EFFECT OF GENDER AND SPORT TYPE ON Y-BALANCE TEST PERFORMANCE DURING RETURN-TO-PLAY DECISION-MAKING IN PEDIATRIC ATHLETES AGED 8 TO 10 YEARS

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Background: Return-to-play (RTP) criteria are increasingly utilized to ensure children who sustain an injury sufficiently rehabilitate for participation in sports. The Y-Balance Test (YBT) is a quantitative measure commonly used to assess neuromuscular control, limb symmetry, and composite strength in single-limb stance for informed RTP decision making. Correlates for YBT scores in young patients are unclear. Therefore, identifying the influence of gender and sport type on YBT scores in children aged 8-10 may enhance interpretation of YBT scores for pediatric patients.

Hypothesis/Purpose: To identify correlations of gender and sport type on YBT scores in patients aged 8-10 years for more informed interpretation of return-to-play readiness during injury rehabilitation.

Methods: A retrospective review was conducted of patients who presented for a lower extremity injury and completed functional performance testing for RTP decision-making from June 2016 to April 2021. Three balance conditions were tested bilaterally in the anterior, posteromedial, and posterolateral directions. Normalized component scores for each condition were calculated by dividing the raw YBT metric (reach distance) by leg length and multiplying by 100. In addition, a composite was computed per leg by averaging the three normalized component scores, and side-to-side differences (Δ) were calculated for each score (components and composite). A Student's t-test or Mann-Whitney U-test was computed for each YBT metric to identify the significance of gender (Male/Female) and sport type (Contact/Non-Contact) on YBT scores (α<0.05). Additionally, linear regression was applied to identify the significance of age at test date on YBT scores (r^2 > 0.95).

Results: Fifty-six patients (22 males, 26 contact sport, 9.61±0.59 years, 6.82±5.63 months post-injury) were identified for analysis. Patients were either treated operatively for an anterior cruciate ligament injury (31.5%) or non-operatively for general instability and/or muscle weakness (59.3%). Significance as a result of gender existed for the right composite (p=0.04) and posterolateral difference (p=0.03) metrics (Table 1). Furthermore, sport type proved to be a significant factor on YBT scores for four metrics: right posterolateral (p=0.02), left composite (p=0.01), right composite (p<0.01), and anterior difference (p=0.04; Table 2). Notably, female and non-contact patients illustrated greater composite scores and smaller side-to-side differences for metrics illustrating significant differences.

Conclusion: Gender and sport type were significantly associated with YBT scores in patients aged 8-10 years, suggesting males and contact athletes in this youngest pediatric group may demonstrate lower YBT measures of neuromuscular control during post-injury testing.

Tables/Figures:

Table 1. Significance of Gender on YBT Scores (Mean ± SD) of Patients Aged 8-10 Years

Y-Balance Metric	Female	Male	*p*-value
Left Anterior	74.83 ± 9.33	72.94 ± 9.58	0.39
Right Anterior	74.17 ± 8.62	72.57 ± 10.78	0.34
Left Posteromedial	117.54 ± 13.89	108.80 ± 27.48	0.19
Right Posteromedial	117.21 ± 14.16	112. 75 ± 14.37	0.26
Left Posterolateral	114.87 ± 14.14	110.43 ± 14.64	0.26
Right Posterolateral	113.33 ± 12.76	107.51 ± 16.44	0.14
Left Composite	102.09 ± 6.31	97.00 ± 11.21	0.05
Right Composite	101.34 ± 6.89	97.20 ± 7.60	**0.04***
Δ Anterior	2.26 ± 2.45	2.50 ± 1.41	0.10
Δ Posterolateral	2.39 ± 2.00	4.41 ± 3.65	**0.03***
Δ Posteromedial	4.53 ± 11.93	6.18 ± 14.66	0.32
Δ Composite	2.11 ± 2.02	4.19 ± 5.74	0.05

Note: Significant differences notated in bold with an asterisk (*).

Table 2. Significance of Sport Type on YBT Scores (Mean ± SD) of Patients Aged 8-10 Years

Y-Balance Metric	Contact	Non-Contact	*p*-value
Left Anterior	72.43 ± 8.83	75.55 ± 7.39	0.17
Right Anterior	71.78 ± 8.48	71.43 ± 8.45	0.11
Left Posteromedial	109.60 ± 24.36	118.33 ± 10.28	0.09
Right Posteromedial	112.25 ± 9.89	118.05 ± 11.93	0.06
Left Posterolateral	110.02 ± 12.31	115.91 ± 12.15	0.09
Right Posterolateral	106.77 ± 12.35	115.11 ± 12.46	**0.02***
Left Composite	97.09 ± 10.46	103.21 ± 6.30	**0.01***
Right Composite	96.86 ± 6.99	102.80 ± 6.98	**<0.01***
Δ Anterior	2.85 ± 2.40	1.78 ± 1.65	**0.04***
Δ Posterolateral	3.96 ± 3.54	2.56 ± 2.04	0.19
Δ Posteromedial	5.65 ± 13.79	2.30 ± 1.96	0.13
Δ Composite	4.02 ± 5.37	2.06 ± 1.97	0.07

Note: Significant differences notated in bold with an asterisk (*). Contact sports included Basketball, American Football, Soccer, and Baseball. Non-contact sports included Cheer, Dance, and Gymnastics.