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Frequency Distribution of Equine Diseases in Three Metropolises of the Upper Punjab, Pakistan

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Abstract

We developed an inventory of the diseases of equines prevalent in three districts (Faisalabad, Sargodha and Lahore) of Punjab, Pakistan affecting the equine health and production. Survey was done with the help of Brooke Hospitals for Animals, Pakistan, located at the University of Agriculture, Faisalabad, Pakistan. Participatory epidemiological approach was used to collect information on a pre-designed quesntionnaire from urban and peri-urban areas of the study districts. A total of 450 equines including: 147 horses, 230 donkeys and 73 mules were subjected to clinical examination, blood examination and necropsy for the documentation of diseases/conditions of equines. A total of 53 diseases/conditions were documented in different species of equines in the study area. Internal parasites (32.2%) constituted the major category of ailments followed by wounds (26.9%), bacterial infections (20.4%), lameness (12.9%), miscellaneous (12.7%), gastrointestinal disorders (7.6%), bronchitis/cough (7.3%), allergic dermatitis (7.1%), external parasites (6.2%), colic (5.3%), eye problems (3.1%), hematuria (1.8%) and quidding (1.1%). Horses were most diversely affected (n=47/53) followed by donkeys (n=44/53) and mules (n=24/53). This information may serve as a guidline for planning an equine disease control programme in the targeted districts of the province.

Keywords: Equines; Upper Punjab; Epidemiology; Determinants; Diseases; Inventory; Pakistan

Introduction

Equines (horses, donkeys and mules) are raised primarily for draught and game purposes. As draught animals, equines play extremely important role in the daily livelihood of poor people. These animals are used for transportation of people, carriage and agricultural purposes. In Pakistan, horses are raised as companion animal, draught animal for transportation, riding and racing animal. Nevertheless, role of equines as working animals is more crucial both in urban and rural areas of Pakistan. Over 95% of all donkeys and mules and 60% of all horses are found in developing countries (Fielding, 1991), which are playing a pivotal role in economies of developing countries through provision of 75% of traction energy (US Congress, Office of Technology Assessment, 1988; Pearson *et al.*, 2005). Among equines, a wide spectrum of welfare issues is encountered, including limb disorders, skin lesions and malnutrition (Pritchard *et al.*, 2005). Health issues affecting welfare of animals include acute diseases and disorders that cause immediate suffering and long-term progressive conditions leading to chronic pain (Rousing *et al.*, 2001). Physically, body condition score is of particular relevance to equines (Carol and Huntingdon, 1988); for example, hoof horn quality (Zenker *et al.*, 1995) and skin turgor as an indicator of hydration status (Freeman *et al.*, 1999). A comprehensive study in the direction of body scoring in equines has been published by Pritchard *et al.* (2005), which is the largest assessment of the welfare of working equines to date. They established correlations between aggregated behaviour and health parameters of 4889 working equines assessed in Afghanistan, Egypt, India, Jordan and Pakistan which met the welfare indicators criteria of Rousing *et al.* (2001).

The equines are neglected animals compared with food animals despite their role in supporting poor people's economy especially in developing countries like Pakistan. Equine parasitism is one of the important menaces affecting their working capacity and may result in mortality (Urquhart *et al.*, 1996). For example, ticks, mites, lice, flies etc. cause irritation, weakness, emaciation, anemia, rough hair coat and disease transmission resulting in poor efficiency, stunted growth and even death of the animals (Kaufman *et al.*, 2006). Mortality in equines has been frequently reported due to strongyles, tapeworms, ascarids, trypanosomes and *Babesia spp.* (Soulsby, 1982; Urquhart *et al.*, 1996). Therefore, equine owners particularly those who have bet huge amounts in sports, cannot afford their animals to stay sick, unthrifty and debilitated due to parasites. This necessitates, besides other diseases, development of an inventory of the parasitic diseases of equines.

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Materials and Methods

Study Districts

Three metropolises of upper Punjab viz; Faisalabad, Lahore and Sargodha were included in the present survey. District Lahore is the capital of Punjab (second largest city of Pakistan after Karachi) while district Faisalabad is the third largest city (hub of textiles) of the country after Karachi and Lahore. District Sargodha is comparatively smaller city close to Faisalabad towards the north. It is also known as Pakistan's best citrus-producing area. It is an agricultural trade centre with various industries. The equine population of the three districts has been estimated as 24628 horses, 174994 donkeys and 7849 mules (Anonymous, 2006). The climate of the district can see extremes, with a summer maximum temperature 50°C (122°F) and a winter temperature of −1°C (30.2°F). From late June till August, the monsoon season starts, with heavy rainfall throughout the province. The use of equines in the three selected industrial districts of Punjab is frequent because these are the cheapest sources of carriage of industrial raw materials and products from and to the market. Fig. 1 shows physical map of Punjab province and the three study districts.

Selection of Animals

Stratified random sampling was used to select the areas from where the animals were screened. For representable distribution of the samples; map grid method was used for site selection. Nine sites of district Faisalabad viz; Sidhupura, Chak 79, Ahmad Nagar, Pansera, Chakera, Naitheri wala, Aziz Town, Karad Wala and Brooke Hospital For Animal Static Clinic, UAF; 9 sites of Sargodha viz; Noor colony, Chak 87, Chak 88 South, Chak 34, Fatima Jinnah Road, Farooq Colony, Makam e Hayat, Chak 88 North, and Saido wanan; and 6 sites of Lahore viz; Shahdra Town, Fazal Park, Raiwand, Badian, Sharakpur, and Thokar Niaz Baig entered in our survey. Animals of the selected regions were randomly selected and examined for any disease condition.

Convenient sampling method was used to screen a total of 450 equines including 230 donkeys, 140 horses, and 73 mules from the three districts.

Questionnaire-based Surveillance

The objectives of the epidemiological survey were to identify and quantify variations in the prevalence of equine diseases with respect to various determinants. To this end, a questionnaire containing dichotomous and multiple choice questions was prepared and refined through formal and informal testing (Thrusfield, 2007). The selected subjects were screened over a period of one year from January–December, 2011 for any diseased condition by the technically trained personnel of the University of Agriculture, Faisalabad, Pakistan in order to procure the required information. The questionnaire contained

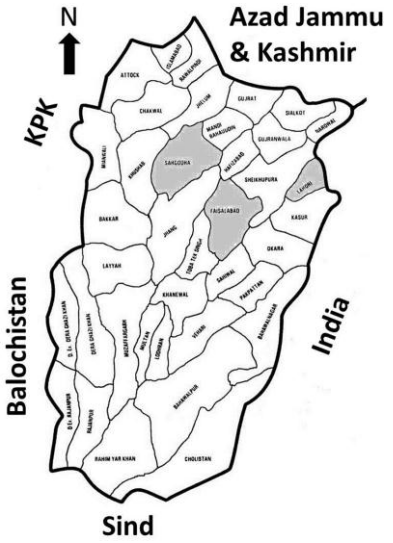

Fig. 1: Physical map of the Punjab province, Pakistan indicating districts Faisalabad, Sargodha and Lahore

information regarding species of the animal, age, breed/type and sex of animal, name and address of the owner and the health cover provided by the expert veterinarian of The Brooks. The animals were subjected to (a) clinical examination, (b) blood collection and examination, and (c) necropsy examination using following protocols.

Clinical Examination

Clinical examination started with the clinical history about the animal's health, husbandry, behavior etc. The questions about clinical history varied according to the problem for which the animal was presented, but normally included: Food in/food out i.e., appetite, any difficulty eating, regurgitation, appearance of faeces, presence of adult parasites in faeces, discharge from eyes or nose, coughing, wheezing or tiredness, breeding history, lameness or weakness during exercise, itching, rubbing or problems with skin, abnormal behavior (colic), eyes (discharge, conjunctiva, 3rd eyelid, cornea, globe, etc.), nostrils (color, consistency and amount of discharge), mouth (incisors, cheek teeth, oral cavity, etc.), submandibular lymph nodes, chest both sides (auscultation for heart and lungs), urogenital system (sheath or vulva, mammary glands – wounds, swelling, discharge, etc.), legs and feet (conformation, wounds, swelling, foot size and shape, shoe size and fitting, swelling, heat, pain, flex, joint stiffness, pain, feet, sole and frog), skin (checked head, chest, girth, saddle and upper areas for harness-related wounds, other wounds or swelling, alopecia, scaling, crusting, discharge) and ectoparasites (flies, ticks, mites, lice, etc.).

Blood Collection and Examination

Animals showing clinical signs, such as intermittent fever,

petechial haemorrhages on 3rd eyelid, swelling of mandibular lymph nodes, haematuria, anaemia etc., were selected for blood examination to detect blood protozoa. Blood examination of 66 equines including: 27 horses, 27 donkeys and 12 mules were conducted. The district-wise number of animals screened was 04, 05 and 18 horses, 05, 13 and 09 donkeys and 03, 04 and 05 mules in Faisalabad, Sargodha and Lahore, respectively.

Five mL blood was collected from the jugular vein and/or ear tips of equines with the help of sterile needle and syringe. The blood after collection was properly labeled with the name of owner, species of animals and date. Ice bags were used for the transport of the blood samples (Adam *et al.*, 1971) in anticoagulant tubes (BIO-VAC, Vacuum tube, EDTA) to the Department of Parasitology, University of Agriculture, Faisalabad (UAF). A thin blood smear was prepared from each blood sample, air dried, fixed in methanol for 2-3 min and stained with 5% Giemsa stain. Rinsing was performed in two changes of distilled water buffered to pH 7.2. Examination of the smears was done at 100x magnification with compound microscope by searching at least 50 fields per slide (Adam *et al*., 1971).

Necropsy Examination

The equines warranted for euthanasia (sick/injured/debilitated, surrendered, etc.) during the survey were used for the necropsy examination. A euthanasia consent form was completed and signed by the owner of every surrendered equine at a compensation rate of Rs. 2,000/animal. A total of six animals including two each of donkeys, horses and mules were necropsied at the Brooks Animal Hospital affiliated with the department of Clinical Medicine and Surgery, UAF using standard protocol. Briefly, animals were sedated with xylazine (0.5-1.1 mg/kg xylazine, i/v) followed by slow injection of thiopentone (1 g per 100 kg, i/v). When animal became unconscious, Magnesium sulphate was injected (rate??). Each organ of the animal was examined in an autopsy beginning with the digestive tract (Soulsby, 1982). Adult worms if found were collected, preserved in 10% formaline, properly labeled and brought to the department of Parasitology, UAF for taxonomic identification of the parasitic species using standard keys (Soulsby, 1982; Urquhart *et al.*, 1996; Tolliver, 2000). Adult parasites were placed directly on glass slide, covered with a cover slip and observed under microscope for mouth parts and other structures (Tolliver, 2000).

Collection of Ectoparasite Specimens

Flies on equines were easily detectable with naked eyes such as house fly, horse fly, mosquito and bot fly. Close examination of the skin of equines with magnifying lens helped in diagnosing myasis, ticks, lice, eggs of flies etc. Ticks were removed from the host by grasping them around the head with forceps, preserved them in 10% formalin solution and observed under stereoscopic microscope for the identification of species (Soulsby, 1982; Urquhart *et al.*, 1996; Bergvall, 2005). Skin scrapings were performed on suspected cases for mites. Animals showing clinical signs of mange were subjected to the skin scrapping protocol (Bhasker and Joseph, 1987). The skin scrapping of infected animals was taken with a sharp, clean and sterilized blade from the area of 2.5 cm^2 in a clean petri dish. The skin layers were scrapped until little blood oozed out. Later, wounds were dressed aseptically. Collected samples were placed in petri dish and treated with 10% acetic acid to clear the mites before examination under microscope.

Statistical Analysis

The diversity of diseases was analysed using percentage. SAS package (2010) was used to make species-wise and district-wise comparison of disease distribution through analysis of variance (Schork and Remington, 2010).

Results

A total of 53 diseases/conditions were documented in different species of equines in the study area. Table 1 explains the diversity of different diseases found in the study animals. The frequency of internal parasitism was found highest (32.2%), followed in order by wounds (26.9%), bacterial infections (20.4%), lameness (12.9%), miscellaneous (12.7%), gastrointestinal disorders (7.6%), bronchitis/cough (7.3%), allergic dermatitis (7.1%), external parasites (6.2%), colic (5.3%), eye problems (3.1%), hematuria (1.8%) and quidding (1.1%). Ranking of different diseases/conditions in the study metropolises have been shown in Fig. 2 which indicates a descending trend from abrasions to azoturia.

Among internal parasites, *Oxyuris (O.) equi* was recorded in maximum number of equines (n=40/450) followed by *Parascaris (P.) equorum* (n=36/450), *Trypanosoma (T.) evansi* (n=35/450), *Strongylus (S.) vulgaris* (n=12/450), *Theileria (T.) equii*, and/or *Babesia (B.) caballi* (n=11/450), *Habronema (H.) muscae* (n=05/450), *Setaria (St) equina* (n=04/450), *Cyathostomum (C.) catinatum* (n=04/450) and *Cylicocyclus (Cy.) nassatus* (n=02/450). Among ectoparasites, ticks were recorded from majority (n=18/450) of the equines followed by mites (n=07/450) and *Gastrophilus (G.) nasalis* (n=03/450).

Distribution and ranking of different diseases/ conditions in equines of the three metropolises has been summarized in Table 2. Interestingly, the bacterial diseases/conditions documented in the current study were few and mainly caused by infectious contaminants or food-borne pathogens. These diseases/conditions pertain to the hygienic/sanitary measures, animal husbandry practices, nutritional status, metabolic efficiency and general management of the animals. The number of diseases/conditions affecting different species of equines in various metropolises was significantly higher ($P<0.05$) in

Table 1: Inventory of the diseases/ conditions of equines documented from metropolises of Faisalabad, Sargodha and Lahore, Punjab, Pakistan

Disease/condition	Frequency	Faisalabad	Sargodha	Lahore
Category 1: Internal parasites	32.2% (n=145/450)	28.7% (n=43/150)	34% (n=51/150)	34% (n=51/150)
1. *Cylicocyclus nassatus*	02	02	-	-
2. *Cyathostomum catinatum*	04	02	01	01
3. Setaria equina	04	04	-	-
4. Habronema muscae	05	-	02	03
5. Piroplasmosis (*Theileria equii, Babesia caballi*)	11	04	04	03
6. Strongylus vulgaris	12	02	05	05
7. Trypanosoma evansi	31	04	12	15
8. Parascaris equorum	36	10	09	17
9. Oxyuris equi	40	15	18	07
Category 2: Wounds	26.9% (n=121/450)	33.3% (n=50/150)	23.3% (n=35/150)	24.0% (n=36/150)
10. Girth gall	01		01	-
11. Rope gall	01	-	01	-
12. Lip lesion	02	01	01	-
13. Contusion	06	03	01	02
14. Breast gall	23	13	06	04
15. Saddle gall	28	15	06	07
16. Abrasions	60	18	19	23
Category 3: Bacterial infection	20.4% (n=92/450)	18.7% (n=28/150)	19.3% (n=29/150)	16.7% (n=25/150)
17. Strangles	27	08	10	09
18. Salmonella diarrhoea	36	12	09	15
19. *Escherichia coli* diarrhoea	27	06	10	11
20. Tetanus	02	02	-	-
Category 4: Lameness	12.9% (n=58/450)	12.0% (n=18/150)	13.3% (n=20/150)	13.3% (n=20/150)
21. Hind leg paralysis	01	-	01	-
22. Hoof crack	04	01	01	02
23. Ankylosis	04	02	-	02
24. Coronitis	06	02	02	02
25. Sprain fetlock	07	03	02	02
26. Bone spavin	08	02	04	02
27. Sprain shoulder	09	02	02	05
28. Foot puncture	12	04	03	05
29. Miscellaneous	07	02	05	-
Category 5: Miscellaneous	12.7% (n=57/450)	12.7% (n=19/150)	15.3% (n=23/150)	10% (n=15/150)
30. Muscular pain	12	03	03	06
31. Debility	28	06	14	08
32. Heat stress	10	05	04	01
33. Insect/pesticide toxicity	07	05	02	-
Category 6: Gastrointestinal disorders	7.6% (n=34/450)	2.7% (n=04/150)	7.3% (n=11/150)	12.7% (n=19/150)
34. Anorexia	23	04	08	11
35. Diarrhea	05	-	02	03
36. Indigestion	06	-	01	05
Category 7: Respiratory problem	7.3% (n=33/450)	8% (n=12/150)	7.3% (n=11/150)	6.7% (n=10/150)
37. Bronchitis	33	12	11	10
Category 8: Skin problem	7.1% (n=32/450)	8% (n=12/150)	5.3% (n=08/150)	8% (n=12/150)
38. Allergic dermatitis	32	12	08	12
Category 9: External parasites	6.2% (n=28/450)	4% (n=06/150)	9.3% (n=14/150)	5.3% (n=08/150)
39. Gasterophilus nasalis	03	01	02	-
40. Ticks	18	04	08	06
41. Mange	07	01	04	02
Category 10: Colic	5.3% (n=24/450)	6.0% (n=09/150)	3.3% (n=05/150)	6.7% (n=10/150)
42. Urine retention colic	05	01	02	02
43. Colic due to impaction	08	05	01	02
44. Colic due to flatus	11	03	02	06
Category 11: Eye problems	3.1% (n=14/450)	4.7% (n=07/150)	1.3% (n=02/150)	3.3% (n=05/150)
45. Conjunctivitis	07	03	01	03
46. Excessive lacrymation due to *"Bursati"*	03	02	01	-
47. Corneal opacity	02	01	-	01
48. Uveitis	02	01	-	01
Category 12: Hematuria	1.8% (n=08/450)	2.7% (n=04/150)	1.3% (n=02/150)	1.3% (n=02/150)
49. Azaturia	01	01	-	-
50. Monday morning disease	02	01	01	-
51. Muscular exertion	03	01	01	01
52. Phosphorus deficiency	02	01	-	01
Category 13: Dental problem	1.1% (n=05/450)	0.7% (n=01/150)	1.3% (n=02/150)	1.3% (n=02/150)
53. Quidding	05	01	02	02

Note: There are 651 total entries for different diseases/conditions in 450 animals indicating that 44.7% of animals had more than one disease/condition [*Gasterophilus nasalis* (stomach), *Habronema muscae* (intestine), *Setaria equina* (liver), *Cyathostomum catinatum* (intestine), *Cylococyclus nassatus* (intestine) were recovered in autopsy of equines]

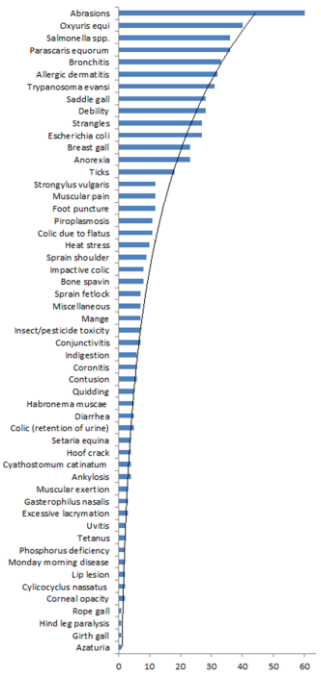

Fig. 2: Ranking of different diseases/conditions (n=53) of equines in the three metropolises of upper Punjab, Pakistan

horses and donkeys compared with mules. The diversity of diseases was also least in the mule population as 29 of the total (n=53) diseases/conditions were not recorded from mules; whereas, 09 and 06 diseases/conditions were not recorded from donkeys and horses, respectively. The quantitative frequency as well as diversity of diseases were insignificantly (P>0.05) different between horses and donkeys.

In horses, maximum (67.9%) of the total diseases/conditions were prevalent in Faisalabad; whereas an equal percentage (62.3%) was recorded in Sargodha and Lahore. Donkeys were most diversely (64.2%) affected in Faisalabad followed by Sargodha (60.4%) and Lahore (58.5%); whereas, mules were most diversely (28.3%) affected in Sargodha followed by Lahore (24.5%) and Faisalabad (22.6%).

The common diseases prevalent in all the three study species of equines included: abrasions, allergic dermatitis, anorexia, bone spavin, breast gall, bronchitis, colic due to flatus, contusion, coronitis, debility, hoof crack, muscular pain, saddle gall, *Escherichia (E.) coli*, *O. equi*, *P. equorum*, *Salmonella spp.*, *T. evansi* and ticks. The 19 common of the total 53 diseases/conditions in horses and donkeys were: ankylosis, conjunctivitis, diarrhea, foot puncture, heat stress, impactive colic, indigestion, insect/pesticide toxicity, mange, phosphorus deficiency, piroplasmosis, quidding, sprain fetlock, sprain shoulder, strangles, uveitis, *S. vulgaris* *C. catinatum* and *Cy. nassatus*. Corneal opacity and excessive lacrymation were not documented from donkey but present both in horses and mules. Muscular exertion was documented both from donkeys and mules not from horses. Corneal opacity and excessive lacrymation were not documented from donkey but present both in horses and mules. Colic due to retention of urine, *G. nasalis*, *H. muscae*, lip lesion, Monday morning disease and tetanus were only documented from horses. Azoturia, girth gall, hind leg paralysis and *St. equina* were documented only from donkeys. Rope gall was documented from mules only.

Table 2: District wise frequency and ranking of different diseases/conditions of equines

Disease/condition	Faisalabad	Sargodha	Lahore	RF	RS	RL
Internal parasites	28.7	34.0	34.0	2	1	1
Wounds	33.3	23.3	24.0	1	2	2
Bacterial infections	18.7	19.3	16.7	3	3	3
Lameness	12.0	13.3	13.3	5	5	4
Miscellaneous	12.7	15.3	10.0	4	4	6
Gastrointestinal disorders	2.7	7.3	12.7	9	7	5
Bronchitis/cough	8.0	7.3	6.7	6	7	8
Skin problem	8.0	5.3	8.0	6	8	7
External parasites	4.0	9.3	5.3	8	6	9
Colic	6.0	3.3	6.7	7	9	8
Eye problems	4.7	1.3	3.3	8	10	10
Hematuria	2.7	1.3	1.3	9	10	11
Quidding	0.7	1.3	1.3	10	10	11

RF= Ranking at Faisalabad; RS= Ranking at Sargodha; RL= Ranking at Lahore

Table 3: Ratios indicating number of diseases/conditions per animal in horses, donkeys and mules in districts of Faisalabad, Sargodha and Lahore

Species of equine	Faisalabad	Sargodha	Lahore	Total
Horses	1:1.85 (87/47)	1:2.63 (84/32)	1:1.54 (105/68)	1:1.88 (276/147)
Donkeys	1:1.34 (98/73)	1:1.15 (102/89)	1:1.49 (101/68)	1:1.31 (301/230)
Mules	1:0.93 (28/30)	1:0.93 (27/29)	1:1.36 (19/14)	1:1.01 (74/73)
Total	1:1.42 (213/150)	1:1.42 (213/150)	1:1.5 (225/150)	1:1.45 (651/450)

Note: Figures in parenthesis indicate number of animals examined/total number of entries of different diseases/conditions

It is evident from Table 3 that highest number of diseases/conditions (1:1.5) per animal was recorded from Lahore; whereas, Faisalabad and Sargodha had similar ratio. Within districts, however, highest number of diseases/conditions was recorded for horses followed in descending order by donkeys and mules in all the three districts included in the study. Horses were most affected in Sargodha (1:2.63) followed by Faisalabad (1:1.85) and Lahore (1:1.54); whereas, donkeys were most affected in Lahore (1:1.49) followed by Faisalabad (1:1.34) and Sargodha (1:1.15). Mules were more affected in Lahore (1:1.36); whereas, horses and donkeys were equally affected in Faisalabad and Sargodha (1:0.93).

Discussion

The parasitic conditions documented in the current study are not new to science but, as far as could be ascertained, are new record from Pakistan except *P. equorum* (Khan *et al.,* 2010) and *T. evansi* (Waheed *et al.,* 1998; Jahanzaib, 2005; Nadeem *et al.,* 2011). Prevalence of above reported parasitic diseases has wide variation among different species of equines in different parts of world (e.g., Lyons *et al.,* 2000; Ayele *et al.,* 2006; Nielsen *et al.,* 2006; Kornas *et al.,* 2009; Getachew *et al.,* 2010; Charlotte *et al.,* 2010; Abdullah *et al.,* 2011).

Parascariosis has been observed worldwide (Lyons *et al.,* 2006; Ayele *et al.,* 2006; Khan *et al.,* 2010). Habronemosis in equines has a global distribution and is found in many countries of Asia, Africa, Australia and the Americas (Collobert-Laugier, 2000; Naem, 2007; Yarmut *et al.,* 2008; Schuster *et al.,* 2010). *St. equina*, a vector-borne filarial nematode, is causing a relatively benign infection of equines in which the adult worms reside in the peritoneal cavity. *Setaria spp.* in their normal site is harmless and can be discovered at necropsy. Infection with the adult worms is only accidently discovered in the living animal by finding the microfilariae in routine blood smears (Yeargan *et al.,* 2009). The prevalence is higher in warm countries, where there is longer seasonal activity of the mosquito vectors (Urquhart *et al.,* 1996). Equine piroplasmosis, caused by *T. equi* and *B. caballi*, is tick-borne haemoprotozoan disease, with a worldwide economic impact on the equine industry. It is characterized by fever, anemia, jaundice, and edema. In some cases, it causes death (DeWaal, 1992). *Trypanosoma evansi* is mechanically transmitted by biting flies such as tabanids and stomoxys and also by vampire bats in South America.

Mules were least affected animals compared with horses and donkeys, which may be attributed to the nature of their employment, the level of education/awareness of the owners, accessibility to the health coverage programmes, population density, mechanization, climatic conditions of the area, resilience level, animal husbandry practices, etc. The human population density, mechanization, climatic conditions of the area and animal husbandry practices did not apparently affect the number of diseases/conditions of different species of equines.

A mule is not a genus, specie or breed, but a hybrid offspring of a donkey (*Equus asinus*) and a horse (*E. caballus*). Mules are sure-footed and sturdy animals. They can live longer than horses. They are generally known as less stubborn, faster and smarter than donkeys (Sonmez, 1973). Cross of horse and donkey; therefore, may have resulted in increased resilience in mules, which might have attributed to low number of diseases/conditions in this animal. The differences in the nature of wounds/injuries among different species of equines are due to their nature and extent of involvement in the employment. In developing countries like Pakistan, equines are mostly used as working animals, often carrying out tasks under harsh and impoverished conditions for longer period. Consequently, they have many physical and clinical problems such as: wounds, poor body condition, dental problems and lameness (Burn *et al.,* 2010).

Colic, diarrhea, indigestion, internal and external parasitism leads to debility and lower the working capacity of equines (Kaufman *et al.,* 2006). Ninety percent of all the colic may be related to the damage of blood vessels caused by migrating larvae of *S. vulgaris* (Hudson *et al.,* 2009). Cyathostomes (small strongyles) are the principle pathogenic parasites of equines. They are frequently responsible not only for ill-thrift, but also for gastro-intestinal dysfunctions including colic and the potentially fatal condition of acute larval cyathostomosis (Love *et al.,* 1999).

A variety of factors like age, sex and breed of the host, grazing habits, level of education and economic capacity of the farmers and standard of management (Asanji and Williams, 1987; Pal and Qayyum, 1992; Maqsood *et al.,* 1996), weather conditions (Urquhart *et al.,* 1996) and in case of vector borne diseases, to the vector population dependent on microclimate, animal herd density, distance between herds, etc. (Foil, 1996) contribute to the parasite epidemiology in the small ruminant livestock population. However, as far as could be ascertained, statistical correlation (if any) of these factors has not yet been investigated in the equine population.

Working equines may be unresponsive due to disease, exhaustion, over-stimulation by a crowded and noisy city environment or to avoid soliciting harsh handling leading to serious injuries. Animals displaying fear behavior are often exposed to adverse handling procedures because they react inappropriately to handling (Rousing *et al.,* 2001). Though at a limited scale, findings of the present study were quite similar to those of Pritchard *et al.* (2005). They have also demonstrated a high prevalence of abnormalities of teeth, eyes and limbs in horses, donkeys and mules. Quidding and/or other dental abnormalities are attributed to inadequate dental rasping in most working equines due to sparse availability, cost or quality of veterinary services and lack of knowledge on behalf of owners. Eye abnormalities

seen ranged from mild discharge to signs of ocular pain, keratitis, uveitis and blindness. Assuming that the clinical indicators of dehydration are equally appropriate across all three species of equines, it was surprising that donkeys, which are adapted to arid environments and conserve body water in conditions of water deprivation (Yousef, 1991), had higher prevalence of heat stress as indicated by dehydration; whereas, this condition was not recorded from mules.

The lip lesions were due to a bit that was used for steering and braking leading to lesions at the commissures. The cause of lesions on the body has not been entirely understood in some cases, although the site of some lesions is likely to be related to the type and position of the girth, breast strap and saddle. Draught animals may also be more likely to fall on roads at high speed than those doing other types of work, causing lesions on the cranial aspect of the carpus. Debility was one of the common conditions documented in this study, which is an indicator of reduced body fat (Henneke *et al.*, 1983); consequently, thin animals may have less natural padding protecting them from pressure, friction and shear lesions caused by harness, and thus more chances of getting injuries.

Findings of this study may help in welfare of working equines by making crucial decisions on management interventions based on the inventory of diseases/conditions. The differences in the prevalence of each disease/condition between species and across work types may allow interventions to be targeted at specific problems in specific groups of animals (Pritchard *et al.*, 2005). Based on the findings of our study, it may be concluded that working equines in the study area have been found to suffer from a variety of ailments mainly the parasites, wounds and bacterial diseases. It has been observed that many of the diseases/conditions suggest poor animal husbandry practices. The respondents in the current study were the equine farmers and disease profile might be developed from amongst the complainting equines; which makes this kind of study less random. It is therefore, recommended that a wide-scaled epidemiological investigation must be carried out based truly on randomization priciples to better understand the disease picture of the equine population. However, results of the present study should be shared with the equine owners and education/training programms on best equine husbandry practices be carried out.

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