

GenuTrain®

EVALUATION OF THE BIOMECHANICAL MODE OF ACTION OF THE GenuTrain® KNEE SUPPORT

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One postulated effect of GenuTrain is that it relieves and stabilizes the knee joint. The aim of this study was to investigate the biomechanical mode of action of knee supports in patients walking with a pathological gait – patients suffering from osteoarthritis of the knee in this particular comparative cross-sectional study. The study focused particularly on the adduction of the knee joint and the associated joint torque, because these aspects are considered to be connected to the development of osteoarthritis of the knee. The study compared the kinematics and kinetics of walking with and without a knee support.

METHODOLOGY

Sample:	n = 31 (16 females, 15 males)
Age:	51 ± 9 years for females, 54 ± 6 years for males
Test support:	GenuTrain knee support (Bauerfeind AG)
Test method:	3D kinematics and kinetics (Vicon)
Data analysis:	Variance analysis with significance level of 5%
Inclusion criteria:	• Age: 25–65 years • Unilateral or unilaterally pronounced bilateral osteoarthritis of the knee
Exclusion criteria:	• Neurological impairments • Endoprotheses for the knee, hip, and ankle • A definite intolerance of the physiological stresses occurring during the study



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Active support for relief and stabilization of the knee joint

Source:

Schween R, Gehring D, Gollhofer A (2015); Immediate Effects of an Elastic Knee Sleeve on Frontal Plane Gait Biomechanics in Knee Osteoarthritis. PLOS | one 10(1): e0115782. doi:10.1371/journal.pone.0115782

RESULTS

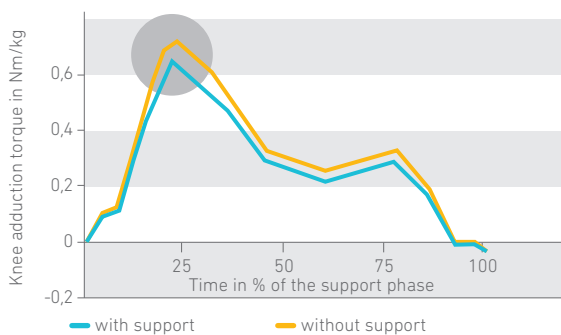
The knee adduction in the affected (= diseased) leg was significantly reduced by the knee support at the beginning and at the peak of the floor contact phase (by an average of 2°; no picture).

The maximum knee adduction torque in the affected leg was significantly reduced when wearing the knee support (by an average of 9%).

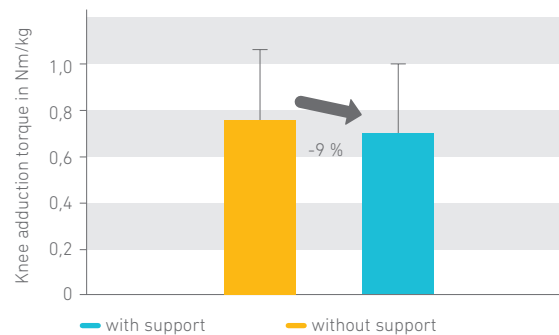
With GenuTrain, a significant reduction of the maximum pressure value of up to -25% in the hindfoot area was measured.

- **GenuTrain affects the neuromuscular control of the gait**
- **GenuTrain relieves and stabilizes the knee**

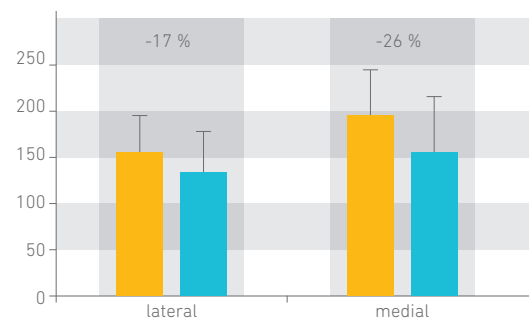
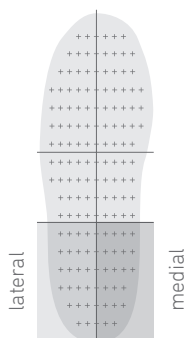
Knee adduction torque



Maximum knee adduction torque



Pressure in the hindfoot area



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PROPRIOCEPTION DECLINE IN THE OSTEOARTHRITIC KNEE

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In the early stages, osteoarthritis is limited to changes in the articular cartilage. Accompanying inflammatory responses then also occur as part of the overall condition at a later date. In general, the development of osteoarthritis is a process involving multiple aspects, in which changes on a mechanical and molecular biological level and traumatic, genetic, and hormonal factors play a significant role. Proprioception decline is also a major part of this pathogenetic process. The frequently altered gait – that often cannot be explained solely by pain or the age of the patient – already indicates proprioception decline.

The aim of the study is to measure the effect of a knee support on the proprioception of patients with polyarthritis.



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METHODOLOGY

Patients:	n = 59 in total, n = 34 women, n = 25 men, age: 69.8 years
Healthy subjects:	n = 80 in total, n = 46 women, n = 34 men, age: 68.6 years (= control group 1)
Healthy subjects:	n = 30 in total, n = 20 women, n = 20 men, age: 23.5 years (= control group 2)
Test support:	GenuTrain knee support (Bauerfeind AG)
Test method:	• TTDPM – (Threshold to Detection of Passive Motion) = angle reproduction test • The supine test subjects are to position a leg model at an angle that corresponds to the one at which they feel their knee is positioned. The patient's leg has previously been positioned at a corresponding angle by a second person ("passive" angle reproduction test). • The supine test subjects are to position their knee at an angle that they are shown using a leg model ("active" angle reproduction test). • The patients were unable to see their legs in any of the tests.
Inclusion criteria:	Patients with severe osteoarthritis of the knee, confirmed in an X-ray. (45 patients with grade IV, 5 with grade III, and 5 with grade II: osteoarthritis grades in accordance with Kellgren)

Source:

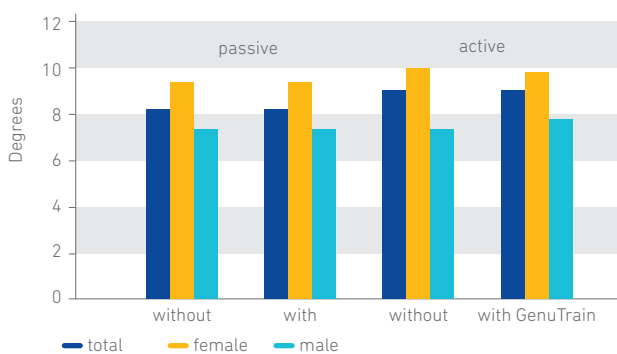
Sell S, Zacher J, Lack S; Proprioception decline in the osteoarthritic knee; Z. Rheumatol, 52: 150-155: (1993)

RESULTS

The group over 50 years old showed an average of 8.3° in the passive test and 8.8° in the active test. The differences between the two groups were statistically significant in both the active and the passive test. The knee support had no demonstrable effect in test subjects with no knee joint problems. The osteoarthritis group had considerably disrupted proprioception values compared with the two control groups. This was evident in both the active and passive tests. A positive effect of the knee support on proprioception was demonstrated in all test methods. With GenuTrain, proprioception is significantly improved in cases of chronic inflammatory knee joint complaints, thus increasing joint stability. Joint perception was improved by 14% in the "passive" test and by 12% in the "active" test.

- **GenuTrain improves proprioception in patients with joint perception deficits**
- **GenuTrain provides neuromuscular stabilization for the knee**

Proprioception in the angle reproduction test
Control group, age = 50 years



Proprioception with osteoarthritis in the angle reproduction test
Total study population

