Review on Common Ophthalmic Problems of Equines

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Abstract: Equidae is the mammalian family comprising the single genus equus consisting of domestic and feral horse, donkey, mule and zebra. An estimated 60 percent of the world's horse population and over 95 per cent of all donkeys and mules are found in developing countries. These equidae are suffering from different diseases. Among the diseases affecting equine, ocular disease is very common. Ocular disease is a frequent problem in working equidae in developing countries. One of the most common eye conditions seen in equine, especially during the summer months, is conjunctivitis. Equine corneal ulceration is also common in horses and it is a sight-threatening disease requiring early Clinical diagnosis, laboratory confirmation, and appropriate medical and surgical therapy. Ocular manifestations of leptospirosis appear in the form of equine recurrent uveitis. Toxoplasma Gondi is a protozoan parasite that can infect horses although clinical disease is rare. Equine herpes viruses have been repeatedly isolated from eyes of horses suffering from certain forms of keratitis or kerato-conjunctivitis. Although they are the viruses most often considered as being the causative agent of corneal disease; adenoviruses, and other viruses have also been incriminated. Trauma is a relatively common cause of eye disease in the equine and the cornea is the most common location for eye injuries. A wide variety of tumors have been identified in the orbit ofequine. Tumors in the orbit itself are a serious diagnostic and therapeutic challenge. There are few published studies investigating ocular disease in Ethiopian horses. Wounds and ocular injuries were the most frequently recorded health concerns. It is very important to understand how the eye functions and the importance of good husbandry. Advising the owner on early recognition of ocular changes and good eye management is an important responsibility as a veterinarian.

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1. Introduction

Equidae is the mammalian family comprising the single genus equus consisting of domestic and feral horse, donkey, mule and zebra (Bradley, 1981). The equine population of the world is reported to be 122.4 million with 40 million donkeys, 15 million mules and 43.3 million horses. An estimated 110 million equine lives in developing world, with highest population concentration in central Asia and north and east Africa (FAO, 2008). An estimated 60 percent of the world's horse population and over95 per cent of all donkeys and mules are found in developing countries (Pritchard*et al*., 2005). The number of equine in Africa is in range of 17.6 million comprising 11.6 million donkeys, 2.3 million mule and 3.7 million horses (Starkey, 1997).

Ethiopia possesses approximately half of Africa's equine population; according to UN Food and Agriculture Organization. There are over 7 million donkeys, mules and horses in Ethiopia, including 1.9 million horses (Anon, 2010). In urban towns in Ethiopia, horse-drawn taxi carts are a source of sustainable income for a significant number of Ethiopian families (Dinka *et al*.,2006), and provide the only affordable transportation service in many towns (Ameni,2006).

The equine eye is an immune privileged site in the same way as the nervous system. The mammalian eye has adapted the intraocular immune effect or mechanism to limit the intensity and extent of the local response to antigen challenge. This situation of immunological tolerance is fundamental to the integrity of the healthy eye (Gelatt, 2007). Intraocular immune privilege is determined by a number of mechanisms, including the blood-ocular barrier, the absence of lymphatic drainage in the eye, immune inhibitory cytokines in the ocular fluids and the phenomenon of anterior chamber associated immune deviation. These mechanisms function to protect sensitive intraocular tissues from the effects of uncontrolled T cell driven inflammation, and their impairment exposes the uvea to the possibility of immune mediated insult. The mechanisms by which immune tolerance is broken and inflammatory disease arises are unresolved (Barnett *et al*., 2004).

Equines are suffering from different diseases. Among the diseases affecting them, ocular disease is very common. Ocular disease is a frequent problem in

working equidae in developing countries. An assessment of the welfare of 4889 working equines carried out in several countries estimated that 66.4 per cent of horses had an ocular abnormality, and this was higher in donkeys (86.4 per cent). The eye abnormalities included; conjunctivitis, uveitis, corneal ulceration, keratoconjunctivitis, orbital tumor, physical trauma and blindness (Pritchard *et al*., 2005). Ocular diseases often have an impact on the performance of equine. Signs of a vision problem include clumsy behavior and self-trauma; equine resistant to move from one place to another, and this may be especially prominent when moving from a lighted area to a dark one; they may shy away or spook easily and occasionally have head shaking behaviors. There may also be a change in herd behavior; equines are herd animals that use visual cues to establish dominance order within a group. Animals with vision problems may be bullied by more dominant individuals (Lynne Sandmeyer, 2017).

Therefore the objective of this seminar paper is to touch on a few of the most common types of ocular diseases in population of equine.

2. Eye Anatomy and Physiology of Equine.

The equine eye is among the largest, and held by some to be the largest, in terms of absolute dimensions, of any terrestrial mammal. Leaving aside the aesthetic appeal this gives the horse, it suggests that the horse relies heavily on visual information about its environment. With large retinae and a relative image magnification that is 50% greater than that of humans (Roberts SM, 1992). The horse's eyes allow it to visualize a wide panorama of the horizon and also the area ahead where feet will be placed and fodder will be selected. As a herbivorous flight animal, the horse has good distance vision, allowing it to scan widely for danger and, despite being relatively poor at accommodation, with a vertical field of 178°,4 is able to visualize the ground immediately ahead while grazing (knill LM, 1977).

Equine eyes are designed to detect motion and act as an 'early-warning system' for predators. They have a wide range of vision, greater than 350 degrees due to the positioning of the eyes on the sides of the head with only two 'blind' spots; right in front of the head and right behind the tail (Hanggi and Ingersoll, 2012). This allows them to see approaching predators even when their heads are lowered for grazing, initiating the 'flight' response if necessary. The horse retina is adapted for detection of movement because it contains significant numbers of large-diameter ganglion cell (Brooks DE, Blocker TL, et al., 1995).

The equine eye is the largest eye of all terrestrial mammals. Approximate globe dimensions are 42 to 44 mm from the anterior to posterior axis, 45 to 50 mm vertically and 50 to 54 mm horizontally. The globe is composed of three basic layers: the fibrous tunic (the cornea and sclera) that give the eye a constant shape and form; the uvea (the choroid, iris and ciliary body) that modify both external and internal light, provide nourishment and remove waste; and the inner nervous coat (the retina and optic nerve). The three tunics contain the inner transparent media of the eye: aqueous humor, lens and vitreous humor which function to transmit and refract light and keep the globe distended. The iris divides the globe into an anterior and a posterior chamber, which communicate through the pupil (Gilger, 2005).

2.1. Pupil

The pupil is the black space in the middle of the eye. The pupillary light reflex/response (PLR) – a reduction in pupil size when light is shone on the eye – indicates whether the nerve pathways (retina, cranial nerves II and III) are working correctly. As light is shone in one eye there is a consensual response in the opposite eye where the pupil also constricts slightly. The pupil can look distorted if there is neoplasia or scarring of the ciliary body preventing normal movement of the iris. During the inflammatory processes which occur with intraocular disease, adhesions can form between the iris and other structures; these are known as synechiae and are permanent (Dwyer, 2012).

2.2. Lachrymal system

The naso-lacrimal duct runs from a small hole in the medial corner of the eye and exits from the nose. It is this duct which allows fluorescein dye solution to exit from the nose when placed in the eye to examine for corneal ulceration. Dye should pass within a minute, but allow up to 5 minutes. Blockage of the puncta either from dirt, dust, Habronema infection or swellings, causes tears to build up and watering of the eye which results in further dust accumulation potentially leading to conjunctivitis and even more severe ocular pathology (Ramsey, 2003).

2.3. Nictitating membrane (third eyelid)

Gently pressing the upper eyelid onto the globe to cause eversion of the third eyelid. It can be assessed for tumors, or granulation tissue from Habronema infection. The ventral fornix can be inspected for foreign bodies by pulling the third eyelid out gently with soft-end forceps and looking into the space (Herring, 2003).

3. Equine Eye Problems.

Eye problems are common in equine. Since equines have only two eyes, damage to one of them can be very serious. Although there are many conditions that can affect the equine eye, the most common are conjunctivitis, corneal ulceration uveitis, orbital tumor and trauma. Other disorders such as

lacerations of the eyelids and allergies can also have negative effects on the eye or vision and require prompt treatment (Thangadurai, R., S. Srikant *et al.,* 2010).

Because of their speed and tendency to move their heads violently, equine are predisposed to eye injuries. Wounds often involve the eyelids and sometimes damage the eye itself. Wounds that are near the eye or involve the eyelids should be seen by a veterinarian immediately. Careful surgical repair of eyelid wounds is critical. Failure to repair these injuries correctly can lead to an eyelid that does not function correctly, or actually irritates and damages the eye (Thalsehabla Espanola, 2013).

3.1. Both infectious and non-infectious ophthalmic disease of equines**.**

3.1.1. Conjunctivitis

One of the most common eye conditions seen in horses, especially during the summer months, is conjunctivitis. Conjunctivitis is inflammation of the conjunctiva or mucous membrane, which covers the posterior aspects of the eyelids, nictitating membrane, and the superficial surface of the sclera. It is a nonspecific finding of ophthalmic and often systemic diseases, as the eye has limited ways to react to injury. Infectious and non-infectious diseases of the eyelids, cornea, sclera, anterior uvea, nasolacrimal system and orbit commonly result in conjunctivitis in the equine (Plummer CE, 2008).

Conjunctivitis is often associated with ulcerative keratitis, corneal stromal abscesses, equine recurrent uveitis and obstructed naso-lacrimal ducts in horses. Conjunctivitis in the horse may be secondary to trauma of the globe, conjunctival foreign bodies and allergic reactions to dust, hay, sand, dirt, ammonia, pollen, ash and environmentalirritants. Equine neonates may develop conjunctivitis from placentitis, septicemia and subconjunctival or episcleral hemorrhages and pneumonia. Conjunctivitis caused by environmental irritants is common among neonates with recumbent foals being especially at risk (Plummer CE, 2005).

Equine conjunctivitis may also be found with systemicdiseases such as polyneuritis equi, vestibular disease syndrome, African horse sickness, epizootic lymphangitis and neonatal maladjustment syndrome Neoplastic causes of equine conjunctivitis include squamous cell carcinoma (SCC), lymphoma, papilloma, haemangioma, mast celltumors, melanomas and multiple myeloma. The prevalence of equine ocular SCC increases with age (Brooks DE, 2008; Plummer CE, 2008).

The clinical signs of tearing, mucoid discharge from both eyes. Signs of ocular pain (squinting). Less common but still frequent causes include viral (Equine herpes), bacterial, and solar injury. Parasitic conjunctivitis (Onchocerchiasis, Habronemiasisis and Thelaziasis) may be seen in horses that are not being on an adequate deworming regimen (Tammy Miller, 2013).

Treatment of conjunctivitis is directed at the underlying cause. Medical therapy for conjunctivitis is typically delivered via topical ophthalmic medications. Topical antibiotic therapy is the mainstay of initial therapy. It can be used safely in the period before a diagnosis is obtained if the case is believed to be bacterial, and to prevent secondary bacterial infections when the tissue is very inflamed or traumatized. Topical broad-spectrum antibiotics, such as oxytetracycline or triple antibiotic ophthalmic ointment are good initial choices (Tammy Miller Michau, 2013).

3.1.2. Uveitis.

Uvitis is inflammation of the anterior uvea. It may be unilateral or bilateral. In foals this occurs most often secondary to sepsis associated with Salmonella, E. coli, and Streptococcus. One study found that uveitis was a negative prognostic indicator in septic foals. (Leiva M, Pena T, Armengou L *et al*., 2010). Clinical signs include blepharospasm, epiphora, conjunctival and scleral hyperemia, meiosis, variable corneal edema, and aqueous flare, fibrin in the anterior chamber, hypopyon, and hyphema.

Aggressive treatment is essential as uveitis has the potential to cause blindness. Therapy for uveitis involves systemic antibiotics and NSAIDs and topical corticosteroids (such as prednisolone acetate 1% or dexamethasone 0.1%). Topical steroids should be administered as frequently as every 4 hour, depending on the severity of the uveitis. Topical atropine reduces painful ciliary muscle spasm and treats uveitis by stabilizing the blood-aqueous barrier and it is administered every 24 to 12 hour. Gastrointestinal motility must be closely monitored as atropine is a parasympatholytic and can be absorbed into the systemic circulation through the eye. In some cases, tissue plasminogen activator can be injected into the anterior chamber to dissolve fibrin (Brooks DE, 2007).

3.1.3. Corneal ulceration.

Horses frequently suffer from corneal ulcers or ulcerative keratitis because of the large size of their eyes and the laterally prominent position of the globe. The active movement of the head may increase exposure of the corneas to bacterial and fungal pathogens. Racehorses often develop ulcerative keratitis after running, especially racing, because of corneal contact with foreign bodies such as materials of track surface kicked up by other horses. In severe ulcer cases, the animals can become blind because of large corneal scars or concurrent uveitic side effects such that the functional vision required for racing purposes is impaired (Andrew SA *et al.,* 2005).

Equine corneal ulceration is very common in horses and is a sight-threatening disease requiring early Clinical diagnosis, laboratory confirmation, and appropriate medical and surgical therapy. Ulcers can range from simple, superficial breaks or abrasions in the corneal epithelium to full-thickness corneal perforations with iris prolapse. The prominent eye of the horse may predispose to traumatic corneal injury (Brooks, DE. 2002).

Horse corneas demonstrate a pronounced fibro vascular healing response. The unique corneal healing properties of the horse in regards to excessive corneal vascularization and fibrosis seem to be strongly species specific. Many early cases of equine ulcerative keratitis present, initially as minor corneal epithelial ulcers or infiltrates, with slight pain, blepharospasm, epiphora, and photophobia (Brooks, DE. 2002).

Corneal ulcers in horses should be aggressively treated no matter how small or superficial they may be. Infection should be considered likely in every corneal ulcer no matter how small in the horse. Fungal involvement should be suspected if there is a history of corneal injury with vegetative material, or if a corneal ulcer has received. Prolonged antibiotic and/or corticosteroid therapy without improvement (Brooks, DE.2002).

3.2. Infectious ophthalmic disease of equines**.**

3.2.1. Parasiticdisease.

3.2.1.1. thelaziasis

Thelaziasis is caused by thelazia parasite called thelazialacrimalis. In horses, this problem often goes unnoticed, with many horses showing no signs. The infective thelazia larvae are deposited near the eyes by flies (face flies) that feed on the moist discharge from the eyes. Once the larvae are deposited by the flies, they migrate into the tissues of the eye such as the conjunctival sac or the lacrimal ducts and glands. Once in these areas, the larvae mature to the adult stages and start the cycle all over again. Conjunctivitis, keratitis, and sensitivity to light (photophobia) are common clinical signs. Diagnosis of this problem can be done by directly observing the adult worms in the conjunctival sac or the lacrimal ducts and glands. Treatment for this infection involves manually removing the adult worms with forceps and saline flushes after an eye anesthetic is administered. Daily treatments with fenbendazole (10 mg/kg for 5 days) have been used to kill the worms. Proper fly control methods should also be implemented. Studies indicate that ivermectin is probably not effective (Dongus *et al.,* 2000)

3.2.1.2. onchocerchiasis.

This eye disease is caused by the parasite Onchocercacervicalis. Infections most often occur in adult animals. The Onchocerca parasites cause eye problems when the microfilaria larvae of the parasite migrate through the body tissues and eye. The migration and then death of the microfilaria in the eye causes inflammation and an immune response. This causes conjunctivitis and keratoconjunctivitis. Uveitis and other ocular changes can also be noticed. To diagnose this problem, samples of the conjunctiva or cornea must be collected and examined for evidence of microfilaria organisms. The initial treatment for this condition is to get the inflammation in the eye under control. This usually involves corticosteroids that are given topically or systemically and anti-inflammatory agents such as phenylbutazone or flunixinemeglumine. After the inflammation is under control, then treatment to kill the microfilaria is started. The typical treatment includes oral ivermectin at 0.2 mg/kg (Sellon *et al*., 2007).

3.2.1.3. toxoplasmosis.

Toxoplasma Gondiisa protozoan parasite that can infect horses although clinical disease is rare. Few case reports have demonstrated elevated titers to Toxoplasma in horses with chorioretinitisand in one horse with optic nerve atrophy (Sellon *et al*., 2007). However, one study in India showed no correlation between positive titers and ocular lesions and another study in horses with ERU showed any correlation with positive titers (Alexander*, et al*., 1990).

3.2.2. bacterial disease.

3.2.2.1. leptospirosis.

Ocular manifestations of leptospirosis appear in the form of equine recurrent uveitis (ERU), also referred as moon-blindness or periodic ophthalmia. Leptospira spp. is considered as the most common infectious cause of ERU (Hartskeerl *et al*., 2004).

ERU is characterized by bouts of inflammation of the vascular tunic or uvea of the eye alternating with symptom-free intervals of low or no inflammation. ERU has a worldwide prevalence of around 10% and is a major cause of blindness in horses While Appaloosa breed and horses with MHC-I haplotype are considered to be at increased risk of developing ERU. Leptospira-associated equine uveitis is a painful condition that develops weeks to months after systemic leptospirosis (Hartskeerl *et al*., 2004).

Early signs of the disease include meiosis, blepharospasm, lacrimation, photophobia, oedema of the eyelid, swollen conjunctiva and corneal oedema. As the disease progresses, aqueous flare and hypopyon may also be seen. A good prognosis is contingent on an early therapeutic intervention during this phase of the disease. The acute phase is followed by a period of low inflammation Subsequent recurrences of inflammation are marked with much severe inflammatory response resulting in serious injury to ocular components. Secondary cataract, anterior or posterior attachment of iris, lens luxation, vitreous exudates and retinal detachment are seen as a result of

a pronounced inflammatory insult to the eye components. A thick hyaline membrane adjacent to the posterior aspect of the iris and the eosinophilic linear cytoplasmic inclusion bodies in the non-pigmentedciliary epithelial cells are considered pathognomonic for ERU (Gilger and Michau, 2004).

Diagnosis of Leptospira-associated recurrent uveitis is based on the presence of classical signs of uveitis, a history of recurrence and seropositivity by (MAT) microscopic agglutination test. If leptospirosis is suspected, systemic therapy can be initiated with an appropriate antibiotic. Little is known about antimicrobial susceptibility of *Leptospira*spp. and there are no standardized methods for testing (Weese, 2009). Enrofloxacin at 7.5 mg/kg intravenously resulted in aqueous concentration above the MICminimum inhibitor concentration of *Leptospira* spp might be the best option for treatment of horses with suspected acute leptospirosis with ocular involvement. However, it is important to note that antibiotic treatment has never been shown to prevent recurrence (Kim *et al*., 2006; Divers *et al*., 2008).

3.2.3. viral disease.

3.2.3.1. equine viral keratoconjunctivitis.

Equine herpes viruses have been repeatedly isolated from eyes of horses suffering from certain forms of keratitis or keratoconjunctivitis. Although they are the viruses most often considered as being the causative agent of corneal disease; adenoviruses, and other viruses have also been incriminated (MAGGS, 2003). Equine adenoviruses (EAdV) have been isolated from ocular samples taken from several eyes of foals showing signs of keratoconjunctivitis. Superficial punctate or linear corneal opacities with or without concomitant conjunctivitis are the clinically manifest forms of keratitis most often associated with viral etiology. There are three distinct forms of viral keratopathies: Superficial punctate keratitis (SPK), ulcerative viral keratitis, and macular keratitis. However, it has been suggested that each form merely represents a different stage of the same disease (MAGGS, 2003).

A combination of topographic and etiologic classification seems to be appropriate forgeneral clinical use. The classifications of keratitis according to anatomical location are as follows: superficial; Interstitial; deep; and ulcerative (considered an independent group due to the frequent Involvement of all corneal layers) (SLATTER, 2001).

3.3. **Non infectious ophthalmic disease of equines.**

3.3.1. Exophthalmoses.

The normal-sized globe is pushed forwards, usually due to retro bulbar disease, e.g. abscess/tumour in the orbit behind the globe (Naylor *et al*., 2010). It results from dehydration secondary to systemic illness or maladjustment. Other causes include loss of orbital fat from cachexia, trauma, scarring, or congenital microphthalmos (Brooks DE., 2007).

3.3.2. entropion.

Entropionis an inward rolling of the eyelid margin, a common ocular abnormality in foals and requires immediate therapy. This causes the eyelid hairs to rub on the cornea. It most commonly involves the lower eyelid however; both the upper and lower lids may be affected. Entropion is a possible sequela, leading to chronic irritation. The affected orbit is also abnormally flat and small; this becomes more prominent as the animal ages. It may be repaired to prevent corneal ulceration in the neonate by placing sutures at the lid margin to roll out the offending eyelid margin (Brooks DE., 2007).

3.3.3. Glaucoma.

Glaucoma is associated with elevated intra-ocular pressure (IOP) and is often secondary to recurrent uveitis. Most cases are chronic and insidious in onset. Early signs of glaucoma are subtle and often missed. Although rarely reported in horses, it is a cause of blindness (Pickett and Ryan, 1993).

3.3.4. Cataracts.

Cataracts are opacities of the lens and are the most frequent congenital ocular defect in foals. Horses manifest varying degrees of blindness as cataracts mature. Very small incipient lens opacities are common and not associated with blindness. As cataracts mature and become more opaque, the degree of blindness increases. In adult horses, cataracts might be caused by heredity, traumatic injury, nutritional deficiencies or toxicities, or be secondary to other inflammatory eye conditions such as equine recurrent uveitis (Dennis E. Brooks,2017).

3.3.5. Orbital tumours.

A wide variety of tumours have been identified in the orbit of horse including neuroen docrine tumours, lymphoma, osteoma and melanoma (Meisner *et al*., 2009).

The most common ocular tumour seen in equidsis squamous cell carcinomas (SCC) (Kaps *et al*., 2005). The next most common issarcoids, followed by small numbers of melanomas, papillomas, and schwannomas/neurofibromas (Moore *et al*., 2000).

The clinical evidence of retro bulbar masses is usually restricted to an insidious onset of progressive unilateral exophthalmos, Distension of the supraorbital fossa, Vision may benormal, exposure conjunctivitis, keratitis and carcinoma development can occur. Concurrent pressure induced damage to the orbital bone can extend to the point of bony destruction and sinus involvement. In a few cases the frontal lobes of the cerebral cortex can be involved (Sweeney and Beech, 1983).

Tumours in the orbits are a serious diagnostic and therapeutic challenge. Diagnosis is constrained by the lack of effective simple imaging methods and therapy is a challenge because of the inaccessibility of the retro bulbar structures. The advent of better quality ultrasound facility and in particular (MRI) magnetic resonance image and (CT) computed tomography diagnostics has improved the imaging of the orbital structures enormously and we are getting better at identifying the various neoplastic and non-neoplastic space occupying masses in the equine orbit (Payne *et al.*, 2009).

Figure 1: An ocular squamous cell carcinoma in a working equid.
Source: Moore *et al*., 2000

4. Status of Ocular Disease in Ethiopia.

There are few published studies investigating ocular disease in Ethiopian equine. Wounds and ocular injuries were the most frequently recorded health concerns in Gondar (Anon, 2001) and ocular injuries due to ill-fitting blinkers and tack were reportedly common (Bradbury, 2002). A survey of 250 carthorses found 21 percent hadan ophthalmic condition, with greater than 60 per cent of these involving the right eye (Anon, 2005), and ocular infections were observed in 5.4 percent of 241 randomly selected carthorses examined in the middle Rift Valley region of Ethiopia (Shelima *et al*., 2006).

Ocular disease represented 5 per cent of cases presenting for non-routine problems to the veterinary clinics of Society for Protection of Animals Abroad (SPANA). A similar percentage (5.4 per cent) of donkeys presented with ocular disease to Donkey Sanctuary clinics, with the most common pathologies being medial canthal wounds due to habronemiasis and fly strike, conjunctivitis and corneal ulcers, scars and opacities generally attributed to trauma (Getachew *et al*.,2002).

A number of risk factors for ocular disease were found, including increased age of the horse, longer duration of ownership, the right eye versus left eye and town within which the animal resided. The prevalenceof eye disease was significantly higher in the right eye compared with the left, and the reasons for this are not clear. Since a whip injury was identified as the specific reason by six owners, a possible explanation includes whip use by predominantly right-handed drivers. Foreign bodies, such as stones flicking up from the road when traffic passes the cart are another possible cause for this asymmetrical distribution (Getachew *et al*., 2002).

Trauma is a relatively common cause of eye disease in the horse (Gilger, 2005), and the cornea is the most common location for eye injuries (Cutler, 2004), possibly due to its large surface area and prominent vulnerable position. (Getachew *et al.,* 2002) reported that trauma was a common cause of ocular pathology in donkeys in Ethiopia. Severe trauma and inflammation within the eye has the potential to result in phthisis bulbi. Often head collars which have adornments placed near the eye or may be poorly maintained which could contribute to the risk of ocular trauma and this may be an additional area to address within an ocular health education initiative. However, infectious disorders of the eye, such as fungal or bacterial keratitis, may also lead to the same end result if not managed correctly (Brooks, 2004).

The findings that increased age and increased duration of ownership were associated with increased risk of ocular abnormalities may be due to increased exposure to risk factors over the working lifetime of the horse. Alternatively, it may be due to a reduced ability to sell animals with abnormal eyes and, therefore, increased retention of horses with ocular abnormalities. One concern is that end-stage eyes may devalue the horse, therefore lowering purchase price. A lower price may make a purchase seem more attractive to a less affluent purchaser, and this aspect has socioeconomic as well as well fare implications *(Ireland et al*., 2012).

The difference in prevalence between towns is an interesting finding, and the reasons for this were not explained by other variables, such as age of the horse. The trade route (purchase and sales) of horses in this area of Ethiopia is predominantly unknown. However, it appears that horses change hands regularly, and the majority (90 per cent) is purchased from markets (Dinka *et al.,* 2006). It is possible that the more southern towns of Modjo and Nazareth represent horse populations further along the trade route, which may explain the higher prevalence in these towns. Additionally, there may be particular climatic, environmental or husbandry practices (including harnessed sign and equipment) that increase the risk of eye disease within these towns, such as vectors of infectious disease that may lead to an increased chance

of chronic eye disease in poorly managed eyes. Regional variations in fly populations, including *Glossina*, *Stomoxys*, *Tabanus* and *Haematopota* species have been reported in Ethiopia. Some of which are known intermediate vectors for conditions, such as habronemiasis and Thelazia infections (Abebe and Wolde, 2010).

5. Conclusion and Recommendation

Equidae is the mammalian family comprising the single genus equus consisting of domestic and feral horse, donkey, mule and zebra. These equidae are suffering from different diseases. Among the diseases affecting equine, the ocular disease is very common. Ocular disease is a frequent problem in working equidae in developing countries. The most common ocular disease of equidae are conjunctivitis, uveitis, cornealulceration, orbital tumor, physicaltrauma, internal parasitic diseases such as Thelaziasis, and Onchocerchiasis, protozoal parasitic diseases mainly toxoplasmosis, bacterial diseases particularly leptospirosis, and viral diseases specifically viral kerato-conjunctivitis which is commonly caused by herpes virus and adenovirus. A number of risk factors for ocular disease were found, including increased age of the horse, longer duration of ownership, the right eye versus left eye and town within which the animal resided.

Based on the above conclusion the following recommendations are for warded;

- ✓ Decrease risk of ocular abnormalities by decreasing exposure to risk factors over the working lifetime of the equines.
- ✓ Advising the owner on early recognition of ocular changes and good eye management.
- ✓ Understanding the social and economic reasons for owners' recognition and perceptions of ocular health and disease, and the motivating and deterring factors behind seeking treatment.
- ✓ Early treatment of neoplasia of or around the eye is critical. Because many cancers of the eye of the equine spread readily. There are many possible treatments for neoplasia of the eye or eyelids including surgical removal of the mass, topical chemotherapeutic agents freezing.
- ✓ Government should be give education/awareness to the society.
- ✓ Animal well-fare awareness should be provided for the society.

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