

[Physical Therapy]

Compliance With Injury Prevention Measures in Youth Pitchers: Survey of Coaches in Little League of Puerto Rico

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Background: Because of the problem of elbow and shoulder injuries in baseball pitchers between 9 and 14 years of age, the USA Baseball Medical & Safety Advisory Committee and the Department of Recreation and Sports in Puerto Rico developed injury prevention guidelines for pitchers. The purpose of this study was to determine the compliance of pitching coaches of 9- to 14-year-old Little League teams in Puerto Rico with the Administrative Order 2006-01 and the USA Baseball guidelines.

Hypotheses: (1) The coaches will have a satisfactory level of compliance with the Administrative Order as well as with the USA Baseball guidelines and (2) both the level of education of the coach as well as the years of experience will correlate with the level of compliance.

Study Design: Descriptive cross-sectional study.

Level of Evidence: Level 5.

Methods: A self-administered questionnaire was developed based on the Administrative Order and on the USA Baseball guidelines. A descriptive univariate analysis was conducted to determine the mean coach compliance with both guidelines. Pearson correlation coefficients were used to describe the correlation between the level of education and the years of experience of the coaches with the level of compliance.

Results: Thirty-five coaches (response rate, 78%) participated in the study. On average, the coaches complied with 70% of the Administrative Order and with 73% of the USA Baseball guidelines. No significant correlations were found.

Conclusion: The coaches who participated in the study did not reflect a satisfactory level of compliance with the USA Baseball guidelines or with the Administrative Order.

Clinical Relevance: These findings emphasize the need for reinforcing compliance with the injury prevention guidelines and the need to provide resources and training to coaches to effectively prevent elbow and shoulder injuries in pitchers.

Keywords: Little League; coaches; injury prevention; pitchers

In Puerto Rico, approximately 56,000 children and young people participate in baseball.¹⁷ Practicing this sport without following the recommendations of injury prevention increases the risk of suffering injuries that affect the health of children and adolescents in the short and/or long term.

In 2007, approximately 110,000 children and adolescents between 5 and 14 years of age went to an emergency room as a result of injuries sustained during baseball or softball practice in

the United States.¹⁶ The incidence of injuries for baseball and softball pitchers in 11 high schools in South Carolina was greater than for players in other positions (37.3% vs 15.3%).¹⁸ In the past few years, both elbow injuries in pitchers as well as ulnar collateral ligament surgeries¹ in adolescents have increased.⁸

Based on these statistics and the etiology of injuries in juvenile pitchers,^{8,12} the USA Baseball Medical & Safety Advisory

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Committee (USA Baseball) developed a 2008 guideline for the prevention of injuries in children and adolescents between 9 and 14 years of age (Table 1 in Appendix 1, available at <http://sph.sagepub.com/content/by/supplemental-data>).¹⁹ Likewise, the Department of Recreation and Sports of Puerto Rico created the Administrative Order number 2006-01⁵ (Administrative Order) as a measure to minimize injuries in baseball pitchers between 8 and 18 years of age (Table 2 in Appendix 1).

The composition of prevention guidelines, however, does not guarantee their compliance.^{4,13,21} The actions of the coaches have a determining role in the prevention of injuries.^{5,19} In the case of baseball, it is necessary to determine whether the coaches comply with the guidelines for the prevention of injuries in pitchers and which elements impede or facilitate their compliance. One of the most used theoretical methods to explain the reasons people do or do not comply with health-related guidelines is the health belief model.^{2,4} The health belief model allows the identification of barriers and facilitates compliance with the injury prevention guidelines as well as explores the reasons coaches do or do not comply with these guidelines.

Several factors can affect the level of compliance. Previous studies have explored the relation between the degree of compliance of a person with the prevention guidelines related to health and the level of education: the higher the level of education achieved, the greater the compliance with the prevention measures.^{11,20} Likewise, several studies have found that the greater the number of years of experience working as a health professional, the greater the compliance with prevention guidelines.^{10,15}

In the United States, a study determined the knowledge and compliance of coaches of young baseball pitchers with USA Baseball guidelines⁷; 73% of coaches said they complied with the prevention measures but only 43% responded correctly to questions about the guidelines. In Japan, 39.8% of youth coaches had correct knowledge of the recommendations but only 28.3% consistently complied with them.²²

The purpose of this study was to determine the compliance of Little League pitching coaches of children and adolescents between 9 and 14 years of age in Puerto Rico with the Administrative Order 2006-01⁵ and the USA Baseball guidelines.¹⁹ The hypotheses tested in this study were (1) The coaches will have a satisfactory level of compliance with the Administrative Order as well as with the USA Baseball guidelines and (2) both the level of education of the coach as well as the years of experience will correlate positively with the level of compliance.

METHODS

The protocol was approved by the institutional review board. A questionnaire for baseball coaches was developed based on the content of the Administrative Order⁵ and the USA Baseball prevention guidelines.¹⁹ The questionnaire was distributed to the coaches, and the data were analyzed from August 2014 to February 2015.

Instrument

The questionnaire had 41 questions about the compliance of the coaches with the recommendations provided in the Administrative Order (11 questions) and the USA Baseball guidelines (10 questions) (see Appendix 2, available at <http://sph.sagepub.com/content/by/supplemental-data>). Prior to administering the questionnaire, it underwent content validity by a panel of 3 experts, followed by a pilot study with 2 coaches. Demographic data were collected as well as a description of the exercises supervised by the coaches during the training sessions.

Sample and Data Collection

Using a convenience sampling method, 45 coaches of Little League teams from 7 municipalities in Puerto Rico were invited to participate in this study. After administering the questionnaire, each participating coach received a pitch counter in appreciation for their time and participation.

Data Analysis

The level of compliance with the Administrative Order was determined based on 20 questions (11 questions included only in the Administrative Order and 9 questions consistent in both measures). The level of compliance with the USA Baseball guidelines was determined based on 19 questions (10 questions included only in the USA Baseball guidelines and 9 questions consistent in both measures). For the purpose of this study, 80% compliance with the measures was considered satisfactory. Central tendency measures and dispersion were calculated (ie, mean, standard error for the continuous variables [eg, age, years of experience]). The Shapiro-Wilk test was used to determine that the variables of compliance, level of education, and years of experience had a normal distribution. The Pearson correlation coefficient was used to describe the correlation between the level of education and the years of experience of the coaches with the level of compliance with the guidelines for the prevention of injuries, at a significance level of $P < 0.05$. To analyze the data, the Statistical Package for the Social Sciences (SPSS; IBM), version 16.0, was used.⁹

RESULTS

Of the 45 coaches invited to participate in the study, 78% came to the meetings scheduled: 29% of the coaches worked with 9- to 10-year-olds, 37% with 11- to 12-year-olds, and 34% with 13- to 14-year-olds (Table 3 in Appendix 1).

Level of Compliance and Correlation

On average, the coaches complied with 70% of the recommendations in the Administrative Order (14 ± 0.40 of 20 questions) and with 73.11% of the recommendations in the USA Baseball guidelines (13.89 ± 0.33 of 19 questions) (Table 4 in Appendix 1). There was no significant correlation between the highest level of education and the compliance neither with the Administrative Order ($r = 0.33$, $P = 0.05$) nor with the USA

Baseball guidelines ($r = 0.32$, $P = 0.06$). Similarly, the years of experience as coach and the level of compliance with the Administrative Order ($r = 0.13$, $P = 0.47$) or with the USA Baseball guidelines ($r = 0.01$, $P = 0.94$) did not reflect a significant correlation.

The coaches reported that they perform warm-up exercises with the pitchers for an average of 15.64 ± 1.25 minutes. Thirty-three (94%) coaches indicated that they do static stretching, while 22 (63%) perform ballistic stretching. Twenty-seven (77%) coaches do active stretching, while 23 (66%) perform active-assisted stretching. The strengthening exercises more frequently performed are push-ups and abdominal crunches (66%, $n = 23$). Push-ups are performed an average of 1.70 times a week, doing 5 sets of 7 repetitions. The coaches indicate to the pitchers to do aerobic exercise for an average of 16.76 ± 2.76 minutes per session. Last, the coaches encourage pitchers to do cool-down exercises an average of 12 minutes.

DISCUSSION

On average, the level of compliance of the coaches was 70% with Administrative Order 2006-1 and 73% with the USA Baseball guidelines. The level of compliance in this study was greater than that with the Japanese Society of Clinical Sports Medicine injury prevention guidelines.²² The Japanese guidelines differ from the USA Baseball guidelines so a direct comparison is not possible. The mean level of compliance was less than 80% for both the USA Baseball guidelines and the Administrative Order and therefore not satisfactory.

There was no correlation found between the level of education and the level of compliance. A possible explanation for these findings is that the injury prevention guidelines are not being promoted adequately and thus, the years of experience of the coaches or their level of education was not a factor.

The results of our study also show that most coaches (57.14%) do not have a certification as a coach from the Department of Recreation and Sports (See Table 3 in Appendix 1). To have such a certification, coaches must have a total of 12 contact hours in applied sports science, 18 contact hours in teaching methods applied to sports training, and 18 contact hours of a technical component.³ Coaches who are certified have greater preparation to train children and young people who practice this sport.

Only 48.57% of the coaches complied with the established guidelines for pitches thrown in a game (Table 5 in Appendix 1). The number of pitches thrown in a game is the main risk factor in the development of injuries; these results reflect the need to reinforce compliance with pitch count restrictions.⁸

The National Strength and Conditioning Association recommends doing strengthening exercises 2 or 3 times a week.⁶ On average, the coaches in this study perform strengthening exercises 1.70 times per week, which is not enough to gain muscular strength.⁸ Push-ups were the

strengthening exercise most utilized; the coaches reported an average of 5 sets of 7 repetitions, which is more than recommended.

Limitations

The findings of this study cannot be generalized as they are based on a convenience sample, composed only by some municipalities, and do not represent all coaches of juvenile pitchers of Little League of Puerto Rico. The absence of a correlation could also be due to the small sample that was used in this study, which results in a low statistical power.¹⁴

CONCLUSION

The coaches who participated in this study did not demonstrate a satisfactory level of compliance with the USA Baseball guidelines nor with Administrative Order 2006-01. The findings of this study pose the need to reinforce compliance with the guidelines for the prevention of injuries.

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