The effect of MBT shoes on the gait pattern. A gait analysis

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MBT Model: Sole 2004

ABSTRACT

INTRODUCTOIN: Walking is one of the most important functions of our musculoskeletal system and the most elementary form of moving. It is a complex interaction of joint movements, selectively controlled muscle activity and positional perception which allow a person to move at a certain speed in a chosen direction (Perry in Goetz - Neumann, 2003). No other movement is performed as often and as automatically as walking.

Every type of movement has certain stability. There are two strategies to aid stability when walking and standing (Nigg, 2004):

Firstly, shoes can be worn which support stability (foot orthotics, high shoes, etc.). Secondly, it makes sense to train the leg muscles. Unfortunately, the muscles in the lower extremities are neglected when using "stable" shoes and therefore not trained. This has to be compensated with special training (e.g. with MFT training devise). Therefore, it makes sense to carry out this type of training in the daily activities (Nigg, 2004). In order to do so, however, it is necessary to use "unstable" shoes.

This was the basic idea of the company Masai Barefoot Technologies (MBT) in development of an innovative shoe. The aim was to design a shoe which offer less stability and can still be worn in everyday situations. The wearer is therefore forced to stabilise himself/herself through increased muscle activity. This unique and continual

stabilisation has been demonstrated positive medical and health effects (Nigg, 2004; MBT, 2004).

As already mentioned, walking is a very ingrained and automatic movement. The company promises that using this shoe alters gait patterns. In addition, when a pair of MBT shoes are purchased, a special gait training by an authorised MBT instructor is offered. This gait training serves to help teach this specific walking technique. How do you learn this walking technique? - What teaching theory is it based on? Can this walking technique be transferred to normal shoes? Are there disadvantages in comparison with normal shoes?

METHODS: The random test was performed on a female sports student (22 years old) and a male sports student (25 years old). The test subjects were not experienced in using MBT shoes and were rested when they came to the examination. The kinematical measurements were performed with a JVC digital camera, the SIMI motion software and the dynamic measurements using AMTI power measurement discs. The examination varied for each test subject.

Test subject 1:

Measurement in normal shoes (actual value), measurement in MBT shoes immediately after putting them on, 10 minutes movement in MBT shoes without training, another measurement in the MBT shoes, repeated measurement in the MBT shoes after a further 10 minutes followed by an immediate measurement in normal shoes, and after a further 10 minutes a final measurement in normal shoes.

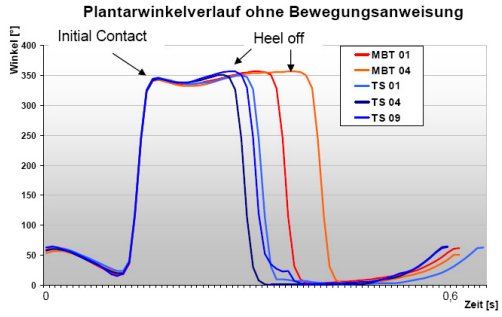
Test subject 2:

Measurement in normal shoes (actual value), measurement in MBT shoes immediately after putting them on, specific training with an MBT instructor, measurement after 10 minutes in the MBT shoes with another measurement after a further 10 minutes, followed by immediate measurement in normal shoes, and a final measurement in normal shoes after 10 minutes.

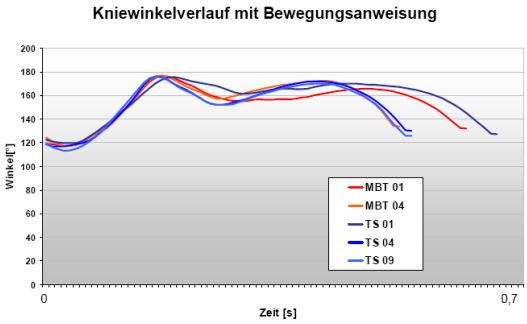
RESULTS:

Kinematics:

- The mean stance phase up to heel-off is extended. This is clearly displayed in the plantar angle progression. With instruction this extension is relatively larger.



Plantar angle without instruction



Knee angle with instruction

MBT 01 = Test with MBT shoes; MBT 04 = Test with MBT shoes after 10 minutes; TS 01 = Actual value in normal shoes; TS 04 = Test after training; TS 09 = Test 10 minutes after the training

- Only slight alterations were detected at the knee angle and during the different marginal conditions. A difference could only be seen after instruction.
- A transfer to the "old" marginal condition would only be recognisable at the knee angle with instruction. Otherwise, no transfer was detected.

Dynamics

- First peak – lower in MBT shoes
- Second peak – lower in MBT shoes
- The strength curve is longer and smoother with MBT shoes.

An external influence (instruction) does not seem to make a difference here. Therefore, the reaction force seems to be directly dependant on the external marginal condition.

CONCLUSION: The dependence of the performance of movement on external parameters was clearly shown. An alteration was immediately visible both in the kinematics in the ankle joint region and in the dynamics. Strong dependency especially in the lower extremities is to be presumed. An alteration of the gait pattern was also achieved in the knee region by another parameter, namely instruction.

Dynamics paints a similar picture to the plantar angle progression. The dependence of a reaction force on external alterations is very strong. A transfer to the old marginal condition could not be identified.

This is also logical – otherwise there would not be such a strong degree of dependency. However, this is contrary to alterations that are easier to influence by oneself. Here, transfers were identified.