

EYE DEFECTS IN SCHOOL CHILDREN: EXTENT AND PREVENTION.

Public health movements to be attended with any great degree of success must be based upon a complete understanding of all phases of the disease at which they are aimed. Armed with these facts, prevention becomes merely the logical application of medical knowledge against the causes and effects as determined.

However, success is not possible in full measure without the cooperation of the public and herein lies the greatest problem of public health. To secure the cooperation of all the people is impossible as there is no organization at present time through which this may be accomplished. On the other hand, to secure the cooperation of part of them is possible and in the public school system we have a highly organized, easily accessible body of some 20,000,000 persons through which wonderful results may be secured, with a minimum of effort. And is it not logical that public health principles taught and applied here may secure more lasting results than in any other field.

With these principles in mind we may proceed to a study of one of the great public health problems of the day, a study aimed at the preservation of that which is undoubtedly one of man's greatest single assets - vision.

Let us consider the problem of eye defects in children. They may be classified into three main types:

First, that large group of cases resulting from abnormalities in the refractive media of the eye which manifest themselves by a diminution in the acuity of vision in proportion to the magnitude of the defect.

Secondly, those diseases of the eye and its appendages inflammatory in nature, which, though they may not affect vision primarily, if persistent, may result in secondary defects in vision.

Thirdly, those abnormalities or weaknesses in the extrinsic muscles of the eye.

It is not until recently that accurate data concerning the prevalence of visual defects has been available. A study of this data leads to some rather alarming conclusions. A recent report by the United States Public Health Service on the examination of the eyes of 12,000 school children ranging in age from 6 to 16 years gives probably a fairly accurate estimate of the refractive errors in school children. The material for this study was principally drawn from rural districts in the Eastern and Southern states. Visual acuity was tested with the Snellin's test types, charts for illiterate children being used for those who could not read. These results are reproduced here as being probably the most comprehensive study the literature affords.

School childrens vision as determined by the Snellin Test
representing a study of 9,000 cases by the U. S. Public
Health Service.

VISION		<u>%</u>
All Children		100.0
(1) Normal in both eyes (10/10 or better)		62.9
(2) Normal in one eye and 6/10,7/10, or 8/10 in other		10.2
(3) 6/10,7/10,or 8/10 in both eyes		16.9
(4) Normal in one eye and 4/10 or 5/10 in other.		1.0
(5) 6/10,7/10 or 8/10 in one eye and 4/10 or 5/10 in other		2.4
(6) 4/10 or 5/10 in both eyes		2.7
(7) Normal in one eye and 3/10 or less in other8
(8) 6/10,7/10 or 8/10 in one eye and 3/10 or less in other7
(9) 4/10 or 5/10 in one eye and 3/10 or less in other8
(10) 3/10 or less in both eyes		1.6

A study of this table shows that approximately 63% of children have normal vision in both eyes, 10% have rather poor vision in one or both eyes while the intervening 27% grade from normal to rather poor vision. The few children who were **blind** in one or both eyes were not included in this chart. These facts lead to rather pessimistic conclusions but it must be remembered that the Snellin test is a test of distant or relaxed vision and that most refractive errors are increased as the distance of the eye from the object is increased and a marked diminution in visual acuity at 20 feet might not manifest itself at shorter distances.

When classified as to age it is surprising to find that the percentage of children with normal vision increases with age being in agreement however with what is known of the anatomic development of the eye which does not reach maturity until about the 20th year. On the other hand the percentage of children with marked defects (vision of $\frac{3}{10}$ ths or less in one or both eyes) is almost trebled. This again is in accord with present day knowledge, that is, that uncorrected errors of ~~refraction~~ refraction usually become worse as time goes on and the eye is subjected to more and more strain.

Further statistics show that of the children with vision of $\frac{3}{10}$ th or less in both eyes, only 22% wear glasses and of these only 1.4% were completely corrected. The percentage of children wearing glasses decreases with the amount of error while the percentage of perfect corrections is greatly increased. It is furthermore noted that the percentage of children wearing glasses increases with age. Although at first sight it would appear that the glasses were only of benefit in a small percentage of cases with severe

defects, it must be remembered that though perfect vision may not be attained yet in most cases where there is only a refractive error the vision can be greatly benefited and further decrease in vision greatly minimized.

The prevalence of visual defects in school children having been fairly well established, the question now arises as to why visual defects are so prevalent. Dr. J. F. Williams in a work entitled "Personal Hygiene Applied", has said, "The eyes of man developed to perform a function that has been greatly changed in modern civilization. The invention of Gutenberg has thrown enormous strain upon the eye by requiring it in reading the printed page to make many more movements than are even called for in the environment of larger objects. Many eyes are unable to make this adjustment".

It might further be added that at no time in history has such a high degree of accommodation been required of the eye as is required in this age of education and other highly detailed work in which the eyes are the chief participants. Nature on the other hand has not greatly changed the visual equipment of man and the question resolves itself into one of how we can best make that which is not sufficient, suffice to serve ones needs.

Science has accomplished much in this direction. The Crede method has ruled out a large percentage of blindness at birth. Science has made it possible to correct a great many visual defects by the use of lenses but the modern world has not yet learned that prevention has a worth approximately sixteen times that of cure, if an old axiom is to be at all relied upon and it is here that Public Health must dedicate its efforts.

Having made these rather broad deductions and granting that our heritage of vision may be deficient in some respects let us proceed to a more

concrete consideration of why it proves deficient. It is a fundamental fact that the farther we deviate from the natural, the heavier the penalties we have to pay and so we find in the case of the eyes that acquired defects are usually due to a disregard for this fundamental law. First and most important among these deviations is the subjection of the eye to fine detailed work over longer periods than are natural, under conditions of inadequate and improper illumination and frequently in an incorrect posture which forces the eye to unnatural positions in order to bring the school book into the field of vision. The result is not hard to see. If the child has sufficient reserve power to withstand this overload then nothing happens but if his reserve is not sufficient, the eye becomes fatigued and eyestrain results. If unheeded, eyestrain invariably results in permanent diminution of vision.

The correction of these faults so commonly seen is obvious. School buildings may be designed without any additional expense so as to give every student in the room adequate and proper light, desks may be designed so as to make the correct posture the natural one and the work may be distributed throughout the day so as to not overload the eye over a prolonged period. These facts are being given far greater consideration in modern education.

School books and school environment are arranged for healthy eyes, it is necessary to go farther than the correction of the aforementioned faults and require that every student be required before entering school to have a thorough ophthalmoscopic examination by an ophthalmologist and under no consideration should an optometrist's examination be accepted in lieu thereof. If this be done and the findings recorded the eye corrected, if necessary, the cases of

later eyestrain would be greatly minimized and in those cases where necessary, observations made from time to time.

The part of the teacher in the control of this problem is an important though easy one. Very little knowledge of the eye is required in order to test the visual acuity of pupils by the Snellin method. Those cases which show a diminished acuity must be referred to a competent oculist for further diagnosis and treatment. Examination should be made at the beginning of each year the time and expense incurred would be very small, when compared with the benefits from an economic standpoint.

In spite of all these precautions, eyestrain would occasionally show up in pupils. The symptoms of this condition are fairly definite and here again the teacher could be quite easily instructed in the observation and questioning of the pupils in this respect. Any fading of vision, eye pains, inflamed lids or lachrymation should be immediately referred to an oculist. It is believed that if these simple preventive measures be taken immeasurable good will logically accrue therefrom.

Dr. Frank Allport, chairman of the committee on conservation of vision, Chicago, working along these lines, has constructed a visual chart with instructions as to its use. This is being rapidly adopted in many cities in this country with a great deal of success. The cost of these charts in quantities of 100 or more is only seven cents each and one chart is sufficient for numerous examinations if properly cared for. He has also devised a list of symptoms of eyestrain for the use of the teacher. By his system parents are notified by form of any defects and advised as to the course to follow in the care of them. In this way the problem is solved thru the medium of the school

system under the supervision of the Public Health service with almost no cost to either.

A detailed discussion of so broad a problem as diseases of the eye is not within the scope of this paper. They do not as a rule result primarily in defects in vision yet they are contributory factors in a great many cases and it is not entirely without the scope of this paper to consider them briefly from the Public Health standpoint at this time. The most important diseases in school children from this standpoint are the various forms of conjunctivitis so commonly encountered. These diseases from the fact that they are nearly all bacterial in origin and very contagious in character may become epidemic in proportion. They may cause discomfort and pain with its resultant effects upon the well being of the child, local damage with resulting deformities, and, erosions of the cornea with resulting ulcer formations and its complications which may materially affect sight even to the degree of blindness. It is imperative that these cases be recognized and treated early from the standpoint of the pupil affected and for the safety of those who are daily exposed to contact. These diseases manifest themselves by an inflammation of the lids of the eyes, pain and lachrimation, photophobia and this complex is easily recognized by the most inexperienced. These symptoms should indicate to the teacher, the nature of the disease and the need for prompt attention.

Of the deeper seated diseases of the eye little need be said. The symptoms are so pronounced usually that the pupil demands relief, which should be immediately given him as the complications and sequelae are of the most serious nature in regard to sight.

What has been said concerning the causes of eyestrain from a re-

fractive standpoint might be repeated as regards weaknesses of the eye muscles. We are concerned with the movements of the eye. They are not indefatigable and overuse or abuse of them by incorrect posture results in weaknesses of these muscles. While the reserve is sufficient this may give no symptoms but once this is broken down, we have a resultant eyestrain. It is not necessary that this weakness manifest itself in an apparent strabismus or squint or yet in a diminution of vision but if the symptoms of eyestrain are present without these effects one should suspect a latent strabismus or heterophoria which should have the immediate attention of an oculist.

In closing let us not forget that the eye is a delicate organ depending upon the body for nutrition and that it quickly reflects in its efficiency, any condition effecting the general health, that the prime requirements for a healthy normal eye is a healthy normal body, that an unhealthy body is one of the greatest predisposing factors to its weakness and for this reason treat it not as an isolated organ but as a part of an intricate organism and direct our efforts logically and accordingly to the healthy preservation of both.

B I B L I O G R A P H Y

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