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Prevalence of Work Related Wound and the Associated Risk Factors in Cart Horses in Bishoftu Town, Central Ethiopia

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Abstract
A cross-sectional study was conducted from November 2016 to April 2017 with the objectives to estimate the prevalence of work related wound and the associated risk factors in 400 randomly selected carthorses in Bishoftu town, Central Ethiopia. The findings revealed high overall wound prevalence of 42.5%. Age, body condition scores, harness type, and work load were the major risk factors associated with occurrence of wound in the study area. Older horses were found to be highly affected by wound than young and adults and the difference was statistically significant ($p < 0.05$). Likewise, poor body conditioned animals were at greater risk of developing wound than good body conditioned animals. There was significant association between horse handling and prevalence of wound where horses managed by beating were at higher risk of developing wound than those managed by soothing voices (OR =3.291, 95% CI = (2.160-5.014)). Furthermore, wound prevalence was significantly associated with harnessing type. Horses with plastic harnesses were almost three times at greater risk of developing wound (OR=3.116, 95% CI= (2.038-4.764)) than those with leather harness. Also the distribution of wound on the affected animals shown significant differences ($p < 0.05$), in which higher proportion (41%) of wound was observed at the back and withers of affected animals whereas lower proportion (7%) was observed on the abdominal area. In general, the present study revealed high overall prevalence of wound in cart horses in the study area that require a comprehensive equine health, management and welfare promotion program so as to enhance the efficient utilization in these animals and also to improved the community's livelihood.
Keywords: Cart horse, Wound, Risk factors, Bishoftu, Ethiopia

1. Introduction

The equine population of the world is currently estimated to be 112.5 million, of which 44.3 million were donkeys, 58.5 million were horses and the rest mules (FAO, 2013). Working equines are the most important source of agricultural energy and transport resource for the poor both in urban and rural areas of the developing world (Swann, 2006; Biffa and Woldemeskel, 2006). They provide best alternative in a place where road network is insufficiently developed, terrain is rugged and mountain and cities with narrow streets prevent easy delivery of mechanization. Equine also provides urban dwellers with opportunity of income generation (Wilson, 2002).

Ethiopia has the largest population of equines in Africa and the second largest equine population in the world next to China (Anon, 2007), by possessing 2.08 million horses, 7.88 million donkeys and 0.41 million mules (CSA, 2016). Also the country possesses approximately half of Africa's equine population with 37%, 58%, and 46% of all African donkeys, horses, and mules, respectively (CSA, 2006). Equines are important animals to the resource-poor communities, providing traction power and transport services at low cost and in the remote areas of Ethiopia, pack animals offer the only realistic way of obtaining returns from agriculture above mere existence (Biffa and Woldemeskel, 2006).

Among equine, horses have significant role to the farming economy in Ethiopia. In a country where there is less developed transport and communication services and road network insufficiently developed, the natural choice rests on the use of human labor and pack animals as a mode of transport, as it has been the case in some parts of the world. This remains true in the Ethiopian context. The mountainous nature of the land has made the travel time consuming and difficult, which has resulted the back of animals to remain as the only means of transport for Ethiopian terrain for centuries (Hassen, 2000). Also horses have a prominent position in the agricultural systems as draft, pack and riding animals (Endebu, 1996; SPANA, 2003).

Although working horses have significant contribution to the daily lives and livelihoods of lots of local community in Ethiopia, their productivity is constrained by several factors (Wilson *et al*., 1999). Horses involved

in pulling carts often work continuously for 6 to 7 hours per day, carrying 3 to 4 persons (195-260 kg) in single trip (Biffa & Woldemeskel, 2006). They are also prone to painful, debilitating and often fatal tropical illnesses and conditions such as tetanus, parasitic infection and colic (Swann, 2006).

In addition, working equines are the most neglected animals in Ethiopia, accorded low social status, particularly the male working equine (Magda and Khaled, 2011). Limited researches have been conducted to assess major equine problem in the country in general and in working cart horses in and around Bishoftu town particular. Thus, this study was designed to assess the prevalence of wound in horses involved in pulling carts and the associated risk factors in and around Bishoftu town.

2. Materials and methods

2.1. Study design and study area

A cross-sectional study was conducted in Bishoftu town of Oromia regional state, central Ethiopia from November 2016 to April 2017 to estimate the prevalence of wound in cart pulling horses and the associated risk factors. Bishoftu town is found at 47km south east of Addis Ababa, Capital of Ethiopia with an altitude of 1860m above sea level. The area is geographically located at 8^0 7'N latitude and $3^0$9'E longitude. It has a bimodal rainfall with annual average of 871mm in which 80% is received during the long rainy season (from June to September) while the short rainy season extending from March to April and dry season from October to February. The mean annual maximum and minimum range of temperatures are 26^0c and 14^oc respectively, with average relative humidity of 63.8 %(CSA, 2007). In the town, 'there are 160,697 cattle, 22,181 sheep, 37,510 goat, 5660 horse, 38,726 donkey, 268 mule and 191,380 poultry (CSA, 2008).

2.2. Study animals

The study animals were horses kept mainly for pulling carts in Bishoftu town which are common source of transportation of peoples, goods, construction materials, farm product and others. Age of the horses was categorized as young (those in between 1-5 years), adult (between 6-10 years) and old above 10 years.

2.3. Sampling technique and sample size determination

Simple random sampling technique was used to select animals in each cart station. Since there was no previous study in the area, 50% expected prevalence was considered to determine the sample size with 95% confidence level and 5% absolute precision; and the total number of animals required for the study was calculated based on the formula given by Thrusfield (2005).

$$n = \frac{1.96^2 Pexp\ (1-Pexp)}{d^2}$$

Where n= the required sample size; 1.96 is the value of z at 95% confidence level; Pexp=expected prevalence of wounds; d= desired absolute precision level at 95% confidence level.

Accordingly, the sample size required for the study was 384, but to increase the precision a total of 400 animals were included in the study.

2.4. Study methodology

2.4.1. Physical clinical examination

Each randomly selected cart horse was physically examined for the presence of any wound. During this time special attention was given for the nature and extent of wound on the selected horses. The findings were then recorded on a structured body map format. Severity of wound was classified according to the descriptions by Biffa and Woldemeskel (2007), who classified wound as severe when there is ulceration involving a pronounced contusion in wide areas, tissue hypertrophy and severe complication**;** moderate wound when there is injuries involving coalition of small wound with tissue sloughing with no complication and hypertrophy and some with chronic courses; and mild wound when there is loss of epidermis and superficial layers with no further trauma.

2.4.2. Questionnaire survey

Semi structured interview was used explore overall management practices of cart horse in the study area as working nature of horses (presence/absence of rest), harness types used, fate of injured animals, and horse handling techniques (horse- owner relationship).

2.5. Data analysis

All the data collected during the study was properly coded and entered into a Microsoft Excel spread sheet and checked for any invalid entry. Data analysis was made using Statistical Package for Social Science (SPSS 2007 version 20) software. Descriptive statistics was used to compare occurrence of wound between the different risk factors, and odds ratio (OR) estimate was used to determine the degree of association between the different risk factors and the wound. In all the analyses, confidence levels at 95 % were calculated, and a $p < 0.05$ was used for

statistical significance level.

3. Results

From the total of 400 horses examined, 170 of them were found affected by wound with the overall prevalence of (42.5%). Wound prevalence in relation to age of the horse, harness types used and horse handling practices is described in Table 1. Wound prevalence among age categories found significant difference ($p< 0.05$) where high prevalence was recorded in old horses (68.3%) than in young (30%) and adults (13.7%). Higher wound prevalence was recorded in horses that used plastic harnessing than leather harness; and also in those who frequently beat their animals for handling purpose than those who use soothing voice (Table1).

Table7. Wound occurrence in relation to age, harness type and horse handling practices

Risk factors		Number examined	Number injured	Prevalence (%)	OR(95%CI)	P- value
Age	Young	20	6	30	2.696(0.945-7.697) 5.026(1.85-13.67)	0.002
	Adult	175	24	13.7		
	Old	205	140	68.3		
Harness type	Plastic	228	123	53.9	3.116(2.04-4.76)	0.000
	Leather	172	47	27.3		
Horse handling	Handling by soothing voice	183	50	27.3	3.291(2.16-5.01)	0.000
	Handling by beating	217	120	55.3		

Owners' practice regarding work time management in cart horse is described in Table 2. Majority of the respondents (69%) were not conscious about work load and incidence of wound in their horses and they indicated steady using of their horses to pull carts without giving even a single day rest in a week.

Table8. Owners' practice regarding working time management

Working time management	Number of responses (n)	Percentage (%)	**P- value**
Work without providing rest	277	69	0.000
Provide rest for their horses	123	31	
Total	400	100	

Horse owners practiced different approaches to manage wounds on their carthorses. 36.3% of the respondents seek for veterinary care, 20.3% go to traditional healer, 17% treat by themselves and 26.6% do nothing (Table3).

Table9. Owner's practice towards wound management in their cart horses

Management response	No. examined	No. injured	Percentage	Chi-square	p-value
Self treat	68	50	17	90.579	0.000
Seek traditional healer	81	4	20.3		
Seek veterinary services	145	67	36.3		
Do nothing	106	49	26.6		
Total	400	170			

Wound prevalence in relation to body condition score (BCS) is described in Table 4. The result showed that wound prevalence was strongly associated with body condition score (P=0.000), where horses with poor body condition score have higher prevalence of wound (50.5%) than those with good body condition scores (20%).

Table 4. Wound prevalence in relation to body condition score

BCS	Examined horses (n)	Wounded (n	Percentage (%)	Chi-square	p value
Poor	295	149	50.5	29.245	0.000
Good	105	21	20		

Wound in the present study was categorized in to mild, moderate and sever. The findings therefore revealed that higher proportion (60%) of the wound were severe, followed by moderate (27.06%) and mild wound (12.94%).

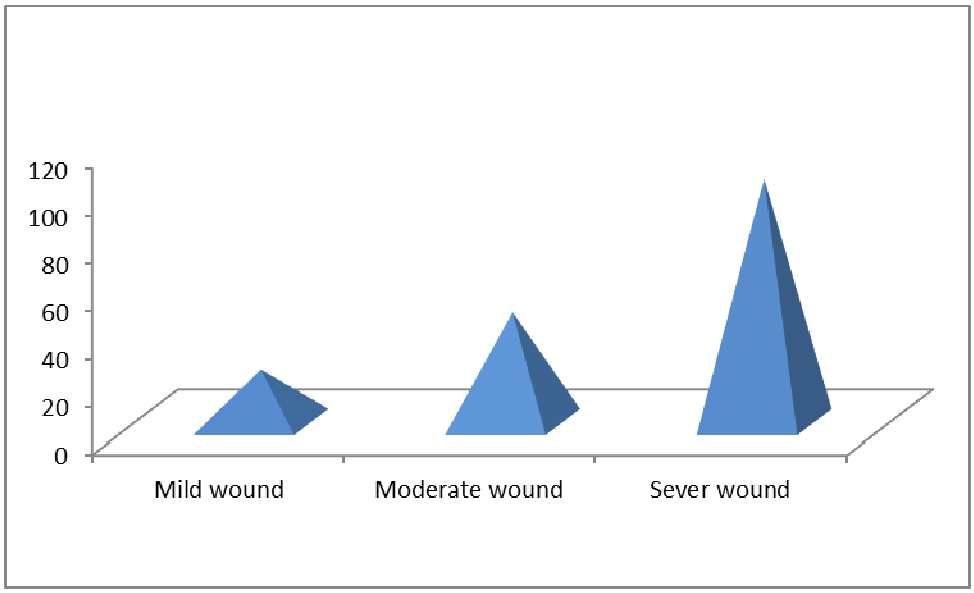
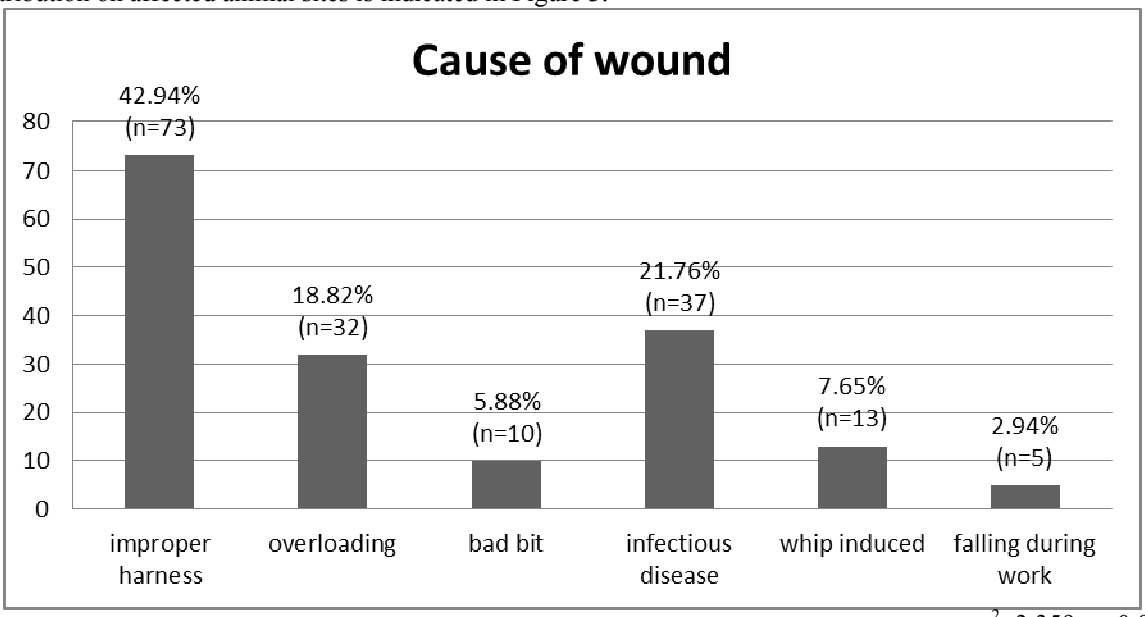


Figure5. Classification of wound by severity

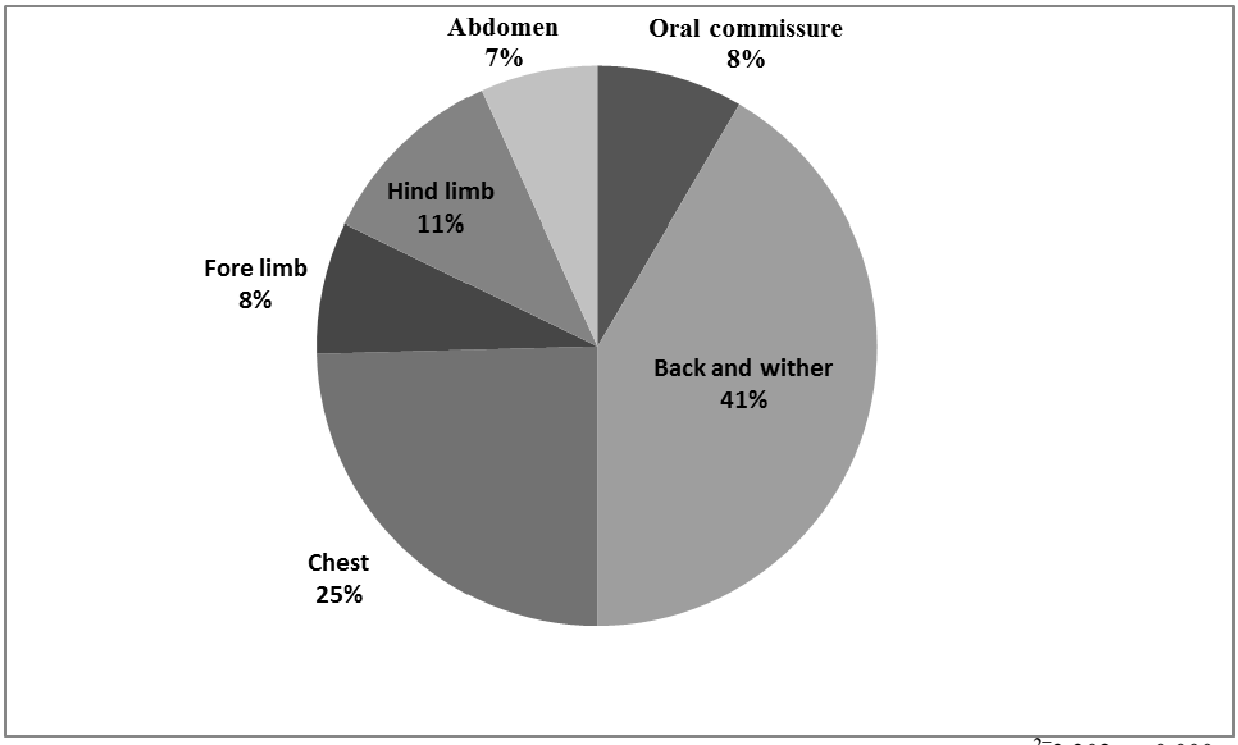
The likely causes of wound on cart horses as explained by owners are described on Figure 2 and wound distribution on affected animal sites is indicated in Figure 3.



x^2=3.359, p=0.000

Figure2.Causes of wound in cart horses

As it can be observed from the above figure, higher proportion of wounds were inflicted by improper harness (43%) followed by infectious disease (22%) and overloading (19%) and the difference was statistically significant (p=0.000).



$x^{2=}3.302$, p=0.000

Figure3.Wound distribution on different body parts

The result also indicated that significant difference was observed in the distribution of wounds among different body parts (p=0.000) where the highest proportion (41%) was recorded on the back and wither areas whereas lowest on the abdomen (7%).

4. Discussion

In the present study the overall prevalence of wound in carthorses was 42.5% which indicates wound as the most serious problem of cart horses in and around Bishoftu town. The finding was in line with previous report from central Ethiopia by Pearson *et al* (2000) who reported 44% prevalence. Compared to the 25% prevalence report from Mekelle town by Sisay (2013), the present finding is higher however; it is less than the findings by Biffa and Woldemeskel (2006) who reported (72.1%) prevalence in working equines in Hawassa. The difference in wound prevalence might be due to variation in husbandry and management practice by the farmers among the different geographic area

Regarding wound distribution, higher proportions of wound were observed at the back (Wither) and breast areas. This might be due to the using of improper harness and saddle that are manufactured by unskilled artisans which is commonly practiced in different parts of the in Ethiopia. Also horse-drawn carts are often designed unbalanced and too heavy and do not consider load distribution in relation to the body balance and style of movement. Wooden or iron-made saddles are constantly put on the back/shoulder and strongly tied to the body by plastic rope, which causes persistent irritation and injuries. In most cases, harnesses were made of hard plastic strips, which cut in to the skin of the equines and form large open wounds. These findings concur with previous reports by Pearson *et al.* (2000) and Biffa and Woldemeskel (2006).

In the present study, significant proportions of wound in cart horses were graded as severe. This finding concurs with the findings of Biffa and Woldemeskel (2006) who reported similar evaluations in working equines from Hawassa. Age wise wound distribution in the present study revealed that 68.3% wound was recorded from older horses flowed by 30% in young and 13.7% adult. However, our finding was contrary to the report of Biffa and Woldemeskel (2006). The higher wound in older animals might be due to the fact that they are involved in multiple activities in the study area; yet older animals were made to carry heavy loads over long distances and not even provided with adequate rest.

Wound in the current study was significantly associated with body condition score, where horses with poor body condition were at greater risk of developing wound than those with good body condition score (OR=3.116,95%CI(2.038-4.764)). Our finding is in agreement with the reports by Mekuria *et al*. (2013); and Solomon and Rahmato (2010) but contrary to the report by Sells et al. (2010) who reported no significant association between wound prevalence and body condition score. However, the probable reason for higher occurrence of wound in poor body conditioned animals might be due to the poor immune system in which this

group has less natural padding that protect them from pressure and friction caused by saddle.

There was significant association between wound prevalence and harness type, where horses with plastic harness where three times at greater risk of developing wounded than those which leather harness (p=3.116,95%CI(2.038-4.764)). Our observation is in line with the findings of Biffa and Woldemeskel (2006). This is probably due to the fact that plastic harnesses become hot when the horse sweats and unable to resist friction when compared to leather one and intern inflict wound by rubbing the skin of the horse.

With regard to horse handling, the current study had found significant association between the ways owners handle their animals and wound prevalence. Higher proportion of wound (55.3%) was observed in horses managed by beating than those who managed by using soothing voices only (27.3%). In addition, some owners beat wounds on their equines as 'accelerators' since the animals move faster when the wound is beaten (Brooke 2007). Concerning wound management, majority of horse owners (36.3%) in the study prefer veterinary services to treat their animals. However, 20.3% seek traditional healer, 17% treat by themselves and 26.6% do nothing letting the wound heal by itself. Similar observations were reported by Biffa and Woldemeskel (2006) and Pearson et al. (2000).

5. Conclusion and recommendations

The present study revealed high overall prevalence of wound in working cart horses in and around Bishoftu town, central Ethiopia. Improper harness and saddle, poor breast strap, poor girth rope and infectious diseases were the major contributors to the higher prevalence of wound in the area. Many of the horse owners used to take their horses to veterinary clinics however, they take at terminal stage after the wound gets at its worst stage. In addition, there are owners who neglectfully handle their animals and did not consider wound as a disease as a result letting the wound heal by itself. In conclusion, although cart horses have significant role to the daily life and livelihoods of the community, majority of them did not receive any help from their owners while wounded. This strongly calls for a continuous awareness creation to horse owners on the proper management and handling of their animals so as to enhance their utilization by the community. Furthermore, policies and legal frameworks that support animal welfare issues and inspect animal facilities should be promoted in order to ensure animal welfare issues.

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