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Incidence of Wound and Associated Risk Factors in Working Donkeys in Yilmana Densa District

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Abstract: Across sectional study was conducted from October 2013 to April 2014 on randomly selected working donkeys to determine prevalence of wound in Adet town (Administration town of Yilmana-Densadistrict) and its surroundings kebeles. The study animals were selected randomly. The risk factors sex, age, body condition scores, condition of saddle, working nature and type of load carried were assessed through Questionnaire Survey and physical clinical examination of animals. A total of 410 working donkeys were examined. The overall prevalence of wound was 42.2% (n=173). The occurrence didn't vary significantly among sex of the animal. However, theoccurrences of wound vary significantly among age categories. Higher prevalence was noticed in old animals (46.3%) than adults (42.2%) and young ones (22.9%). The body condition scoring was found to be significantly associated with wound prevalence where donkeys with poor body condition were twice at risk of developing wound than those having good body condition (32.6%). In terms of working nature the present study showed that, donkeys usually transporting a pack weighing more than 80kgs were with appreciably higher prevalence of wound than those donkeys usually transporting a pack weighing less. Similarly, donkeys working for more than 4kms per single trip were with notably higher prevalence of wound than those usually working for nearer distances (<4kms). In addition, those donkeys transporting construction materials were significantly with higher prevalence of wound than donkeys used for other purposes. More specifically, prevalence of back sore considerably associated with condition of saddling and donkeys which are used with insufficient or without any saddle were almost twice at a greater a risk of having back sore than those used with proper saddle (16.7%). However, positive wound cases (79.25%) haven't received wound treatments but were seen with traditional wound management system of the society. Generally, the study has clearly indicated wound as a prevailing welfare problem of working donkeys in Adet town and its surroundings. Hence, implementing a comprehensive donkey health and welfare improvement program should be a priority for concerned stakeholder.

Key words: Adet · Donkeys · Ethiopia · Prevalence · Risk Factors · Wound

INTRODUCTION

It is estimated that the world donkey population is about 44 million; half is found in Asia, just over one quarter in Africa and the rest mainly in Latin America [1]. Ethiopia has about 6.75 million donkeys or 32% of all the donkeys in Africa and 10% of the world population. Although donkeys are found in all the ecological zones of the country (arid to alpine) the majority are found in the highlands [2, 3]. Specific to Amhara National Regional State there are 2 million donkeys, 124 thousand mules and 300 thousand horses. There are about 11 donkeys per square kmof land or one donkey for every two households in the community. This ratio is much higher in the rural community, with three donkeys per every five household [4].

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In all zones of Ethiopia, donkeys are primarily used as pack animals. The low level of development of the road transport network and the rough terrain of the country makes the donkey the most valuable pack animal under the smallholder farming systems of Ethiopia [3, 5]. It is known that donkeys often are involved in multipurpose activities and help in transporting goods to and from markets, farms and shops, traveling long distances. They also pull carts carrying heavy loads 3 to 4 times their body weight. They work from 4 to 12 hours/day, depending on the season and type of work. The increasing human population, demands for transport of goods to and from far, remote areas and construction activities around towns are making equines highly demanded animals [6].

Despite their use, the husbandry practices of working equines especially of donkeys arepoor [7]. Unlike horses, donkeys are not provided with feed supplements. Feed shortage and disease are the major constraints to productivity and work performance of equines. They are brutally treated, made to work overtime without adequate feed or health care indicating their poor welfare status [7, 8].

Though donkeys provide several advantages, health and welfare is a visible problem and most of the animal owners are not even aware of animal welfare and management practices; as a result animals have to undergo significant suffering due to improper husbandry practices. Studies to elucidate the magnitude of this problem are lacking. Such information would be useful for designing strategies that would help improve donkey health and welfare [7, 8].

Wounds are one of the primarywelfare concerns of working equids [9]. Wound is an open mechanical injury of the skin (epidermis), underlying tissues and organs. It is characterized by pain, gaping, bleeding and functional disturbance [10]. The type of wound in working donkeys includes tissue damage with or without blood/exudates/ pus, abscess formation, or any secondary bacterial complication. Bites (lacerated wounds) will be identified by irregular edges with underlying tissues removed as well as hemorrhage [11]. The most common cause of these wounds in working equine are over loading, improper position of load predisposing to falling, beating of donkeys, hyena bites, donkey bites, injuries inflicted by horned Zebu [10]. Some hobbling methods, inappropriate harnesses or yokes that may be heavy and ragged, long working hours may cause discomfort and inflict wounds [7]. However, studies on equine wound in general and donkeys in particular were not found enough to put the exact picture to its prevalence and damaging effect in Ethiopia. Therefore, the objectives of this study were to determine prevalence of wound in working donkeys in Adet town and surrounding Kebeles of Yilmana Densa district and to assess factors associated with wound in working donkeys.

MATERIALS AND METHODS

Study Area: The study was conducted from October 2013 to April 2014 on randomly selected working donkeys in Adet town (Administration town of Yilmana-Densadistrict) and its surroundings kebeles. The areais located in Amhara National Regional State North-western part of Ethiopia, at a distanceof 565km from the capital, Addis Ababa.

Yilmana-Densais one of thedistrictsasin Mirab Gojam Zone, Amhara National Regional State of Ethiopia. Yilmana-Densa is bordered on the south byKuarit, on the southwest by Sekela, on the west by Mecha, on the north by Bahir Dar Zuria, on the east by theAbay River which separates it from Debub Gondar Zone and on the southeast by the Misraq Gojam Zone.

The area has an altitudinal range of 1552 to 3535 masl and an average annual rain fall of 1270mm with the main rainy season, from May to October. The agro-climatic zone comprises lowland (12%), mid highland (64%) and highland (24%) the temperature range is about 10°C-30°C. The farming system in the area is mixed type (crop-livestock production). The livestock population of the area is estimated to be 123,220 bovine, 106,211 ovine and 15,772 caprine, 22,886 equine and 581,778 poultry [12].

Study Animals: The study has considered randomly selected donkeys irrespective of age, sex and BCS to investigate the prevalence of wound and associated risk factors.

Study Design and Methodology: A cross sectional study has been conducted to determine the prevalence of external injuries in donkeys and associated risk factors.

Sample Size Determination and Sampling Technique: A total of 410 donkeys have been sampled randomly for physical examination from Adettown especially those which are present at the towns' main market and grind mill houses and some purposively selected Kebeles around the town in Yilmana Densadistrict. The sample size has been determined according to the formula given by Thrusfield [13].

$$N = 1.962P\exp(1 - P\exp)/d2$$

Where,

N= required sample size, P_{exp}= expected prevalence (50%),
d= desired precision (5%),
Z = 1.96 for 95% confidence interval.

Physical Examination: Each randomly selected donkey has been physically examined for any external body injury and findings including site, severity and class of wound have been recorded on a structured body mapping and physical examination sheet. Age and body condition score estimations have been made according to the method described by Sevendsen [11]. Wound severity and classification estimation also made as indicated byBiffa and Woldemeskel [6] and Knottenbelt [14] respectively.

Questionnaire Survey: In addition to the direct physical examination each randomly selected donkey owner has been interviewed with a semi-structure interview (having both open and close questions)to extrapolate information regarding owner's general information, donkey management practice (harnessing, feeding, housing, health care), working nature (duration of work, weight carried, length of journey covered, nature of working environment) and donkey-owner relationship.

Data Analysis and Presentation: Data both from the direct physical examination and questionnaire were properly coded and entered into Microsoft Excel-2007 spread sheet. The data was filtered for any invalid entry and then transferred to SPSS 16.0 version for windows package (2007) for statistical analysis. Descriptive statistics was made and differences (associations) in the prevalence of wound within each risk factor (independent variable) have been tested for significance through Pearson's Chi-square analysis at a probability level of 0.05. Results of the analysis are presented through illustrative figures and tables.

RESULT

Descriptive statistic for sex, age and body condition score of the sampled donkeys is illustrated in Table 1 below.

Prevalence and Distribution of Wound: The overall prevalence of wound was 42.2% (n=173) from the 410 examined donkeys. Figure (1) below illustrates distribution of wounds on the body of examined donkeys.

In figure 2 below it has been indicated that the proportion of wound scores in a 1 to 5 scoring system. Twenty eight percent (n=116) of the examined donkeys were with only back or girth sore (score 3), while 1.5%

Table 1: Descriptive statistics for sex, age and body condition score of physically examined donkeys.

Variable		Numbers examined, n (%)
Sex	Male	211 (52)
	Female	195 (48)
Age	Young (<5 year)	35 (8.5)
	Adult (5-10 years)	211(51.5)
	Old (> 10 years)	164 (40)
BCS	Poor (BCS< 3)	324 (79)
	Good (BCS =3)	86 (21)

Table 2: Wound classification of the total wounded donkeys.

Wound class	Frequency (%)
Fresh	12 (6.9)
Infected	161 (93.1)
Total	173(100)

Table 3: Prevalence of wound among sexes

Sex	Examined (n)	Wound cases (n)	Percentage (%)	P value
Male	211	97	46.0	
Female	195	76	39.0	0.154
Total	406	173		

Table 4: Prevalence of wound among age groups

Age groups	Examined (n)	Wound cases (n)	Percentage (%)	Chi- square	P value
Young	35	8	22.9		
Adult	211	89	42.2	6.522	P<0.05
Old	164	76	46.3		
Total	410	173			

Table 5: Prevalence of wound among body condition scores

BSC	Examined (n)	Wound cases (n)	Percentage (%)	Chi- square	OR(95% CI)	P value
BCS<3	324	154	44.8			
BCS=3	86	28	32.6	4.144	1.678(1.016-2.770)	P < 0.05
Total	410	173				

OR= Odds Ratio; CI = Confidence Interval.

Table 6: Prevalence of woundamong different working natures

Variable	Categories	Examined (n)	Wound cases (n)	Percentage (%)	Chi-square	P - Value
Usual weight transported by the donkey	< 50 Kg	49	10	20.4	12.126	
	50 - 80 Kg	263	114	43.3		P < 0.05
	> 80 Kg	98	49	50.0		
The average length of trip covered by	<4 Km	45	6	13.3	17.264	
the donkey while working	4-8 Km	168	77	45.8		P < 0.001
	>8 Km	197	90	45.7		

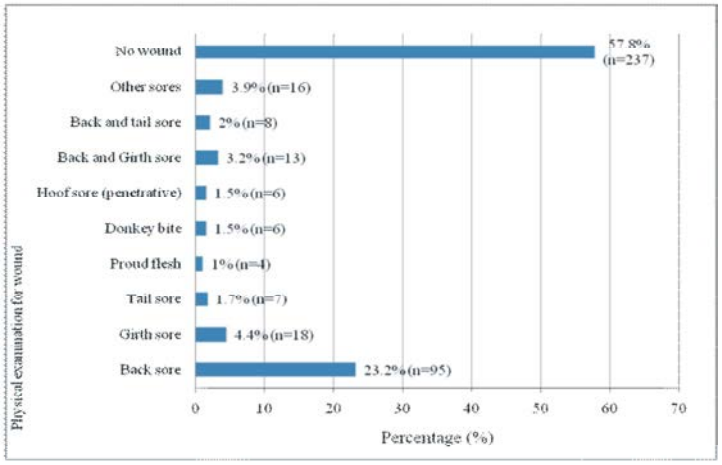

Fig 1: Distribution of wounds on the body of examined donkeys.

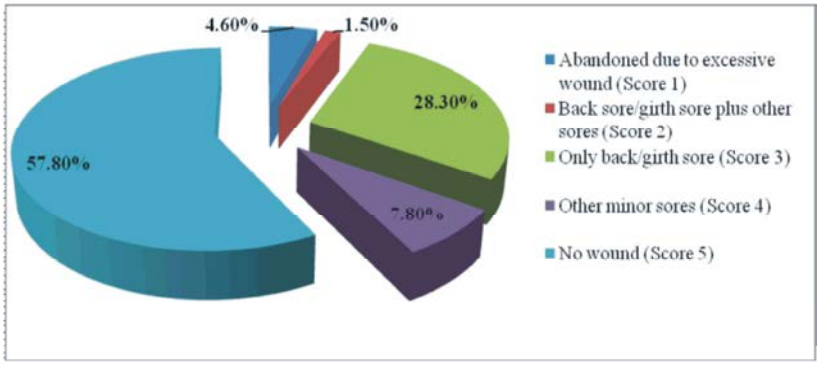

Fig 2: Relative percentage of wound scores

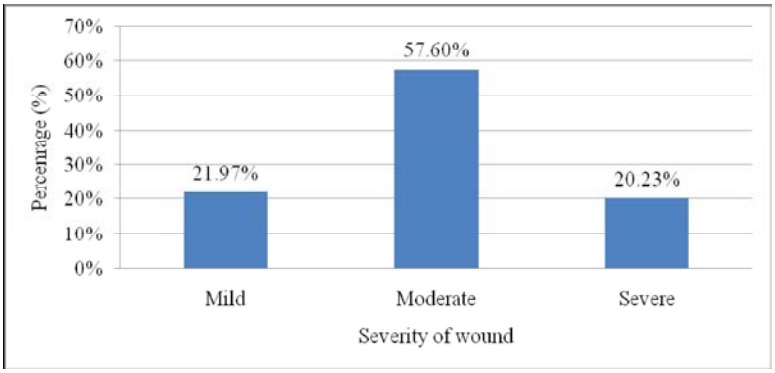

Fig 3: Wound intensity/severity of the total injured (wounded) donkeys (n=173).

Table 7: Prevalence of wound among different type of load

Type of load carried	Examined (n)	Wounded case(n)	Percentage (%)	Fisher's Exact	P- value
Only flour from grind mill house	6	2	33.3	F= 12.786	P < 0.05
Construction materials	3	2	66.7		
Wood	6	1	16.7		
Farm produce	142	73	51.4		
Flour from grind mill house and farm produce	240	87	36.2		
Water and farm produce	13	8	61.5		
Total	410	173			

Table 8: Prevalence of back sore among condition of saddle

Saddle condition	Examined (n)	Wound cases (n)	Percentage (%)	Chi- square	OR (95% CI)	p- value
Insufficient/No saddle	260	70	26.9	5.26	1.842(1.107-3.066)	0.05
Proper harness	150	25	16.7			
Total	410	95	43.6			

OR= Odds Ratio; CI = Confidence Interval.

(n=6) of them were having back or girth sore concurrent with other sores (Score 2) and 7.8% (n=32) were with only minor sore (Score 4). Approximately 8% of the examined donkeys were abandoned due to wound.

Wound Intensity (Severity) and Class: Regarding wound intensity and classification of wound among wounded majority of wound was moderate 100 (57.8%) and infected wound 161(93.1%) respectively. Figure 3 and Table 2 below indicate wound severity and infection status.

From the total 173 injured donkeys, back sore was found to have greater proportion (23.2%, n=95) followed by girth sore (4.4%, n=18).

Prevalence of Wound among Sex, Age and BCS Groups: Wound prevalence among sex, age and BCS groups were summarized in tables 4, 5 and 6.

The study has showed that a significantly higher prevalence of wound was recorded in old donkeys (46.3%, x^2= 6.522, P < 0.05) than adults (42.2%, n=89) and young ones (22.9%, n=8) (Table 4).In addition, wound was found to significantly associated with body condition, where donkeys with poor body condition were twice at risk of developing wound (x^2= 4.144, OR= 1.67, CI=1.016-2.770) than those having good body condition (P<0.05) (Table 5). On the other hand there was no significant difference in the overall wound prevalence among sex groups (p>0.05) (Table 3).

Prevalence of Wound and Working Nature: The study showed that, donkeys usually transporting a pack weighing more than 80kgs were significantly with higher prevalence of wound (50%, x^2= 12.126, P < 0.05) than those donkeys usually transporting a pack weighing less. Similarly, donkeys working for more than 4km per single trip were significantly with higher prevalence of wound (45.8%, x^2= 17.264, P < 0.001) than those usually working for nearer distances (<4km) (Table 7).

Concerning type of load carried the study also showed considerable association with wound prevalence. Donkeys used to carried construction material were significantly with higher prevalence of wound (66.7% F = 12.786; P < 0.05) than those donkeys used to carried other goods (Table 7).

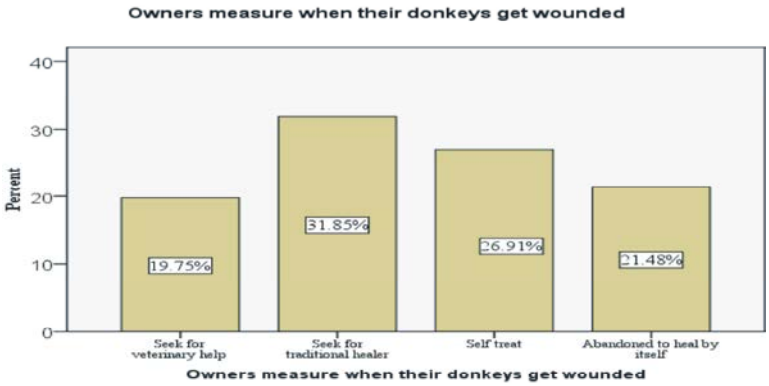

Fig 4: Owners' Responses to the Management of Injuries

Prevalence of Back Sore Among Conditions of Saddling: Prevalence of back sore was significantly associated with condition of saddling or padding (x^2= 5.621, P < 0.05). Those donkeys which are used with insufficient or without any saddle were almost twice at a greater a risk of having back sore (26.9%, OR= 1.842, 95%CI=1.107-3.066) than those with proper saddle (16.7%) (Table 8).

Owners Practice (Measure) When Donkeys Get Wounded: The higher proportion of (31.85%) owners seeks for traditional healers to their donkeys. Figure (4) below illustrates owners' measure when their donkeys get wounded.

DISCUSSION

In the present study, the overall prevalence of wound in working donkeys was 42.2%. This finding was markedly lower than the reported 77.5% [15], 79.4% in Hawassa [6], 59% in Jordan [16] and 54% in Morocco [9] but closer to the report by Pearsons *et al.* [17] (40%) in Central Ethiopia. This might be due to variation in management and husbandry to the donkeys in the region.

Donkey wounds were found commonly distributed on the back and girth. Similarly Biffa and Woldemeskel [6] and Tesfaye and Curran [18] reported the same scenario in South and Central Ethiopia respectively. This might be due to poorly designed and ill fitted saddles and straps manufactured by unskilled artisans or donkey owners. Where as in the report done by Sells *et al.* [9] in Morocco the most common site of a wound was the withers this difference might be attributed to the different design in saddle and strap.

The report of Biffa and Woldemeskel [6] indicated that greater proportion of severely injured donkeys, the current research has showed majority of wounded cases being presented as moderate. This difference might be due to difference in causes of wound, use of donkeys and difference in saddle design.

From the age categories the present finding has showed that 22.9% of wound in young, 42.2% in adults and 46.3% in old donkeys. This showed that a significantly higher prevalence of wound was recorded in old donkeys (x^2= 6.522, p< 0.05). Similar scenarios were reported by Biffa and Woldemeskel [6]. This might be due to the fact that oldswere involved in a wide array of activities, yet very little management was accorded to them. They were made to carry heavy loads over long distances and hours. They travel as far as 70 km/day while carrying an average weight load of 90 kg. it could also be attributed by lack of regular feeding and health care provision were not practiced regularly and aggravates donkey wound in olds and adults than young's.

According to Henneke *et al.* [19] poor body condition score is an indicator of reduced body fat. In the current study wound was found to be significantly associated with body condition, where donkeys with poor body condition were twice at risk of developing wound (x^2= 4.144, OR= 1.67, CI=1.016-2.770) than those having good body condition (p<0.05). This is in line with the reports by Mekuria *et al.* [7] and Pearson *et al.* [17] indicated that poor physical condition due mainly to malnutrition is the leading causes of sores in donkeys. The probable reason for such association is due to donkeys with a poor body condition score may have less natural padding protecting them from pressure, friction and shear lesions caused by saddle. In contrast no significance difference between wound prevalence and body condition score on the research done in morocco by Sells *et al.* [9]. On the other hand there was no significant difference in the overall wound prevalence among sex groups (p>0.05).

In terms of working nature it has been showed that donkeys usually transporting a pack weighing more than 80kgs were significantly with higher prevalence of wound (50%, x^2= 12.126, p< 0.05) than those donkeys usually transporting a pack weighing less. Similarly, donkeys working for more than 4kms per single trip were significantly with higher prevalence of wound (45.8%, x^2= 17.264, p< 0.001) than those usually working for nearer distances (<4km); a similar situation was also reported by Sells *et al.* [9] in morocco and Pritchard *et al*. [20] conducted their studies inAfghanistan, Egypt, India, Jordan and Pakistan.

The probable reason for such association is due to donkeys in bad working condition (over loading and working without rest) can predisposethe donkey to persistent irritation and reduce their body condition score and this may lead the donkey to have less natural padding, protecting them from pressure and the pressure exerted by the load will force the donkey to lose its balance and fall to the ground, this results in friction and shear lesions. In addition donkeys used to carry construction material (cement, sand and metal) showed a significantly higher prevalence of wound (66.7% F = 12.786; p< 0.05) than those donkeys used to carried other goods.This might be associated withsharp and heavy constructionmaterials whichcould results in damage to the skin of the animal bypiercing and causes persistent irritation and injuries.

Condition of saddling or padding also significantly associated with prevalence of back sore (x^2= 5.621, P < 0.05). Those donkeys which are used with insufficient or without any saddle were almost twice at a greater a risk of having back sore (26.9%, OR= 1.842, 95%CI=1.107-3.066) than those with proper saddle (16.7%).

The majority of donkey owners (31.85%) seek for traditional healers whenever their donkeys get wounded. Few owners managed their sick donkeys differently by allowing them to have access to appropriate veterinary care (19.75%) and long-term rest until recovery. This signifies the widely prevailing equine wound problem in the area. Similar situations have been reported by Pearson *et al.* [17] in central Ethiopia where only a few people look for veterinary advice on treatment of sores in donkeys.

CONCLUSION

The current study has revealed woundas major welfare problem in working donkeys in and around Adet Town. Overworking (over loading and long restless travels) and pack nature, improper saddling or padding and poor body condition of donkeys were found as contributors to the occurrence of wound in working donkeys. More over poor practice of owners' management of wound, less attention givenand lack of awareness about animal welfare matters most.

Continuous awareness creations to donkey owners on proper management and handling of donkeys should be in place.A comprehensive approach targeting the improvement of welfare of working equids should be given priority by stakeholders and further and detailed investigations on equines are required to be done to having a wider scope able to mitigate the problems on time.

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