

# COMPARISON OF PLANTAR PRESSURE PATTERNS IN CHILDREN WITH JUVENILE IDIOPATHIC ARTHRITIS (JIA) - OLIGOARTHRITIS VERSUS POLYARTICULAR ARTHRITIS

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## SUMMARY

The present study compared plantar pressure patterns of 22 patients with JIA polyarticular arthritis versus 20 Patients with JIA oligoarthritis in order to evaluate the necessity of specific treatment for affected patients. Ten trails (5 steps left/5steps right) were measured with self selected velocity. The measurements revealed higher peak pressure (PP) and force time integral in the hindfoot and higher PP in the first to fifth metatarsal in patients with polyarticular arthritis.

## CONCLUSION

The findings of this study demonstrated that juvenile idiopathic arthritis (JIA) with polyarticular arthritis (poly) may cause higher PP in the hindfoot as well as in the first to fifth metatarsal as compared to JIA oligoarthritis (oligo). This shows the necessity of preventive measures in these patients.

## INTRODUCTION:

JIA may affect various joints and may lead to specific malpositions with compensatory movements. Arthritis releases a pronounced pain stimulus, which causes the children to respond with a pain relieving position thus causing muscular dysbalance. In children with JIA-oligo the joint problem can partially be compensated by neighbouring joints, maintaining an asymmetric but usually rather smooth gait pattern. In children with JIA-poly the neighbouring joints are also affected and compensation is hardly possible. Therefore, these patients may develop a slow robot-like gait pattern [1]. The aim of this pilot study was to evaluate characteristic gait patterns in these diseases to show the necessity of specific care/treatment for the affected patients.

## PATIENTS/MATERIALS AND METHODS

20 patients (15 female; 5 male; age: 11.0 ±3.5 years) with JIA-oligo and 22 patients (15 female; 7 male; age: 14.2 ±3.6 years) with JIA-poly were examined. Clinical data and pedobarographic measurements (emed ST 4, Novel; 50Hz) were collected from inpatients. Every participant passed a clinical examination and the visual analogue scale was used to assess the current pain intensity. Plantar pressure measurements were carried out with the instruction to walk normal at self-selected velocity and recording a step in full gait. Ten valid trials (5 steps left /5 steps right) were stored for subsequent analyses. The foot was divided in 10 regions of interest and dynamic parameters (peak pressure PP, maximum force MF, force time integral FTI) were evaluated for all regions. All MF data were normalized to body mass. The averaged data of right and left foot were used for statistical comparisons. Mann-Whitney U Tests were used for statistical analysis.

## RESULTS

While the total maximum PP did not show statistical differences, particularly higher PP were found under the hindfoot in children with JIA-poly (medial (mh); lateral (lh)). Furthermore, significantly higher PP were seen in children with JIA-poly in the first metatarsal (MT1), second (MT2) and third to fifth metatarsal (MT3-5). The results of MF revealed higher force peaks in the lateral midfoot (lm) in patients with JIA-oligo. The analyses of the FTI showed higher values in the lateral and medial hindfoot and also in the third to fifth metatarsal (MT3-5) in patients with JIA-poly. The clinical findings indicated movement restrictions in dorsal and plantar flexion in patients with JIA-poly more frequently than in patients with JIA-oligo.

## DISCUSSION

The present clinical data in patients with JIA-poly cause changes in the loading response and the terminale stance phase. This can be considered as a reason for the higher values in PP and FTI under the hindfoot (mh and lh) as well as PP under first to fifth metatarsal in JIA-poly. The differences in MF (lm) were significant, but the values were very small and so not essential.

## REFERENCES

- [1] Häfner, R., Spamer, M.: Rehabilitation of children. In: Isenberg DA., Maddison PJ., Woo P., Glass, D., Breedveld FC.: Oxford Textbook of Rheumatology, 3<sup>rd</sup> Edition. Oxford University Press 2004, 269-279.

Tab.1: Mean, SD and statistical values of selected gait patterns

	Oligoarthritis		Polyarticular arthritis		Mann-Whitney U Tests significance
	mean	n=20 (SD)	mean (n=22)	(SD)	
PP_total [kPa]	496,41	193,96	561,73	205,40	no sign.
PP_lh [kPa]	269,93	59,76	323,79	84,80	p=0,016
PP_mh [kPa]	310,92	85,19	379,05	118,53	p=0,037
PP_MT 1 [kPa]	201,86	122,07	264,19	181,81	p=0,049
PP_MT 2 [kPa]	272,23	114,44	353,14	148,65	p=0,022
PP_MT 345 [kPa]	254,23	93,56	354,60	121,93	p=0,008
MF_lh [N]	0,18	0,06	0,14	0,09	p=0,035
FTI_lh [N*s]	29,88	14,02	41,38	18,40	p=0,030
FTI_mh [N*s]	36,77	15,18	50,75	22,64	p=0,044
FTI_MT 345 [N*s]	49,74	20,92	68,30	33,22	p=0,034