Systematic Review

Current Status of Evidence-Based Sports Medicine

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Purpose: The purpose of this investigation is to determine the proportion of sports medicine studies that are labeled as Level I Evidence in 5 journals and compare the quality of surgical and nonsurgical studies using simple quality assessment tools (Consolidated Standards of Reporting Trials [CONSORT] and Jadad). **Methods:** By use of PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines over the prior 2 years in the top 5 (citation and impact factor based) sports medicine journals, only Level I Evidence studies were eligible for inclusion and were analyzed. All study types (therapeutic, prognostic, diagnostic, and economic) were analyzed. Study quality was assessed with the level of evidence, Jadad score, and CONSORT 2010 guidelines. Study demographic data were compared among journals and between surgical and nonsurgical studies by use of χ^2, 1-way analysis of variance, and 2-sample Z tests. **Results:** We analyzed 190 Level I Evidence studies (10% of eligible studies) (119 randomized controlled trials [RCTs]). Therapeutic, nonsurgical, single-center studies from the United States were the most common studies published. Sixty-two percent of studies reported a financial conflict of interest. The knee was the most common body part studied, and track-and-field/endurance sports were the most common sports analyzed. Significant differences ($P < .05$) were shown in Jadad and CONSORT scores among the journals reviewed. Overall, the Jadad and CONSORT scores were 2.71 and 77%, respectively. No differences ($P > .05$) were shown among journals based on the proportion of Level I studies or appropriate randomization. Significant strengths and limitations of RCTs were identified. **Conclusions:** This study showed that Level I Evidence and RCTs comprise 10% and 6% of contemporary sports medicine literature, respectively. Therapeutic, nonsurgical, single-center studies are the most common publications with Level I Evidence. Significant differences across sports medicine journals were found in study quality. Surgical studies appropriately described randomization, blinding, and patient enrollment significantly more than nonsurgical studies. **Level of Evidence:** Level I, systematic review of Level I studies.

There has been a recent dramatic emphasis shift toward the use of evidence-based medicine (EBM) in all facets of health care. This has prompted the necessary use of available literature to support practitioners' clinical decision making, health care payers' reimbursement for medical services provided, and both public and private funding of research. Medical decisions are made during informed discussions between the physician and patient regarding potential benefits and risks of an intervention, alternatives to the intervention, and the intended outcome. In the past, a physician's anecdotal experience and knowledge of the literature formed the basis for the justification of proposed interventions for a patient's diagnosis. The current medical climate requires physicians to be aware of the evidence to support an intervention for not only quality medical care but also for reimbursement, avoidance of litigation, and substantiation of research subsidies.

Within sports medicine, both orthopaedic surgeons and primary care specialists are being asked to adjust their clinical practices, hospitals, and offices to conform to the guidelines imposed by both public and private entities. It was not long ago that assignment of

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methodologic quality of medical research was initially introduced in antithrombotic medication literature through level-of-evidence ratings and validated study methodologic quality scores.[1] This has triggered sports medicine journals to encourage authors to submit and publish higher qualities of evidence. This means not only better performance of clinical trials but also better reporting of results with transparency of study design.[2,3] However, recent investigations analyzing orthopaedic and sports medicine evidence have shown a predominance of Level III and IV Evidence, with several shortcomings identified.[3,4] These include retrospective study design; lack of sample size calculations and blinding; short follow-up; and inadequate recognition and discussion of study limitations, bias, and error.

Long recognized as the gold standard for medical evidence, the high-quality randomized controlled trial (RCT) was, and continues to be, the basis on which many medical decisions are made (Level I Evidence).[5] This type of study, however, represents only 3% to 9% of published literature.[6-8] Despite the rigorous nature of design and performance of RCTs, their publication has increased in sports medicine research.[9] Nevertheless, execution of RCTs is not always possible in certain disciplines of sports medicine, and other "lower levels of evidence" may have excellent study designs that provide clinically valuable support for a given treatment.[10,11] Thus practitioners must be familiar with all facets of EBM and its integration into their practice. However, two-thirds of orthopaedic surgeons cite a lack of appropriate clinical evidence relevant to their own practice as the reason for not universally accepting EBM.[11] Thus a need exists to highlight the distribution and quality of evidence within sports medicine. This would provide clinicians with information regarding their own clinical practice.

The purpose of this investigation was to determine the proportion of sports medicine studies that are labeled as Level I Evidence in 5 journals and compare the quality of surgical and nonsurgical studies using simple quality assessment tools (Consolidated Standards of Reporting Trials [CONSORT] and Jadad). Furthermore, we intend to report the proportion of published sports medicine literature that is labeled as Level I Evidence and compare surgical and nonsurgical sports medicine literature. We hypothesized that less than 10% of sports medicine research in 5 journals is Level I Evidence and that there is no significant difference in CONSORT or Jadad scores of surgical and nonsurgical studies.

Methods

This investigation's study design was selected a priori. PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and the PRISMA checklist were used without a formal protocol or publically available registration number for this investigation.[12] Journals were selected a priori based on the top 5 journals pertinent to sports medicine (based on the past 3 years of citations from a private ranking company[13]): *American Journal of Sports Medicine* (AJSM), *British Journal of Sports Medicine* (BJSM), *Medicine and Science in Sports and Exercise* (MSSE), *Arthroscopy: The Journal of Arthroscopic and Related Surgery* (*Arthroscopy*), and the American version of the *Journal of Bone and Joint Surgery* (JBJS Am).[13] The journal impact factor was extracted from the Journal Citation Reports from the ISI Web of Knowledge "Sports Sciences" subject category[14]: AJSM (No. 5 ranking based on impact factor [3.792]; 5-year impact factor, 4.427), BJSM (No. 4 ranking based on impact factor [4.144]; 5-year impact factor, 3.790), and MSSE (No. 3 ranking based on impact factor [4.431]; 5-year impact factor, 5.017). Extracted journals were also taken from the "Orthopedics" subject category[14]: *Arthroscopy* (No. 6 ranking based on impact factor [3.024]; 5-year impact factor, 3.079) and the sports medicine section of JBJS Am (No. 4 ranking based on impact factor [3.272]; 5-year impact factor, 4.289).

Two independent reviewers (1 board-eligible orthopaedic surgeon and 1 orthopaedic surgery resident physician) completed the search and analyzed each inclusive study. The search was performed on August 12, 2012. The previous 2 years of publications from the searched journals were searched. Study analysis commenced on August 12, 2012, and was completed on September 1, 2012. No study was omitted or excluded from analysis. Levels of Evidence I, II, III, IV, and V (per the Oxford Centre for Evidence-Based Medicine used by JBJS Am)[15] were analyzed based on the journal's designated level-of-evidence assignment, and Level I Evidence was scrutinized further. We also evaluated the study's level of evidence and observed congruence for all analyzed studies. In addition, we analyzed the continent and country of residence of the study authors; the presence or absence of a self-reported financial conflict of interest; and the inclusion of a biostatistician, holder of a master of public health (MPH) degree, and/or epidemiologist as a study author.

Study methodologic quality was assessed by the level-of-evidence rating,[15] CONSORT 2010 statement,[16] and Jadad scale.[17] The CONSORT questionnaire (2010) is a 25-item questionnaire with 12 sub-items, for a total of 37 questions, scored 1, 2, or 3 (Appendix Table 1); the total score ranges from 37 to 111. A percent score is calculated based on the responses to each item. The intent of the creators of the CONSORT questionnaire was not to numerically grade studies. However, for the purposes of this study, a simple quantitative score was used to allow for group comparisons. The Jadad scale is a very simple 3-question test evaluating study randomization, blinding,