

## Is Generalized Joint Hypermobility Associated with Inguinal Hernia in Children?

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Pediatric inguinal hernia (PIH) is a common surgical problem in childhood.<sup>1</sup> Many factors have been implicated to explain the cause of patency of the vaginal process, as structural abnormalities of the collagen tissue.<sup>2</sup>

Generalized joint hypermobility (GJH) which is associated with abnormality of collagen synthesis is characterized by the presence of symptoms related to the musculoskeletal system in the lack of an underlying systemic rheumatologic disease.<sup>3</sup>

Studies have focused on the relationship between GJH and inguinal hernia (IH) in adult patients.<sup>4,5</sup> Unfortunately, there are only a few studies on the relationship between GJH and PIH.<sup>2,6</sup> In our study, we aimed to evaluate whether the frequency of PIH increases among patients with GJH.

One hundred ten cases with GJH (50.9% female, mean age  $\pm$  standard deviation (SD);  $9.3 \pm 3.1$  years), and 220 gender- and age-matched healthy children (50.9% female, mean age  $\pm$  SD;  $9.4 \pm 3.5$  years), were included in the study. All GJH patients and control subjects were examined by a pediatric surgeon for the presence of inguinal hernias. Control subjects were chosen from individuals whose Beighton score (BS) was  $\leq 5$  points in children aged 4–9 years,  $\leq 4$  points in children aged 10–18 years, and without health problems and chronic diseases. The study protocol was approved by the institutional Ethics Committee (ethics committee number: 2018/302). Findings of GJH were evaluated by a pediatric rheumatologist according to the BS. A score of  $\geq 5$  points in children aged 4–9 years and a score of  $\geq 4$  points in children aged  $\geq 10$  years were considered as GJH.<sup>7</sup>

Statistical examination was performed using the SPSS 22.0 (Statistical Package for Social Sciences, SPSS Inc.; Chicago, Ill, USA) software, and the continuous variables were expressed as mean  $\pm$  SD and categorical variables as percentages (%). Chi-square test or Fisher's exact test was used for statistical analysis of the categorical sizes.  $P < .05$  was considered statistically significant. Power analysis calculation was performed with reference to the study by Sullivan et al.<sup>8</sup> With the assumption that PIH is expected to occur in 0.8–4.4% of the population, we calculated that a sample of 220 healthy children has 95% CI and with a power of 80%.

The prevalence of PIH in the cases with GJH and control subjects was found similar (1.8% vs. 2.3%,  $P = .78$ ). In the GJH group, there was a family history of IH in both cases. Three of the 5 patients in the control group had a family history of IH.

Friedman et al reported hypermobility in 3 of 9 patients with IH, and noted that the incidence of IH was higher in cases with hypermobility than in the normal population.<sup>5</sup> On the other hand, Pans et al reported no association between GJH and IH in adulthood.<sup>4</sup>

In a study, the hernia sac tissues in patients with PIH aged 3–10 years were analyzed, and the oxidative stress and prolidase activity in the hernia sacs of patients with GJH were found to be higher than in those of control subjects.<sup>2</sup> Nazem et al investigated the prevalence of GJH in 100 patients with PIH aged 2–12 years and the rate of patients with BS of 4 or higher was

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reported to be 92%. It was determined that the prevalence of GJH was higher in pediatric patients with PIH than the normal population.<sup>6</sup> The fact that Nazem et al studied on very young age group of patients, and it was difficult to evaluate hypermobility in this age group, may be considered as a limitation of their study.

In conclusion, we found that the prevalence of PIH with GJH was similar to healthy subjects. Nevertheless, further studies with larger data series and longer follow-ups are needed to understand the relationship between GJH and PIH.

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