

Abnormal Spectrum Analysis of Unqualified Ophthalmology in Medical Selection for Student Pilots Recruitment

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Abstract: Objective: To analyze and summarize the causes of unqualified ophthalmology in civil aviation enrollment examination and the elimination of ophthalmic diseases, so as to provide reference for aviation health management departments and ophthalmologists. Method: A retrospective analysis was made of the medical examination data of 4620 high school graduates and college students who took part in the enrollment check-up in the Medical Examination Center of CAAC Flight College from 2018 to 2019. The causes of eye disqualification and the elimination of eye diseases were analyzed. Result: There were 4620 cases in ophthalmology, 1643 cases were unqualified, the elimination rate was 35.56%. The reasons for elimination were abnormal eye position (10.13%) (including dominant strabismus and recessive strabismus), excessive diopter (9.16%), retinobulbar disease (6.67%) and lens and vitreous disease (3.38%). The elimination rate varies from 28.89% to 38.60% depending on the region. Conclusion: The elimination rate of ophthalmology in flying cadets is relatively high. Physicians should constantly sum up their experience from practice and "attach importance to function while neglecting form" to improve the qualified rate of Ophthalmology on the premise of ensuring flight safety.

Keywords: Flight enrollment examination; Ophthalmological diseases; Elimination rate

1. Introduction

Good visual function is an important prerequisite to ensure flight safety. Medical selection of flight enrollment examination is an important measure for civil aviation to recruit flight cadets. In September 2017, the Civil Aviation Administration issued a new "Code for Physical Examination and Identification of Flying Students for Civil Aviation Recruitment"^[1]. The new standard has been relaxed in naked vision, diopter and corneal refractive surgery, aiming at ensuring safe flight and bringing more high-quality students into the civil aviation flight team. In China, there is still lack of relevant information about the analysis of eye disqualification abnormal spectrum in civil aviation enrollment examination. Therefore, we summarized and analyzed the medical data of 4620 high school graduates and college students who took part in civil aviation enrollment examination from 2018 to 2019. Now we report the analysis of eye disqualification abnormal spectrum as follows.

2. Data and Methods

2.1. Objectives

A total of 4620 high school graduates and undergraduates who participated in the physical examination in the Medical Examination Center of the Hospital of CAAC Flight College from November 2018 to March 2019 were se-

lected as the subjects, all of whom were males. The youngest was 17 years old, the oldest was 28 years old, and the average age was 20.34 ± 2.33 years old.

2.2. Methods

A retrospective analysis was carried out on 4620 high school graduates and college students who took part in the civil aviation flight enrollment physical examination according to the Code for Physical Examination and Appraisal of Flight Enrollment Students in Civil Aviation. Statistical analysis was made on the physical examination of flight enrollment, and the causes of eye disqualification were classified and summarized. According to the different regions during the physical examination, the comprehensive analysis was carried out.

2.3. Classification of the causes of eye disqualification

According to the process of ophthalmic flying examination, the first round of ophthalmic examination items are: naked far vision, near vision, color vision and external eye examination; the second round of examination items are occult strabismus examination; the third round of examination items are slit lamp, fundus and optometry examination after mydriasis. The causes of eye disqualification are summarized as follows:

Naked far vision is not up to standard;

Near vision is not up to standard;
Color vision is abnormal;
External eye diseases (including eyelid, conjunctiva, etc.);
Eye position abnormalities (including dominant strabismus and recessive strabismus);
Pupil and iris diseases (including pupil not up to standard). Rules, pupil dilatation, iris disruption, iris adhesion, etc.;
Corneal diseases (including corneal macula, leukoplakia, epithelial injury, corneal pannus, keratitis, corneal malnutrition and corneal endothelial lesions);
Lens and vitreous diseases (including lens opacity, congenital cataract, lens extraction) Posterior, moderate vitreous opacity, cysts, etc.;
Retinal choroidal diseases (including retinal degeneration, retinal hole, obsolete lesions, choroidal defect, macular lesions, etc.);

Excessive refraction (including anisometropia, astigmatism);
Operative problems related to refractive surgery (including preoperative, surgical, etc.) After the surgery and other related issues;
Corneal plastic lens related issues.

2.4. Statistical processing

All data were input into computer to establish excel table, and analyzed by SPSS 23.0 statistical software. Measurement data were expressed by $\bar{x} \pm s$ and counting data utilization rate. The data between groups were compared by χ^2 test, with $P < 0.05$ as the significant difference.

3. Results

3.1. Elimination rate and unqualified abnormal spectrum of ophthalmic enrollment physical examination

Table 1. 1643 Cases of unqualified ophthalmological anomalies in civil aviation enrollment examination students

Rank	Disease diagnosis	Number of unqualified persons	Constituent ratio (%)	Elimination rate (%)
1	Eye position abnormality	468	28.48%	10.13%
2	Diopter exceeding standard	423	25.75%	9.16%
3	Retino-choroidal diseases	308	18.75%	6.67%
4	Lens and vitreous diseases	156	9.49%	3.38%
5	Corneal diseases	83	5.05%	1.80%
6	Abnormal color vision	81	4.93%	1.75%
7	Problems related to refractive surgery	66	4.02%	1.43%
8	Near vision is not up to standard	19	1.16%	0.41%
9	Outer eye diseases	18	1.10%	0.39%
10	Far vision is not up to standard	9	0.55%	0.19%
11	Pupil and iris diseases	8	0.49%	0.17%
12	Problems related to lenses for orthokeratology	4	0.24%	0.09%
13	Total	1643	100%	35.56%

According to the above table, the number of ophthalmologists participating in the physical examination was 4620, the number of unqualified persons was 1643, and the elimination rate was 35.56%. The main reasons for elimination were eye position abnormality (10.13%) (including dominant strabismus and recessive strabismus),

excessive diopter (9.16%), retinochoroidal disease (6.67%), lens and vitreous disease (3.38%), corneal disease (1.80%) and color vision abnormality (1.75%).

3.2. Regional distribution of unqualified physical examination in ophthalmological enrollment

Table 2. 1643 Unqualified ophthalmological distribution of civil aviation enrollment examination students

Geographical distribution	Number of physical examinations	Number of unqualified persons	Constituent rati (%)	Elimination rate (%)
Sichuan province	2033	718	43.70%	35.32%
Chongqing	643	242	16.31%	37.64%
Henan province	414	153	7.73%	36.96%
Jiangsu province	324	121	7.36%	37.35%
Shanxi province	286	109	6.63%	37.06%
Zhejiang province	288	85	5.17%	29.51%
Jiangxi province	270	78	4.50%	28.89%
Guizhou province	191	71	4.32%	37.17%
Fujian province	171	66	4.26%	38.60%

Total	4620	1643	100%	35.56%
c^2	13.620			
P	0.092 > 0.05			

From the above table, it can be seen that the disqualification rate of ophthalmology in flying cadets is different due to regional differences, and the disqualification rate is between 28.89% and 38.60%. There was no significant difference in the unqualified rate among different regions.

4. Discussion

Visual function is of special significance to flight. Hypoxia, low atmospheric pressure and additive factors in high altitude flight environment can affect visual function. Therefore, it is very important to check the ophthalmology of flying cadets. The elimination rate of ophthalmologists in different areas of our enrollment examination may not be related to the choice of people, the local living habits, the quality of the initial enrollment examination and the grasp of the enrollment criteria by ophthalmologists. Under the new concept of "attaching importance to function but neglecting form", we constantly sum up our experience from the practice of flying recruitment, so as to achieve "elimination with basis, qualifications with assurance" and better complete the work of flying recruitment physical examination.

4.1. Eye position abnormality

Tian Qing's^[2] investigation found that the detection rate of concomitant strabismus in recruited pilots was 2.30%. Lin Shibin's^[3] survey of primary and secondary school students in Shantou showed that the prevalence rate of intermittent exotropia was 7.98%. Ke Shanhua's^[4] survey showed that the elimination rate of myopia in flying cadets accounted for 6.68% and 2.48% of the total elimination rate in ophthalmology. The survey of Li Jianhua^[5] showed that the prevalence of strabismus was 1.73% in Dai, 2.39% in Hani, 2.75% in Lahu and 1.96 in Han. There was no significant difference between different nationalities. In this survey, dominant strabismus and recessive strabismus were included in the eye position abnormality. The total elimination rate was 10.13%, which accounted for a fairly high proportion. Recessive strabismus will become dominant strabismus, even diplopia, and cause corresponding eye symptoms under the influence of visual fatigue, high altitude flight environment and other factors. Therefore, we should strictly control the selection of strabismus medicine, and strive to reduce the elimination rate and improve the eligibility rate under the premise of ensuring aviation safety. Some students are highly nervous and under great psychological pressure during strabismus examination, which leads to excessive regulatory set and normal eye position after psychological counseling or correct guidance. All of us

should pay attention to quality control in the process of strabismus inspection, so as to reduce the mistake rate.

4.2. Refraction exceeding the standard

The prevalence of myopia is increasing year by year. Surveys show that more than 80% of high school graduates suffer from myopia^[6,7]. Most of the students who take part in flying examination are senior high school graduates and some college students. Relevant studies have found that adolescents are the highest period of myopia prevalence^[8]. Since the Civil Aviation Administration relaxed the diopter standard, many middle and high myopic students also want to take part in the flight enrollment examination to join the civil aviation flight team, diopter exceeding the standard occupies the second largest reason for the elimination of ophthalmology. High myopia generally refers to myopic diopter (> 6.00D), degenerative changes of fundus visual function and ametropia of visual dysfunction. Its main hazard is a series of degenerative pathological changes in the fundus of the eye. Therefore, the author believes that the pupils should be fully dilated and the ciliary muscles should be completely paralyzed during the examination of optometry. Two ophthalmologists should review the difficult examination and eliminate the problem after determining that the objective diopter exceeded the standard.

4.3. Retinal and choroidal diseases

The elimination rate of retinal and choroidal diseases in flying cadets is also on the rise. The reasons for elimination are retinal degeneration, peripheral holes, macular lesions and congenital choroidal defects. The main reasons for elimination of retinal degeneration are lattice degeneration, lattice degeneration is the risk factor for retinal detachment. Prime. Ho Yiping's^[9] investigation of the peripheral retina of College Students' myopia showed that the detection rate of lattice degeneration was 8.98%. Studies have shown that the retina of moderate and high myopia often has degeneration or holes. The higher the degree of myopia, the higher the incidence of degeneration^[10]. Periretinal paving stone degeneration, cystic degeneration, non-compressive whitening and other pathological changes do not tend to occur retinal detachment^[11]. Therefore, the role of these pathological changes should not be amplified in flying cadets.

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