

## Research Article

# Retrospective Review of the Duke University Men's Basketball Team Eye Screening

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**Abstract****Objectives:** To assess the utility and effectiveness of performing eye screenings on young healthy athletes.**Design:** Retrospective review**Methods:** The eye screening cards of the Duke University Men's Basketball players over a ten year period were reviewed. Visual acuity, intraocular pressure, portable slit lamp exam and undilated direct ophthalmoscopy were recorded for each subject and analyzed. Any patient with an abnormality during screening received a comprehensive eye exam.**Results:** A total of 60 players were screened. 14 out of 60 (23%) of athletes wore contact lenses. 9 out of 60 (15%) of athletes had uncorrected refractive error. 6 out of 60 (10%) of athletes were diagnosed as glaucoma suspects. 1 out of 60 (2%) of athletes had keratoconus.**Conclusion:** Eye screening of healthy athletes is beneficial to identify refractive error and glaucoma/keratoconus suspects as well as to provide education on contact lens hygiene.**Keywords:** Sports ophthalmology; Sports vision; Eye care; Contact lens use**Introduction**

In his book "The Sports Gene," David Epstein explores the science of extraordinary athletes, debating if their abilities are based on genetics or excessive training above the competition [1]. The assumption is quickly made that an athlete's vision is better than the average person. There may be some truth to this theory; however, many athletes reach the collegiate level without ever having an eye exam. The sports vision epidemiology project screened 939 athletes at the AAU Junior Olympic Games and found 25% have never had a complete eye exam, 29% had visual symptoms and 28% had less than 20/25 acuity [2].

Each sport appears to require a specific visual skill set [3]. In basketball, decreased visual acuity can degrade performance [4-6]. To maintain a competitive edge, all players on a basketball team should maximize their vision potential. Over the past 15 years and to this present date, annual eye screenings are performed on the Duke Men's Basketball Team prior to the start of the season. We report the findings and evaluate the utility of screening young healthy basketball players.

**Methods**

This retrospective study was performed with the approval of the Duke University Medical Center Institutional Review Board and in accordance with the Declaration of Helsinki guidelines for human research and the U.S. Health Insurance Portability and Accountability Act. Annually, Dr. Terry Kim, Consultant Ophthalmologist for the Duke Men's Basketball Team, brings his team of ophthalmic technicians, ophthalmologists and optometrists from Duke University

Eye Center to set up eye screenings in the Cameron Indoor Stadium facility. Stations are setup around the room to evaluate visual acuity, intraocular pressure, portable slit lamp examination, confrontation visual field, pupil size/reaction and undilated direct ophthalmoscopy. Figure 1 shows Dr. Kim performing a portable slit lamp exam on one of the Duke Basketball players. All findings are documented on an eye screening card and any patient with abnormal findings during screening receives a comprehensive eye exam at Duke University Eye Center.

The eye screening cards of the players from 2001-2011 were acquired and the data was tabulated avoiding duplication of the



**Figure 1:** Dr. Terry Kim performs a portable slit lamp exam on a Duke Basketball player.

**Table 1:** Summary of screening exam findings.

Total Players Screened	60
Contact Lens Use	23% (14/60)
Uncorrected Refractive Error	15% (9/60)
Glaucoma Suspects	10% (6/60)
Keratoconus	2% (1/60)
Referred for Comprehensive Exam	25% (15/60)

same athlete since several players were screened during multiple years. Results from visual acuity, intraocular pressure, portable slit lamp examination and undilated direct ophthalmoscopy testing were collected.

## Results

A total of 60 unique players were screened over the 10 year period. Table 1 summarizes the findings. 23% of the athletes used contact lenses and 15% had uncorrected refractive error. The degree of visual acuity in these players ranged from 20/25 to 20/70 with a mean of 20/38. In regards to ocular pathology identified, 2% had keratoconus and 10% were identified as glaucoma suspects. Overall 25% of the patients were referred for more comprehensive exams.

## Discussion

Approximately 39.2 million Americans wear contact lenses [7]. A survey of 6,850 college students from India found 17.5% (392) wore contact lenses on a daily basis [8]. In this study, 14 out of 60 (23%) players wore contact lenses when playing basketball and reported their use during the screening. Compared to the general population, 59% of individuals age 18-34 used contact lenses, glasses, or had refractive surgery [9]. Michael Peters, O.D., a professional team optometrist, found that in the National Basketball Association, 16% of the players had a need for vision correction with the majority wearing contact lenses [9].

Benefits for contact lenses over glasses in sports include the fact that contact lenses do not fog up or limit peripheral vision as much as glasses. Alternatively, specialized sports glasses can provide eye protection preventing ocular trauma. Contact lens complications can be severe and lead to permanent blindness. The most common reason for a corneal infection or ulcer is contact lens use [10]. Other complications include dry eye, giant papillary conjunctivitis, corneal abrasion, corneal edema, keratitis and neovascularization [11]. To avoid complications, daily disposable contact lenses are recommended because they are discarded after one use and relinquish the need for cleaning.

At Duke, all players that are found to be wearing contact lenses are sent to a local optometrist to evaluate their fit and recommend using daily disposable contact lenses. It is paramount to educate the athletes on proper contact lens hygiene and pattern of use. During competition, contact lenses can fall out; hence, it is recommended for players to have new backup lenses available on the sideline.

Although 23% of players wore contact lenses, 9 out of 60 (15%) had residual or uncorrected refractive error. The degree of visual acuity in these players ranged from 20/25 to 20/70 with a mean of 20/38. To place this in perspective, the minimum standard for driving

without glasses is 20/40 or better in all states in America except for 3 (Georgia – 20/60 or better and Wyoming and New Jersey 20/50 or better) [12]. Refractive error can be corrected with glasses, contact lenses, laser vision surgery to include LASIK or PRK and phakic intraocular lenses.

The standard goal when checking vision is 20/20, although some people are capable of seeing 20/15 or 20/10. In some sports such as baseball, players will use contact lens to improve their 20/20 uncorrected vision to achieve 20/15 or 20/10 vision [13]. The impact of refractive error can degrade performance in basketball and therefore should be corrected [4-6]. For example when shooting basketball free throws, some studies have shown the shot will typically miss towards the side with the better seeing eye [9].

According to the American Academy of Ophthalmology, “a glaucoma suspect is an individual with clinical findings and/or a constellation of an increased likelihood of developing primary open angle glaucoma” [14]. In this study, there were two ways to identify glaucoma suspects: 1. Elevated intraocular pressure over 21mm Hg which is defined as ocular hypertension; 2. Thin optic nerve on direct ophthalmoscopy. 6 out of 60 (10%) athletes were found to be glaucoma suspects. Three of the athletes had ocular hypertension and four had increased thinning of the optic nerve. Only one athlete had elevated intraocular pressure and a thin optic nerve. All athletes identified as glaucoma suspects were scheduled for a more thorough examination, which included visual field testing, optic nerve imaging and gonioscopy.

Glaucoma is a slow and progressive disease which can lead to permanent vision loss if left untreated. The prevalence of glaucoma suspects is lacking; however, it is estimated that 3 to 6 million Americans have ocular hypertension [14]. By identifying glaucoma suspects, proper treatment or observation can be initiated to prevent visual loss.

Keratoconus is a progressive disease of the cornea with a prevalence of about 50 per 100,000 [15]. The thinning and protrusion of the cornea can lead to visual loss and eventual need for corneal transplantation. Systemic diseases such as obstructive sleep apnea and mitral valve prolapse are associated with keratoconus [16]. Refractive surgery is contraindicated in patients with keratoconus because it can lead to post-surgical corneal thinning and blindness. 1 out of 60 (2%) athletes was noted to have keratoconus on corneal topography after identifying decreased visual acuity on screening. This patient underwent specialty contact lens fitting for keratoconus, which resulted in markedly improved visual acuity. He will continue to have yearly eye examinations and if changes are noted, may be eligible for early treatment such as corneal collagen cross linking.

Screening athletes can be challenging because the schedules of these student-athletes are demanding. To save time and improve access for the athletes, our screening was performed at the practice facility conveniently located where the team practices and plays. At the University of Texas El Paso, the athletes have eye screenings at the practice facility in conjunction with the physicals performed by the athletic trainers. Technician help and support is often easy to elicit because many of them enjoy the opportunity to work with the athletes. When working with the athletes, it is extremely important

to respect HIPPA regulations and ensure privacy of exam findings. Accidental disclosure of information could potentially impact a player's standing in a professional draft and/or give the opposing team an advantage [17].

## Conclusion

Eye screening of healthy athletes is beneficial in identifying and treating refractive error as well as potentially blinding eye diseases like glaucoma or keratoconus. Contact lens use is prevalent and players should be educated on the proper use of contact lenses. Evaluating the visual function of elite athletes can potentially help achieve maximum performance and gain a competitive advantage.

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