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# FIELD STUDY OF HOOF WALL PROBLEMS IN UNSHOD WORKING HORSES

A. S. BIGHAM & A. N. TABATABAEI

Department of Veterinary Surgery, Shiraz University, Shiraz, Iran

**Summary**

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A population of 100 native breed unshod working horses was examined for hoof wall problems. The diagnosis of hoof wall defects was performed by close visual observation and via physical examination. The location, extent and types of defects were then determined and recorded. Out of 100 horses, 124 hoof wall defects were noted in ninety working horses. The number of each defect in this study included the following cases: hoof wall horizontal grooves: 40, quarter cracks: 30, long toe problems: 20, toe cracks: 16, underrun heel: 10, white line disease: 4 and sheared heel: 4. Ten horses of our study had healthy hooves without any problems. Ninety percent of the horses had more than one defect in their hoof walls. This suggests that regular trimming and shoeing of the equine hoof can prevent and reduce hoof wall problems and reduce the rate of lameness in working and racing horses. Therefore, by performing regular trimming and shoeing, we can protect horses' high performance and raise high quality breeds of horses.

**Key words**: hoof wall defects, unshod working horse

## INTRODUCTION

Hoof wall lesions are usually described based on the gross appearance of the lesions. The consequences of hoof wall defects can be major problems for horse owners, veterinarians and farriers (Kempson, 1987; Buffa *et al.,* 1992). Superficial or deep cracks and splits, thin, flaky walls or crumbly, fragile hooves are all common types of hoof wall problems (Kempson, 1987; Kempson, 1990; Naylor, 1992; Adair, 1992; Buffa *et al.,* 1992; Reilly, 1995). These lesions can cause a wide spectrum of clinical presentations that range from very subtle losses of performance to severe lameness (Kempson, 1990; Reilly, 1995). A variety of causes have been hypothesized, including genetics, nutrition, stable or pasture management, and physiological or biomechanical abnormalities of the hoof itself (Adair, 1992; Grosenbaugh & Hood, 1993). In the Corbal region of the Fars province, Iran, the farmers use horses on the rice farms as work animals. Unfortunately, the horses are used without suitable trimming and shoeing in wet environmental conditions. The Corbal region is near the lake of Bactegan. It is believed that hoof wall problems occur with a high prevalence in this region. Therefore this study was designed to survey the different types of hoof defects and the problems of unshod working horses.

## MATERIALS AND METHODS

One hundred native breed working horses on the rice farms were randomly examined between March and October 2005. A full history was recorded for each horse. Information regarding age, breed, gender, diet, trimming and shoeing practices, the type of work and the condition of stabling was obtained and recorded. Macroscopic evaluations of the type, extent and location of hoof wall defects were performed and the results were recorded.

## RESULTS

Of the 100 horses, 10 horses were healthy without any problems in the region of their hoof walls; 90 horses were affected and they had 124 hoof wall defects. Hoof wall horizontal grooves had the highest prevalence (40) followed by quarter cracks (30), long toe problems (20), toe cracks (16), underrun heel (10), sheared heel (4) and white line disease (4). The prevalence of the recorded defect types according to the horses' ages is shown in Table 1. The 9 to 10 year-old horses were the most affected group (62), and this was followed by the 7 to 8 year-olds (32), the 5 to 6 year-olds (20) and the 2 to 4 year-olds (10).

## DISCUSSION

A recent study on Lipizzaner stallions at the Spanish Riding School found a 90% prevalence of crumbled, fissured hooves (Josseck *et al.,* 1995). The results of our study indicate that 100 unshod working horses had 124 hoof wall problems. However, Slater & Hood (1997) reported that 28% of racing horses had hoof wall problems. It is suggested that the higher prevalence of hoof wall defects in our study can be related to untrimmed and unshod hooves, poor housing and nutrition and unfavorable environmental conditions.

Hoof wall grooves or rings had the highest prevalence in our study. Pollit (1995) believes that rings indicate episodes of chronic laminitis but Rooney (1999) considers that these grooves or rings result from the compression of the outer portion of the hoof wall with subsequent buckling of the superficial horn tubules. In this study the occurrence of both chronic laminitis and compression of the hoof wall is possible because episodes of chronic laminitis can occur due to se-

**Table 1.** Prevalence according to the types of hoof wall defects in horses and their age

| Age (years) | Number of horses | Number of defects | Types of hoof wall defects | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Cracks | | Hoof wall grooves | Long toe | Underrun heel | Sheared heal | White line disease |
| | | | quarter | toe | | | | | |
| 2–4 | 15 | 10 | 2 | 2 | 4 | 2 | - | - | - |
| 5–6 | 25 | 20 | 4 | 4 | 8 | 4 | - | - | - |
| 7–8 | 40 | 32 | 6 | 4 | 12 | 4 | 4 | 2 | - |
| 9–10 | 20 | 62 | 18 | 6 | 16 | 10 | 6 | 2 | 4 |
| Total | 100 | 124 | 30 | 16 | 40 | 20 | 10 | 4 | 4 |

vere trauma during work; also, compression of the hoof wall tubules can occur during load carrying.

Hoof wall cracks are generally described by their location (toe, quarter, heel or bar), length (partial or full length), depth (superficial or deep) and presence or absence of hemorrhage or infection (Moyer, 2003). In this study, the number of superficial partially quarter cracks was 30 and the number of superficial partial toe cracks – 14, so the prevalence of quarter cracks was higher than that of toe cracks. Stashak (1989) supposes that from toe, the hoof wall becomes progressively thinner to the quarter and it is more sensitive to cracks; therefore, thinner quarter walls could have a higher incidence of cracks than that at the toe. In addition, heel and quarter cracks are frequently linked with under-run heels and long toes and this theory supports our observation of 10 underrun heel coexisting with long toe and quarter cracks. The number of toe cracks was 16 in this study. Stashak (1989) reported that allowing the hoof wall to grow too long makes it susceptible to splitting and cracks. This is true for unshod horses and for horses that are shod, but whose shoes have not been reset for a prolong period. In this study, the working horses were left unshod and worked on hard ground surfaces that predisposed them to splitting of the hoof wall and consequently toe cracks.

The number of long toe due to an untrimmed hoof wall was 20 in our study. Rooney (1999) believed that long toe can lead to white line disease whereas Stashak (1989) assumes that it can lead to hoof wall splitting and cracks. In addition, it can cause injury to the suspensory apparatus (digital flexor tendons, the suspensory ligament, the proximal sesamoid bones and the associated supporting ligaments) (Balch *et al.,* 1995). These previous studies are in line with our study because we observed 2 cases of white line diseases and 10 toe cracks that were all concurrent with long toe. Evaluations for soft tissue injuries such as tendon and ligament injury were excluded from our study; therefore we didn't have any information about the tendon and ligament injuries coexisting with hoof wall defects.

Underrun heel may often be the genesis for a long toe, and the pathogenesis of this process is logical. In general, the direction of heel growth follows that of toe growth; as the toe becomes long, the heel grow forward and hence lower (O'Grady *et al*., 2003). In our study, the number of underrun heels was 10, and all of them were concurrent with long toes due to untrimmed hoof walls. Also, environmental conditions such as excessive moisture in spring and excessive dryness in summer were predisposing factors in our study; all of these factors together were cumulative and produced this defect. Therefore, the causes of underrun heels are multifactorial. There may also be a genetic basis for this problem.

White line disease is characterized by separation at the stratum medium and stratum lamellatum; white line disease involves separation of the hoof wall and often involves separation damage proximal to the white line zone (O'Grady, 2002; Moyer, 2003). Although 50% of the white line disease in our study was noted to be concurrent with long toe and another 50% was noted individually, we expected a higher prevalence of this disease because Rooney (1999) suggested that long toe increased the leverage on the attachments between the coffin bone and the hoof wall, and it predisposed the hoof to white line disease. We suggest that the lower prevalence of white line disease in

our study may be inaccurate because this condition is usually diagnosed during sole trimming and shoeing, and we didn't perform any trimming and shoeing during the study. It is possible that many cases of white line disease were ignored throughout the study.

To many horsemen, sheared heels are a condition for which one heel bulb is higher than the other. This defect is apparently load-induced and it's often seen as a reflection of medial lateral imbalance in loading of the foot during the stance phase (Redden, 2003). Faulty shoeing and trimming, with leaving one side of the foot higher than the other, is the usual cause (Pollit, 1995). In our study, the number of sheared heel was 4; it can be related to untrimmed and unshod hoofs of the working horse that lead to unbalanced hoofs and for a load to be exerted to one side of the foot, higher than other side, during the load carrying.

Data analysis showed that hoof wall problems increased with increasing age of horses. We couldn't find any correlation between age and hoof wall problems in the literature, but we assume that increasing age causes decreasing hoof wall quality and the hoof wall becomes more susceptible to defects.

## CONCLUSIONS

In conclusion, the Corbal region of Iran and other geographic areas that have excessive humidity predispose horses to various hoof wall problems. In addition hoof wall problems increase with increasing age of horses. Therefore, the regular inspection and trimming and shoeing can help prevent from hoof wall problems and protect the high performance horses and raise high quality breeds of horses.

## REFERENCES

Adair, H. S., 1992. Common lameness problems of the draft horse. In: *Current Therapy in Equine Medicine,* 3rd edn, ed. N. E. Robinson, Saunders, Philadelphia, pp. 85–91.

Balch, O., D. Butler, K. White & S. Metcalf, 1995. Hoof balance and lameness: Improper toe length, hoof angle and mediolateral balance. *Compendium on Continuing Education for the Practicing Veterinarian*, **17**, 1275–1283.

Buffa, E. A., S. S. Van den Berg, F. J. Verstraete & N. G. Swart, 1992. Effect of dietary biotin supplement on equine hoof horn growth rate and hardness. *Equine Veterinary Journal*, **24**, 472–474.

Grosenbaugh, D. A. & D. M. Hood, 1993. Practical equine hoof wall biochemistry. *Equine Practice,* **15,** 8–14.

Josseck, H., W. Zenker & H. Geyer, 1995. Hoof horn abnormalities in Lipizzaner horses and the effect of dietary biotin on macroscopic aspects of hoof horn quality. *Equine Veterinary Journal,* **27,** 175–182.

Kempson, S. A., 1987. Scanning electron microscope observations of hoof horn from horses with brittle feet. *Veterinary Record,* **120,** 568–570.

Kempson, S. A., 1990. Ultrastructural observation on the response of equine hoof defects to dietary supplementation with Farrier's Formula. *Veterinary Record,* **127,** 494–498.

Moyer, W., 2003. Hoof wall defects: Chronic hoof wall separations and hoof wall cracks. *Veterinary Clinics of North America: Equine Practice,* **19,** 463–477.

Naylor, I. M., 1992. Nutritional management in disease. In: *Current Therapy in Equine Medicine,* 3rd edn, ed. N. E. Robinson, Saunders, Philadelphia, pp. 736–741.

O'Grady, S. E., 2002. White line disease - an update. *Equine Veterinary Education,* **14,** 51–54.

O'Grady, S. E. & D. A. Poupard, 2003. Proper physiologic horseshoeing. *Veterinary Clinics of North America: Equine Practice,* **19,** 333–351.

Pollitt, C. C., 1995. Color Atlas of the Horse's Foot. Mosby-Wolfe, London, pp. 178–180.

Redden, R. F., 2003. Hoof capsule distortion: Understanding the mechanisms as a basis for rational management. *Veterinary Clinics of North America: Equine Practice,* **19,** 443–462.

Reilly, J. D., 1995. No hoof no horse? *Equine Veterinary Jorunal*, **27,** 166–168.

Rooney, J., 1999. Rings of the hoof wall of equids. *Anvil Magazine,* December*,* 24–27.

Slater, M. R. & D. M. Hood, 1997. A cross-sectional epidemiological study of equine hoof wall problems and associated factors. *Equine Veterinary Journal*, **29,** 67–69.

Stashak, T. S., 1989. Management of lacerations and avulsion injuries of the foot and pastern region and hoof wall cracks. *Veterinary Clinics of North America: Equine Practice*, **5**, 195–220.

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**Correspondence**:

A. S. Bigham
Department of Veterinary Surgery,
Shiraz University,
Shiraz 71345-1731, Iran
Tel.: +98 711 2286950; Fax: +98 711 2286940
E-mail: dr.bigham@gmail.com