

Clinical Epidemiology and Principal Health Effects of Sarcoids in Donkeys of Central Ethiopia (Shoa)Tibebu Dejene¹, Ayele Gizachew^{1*} and Tadesse Birhanu²¹Addis Ababa University, College of Veterinary Medicine and Agriculture, P.O. Box 34, Bishoftu, Ethiopia²Selale University, College of Agriculture, Department of Animal Science, P.O. Box 245, Fitcha, Ethiopia*Corresponding author: equineexpert@gmail.com>

Abstract: A case study was carried out from November 2008 to May 2009 to determine the clinical appearance and impact of equine sarcoid in donkeys, and assess associated risk factors at selected districts of central Ethiopia. A total of 240 sarcoid cases were diagnosed at the donkey health and welfare project stationary and mobile clinics of the study areas. In this study, the sarcoids types were fibroblastic (42.5%), mixed (7.5%), nodular (17%), verrucous (19%) and occult (14%). Donkeys in age range of 3-6 years were more affected (60%) while those beyond 10 years were less affected (9.2%). The anatomical sites affected were limb and shoulder (24.2%), head and neck (53.8%), trunk and genital regions (22%). No marked sex predilection was observed (male 51% and female 49%). The effects of sarcoids observed on the animals were weight loss, secondary bacterial and larval complications of the mass, bleeding, epiphora, fly worry and fate of donkey being isolated by owners from companions for fear of transmission. Apparent blindness, difficulties in locomotion, urination, grazing, mastication and defecation were the most principal effects of sarcoids observed depending on the site of development of the mass. The study concluded that most and quite often the severe sarcoids encountered were those improperly interfered by traditional healers and owners. Thus, awareness creation of the community should be done in order to bring the sicken animals at clinic.

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Key Words: Central Ethiopia, Donkey, Equine, Sarcoid

1. Introduction

There are about 115.2 million domesticated Equids (Horses, Donkeys, and Mules) in the world of which 44.3 million are donkeys and 57.6 million are horses (FAO, 2003). The common donkey (*Equus asinus asinus*) was domesticated some 5000 years ago. These were thought to be originated from semi arid part of the world, but are now kept in variety of different environments (Pearson and Quassat, 2000). Ethiopia has the second largest number of donkeys in the world having 5.2 million donkey populations which constitutes nearly 40% of African donkey population. There is an increasing interest in the greater use of drought animals in many parts of the tropics. Most of this interest has been focused on cattle and buffalo. However, the tropics and subtropics have a total equine population of approximately 96 million (FAO, 2003).

Of these, approximately 40% are donkeys. The working donkeys has received little attention from planners, extension and research workers. One of the reasons for this may be lack of knowledge on many aspects of these animals (Fielding and Krause, 1998). The donkey has always been playing an important role in the rural and urban economy of both developed and developing countries. They are mainly used as an animal for packing, transportation, recreation, carting, threshing, farm cultivation and milk and meat provision for human consumption (Crane, 1997).

Donkeys are subjected to variety of health disorders like respiratory, musculoskeletal and dermatological problems (Fielding and Krause, 1998). Among the dermatological problems sarcoids are the most important skin disease in donkeys. Sarcoids have been defined as locally invasive, fibroblastic, non-metastatic and neoplastic tumors of the skin with variable epidermal components, which has a high propensity for recurrence, occurring in six clinically recognizable forms which are occult, verrucous, nodular (warty), fibroblastic, mixed and malevolent sarcoids (Pascoe and Knottenbelt, 1999).

The occult is usually manifesting itself as a ring of alopecia with slightly scaling or skin thickening. The changes due to occult sarcoids lesions are limited to the superficial epidermis with areas (often circular or almost circular) of alopecia with a grey, scaly surface. Verrucous sarcoids show an increased epidermal component, which may be small or very extensive. They are seldom localized, most having an ill-defined margin. These lesions are cauliflower (warty) in appearance. They can be local or diffuse, single or multiple. The lesions commonly produce large amounts of keratin and so have flat, grey or scab by appearance. Nodular sarcoid tumors are usually entirely subcutaneous, giving the appearance of spherical (marble sized, though can be smaller or larger) nodules under intact, apparently normal skin. The overlying skin is often apparently normal but

sometimes takes on a thinner, shiny appearance with a mass adherent to the skin (Marcanne and Knottenbelt, 2001).

Fibroblastic sarcoid tumors are the most aggressive type, having the appearance of a true neoplasm. The surface is usually ulcerated and is liable to trauma, hemorrhage and local infection. In some cases the extent of the tumor can be easily defined and may have a pedunculated nature. In others, the margins of the tumors are poorly defined and the mass has a sessile and invasive characters. Mixed type of sarcoid is assumed simply a mixture of one or more of other types in varying proportions (verrucous, occult and fibroblastic). Malevolent sarcoids are recently described one which show extensive infiltration of lymphatics (cords of tumor are commonly palpable) with numerous ulcerative nodules and surface involvement also the local lymph nodes can be enlarged (Pascoe and Knottenbelt, 1999).

Sarcoid lesions may be found on all areas of the body but are least common on the dorsum of the trunk (Goodrich *et al.*, 1998). There are controversial reports on the age group of equines affected by sarcoids. Marcanne and Knottenbelt, 2001 reported that 70% of sarcoids occur in horses of less than 4 years of age. Goodrich *et al.*, 1998 have concluded that there is no predilection for sex, age, breed and season of the year. Study carried in DHWP (Donkey Health and Welfare Project) clinic, Ethiopia indicated that sarcoid occurs more frequently at age of 3-6 years (Ayele *et al.*, 2007).

In Ethiopia, although few local reports indicated that sarcoid is one of the health problems of donkeys, the clear image on the overall sarcoid status is not clearly known. A clinical study done on equine sarcoids was focused only on donkeys presented to DHWP clinic at the Addis Ababa University, Faculty of Veterinary Medicine. Therefore, this would make the available information less powerful to give the correct clinical picture of the disease. The current study, aimed at representing the true clinical population of donkeys of Central Ethiopia could give a clear elucidation of the clinical epidemiological features of disease under the study sample.

2. Material And Methods

2.1 Study Area

The study was under taken from November 2008 to May 2009 in areas where DHWP operates. These sites are Akaki, Ada'a, Boset, and Dugda bora, Lume, Sebeta and Sendafa. These areas are known by their occupation of high equine population.

Ada'a and Akaki: These two regions are similar in geography and so are considered together. They are 45 and 20 km South of East of Addis Ababa,

9.02°8'N and 38.45°8' East, respectively. They are located in the central high land plateau at mid altitude on the escapement of the Great Rift Valley. Ada'a has an altitude of 1850m above sea level. It receive an annual rain fall of 1151.6mm with mean maximum and minimum temperatures of 30.7°C and 8.5°C respectively and a mean relative humidity of 61.3 % (NMSA, 2003). The donkey population is 46,222 (MOA, 2015).

Boset: It is located 130km east of Addis Ababa. The total land coverage is 124,106 hectares. The altitude range is 1200-2000m above sea level and annual rain fall range 550-570mm. The average daily maximum and minimum temperatures is 34°C and 28°C respectively (NMSA, 2016) and estimated to have about 37,181 donkeys (MOA, 2004).

Dugda Bora: It is located 124km South of Addis Ababa. The altitude range is 1600m-2020m and the annual rain fall is 750mm. The average daily minimum and maximum temperature are 22°C and 28°C respectively (NMSA, 2004). The total land coverage is 146,800 hectares. The donkey population is estimated to be 12,900 (MOA, 2015).

Sebeta: It is a capital city of Alemgena district (woreda) in West Shoa zone administration in Oromia regional state. The area has mid sub tropical whether "Woyna Dega" and high land temperate climate "Dega" accounting to 94% and 6% of the climate respectively. The mean annual and temperate rain fall ranges between 15°C -21°C and 800mm to 1199mm, respectively (Alemgena woreda regional agricultural office in formation, 1997). It is situated 25km south of Addis Ababa. The altitude of the area ranges from 1500 to 3000m and the total coverage of the area is 103,758 square kilometer. According to the information obtained from Veterinary section of the Alemgena woreda agricultural office report (1997), the total population of Equids in this woreda is estimated to be 12,337.

Sendafa: It is found in 44km to 66km north of Addis Ababa, which is located at 9°N and 39°E at an altitude of 2513m above sea level. Its monthly average temperature is 16°C and receives 985mm annual rain fall and relative humidity is 50.5% (NMSA, 2003). The total land coverage is 139,900 hectares and has a donkey population of 24,395 (MOA, 2015).

Lume: It is located in the rift valley at 8°35' N and 39°10' E and 70 km south east of Addis Ababa (EMPDA, 1984). The total area is 752.2 square kilometer. The climatic condition of the area includes, Highland (30%), mid highland (45%) and Lowland (25%) (LDSP, 2005). The minimum and maximum temperatures are 18 and 28 degree centigrade respectively. The rain fall distribution of the area is from 500mm-1200mm. The human population of the

area is 117,051 and their donkey population is 15,701. Donkeys have mainly engaged in carrying farm products and water.

2.2 Study Animals

The study animals were donkeys inhabiting six districts of Central Ethiopia. Study was done on donkeys that are present during the study time irrespective of age and sex.

2.3 Determination of Sample Size

All donkeys with complaint of tumor or tumor like growth were included during the study period the study areas where DHWP operating sites.

2.4 Study Methodology

For clinical epidemiology all donkeys presented to the stationary and mobile clinics of DHWP has been considered. Donkeys from different agro ecological zones were also sampled. Highland was represented by Sendafa and Sebeta, mid highland was represented by Ada'a and Akaki and lowland was represented by Boset and Dugda bora.

2.4.1 Clinical field observation

Up on field visit to the study area, field observation was made to identify donkey with clinical appearance of sarcoid and other cases resembling sarcoids. Here sarcoid was classified by its morphological characteristics and site of predilection to identify the type of sarcoids. Identification of types of sarcoid was made according to Pascoe and Knottenbelt (1999) identification clues.

2.4.2 Questionnaire survey

An attempt was made to assess the current status of sarcoid that are found in central Ethiopia using a semi structured questionnaire format. The

questionnaire was directly forwarded by interviewing owners presenting their donkeys to the sites (stationary and mobile clinics of DHWP) for deworming and treatment during the study period. The questionnaire was designed to include important points, as a result adequate information was collected on potential risk factors associated with equine sarcoids, duration of sarcoids, major clinical signs manifested by affected donkeys, drugs that are used for management of sarcoids and factors that may predispose the donkey for sarcoids and sarcoid associated diseases.

2.5 Statistical Analysis

All collected data was entered and analyzed using Statistical Package for Social Sciences (SPSS, 2003) version 20. Descriptive statistics procedures of SPSS were used to calculate percentages.

3. Results

3.1 Clinical Epidemiology

Two hundred forty cases of sarcoids and 25 sarcoid resembling masses were diagnosed during the study period. Sarcoid were evident in 122 male and 118 female donkeys, presented to the stationary and mobile clinics of DHWP, Central Ethiopia from November 2008 to May 2009. Five clinical types of sarcoids were diagnosed, such as fibroblastic (42.5%), mixed (7.5%), nodular (17%), verrucous (19%) and occult (14%) sarcoid (figure1). Cases which resemble sarcoid in clinical appearance include hyperkeratosis (12%), habronemiasis (16%), hernia (8%), chronic skin rubbing (24%), scar (28%) and dermatophytosis (12%).

Table 1: Type of Sarcoid related with work in central Ethiopia

Type	Age and Activities		Total
	>3years working donkeys	<3years non working donkeys	
Fibroblastic	83	19	102
Mixed	18	0	18
Nodular	1	0	1
Nodular	38	1	39
Nodular	1	0	1
Occult	32	2	34
Verrucose	38	7	45
Total	211	29	240

Table 2: Types of sarcoids and anatomical distribution in study area

Type	Site of Sarcoids			Total
	Head and Neck	Limb and Shoulder	Trunk and Genitalia	
Fibroblastic	58	14	30	102
Mixed	12	6	2	20
Nodular	16	11	12	39
Occult	17	14	3	34
Verrucose	26	8	11	45
Total	129	53	58	240

Table 3: Distribution of sarcoids in different district of central Ethiopia

District	Types of Sarcoids					Total
	Fibroblastic	Mixed	Nodular	Occult	Verrucose	
Adaa	66	10	30	20	29	155
Akaki	10	3	2	4	5	24
Boset	3	0	1	1	3	8
D/Bora	5	1	4	2	2	14
Lume	6	0	1	2	2	11
Sebeta	6	1	1	3	2	13
Sendafa	6	3	2	2	2	15
Total	102	18	41	34	45	240

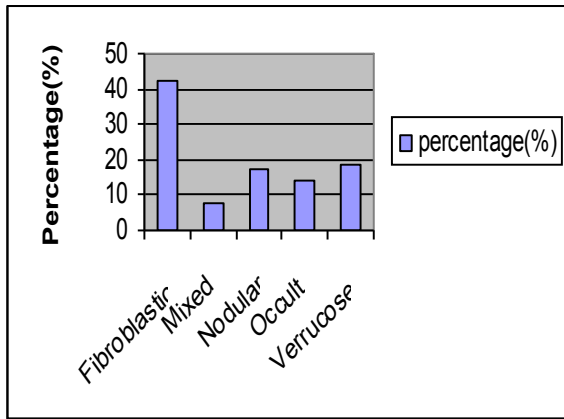


Figure 1: Overall percentage of sarcoid in the Central Ethiopia

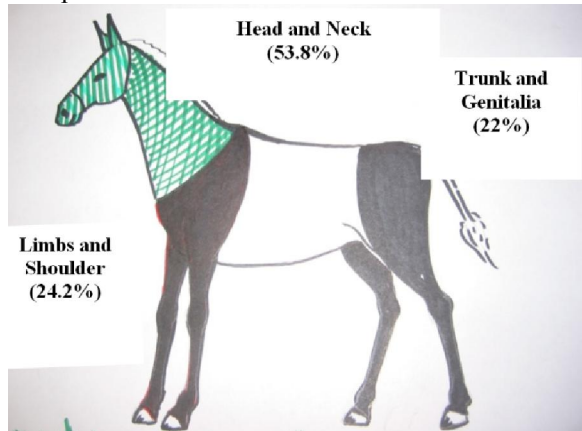


Figure 2: The anatomical distribution of sarcoid in donkeys

Twelve percent of sarcoids occurred in donkeys less than 3 years of age, 60% in between the ages of 3 – 6 years, 18.7% occurred at the age of greater 6 – 10 years and 9.2% occurred in donkeys at the age greater than 10 years. There was no statistically significant association ($p=0.064$) between sarcoids types and age (working and non-working age groups).

During the study sarcoids were most often present in the head and neck area (53.8 %), followed by trunk and genitalia (24.2%) and limb and shoulder

areas (22%) (Figure 2). There was statistically significant association ($p=0.015$) between types of sarcoids and anatomical sites (table 2). All types of sarcoids were diagnosed in all districts. The percentage of sarcoids diagnosed in each district was; Adaa 64.6%, Akaki 10%, Sebeta 5.4%, Sendafa 6.3%, Lume 4.6%, Boset 3.3% and Dugda bora 5.8% (Figure 3). There was no statistically significant association ($p=0.96$) between district and sarcoids types (Table 3). The principal effects of sarcoids observed on the animals were debilitation, secondary bacterial and larval complications of the mass (figure 4), bleeding, epiphora and fly worry. Apparent blindness, difficulties in defecation, locomotion, parturition, urination, grazing, and mastication were the most principal effects of sarcoids observed depending on the site of development of the mass (Figures 5-8).

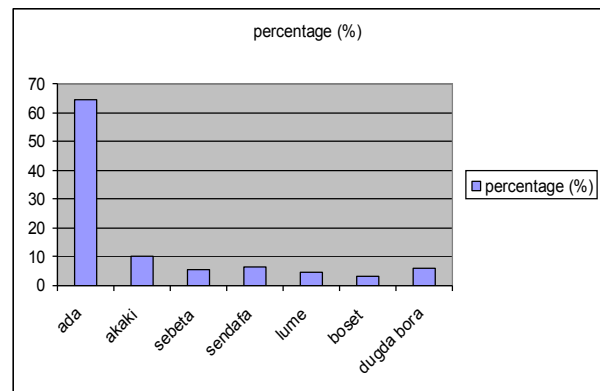


Figure 3: Sarcoid distribution in all districts of central Ethiopia

Five sarcoid cases were detected in sites with history of previous wound occurrence. History from the owners on the nature of the tumors indicated that the transition of the occult, verrucous and nodular sarcoids in to fibroblastic type. The sarcoids experience different kinds of growth patterns, some were static for long periods, most of the cases manifest moderate increment in size and there were also few cases with a rapid transformation to a large

size. According to the information from the owners, the rate of transition was faster for sarcoids grown on parts of the body exposed to harness and other work related injuries. The owners detected the sarcoids on their donkeys between 1 month and 6 years prior to presentation to the clinic. There was no gender predilection for the occurrence of clinical cases of sarcoids.



Figure 4: Complicated (abscessed) fibroblastic Sarcoid



Figure 5: Effect of fibroblastic sarcoid: apparent blindness

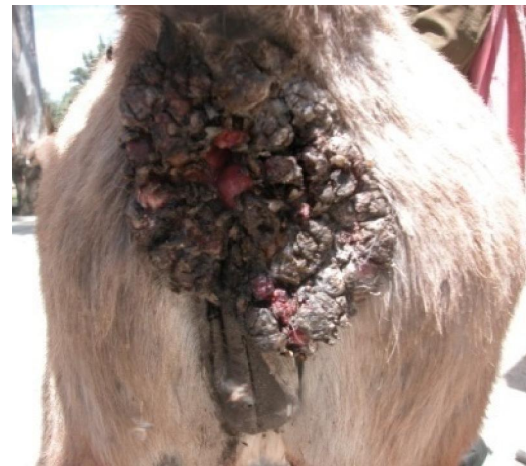


Figure 6: Effects of mixed Sarcoid that impaired defecation



Figure 7: Effect of fibroblastic Sarcoid: impaired locomotion



Figure 8: Effect of fibroblastic sarcoid: impaired urination.

The owners isolated the affected donkeys from its companions in fear of transmission of the disease and the bad smell developed after the tumors were complicated. Most and quite often the severe and complicated sarcoids encountered were those improperly treated by traditional healers and owners (Figure 9). The owners or traditional practitioners inhumanly restrain donkeys and cut the tumor with the objective of only removing or reducing a visible mass without considering its consequences. In addition to the traditional excisions with hot sharp metal, owners had practiced severing the dorsal aspect of tongue with sharp objects for the treatment of sarcoid grown on any part of the donkey. This practice resulted in difficulties in eating and local infections of tongue.



Figure 9: Large sessile fibroblastic sarcoid: after owner intervention

Discussion

In this study, five clinical types of sarcoids were diagnosed, such as fibroblastic (42.5%), mixed (7.5%), nodular (17%), verrucous (19%) and occult (14%). Cases which resemble sarcoid in clinical appearance includes hyperkeratosis (12%), habronemiasis (16%), hernia (8%), chronic skin rubbing (24%), scar (28%) and dermatophytosis (12%) were also diagnosed based on gross appearance. Teifke (1997) reported that fibroblastic types of sarcoids are most often diagnosed in horses. The higher percentage of fibroblastic type of sarcoids might be associated with the transition of the other forms of sarcoids to fibroblastic type following traumatic injuries (Pascoe and Knottenbelt, 1999).

There are controversial reports on the age group and sexes of equine affected by sarcoids. Epidemiological observations on sarcoids in a population of donkeys in the donkey sanctuary UK has indicated that the disease was most frequently occurred in younger, male donkeys in their first five years of age (Reid and Mohammed, 1997). Marcanne and Knottenbelt (2001) reported that 70% of sarcoids occur in equine less than four years of age. Goodrich *et al.* (1998) have concluded that there were no predilections for age, sex, breed color or season of the year. The present study has demonstrated that there were no specific preferences to sex (50.8% male and 49.2% female) and relatively higher risk of the disease in young donkeys in agreement with a study carried in the DHWP, Ethiopia which indicated that sarcoid occurs more frequently at age range of 3-6 years (Ayele *et al.*, 2007). Reid and Mohammed (1997) have indicated castration as the possible risk factor for the relative increased incidence of sarcoid in male donkeys. In the present study, there was no complaint

of castration by interviewed owners for the occurrence of sarcoid.

The present study reveals that sarcoids were most often present in the head and neck area (53.8%), followed by trunk and genitalia (24.2%) and limb and shoulder areas (22%). Discordance with Ayele *et al.* (2007) who have reported sarcoid predisposition most often on the limbs and shoulder (59.8%), followed by head and the neck (33.1%) and trunk including the male and female genitalia (7.1%) and the other researchers Reid *et al.* (1994) who has reported common observation of sarcoid around the paragenital area. The reasons for the differences observed between the present study and the others were due to the reasons that there were large numbers of donkeys considered during the present study. The other possible reason for the high occurrence of sarcoids in head and neck areas is the exposure frequency of these anatomical parts to different traumatic agents in the working environment of the donkeys. All the districts of the present study on the central Ethiopia have shown almost the same results on the frequency of predilection site of sarcoids.

Reid *et al.* (1994) reported that the main cause for the spread of sarcoids in donkeys was direct daily contact between affected animals assuming there is a transmissible agent. In the present study, reports of sarcoids following saddle sharing between diseased and healthy animals might further strength this hypothesis. There were no report from the interview about the transmission of sarcoid by direct contact, rather among the many cases which were diagnosed during the study period where there were many donkeys confined in one area having sarcoid infected donkey without any evidence of transmitting to other healthy donkeys. This might suggest that close contact between healthy and diseased donkeys is not the only factor for occurrence of sarcoids. Chamber *et al.* (2003) suggested that skin trauma, the immunological status and the genetic constitution of the individual animal play an important role for the occurrence of equine sarcoids.

The principal effects of sarcoids observed on the animals were weight loss, secondary bacterial and larval complications of the mass, bleeding, epiphora and fly nuisance. Apparent blindness, difficulties in locomotion, urination, grazing, mastication and defecation were the most principal effects of sarcoids observed depending on the site of development of the mass. The owners isolated the affected donkeys from its companions in fear of transmission of the disease and the bad smell developed after the tumors were complicated. Most and quite often the severe sarcoids encountered were improperly treated by traditional healers and owners. The owners or traditional healers use sharp metal to cut the mass with improper manual

restraining which favors autoinoculation of the disease. In addition, they don't take in to account the margin and depth of the mass which also facilitate the recurrence of the mass in more aggressive form. Pascoe and Knottenbelt (1999) have recommended that incomplete excision can precipitate rapid fibroblastic proliferation which can be difficult if not impossible to treat successfully. Sarcoid was also an economic problem for the owners who are dependent on their single donkey for their various daily income activities as the mass can cause loss of use of the donkeys.

Conclusion And Recommendations

The study concluded that sarcoids were diagnosed affecting the health and welfare of working donkeys in the study area. Equine sarcoid has been a clinical challenge for veterinarians and equine owners. It is also an economic problem for owners especially for those who are dependent only on the burdens of donkeys as a means of acquiring their income. The presence of the five types of sarcoids (occult, verrucous, fibroblastic, nodular and mixed) in the area causes a great deal of economic loss and disfunction of donkeys. Therefore; awareness enhancement should be undertaken to make donkey owners realize the consequences of faulty interference of sarcoid. Moreover, further epidemiological study under a true representative population should be carried out on the diagnosis and treatment measures of donkey sarcoids.

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