

Influences of upper limb orthosis on trunk muscle activity during static and dynamic sitting tasks for hemiparetic stroke

Clinical Biomechanics, 122, February 2025. DOI: 10.1016/j.clinbio-mech.2025.106439

Products

Omo Neurexa

Major Findings

With Omo Neurexa compared to no orthosis:
→ **Significantly higher activity of thoracis (p=0.025) and lumbar erector spinae muscles (p=0.047) on non-paretic side with Omo Neurexa than without it during static sitting**

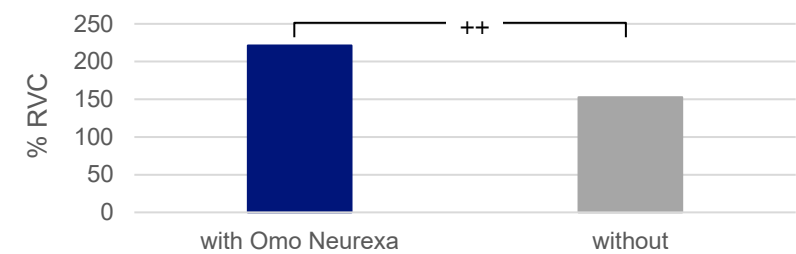


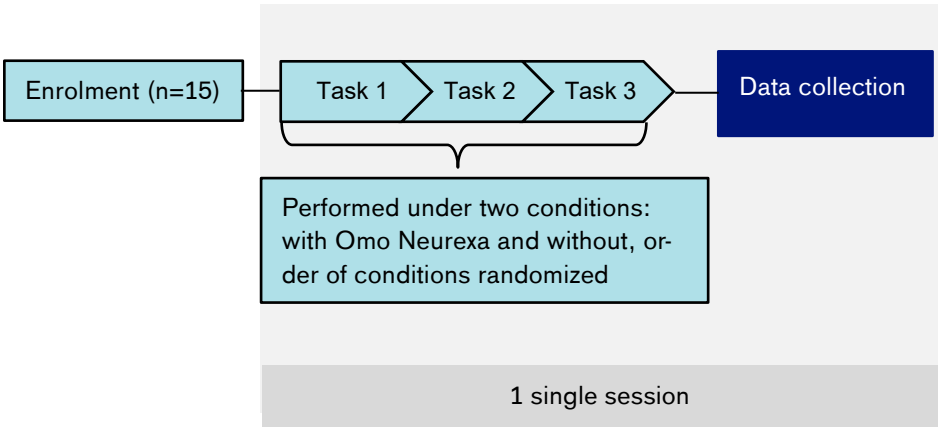
Figure 1: shows the Reference Voluntary Contraction (%RVC) of the thoracic erector spinae on the non-paretic side during static sitting task (++ indicates significant increase)

→ **Significantly shorter time to complete five repetitive lateral reaching movements with Omo Neurexa than without (p=0.030)**

Population	Subjects:	15 (3 females, 12 males)
	Mean age:	63.6 ± 12.8 years
	Clinical condition:	Hemiparesis due to cerebral haemorrhagic or ischemic stroke
	Lesion side:	8 right, 7 left
	Time from stroke onset:	18.9 ± 9.6 days
	Start date of rehabilitation:	2.8 ± 2.0 days

Study Design

Single-group interventional:



The tasks comprised a static sitting task (task 1), a repetitive lateral reaching task involving reaching in the direction of the non-paretic side (task 2) and a maximum lateral reaching task involving leaning in the direction of the non-paretic side (task 3).

Trunk muscle activity and trunk movement were recorded via surface electromyography (sEMG). The elbow joint of each participant was adjusted to approximately 30° to standardize the posture of the upper limbs.

Results

Functions and Activities						Participation	Environment
Biomechanics – Static Measurement	Biomechanics – Gait analysis	X-Rays	EMG	Functional tests	Clinical effects	Satisfaction	Health Economics

Category	Outcomes	Results for Omo Neurexa vs. without			Sig. ^a
EMG	%RVC during static sitting	Significantly higher %RVC of the thoracic and lumbar erector spinae on the non-paretic side when wearing the Omo Neurexa compared to without it.			
		Muscle	With Omo Neurexa	Without	
		Paretic side (p.s.) thoracic erector spina	188.9% ± 114.5%	194.5% ± 128.1%	0
		Non-paretic side (n.p.s.) thoracic erector spinae	221.3% ± 124.3%	152.7% ± 118.3%	++
		p.s. lumbar erector spinae	187.8% ± 132.2%	190.5% ± 164.1%	0
		n.p.s. lumbar erector spinae	137.7% ± 98.4%	103.5% ± 63.3%	++
		p.s. external abdominal obliques	105.1% ± 37.4%	73.7% ± 40.8%	0
		n.p.s. external abdominal obliques	98.4% ± 30.9%	96.0% ± 39.8%	0
EMG		No significant difference in all trunk muscle activities.			

Category	Outcomes	Results for Omo Neurexa vs. without			Sig. ^a
	%RVC during repetitive lateral reaching	Muscle	With Omo Neurexa	Without	
		p.s. thoracic erector spina	490.6% ± 167.9%	551.8% ± 262.5%	0
		Non-paretic side n.p.s. thoracic erector spinae	225.2% ± 118.0%	231.8% ± 139.3%	0
		p.s. lumbar erector spinae	580.7% ± 536.4%	527.4% ± 349.8%	0
		n.p.s. lumbar erector spinae	145.5% ± 94.6%	193.6% ± 279.6%	0
		p.s. external abdominal obliques	455.0% ± 738.8%	208.1% ± 195.6%	0
		n.p.s. external abdominal obliques	183.5% ± 89.7%	166.9% ± 80.3%	0
EMG	%RVC during maximum lateral reaching	No significant difference in all trunk muscle activities.			
		Muscle	With Omo Neurexa	Without	
		p.s. thoracic erector spina	613.8% ± 262.6%	841.9% ± 542.8%	0
		Non-paretic side n.p.s. thoracic erector spinae	180.6% ± 67.0%	162.3% ± 81.0%	0
		p.s. lumbar erector spinae	687.5% ± 662.3%	636.2% ± 522.9%	0
		n.p.s. lumbar erector spinae	135.4% ± 96.5%	141.1% ± 111.3%	0
		p.s. external abdominal obliques	406.1% ± 336.1%	245.1% ± 288.8%	0
n.p.s. external abdominal obliques	192.4% ± 85.6%	176.1% ± 103.9%	0		
Clinical effects	Repetitive lateral reaching time [s]	Significantly shorter when wearing the Omo Neurexa compared to without it.			
		With Omo Neurexa	Without		--
		11.8s ± 4.1s	12.7s ± 4.5s		

^a no difference (0), positive trend (+), negative trend (–), significant (++)/–), not applicable (n.a.)

Author's Conclusion

“Our results demonstrated that wearing the Omo Neurexa upper limb suspended orthosis increased the muscle activity of the erector spinae on the non-paretic side during static sitting. These results may be helpful for exploring the use of upper limb orthoses in the treatment of sitting disabilities in clinical practice.” (Fukata et al., 2025)

Author's Affiliation

¹Department of Rehabilitation, Saitama Medical University International Medical Center, 1397-1, Yamane, Hidaka-shi, Saitama 350-1298, Japan

²Department of Rehabilitation, Sendai Seiyō Gakuin University, 4-7-22, Chuo, Seiyō-ku, Miyagi 982-0011, Japan

³Department of Rehabilitation, Saitama Medical University International Medical Center, 1397-1, Yamane, Hidaka, Saitama 350-1298, Japan

©2026, Otto Bock HealthCare Products GmbH ("Otto Bock"), All Rights Reserved. This article contains copyrighted material. Wherever possible we give full recognition to the authors. We believe this constitutes a 'fair use' of any such copyrighted material according to Title 17 U.S.C. Section 107 of US Copyright Law. If you wish to use copyrighted material from this site for purposes of your own that go beyond 'fair use', you must obtain permission from the copyright owner. All trademarks, copyrights, or other intellectual property used or referenced herein are the property of their respective owners. The information presented here is in summary form only and intended to provide broad knowledge of products offered. You should consult your physician before purchasing any product(s). Otto Bock disclaims any liability related from medical decisions made based on this article summary.