

Amblyopia screening in children in Bandar Abbas (Iran) during 2011-2012

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Abstract

Background: Amblyopia is an acquired defect of vision caused by abnormal visual experience that occurs during childhood. Since early diagnosis is important in preventing further irreparable effects, the aim of this study was to investigate the outcome of amblyopia screening in children.

Methods: Data from the amblyopia screening program in the Welfare Department of Bandar Abbas during 2011-2012 were used. Suspected cases were referred to specialists in the Optometry clinic for screening purposes. Subsequently, patients who suffered from strabismus, amblyopia, or refractive errors were referred to ophthalmologists. SPSS version 16 was used to analyze the data. The significance level was set at $P < 0.05$.

Results: Of the 16,599 children examined in 2012, 2486 suspected cases of amblyopia were diagnosed and 168 being diagnosed with amblyopia after visit with ophthalmologist. The prevalence rate of amblyopia was 1.01%. In 2011, of 17,733 cases, 2013 children were diagnosed as suspected cases and 171 patients were diagnosed to be amblyopic finally.

Conclusions: The prevalence of amblyopia in this study was 0.96% and 1.01% in years 2011 and 2012 respectively, which was consistent with the results of studies in other countries. By considering the importance of diagnosing the prevalence of amblyopia on time in preschool and in order to prevent children's low vision or blindness in future, it is essential to increase the quality of the examinations that are conducted by the trainers.

Keywords: Amblyopia, Screening, Strabismus, Refractive errors

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1. Introduction**1.1. Background**

Amblyopia is an acquired defect of vision caused by abnormal visual experiences that occur during childhood (1, 2). Two major clinical forms in which the disease occurs related to such experiences are strabismus and any retinal disorder that causes a blurred image in one or both eyes (1, 3).

1.2. Statement of Problem

It is estimated that between 2 and 5% of children and adolescents in most countries have amblyopia (1, 4). However, due to different definitions and criteria in diagnosing amblyopia, it has been found to exist in 2 to 4.3% of the children in preschool and from 0.8 to 4.6% in elementary school (5). A study in the UK reported the prevalence of amblyopia in preschool children as 5% (6). Also, a study in Sweden, reported that the prevalence in urban areas due to cultural and economic circumstances varied between 1 and 5% (7). In some other studies, the prevalence of amblyopia in soldiers was between 1 and 4% percent, and it was reported to be between 0.5 and 3% in preschool and school-age children. In patients with eye problems, the range was reported to be between 1 and 5% (8). However, the prevalence of this problem among children in Japan whose ages ranged from one month to three years was about 0.38%. Among Singaporean people whose ages ranged from 18 to 19, the prevalence was 73% (5). In a study that Sharifi et al. did with 2955 children in Orumiyeh whose ages ranged from 6 to 10, the prevalence of amblyopia was estimated at 2.2% (9). Also, in a study that Azami et al. conducted in which they examined 8427 kindergarten children in Ardebil in 2001, the prevalence of amblyopia was reported as 1.42% (10). A study on 1,310 children younger than 10 was conducted in Tehran, and they showed the prevalence of amblyopia as 3% (11). Amblyopia is an important socio-economic issue, and studies have shown that the primary cause of vision loss among adults between the ages of 20 and 70 is monocular. In addition, amblyopia increased the risk of complete blindness due to other causes that lead to injuries to normal eyes (12). Amblyopia is often treated in the first decade of life (13). Therefore, early diagnosis of the disease in this age group would be a great help to patients (14). One of the programs that can make it possible to identify apparently healthy and asymptomatic people is screening.

1.3. Objectives

The general objective of this study was to determine the prevalence of amblyopia in children between the ages of 2 to 6 in Bandar Abbas. The followings were set as the specific objectives of the study:

- To determine the prevalence of amblyopia in children between the ages of 2 to 6 in Bandar Abbas in 2012
- To determine the prevalence of amblyopia in children between the ages of 2 to 6 in Bandar Abbas in 2011
- To determine the prevalence of strabismus in children between the ages of 2 to 6 in Bandar Abbas
- To determine the prevalence of refractive errors in children between the ages of 2 to 6 in Bandar Abbas

2. Materials and methods

2.1. Research design and setting

This study was a cross-sectional and retrospective study that aimed to determine the prevalence of amblyopia in children between the ages of 2 and 6 in Bandar Abbas. In this study, we used the raw data from an amblyopia screening program conducted by the Bandar Abbas Welfare Department during 2011-2012.

2.2. Data collection

The following information was included, i.e., the number of healthy and suspected children during trainers' optometry examinations that were conducted by optometrists, the number of children attending any level of prevention, the number of permanent and non-permanent child-care centers, different age groups, age, and residence of all children who were referred to as total first class coaches were preventable.

2.3. Measurement tool

In the present study, the method used was that, after the children had been examined by their kindergarten teachers in the first level by using the gold standard chart, the suspected cases were referred to the second level of visiting optometrists. In the second level, the optometrists referred the patients with strabismus, amblyopia, and refractive errors to ophthalmologists.

2.4. Criteria for diagnosis of amblyopia

In this study, amblyopia was diagnosed based on the following criteria: 1) visibility of less than 20/30 in both eyes or a disharmony in the vision between two eyes of as much as two or more lines after the best corrected binocular of defects and rule out of organic causes; 2) presence of blatant and fixed deviance in one eye or lack of central fixation in one of the eyes (15); 3) presence of astigmatism of more than 1.50 diopter in the orthogonal axis or over 1.00 in the slant axis; 4) presence of hyperopia more than +3.50 Diopter; and 5) presence of myopia of more than 3.00 diopter (16).

2.5. Ethical consideration

For the purpose of ensuring research ethics, we confirmed the confidentiality of personal information. Signed informed consent forms were obtained from the parents of all participants.

2.6. Statistical analyses

SPSS version 16 was used to analyze the data. Descriptive data analyses also were used.

3. Results

3.1. Prevalence of amblyopia in 2012

Of the 16,599 children who were examined in 2012, 83 (5%) were between 2 to 3 years old, and 5091 of them (30.67%) aged between 3 to 4 years and about 9328 children (67.30%) aged between 5 to 6 years old. In this study, 12660 of the subjects (76.45%) live in the city and 3939 people (23.55%) lived in the rural areas. Also 8302 of them were females (50.13%) and 8297 (49.87%) were male. Mobile and fixed base stations were 15424 and 10448, respectively, and permanent and non-permanent kindergarten bases were 5863 and 288, respectively. Of the total population who were examined by the trainers, 2486 people were diagnosed as suspected to have amblyopia, and 14,113 people were diagnosed as healthy and after the final diagnosis, 168 patients were diagnosed as amblyopic.

3.2. Prevalence of amblyopia in 2011

During 2011, of 17733 children who were examined 227 people or (1.28%) were aged between 2 to 3 years old, 1884 people or (10.62%) aged 3-4 years and 5604 people or (31.60%) aged 4-5 years, 9967 people or (56.20%) were in the age group 5-6 years. In this year 13775 people (78.68%) lived in the city and 3955 people or (22.30%) were residing in the village. Also 8763 people or (49.41%) were females and 8970 people or (50.59%) were males. The fixed base station and mobile bases were 294 and 17439, respectively. And 12959 bases were kindergartens of which 4172 were non-permanent bases and 602 were permanent bases. Of the total population who were examined by the trainers, 1932 people diagnosed as suspected to have amblyopia and 15,801 people were diagnosed as healthy. A total of suspected cases 946 people or (48.96%) were females and 986 people or (51.3%) were males. So the gender ratio was 1.04. After final diagnosis 171 patients were identified as amblyopic.

3.3. Prevalence of amblyopia, strabismus, and refractive errors

The prevalence of amblyopia, strabismus, and refractive errors during 2011 were respectively 0.96%, 0.24% and 2.59% and these rates during 2012 were respectively 1.01%, 0.27%, and (2.72%).

4. Discussion

This study reports the results of amblyopia screening in children between the ages of 2 to 6 in Bandar Abbas, Iran. The aim of the study was to determine the prevalence of amblyopia. The prevalence of amblyopia during 2011 to 2012 was determined to be 0.96% and 1.01% in 2011 and 2012, respectively. Several studies have been conducted in Iran and in many other countries concerning the prevalence of amblyopia. The results of the current study are somewhat in agreement with the results of a research study conducted by Azami et al., which indicated that the prevalence was 1.42%. (15). Ostadi Moghaddam's study indicated a prevalence rate of (1.9%) (17). A study conducted by Snowden et al. had prevalence rate of (1.2%) (18). In a study conducted in Singapore among 450 children that were 4 years old, the prevalence rate was determined to be (0.17%) (19). Studies that were conducted with students in Denmark indicated that the prevalence rate was (1.1%) (20). In Saudi Arabia, the prevalence rate among children between the ages of 8 and 12 was (1.8%) (21). In Tabriz, the rate was (1.2%) (22), and, in Khuzestan, the rate was (1.03%) (23). And the amblyopic rate in this study was less than that of studies in America (2%) (24) and Turkey (2.3%) (25). Studies conducted by Verkin et al. showed the rate was (3.5%) (26), and Fars' study showed (4.44%) (27). Murat's study, which was conducted among 2000 students between the ages of 6 and 9 had a prevalence rate of (3.4%) (28). Sharifi's study, which was conducted among children between the ages of 6 and 10 had prevalence rate of (2.2%) (9). The results of this study indicated the rate was greater than that of a study conducted in Japan that showed a prevalence of 0.14% , as well as that of a study conducted in Finland in which the prevalence rate was (0.17%) (25).

Each of these studies reported different prevalence rates for a number of reasons, including different sample groups of different ages, the cultural and economic characteristics of the subjects, the skills of examiners, and their definitions of amblyopia. We stress the importance of screening in early childhood, and thus the overall result is that amblyopic screening programs are useful in various countries, and this procedure is done through by Snellen chart

that is economically feasible and has been proven scientifically (15). The results of the recent studies showed that the prevalence rate of amblyopia in students with no screening program was 3%, and the prevalence of amblyopia in the population of children of age 5 was 2%. If screening program occurs before the age of 3, prevalence rate would be less than 1% (29-31). This illustrates the importance of screening at an early age. Another significant point in this study is that having losing children between the different stages of the screening can greatly affect the prevalence rate. Authorities should take this point into account and continue children's treatment from the very beginning steps and, because of the importance of screening and its effect on time diagnosis, they should try to determine the reasons that prevent children from continuing their treatment steps. This may be due to lack of awareness of families of disasters that could be caused by amblyopia, by economic problems, and by the lack of adequate numbers of optometrists, which eventually means that families have to visit physicians out of the Province. Furthermore, in this study, a significant difference was identified between the trainers' diagnoses and the coaches sight gauges' diagnoses, so that too many children are referred after examination by trainers to the sight gauges and almost more than half of those who attended had no eye problems. Thus, another important fact that is worth noting is the quality of the trainers' examinations.

Since trainers are at the first stage of amblyopia screening, their exact and careful examination is of great importance in the screening results and it is suggested that the trainers must be trained properly. And experienced trainers should be used and their work must be adequately monitored so that incorrect diagnoses can be avoided. And differences between their diagnoses and sight gauges' diagnoses should dramatically decrease. Firoz Amani's study on the comparative investigation of differences between trainers' examinations and sight gauges' examinations during screening programs in Ardebil confirmed the results of our study (15). It was observed in this study that about (36.4%) of the kindergarten children were not tested at the standard examination distance and that about (18.8%) of the teachers were not skillful. And there were 46 cases in which there were discrepancies between the trainers' and sight gauges' examinations of the children.

After analyzing the data in the present study, the prevalences of strabismus during 2011 and 2012 were 0.24% and 0.27%, respectively. The results of this study were consistent with the results of Azami's study with prevalences of 0.55% and 0.32% (15), H. Murat's study with the prevalence of 0.34% (28), as well as a study that was conducted in the rural areas of Tanzania that showed a prevalence rate of strabismus that was less than 1% (25). The prevalence rate of strabismus in Ostadimoghadam's study was 3.1% (17), which was significantly greater than the prevalence rate in our study. The prevalence of refractive errors in tests conducted in 2011 and 2012 were 2.59% and 2.72%, respectively, which were consistent with the results of studies conducted in Ardabil in 1999 and 2001, which showed prevalence rates of 3.59% and 2.38%, respectively (15). And these results were also consistent with the results of studies conducted with children in Ghazvin whose ages ranged from 6 to 9. But the prevalence rate in the present study was less than those of studies conducted in Ardebil with the prevalence rate of 11.4%, statistics published by the Medical College of Alaz City of Turkey that indicated a prevalence rate of 11.9%, and survey studies on 450 children in Singapore that had a prevalence rate of 14.5% (25).

5. Conclusions

By considering the importance of diagnosing the prevalence of amblyopia on time in preschool and in order to prevent children's low vision or blindness in future, it is essential to increase the quality of the examinations that are conducted by the trainers. It is undeniable that estimating the prevalence of amblyopia in children accurately at all levels demands serious efforts of all authorities.

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Conflict of Interest:

There is no conflict of interest to be declared.

Authors' contributions:

All of authors contributed to this project and article equally. All authors read and approved the final manuscript.

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