

Proteinuria in Adolescent Sports Physical Examinations

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The preparticipation sports physical examination has become a standard element in the delivery of sports medicine to individuals involved in organized athletic programs. While there is general agreement among health care providers about the value of such an examination, there seems to be a lack of consensus regarding the appropriate timing and frequency of such examinations and the specific components of the examination that are essential and valuable.^{1,2}

Historically, routine testing of urine samples was recommended on all examinees. In view of the frequent occurrence of benign abnormalities, particularly proteinuria in the healthy adolescent population, this practice has recently been questioned.³

The results of 724 preparticipation sports physical examinations, performed on junior and senior high-school students at a family practice center, suggest that such routine screening of urine samples is not warranted.

METHODS

As part of its athletic medical program, The University of Michigan Family Practice Center at Chelsea performs preparticipation sports examinations annually for junior and senior high school students. The Family Practice Center is located in Chelsea, a semirural community with a population of approximately 4,500, which is 14 miles west of Ann Arbor. The school district

encompasses 120 square miles with a population of 12,000. The students are predominantly white, coming from families of middle socioeconomic status. Each year, during a summer afternoon, the students are welcomed at the center for their examinations. A modified "herd" technique is employed, utilizing several stations for limited urinalysis, vision testing, and 20 separate examination rooms where vital signs are recorded, medical history is reviewed, and the physical examination is performed. Urine testing is conducted by office staff who have been specifically tested for their competence. Standard dipstick testing is employed, using reagent strips impregnated with the dye tetrabromophenol blue for detection of protein. Positive results are recorded as trace, 1+, 2+, or 3+. Urine samples are clean catch, midstream specimens.

RESULTS

Two separate groups were reviewed, students from the summer of 1982 and students from the summer of 1983. The total number of urine specimens evaluated was 724 (336 in 1982, and 388 in 1983). The ratio of male to female was 60:40; slightly more than one half (52 percent) of the students examined in 1983 had also been examined in 1982.

Proteinuria was a strikingly common abnormality, occurring in 62 percent of all urinalyses. Even excluding cases of trace proteinuria, 17 percent were abnormal for protein (1+, 2+, 3+). Samples from menstruating girls were excluded. A comparison of results from both years, including results for male and female

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TABLE 1. FREQUENCY OF PROTEINURIA (PERCENTAGE)

	Year 1 (n = 336)		Year 2 (n = 388)		Totals Both Years Combined	
	Number	Per-centage	Number	Per-centage	Number	Per-centage
Boys	66	37	125	56	191	46
Girls	118	79	142	89	260	84
Combined Boys and Girls	184	54	267	68	451	62

students separately, is found in Table 1. Among the 214 individuals who were present at both years' examinations, 61 (28.5 percent) exhibited proteinuria on both occasions.

DISCUSSION

In recent years, several authors have questioned the advisability of routine urine screening as a part of mass athletic screening examinations.³⁻⁵ Proteinuria is a common finding in the pediatric age group.⁶ The incidence reaches a peak during adolescence. Various screening studies have reported the incidence of proteinuria in populations of children to vary from 5 percent to 85 percent, increasing with age up to 16 years. Warm summer weather has been shown to increase the likelihood of proteinuria.⁷ As indicated above, the examinations were performed at the Family Practice Center in the summer. Several studies have demonstrated a higher incidence of proteinuria in girls than boys, as was clearly the case with these results.

Proteinuria in childhood is a benign event in all but 0.08 percent of cases.⁷ By far the largest share of benign proteinuria in adolescents is orthostatic in nature. Such posturally related proteinuria usually occurs transiently or intermittently and in neither the transient nor fixed state is it likely to be associated with any significant renal disease.⁸ Indeed, the results from the group of students present at both years' examinations support the intermittent character of proteinuria, as only 28.5 percent of that group exhibited proteinuria on both

occasions compared with an overall occurrence of proteinuria of 62 percent. Some other forms of benign proteinuria in childhood are postexercise, febrile, cold exposure, and emotional stress induced. Regardless of the cause of benign proteinuria, the incidence decreases rapidly after adolescence.

Renal specialists agree that the proper evaluation of proteinuria includes several repeat urinalyses with microscopic examination as well as 24-hour collections for quantification of total protein. The monetary cost of even this limited evaluation is not small, nor is the emotional cost involved for the patient and family. In view of the common occurrence of benign proteinuria in adolescents, the use of routine urine screening appears to be unwarranted.

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