

Markers of Bone Health, Bone-Specific Physical Activities, Nutritional Intake, and Quality of Life of Professional Jockeys in Hong Kong

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Weight-making practices, regularly engaged in by horse racing jockeys, have been suggested to impair both physiological and mental health. This study aimed to assess bone health markers, nutritional intake, bone-specific physical activity (PA) habits, and quality of life of professional jockeys in Hong Kong ($n = 14$), with gender-, age-, and body mass index-matched controls ($n = 14$). Anthropometric measurements, serum hormonal biomarkers, bone mineral density, bone-specific PA habits, nutritional intake, and quality of life were assessed in all participants. The jockey group displayed significantly lower bone mineral density at both calcanei than the control group (left: 0.50 ± 0.06 vs. 0.63 ± 0.07 g/cm²; right: 0.51 ± 0.07 vs. 0.64 ± 0.10 g/cm², both $ps < .01$). Thirteen of the 14 jockeys (93%) showed either osteopenia or osteoporosis in at least one of their calcanei. No significant difference in bone mineral density was detected for either forearm between the groups. The current bone-specific PA questionnaire score was lower in the jockey group than the control group (5.61 ± 1.82 vs. 8.27 ± 2.91 , $p < .05$). Daily energy intake was lower in the jockeys than the controls ($1,360 \pm 515$ vs. $1,985 \pm 1,046$ kcal/day, $p < .01$). No significant group difference was found for micronutrient intake assessed by the bone-specific food frequency questionnaire, blood hormonal markers, and quality of life scores. Our results revealed suboptimal bone conditions at calcanei and insufficient energy intake and bone-loading PAs among professional jockeys in Hong Kong compared with healthy age-, gender-, and body mass index-matched controls. Further research is warranted to examine the effect of improved bone-loading PAs and nutritional habits on the musculoskeletal health of professional jockeys.

Keywords: bone mineral density, horse racing jockeys, nutrition, physical activity habits, weight making

Horse racing is one of the most popular sports worldwide and generates billions of dollars in revenue from both the breeding industry and gambling (Wilson et al., 2014a). In Hong Kong, there are more than 600 races each year (Hong Kong Jockey Club, 2015), and three of the world's best 11 horses (as per the Longines™ World's Best Racehorse Rankings 2015) are trained in the city. As horse racing is classified as a weight-category sport, most competitions require jockeys to align their body mass within certain race limits. For example, the current minimum weight allocation for jockeys in Hong Kong is 51.3 kg (Hong Kong Jockey Club, 2016). Professional jockeys are unique among weight-category athletes in that they are required to be weighed immediately before and after every race, which can be up to 10 times on a typical race day during their prolonged competitive season. Hence, they may have insufficient time to replenish energy and fluid depleted during weight making (Dolan et al., 2012a; Wilson et al., 2014a). Consequently, use of potentially dangerous acute and chronic weight-making strategies, including extreme calorie restriction, sporadic eating, self-induced vomiting soon after consumption, laxative use, sweating in saunas and hot baths, and excessive exercise in sweat suits have been reported among jockeys (Cotugna et al., 2011; Dolan et al., 2011; Labadarios et al., 1993; Leydon & Wall, 2002;

O'Reilly et al., 2016; Wilson et al., 2014b). A recent study conducted in professional jockeys in Hong Kong found that fatigue (27.7%) was the most common side effect of weight loss followed by dehydration (22.3%) and headache (20%; O'Reilly et al., 2016). Such weight-making strategies are suggested to be harmful for psychological (Caulfield & Karageorghis, 2008); physiological (Warrington et al., 2009); and hormonal function (Dolan et al., 2012b). Moreover, jockeys are positioned in a continuous state of dynamic imbalance approximately 2–3 m from the ground, moving at a speed often up to 60 km/hr during racing (Warrington et al., 2009). Given the occupational safety concern that high-speed falls and bone fractures are frequent (Rueda et al., 2010), achieving optimal bone health is of paramount importance for jockeys. However, previous research suggested that extreme dietary weight-making practices can result in an inadequate intake of macronutrients and micronutrients such as calcium and vitamin D, consequently leading to bone-specific clinical conditions, including osteopenia and osteoporosis (O'Reilly et al., 2016; Warrington et al., 2009). Recently, osteopenia characterized by a bone mineral density (BMD) T score between -1 and -2.5 in the lower limb was reported in Hong Kong jockeys (O'Reilly et al., 2016), whereas earlier studies in New Zealand (Leydon & Wall, 2002) and Ireland (Dolan et al., 2012a; Warrington et al., 2009) have also found suboptimal bone health among elite-level jockeys, as demonstrated by a BMD T score < -1 , indicating either osteopenia or osteoporosis of whole body, lumbar spine, and hip.

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