Göteborg, 2021

Spinal column and hip joint changes, and their correlation to back pain in young athletes

Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademin, Göteborgs universitet kommer att offentligen försvaras i R-aulan, Mölndal sjukhus, Göteborgsvägen 31, Mölndal, fredagen den 19 november 2021 kl. 09:00

av

Wisam A. Witwit, MD

Fakultetsopponent

Docent Bengt Sandén

Institutionen kirurgiska vetenskaper, Uppsala Universitet, Uppsala, Sverige

Avhandlingen baseras på följande delarbeten

1. Wisam A. Witwit MD, Peter Kovac MD, Anna Swärd MD, Cecilia Agnvall PT, Carl Todd DO, PhD, Olof Thoreson MD, PhD, Hanna Hebelka MD, PhD, Adad Baranto MD, PhD.
   Disc degeneration on MRI is more prevalent in young elite skiers compared to controls.
   Journal of Knee Surgery, Sports Traumatology, Arthroscopy (KSSTA). 2018; 26 (1): 325-332.

2. Carl Todd DO, PhD, Wisam A. Witwit MD, Josefin Abrahamson PT, Anna Swärd MD, Pall Jonasson MD, PhD, Jon Karlsson MD, PhD, Adad Baranto MD, PhD.
   A low Pelvic Incidence angle may not place young athletes at risk of developing cam morphological changes in the hip joint.
   Jacobs Journal of Sports Medicine. 2018, 5 (1) 032.

3. Wisam Witwit MD, Olof Thoreson MD, PhD, Anna Swärd Aminoff MD, Carl Todd DO, PhD, Pall Jonasson MD, PhD, Gauti Laxdal MD, PhD, Hanna Hebelka MD, PhD, Adad Baranto MD, PhD.
   Young soccer players have significantly higher disc degeneration on MRI compared to non-athletes.
   Journal of Translational Sports Medicine. 2020; 3: 288–295.

4. Wisam A. Witwit MD, Hanna Hebelka MD, PhD, Anna Swärd Aminoff MD, Josefin Abrahamson PT, Carl Todd DO, PhD, Adad Baranto MD, PhD.
   A 2-year follow-up of MRI findings and back pain in the thoraco-lumbar spine of young elite skiers.
   Manuscript pending publishing.

SAHLGRENSKA AKADEMIN
INSTITUTIONEN FÖR KLINISKA VETENSKAPER

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Spinal column and hip joint changes, and their correlation to back pain in young athletes

Wisam A. Witwit, MD

Avdelningen för ortopedi
Institutionen för kliniska vetenskaper, Sahlgrenska akademin, Göteborgs universitet, Sverige, 2021

Abstract

BACKGROUND
Young athletes are at increasing risk for spinal column injuries and back pain due to excessive sporting activities, with potential development of complications like spinal canal stenosis and chronic back pain later in life. Increased knowledge is necessary in order to make the correct diagnosis and to be able to adapt the appropriate preventive measures, rehabilitation programs, and treatments accordingly.

PURPOSE
The aim of this project was to identify MRI changes in the thoraco-lumbar spine and the lifetime prevalence of back pain at baseline and with continuing sporting activity, as well as the association between them, in young athletes compared with non-athletes. Another purpose was to investigate the relationship between the pelvic morphology and the hip cam change in young elite skiers compared with non-athletes.

MATERIAL AND METHODS
Seventy-five young elite alpine and mogul skiers (mean age 18), and 31 young elite football (soccer) players (mean age 17) were compared with 27 non-athletes (mean age 16). All subjects were invited to undergo MRI of the thoraco-lumbar spine. The MRI images were evaluated for vertebral changes and disc abnormalities such as Pfirrmann grade, disc desiccation, disc height loss, bulging, herniation, and Schmorl's nodes. All participants answered standardized questionnaires with questions related to back pain, training hours, spinal injuries, and health perception. The skiers hip joints were examined for cam morphology (defined as α-angle >55°) with MRI, and sagittal spinal alignment measurements including Pelvic Incidence (PI) on standing lateral plain radiographs. All participants were invited to participate in a 2-year follow-up, but 35 skiers and 10 non-athletes dropped out due to personal reasons.

RESULTS
The spinal column abnormalities were significantly higher in athletes than non-athletes. Fifty-six percent of skiers had at least one disc of Pfirrmann grade ≥3 compared with 30% of non-athletes ($p = 0.03$). Schmorl's nodes (46%) and disc height reduction (37%) were significantly more prevalent in skiers compared with non-athletes (0%) ($p < 0.001$). The football players had significantly higher rate of MRI changes than non-athletes, 89% compared with 54% when all disc degenerative changes were combined ($p = 0.006$). There was no significant difference in lifetime prevalence of back pain between athletes (50%) and non-athletes (44%). No significant correlation between MRI abnormalities and back pain was identified. Athletes had better health perception than non-athletes ($p = 0.03$). Skiers had significantly greater prevalence of cam morphology (49%) compared with non-athletes (19%, $p=0.009$). No correlation was shown between a low Pelvic Incidence (PI) and hip cam morphology. No significant interval difference in spinal column abnormalities, neither for skiers nor non-athletes, and no significant difference in terms of back pain was found between baseline and 2-year follow-up.

CONCLUSION
Athletes demonstrated significantly more spinal column abnormalities than non-athletes while lifetime prevalence of back pain was not different between the groups. Skiers had greater prevalence of hip cam morphology compared with non-athletes. A low Pelvic Incidence (PI) was not correlated with abnormal cam morphology. Between baseline and 2-year follow-up, there was no significant interval change of the spinal column findings on MRI, nor in back pain prevalence, neither for skiers nor non-athlete.

KEYWORDS: Skiers, football, soccer, Schmorl's node, MRI, follow-up.

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