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ORIGINAL ARTICLE

Multicenter survey of badminton-related eye injuries

Katherine V. Zamora, MD[1]
Harvey S. Uy, MD[1, 2]
Philippine Badminton Eye Injury Study Group

[1]*Department of Ophthalmology and Visual Sciences*
Sentro Oftalmologico Jose Rizal
University of the Philippines–Philippine General Hospital
Manila, Philippines

[2]*Asian Eye Institute*
Makati, Philippines

ABSTRACT

Objective

To determine the patient profile and risk factors for badminton-related eye injuries in Metro Manila.

Methods

We conducted a cross-sectional survey of badminton-related eye injuries in Metro Manila. A survey form was sent to 13 ophthalmologists who were asked to report on patients treated for badminton-related eye injuries from July 1 to December 1, 2004. The following data were collected: patient age, gender, and sports experience; details of eye injury; use of protective eyewear; and visual outcomes. Logistic regression analysis was performed to predict sight-threatening injuries.

Results

The average patient age was 34.7 ± 6.2 years (range 18 to 46). There were more males than females (1.55:1). All patients sustained eye injury while playing doubles. None of the patients were wearing protective eyewear at the time of injury. Blunt trauma due to shuttlecock impact was the cause of injury in 74% of cases. The most common ocular findings were iridocyclitis (n = 11), secondary glaucoma (n = 6), and hyphema (n = 5). Twenty-nine sight-threatening conditions were reported. Six (26%) patients developed chronic ocular sequelae.

Conclusion

Sight-threatening injuries can occur in individuals playing badminton. While vision loss is uncommon, treatment outcomes are generally good. Since all injuries were sutained without the use of protective eyewear, ophthalmologists have a responsibility to promote its use when playing badminton.

Keywords: *Badminton, Eye injury, Trauma, Protective eyewear*

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Philippine Badminton Eye Injury Study Group
Katherine V. Zamora, MD[1]
Edgar Leuenberger, MD[2, 3]
Aileen Antonio-Santos, MD[4]
Joanne Bolinao, MD[1, 5]
Pik Sha T. Chan, MD[2, 5]
Estrellita Genuino, MD[1, 6]
Sonia Javelosa-Silos, MD[1]
Maria Melania Mariano, MD[6]
Manolette Roque, MD[7]
Ronel Santos, MD[4]
Alexander Tan, MD[1]
Ellen Yu-Keh, MD[5]
Harvey S. Uy, MD[1, 2, 5, 6, 7]

1. University of the Philippines–Philippine General Hospital
2. Asian Eye Institute
3. University of the East Ramon Magsaysay Memorial Medical Center
4. Medical Center Manila
5. St. Luke's Medical Center
6. Manila Doctors Hospital
7. Asian Hospital and Medical Center

Correspondence to
Harvey S. Uy, MD
Asian Eye Institute
9F Phinma Plaza Bldg.
Rockwell Center, Bel-Air
1200 Makati, Philippines
Telephone : +63-2-8982020
Fax : +63-2-8982002
Email : harveyuy@pol.net

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WHILE sports-related ocular traumas are rare occurrences, they may result in devastating and disabling consequences. The causes of eye-related injuries depend on the type of sports popular in a particular area or country. In the United States, most sports-related eye injuries are sustained while playing basketball and baseball. Soccer and racquet sports lead the list in most of Europe. In the United Kingdom and Australia, squash and badminton account for about half of all sports-related eye injuries.[1-4] In Malaysia, where badminton has been a popular sport for many years, badminton accounts for two thirds of all ocular sports injuries.[5] In the Philippines, badminton has gained growing popularity over the past 2 years, leading to an increased incidence of badminton-related physical and ocular injuries.[6] We, therefore, conducted this survey to determine the types of injuries and risk factors associated with badminton.

METHODOLOGY

A printed questionnaire was distributed to 13 ophthalmologists in 7 eye centers in Metro Manila. They were asked to report cases of badminton-related eye injuries treated from June 1 to December 1, 2004. The following data were collected: patient age, gender, and sports experience; details of eye injury; use of protective eyewear; and visual outcomes. The types of ocular injury were classified as sight-threatening or not. Sight-threatening injuries are ocular conditions that if unresolved can affect visual acuity (e.g., uveitis, glaucoma, hyphema, vitreous hemorrhage, retinal detachment, and optic neuropathy).

Data were coded and entered into MS Excel (Microsoft Corporation, Redmond, WA), and statistical analyses performed using Statistical Package for Social Sciences version 10 (SPSS Inc. Chicago, IL, USA). Categorical variables were presented as percentage-frequency distribution and continuous variables such as age, gender, years of playing badminton, presence of trainer, use of protective eyewear, prior history of ocular injury, doubles play, type of injury, cause of injury (shuttlecock or racquet) were dichotomized and entered into a binary logistic regression analysis using the forward technique to predict sight-threatening injuries.

RESULTS

Information on 23 patients who suffered badminton-related eye injuries were reported by 13 ophthalmologists. The average patient age was 34.7 ± 6.2 years (range 18 to 46). Fourteen (64%) patients were male and 9 (36%) female.

Data regarding the patient's training and number of years playing badminton were not available for 7 patients. Of the remaining 16 patients, 4 (25%) had less than one year experience, 7 (47%) had 1 to 2 years, and 5 (33%) had more than 3 years. Five patients (33%) underwent training with a professional player while 11 (69%) did not. Two patients had history of minor sports-related eye injuries. One had suffered a self-inflicted blunt injury playing tennis while the other had been hit by a shuttlecock in the nasal canthal area.

None of the patients wore protective eye gear. One patient's spectacles were shattered after being hit by a racquet. Eighteen (78%) patients indicated the type of game at the time of injury (singles or doubles); all were playing doubles. Shuttlecock impact caused injury in 17 (74%) patients while racquet injuries occurred in 6 (26%). The injury was caused by an opponent in 15 (65%), a partner in 6 (26%), and self-inflicted in 2 (9%) cases.

All injuries were unilateral. Three (13%) eyes remained normal after injury and 12 (52%) had multiple injuries. Thirty vision-threatening injuries were reported in 13 (57%) patients (Table 1). Chronic sequelae such as glaucoma developed in 6 patients, 3 of whom developed angle-recession glaucoma that needed maintenance medications. One each developed a macular hole, chronic uveitis, and retinal detachment.

The patient with macular hole developed a final visual acuity of 20/80 in the injured eye. The rest had visual acuity of 20/40 or better. Two patients (1 with lid laceration and 1 with retinal detachment) needed surgery while the rest were managed medically or placed under observation.

Factors associated with sight-threatening injuries are shown in Table 2. Those with high associations are age (>34 years), gender (male), playing experience (≥3 years), doubles play, partner as the instigator, and shuttlecock as the offending object. However, none of the associations reached statistical significance.

Table 1. **Types of badminton-related eye injuries.**

Type of Injury	Number of Cases
Iridocyclitis/Iritis*	11
Secondary glaucoma*	6
Hyphema*	5
Posterior vitreous detachment	3
Eyelid contusion	2
Corneal abrasion	2
Corneal edema*	2
Cystoid macular edema*	1
Peripheral intraretinal hemorrhage	1
Lid laceration	1
Commotio retina*	1
Vitreous hemorrhage*	1
Berlin's edema*	1
Subconjunctival hemorrhage	1
Bulbar congestion	1
Conjunctivitis	1
Iridoplegia	1
Macular hole*	1
Retinal detachment*	1

* Sight-threatening injury

DISCUSSION

Eye injuries in sports can easily be prevented with proper use of protective eyewear (i.e., polycarbonate lenses).[3, 5, 7-11] Failure to wear protective eyewear, noted in all patients in this series, was the primary risk factor for sustaining badminton-related eye injuries. Most of these were sustained while playing doubles. Many studies have reported that doubles games in tennis, racquetball, and badminton are associated with more injuries than singles.[7, 8] In doubles, injury may be inflicted by the teammate or the opponents. Injuries may happen when an inexperienced player turns around to look at the teammate or when he inadvertently gets in the line of the teammate's shot.[1, 8] These situations do not arise in singles matches where injuries often occur when a player fails to avoid the high speed oncoming shuttlecock. While the badminton shuttlecock is light (it weighs only 1 ounce), it achieves a velocity high enough to cause injury when it hits the eye. The shuttlecock head has a small diameter that fits the human orbit. While some studies reported that racquets cause more injuries, [1, 3] our study found that shuttlecock was associated with higher risk of sight-threatening injuries. Due to the small sample, however, it did not reach statistical significance.

Table 2. **Factors associated with sight-threatening injuries.**

Variable	Odds Ratio**	95% Confidence Interval	*p**
Age ≤ 34 > 34	2.80	0.35–25.2	0.25
Gender Male Female	2.67	0.32–24.4	0.29
Length of experience < 3 years ≥ 3 years	5.14	0.36–15.2	0.15
With training No Yes	0.30	0.03–2.8	0.22
Protective eyewear No Yes	0.21	0–20.7	0.32
History of prior injury No Yes	0.90	0.02–39.7	0.94
Type of game Singles Doubles	4.29	0.28–13.3	0.22
Instigator of Injury Partner Opponent	2.00	0.19–23.0	0.49
Instrument of injury Shuttlecock Racquet	1.93	0.18–23.6	0.52

* Significant if p value ≤ 0.05
** Computed using binary logistic regression, SPSS10

Most badminton-related eye injuries are due to blunt trauma resulting in complications such as hyphema, iridocyclitis, secondary glaucoma. Hyphema has been reported to be the most commonly reported ocular injury sustained in racquet sports accidents.[1] Chandran reported that macular changes, traumatic cataract, and glaucoma are the main causes of visual impairment in badminton-related injuries.[5] Our study demonstrated that sight-threatening conditions (Table 1) may arise from badminton injuries.

Only a few eye doctors practicing in a single urban center were surveyed; thus, the actual number of badminton-related eye injuries in the Philippines is likely to be higher than reported in this study. This small series lacks statistical power to identify any specific risk factors, including the amount of badminton training and experience and the use of protective eyewear. Since all injuries were sustained without the use of protective eye gear, the fact alone supports the importance of protective-eye-wear use while playing even if not shown to be statistically significant. A larger study to identify other risk factors with a longer follow-up should be conducted to detect late sequelae of badminton injures, such as posttraumatic cataract or visual loss from angle-recession glaucoma, which can occur months to years after injury. Nevertheless, the results of this study can be used to support a campaign to promote protective eyewear use.

In summary, this study demonstrates that sight-threatening injuries can occur while playing badminton. Failure to use protective eyewear and playing doubles matches are predisposing factors for badminton-related injures. While vision loss is uncommon, these injuries can lead to permanently diminished visual function.

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