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### **Review**

of the doctoral thesis submitted by Robert Gajewski, M.Sc.  
entitled "Problems of footwear for pregnant women"

#### **1. Formal grounds for the review**

This review has been written following the letter of the Dean of the Faculty of Technology at the Tomas Bata University in Zlin of 11 Dec. 2009.

#### **2. Characterisation of the thesis**

The thesis has the character of research work which examines the influence of pregnancy on foot health and discusses the issue of selecting footwear for pregnant women.

The doctoral thesis consists of the main body and an Annex. The main body is presented on 142 pages and is divided into 8 chapters. Test results are presented in 69 tables, 24 drawings and 6 graphs. Bibliography includes 161 items.

The thesis consists of:

- introduction which contains justification why the study has been taken up,
- literature review which can be regarded as a theoretical introduction,
- explanation of methodology (Chapter 3, pp. 29-38) containing characteristics of the experimental material and research methods,
- research results and their discussion (Chapter 4, pp. 39-84),
- discussion of the results which has the character of a summary,
- conclusions,
- bibliography.

#### **3. Assessment of the usefulness of taking up the research**

The period of pregnancy and confinement is a particularly difficult time for women. The changes which occur then affect, less or more acutely, every woman who is to give birth to a baby. The problem of selecting footwear for pregnant women and the general impact of

pregnancy on foot health has been the object of investigations for a long time, however, it has barely been discussed in literature.

In view of the above said, starting research into the way in which pregnant women or those in the post-natal period walk is fully justified. Equally justified are possible recommendations allowing to prevent negative changes caused by pregnancy in the foot morphology.

#### **4. Evaluation of the factual contents of the thesis**

In the introduction the Author outlines the aspects related to the issue of footwear for pregnant women as well as presents the issues which may influence foot health of women. The factors mentioned are mainly of mechanical (increased pressure on feet due to the increased body weight and a forward shift in the centre of gravity) and physiological (mainly hormone economy) ones. The Author shows the hypotheses which aimed at explaining the fact of a more frequent incidence of foot defects in women due to pregnancy and factors occurring in its course. He describes the development of research into foot biomechanics and the current state of knowledge in this field.

The Author presents the main goals which he set for himself while taking the subject up (p. 28). They include: documentation of the changes occurring in foot functioning in the period of pregnancy and the post-natal period on the basis of examined pressures on the foot sole, determination of changes in the foot size in pregnancy and in the post-natal period, determination whether the changes in women's foot biomechanics and size are permanent.

Chapter 3 outlines the methods used in the research work. The Author describes criteria according to which he selected women for tests in order to limit the number of variables which may affect the results. He also describes equipment which was used for particular tests (biomechanical and anthropometric ones) and the procedures according to which they were carried out.

Chapter 4 reports on the results of conducted investigations. They are divided into sub-chapters according to the research results of distributing pressures on the foot sole in static and dynamic conditions, anthropometric tests, clinical assessment and painfulness during pregnancy. A statistical analysis is an integral part of the chapter. The Author used different methods depending on the type of data. In the case of a comparison between two groups he

used the t-Student test, whereas in the case of factor systems with repeated measurements, he used the analysis of variance (ANOVA). He also conducted an analysis of correlations between selected parameters of examined women (weight, age, etc.) and biomechanical parameters measured by Pearson's correlation coefficient. The aim of this analysis was to identify the factors which may entail stronger or weaker changes in foot biomechanics and morphology caused by the pregnancy induced factors. Calculations were made with the use of the *Statistica* programme. The results are presented in tables. In this part the Author comments on the results as he presents them.

In the discussion of results (Chapter 5), the Author comments on the results obtained and interprets them. At the same time he shows his own results against those obtained by other scholars and presents his point of view on them.

In Chapter 6 – “Design- and material-related requirements concerning insoles and footwear for pregnant women” – the Author presents the footwear available on the market and insoles intended for pregnant women. He describes the footwear, presents its advantages and refers to their usefulness from the point of view of the results obtained. The Author conducted experiments testing the influence of one type of footwear for pregnant women (the so called negative heel footwear) on biomechanics of walking and comments on its functional qualities. Finally, he presents materials and design-related solutions which can have a positive impact on women's foot health, especially when the women are pregnant. His recommendations take into consideration also the latest material solutions which are just being introduced into the footwear practice.

In Chapter 7 - “Conclusions” – the Author presents briefly the most important results and formulates conclusions based on the work conducted by him.

The last Chapter – “Bibliography” – covers 161 items of literature in the field, published in the period from 1920 to 2006, including 17 Polish publications. The remaining ones represent foreign literature. It is a pity that 53 of these items are 20 or more years old.

What is worth mentioning is the fact that it is probably the first thesis dealing in such a complex way with pregnancy as a factor influencing foot physiology and functioning. Its complexity refers to both the number of tested women (33) and the length of research which

spanned from the early stage of pregnancy until the post-natal period. Thus, it is the thesis which is becoming an inherent part of a discussion on the factors which may affect foot deformation and as such it is of great cognitive as well as practical significance.

Fully understandable investigation procedures, correlations between and interpretations of results obtained by many complementary methods account for reliability of results and relevance of conclusions.

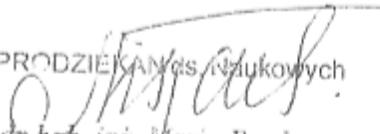
It must be emphasized that the Author has considerable academic achievements to his credit (41 publications).

### 5. Conclusion

The doctoral thesis entitled "Problems of footwear for pregnant women" and submitted by Robert Gajewski, M. Sc. is an original contribution to the knowledge on the effect of pregnancy on foot physiology and functioning. The Author has proved his general knowledge of theory and ability to investigate, analyse, and present results independently. A very good critical review of literature, quotations from many sources in foreign languages, tackling valid research problems significant for both the theory and practice, application of many complementary research methods, versatile analysis and interpretation of results allow me to declare that the doctoral thesis in question meets the requirements specified in the Act of 14 March 2003 on academic degrees and title and degrees and title in the field of art (Journal of Laws No 65, item 595). Consequently, I recommend the thesis for public defence.

Radom, January 2010

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