

# Inpatient Shoulder Rehabilitation – Success and Sustainability of a Multidisciplinary Rehabilitation Program

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## INTRODUCTION

Painful shoulder impairments results in substantial difficulties in daily activities. This further results in loss of life quality, reduced working capacity and extensive absence due to sickness which can lead to early retirement or loss of the job. Additionally this results in a high financial burden for the healthcare system.

The goal of non-operative interventions used in rehabilitation programs (exercise, physiotherapy, psychotherapy,...) refer to: (i) Pain reduction, (ii) Help in recovery and maintain a passive range of motion, (iii) To strengthen the rotator cuff in a non-impingement range of motion, and (iv) To prevent the occurrence of progressive pathological changes. Kuhn summarized that exercise in the treatment of rotator cuff impingement (as applied in rehabilitation programs) has statistically and clinically benefits on pain reduction and improvement of function.

[Kuhn JE 2009, J Shoulder Elbow Surg 18:138-160]

## DESIGN

A multicenter (Bad Aussee, Bad Ischl, Gröbming, Saalfelden) follow up study (baseline, 3 weeks, 3 months, 6 months) was performed. Standardized rehabilitation program during the 3 weeks inpatient stay: physiotherapy, mobilization, manual therapy, therapeutically exercise training, medical-gymnastic, underwater-gymnastic, therapeutic ultrasound, electrotherapy, massages, compresses

Inclusion criteria: ♦ 150 patients (30-75 years)  
♦ painful shoulder disorders without total rupture of rotator cuff (OA, tendinitis, bursitis, Impingement)  
♦ VAS ≥ 4

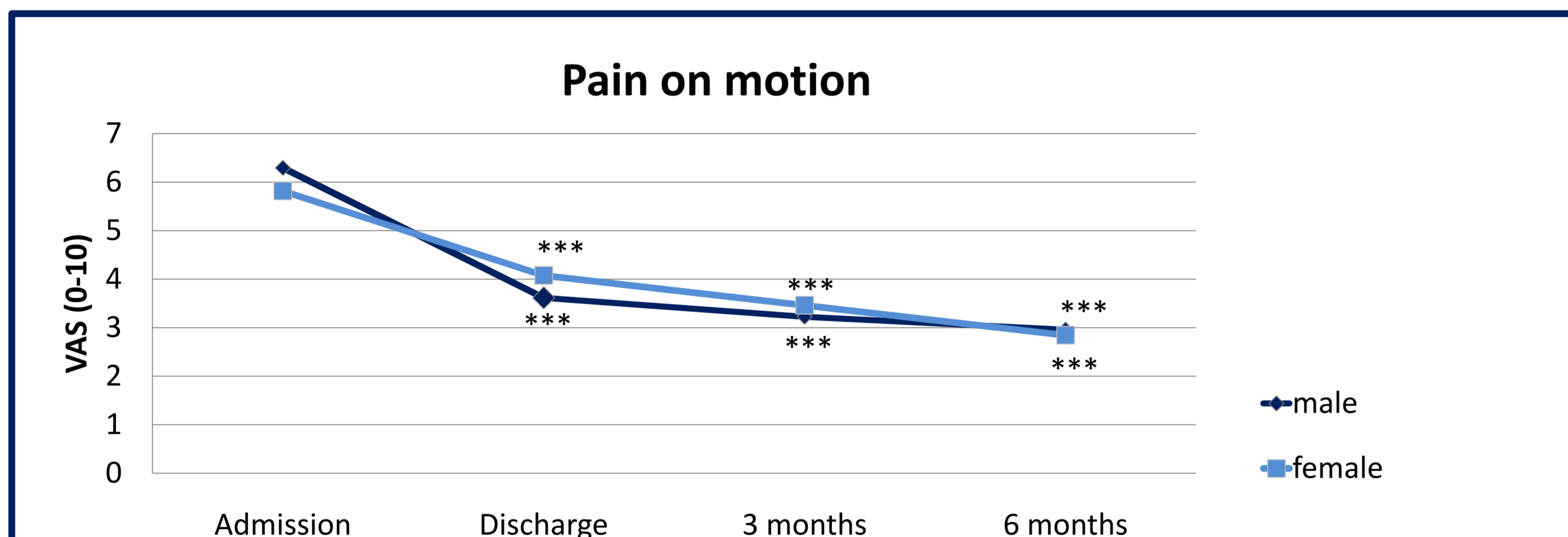
## METHODS

In the study 150 patients suffering from painful shoulder disorders in four Austrian rehabilitation centers were recruited. Data were gained by standardized questionnaires concerning function (Quick-DASH; Disability of the Arm, Shoulder and Hand) sleep quality (PSQI; Pittsburgh Sleep Quality Index) and pain intensity (VAS; Visual Analogue Scale 0-10). Parameters for stress and pain, such as ACTH (Adrenocorticotrophic Hormone/ Corticotropin), Dynorphin, and  $\beta$ -Endorphin were analyzed by ELISA technique and Serotonin was measured by HPLC (High Pressure Liquid Chromatography) at baseline (admission) and discharge (three weeks).

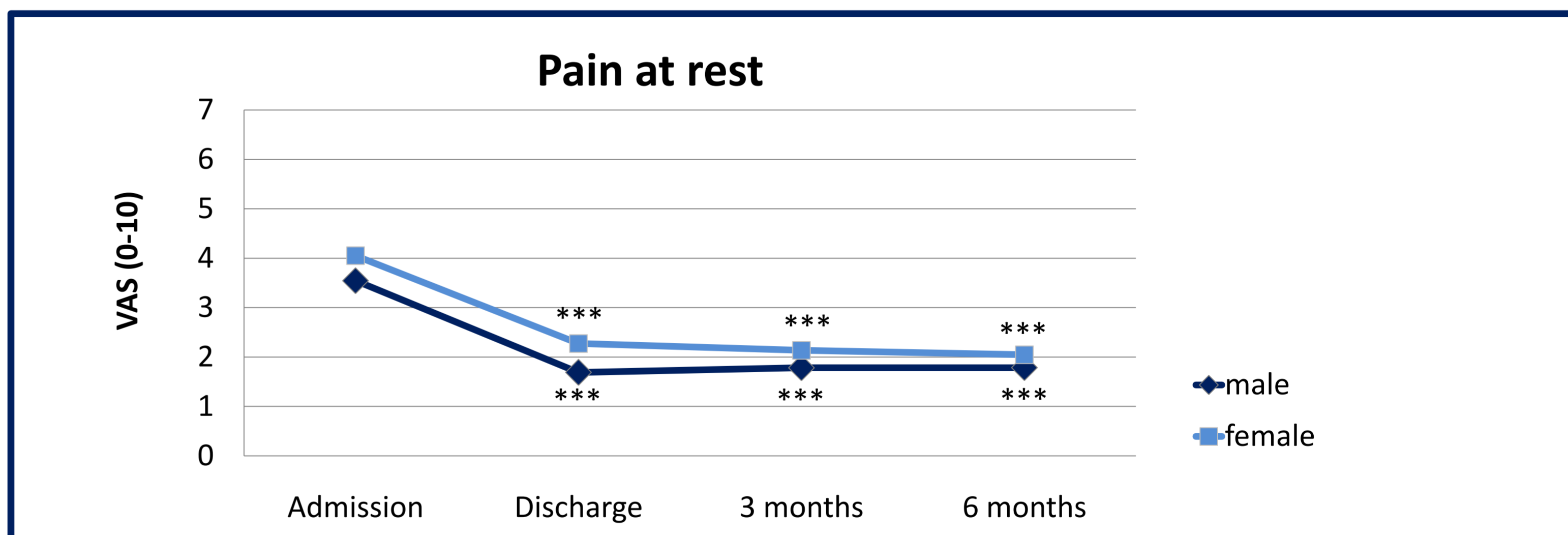
## AIM

The aim of this study was to observe in a follow up trial the sustainability of a shoulder rehabilitation in diverse rehabilitation centers of the PVA in Austria.

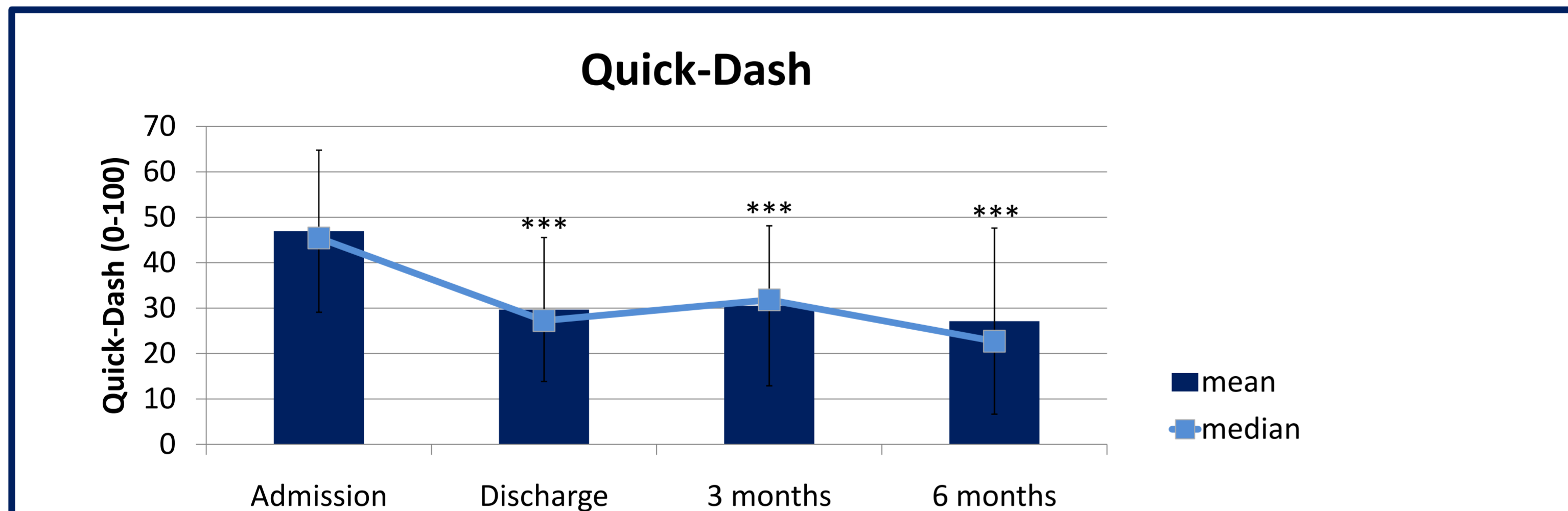
## RESULTS



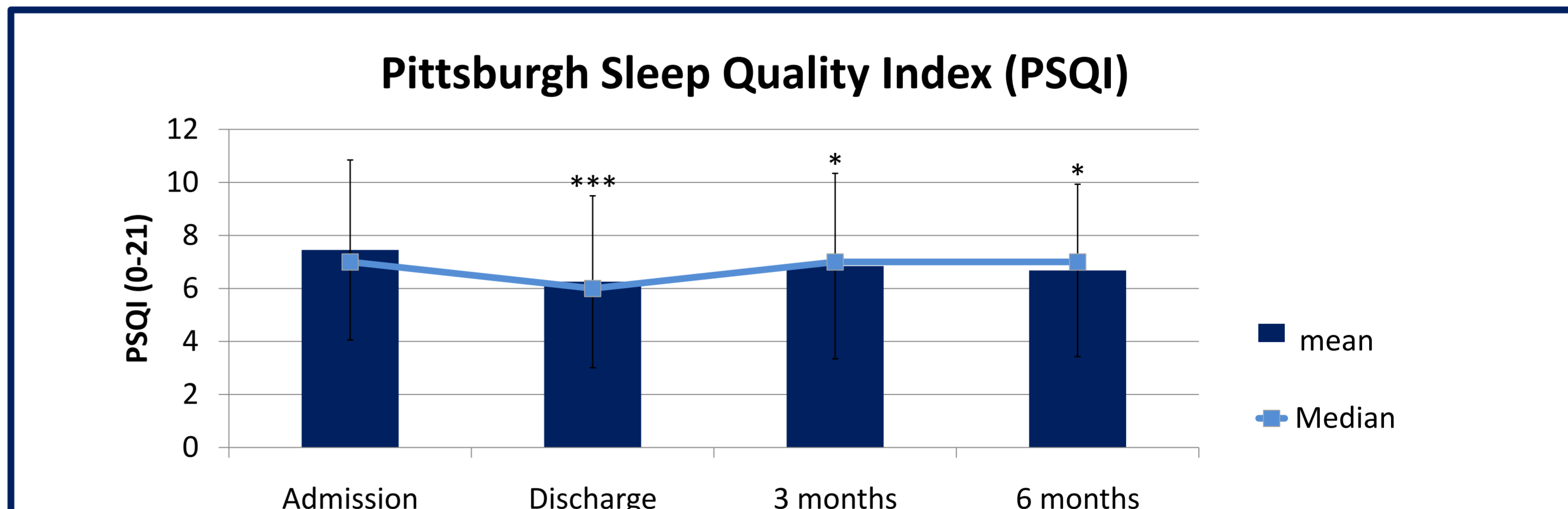
**Fig.1: Measurement of pain intensity (pain on motion)**  
Pain intensity was measured by VAS rating 0-10. Mean intensity in male and female is shown. Significant differences refer to comparison to baseline (\*\*p<0.01, \*\*\*p<0.001).



**Fig.2: Measurement of pain intensity (pain at rest)**  
Pain intensity was measured by VAS rating 0-10. Mean intensity in male and female is shown. Significant differences refer to comparison to baseline (\*\*p<0.01, \*\*\*p<0.001).



**Fig.3: Alteration of shoulder function**  
Quick-DASH (Disability of the Arm, Shoulder and Hand) 0-100 was used to determine the function of the shoulder. Significant differences refer to baseline (\*\*p<0.01, \*\*\*p<0.001).



**Fig.4: Pittsburgh Sleep Quality Index**  
To ascertain the sleep quality, PSQI was used. It consists of 7 items and the total score lasts from 0 (good sleep quality) to 21 points (insomnia). Significant difference refer to baseline (\*\*p<0.01, \*\*\*p<0.001, \*p<0.05).

**Table 1: Development of pain and stress biomarkers during inpatient rehabilitation measured by immunoassays.**

	n	Rehabilitation admission			Rehabilitation discharge (3 weeks)		
		Mean	Median	SEM	Mean	Median	SEM
ACTH (pg/ml)	123	51.3	39.7	3.0	50.5	41.4	2.6
$\beta$ -Endorphin (pg/ml)	123	131.3	14.8	36.7	225.8	23.5	78.2
Dynorphin (pg/ml)	123	4.3	1.9	0.6	4.1	2.2	0.5
Serotonin (ng/ml)	124	123.3	114.2	6.0	120.0	109.9	6.4

n: Number; ACTH: Adrenocorticotrophic Hormone; SEM: Standard Error of Mean

## SUMMARY

- Decrease of the pain intensity (pain at rest and pain on motion) (Fig.1, Fig.2)
- Increase in pain suppressing  $\beta$ -Endorphin (table 1)
- Clear improvement in shoulder function (Fig.3)
- Improved sleep quality lasted up to 6 months after rehabilitation (Fig.4)
- Decrease of stress parameters (ACTH, Dynorphin, Serotonin) (table 1)

## CONCLUSION

The improvement of the main outcome parameters showed that an inpatient rehabilitation program has a long-lasting effect on pain and function in shoulder disabilities and is therefore very important for the improvement in quality of life.