agreement with other workers, Feseha et al.

stated that in donkeys, wounds are caused by a total lack of any type of saddle or protection from the back, abrasions due to friction with improper harness of harnessing material such as nylon ropes and stripes of car tires. This is also in harmony with the work and ideas of Keith, Hanson, Demelash and Moges [9,12,13].

Who have reported that injuries caused by improper harness and saddle designs were seen to be more prevalent in working equines [9].

The Present study also reported that overloading and overworking as a major cause of injuries in donkeys at study area. Donkeys were involved in a wide array of activities, yet very little care and management was provided to them. They were forced to carry over weight goods and other material over long distance to Mekelle city from surrounding. Pearson et al. reported a similar situation in central Ethiopia where overweight and heavy of load contributed to high cases of back sores in donkeys [15]. Fred, work also in agreement with this study, donkeys developed extensive sores and wounds due to overworking [10].

Table 5, in the present study, indicated that higher number of lacerated wounds due to hyena bites mostly. Donkeys examined at Quiha Veterinary Clinic, were exposed to hyena bite than Mekelle veterinary clinic. The study conducted at southern Ethiopia reported that trauma due to fighting among donkeys and hyena bite were other major causes of wounds evidentially supporting the present study. At study area, donkeys were more exposed to hyenas due to improper housing and allowed to eat at night after long hours of laborious work.

Another observation in the present study was that injuries were more frequently observed on back/ loin (41.76%) when considering prevalence of distribution on various body parts. This is due to the fact that the back and loin are exposed to saddle injuries which are common. This is in accordance with the work of Yilma et al and Demelash and Moges who reported relatively high prevalence rate on back injuries in donkeys loaded with a saddle [4,18]. So it could be suggested that whatever animal work either by absence or improper equipment and harnessing, there is a potential to cause injury.

Based on the severity index categorized by Demelash and Moges 62.17% of donkey samples were severely infected, 27.97% moderately and 9.84% were mildly infected at the present study area [4]. The incidence of high external injuries of donkeys in the study area might be associated with lack of any donkey welfare intervention program and management system where the equines /donkeys are forced to carry a heavy load without rest for a very

long distance. The finding suggest that external injury prevalence observed from injured donkeys at the study area is significantly larger (68.39 %,  $\chi^2= 27.373$ ,  $P<0.0001$ ) in size and more tissue deficits. In agreement with findings, Brown, stated wound that is complicated by large tissue deficits will inevitably heal slowly [1]. Skin margins are far away from the center point of the wound, but also there will be an increase primary contraction of the wound site and expose deeper tissue which will be more liable to dehydration and contamination. Most wounds with tissue deficits are also complicated by disruption local blood supply.

## Conclusion and Recommendation

The study observed that, external injury problem of donkeys do exist more commonly in and around Mekelle. Even though donkey utilization is more common in this area, a care and management system followed for working equines is undoubtedly poor. The fact that pack animals are more liable to external injury because of their natural instinct and the type of work they are engaged in. Proper care of equine health is essential. Generally a large proportion of donkeys suffered various degrees of wounds. This showed external injuries as major health problem/ constraints of donkey's performance at the study area. Based on the findings the present study the following recommendations are forwarded:

- A comprehensive equine health and welfare promotion program is a paramount importance to alleviate these problems.
- Prevention is the most practical way to deal with external injuries health problems.
- The above problems could be improved by a combination of better husbandry, well designed harness, and regular, consistent, consider and hence less stressful, working practices.
- Adequate rest, balanced load to its body weight and good nutrition are advised for donkey owners, transporters and users to harvest maximum benefit from donkeys.

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