

Spino-pelvic sagittal alignment and back and hip pain prevalence in young elite athletes

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**This thesis is based on the following studies,
referred to in the text by their Roman numerals.**

I. Cecilia Agnvall PT, Carl Todd MSc DO, Peter Kovac MD, Anna Swärd MD, Christer Johansson MSc, Leif Swärd MD PhD, Jon Karlsson MD PhD, Adad Baranto MD PhD.

Validation of spinal sagittal alignment with plain radiographs and the Debrunner Kypometer

Medical Research Archives. 2015: 1. DOI: <http://dx.doi.org/10.18103/mra.v2i1.319>.

II. Carl Todd MSc DO, Peter Kovac MD, Anna Swärd MD, Cecilia Agnvall PT, Leif Swärd MD PhD, Jon Karlsson MD PhD, Adad Baranto MD PhD.

Comparison of radiological spino-pelvic sagittal alignment in skiers and non-athletes

Journal of Orthopaedic Surgery and Research. 2015: 10:162, DOI: 10.1186/s13018-015-0305-6.

III. Carl Todd MSc DO, Anna Swärd MD, Cecilia Agnvall PT, Leif Swärd MD PhD, Jon Karlsson MD PhD, Adad Baranto MD PhD.

Clinical spino-pelvic parameters in skiers and non-athletes

Jacobs Journal of Sports Medicine. 2016: 3(3): 022.

IV. Carl Todd MSc DO, Wisam Witwit MD, Peter Kovac MD, Anna Swärd MD, Cecilia Agnvall PT, Páll Jonasson MD PhD, Olof Thoreson MD PhD, Leif Swärd MD PhD, Jon Karlsson MD PhD, Adad Baranto MD PhD.

Pelvic retroversion is associated with flat back and cam type Femoro-acetabular impingement in young elite skiers

Journal of Spine. 5: 326. DOI:10.4172/2165-7939.1000326

V. Carl Todd MSc DO, Anna Swärd MD, Cecilia Agnvall PT, Olof Thoreson MD PhD, Leif Swärd MD PhD, Jon Karlsson MD PhD, Adad Baranto MD PhD.

An investigation into the prevalence of spine and hip pain in young elite skiers

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SAHLGRENSKA AKADEMIN
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Abstract

Young athletes that perform regular intense training and sports competitions have been shown to increase the risk of low back pain (LBP). This may be the result of heavy loading in different planes to the spine, heavy training in young age, overuse injuries or from postural positions associated with particular sports that sustain heavy loads to the spine, at a young age. Whilst specific spinal pathologies have been shown to correlate with types of spinal curvature according to Roussouly et al. (2003), little is known about how pelvic or hip morphology may effect spinal alignment. It is not fully understood how hip joint conditions such as whether Femoro-acetabular impingement (FAI) and sporting activities may affect the spino-pelvic sagittal alignment in young Elite athletes.

This thesis aims to investigate the results from clinical and radiological studies that compared the spino-pelvic sagittal alignment and the prevalence and correlation of back and hip pain in young Elites athletes to a non-athletic population. The athletes were young Elite skiers (n=75) and were all High School pupils (grades 1-4, between 16-20 years of age) as the control group (n=27) were first year High School pupils.

Study I is a validation study of spinal sagittal alignment using plain radiographs and the Debrunner Kyphometer comparing young Elite skiers and non-athletes. Measurement of the thoracic kyphosis showed good levels of agreement for comparison of both methods. Measurement of lumbar lordosis was shown to have poor levels of agreement for comparison of both methods.

Study II is a radiological study comparing the spino-pelvic sagittal parameters between young Elite skiers and non-athletes. Elite skiers were shown to have a greater prevalence of Type I spinal curves according to Roussouly et al. (2003).

Study III is a clinical study comparing the spino-pelvic parameters in standing and sitting between young Elite skiers and non-athletes. Elite skiers were shown to have significantly lower values for spino-pelvic sagittal alignment in sitting and standing compared with the non-sporting population.

Study IV is a radiological study comparing spino-pelvic sagittal alignment in relation to hip joint cam-type FAI between young Elite skiers and non-athletes. A significant difference was shown for an increased Pelvic Tilt (PT) value in an age-matched mixed-group of Elite skiers and non-athletes in the presence of increased morphological hip joint cam-type FAI. Elite skiers were also shown to have an increased prevalence of spinal Type II classification according to Roussouly et al. (2003), in the presence of an increased frequency of cam-type FAI.

Study V investigated the prevalence of spine and hip pain in athletes using a three-part questionnaire, a specific back and hip pain questionnaire, Oswestry Disability Index and EuroQoL. Young Elite skiers were shown not to have a significant difference for lifetime prevalence of back pain or hip pain compared with non-athletes. In spite of this a high percentage of skiers reported duration of back pain prevalence > 5 years, however, this was not statistically significant.

Keywords

Athletes, cam, Femoro-acetabular impingement, Debrunner Kyphometer, Low back pain, Pelvic parameters, Pelvic Tilt, Skiers, Spino-pelvic alignment.

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