

Examination of dissertation, Faculty of Physical Education and Sport of the Charles University in Prague

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Dissertation thesis title: Pelvis malposition is related to knee dysfunction by loading of long duration (presentation in the case of endurance runners).

Review:

The title itself does not clearly define the subject of the dissertation. A suggested title could be "An Analysis of the Position of the Pelvis in Long-distance and Endurance Runners, and the Effects on the Function of their Knee Joints."

Style of the study is well-arranged. The form of the thesis is illustrative. The thesis including literature has 104 pages + attachments. A list of referred literature is extensive (101 publications), and is well chosen but unfortunately, literature about physiology, pathophysiology of pain and examination of pain is missing. Quotations are mainly from English, German and Czech scientific literature.

Formal and graphic layout is concise. Regrettably, the English translation contains innumerable errors, some of the terminology stated by the author has not been well translated, for instance "a rehabilitation worker" (p. 76) instead of a physiotherapist.

The dissertation is divided into the following parts: introduction, theory, and is concluded with a review of scientific literature related to the given issue, mainly the objective methodic of pelvis malposition, anatomic leg length measurement, the elimination of athletes (endurance runners) with organic hip joint and knee joint dysfunctions.

The theoretical part is well structured, includes a comprehensive range of colour pictures detailing an anatomical and biomechanical approach, both in regard to the pelvis and knee joint and their anatomical structures. The part of the study which deals with pain is not handled with sufficient accuracy. An excessive overload on a knee joint without a pelvis malposition, and a dysfunction of the hip, might also influence knee pain. Scoliosis is one of the other influencing examples. Actually, the candidate mentions the issue of scoliosis in literature - Hackenberg L., Hierholzer E., Bullmann V., Liljenqvist U., Götze C., and "Rasterstereografic back shape analysis in idiopathic scoliosis after posterior correction and vision". The candidate has good insight into the theoretical part from an anatomical and biomechanical viewpoint, but there is no functional standpoint. In the "Purpose of the study" chapter, he has stated that endurance runners involved in the study responded in writing to knee pain localization as a report of subjective pain. Pain is always subjective, and depends also on individual pain thresholds. Some people have very low pain thresholds, others high thresholds. In knee pain, localization is not the only significant matter as mentioned by the student. It is necessary to find out the character of pain, the dynamic of pain, whether one has a relief position, when and in what position, and at which physical effort pain is most intensive, whether the pain progresses to other parts of the body, how long has the pain persisted, whether a runner has also a problem with pain in hip joints, pain in the other knee joint, and in the tarsal, metatarsal and interphalangeal joints.

The following chapter is a hypothesis. The candidate assumes two hypotheses:

1. Is there a relation between a pelvis malposition and a knee joint dysfunction.
2. There is no specific relation between the localization of pain in the knee region, and the type of pelvis malposition.

Taking into account that the student presumes a positive answer to the first question, and a negative answer to the second question, there should be a question mark at the end of both sentences.

The study title does not fully describe both hypotheses, because of the fact that in the second case we cannot say that there is a relation between the character of a pelvis malposition and a knee joint dysfunction.

The pain is depicted in the second hypothesis but the pain is actually only one of the indicators of a knee joint impairment. In general, pain cannot be classified as knee joint dysfunction. Pain is a protective mechanism and a signal that announces a function overload or an arisen impairment. Therefore, a man who has knee joint pain does not necessarily have a joint impairment.

In the Methodology chapter, the candidate shows data concerning the examination of 100 cases that he has divided into two groups: 50 persons with knee pain, and 50 persons without knee pain.

Even if pain in one knee is described, it is very likely that a runner has suffered pain in both knees. The candidate indicates preliminary criteria and contradictions of a study entry. He took measurements at the beginning of the study, and check measurements were done 4 weeks later.

In every case, anamnestic data is described, e.g. gender, age, bodyweight, height and the intensity of the running load. As well, the methods of examinations are given. Testing of sacroiliac joint function as well as the anatomic leg length measurements, and the position of the two, anterior and superior iliac spine measurements (according to Thomas and Nelsona) were worked out excellently.

Methodology in which the runner is asked about knee joint pain localization (ventral, dorsal, medial, lateral or a combination of these) is not sufficient. There are algometric methods that are commonly used, but the student mentioned none of these in either quotation. This approach to pain measurement cannot be considered as standardized. A subjective scale of pain intensity from 0 to 100 gives an illustrative picture of a subjective feeling of the runners, and their potentials and limitations to run.

Statistic methods, validity and reliability of coefficients were used appropriately. In the "Result" chapter, the student describes the results in tables. In column "a" a side of sacroiliacal dysfunction (right and left) is described; in column "b" a difference in anatomic leg length; in column "c" a malposition bilat. comparison; in column "d" a difference in knee flexion bilat. comparison; in column "e" a difference in knee extension bilat. comparison; in column "f" a difference in hip endorotation bilat. comparison; in column "g" a difference in hip exorotation bilat. comparison; in column "h" pain localization, and column "i" a subjective scale of knee pain.

I think that the comparison of right – left sides is unexplained. The candidate expects one leg to be "healthy", and the second leg to have a "dysfunction". Impairment of both knees or a long-lasting overload of both knees with pain, with or without dysfunction can be seen in runners with overloaded legs.

From each column, the candidate shows final data from a comparison of both groups which he has presented in charts, at the beginning of the examination, and also fourteen days later. Afterwards, he elaborates the statistically acquired measurements.

He also illustrates a number of pain localizations in charts - ventral, dorsal, medial, lateral, ventral/medial, dorsal/lateral, ventral/lateral, dorsal/lateral depending on varied types of pelvis malpositions. Described as "spots of pain", this is an insufficient description, as mentioned above. This is a simplification without the use of algometry.

In the "Summary of the results" chapter, the candidate gives basic demographical data about the two groups of respondents. He compares results according to the height and weight of runners, about leg lengths and overloads. The candidate states that in all members in the group with knee pain, he measured pelvic malposition. In both groups, he assessed the angle of knee flexion, intrinsic and extrinsic hip joint rotation, and he compared a right leg to a left leg. He has come to results that are not significant. Other compared facts in the tables show that there are no significant differences between the two groups of cases, not even between the first and second examinations. The same is true about a comparison of a type of pelvis malposition and pain localization.

In "Discussion", the candidate mentions that he wants to incorporate the results into present scientific knowledge in this field. He would like to emphasize the clinical use of the study for physicians and physiotherapists.

The only positive outcome I can see, is that the results of the study can be used in the prevention of knee dysfunction in runners who have pelvic malpositions, and who suffer after long and long-lasting running.

As stated in "Discussion" (p.77), quoted authors Rechter and Hebgen, Peeters and Lason, Frich, Meer, Snijder, believe that there is a relation between a pelvic malposition and knee pain in athletes, but all these authors see these results from a functional and anatomical point of view. Unfortunately, this functional viewpoint is missing in this study. The candidate regards the issue from an anatomical and biomechanical point of view, but not from a functional point of view.

In "Discussion about methodology" no discussion about pain was included, pain itself is depicted simplistically.

In "Discussion about the results", the student describes particular phases of the submitted study, and also describes several scientific studies related to this issue.

In conclusion, he mentions that a correlation between a pelvic malposition and knee problems as a result of long-distance racing has shown that one-sided malposition of the iliac bone can probably lead to a change in the kinesiology and biomechanics of the lower extremities. Both a functional point of view and a potential connection with other supporting joints and the spine are missing.

Conclusion of the review:

It is obvious that the candidate is familiar with the field of health problems in runners. Literature about biomechanics, sport medicine, manual medicine, orthopedy is well selected, but literature about physiology, pathophysiology of pain, and the examination of pain is not included. Also, literature about the functional examination of movement is not included. The study title does not fully describe both hypotheses, because in the second case dealing with knee pain, we cannot say that there is a correlation between the character of a pelvis malposition and knee joint dysfunction.

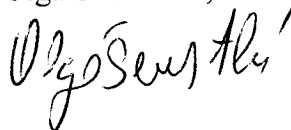
The functional point of view on this issue is missing.

The part of the study dealing with pain is not elaborated sufficiently or decisively. Methodology, in which the runner is asked about knee joint pain localization (ventral, dorsal, medial, lateral or combination of these), is insufficient. There are algometric methods that are commonly used throughout the world, but the candidate mentioned none of these in neither quotation. This approach to pain measurement cannot be considered as standardized. The use of the study outcomes is feasible in the prevention in runners who have pelvic malpositions, and who are exposed to the onset of knee pain after a constant and long-lasting run.

I recommend defence of the dissertation.

Final classification of this study will depend on the defence process, on answers to all the above-mentioned remarks, and finalization of the theoretical part, i.e. the functional examination of the relevant issues, and the basis of physiology, and pathophysiology of pain and algometry.

Assoc. prof. Olga Švestková, M. D., Ph.D.



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