

The Prevalence of Spondylolysis in Symptomatic Adolescent Athletes: An Assessment of Sport Risk in Non-Elite Athletes.

Mitchell Selhorst, DPT, OCS¹, Anastasia Fischer, MD, FACSM², James MacDonald, MD, FAAFP, FACSM².

Mitchell.Selhorst@Nationwidechildrens.org

1. Sports and Orthopedic Physical Therapy, Nationwide Children's Hospital, Columbus, Ohio.
2. Division of Sports Medicine, Nationwide Children's Hospital, Columbus, Ohio.

Background

Adolescent athletes experience high rates of low back pain (LBP) with many experiencing spondylolysis.

- The prevalence of spondylolysis is 14-30% among athletes with LBP and has been reported as high as 47% in certain sports.

Experts suggest participating in certain sports, including gymnastics, dance, football, weight lifting, diving, wrestling, cricket and crew, increase the risk of spondylolysis.

- The existing epidemiologic literature is based on elite athletes from specified geographic regions.
- The current literature may not be generalizable to all adolescent athletes presenting with LBP.



Purpose:

- To assess the risk of spondylolysis by sport in non-elite adolescent athletes with LBP.

Methods

This was retrospective study.

Setting:

- Hospital based sports medicine clinic in central Ohio.

Inclusion Criteria:

- Adolescent athlete (10-19 years) reporting LBP.

Exclusion Criteria:

- The patient did not participate in an organized sport
- Imaging was performed at another institution/clinic
- Diagnosis of spondylolysis was made by clinical suspicion only (without supportive, positive radiologic findings)

Diagnostic Imaging:

- Classified as having spondylolytic injury if confirmed by any diagnostic imaging modality
 - Radiographs, magnetic resonance imaging (MRI), computed tomography (CT), or single-photon emission computerized tomography (SPECT).

Variables:

Predictor Variable:

- Sport played – Based on patient/family response at time of evaluation.
- Single vs. multisport athlete.
- Sex

Outcome Variable:

- Presence of a spondylolysis on imaging.

Data Analysis:

- Relative risk of being diagnosed with a spondylolysis was calculated for each sport.
 - Sports with 95% confidence intervals > 1.0 were deemed statistically significant.
 - Relative risk was only calculated when ≥ 8 athletes by gender played that sport

Results

Table 1. Demographics

	All Patients (n=1025)	Spondylolysis (n=308)	No Spondylolysis (n=717)
Age	15.0 (1.8)	14.5 (1.7)	15.2 (1.8)
Gender (% Female)	569 (55.5%)	139 (45.1%)	430 (60.0%)
Single sport athlete	609 (59.4%)	174 (56.5%)	134 (43.5%)

Table 2. Presence of Spondylolysis by Sport-Males

Sport	Number of Male Athletes (n=456)	Spondylolysis (n=169)	% with Spondylolysis	RR (95% CI)
Baseball	93 (20.4%)	50	53.8	1.45 (1.15, 1.83)
Soccer	71 (15.6%)	34	47.9	1.25 (0.99, 1.58)
Hockey	9 (2.0%)	4	44.4	1.14 (0.63, 2.05)
Tennis	10 (2.2%)	4	40.0	1.14 (0.32, 4.08)
Basketball	117 (25.7%)	46	39.3	1.05 (0.89, 1.24)
Lacrosse	36 (7.9%)	14	38.9	1.03 (0.79, 1.35)
Football	176 (38.6%)	66	37.5	1.01 (0.88, 1.17)
Wrestling	34 (7.5%)	9	26.5	0.95 (0.75, 1.21)
Track and Field	49 (10.7%)	12	24.5	0.81 (0.68, 0.97)
Golf	17 (3.7%)	4	23.5	0.82 (0.62, 1.07)
Weight Lifting	10 (2.2%)	2	20.0	0.78 (0.56, 1.08)

RR, relative risk.

Total is greater than 100% due to multi-sport athletes

Table 3. Presence of Spondylolysis by Sport-Females

Sport	Number of Female Athletes (n=569)	Spondylolysis (n=139)	% with Spondylolysis	RR (95% CI)
Gymnastics	64 (11.2%)	22	34.4	1.14 (0.96, 1.36)
Band	13 (2.3%)	4	30.8	1.09 (0.76, 1.58)
Softball	87 (15.3%)	26	29.9	1.09 (0.94, 1.26)
Lacrosse	24 (4.2%)	7	29.2	1.07 (0.82, 1.39)
Tennis	24 (4.2%)	7	29.2	1.07 (0.82, 1.39)
Volleyball	87 (15.3%)	25	28.7	1.07 (0.93, 1.24)
Soccer	86 (15.1%)	23	26.7	1.04 (0.90, 1.19)
Cheer	130 (22.8%)	32	24.6	1.00 (0.90, 1.12)
Basketball	77 (13.5%)	18	23.4	0.98 (0.86, 1.12)
Track and Field	67 (11.8%)	12	17.9	0.91 (0.81, 1.03)
Dance	57 (10.0%)	9	15.0	0.89 (0.78, 1.00)
Swimming	26 (4.6%)	3	11.5	0.85 (0.73, 0.98)
Equestrian	9 (1.6%)	1	11.1	0.85 (0.67, 1.07)
Cross Country	21 (3.7%)	2	9.5	0.83 (0.72, 0.96)

RR, relative risk.

Total is greater than 100% due to multi-sport athletes

Discussion

The sports with the greatest risk of spondylolytic injury in adolescent athletes in this study were not consistent with published literature.

- Clinicians should be cautious generalizing high-risk sports to their practice, as geographic region and level of the athlete may significantly influence the incidence of spondylolysis in the population they are treating.

Limitations:

- Retrospective review
 - Non-randomized, not collected for research purposes.
 - Missing key sport information – position, intensity/frequency.

Clinical Bottom Line:

- Any adolescent athlete is at risk for spondylolysis.
- Increased suspicion of a spondylolysis when evaluating adolescent male throwing athletes with LBP

