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Title

Options for predicting the speed of growth of childrens feet

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Summary

According the anthropological study of children's feet was developed prediction mathematical model to helping parents and chop assistants for right chosen correct size of shoes and establishing how long can their children new shoes wear.

Introduction

The production of childrens footwear must respect the fact that a childs foot is a growing foot. The provided analyses demonstrate that a high proportion of children wear shoes the dimensions of which restrict foot growth (1-5). The speed of foot growth is then dependent on various factors. Cavanagh (8) and Cheskin (9), Rossi (10). recommend to parents that they should compare their childrens foot length with the size of the shoes worn after a certain period of wear. The entire situation is complicated by the chaos in footwear numbering. At the very least, this requires the ownership of a measuring instrument for foot length and footwear or a visit to a sales shop. Therefore, an extensive measurement of childrens feet and the foot length of their genetic parents was conducted for the purpose of establishing a mathematical model that could facilitate a more precise establishment of the period during which it is possible to wear newly purchased childrens shoes.

Methods

Overall, included in the results for the 2008 children foot were children aged from 3 to 19, 1002 girls and 1006 boys. During the selection of the children, care was taken that each year was represented by at least 25 boys and 25 girls. The rate of return for questionnaires was very low, for girls 42% and boys 34%. A simple foot outline was performed for each child. Recorded at the same time were the date of birth of the child, his/her weight, height and gender. Each child received detailed instructions with a guide and were asked to perform the same task with their

parents and presenting weight. From the foot outlines, the direct foot length was determined and these data were analyzed using multiple non-linear regression methods. A dependent variable was the length of a growing child's foot. As the independent variable was the values achieved for the actual age of the child at the time of measurement and the foot lengths for both parents.

Results

The measured values were analyzed in detail using multiple non-linear regression. Two independent groups (boys, girls) were evaluated. From the selection of basic non-linear equations, the following were shown as ideal equation types:

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_{11}X_1^2 + B_{22}X_2^2 + B_{33}X_3^2 + B_{123}X_1X_2X_3$$

where Y is the child's foot length, X₁ is the age of the child at the time of measurement, X₂ the child's foot length at the period of measurement, X₃ the sum of foot lengths of both parents and B₀ through B₁₂₃ are the regressive coefficients of multiple regressive equations.

On the basis of these equations, a program was set up by which it is possible to forecast the anticipated foot lengths in adulthood and at the same time to establish how long newly purchased footwear may be worn by individual children. The program evaluated the deviation of foot sizes from the theoretically calculated foot sizes and calculated the anticipated speed of growth of the child's foot.

The specific approach is as follows:

We warn you that shoes purchased today for your child may be safely worn only until September 25, 2012.

Conclusion

The speed of growth of a child's foot is governed by laws that had not yet been used during the purchase of shoes. Currently, it is possible to take advantage of these laws and to begin to use them routinely during the standard sale of children's footwear. The benefit of the developed program rests in the fact that during the sale of children's footwear, the customer will be informed precisely about the dimensional ratios between foot sizes and newly purchased shoes. Theoretically, it is possible to prevent the purchase of small shoes or at least to notify the customer of such a fact. At the same time, this reduces the possibility of foot deformity due

to wearing small shoes, when the growth of the foot necessitates replacing old shoes. Other applications can be found for the model during the production of individual childrens footwear, when it is possible to calculate foot size until the period of receiving individually manufactured orthopaedic shoes.

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