A survey of white line disease in racehorse population in the North of Iran (Gonbad)

Sardari, K.¹*; Mohri, M.¹ and Emami, M. R.¹

¹Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

*Correspondence: K. Sardari, Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: k_sardari@yahoo.com

Summary

During summer 2000 and 2001, 482 racehorses kept in Gonbad in the North of Iran were studied for white line disease. The survey was conducted when horses were being shoed by farriers. The horses that still exhibited damaged white line after regular trimming were diagnosed as having white line disease. The factors recorded were age, sex, number of diseased hooves, number of lesions by region over the bearing border of the hoof. The percentage of total diseased horses was 20.7%(100 horses), with incidence increasing significantly with age (P=0.001). The occurrence of white line disease was independent of sex (P>0.05) and was observed more frequently in the fore- than in the hindhoof (P<0.05) and developed more frequently at the toe than at any other region of the fore hoof-bearing border (P<0.05).

Key words: Horse, White line disease, Lameness, Iran

Introduction

Three layers comprise the hoof wall: the stratum externum, stratum medium and stratum internum. Of all hoof capsule components, the white line located between the stratum medium of the hoof wall and the sole has an unique structure formed by two interdigitating components (Budras et al., 1998). White line disease is recognized when any horn damage occurs in the white line due to various causes, e.g. mechanical trauma (Redden, 1990; Reilly, 1997) nutritional problems (Young, 1993), wet and polluted environment (Young, 1993; Pollitt, 1995), hereditary vulnerability (Young 1993), microorganism infection (Dewes and Lowe, 1987; Juell, 1988; Redden, 1990; Chapman, 1992; Kuwano et al., 1998) and chronic laminitis (Kuwano et al., 1998). Since the white line is essential to the hoof, its deterioration can lead to catastrophic consequences for horses. This disease is basically confined to the nerveless horny structure and gives relatively slight damage in the early stages. Therefore, it is easy to resect damaged tissue during the regular shoeing process, in which case it usually causes no problems. However, if left unattended and covered with the horseshoe for a long period, it can extend to more severe and wider fissure formation beneath the wall, leading to hoof wall separation and secondary infection of the dermis (Loest, 1984; Budras et al., 1998). Therefore, it is important to identify the position, the extension of white line disease and to know factors contributing to this form of damaged horn. Since there have been few surveys reported about white line disease in horses (Kuwano et al., 1999). Therefore, the present study was conducted to determine its prevalence among an Iranian horse population in Gonbad area and to gain objective data about the nature of lesions, age and sex distribution of affected horses.

Materials and Methods

The survey was conducted in summer, 2000 and 2001 at the Gonbad Racing Track in the North of Iran. All 4 hooves of a total of 482 Iranian Racehorses (thoroughbred and mixed breed horses) were examined, of which 135 were 2 years old, 136 were 3 years old, 117 were 4 years old and 94 were 5 years old. By sex, 197 of the horses were male and 284 were female. The investigation was
conducted at the time of shoeing, with the consent of the farriers working in Gonbad. Horse age, sex, the number of diseased hooves and location of lesion along the bearing border of the hoof were classified according to Figure 1. The number of lesions were then counted by region, but multiple discontinuous lesions on a single hoof were counted separately. When the horses were shod, ordinary routine trimming was performed. Then, if the horse had white line damage remaining after trimming it was defined as having white line disease (Fig. 2).

Statistical analysis

Statistical analysis was performed using the SPSS-9 program for Windows (SPSS Inc. Chicago IL, USA). Chi-squared analysis was used to evaluate the differences between groups. The level of significance was set at p<0.05.

Results

Of the 482 horses, 100 (20.7%) were diagnosed as having white line disease. Of the diseased horses, percentages in each age group increased as follows 11.7% (11/94) in 5-year-old, 15.5% (21/135) in 2-year-old, 22% (30/136) in 3-year-old and 32% (38/117) in 4-year-old. There was a statistical significance (P<0.05) between 5-year-old groups and 2, 3 and 4-year-old groups, respectively (Table 1).

The frequency of diseased horses by sex was as follows: males 18.7% (37/197) and females 22.1% (63/284). There was no statistical differences (P>0.05) in white line disease occurrence by sex (Table 2).

The number of diseased hooves totalled 370. Of these, 299 were forehooves (80.8%) and 71 were hindhooves (19.1%), demonstrating a high occurrence in the forehooves than hindhooves (P<0.05) (Table 4).

The total number of lesions was counted as 214 damaged white lines. By region, 163 lesions occurred in toe (76.1%), 17 in the lateral quarter (7.9%), 9 in the medial quarter (4.2%), 13 in the lateral heel (6%) and 12 in the medial heel (5.6%), demonstrating a high occurrence in the toe than other regions (P<0.05) (Table 3).

Discussion

White line disease usually develops under the horseshoes, it is easy to miss the disease in its early stages. In some cases, the disease may not be diagnosed until a horse shows lameness. Therefore, early detection of the disease is required as part of routine stable and hoof maintenance. Our study showed that more than 20% of these racehorses had white line disease. This finding is not in agreement with the report by Kuwano (Kuwano et al., 1999). Their report indicated an incidence rate 10% white line disease at a training center under satisfactory stable management (Kuwano et al., 1999).

The high incidence of the disease in the present study may be attributed to poor farriery condition and stable management in Gonbad. Occurrence of the white line disease directly depend on the stable management and hoof maintenance (Redden, 1990; Dollar, 1993; Kuwano et al., 1999).

In this study percentages of diseased horses significantly increased with age up to 4-year-old. This finding concurred with the report by Kuwano et al., (1999). In our study the incidence of the disease was decreased in 5-year-old horses because most of the horses in this group kept at the new stable under satisfactory stable management. This finding shows the importance of the hoof maintenance and stable condition in occurrence of white line disease that previously reported by others (Redden, 1990; Kuwano et al., 1999).

There was no significant differences between two sexes. This suggests no attributable white line damage from hereditary sexual factors. This finding concurred with the report by (Kuwano et al., 1999). Although practical observations suggested that white line disease occurred more frequently in males than in females (Redden, 1990). The number of diseased hooves was higher in fore- than in hindfeet. This may be explained by differences in hoof function during locomotion between the fore and hindhooves. To be more precise, the
bearing border shape of the forehoof is rounder than that of the hindhoof and the hoof wall is relatively concave. This difference may be explained by the fact that the forehooves support the majority of the horse’s bodyweight in contrast with the hindhooves propelling function (Butler, 1985).

On the bearing border, the disease occurred most frequently at the toe. One possible reason for this is that the load of the bodyweight is concentrated on a limited area of the toe surface at a break-over in motion.

Based on the above findings and report by Kuwano et al.,( 1999) the toe of the forehooves in racehorses should be examined carefully during shoeing. Once any slight lesion is detected in this region, immediate and local trimming using a hoof knife is preferable simply to reshoeing. It is also helpful simultaneously to employ a shoeing technique to aid break-over. If hooves contamination appeared to be a factor in the development of the disease, then it is essential to keep stable clean. If any infection such as Onychomycosis (Kuwano et al., 1996), are diagnosed as a possibly opportunistic infection, then veterinary medical approaches should be taken in close cooperation with farriers, in addition to direct elimination of the lesions.

**Acknowledgments**

We wish to thank Mr. Bernard Duvernay, a consultant farrier from the Switzerland, who kindly presented two workshops in the domain of farriery in Iran. We wish to thank Ferdowsi University and Mustad Hoofcare Company for financial support for the last workshop.

---

**Table 1: Number of affected horses with white line disease per age**

<table>
<thead>
<tr>
<th>Age</th>
<th>2-year-old</th>
<th>3-year-old</th>
<th>4-year-old</th>
<th>5-year-old</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>135</td>
<td>136</td>
<td>117</td>
<td>94</td>
</tr>
<tr>
<td>Disease Horses (%)</td>
<td>21 (15.5)</td>
<td>30 (22)</td>
<td>38 (32.4)</td>
<td>11 (11.7)</td>
</tr>
</tbody>
</table>

White line disease increased significantly with age up to 4-year-old and decreased significantly in group 5-year-old (P<0.05)

---

**Table 2 : Number of total and white line diseased horses in each sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number</td>
<td>197</td>
<td>284</td>
</tr>
<tr>
<td>Disease Horse (%)</td>
<td>37 (18.7)</td>
<td>63 (22.1)</td>
</tr>
</tbody>
</table>

Not statistically significant with sex ( P>0.05) (χ² test)
Table 3: Distribution of white line lesions by 5 regions of the bearing border

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of lesions (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toe</td>
<td>163 (76.1)</td>
</tr>
<tr>
<td>Lateral quarter</td>
<td>17 (7.9)</td>
</tr>
<tr>
<td>Medial quarter</td>
<td>9 (4.2)</td>
</tr>
<tr>
<td>Lateral heel</td>
<td>13 (6.0)</td>
</tr>
<tr>
<td>Medial heel</td>
<td>12 (5.6)</td>
</tr>
<tr>
<td>Total</td>
<td>214</td>
</tr>
</tbody>
</table>

Statistical significant ($\chi^2$ test) demonstrating a high occurrence white line disease in the toe than other regions ($P<0.05$)

Table 4: Numbers of white line diseased hooves

<table>
<thead>
<tr>
<th>Number of hooves (%)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Forehoof</td>
<td>299 (80.8)</td>
</tr>
<tr>
<td>Hindhoof</td>
<td>71 (19.1)</td>
</tr>
<tr>
<td>Total</td>
<td>370</td>
</tr>
</tbody>
</table>

Statistical significant ($\chi^2$ test) demonstrating a high occurrence of the white line disease in the forehoof than hindhoof ($P<0.05$)
Fig. 1: Classified region of the bearing border of the hoof divided into 5 parts: Toe, Lateral quarter, Medial quarter, Lateral heel and Medial heel

Fig. 2: Findings during trimming: dark discoloured region (indicated with an arrow) indentified on the white line. Such lesions can be diagnosed as early white line disease
References


