

Eye Health Screening for Students in an Elementary School within the Scope of School Health Nursing Roles

ABSTRACT

Background: The aim of this study is to determine the eye health problems or visual defects of students in an elementary school and to provide care and treatment when necessary.

Methods: The sample of this cross-sectional descriptive study consisted of 2,136 students in a primary school. In the process of data collection, student identification information form, vision screening form, and feedback form of teachers about screening developed by the researchers were used. Frequency and percentages were used to define categorical variables. Categorical variables were compared by the chi-square test.

Results: From the results of the eye examination, blepharitis, strabismus, and inability to focus (2.2%) were the most common. According to the result of the visual acuity scan, the prevalence of refractive error was found to be 18.9%. A statistically significant difference was found between the suspicion of refractive error according to the age group ($\chi^2 = 50.071$, $P < .001$). Feedback was obtained from 75.4% of the students who suspected refractive errors in any of their eyes. Of these students, 33.2% went to a doctor's examination, 42.6% were given spectacles, 10.9% were started on medication, and 3% were given both medication and spectacles. The results of the screening show that 56.4% of the students who have a suspected refractive error in any of their eyes and who go to the doctor's examination are detected correctly.

Conclusion: It should be noted that nurses play a key role in the provision and maintenance of school health services. In addition, it is recommended that research on the roles of nurses in identifying other problems that may be raised by screening be conducted and that nurses should be employed in schools.

Keywords: Nurse, vision screening, student

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Introduction

In Turkey, the school-age population is rising steadily: in the 2017-2018 school year, there were 5,104,599 students in 24,967 elementary schools.¹ This group of growing and developing young people need protection from illness and need to have their health improved and at the same time have the chance for early diagnosis of health problems.

The ability to provide primary and secondary protection services for early diagnosis of students' illnesses and to enable them to live a healthy life is of great importance for public health.² The objectives of school health services are to give all children of school age access to the best possible physical, social, and mental health; to allow school children to develop in a healthy environment; and to raise the health level of the children's families and the health of the society.³ For this reason, carrying out health scans when children start school and then regularly throughout their school life and making evaluations are of great importance in detecting and diagnosing illnesses at an early stage and in allowing children who are diagnosed to benefit from treatments, and by this way, they help to lay the foundation of a future healthy society.⁴

The key to successful recovery is early diagnosis.⁵ There is evidence that a visual acuity scanning program conducted in the school is both more effective and cheaper than other methods.⁶ Therefore, eye health scanning programs should be an inseparable part of school health services.⁵ Eyesight problems have a negative impact on students' physical, intellectual, social, and emotional development.^{5,7} The World Health Organization has stated that checking children for eyesight problems and blindness under its VISION 2020 program is a priority.⁸ The most important aspect of eyesight problems and eye diseases in childhood is that if they are not diagnosed and treated in the early stages, treatment performed later on will be difficult or impossible.⁹

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In Turkey, 13.6% of major illnesses or health problems in the last 6 months in children aged 7-14 years are problems relating to the eyes.¹⁰ It is thought that there may be problems from time to time in the country in accessing health services and in being able to obtain a good quality health service. Regarding early diagnosis and the possibility of receiving the necessary interventions, it is seen that there are 3,500 ophthalmologists in Turkey, 2,377 of whom are active. In addition, 40% of the population of the country state that they have not had an eyesight test even once.¹¹ In the light of this information, the role of the school health nurse cannot be ignored in helping students to have eye problems easily, quickly, and cheaply diagnosed and to gain access to treatment services without loss of time, thereby allowing ophthalmologists to provide health services to patients with a more serious need for treatment. For these reasons, it is of great importance for the school nurse to conduct eyesight scans at the school. To achieve this, the support and participation of educated and experienced nurses are very important. In many countries of the world, school nurses are accepted as persons trained and qualified to carry out eye scans. In countries such as India, where the number of nurses is limited, it is recommended that eye scans be performed by educating suitably qualified personnel, such as teachers, parents, first-stage health service providers, and specialist doctors.¹²

Of the 10 most disabling conditions in the world, eye diseases come third. If they are treated, blindness can be avoided in most cases. Similar to mortality, disability has a great impact on the society, and therefore, it is necessary to know the conditions that cause disability.¹³ Good eyesight plays an important role in children's physical development and their success at school.¹⁴

All over the world, school nurses play a role in the early diagnosis of childhood eye diseases such as refractive error, strabismus, inability to focus, or amblyopia (lazy eye) with school-based eyesight scans. With eyesight scans conducted by school nurses, it is possible to determine the visual characteristics of 80% of children.¹⁵

Among the main objectives of a school eye scanning program are evaluating students and determining their eye or eyesight problems, informing parents of the results of the students' eye scans, enabling each student in whom a problem is found to access suitable care or to follow-up, to inform teachers about students who have eyesight problems and make recommendations concerning the classroom environment, and to mobilize the relevant organizations to provide students with defective eyesight with appropriate education opportunities.⁵

Therefore, our aim in this study was to determine the eye health problems of students in primary school and, where necessary, enable them to obtain care and treatment.

Material and Methods

Research Type

This research was a cross-sectional descriptive type of study.

Place and Time of the Research

The research was conducted in the district of Bornova in Izmir, Turkey, in an area with a dense population of students, where there were both internal and foreign immigrants and where the socioeconomic level was low. The study lasted for the 6 spring and autumn semesters of 3 academic years, from 2016 to 2019.

Research Population and Sample

The research population consisted of 2,190 students attending classes 1, 2, 3, and 4, who renewed their registration each year. Inclusion criteria were determined as follows: families and students accepting scanning,

being willing to participate in the study, and the students being present in school during the time of the research. Students who were not at school on the days the research was conducted and those who were on sick leave were contacted again later and were given eye examinations. There was no sample selection process in the study, and 2,136 students in classes 1, 2, 3, and 4 were included in the study (a participation rate of 98%).

Data Collection Tools

A student descriptive information form, an eyesight scan form, and a teachers' feedback form on scanning developed by the researchers were used to collect the study data.

Student Descriptive Information Form: This form consisted of four questions collecting information on the student's name, gender, age, class, and use of spectacles.¹⁵⁻¹⁷

Eyesight Scan Form: This form recorded students' eye disease symptoms and the results of the Snellen E test. In the examination of students' eye diseases, assessments were made for eye disease symptoms such as ptosis, edema of the eyelid, discharge or lesion of the eye, redness in the conjunctiva, blue sclera, abnormality of the pupil, blepharitis, rash around the eyes, squint, excessive blinking, rubbing the eyes, eye watering, eye restriction, strabismus, and inability to focus. After these assessments, the Snellen E test was given, and the results were recorded on the form.¹⁵⁻¹⁷

Teachers' Feedback Form on Scanning: This information was obtained from both students and teachers by going to the classes one or two months after the eye scan. The following information was collected from the students and their class teachers: name, the class, the date when the scan was carried out, whether the student wore spectacles, symptoms of eye disease, results of the Snellen E test (right and left eye), whether the student had gone to a health institution, and whether they had been given spectacles or drug treatment.^{13,17}

Data Collection Method

Data were collected through eye examinations and by the Snellen E test by the researchers and by students performing their public health nursing internship, coordinated by the researchers. Before starting the examination, the researchers received a day of training at Ege University Eye and Cornea Oculoplasty Unit and took part in implementations. In addition, the teaching staff taking part in the training gave training in eye examination and eyesight scanning to the intern students in both groups who were to take on scanning duties in the health office and had them perform sample implementations (Figure 1).

Eye Examination: Hands were washed before the examination, when necessary, during the examination, and after each examination. The eyelids, corneas, irises, pupils, and anatomic structure of each eye of the students were examined by inspection in an area where there was enough light.

Snellen E Test: The Snellen Scale table was used to test acuity of vision. This was prepared by Eğrilmez et al. to be logarithmic (LogMAR based) and to be compatible with Early Treatment Diabetic Retinopathy Study scales. The steps of the scanning process were as follows^{18,19}:

- The distance between the wall where the chart for the Snellen E test was hung and the chair where the student to be tested was to sit was arranged as 4 m.
- It was ensured that the place used for the test received enough light and that nothing else that was colorful or that could attract the attention was placed near the chart, that light would not fall directly onto the card to avoid a dazzle, and that the card was not shaded. The room and the lighting were arranged so that the

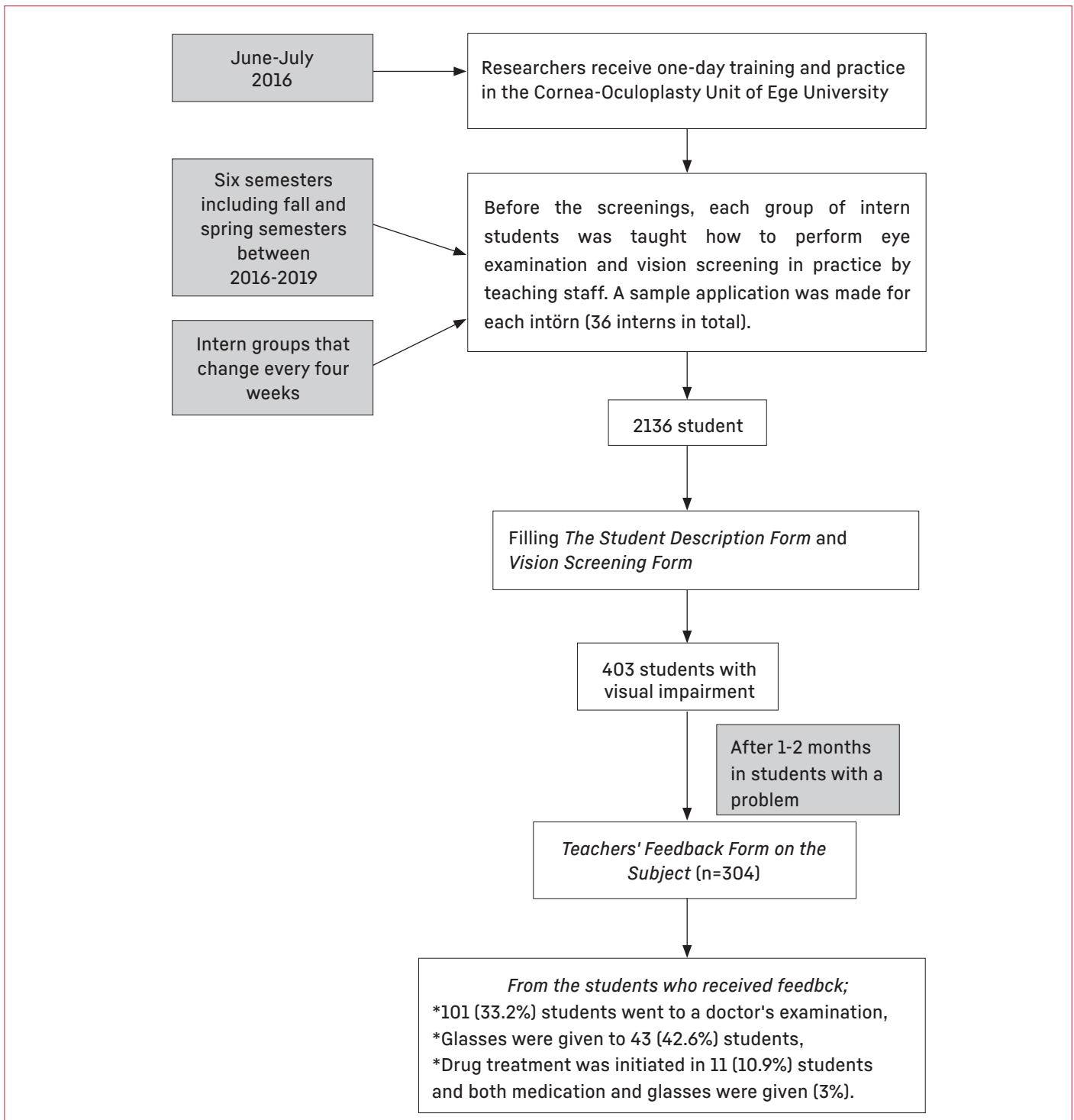


Figure 1. Research process

shadow of the person administering the test would not fall on the chart. It was possible to control the amount of light coming from the windows in the mornings and afternoons. In this way, the test chart could be seen in the best way.

- Students were taken one by one into the health office so that they would not get clues. Those who used spectacles were tested with

their spectacles. During the test, it was ensured that students would not be affected by outside factors, that students taking the test did not change their places until the end of the test, and that they always looked at the chart from a distance of 4 m.

- The students were given the necessary information on how the test would be conducted. The chart showed the letter E, and they

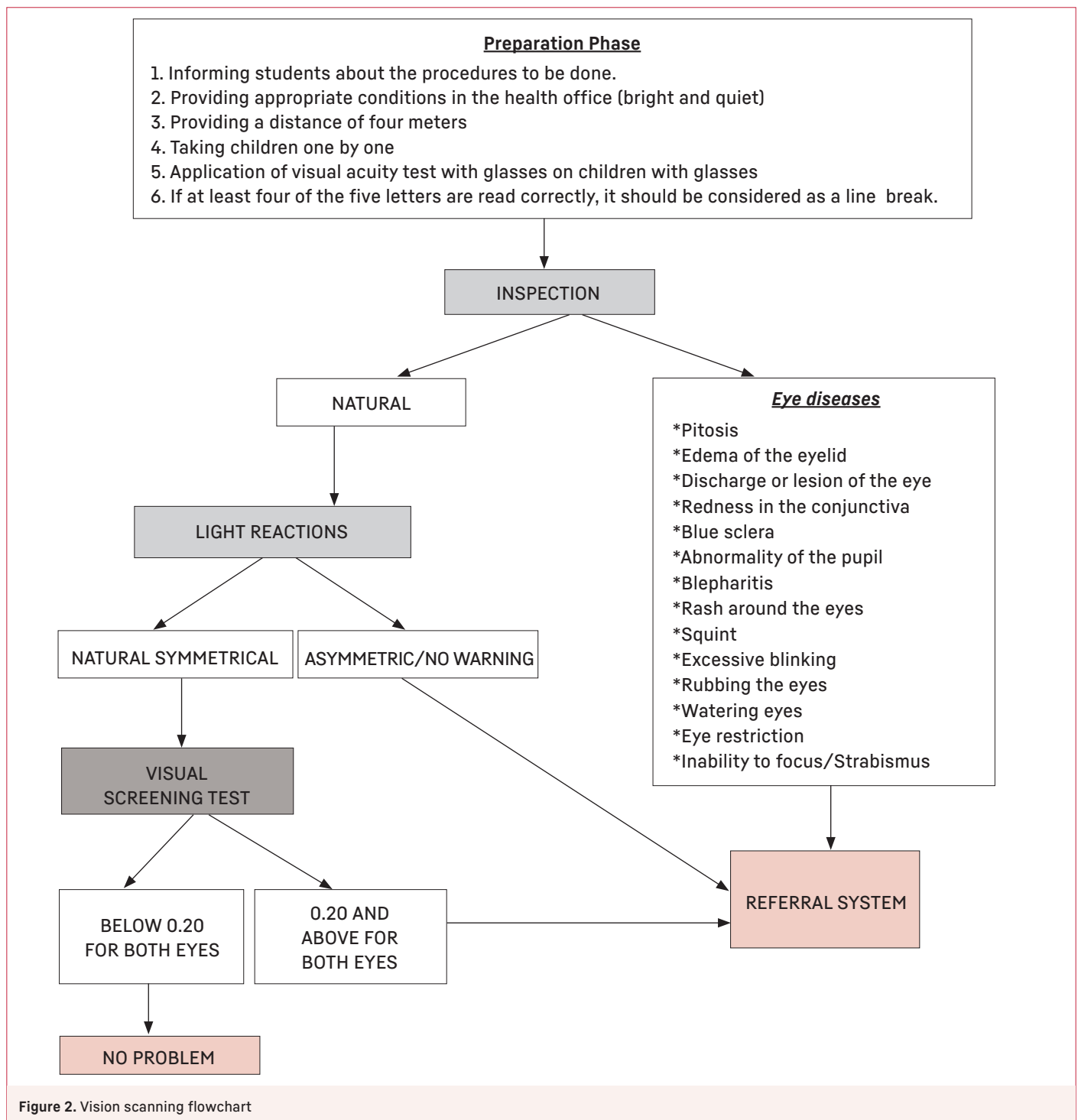
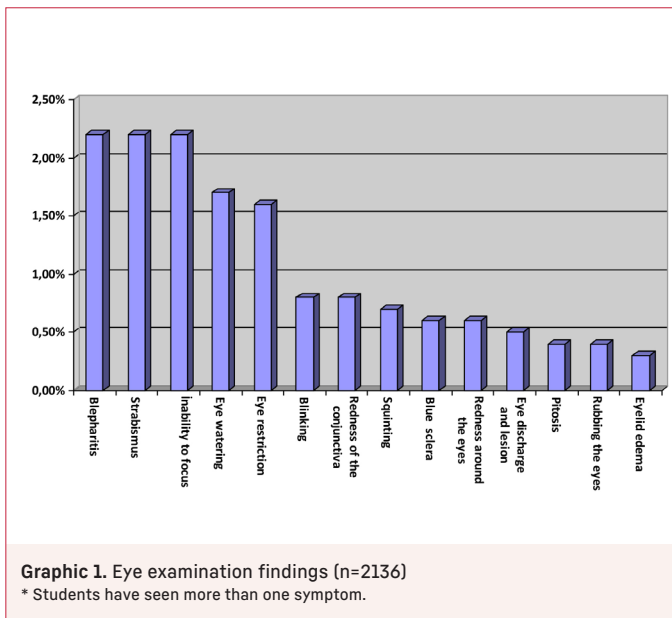


Figure 2. Vision scanning flowchart

- were asked to say or point which way it was facing (up, down, left, right, door, cupboard). Students were asked to answer according to their age or development.
- First, the student's right eye was tested, and then the left eye was. To do this, a specially prepared card was used to cover the student's eye, making sure that no pressure was applied to the eye that had to be closed.
- Measurement began with the upper row of the Snellen Scale chart. Those who could not read 0.20 or more of the letters on the examination form and/or students in whose eyes disease symptoms were found were recorded, their teachers were informed, and their parents were informed of the importance of giving information and of going to an eye doctor.
- In addition, 1 or 2 months later, class teachers and students were contacted. They were asked about the results of the diagnoses



and treatments, and the teachers' feedback form on scanning was given (Figure 2).

All data collected were recorded both on the forms and by computer.

Ethical Consideration

Before beginning the research, written permission was obtained from Izmir Province National Education Directorate and from Ege University Nursing Faculty Ethics Committee (No. 2016-140), and parental permission was obtained after parents were informed by the school administration. Informed consent was obtained from the school children and their families.

Statistical Analysis

Analyses were performed using the program Statistical Package for the Social Sciences for Windows, version 16.0 (SPSS Inc., Chicago, IL, USA). Frequencies and percentages were used in describing categorical variables.

Results

The mean age of the students was 8.30 ± 1.37 (minimum 5, maximum 14) years; 50.3% were male, 30.5% were in year 1, and 5.4% wore spectacles (Table 1).

According to the results of the eye examinations, the students' most frequent problems were blepharitis (2.2%), strabismus (2.2%), and inability to focus (2.2%) (Graphic 1).

As a result of the visual acuity scan performed with the Snellen E test, the prevalence of refractive error in the students was found to be 18.9%. It was established that 14.9% of the students had a refractive error in their right eye, and 14.7% had a refractive error in their left eye (Table 2).

No statistically significant difference was found according to the age group between students with and those without a suspicion of refractive error ($\chi^2=50.071$, $P < .001$). More refractive errors were seen in the group aged 9 years (17.1%) and those aged ≥ 10 years (31.7%) than in other age groups (Table 3).

No statistically significant difference was found according to gender group between students with and those without a suspicion of refractive error ($\chi^2=0.912$, $P = .340$) (Table 3).

Table 1. Introductory Information of Students

Introductory Information	n	%
Gender		
Female	1,062	49.7
Male	1,074	50.3
Grade		
1.	652	30.5
2.	488	22.8
3.	414	19.4
4.	582	27.2
Age, years		
≤ 7	646	30.2
8	665	31.1
9	450	21.1
≥ 10	375	17.6
Use of glasses		
Wearing glasses	115	5.4
Not wearing glasses	2,021	94.6
Total	2,136	100.0

Table 2. Visual Screening Results of the Students

Vision problem	n	%
Suspected refractive error in any eye		
Yes	403	18.9
No	1733	81.1
Right eye		
Yes	318	14.9
No	1818	85.1
Left eye		
Yes	313	14.7
No	1823	85.3
Total	2136	100.0

Feedback was obtained from 75.4% (n=304) of the students (n=403) with a suspicion of some kind of eye refractive error as a result of the scan. It was seen that 33.2% (n=101) of the students from whom feedback was obtained went for a doctor's examination. Of these, 43.6% (n=44) were given no recommendation, 42.6% (n=43) were given spectacles, 10.9% (n=11) were started on drug treatment, and 3% were given both drug treatment and spectacles.

Discussion

In school health services, examination and monitoring relating to the eyes and visual capability are performed by eye checks and scans at reg-

Table 3. Refractive Error According to Students' Age Group and Gender

Age group	Refractive error suspected				Total		Test
	Yes		No				
	n	%	n	%	n	%	
≤7	107	16.6	539	83.4	646	30.2	$\chi^2=50.071$
8	100	15.0	565	85.0	665	31.1	$P < .001$
9	77	17.1	373	82.9	450	21.1	
≥10	119	31.7	256	68.3	375	17.6	
Gender							
Female	209	19.7	853	80.3	1062	49.7	$\chi^2 = .912$
Male	194	18.1	880	81.9	1074	50.3	$P = .340$
Total	403	18.9	1733	81.1	2136	100.0	

ular intervals. This examination, known as basic eye examination, is different from the examination performed by an ophthalmologist. The objective of this examination is to identify children who need to be referred in time to an ophthalmologist for early diagnosis and suitable treatment.³

Eye scans are of benefit in detecting not only refractive error and strabismus but also other eye pathologies existing at the same time.²⁰ This way, problems that were potential signs of infection were detected in the students, such as inflammation in blepharitis (2.2%), watering eyes (1.7%), excessive blinking (0.8%), redness in the conjunctiva (0.8%), a rash around the eyes (0.6%), or discharge or lesion of the eyes (0.5%). Signs and findings of infection have been seen in the results of other studies conducted on eye health with primary school students in Turkey. In a study by Yaramış and Karataş,²⁰ it was found that 10.1% of the students had watering eyes, 6.2% had redness of the conjunctiva, 6.3% rubbed their eyes excessively, and 0.6% had blepharitis. In the results of a study conducted with primary school students by Kırış and Bayık Temel,¹⁵ it was seen that 4.6% of students had redness of the conjunctiva, 2.2% rubbed their eyes, and 3.8% had watering eyes. It is thought that the frequency with which these signs were encountered may be because the students did not observe the rules of general hygiene and in particular of hand hygiene. It is thought that health education given on hygiene and hand hygiene could play an important role in preventing eye infections.

In our study, the prevalence of strabismus or inability to focus was found to be 2.2%. In a study conducted with year 1 primary school students, Açıık et al.²¹ found this rate to be 2.5%, and Yaramış and Karataş²⁰ found a rate of 4.3%. It is thought that the reason why Yaramış and Karataş²⁰ found a higher prevalence of squint is that the number of students was lower in that study.

From the result of the eyesight acuity scan, it was found that the prevalence of refractive error in the students was 18.9%. In many studies conducted in different cities in Turkey with different samples, it was found that the proportion of refractive error varied between 7% and 22%.^{4,15,16,20,22,23} In a study conducted by Ghaderi et al.⁷ with 4,106 Iranian students aged 7 years, visual defects were found at a rate of 34%. This result is much higher than the findings of our study or those of other studies performed in this country. It is thought that the reason for this was because the study was conducted in a rural area with the children of families with a low-income level.

It is noticeable that approximately 1 in 5 students in our study had a visual problem. This result shows that visual problems are one of the

commonest health problems found among children and that it is necessary to carry out eyesight scanning as part of school health services in order to detect and prevent visual problems.

It was seen in this study that the number of students with refractive error increase in line with the age group.^{20,24,25} Considering that some vision problems can be prevented and treated, it is important that vision scanning be conducted as part of school health services at an early stage and in particular in the first years of school. It is reported that in many countries, preschool and school vision scans are part of government health programs.²⁶ It is thought that determining vision defects by scanning at an early stage before they can cause any harm to the students' lives will increase their quality of life.

As in the literature, in this study, no significant difference was found in refractive error according to the students' gender.^{7,15,20,23} For this reason, the participation of all students in eye scanning should be supported without gender distinction.

It was determined that only 33% of the students who, as a result of the scan, had a suspicion of refractive error in either eye went for a doctor's examination and that 67% did not. It is thought that this may be because the socioeconomic levels of the students' families were low (some families did not have health security), and because they did not have sufficient information, they did not accord it the necessary importance. The results of the scans performed by a nurse showed that 56.4% of students who were suspected to have a refractive error in either eye and who went for a doctor's examination had been correctly diagnosed.

Limitations

Our research has a number of limitations. One of these is that it was conducted at only 1 primary school. Another is that only 33% of students who were referred to a doctor as a result of a problem found in the eye health scans were taken to a doctor by their parents.

Conclusion

Eye health scans for students are an important procedure for the early identification of preventable and treatable vision problems. This research was important because vision scanning can determine visual problems in students in the early stages and can help to access the necessary health services. Indications of eye infection were frequently encountered during the course of the study, and 18.9% of students were found to have visual problems.

To solve these problems, it is recommended that places to present school health services such as eye health scans should be created and made more general and that these services should be made permanent. By this means, it is thought that eye problems in school-age children can be determined at an early stage. Eye problems in school-age children are widespread, and diagnosing them particularly at this stage (considering this as a public health problem) and informing teachers and parents may be recommended.

In addition, it is recommended that studies should be conducted to determine the roles of nurses in the identification of other problems that may be exposed by scanning and that nurses should be employed in schools.

Ethics Committee Approval: Ethics committee approval was received for this study from the institutional review board of Ege University Faculty of Nursing (Scientific Ethics Committee) (no. 2016-140).

Informed Consent: Informed consent was obtained from the school children and their families included in the study.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – S.A.Ö.; Design – Z.E.S., S.A.Ö., A.K.; Supervision – Z.E.S., S.A.Ö., A.K.; Resource – Z.E.S., S.A.Ö., A.K.; Materials – Z.E.S., S.A.Ö., A.K.; Data Collection and/or Processing – Z.E.S., A.K.; Analysis and/or Interpretation – Z.E.S., S.A.Ö., A.K.; Literature Search – Z.E.S., A.K.; Writing – Z.E.S., S.A.Ö., A.K.; Critical Reviews – S.A.Ö.

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