Changes in Health-Related Quality of Life and Knee Function After Knee Injury in Young Female Athletes

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Background: Recent literature has called for greater attention to evidence-based practice in sports medicine with the documentation of overall status and impairments following injury. The prospective documentation of impairments associated with knee injuries in female athletes regarding their health-related quality of life (HRQoL) and knee function (KF) of high school and collegiate athletes is limited. Assessing the effect knee injuries have on young female athletes may allow clinicians to better understand the perspectives of the athletes who sustain these injuries.

Purpose: To document the changes over 12 months in self-reported HRQoL and KF in young females who have sustained a knee injury.

Study Design: Case series; Level of evidence, 4.

Methods: A convenience sample of 242 females (mean age, 17.4 ± 2.4 years) who injured their knee participating in sport or recreational activities was utilized. Injuries were categorized as anterior cruciate ligament tears (ACL), anterior knee pain (AKP), patellar instability (PAT), meniscus tear (MNT), iliotibial band syndrome (ITB), collateral ligament sprain (COL), and other (OTH). HRQoL was assessed with the Short Form–12 v 2.0 survey (SF-12) physical component summary (PCS) and mental component summary (MCS). KF was assessed with the 2000 International Knee Documentation Committee survey (IKDC). Dependent variables included the paired differences in the 2000 IKDC as well as SF-12 composite scores from preinjury through 12 months postdiagnosis. Paired differences were assessed with repeated-measures analyses of variance ($P \leq .05$).

Results: IKDC scores were lower through 12 months for ACL, AKP, and PAT; through 6 months for MNT; and through 3 months for COL and OTH. HRQoL PCS and MCS scores were lower through 3 to 12 months depending on the type of injury classification.

Conclusion: Knee injuries can negatively affect KF and HRQoL for up to 12 months in young females. Sports medicine providers need to be aware of these impacts as they work to effectively treat individuals with these injuries.

Keywords: female; knee injury; knee function; quality of life

Since 1972, there has been a surge in female sports participation in the United States. In 2011, an estimated 3.2 million females participated in interscholastic competition[22] and 175,000 participated in National Collegiate Athletic Association (NCAA)–sponsored athletics.[21] It is well recognized that female athletes participating in sports and fitness activities demonstrate a 4 to 6 times higher incidence of knee injuries than males.[2,13,15,18] Much research to date has focused on the incidence, treatment options, and prevention strategies for these injuries.[4,11,14] Studies on outcomes following knee injury have often utilized a retrospective approach and have focused primarily on the effects of interventions such as surgical techniques on adult subjects[25] utilizing traditional clinical measures to evaluate the effectiveness of treatments provided.[5,10,24]

Recent literature has called for greater attention to a whole-person health care approach and evidence-based practice in sports medicine.[26,28] This is specifically true in describing health status, disability, and patient outcomes.[3,9] Patient self-report instruments (PSRs) allow clinicians and researchers to gain a better understanding

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of the structural and functional impairments a disease state or injury causes a patient. Recently, sports medicine providers have been encouraged to measure an individual's health status[23] and joint function through PSRs.[7]

The use of PSRs to measure the impact of impairments associated with sports injuries on health-related quality of life (HRQoL) of high school and collegiate athletes is limited. Assessing the effect knee injuries have on young female athletes may allow clinicians who work with this population to better understand the perspective of the young female athletes who sustain these injuries.

The objective of this study is to document changes in self-reported knee function (KF) and HRQoL in a cohort of female athletes with a variety of knee injuries from preinjury through 12 months after injury diagnosis. In contrast to common clinical measures used by health care providers, we hypothesized that the changes in KF and HRQoL from preinjury through 12 months postinjury could be quantified through the use of various PSRs.

METHODS

Participants included a convenience sample of adolescent (age range, 13-18 years) and young adult (age range, 19-23 years) females who sustained a knee injury while participating in regular fitness or sport activities. Subjects presented to a sports medicine physician for care at an outpatient academic sports medicine center or a university health service sports medicine clinic.

To be eligible for the study, a potential subject must have indicated that they (1) injured the structures of the knee to the degree that it caused them to stop participating in their activity for at least 1 day, (2) sustained the injury during athletic participation (eg, soccer, basketball, practices, or competitions) or regular fitness activity (eg, school-sponsored physical education classes or aerobic exercise classes), and (3) recalled the exact date they were injured or decided that they could not continue with their activity without seeking medical treatment. If the condition was gradual in onset, such as anterior knee pain, the subject had to be able to recall the exact date they decided to seek medical treatment from a physician.

Each eligible subject was made aware of the study by the research staff. All subjects were required to read and sign the informed consent form. Parents/guardians were required to also sign the consent form if the subject was younger than 18 years. This study was approved by the University of Wisconsin Health Sciences Minimal Risk Institutional Review Board. Data were collected over a 6-year period (August 2006 through December 2012).

Instrumentation

The 2000 International Knee Documentation Committee Subjective Knee Form (IKDC) is a joint-specific PSR consisting of 18 multiple-choice questions that assess symptoms and function in daily living and sport activities.[1,15,16] Raw scores are transformed to a 100-point scale (0 = worst, 100 = best possible score). The IKDC has been shown to be responsive for a variety of knee conditions, including anterior cruciate ligament tears, meniscus tears, osteoarthritis, and patellofemoral pain in adolescents and adults. The normative IKDC score (mean ± standard deviation [SD]) for young females is 93.4 ± 5.0.

Health-related quality of life was assessed with the Short Form–12 v 2.0 (SF-12) Acute Recall (Quality Metrics Inc, Lincoln, Rhode Island, USA).[29,31] The SF-12 is a shortened version[17] of the widely used SF-36 survey; it consists of 12 questions and produces a physical component summary (PCS) and mental component summary (MCS). The SF-12 has been used to measure HRQoL in adults following meniscus[8] and ACL surgeries.[6] Most normative data have been collected on adults, but the SF-12 has been used in patients as young as 14 years.[30] The US population–based norm (mean ± SD) for each component score is 50.0 ± 10.0, but age- and sex-specific normative data differ by varying degrees.[31] The normative scores for young females are 52.97 ± 8.59 for the PCS and 44.33 ± 12.76 for the MCS. A change of 2 to 3 points can be used to compare group scores.[17,30]

Data Collection

Potential subjects were contacted during their initial physician visit by research staff to determine their eligibility for inclusion in the study. The physician performed a history and clinical examination on each subject and provided a diagnosis. In cases requiring surgery, the diagnosis was confirmed by examining the operative note provided by the surgeon treating the subject.

Specific knee injury diagnoses were grouped into 1 of 6 classifications: anterior cruciate ligament tears (ACL); anterior knee pain (AKP), including patellofemoral stress syndrome, patellar tendonitis, fat pad impingement, Osgood Schlatter disease, medial plica irritation, and iliotibial band syndrome; meniscus tears (MNT) of the medial or lateral meniscus; collateral ligament sprains (COL) of the medial and lateral collateral ligaments; patellar instability (PAT), including patellar dislocations and subluxations; and other (OTH) injuries, including contusions, intra-articular loose bodies, osteochondritis dissecans, and fractures.

Subjects completed the PSRs 2 times during their initial visit. The subjects completed the first set with regard to their HRQoL and KF in the week prior to their injury (preinjury). On completion, the subjects were asked to complete the same surveys detailing their HRQoL and KF for the week prior to their initial clinic visit (diagnosis). Subjects completed follow-up surveys via mail or through a Web-based system at 3, 6, and 12 months postinjury. Subjects were also asked to report if they sustained another injury to the same or contralateral knee and report the date at which they returned in full to their chosen sport or activity without any restrictions.

Analyses

Dependent variables included the paired differences in the IKDC for KF as well as the PCS and MCS of the SF-12 for HRQoL from preinjury to 12 months postinjury for each injury classification.

TABLE 1
Knee Injury Classifications by Sport and Activity[a]

Activity	No. of Injuries							
	ACL	AKP	PAT	MNT	ITB	COL	OTH	Total (%)
Soccer	33	14	8	6	2	2	1	66 (27.3)
Basketball	31	10	8	3	0	2	3	57 (23.6)
Running	0	11	2	1	6	0	0	20 (8.3)
Track	5	5	2	2	1	0	0	15 (6.2)
Softball	5	2	5	1	0	0	1	14 (5.8)
Volleyball	6	7	0	0	0	0	0	13 (5.4)
Exercise class	3	3	5	1	1	0	0	13 (5.4)
Snow skiing	9	0	0	0	0	1	0	10 (4.1)
Cheerleading/dance	1	4	2	1	0	1	0	9 (3.7)
Gymnastics	1	2	2	0	0	1	0	6 (2.5)
Other sport	5	2	2	1	2	3	1	19 (7.9)
Total (%)	99 (40.9)	63 (26.0)	36 (14.9)	16 (6.6)	12 (5.0)	10 (4.1)	6 (2.5)	242 (100.0)

[a]ACL, anterior cruciate ligament tear; AKP, anterior knee pain; COL, collateral ligament sprain; ITB, iliotibial band syndrome; MNT, meniscus tear; OTH, other; PAT, patellar instability.

Raw scores were converted to norm-based scores via a linear z-score transformation, with composites scored with a mean ± SD of 50 ± 10. The independent variable was injury classification. Paired differences were assessed with repeated-measures analyses of variance. Comparisons were made between the individual and grouped scores at each interval from preinjury through diagnosis as well as 3, 6, and 12 months postinjury. Results are expressed as mean ± SD.

RESULTS

An estimated 400 females aged 13 to 23 years sought treatment during the study enrollment time frame. Potential subjects were excluded if they were injured in a nonsport activity such as a fall or motor vehicle accident or could not recall the date and activity in which their knee injury occurred.

A convenience sample of 255 of 279 (91%) eligible subjects (mean age, 17.4 ± 2.5 years) was enrolled in the study. A total of 242 of the 255 (94%) completed data collection through 12 months. The subjects were initially examined and enrolled at a median of 12 days (25th percentile, 7 days; 75th percentile, 21 days) after their injury. Fifty-six (23%) indicated they had injured the same knee prior to this injury episode. One hundred ninety-one (79%) were acute injuries, while 51 subjects had symptoms that appeared gradually. In addition to the clinical examination, radiographs were obtained on 88% (n = 212) and magnetic resonance imaging was obtained on 69% (n = 164) of subjects. One hundred twenty-seven (52%) underwent knee surgery, and 240 (99%) were prescribed physical therapy to treat their injuries.

Half of the injuries were sustained while participating in soccer or basketball. The most common injuries were classified as ACL, AKP, and PAT. The distribution of each injury by sport activity and injury classification is found in Table 1. None of the subjects reported sustaining a subsequent time loss injury to either their original or contralateral knee. The number of days lost to injury was highest for ACL (263 ± 60) followed by OTH (221 ± 68), PAT (111 ± 83), MNT (107 ± 65), COL (97 ± 85), and AKP (81 ± 75).

Knee Function

The IKDC scores for all subjects at each interval were 92.76 ± 11.36 (preinjury), 47.82 ± 17.61 (diagnosis), 65.20 ± 19.04 (3 months), 77.35 ± 16.04 (6 months), and 83.55 ± 4.30 (12 months). The changes in IKDC scores for each type of knee injury at each interval are provided in Table 2. The IKDC scores were significantly lower from diagnosis for subjects with ACL, AKP, ITB, and PAT injuries through 12 months postinjury; COL injuries through 6 months; and MNT and OTH injuries through 3 months postinjury.

Health-Related Quality of Life

The PCS scores for all subjects at each interval were 55.86 ± 4.83 (preinjury), 41.22 ± 10.63 (diagnosis), 48.08 ± 9.43 (3 months), 52.62 ± 6.92 (6 months), and 54.09 ± 6.20 (12 months). PCS scores were lower through 12 months postinjury for ACL injuries. AKP, MNT, PAT, and OTH injuries had lower PCS scores through 3 months postinjury. There was no difference in the PCS scores for COL injuries after diagnosis. The change in the SF-12 PCS and MCS composite scores from preinjury through 12 months for each knee injury classification are provided in Table 3.

The MCS scores for all subjects at each interval were 56.18 ± 7.08 (preinjury), 50.50 ± 11.47 (diagnosis), 52.91 ± 9.57 (3 months), 52.98 ± 8.50 (6 months), and 53.56 ± 7.77 (12 months). MCS scores were significantly lower in subjects with ACL injuries through 6 months. Inconsistent changes in MCS scores were noted for subjects with AKP, COL, ITB, MNT, PAT, and OTH injuries postinjury.

TABLE 2
IKDC Scores for Each Knee Injury Classification, Preinjury Through 12 Months Postinjury[a]

Injury	IKDC Score, Mean ± SD	Change From Preinjury		
		Mean	95% CI	P
ACL (n = 99)				
Preinjury	93.45 ± 2.60	—	—	—
Diagnosis	46.22 ± 18.25	−47.23	−51.19, −43.27	<.001
3 mo	55.68 ± 16.09	−37.73	−41.78, −33.67	<.001
6 mo	74.28 ± 15.29	−19.06	−23.09, −15.03	<.001
12 mo	84.86 ± 13.09	−8.59	−12.55, −4.63	<.001
AKP (n = 63)				
Preinjury	90.91 ± 11.22	—	—	—
Diagnosis	53.04 ± 16.80	−37.88	−44.42, −33.33	<.001
3 mo	73.25 ± 16.52	−17.43	−22.06, −12.79	<.001
6 mo	79.40 ± 15.53	−11.46	−16.03, −6.89	<.001
12 mo	81.43 ± 15.56	−9.49	−14.03, −4.94	<.001
PAT (n = 36)				
Preinjury	93.65 ± 8.93	—	—	—
Diagnosis	45.18 ± 16.71	−48.47	−55.00, −41.94	<.001
3 mo	71.30 ± 18.32	−22.49	−29.37, −15.60	<.001
6 mo	78.13 ± 16.39	−15.72	−22.35, −9.08	<.001
12 mo	80.40 ± 14.21	−13.25	−19.78, −6.72	<.001
MNT (n = 16)				
Preinjury	93.46 ± 7.68	—	—	—
Diagnosis	42.96 ± 14.77	−50.50	−60.27, −40.73	<.001
3 mo	72.63 ± 20.75	−20.83	−30.60, −11.07	<.001
6 mo	78.74 ± 21.87	−14.73	−24.49, −4.96	.004
12 mo	87.28 ± 8.94	−6.18	−15.94, 3.59	.211
ITB (n = 12)				
Preinjury	95.31 ± 5.58	—	—	—
Diagnosis	62.45 ± 5.10	−32.85	−41.18, −24.53	<.001
3 mo	71.15 ± 17.24	−23.78	−32.57, −14.98	<.001
6 mo	84.71 ± 11.17	−11.56	−20.36, −2.76	.011
12 mo	83.24 ± 17.41	−12.07	−20.39, −3.74	.006
COL (n = 11)				
Preinjury	93.30 ± 8.29	—	—	—
Diagnosis	33.91 ± 17.87	−58.39	−73.15, −43.63	<.001
3 mo	73.35 ± 14.57	−18.92	−33.35, −4.49	.012
6 mo	72.12 ± 25.64	−13.52	−28.31, 1.27	.072
12 mo	82.18 ± 20.69	−10.11	−24.87, 4.64	.173
OTH (n = 6)				
Preinjury	89.08 ± 22.85	—	—	—
Diagnosis	42.34 ± 14.73	−46.74	−66.92, −26.57	<.001
3 mo	55.17 ± 30.50	−33.91	−54.09, −13.73	.002
6 mo	81.03 ± 12.20	−8.05	−28.22, 12.13	.415
12 mo	95.98 ± 4.29	6.90	−13.28, 27.07	.484

[a]ACL, anterior cruciate ligament tear; AKP, anterior knee pain; CI, confidence interval; COL, collateral ligament sprain; IKDC, International Knee Documentation Committee; ITB, iliotibial band syndrome; MNT, meniscus tear; OTH, other; PAT, patellar instability; SD, standard deviation.

DISCUSSION

Young active females who sustained a variety of knee injuries reported negative effects for up to 12 months after seeking treatment from a physician for their injuries. In addition to affecting their knee function, these injuries also negatively impacted the mental and physical aspects of their HRQoL. As a result of collecting data prospectively, we are able to show that KF and HRQoL change from preinjury through an entire 12 months after injury.

It was expected that subjects with severe injuries such as ACLs would report deficits in KF for 3 or 6 months after injury. However, it is interesting to see that KF deficits in these subjects were still present 12 months after injury—well beyond their return to sports activities. Similar deficits in KF were reported in subjects with AKP or PAT injuries, which are often thought to be less serious than ACL injuries. Like the ACL group, both the AKP and PAT groups reported KF deficits through 12 months, even though subjects returned to their sport within 3 to 6 months after injury. In addition, subjects in the MNT group reported deficits through 6 months but returned to their sport in 3 to 4 months. Only subjects in the OTH group reported improved KF scores well before they returned to their activity.

It is not clear why there was a fairly consistent pattern of self-reported knee deficits present after the return to sport. While we cannot fully account for this finding, one possibility is that this may be a reflection of the subjects' desires to return to physical activity even if they thought their KF was not optimal. This may also reflect the fact that small but significant differences in KF exist and are able to be detected using PSRs, even after the athlete is otherwise healthy and active.

These findings are supported by Cameron et al,[7] who collected PSRs on incoming military cadets using the Knee injury and Osteoarthritis Outcome Score (KOOS). Both male and female cadets who reported a previous history of knee ligament injury had lower scores than cadets who did not report a similar injury. Unlike our data, the authors did not report the length of time since injury. It is likely, however, that because of the high level of physical demands for incoming cadets, many of these injuries would have been sustained well before they entered the military academy.

Our data also illustrate how HRQoL changes occur in young females over the course of 12 months, and that these changes varied in relation to the type of injury sustained by the subjects. Despite improving consistently after diagnosis, the PCS scores for subjects in the ACL group remained lower through 12 months. While subjects in the AKP, PAT, MNT, and OTH groups reported lower PCS scores through 3 months, deficits for all other classifications disappeared by 6 months. The MCS scores for subjects in the ACL group were lower through 6 months, but MCS deficits were not found in subjects with other knee injuries.

Even though our data were collected prospectively, our findings support previous research utilizing self-report instruments in cross-sectional study designs to assess the HRQoL of young athletes. Valovich McLeod et al[27] reported that HRQoL was lower in male and female high school athletes who had sustained an injury compared with athletes who were uninjured. Unlike our study, the authors utilized a retrospective self-report from individual athletes to identify the location and type of injury that was sustained. In addition, there was no attempt to report the impact that a specific type of injury had on HRQoL.

McAllister et al[20] used the SF-36 to report dimensions of HRQoL in collegiate athletes with mild and serious injuries compared with their uninjured peers and found that

TABLE 3
SF-12 Composite Scores for Each Knee Injury Classification, Preinjury Through 12 Months Postinjury[a]

		Change From Preinjury				Change From Preinjury		
Injury	PCS, Mean ± SD	Mean	95% CI	*P*	MCS, Mean ± SD	Mean	95% CI	*P*
ACL (n = 99)								
Preinjury	56.72 ± 3.78	—	—	—	56.65 ± 7.19	—	—	—
Diagnosis	39.94 ± 10.74	−16.78	−18.72, −14.84	<.001	50.42 ± 11.95	−6.08	−8.26, −3.90	<.001
3 mo	45.56 ± 8.41	−11.14	−13.13, −9.16	<.001	52.44 ± 10.43	−4.00	−6.24, −1.76	<.001
6 mo	51.16 ± 6.44	−5.51	−7.49, −3.54	<.001	53.15 ± 8.51	−3.32	−5.54, −1.10	.004
12 mo	53.92 ± 5.33	−2.79	−4.74, −0.85	.005	54.73 ± 6.75	−1.77	−3.95, 0.41	.111
AKP (n = 63)								
Preinjury	54.38 ± 6.76	—	—	—	54.95 ± 6.68	—	—	—
Diagnosis	43.65 ± 10.07	−10.73	−13.25, −8.21	<.001	50.86 ± 10.53	−4.09	−6.85, −1.34	.004
3 mo	50.31 ± 9.57	−4.12	−6.69, −1.55	.002	53.47 ± 8.98	−1.49	−4.30, 1.32	.298
6 mo	53.59 ± 7.72	−0.82	−3.35, 1.71	.523	52.96 ± 9.20	−1.96	−4.73, 0.81	.164
12 mo	54.19 ± 6.81	−0.19	−2.71, 2.33	.880	52.83 ± 8.21	−2.12	−4.87, 0.64	.132
PAT (n = 36)								
Preinjury	55.74 ± 3.94	—	—	—	57.51 ± 5.55	—	—	—
Diagnosis	39.33 ± 11.48	−16.41	−19.77, −13.05	<.001	51.02 ± 12.53	−6.50	−10.12, −2.87	.001
3 mo	49.95 ± 10.01	−5.72	−9.26, −2.17	.002	52.52 ± 9.80	−5.41	−9.24, −1.58	.006
6 mo	52.85 ± 6.64	−3.15	−6.57, 0.26	.070	54.30 ± 7.35	−2.86	−6.55, 0.82	.127
12 mo	54.14 ± 6.16	−1.59	−4.96, 1.77	.350	53.09 ± 8.19	−4.42	−8.05, −0.80	.017
MNT (n = 16)								
Preinjury	57.50 ± 3.32	—	—	—	54.09 ± 11.64	—	—	—
Diagnosis	41.02 ± 9.80	−16.48	−21.43, −11.53	<.001	48.16 ± 9.90	−5.92	−11.87, 0.03	.051
3 mo	50.39 ± 8.82	−7.11	−12.06, −2.16	.006	54.13 ± 8.64	0.04	−5.91, 5.99	.989
6 mo	53.93 ± 8.55	−3.57	−8.52, 1.38	.155	51.97 ± 5.89	−2.12	−8.07, 3.83	.479
12 mo	55.59 ± 4.10	−1.91	−6.86, 3.04	.443	53.85 ± 5.48	−0.24	−6.19, 5.72	.937
ITB (n = 12)								
Preinjury	55.09 ± 4.74	—	—	—	56.43 ± 5.33	—	—	—
Diagnosis	46.55 ± 7.06	−8.55	−13.71, −3.39	.002	48.78 ± 12.29	−7.66	−13.75, −1.56	.015
3 mo	49.08 ± 8.50	−5.96	−11.39, −0.54	.032	53.07 ± 7.03	−3.18	−9.62, 3.25	.323
6 mo	53.32 ± 3.73	−1.95	−7.37, 3.47	.471	52.55 ± 7.63	−3.95	−10.38, 2.49	.222
12 mo	54.40 ± 7.07	−0.70	−5.85, 4.46	.786	48.89 ± 8.61	−7.54	−13.64, −1.45	.017
COL (n = 11)								
Preinjury	55.00 ± 4.31	—	—	—	55.51 ± 6.59	—	—	—
Diagnosis	37.33 ± 13.86	−17.67	−25.74, −9.59	<.001	51.61 ± 12.80	−3.90	−11.66, 3.85	.314
3 mo	52.02 ± 6.68	−2.89	−10.79, 5.01	.463	51.63 ± 11.19	−4.61	−12.24, 3.02	.228
6 mo	50.34 ± 11.14	0.76	−7.34, 8.86	.850	51.35 ± 11.16	−9.19	−17.05, −1.34	.023
12 mo	51.44 ± 11.34	−3.56	−11.63, 4.51	.377	51.32 ± 12.61	−4.19	−11.95, 3.56	.280
OTH (n = 6)								
Preinjury	56.39 ± 0.78	—	—	—	62.01 ± 0.93	—	—	—
Diagnosis	44.36 ± 5.51	−12.03	−22.08, −1.98	.021	52.93 ± 10.29	−9.08	−16.49, −1.67	.019
3 mo	40.17 ± 16.0	−16.23	−26.27, −6.18	.003	55.20 ± 5.25	−6.81	−14.22, 0.60	.070
6 mo	53.95 ± 4.72	−2.44	−12.49, 7.61	.618	57.22 ± 4.76	−4.80	−12.21, 2.62	.192
12 mo	55.38 ± 6.23	−1.01	−11.06, 9.03	.836	57.11 ± 7.44	−4.90	−12.31, 2.52	.183

[a]ACL, anterior cruciate ligament tear; AKP, anterior knee pain; CI, confidence interval; COL, collateral ligament sprain; ITB, iliotibial band syndrome; MCS, mental component summary of the SF-12; MNT, meniscus tear; OTH, other; PAT, patellar instability; PCS, physical component summary of the SF-12; SD, standard deviation; SF-12, Short Form–12.

specific subscales as well as the PCS were lower for athletes who had sustained a mild injury. Huffman et al[12] reported normative data on collegiate athletes utilizing the SF-36 and found that athletes with a self-reported injury had lower subscale scores. However, the authors did not distinguish the changes that may have occurred as a result of a specific type of knee injury.

Unlike these previous studies, our research utilized PSRs that included both a generic and joint-specific instrument. A generic HRQoL instrument allows clinicians to compare health conditions across demographic groups but may not be sensitive enough to detect changes in healthy, active individuals. On the other hand, a joint-specific instrument is more responsive for athletes postinjury than a generic instrument but does not capture changes in HRQoL. To overcome these drawbacks, experts have advocated that researchers should use both a generic measure of health status and a specific measure of joint function[3,9] when assessing the impact injuries have on active individuals. The validity of this point is illustrated in our study when examining the changes for different injuries. Subjects in the ACL group had consistently lower IKDC, PCS, and MCS scores for the entire 12 months of the study. This was not the case for subjects with injuries often thought to be less serious (AKP, PAT, MNT, and COL). In these subjects, the PCS and MCS scores reflected no change, while the subjects reported lower IKDC scores at some intervals. These findings illustrate that using a single generic PSR that measures HRQoL may not be able to fully detect disablement for some knee injuries without a joint-specific measure such as the IKDC.

Limitations

There are several limitations to this study. First, subjects were recruited from a convenience sample from 2 sports medicine clinics. As a result, subjects included in this study may have had knee injuries that they perceived to be more serious and reported that their KF and HRQoL were severely affected. Second, despite the fact that the IKDC and SF-12 surveys have been used in adolescent populations, they were both originally designed for use in adult (age, 18+ years) populations. As such, they may not fully capture the impact of a knee injury in an adolescent athlete (age range, 13-17 years). Despite the fact that the IKDC subjective knee form was used in this study, it has not been validated for patients younger than 18 years. The Pedi-IKDC has been validated for patients aged 10 to 18 years.[19] However, we felt that the cohort of older adolescents and young adults that were recruited warranted the use of a single instrument rather than multiple instruments. Finally, we acknowledge that having patients complete a survey at the time of injury diagnosis regarding their KF and HRQoL prior to injury may bias them to overestimate their KF and HRQoL prior to injury. However, the time frame since injury in this study was relatively small, and previous researchers have validated the ability of athletes to recall health status up to 4 to 8 weeks prior to data collection.[29] In addition, the measures of joint function recalled by the subjects was approximately equal to published normative values.[1] Future studies should strive to capture baseline data on young athletes in school or sport settings prior to injury onset. This will allow a more meaningful measure of change from the preinjury status.

CONCLUSION

Knee injuries can negatively affect KF and HRQoL for up to 12 months in adolescent and young adult female athletes. Sports medicine providers need to be aware of these impacts as they work to effectively treat individuals with these injuries. Understanding the perspective of these patients may allow providers to more effectively treat these patients.

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