



THUASNE

EFFECT OF OFF-LOADING KNEE BRACES ON KNEE OA*

Knee OA:

Affects **30%** of people aged
60 or over.**

Each year, **86 million** people
develop knee OA.**

Women are more affected
than men.**



*OA = Osteoarthritis.

**Cui A, Li H, Wang D, Zhong J, Chen Y, Lu H. Global, regional prevalence, incidence and risk factors of knee osteoarthritis in population-based studies. EClinicalMedicine. 2020;29-30:100587. Published 2020 Nov 26. doi:10.1016/j.eclinm.2020.100587

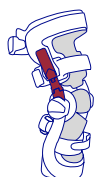
THE EFFECTS OF OFF-LOADING KNEE BRACES ON PAIN



3 metanalysis made by Feehan⁽¹⁾, Petersen⁽²⁾ and Mistry⁽³⁾ conclude that **off-loading knee orthosis** is an **effective way to relieve pain** in the osteoarthritic knee. Pain relief was documented **help in 98,6% of patients** for medial compartment OA.

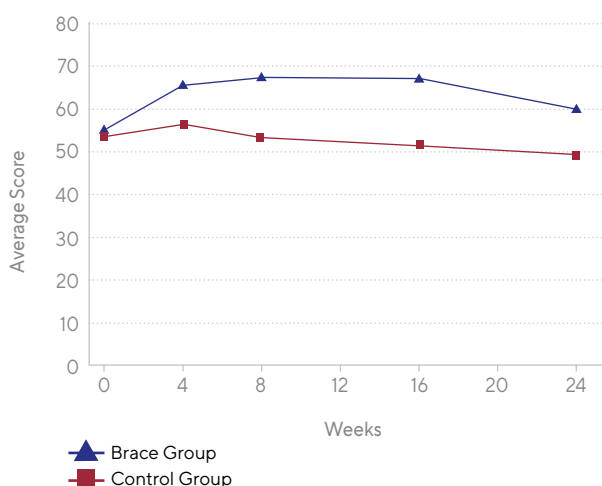


According to Hjartarson⁽⁴⁾, with a **single upright off-loading brace**, **pain** can be **improved** in comparison to placebo during **1-year** of use (study on 149 OA patients).

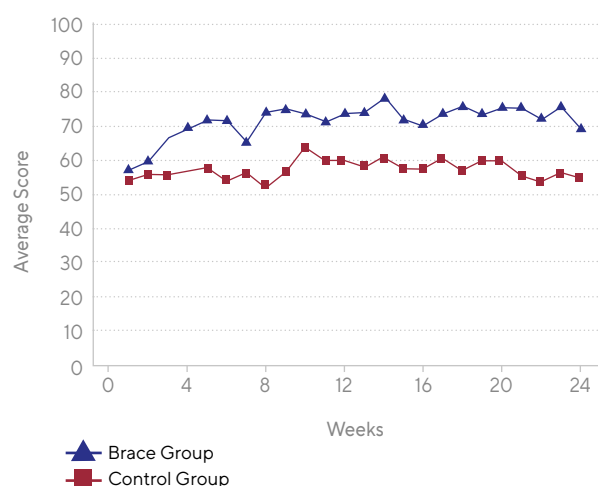


The 2 clinical outcome tools (KOOS and weekly diary VAS) used in the study of Roger⁽⁵⁾ showed **significant improvement in pain** ($p < 0,001$ and $p = 0,021$) in patients wearing **off-loading rigid braces** compared with the control group (study on 50 OA patients).

Pain prospectively rated 0 (extreme problems) to 100 (no problem) on Pain subscale of KOOS⁽⁵⁾



Pain prospectively rated 1 (extreme problems) to 100 (no problem) on VAS⁽⁵⁾



In the same way, **off-loading rigid braces** were found by Giori⁽⁶⁾ to be successful in a majority of patients **3 years** after brace using, with **patients reporting some benefit, primarily with pain** (study on 49 OA patients).

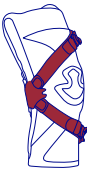
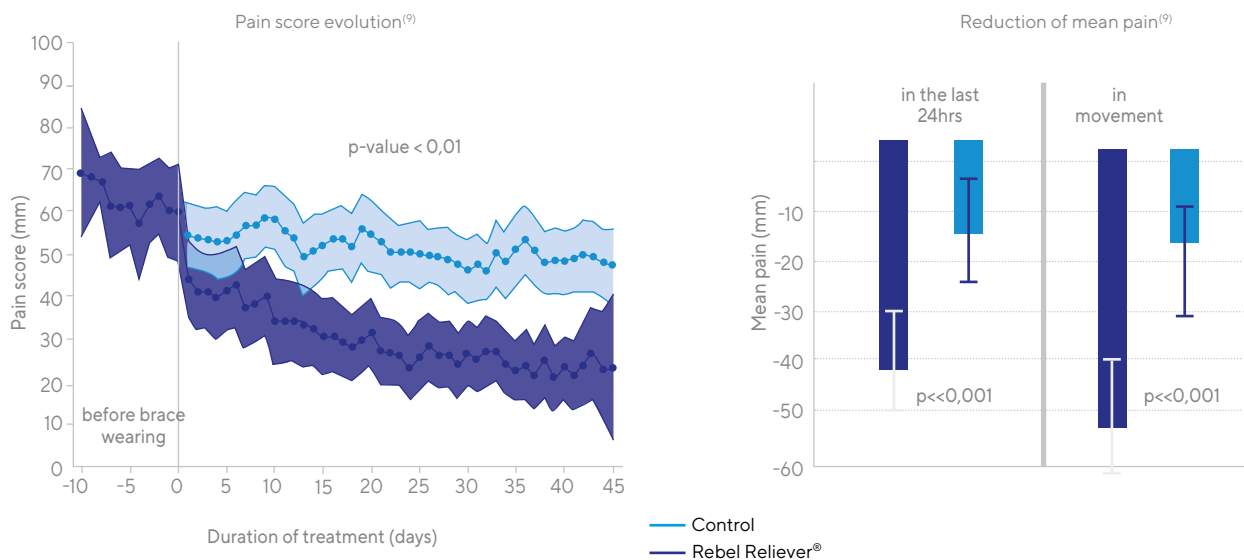
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- (2) Wolf Petersen, et al. "Biomechanical effect of unloader braces for medial osteoarthritis of the knee: a systematic review". *Archives of Orthopaedic and Trauma Surgery* (2016) 136:649-659.
- (3) Dylan A. Mistry, et al. "An Update on Unloading Knee Braces in the Treatment of Unicompartment Knee Osteoarthritis from the Last 10 Years: A Literature Review". *The Surgery Journal* 2018;4:e110-e118.
- (4) Hjartarson HF, et al. "The clinical effect of an unloader brace on patients with osteoarthritis of the knee, a randomized placebo-controlled trial with one year follow up." *BMC Musculoskeletal Disorders*. 2018 Sep 22;19(1):341.
- (5) Roger V. Ostrander, et al. "Efficacy of Unloader Bracing in Reducing Symptoms of Knee Osteoarthritis." *The American Journal of Orthopedics*. 2016;45(5):306-311.
- (6) Nicholas J. Giori "Load-shifting brace treatment for osteoarthritis of the knee: A minimum 2 1/2 -year follow-up study." *Journal of Rehabilitation Research & Development*, volume 41, Number 2, Pages 187-194. March/April 2004.
- (7) Dan K Ramsey, et al. "A mechanical hypothesis for the effectiveness of knee bracing for medial compartment knee osteoarthritis". *Journal of Bone and Joint Surgery Am*. 2007 November; 89(11): 2398-2407.
- (8) Kanto Nagai, et al. "Unloader knee brace increases medial compartment joint space during gait in knee osteoarthritis patients." *Knee Surgery, Sports Traumatology, Arthroscopy* (2019) 27:2354-2360.

THE EFFECTS OF OFF-LOADING KNEE BRACES ON PAIN



Thoumie⁽⁹⁾ showed that the **Rebel Reliever®** knee brace significantly **reduces pain immediately and for a sustainable time** ($p < 0,01$), and also **reduces pain when in movement** ($p < 0,001$). Lamberg⁽¹⁰⁾ corroborated these findings, showing that after 6 months of **Rebel Reliever®** use there were **improvements with regard to pain reduction** (42% of KOOS pain score improvement $p < 0,01$) (study on 19 patients). Similarly, Benning⁽¹¹⁾ confirmed the **reduction of symptoms and extension of pain-free walking distance** with the **Rebel Reliever®** (study on 16 patients).



Wearing a **soft off-loading knee brace** had a **significantly superior effect on pain** (pain-free walking distance increased $p = 0,0001$, decreased of **pain on loading** $p < 0,0001$) compared with standard treatment for Benning⁽¹²⁾ (study on 32 patients).



Ramsey⁽⁷⁾ suggested that **pain relief** may result from **diminished muscle co-contraction** with **knee braces**, which may **result in decreased joint compression**. Indeed, in OA patients, joint laxity and instability is compensated by increased co-contraction (stiffer knee).

The subjects of the Nagai⁽⁸⁾ study felt **reduced pain** when wearing an **off-loading brace**. He showed that **the brace** induced a small (0,3mm on average) but significant **increase (around 10%) in medial compartment dynamic joint space** during gait while no significant differences was found in vertical ground reaction force, suggesting that this increase was not due to decreased external limb load. This increase was **consistent from heel strike to terminal stance**.

CONCLUSION

Off-loading knee braces are a **cost-effective means⁽¹⁾⁽³⁾ of treating OA** and could help to **delay the need for surgery⁽³⁾**.

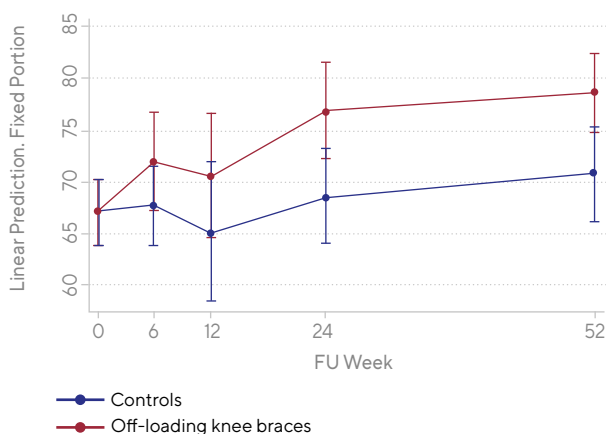
THE EFFECTS OF OFF-LOADING KNEE BRACES ON FUNCTION AND QUALITY OF LIFE



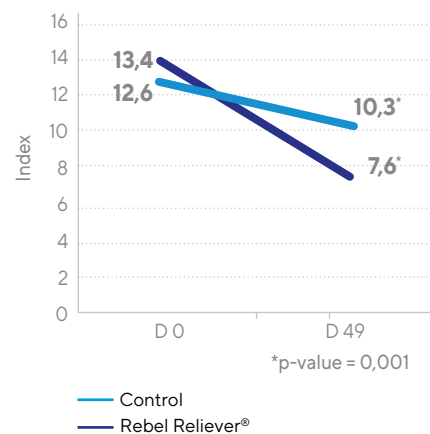
With decreased pain comes **increased function and quality of life**⁽¹⁾⁽³⁾⁽¹⁰⁾⁽¹²⁾.

Off-loading knee brace improves **activity of daily living**⁽⁴⁾⁽⁵⁾⁽¹⁰⁾, **sports**⁽⁴⁾ and **recreation**⁽⁴⁾, with an increased activity levels⁽⁵⁾. Hjartarson⁽⁴⁾ showed the improvements in KSS score are not evident at the 6 weeks follow up, but are improved in comparison to placebo during **1-year use of off-loading knee brace**, suggesting that long-term follow-up is needed and that it may **take time for the patients to adjust** to the brace in the clinical setting and full results should not be expected immediately.

KSS Function with 95% CI⁽⁴⁾



Lequesne algofunctional index⁽⁹⁾



Thoumie⁽⁹⁾ showed that more than **80% of patients** feel a definite and considerable improvement of their condition with **Rebel Reliever®**.

These improvements can be explained by **biomechanical effects** of **off-loading knee braces**: **increased walking speed**⁽²⁾⁽¹⁰⁾ ($p < 0,001$) and **distance**⁽¹²⁾ ($p = 0,0001$), increase in **step length**⁽²⁾, increase in **knee muscle strength**⁽¹⁰⁾ ($p < 0,05$), or **increased gait symmetry**⁽²⁾. This leads to a **better balance confidence**⁽¹⁰⁾ ($p < 0,01$), and an **increased independence**⁽⁵⁾⁽¹²⁾.

CONCLUSION

Off-loading knee braces should be considered a **reasonable alternative**, as part of a **multimodal approach**, to more invasive options, such as Total Knee Arthroplasty⁽³⁾.

KEY TAKEAWAYS

Off-loading knee braces have demonstrated a real **benefit on knee pain** for patients with knee OA. This pain reduction combining with **improved functions** restore mobility and allow patients to **move again**.

This creates a **virtuous circle**: better cartilage nutrition, less wear and tear, less inflammation and not the necessity to have a compensatory posture and movements. All of this leads to an **enhanced quality of life**.

BIBLIOGRAPHY

- (9) Thoumie Philippe, et al. "Effect of Unloading Brace Treatment on Pain and Function in Patients with Symptomatic Knee Osteoarthritis: The ROTOR Randomized Clinical Trial." Scientific Reports 8 (1): 10519.
- (10) Lamberg, et al. 2016a. "Improvements in Function and Strength with Decompressive Bracing of the Osteoarthritic Knee." JPO: Journal of Prosthetics and Orthotics 28 (4): 173-179.
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- (12) M. Benning, et al. "Superiority of a knee relief orthosis in the treatment of knee osteoarthritis: A prospective randomized controlled trial." ORTHOPÄDIE TECHNOLOGY 08/17, Page 24.

THUASNE OFFLOADING BRACES

MEDICAL INDICATIONS



Rebel Reliever®

Symptomatic unicompartmental femorotibial osteoarthritis (moderate to severe).
Knee off-loading for post-traumatic, post-operative or degenerative conditions.
Joint instability/laxity.
Alternative to osteotomy or leg misalignment surgery.
Conservative treatment of knee ligament injuries and/or ruptures (cruciate and/or lateral ligaments).



Patients with medium to high activity



Action Reliever

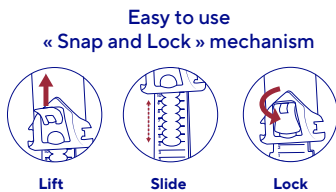
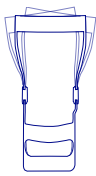
Symptomatic unicompartmental femorotibial osteoarthritis (mild to moderate).
Knee off-loading for post-traumatic, post-operative or degenerative conditions.
Knee pain and/or swelling management.



Patients with medium activity

TECHNICAL FEATURES

LOAD SHIFTERS – for Rebel Reliever®

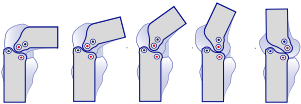


Easy to use

« Snap and Lock » mechanism

Mechanical offloading of the affected compartment⁽³⁾ provided by a significant **varus and valgus correction** of the thigh shell. Averaged **36% reduction of force** through the knee⁽⁴⁾ leading to less pain, better function and clinical benefit⁽¹⁾.

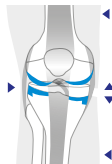
TM5 – for Rebel Reliever®



Ligament protection, prevents tibial instabilities⁽¹⁾⁽²⁾. Roll-back and glide movement similar to natural movement⁽²⁾. No pistonning, no migration⁽²⁾.

DYNAMIC OFF-LOADING – for Action Reliever

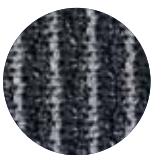
3-POINT PRESSURE



RELIEVE

3-point pressure system: application of **corrective forces** on the leg to **reduce the load** of the affected compartment. **Non elastic straps** creating a **dynamic 3-point pressure system**: maximum straps' tension in extension and so most effective on heel strike⁽¹⁾.

KNITTING STRUCTURE – for Action Reliever



Anatomically-shaped elastic knitting providing **compression** which contributes to enhanced **proprioception** and help to reduce **edema**⁽¹⁾.

(1) Internal CE marking data.

(2) A2S biomechanical study « Biomechanical study of the stride during use of different braces » 2020, including the Rebel® Standard, a rigid ligament brace with the articulation TM5.

(3) Thoumie, Philippe, Marc Marty, Bernard Avouac, Adeline Pallez, Arnaud Vaumousse, Linh Pham Thi Pipet, André Monroche, et al. 2018. "Effect of Unloading Brace Treatment on Pain and Function in Patients with Symptomatic Knee Osteoarthritis: The ROTOR Randomized Clinical Trial." Scientific Reports 8 (1): 10519.

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