

Research Article

Assessment on Ocular Problems of Cart Donkey in and Around Wolaita Sodo, Southern Ethiopia

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Ocular problems are frequent conditions in cart pulling donkeys. A cross-sectional study was conducted from October 2018 to April 2019 in Wolaita Sodo city to assess ocular problems in cart pulling donkeys and associated risk factors. Accordingly, 384 randomly selected cart pulling Donkeys were examined. Out of the total, 40.7% of donkeys were suffering from ocular discharge due to improper harness than properly harnessed donkeys (11.5%). Among the different risk factors, 22.6% of the cart donkeys were affected with entropion and/or ectropion due to whipping and harness touch. According to the study, there was a statistically significant ($p < 0.000$) association between ocular discharge and traumatic wound. However, there is no significant ($p > 0.05$) association between factors like regular cleaning, whipping, working at night and working in the bush and keratoconjunctivitis. In addition, most of the respondents (85.7%) do not regularly clean the eyes of their donkeys. From identified ocular problems, a higher proportion (13.5%) of ocular discharge was found followed by a traumatic wound (7.6%) and cataract (6.3%). In conclusion, ocular problems were major health problems in cart pulling donkeys in the study area. Hence, comprehensive awareness creation on welfare and health management of donkeys should be designed to improve these problems.

Keywords: Wolaita sodo; Cart donkey; Ocular discharge; Ocular problems**Introduction**

Equidae is the mammalian family comprising the single genus *Equus* consisting of domestic and feral horses, donkey, mule, and zebra [1-3]. Donkeys are an important farm animal species that descended from the African wild ass (*Equus africanus asinus*) and early-domesticated equines that have been around as long as mankind [4]. Donkeys have been used principally as working animals for at least 5000 years. Donkeys are adapted to dry and mountainous conditions with limited access to water and poor quality sparse vegetation [5,6].

An estimated 60% of the world's horse population and over 95% of all donkeys and mules are found in developing countries [7]. The world donkey population is estimated to about 44 million; half is found in Asia, just over 25% in Africa and the rest mainly found in Latin America. Over 32% (approximately 6.21 million donkeys) of African donkeys are resident in Ethiopia and 10% of the world population, which makes Ethiopia harboring the largest population of donkeys in Africa and the second largest donkey population in the world after China. In Ethiopia, the majority of donkeys are found in highland areas, even though they are widely distributed in all agro-ecological zones of the country widely distributed in the dry and mountainous areas [8,9].

The use of equines in Ethiopia for transportation will continue for the coming many years because of the rugged terrain characteristics inaccessible for modern road transportation facilities as well as the absence of well-developed modern transport networks. Hence farmers use alternative means like drought animals especially donkeys and mules to overcome transportation problems [10]. The low cost of

purchase and maintenance of donkeys, their relatively small size, ease of training and handling, highly effective digestive system and their ability to withstand thirst has endeared them to small scale farmers and the poor living in peri-urban, remote and hostile environments [5,11-13].

Cart donkeys play an important role in rural communities providing power and transport at low cost. They can be used for various agricultural operations including ploughing and transporting such as carrying water, building material, agricultural products, and people. The efficient use of working animals depends on how they are connected to the instrument they are pulling or the materials they are carrying and how well they have been trained and are managed [14]. According to different studies, working equidae have various roles in the communities of developing countries [15]. Donkey and Horse carts are a source of sustainable income for a significant number of Ethiopian families and provide affordable transportation services in many towns [16,17].

Ocular problems are a frequent problem in working equidae in developing countries. According to assessment on the welfare working equines in several countries by Pritchard et al. [7], 66.4% of horses had an ocular abnormality, and this was higher in donkeys (86.4%) and less common in mules (58.5%). The common ocular problems include mild ocular discharge, ocular abscess, corneal ulcer, keratoconjunctivitis, thelazia infestation and end-stage blindness [7]. Wounds and ocular injuries were the most frequently recorded health concerns in Gondar and ocular injuries due to ill-fitting blinkers and tack were reportedly common [2]. Besides, a survey on 250 cart horses was conducted and 21% had an ophthalmic condition with greater

than 60% of these involving the right eye and 5.4% of carthorses had ocular infections in the middle Rift Valley region of Ethiopia [18].

According to Donkey Sanctuary assessment, 5.4% of donkeys were suffered from ocular disease with the most common pathologies being medial canthal wounds due to habronemiasis and flystrike, conjunctivitis and corneal ulcers, scars and opacities generally attributed to trauma [1]. There are few published studies investigating ocular disease in the study area. Therefore, this study was conducted with the objective of assessing ocular problems and factors precipitating its occurrence.

Materials and Methods

Study area

The study was conducted from October 2018 to April 2019 on randomly selected cart pulling donkeys in Wolaita Sodo, in Southern Nations, Nationalities and People Regional State, Ethiopia.

Study animals

The study animals were donkeys kept by different peasant associations mainly for cart pulling purposes in Wolaita Sodo, Southern Regional State. Besides, the study includes donkeys of both sex, different age group, and used for cart pulling purposes that are common sources of transportation of goods, construction materials, farm products, and others.

Study design

A cross-sectional study was conducted from October 2018 to April 2019 to identify and assess the ocular problems of cart pulling donkeys. A total of 384 cart pulling donkeys were considered in the study from different clinics and fields located in Wolaita Sodo town.

Sample size determination and sampling technique

Perusal of different literatures and articles, there is no research work on the prevalence and risk factors of ocular problems in cart pulling donkeys in the study area. Hence, to determine the sample size, an expected prevalence of 50% was taken into consideration. Moreover, 95% Confidence Interval (CI) and 5% desired absolute precision was used to appreciate the significant difference. Thus, the Thrusfield [19] formula was used to determine the sample size:

$$n = Z^2 \times P (1-P)/d^2$$

Where n = the required sample size, Z = Confidence level (regular value=1.96),

P = expected prevalence (50%) and, d=desired absolute precision (0.05).

$$\text{Hence, } 1.96^2 \times 0.5 (1-0.5)/(0.05)^2=384$$

Accordingly, a total of 384 cart pulling donkeys have been selected and sampled randomly for the study in Wolaita Sodo town.

Study methodology and method of data collection

Observational assessment: An observational study was made to identify ocular problems in cart pulling donkey and data were collected by direct physical examination. Prior to the assessment, consent was obtained from the animal's owners by presenting the aim of the study. Information regarding general conditions such as knowledge of cart pulling donkey owners, history of eye disease such

as duration, problem with vision or pain, work type and condition of harnessing were properly recorded on data collection format. The donkeys were allowed to stand for 5-10 minutes after being held by head halter and collar before assessment began, without causing major disturbance to donkey routine work.

A bilateral ophthalmic examination was performed using pen-torch illumination and ophthalmoscope in clinic and field conditions. The presence of ocular discharge, ocular abscess, thelazia parasite, corneal ulceration, corneal scar, habronemiasis inflammatory eye, end-stage blindness, cataract, palpebral reflex, and pupillary light responses were recorded. Besides, fluorescein stain and topical anesthetics were applied to identify and confirm the case. Where necessary, appropriate treatment was given free of charge.

Questionnaire survey: A questionnaire survey was also administered simultaneously with observational study to indirectly assess the potential risk factors of the cart pulling donkeys by interviewing the donkey owners. For this reason, a semi-structured questionnaire was developed and randomly selected 384 cart Donkey owner were interviewed to assess the donkeys' management practices (feeding, watering, health care, housing practice, and harnessing), working nature (duration of working hours, work type, workload or weight burden) and donkey-owner relationship.

Data management and statistical analysis

All data collected from direct physical examination and questionnaire survey were entered into Microsoft Excel 2016 spreadsheets and analyzed using Stata version 13 statistical software. Descriptive statistics was made and differences in the prevalence of ocular problems within each risk factor were tested for significance through Pearson's Chi-square test at a probability level of 0.05. Statistically significant differences were considered at a P-value of less than 0.05.

Results

Observational assessment results

Overall proportion of ocular problems: According to the present study, ocular discharge was the highest (40.7%) prevailing problem followed by traumatic wound (17.6%) inflammation (14.2%), and cataract (13.1%) as compared to other ocular problems (Table 1).

Questionnaire survey results

Association of ocular discharge and potential risk factors: In the present study, 40.7% of cart donkeys were suffering from ocular discharge due to improper harnessing (harness touch). Besides, ocular discharge was also observed on 76.9% of thelazia infested cases, 20.3% of cataract cases, 90% of inflamed eye, 75.9% of traumatic wound and 42.2% of epizootic lymphangitis cases. Moreover, a statistically significant ($p < 0.05$) association was observed between ocular problems and ocular discharge. However, there is no significant ($p > 0.05$) association between working at night and cataract with ocular discharge (Table 2).

Occurrence of entropion and ectropion and its risk factors: According to the current study, factors such as whipping and harness touch were found to be the most important cause of entropion and ectropion than working at night. The current study revealed that most of the cart donkey owners (232/384) use whip during their working

Table 1: Proportion of different ocular problems in the study area.

Ocular problems	Proportion (%)
Entro and ectropion	3.7
Ocular discharge	40.7
Thelazia	3.4
Keratoconjunctivitis	2.3
Cataract	13.1
Inflammation	14.2
Corneal ulcer	1.1
Foreign body	3.9
Traumatic wound	17.6

Table 2: The proportion of ocular discharges with different risk factors.

Conditions	Number of respondents		Chi-square (X ²)	P-value
	Positive (n=384)	Ocular discharge N (%)		
Harness touch	27	11(40.7)	18.35	0
Thelazia	13	10(76.9)	46.17	0
Cataract	24	5(20.3)	1.16	0.281
Inflammatory eye	30	27(90)	162.49	0
Traumatic wound	29	22(75.9)	104.1	0
Work at night	36	2(5.6)	2.16	0.141
Epizootic lymphangitis	45	19(42.2)	35.81	0

Table 3: The association between entropion/ectropion of the eye with its risk factors.

Risk factor	Number of respondents (n=384)		Entropion/ectropion N(%)	Chi-square	P-value
	Yes	No			
Whipping	Yes	232	11(7.2)	9.24	0.002
	No	152	3(1.3)		
Harness touch	Yes	27	4(14.8)	10.31	0.001
	No	357	10(2.8)		
Work at night	Yes	36	1(2.8)	0.09	0.77
	No	348	13(3.7)		

time. Out of this, 7.2% of the donkeys were suffering from entropion and ectropion due to whip during their working time. In addition, 14.8% of the donkeys were suffering from entropion and ectropion due to harness touch during their working time even though most owners (357/384) use a proper harness for their cart pulling donkeys. The occurrence of entropion and ectropion is significantly associated ($p < 0.05$) with factors like whipping and harness touch. However, only 2.8% of the cart pulling donkeys that work at night were affected with entropion and ectropion and this was found statistical insignificant ($p > 0.05$) (Table 3).

Association of keratoconjunctivitis and potential risk factors:

In the present study, most of the donkey owners (329/384) were not cleaning the eyes of their cart donkeys routinely whereas (55/384) of donkey owners cleaned the eyes of their donkeys during body showering on a regular basis. Moreover, more cart donkeys (2.4%) that were not regularly cleaned were suffering from keratoconjunctivitis.

Table 4: The association between keratoconjunctivitis and its risk factors.

Risk factor	Number of respondents (n=384)		Keratoconjunctivitis N(%)	Chi-square	P-value
	Yes	No			
Regular cleaning	Yes	55	1(1.8)	0.08	0.96
	No	329	8(2.4)		
Whipping	Yes	152	3(1.9)	0.15	0.69
	No	232	6(2.6)		
Work at night	Yes	36	2(5.6)	1.79	0.18
	No	348	7(2.01)		
Work in bush	Yes	223	6(2.7)	0.28	0.59
	No	161	3(1.9)		

Additionally, cart pulling donkeys were suffering keratoconjunctivitis due to whipping (1.9%), working at night (5.6%) and working in the bush (2.7%) and were insignificantly ($p > 0.05$) related to keratoconjunctivitis (Table 4).

Discussion

This study provides additional evidence of the high frequency of ocular discharge in cart pulling donkeys; most of the cases encountered in this study had ocular problems due to different health and managerial problems, and some of the cases were found severe and irreversible. This represents a significant welfare problem in cart pulling donkeys in the study area.

There have been few studies as to the prevalence of ocular problems in cart donkeys with which to compare the results of the current findings. This study provides further evidence of the high frequency of ocular pathology in working equidae. Moreover, it had revealed eye problems as the most prevalent health problems of donkeys (40.7%) in Wolaita Sodo town. This finding was higher than Scantlebury et al. [20] who reported (23.5%) of the donkeys were affected by ocular problems in Ethiopia and also lower than reports of Hurn and Turner [21] in developed countries who reported 5-10% of ocular disorders. This variation in the current study and previous findings might be due to study design, sample size, and Spatio-temporal events. Besides, according to Scantlebury et al. [20], there were significantly more eye abnormalities in the right eye compared with the left one. The plausible reason was that the majorities of cart Donkey drivers were right-handed and were found to whip the Donkeys. Moreover, whipping was a physical trauma that injured the right eye, which predisposed to flies, dust particles and infectious agents.

The current study had shown that there was a significant association between whipping and prevalence of entropion and/or ectropion. Factors like whipping and harness touch could cause 22.6% of the probability of causing entropion and/or ectropion ($p\text{-value} < 0.05$) in cart Donkeys which predisposes to dust particles, flies, bacterial, viral and mycotic agents.

The present study revealed that Donkey owners' practice to manage ocular problems by using traditional remedies (3.7%) by using medicinal plants like ginger (zinjible), checho plant (local name), dagussa powder and olive tree leaf (weira kitel).

The results from this study suggested the prevalence of ocular

discharge was strongly associated with risk factors like harness touch, thelazia infestation, traumatic wound and epizootic lymphangitis due to the fact that they all induce ocular lesions and ophthalmitis. This was comparable with a study conducted by Scantlebury et al. [20] who stated that treatment had rarely been sought, and owners were often unaware of the presence of ocular abnormalities in their horses, there appears to be a lack of knowledge of the potential consequences of eye disease or a low perception of its importance. Prevalence varied by town and was more common in the right eye and in older animals. Further investigations are warranted to establish the etiology and determine risk factors for the major sight-threatening pathologies among working equine populations.

According to the current study, cart donkeys that have been used with improper blinkers were at greater risk of developing ocular problems like ocular discharge, inflammation and traumatic wound. This finding was comparable with Biffa and Woldemeskel [22], injuries in working equines have been caused by improper harness and saddle design.

Most of the respondents (85.68%) or (167/384) in this study were not regularly cleaning the eyes of their Donkeys. Few Donkeys in this study presented to the clinic because of ocular abnormality, and few had received any previous treatment in spite of the availability of low-cost treatment for cart Donkey owners/drivers accessing veterinary clinics which could be attributed to one of the following reasons. Owners may not recognize an abnormal eye or the signs of ocular pain. Furthermore, owners may recognize an abnormality but may be unaware of the importance of early treatment to prevent ongoing eye pathology and potential loss of the eyes. Other influential factors upon whether treatment is sought could include the prioritization of eye disease compared with other common diseases set within a context of practical, financial and social resources and pressures.

The results from this study suggest that most 232/384 (60.4%) of the respondents were not using whip during their working time which may be due to the availability of a rope fitted to the mouth to guide the cart Donkeys to go. Ocular discharge has the highest total percentage of occurrence (13.5%) followed by a traumatic wound (7.6%) and cataract (6.3%) when compared with other eye pathologies. The prevalence of eye abnormalities in this study is lower than that reported by Pritchard et al., [7] however, it is higher than many of the previous studies conducted on cart horses in Ethiopia, Ayele et al., [1]. The reason of variation might be due to recording procedures for cases presenting to the mobile clinic, or maybe influenced by season. Moreover, the reduction in reported prevalence of the current study might be due to the failure of cart Donkey owners to present their Donkeys with ocular disease in the present study areas where free treatment is unavailable and changed to a payment scheme.

Conclusion and Recommendations

This study demonstrated a high prevalence of ocular disease in this population and represents a significant welfare concern. Since treatment had rarely been sought, and owners were often unaware of the presence of ocular abnormalities in their Donkeys, there appears to be a lack of knowledge of the potential consequences of eye disease or a low perception of its importance. Further research is required to

understand the social and economic reasons for owner's recognition and perceptions of ocular health and disease, and the motivating and deterring factors behind seeking treatment. This would complement the establishment of educational strategies for improving ocular health. Prevalence varied and was more common in the right eye and in older animals. Further investigations are warranted to establish the etiology and determine risk factors for the major sight-threatening pathologies among working equine populations. In conclusion, further research should be conducted to elucidate the impacts and epidemiology of ocular pathology in cart pulling equines. Regular survey of cart Donkeys for ocular pathology is recommended for inclusion into routine management. Moreover, awareness creation should be adopted for those cart drivers as eye pathology is an obstacle for their job.

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