Examination of the Correlation Between Pelvic Floor EMG and Hip Muscle Strength Ratios, Femoral Anteversion Angle in Children with Bladder-Intestinal Dysfunction

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Hypothesis / aims of study

The ability of the pelvic floor muscles to perform adequate contraction and relaxation functions is closely related to the muscle strength of the hip muscles and femoral anteversion (1), but no study has been found examining the relationship between the amount of pelvic floor activation and hip muscle strength and femoral anteversion in children with bladder bowel dysfunction (BBD).

Our hypothesis is, "As pelvic floor muscle activation decreases in children diagnosed with BBD, the femoral anteversion angle and hip agonist-antagonist force ratios increase in favor of internal rotators, extensors, and adductors."

Study design, materials and methods

This is a prospective, cross-sectional study conducted on children aged 5-12 years who were diagnosed with BBD by a pediatric urologist in 2022 and 2023. Before starting the study, ethics committee approval was obtained, and clinical trial registration was completed (NCT05182671).

Demographic evaluations of the children, pelvic floor EMG measurements, femoral anteversion, hip internal rotation (IR), external rotation (ER), abduction, adduction, flexion, and extension muscle strength measurements were completed on the same day by the same physiotherapist.

Pelvic floor muscle activity (work and rest minimum, work and rest average, work and rest deviation, work and rest maximum voluntary contraction), femoral anteversion, and hip strength measurement were assessed with relatively, the NeuroTrac Myoplus4 Pro device, Craig test, and MicroFET hand dynamometer.

All data were analyzed with the SPSS software program (IBM, SPSS version 25, Chicago, IL, USA). Correlation analysis was done with the Pearson test.

Results and interpretation

50 children (female=27, male=23) with a mean age of 9.12±2.67 years and a BMI of 18.18±4.03 kg/m2 were included in the study (Table 1). Work minimum, rest average, and rest minimum values (r=0.36, p=0.013; r=0.32 p=0.026; r=0.43, p=0.003, respectively), and extension/flexion strength ratio were positively correlated. Rest average and rest average deviation values (r=0.3, p=0.031; r=0.30, p=0.039, respectively) and IR/ER force ratio were positively correlated. Work minimum value and femoral anteversion angle were negatively correlated (r=-0.32, p=0.031) (Table 2).

Hip extensor-flexor strength imbalance increases the minimum amount of contraction required for pelvic floor muscle contraction to occur, the average resting basal tone of the pelvic floor, and the minimum activation value required for relaxation of the pelvic floor. Hip IR and ER force imbalance increases the pelvic floor contraction tone at rest. As the femoral anteversion angle decreases, the minimum contraction amount required for pelvic floor muscle contraction increases.

Table 1. Demographic and clinical characteristics of the patients

Variables	Total Mean± SD (n=50)
Age (y)	9.12±2.67
Height (cm)	134.05±19.23
Body weight (kg)	131± 36.37
BMI (kg/m^2)	18.18±4.03

Abbreviations: SD: standard deviation, BMI: body mass index, P: independent sample t-test

Table 2. Correlation analysis for biomechanical parameters

Variables		r	p value
Work-minimum	Ext/Flex	0.36	**.013**
	Femoral anteversion	-0.32	**.031**
Rest-average	IR/ER	0.31	**.031**
	Ext/Flex	0.32	**.026**
Rest-minimum	Ext/Flex	0.43	**.003**
Rest average deviation	IR/ER	0.30	**.039**

Abbreviations: ext: extension strength, flex: flexion strength, IR: internal rotation strength, ER: external rotation p: Pearson correlation

Conclusions

There is a need for further studies examining lower extremity anatomical angles and proximal muscle force imbalance in children with BBD according to age and gender categories.

References

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