A Review: Mechanisms and Patterns of Injuries during Unmounted Horse Activities

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Abstract: Horse-related injuries do not occur during horse riding or when mounted only, but handling a horse on the ground also holds dangers. Injuries during unmounted horse activities may happen to any rider, handler and even veterinarian. The aim of this paper was to review the existing scientific data on the mechanisms and patterns of horse-related injuries during unmounted horse activities. This review paper was conducted based on all studies describing mechanisms and patterns of injuries during unmounted horse activities. The main injury mechanism in unmounted horse activities are caused by being kicked, crushed/struck, trampled, dragged/pulled and bitten. The patterns of injuries during unmounted horse activities covered three parts namely types of injury, age and gender as well as regions of injury. Resulted fractures and head region have the highest percentage of injuries. Whilst the percentage of injuries occurred for each gender was based on the age of the victims. The limitation of this review is the lack of recent studies which meant that this was a topic less focused on. Thus, future study should focus more on injuries during unmounted horse activities so that more interventions can be develop as preventive measures which will give benefits for both work and non-work equine identities in order to decrease the percentage of injuries.

Keywords: horse-related, injuries, unmounted, mechanism, pattern

1. Introduction

Horse is an astonishing athlete, a characteristic that is the result of the evolution of horses as grazing animals on the ancient prairies of North America. To survive prey animals, their speed and endurance were enhanced to allow them to travel for a long distance in search of water and feed (Hinchcliff and Geor, 2008). The horse is an animal with fight and flight response (McGreevy, 2012) and characteristics of speed and endurance were subsequently modified or enhanced by selective breeding by humans (Hinchcliff and Geor, 2008) Hence, humans spend their time for hours make an effort to train them (McGreevy, 2012).

At some time in the past, horses were used as working animals (Exadaktylos et al., 2002). However, in the past decades, the horse's role has change dramatically in society (Ng and Chung, 2004). Now, they serve primarily for leisure and professional activities (Exadaktylos et al., 2002; Ikinger et al., 2016; Ng and Chung, 2004). Along with this vigorous activity comes a need for high level athletic skills which carries a certain degree of risk (Ng and Chung, 2004). The capability and horsemanship skill of the horse handlers or riders affected the degree or level of the risk during horse related activities (Chapman and Thompson, 2016).

Part of the risk is related to the human or rider's capability to predict the behaviour of the horse (Ikinger et al., 2016). High perceptions of 'self-efficacy' lead to the growth of the likelihood of an injury or death (Chapman and Thompson, 2016). The level of a human's experience and knowledge about horses can be defined by their number of horse interactive hours, and the type of supervision and training (Hawson et al., 2010). When there is an absent in one of these components, the possibility of harm will increase (Hawson et al., 2010). It is particularly important to make sure that the combination between human and horse are right to reduce horse related risk (Chapman and Thompson, 2016). When there is a wrong match at any point during contact between the human and horse, negative incidence potentially will occur (Owen, 2014). Furthermore, competitive and ambitious attribute amongst professional equestrians can compromise their safety, in the form of 'goal seduction' (Owen, 2014).

Horse related injuries do not occur during horse riding or when mounted only, but handling a horse on the ground also holds dangers (Bethune, 2010; Thompson et al., 2015). According to past study by Northey (2003), 25% of horse related injuries happened during unmounted. Unmounted activities include grooming, feeding, handling, shoeing, or saddling the horse (Nguyen & Lew, 2016). Same goes to the study by Worley (2009), 15-30% of injuries happened while people handling the horses from the ground where they being stepped on, kicked or bitten. In addition, Smartt and Chalmers (2009) found that the percentage of the bystander get injured during horse handling is 21%. The aim of this paper is to review the existing scientific data on the mechanisms and patterns of horse-related injuries during unmounted horse activities.

2. Method of Review

All studies describing mechanisms and patterns of injuries during unmounted horse activities were considered in this review. Publications relating to the mechanisms and patterns of injury were identified from Science Direct, Scopus and Web of Science. The keywords 'equine', 'horse-related', 'injury', and 'unmounted' were searched. This resulted to up to 36 articles ranged from year 2000 - 2019. The articles then excluded the non-English articles and restricted access journal. After that, the duplicated articles were removed. This resulted in only 31 articles. The limitation of this review is lack of recent study dealing with this topic.

3. Mechanisms of injuries

When horse placed in a situation where they feel threatened or insecure, horse can display dangerous behaviour which may or may not leads to injury to human (Visser et al., 2008). Horse-related injuries mostly result from falls from horses (Altgarde et al., 2014; Antoun et al., 2010; Carmichael et al., 2014). However, the main injury mechanism in unmounted horse activities are kicked, crushed/struck, trampled, dragged/pulled and bitten (Altgarde et al., 2014; Wolyncewicz et al., 2018; Hawson et al., 2010; Davidson et al., 2015; Visser et al., 2008 with getting kicked by horse during unmounted horse activities among handler and bystander had the highest percentage (Hawson et al., 2010; Lucas et al., 2009; Nguyen & Lew, 2016; Wolyncewicz et al., 2018) as a mechanism of injury whilst bitten by horse did not appeared as a serious cause of injury (Hawson et al., 2010). Nevertheless, a study from Bowman et al., (2007) stated that besides getting kicked by the horses, getting crushed was also another common injury mechanism among unmounted handlers. It should be noted that the mechanism of injury during unmounted horse activities is complex. For example, one horse handler during grooming the horse got crushed and kicked at the same time. Hence, it is difficult to identify just one discrete injury mechanism.

4. Patterns of injuries

4.1 Types of injury

With a single kick from horse, greater than 10000 N forces were transferred to the body and the face (Exadaktylos et al., 2002). In a study by Ueeck et al (2004), the maxilla-facial injuries caused by horse kick resulted in more than head injuries that caused by other mechanism of injuries. Antoun et al. (2010) reported that 37% out of 71% fracture injuries occurred among younger women. Plus, horse handlers are most likely to suffer facial fracture and laceration caused by getting kicked by the horse (Carmichael et al., 2014). However, in recent study shows that there were 23.6% of head injuries and 29.2% of upper extremity injuries occurred during horse handling activities (Meredith et al., 2018).

4.2 Age and gender

Unmounted male children were mostly associated with injuries compared to adults (Wolyncewicz et al., 2017). Whereas, adult females mostly got injured during unmounted horse activities compare to men (Antoun et al., 2010; Wolyncewicz et al., 2017). The factors of these differences have been attributed to "sex-related differences in exploratory behaviour" that make male children prone to get injured (Holland et al., 2001). Whilst Buckley et al. (1993) and Altgarde et al. (2014) said that injuries in women happened because of their greater involvement with horse activities.

4.3 Regions of injury

Most frequent injury during unmounted horse activities involved injuries to the head (Meredith et al., 2018). A single kicked by a horse was most likely to cause direct trauma to the face (Antoun et al., 2010; Carmichael et al., 2014; Meredith et al., 2018). There were 25.2% head injuries happened with 44% caused by being kicked and 39%

being pushed or head-butted (Meredith et al., 2018). Antoun et al. (2010) reported in their study, 35 out of 49 facial injuries investigated in New Zealand were during unmounted activities. However, studies from Bowman et al. (2007) and Carmichael et al. (2014) said that not only facial injury, but, abdominal injuries were also common among unmounted horse activities. In addition, Carmichael et al. (2014) also said that 39% of lower extremity injuries which ended with fracture needed surgery.

5. Discussions

Equestrian activities are associated with a large number of accidents. A high percentage of people that involve in equestrians activities will experience accidents, with different degrees of severity, throughout their riding careers (Camargo et al., 2018). This situation happened caused by equestrianism is the only sport that involves a non-human partner that is not only much larger and stronger than its human teammate, but also able to achieve high speeds of up to 65 km/h (Ikinger et al., 2016). In this paper, we reviewed the mechanisms of injury and pattern of injury which covered three parts namely types of injury, age and gender and region of injury during unmounted horse activities.

These horse-related injuries during unmounted activities can range from minor to severe ones. The most common mechanism of injury during unmounted horse activities is getting kicked by the horse. A high number of head injuries caused by kicked by the horse may be partially linked to the lack of use of helmets during unmounted horse activities. Despite that, helmet usage is rarely encouraged among this group (Meredith et al., 2011). However, attempts to decrease the horse related injuries have only focused on low level risk control which is personal protective equipment such as helmets (Chapman and Thompson, 2016).

6. Conclusion

Horse related injuries being a relatively common to human. This topic is important as equine-related activities continue to grow throughout Malaysia. The prevention of accidents and injuries during unmounted horse activities is important in order to reduce the possibility of unbearable consequences in the health and the quality of life among equestrians. Therefore, there is a need for consistent standard for qualifications, training, supervision and monitoring during horse related activities to be adopted in every equestrian centers. Future study should aim to evaluate or investigate different preventive measures that can benefit to decrease the percentage of injuries among unmounted equestrian.

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