Development and testing of a new type of „barefoot running shoe“: The freeheel runningpad

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Common barefoot running shoes or minimal footwear have one or several of the following properties/deficiencies, depending on the type and brand and personal taste: - Coverage of a considerable fraction of the foot’s surface with textile/plastic leading to sub-optimal foot climate - Considerable weight for a true “barefoot shoe” - Toe pockets that do not fit with non-standard feet - Considerable size and thickness, in particular in the heel section of the protective sole for a true “barefoot shoe” - Positive drop and therefore a change in the biomechanics compared to barefoot running. We wanted to design a new type of shoe that would be as close as possible to “real” barefoot running” and thereby overcome one or several of these perceived deficiencies. Whether this would lead to a reduction or increase in running related injuries and how to best train with the new shoes is not within the scope of this article.
Background

Common barefoot running shoes or minimal footwear have one or several of the following properties/deficiencies, depending on the type and brand and personal taste:
- Coverage of a considerable fraction of the foot’s surface with textile/plastic leading to sub-optimal foot climate
- Considerable weight for a true “barefoot shoe”
- Toe pockets that do not fit with non-standard feet
- Considerable size and thickness, in particular in the heel section of the protective sole for a true “barefoot shoe”
- Positive drop and therefore a change in the biomechanics compared to barefoot running

We wanted to design a new type of shoe that would be as close as possible to “real” barefoot running and thereby overcome one or several of these perceived deficiencies. Whether this would lead to a reduction or increase in running related injuries and how to best train with the new shoes is not within the scope of this article.

Methods

Being a recreational runner for several years in normal running shoes the author performed a self-experiment by changing to run in Vibram five-finger shoes. MD gained experience over a time period of 18 months, including a half-marathon, a marathon and an ultra-marathon in the mountains (>50km, >2000m). During these runs an accelerometer recorded the accelerations at the COM (actibelt) and the subsequent analysis revealed changes in the step patterns. MD was stimulated by the work of Daniel Lieberman, by the work of Bernd Heinrich “Why we run” and by Christopher McDougall’s “Born to run”. The above mentioned properties/deficiencies were perceived in hundreds of hours running with conventional barefoot shoes. Based on the concept from evolutionary biology of being designed for running long distances with a forefoot strike, barefoot at high temperatures the idea emerged to develop a shoe that would only protect the forefoot, with minimal coverage of the rest of the foot and with a sole that would act like a “second skin” with minimal changes to the biomechanical properties of the otherwise unprotected foot. The following figure shows the different types of shoes used for the experiment.

Results

We developed the “freeheel runningpad” (http://www.runningpad.de/ "It’s top), a “shoe” that could be seen as the front part of huaraches, with a leather sole and an elastic strip or leather strip that attaches the sole to the foot. It is of very low weight. Sweating is not much different from being barefoot, but the front part protects both has roughly, and by definition, 50% less sole area than usual (minimal) shoes. Because of this and the missing front part of huaraches, with a leather sole and an elastic strip or leather strip that attaches the sole to the foot. It was designed for running long distances with a forefoot strike, barefoot at high temperatures the idea emerged to develop a shoe that would only protect the forefoot, with minimal coverage of the rest of the foot and with a sole that would act like a “second skin” with minimal changes to the biomechanical properties of the otherwise unprotected foot. The following figure shows the different types of shoes used for the experiment.

Conclusions

The concept of the shoe is actually not entirely new. It turned out that “ashinakas” (Figure ...) were worn in Japan a much increased risk of injury (https://peerj.com/preprints/250/). It will be interesting to see if the shoe can be integrated in the context of natural walking/exercise walking in a rehabilitation setting. Independent and knowledgeable research in the biomechanical properties of barefoot shoes and the relationship with running injuries is warranted.

A short overview about the history of shoes

The following figures show different types of shoes and some background information.

REFERENCES

1. www.runningpad.de
4. www.purpleleaves.de/blog/de/high-heel/

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