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ORIGINAL ARTICLE

Comparison of Hippological Differences Between Jeju Ponies and Jeju Pony Crossbreds: I. The Incidence of Anhidrosis in Two Racepony Populations

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ABSTRACT

The purpose of this study was to evaluate hippological differences between Jeju ponies and Jeju Pony crossbreds population. This is the first repot of the differences use an anhidrosis in Korean native horses. The precise prevalence of anhidrosis is unknown; however, it has been estimated that 6-20% of horses may be affected. However, there is no report about the incidence of the disease in pony breeds. We performed diagnosis by clinical signs (sweating) to investigate the incidence of anhidrosis in Jeju Ponies(n=340) and Jeju Pony crossbreds (n=536) at Jeju Race Park from July to September in 2012 as a way of find of hippological difference. Results of this study showed that 74 (21.8%) of the 340 examined Jeju Ponies and 61 (11.4%) of the 536 examined Jeju Pony crossbreds had anhidrosis. So, the former had almost two times higher than the later. Among 74 Jeju Ponies those had the disease, 50 were male (23.1%) and 24 were female (19.4%). Among 61 Jeju Pony crossbreds those had the disease, 22 were male (9.5%) and 39 were female (12.8). In Jeju Ponies, anhidrosis were most common in above the age of 5, followed by 4, 2, 3-years-old. For Jeju Pony crossbreds, the disease were most common in 2-years-old, followed by above the age of 5, 4, 3-years-old. In two breeds, 3-year-old animals were most rare respectively. There was no predilection of age and sex which is correlated with another study. In conclusion, the incidence of anhidrosis in the ponies were considerably similar foreign countries. However, the authors thought that causes of the difference of the breeds were origin and genetic differences.

Key words : Anhidrosis, Jeju Pony, Jeju Pony crossbreds, Racing

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INTRODUCTION

The Jeju Pony is a rare breed and a Korean native with a small population. However, the Jeju Pony crossbreds are cross between the Jeju Pony and Thoroughbred horses, western horses or Japanese horses since early of 20th century. Little research has been done on investigating the specific characteristics of these breeds.

Anhidrosis is the inability of the horse to sweat under appropriate conditions (Crabbe, 2007). Heat is lost from body surfaces to the surroundings by several physical mechanisms. Evaporation is also an important mechanism of heat loss in horses (Hines, 2004).

As the primary mechanism for heat dissipation in horses is sweating, anhidrosis can result in life-threatening hyperthermia (Rooney, 1996.). It is a problem of considerable economic importance to the racing industry in hot, humid climates (Logas and Barbet, 1999). Sound environmental management will continue to be a very important aspect of the treatment of horses affected with anhidrosis (Hubert *et al.*, 2002). Some horses are born with anhidrosis, others develop the condition gradually, and some stop sweating suddenly. There is no definite pattern for the development of the condition (Brennam, 2001).

The cause or causes of this condition are not known (Pasquini, 2005), but down regulation of sweat gland β2–receptors is suspected (Abutarbush, 2009). Anhidrosis was originally assumed to be associated with an acclimatization stress (Hubert *et al.*, 2002), but a survey conducted in Florida in 1982 showed that more native horses were affected than imported horses (Warner and Mayhew, 1982). In acute cases sweating is much reduced or absent; this is accompanied by respiratory distress, labored breathing, fever, collapse and occasionally death (McCutcheon and Geor, 1998). Performance decreases as the disease becomes more severe (Logas and Barbet, 1999). Sweating rates produced in response to an exercise-induced thermal load can be further increased by high ambient temperature or humidity which reduces evaporative efficiency, thereby contributing to the rate of rise in core body temperature (McCutcheon and Geor, 1998). Anhidrosis was diagnosed on the basis of history and clinical signs (Toribio, 2010).

The hippological studies in Jeju ponies and Jeju Pony crossbreds are very rare. This research focus on incidence of anhidrosis in Jeju race resources in order to find hippological difference and prevent unexpected accidents during racing or training and to provide an appropriate training method from the view of animal welfare.

MATERIALS AND METHODS

Animals

During the hot days of the summer season (July 15th-September 3rd, 2012), the experiment was conducted with randomly chosen 340 Jeju Ponies and 536 Jeju Pony crossbreds at Jeju Race Park in Korea. Age range of the race resource was 2-9 years old. All animals were healthy clinically because they were checked up by the formal veterinary officer before started the regular races.

Diagnosis and Methods

Anhidrosis was diagnosed on the basis of history and clinical signs after competitions during days of summer (Hinchcliff *et al.*, 2004). Positive of anhidrosis were no sweat on their skin after races, whereas normal animals have a sweat response to races (Toribio, 2010). When the race resources were unclear sweating, the animals were re-diagnosis at another race. If the animal were above two time unclear sweating, they were diagnosed positive.

RESULTS

This survey found clinical evidence of anhidrosis presence in ponies also (Fig. 1.). Results of this

study showed that total 135 of 876 racers (15.4%) were positive. In detail, 74 (21.8%) of 340 examined Jeju Ponies and 61 (11.4%) of 536 examined Jeju Pony crossbreds had anhidrosis (Table 1). So, the former had almost two times higher than the later.

Among 74 Jeju Ponies those had the disease, 50 were male and 24 were female. Among 61 Jeju Pony crossbreds those had the disease, 22 were male and 39 were female.

In Jeju Ponies, anhidrosis were most common in above the age of 5, followed by 4, 2, 3-years-old. For Jeju Pony crossbreds, the disease was most common in 2-years-old, followed by above the age of 5, 4, 3-years-old. In two breeds, 3-year-old animals were most rare respectively (Table 2)

DISCUSSION

The horse is able to sweat at higher rates than any other animal, and actually extremely efficient at dissipating heat produced during exercise (Marlin, 2002). The primary means of heat dissipation in the horse is evaporation of sweat (McConaghy, 1994). The prevalence of anhidrosis in the U.S. is unknown, although it has been estimated to range from 6 to 20% in Southern states. One study in Thoroughbred horses in central Florida found a prevalence of 6.1% with horses in training and non-pregnant broodmares having the highest prevalence, but the disease was infrequent in young horses (Toribio, 2010). The disease commonly occurs in countries with hot, humid climates including the American Gulf Coast states (Mayhew and Ferguson, 1987; Warner and Mayhew, 1982).

Affected horses often present with a history of poor or decreased exercise performance or exercise intolerance (Hinchcliff *et al*., 2004). It cases career ending, economic loss to owner and serious animal welfare issues (Logas and Barbet, 1999).

The incidence of anhidrosis in Jeju raceponies was 15.4%, 135 out of 876 racers were positive. 74 (21.8%) of 340 examined Jeju Ponies and 61 (11.4%) of 536 examined Jeju Pony crossbreds had anhidrosis. So, the former had almost two times higher than the later. The ponies were resistant to cold, and lived in northern Eurasia; however, the Arabian horses, the ancestor of Thoroughbreds, were heat-resistant desert horses. The spare frame, devoid of fatty tissue, the thin skin, and the ultra-fine coat allowed it to withstand the effects of heat and enabled it to go for long periods without water (Edwards, 2000). The ancestors of Jeju Ponies had lived in cold and frost area. Jeju Pony crossbred is mixedbred pony with hot-blood such as Thoroughbreds. Hot-bloods is small, fine-bone, dry and heat - resistant desert horse (Edwards, 2000).

In Jeju Ponies, anhidrosis were most common in above the age of 5, followed by 4, 2, 3-years-old. For Jeju Pony crossbreds, the disease was most common in 2-years-old, followed by above the age of 5, 4, 3-years-old. There was no predilection of age and sex. The results of this experiment are in agreement with the earlier one (Breuhaus, 2009).

No medical treatments have been consistently beneficial (Logas and Barbet, 1999). A variety of nutritional supplements have been advocated on the treatment of anhidrosis, but objective data on the efficacy of these products in not available (Hinchcliff *et al*., 2004).

The prevalence of anhidrosis in Thoroughbred racehorses in Korea was 22% and it was similar to that of other countries. There does not appear to be sex, foaling country, coat color, age or pedigree of dam predisposition (Yang and Lim, 2011).

The only proven prevention is to move the affected horse to a more temperate climate (Divers, 2008). The climate of Korea including Jeju which located the most south is hot and humid in summertime. There are higher possibility of anhidrosis in Jeju, Korea especially because of the climate of high temperature and humidity. It is important to find a way to reduce mortality rate from high temperature and to prevent economic loss by proper treatment. A periodical inspection of in and out horses and a prompt notification of anhidrosis management to trainer and owner could be a solution to maintain healthy animals.

Table 1. Incidence of anhidrosis in the ponies by sex

Animals	Male	Female	Total
Jeju Ponies	50/216(23.1%)[a]	24/124(19.4%)	74/340(21.8%)[a]
Jeju Pony crossbreds	22/231(9.5%)[b]	39/305(12.8%)	61/536(11.4%)[b]
Sub-total	72/447(16.1%)	63/429(14.7%)	135/876(15.4%)

[a, b] Entries with different superscripts are statistically different(p<0.05) male : 0.000090, total 0.00003, female : 0.072

Table 2. Incidence of anhidrosis in ponies by age

Animals	2	3	4	5≤
Jeju Ponies	21/79 (26.6%)	16/141 (11.3%)	21/76 (27.6%)	16/44 (36.4%)
Jeju Pony crossbreds	23/95 (24.2%)	29/321 (9.0%)	6/96 (6.3%)	3/24 (12.5%)

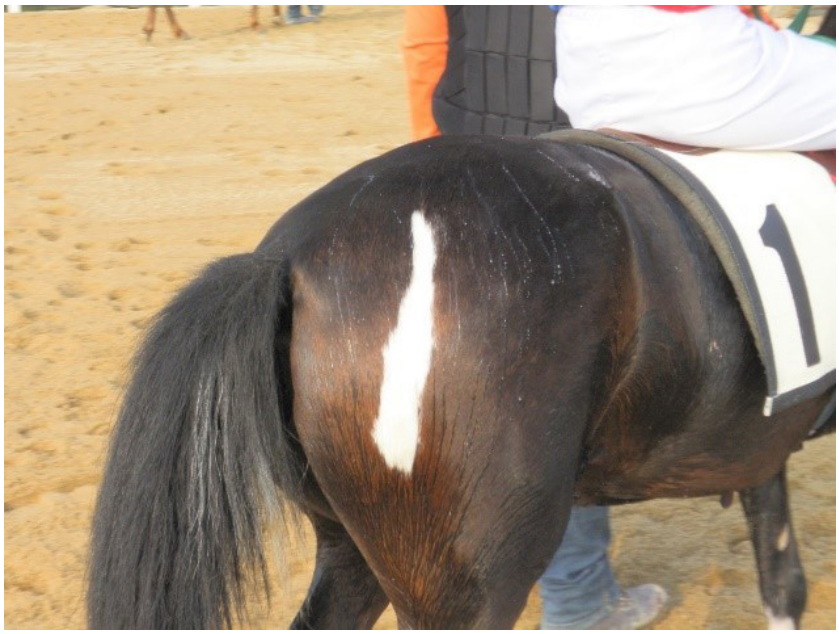

Fig. 1. Sweaty normal Jeju Pony after competition.

CONFLICT OF INTEREST

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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REFERENCES

1. Abutarbush SM, 2009. Disease of the integumentary system. In: Illustrated guide to equine diseases (Abutarbush SM, ed). 1st Ed. Wiley-Blackwell, Iowa, USA, pp:255-341.
2. Brennam M, 2001. A-Z common horse ailments. In: Complete holistic care and healing for horses (Brennam M, ed), 1st Ed. Trafalhar Square Publishing, Vermont, USA, 2001. pp:186-187.
3. Breuhaus BA, 2009. Thyroid function in anhidrotic horses. J Vet Intern Med. 23:168-73. Crabbe B, 2007. The endocrine system. In: The comprehensive guide to equine veterinary medicine (Crabbe B, ed). 1st Ed. Stering, New York, USA, pp:219-28.
4. Divers TJ, 2008. Temperature-related problems. In: Equine emergencies (Orsini JA, Divers TJ, ed). 3rd Ed. Saunders, Missouri, USA, pp:553-7.
5. Edwards EH, 2000. The story of the horse. In: The new encyclopedia of the horse (Edwards EH, ed). 1st Ed. Dorling Kindersley Book, Hampshire, UK, pp:10-25.
6. Hinchcliff KW, Kaneps AJ, Geor RJ, 2004. Equine sports medicine and surgery 1st Ed. Saunders, Philadelphia, USA, pp:919-36.
7. Hines MT. 2004. Changes in body temperature. In: Equine internal medicine (Reed SM, Bayly WM, Sellon DC, ed). 2nd Ed. Saunders, St. Louis, USA, pp:148-50.
8. Hubert JD, Beadle RE, Norwood G, 2002. Equine anhidrosis. Vet Clin North Am Equine Pract. 18:355-69.
9. Logas DB, Barbet JL, 1999. Diseases characterized by nonpruritic alopecia and scaling. In: Equine medicine and surgery (Colahan PT, Mayhew IG, Merritt AM, Moore JN, ed). 5th Ed. Mosby, St. Louis, USA, pp:1897-901.
10. Marlin D, 2002. Thermoregulation. In: Equine exercise physiology (Marlin D, Nankervis K, ed). 1st Ed. Blackwell Science, Oxford, UK, pp:133-50.
11. Mayhew IG, Ferguson HO, 2nd, 1987. Clinical, clinicopathologic, and epidemiologic features of anhidrosis in central Florida Thoroughbred horses. J Vet Intern Med. 1:136-41.
12. McConaghy F, 1994. Thermoregulation. In: The athletic horse (Hodgson DR, Rose RJ, ed). 1st Ed. Saunders, Philadelphia, USA, pp:197-8.
13. McCutcheon LJ, Geor RJ, 1998. Sweating; Fluid and ion losses and replacement. Vet Clin North Am Equine Pract. 14:75-95.
14. Pasquini C, 2005. General. In: Guide to equine clinics (Pasquini C, Pasquini S, Woods P, ed). 3rd Ed. SUDZ Publishing, Texas, USA, pp:297-307.
15. Rooney JR, 1996. Anhidrosis. In: Equine pathology (Rooney JR, Robertson JL, ed). 1st Ed. Iowa State University Press, Ames, USA, pp:287-307.
16. Toribio RE, 2010. Anhidrosis. In: Equine internal medicine (Reed SM, Bayly WM, Sellon DC, ed). 3rd Ed. Saunders, St. Louis, USA, pp:1295-6.
17. Warner AE, Mayhew IG, 1982. Equine anhidrosis: a survey of affected horses in Florida. J Am Vet Med Assoc. 180:627-9.
18. Yang J, Lim YK, 2011. Prevalence of Anhidrosis in Thoroughbred Racehorses in Korea. J Ani Sci Tech. 53:571-73.