







Cross-Sectional Study of High-Risk Diseases in Chinese Civil Aviation Pilots





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Background and Purpose

Background

Focusing on civil aviation pilot health is one of the most important work in the airline safety.

The Ultimate emphasis of our work is to understand the health condition of each pilot and make sure that they keep healthy enough to complete flight.





Background and Purpose

Background

- The past researchers have seldom launched studies of civil aviation on the risk disease which may make an indirect effect on flight safety
- Our HSMS(health safety management system)have summarized high risk diseases as follows:





Background and Purpose

According to the experience of practical work and the disease which may lead to high disability, Our HSMS have summarized high risk diseases:

cardiovascular disease ; cholelithiasis

cerebrovascular disease; type 2 diabetes; urinary calculus...





Background and Purpose

Purpose

This study aimed at understanding the prevalence of high-risk diseases and explore the potential influencing factors which may cause Chinese pilots grounded or high disabled.





Materials and Methods

Methods:

Cross-sectional study

Subjects :

in-service pilots in China Southern Airlines





Materials and Methods

Information:

- We collected the medical record of physical examination in 2016.
- the age , area, flight hours , physical conclusion and diseases





Materials and Methods

The statistical analysis

Descriptive statistics, Chi-square test and nonparametric test

Software: SPSS20.0.





RESULT

General

- There were 5889 Chinese pilots
- The youngest was 20 years old and the eldest was 65 years old , the mean age was (33.11 ± 8.797) years old.
- The qualified rate of physical examination was 98.89%, up from 98.56% in 2015.





RESULT

- **Age distribution**
- **Flight hours**
- **Physical examination conclusion**
- **High risk diseases**

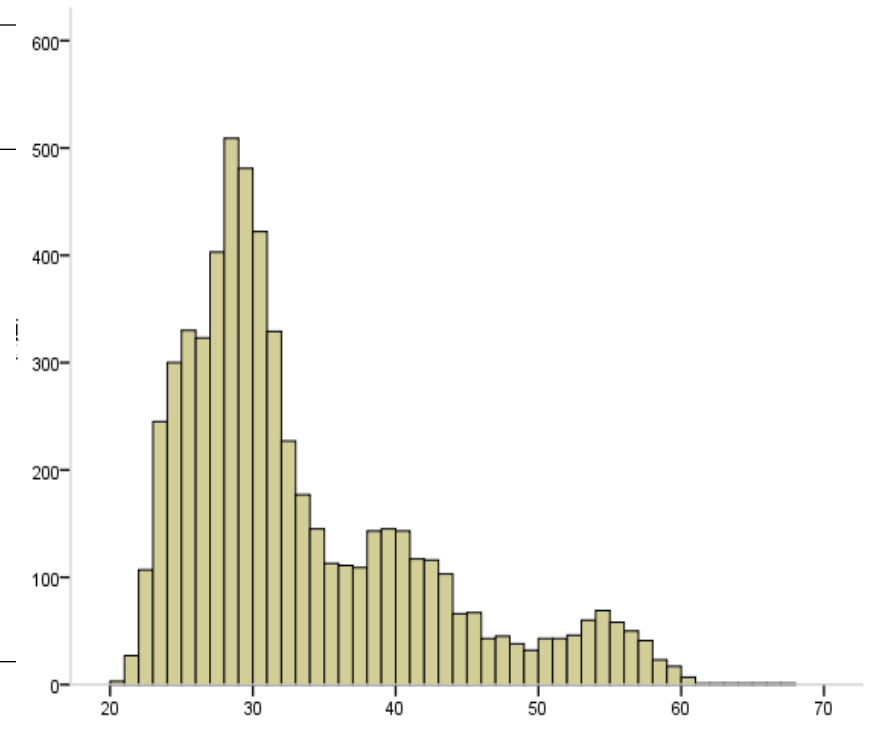




1、Age Distribution

Table 3-1 The age distribution of pilots in 2016

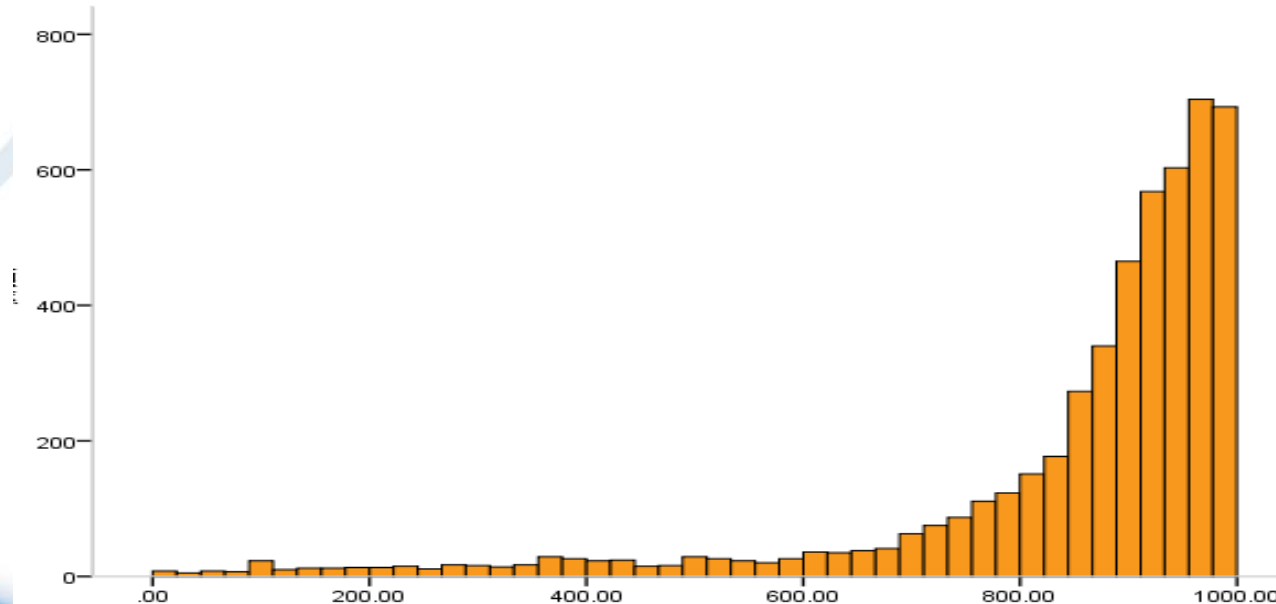
age group (years old)	number	percent (%)
20~29	2655	45.1
30~39	1974	33.5
40~49	788	13.4
50~59	452	7.7
60~	14	0.2





2. Flight hours

The median flight time was 913.22 hours, an increase of 13.72 hours from 899.5 hours in 2015





3. Physical examination

The total number of Chinese pilots who participated in the physical examination in 2016 was 5,889. Among them, 5,823 were "qualified" and the qualified rate was 98.91 %

Table 3-2 physical examination result of pilots in 2016

result	number	percent (%)
qualified	5823	98.9
unqualified	41	0.7
temporarily unqualified	32	0.2
temporalrily wiithout conclusion	22	0.2



3.1 The correlation between age and qualified rate

The yield of various age groups were different. Among them, 20 to 29 years old and 30~to 39 year-old pilots had the highest pass rate by 99.8%.In the age group over 50, the pass rate of the pilot was the lowest by 94.3%.

Table 3-3 Comparison of qualified rate for different age groups

age	conclusion	
	qualified (%)	unqualified (%)
20~29(n,%)	2645 (99.8)	6 (0.2)
30~39(n,%)	1962 (99.8)	4 (0.2)
40~49(n,%)	778 (99.5)	5 (0.6)
50~(n,%)	434 (94.3)	26 (5.7)
χ^2	182.68	
<i>P value</i>	<0.01	



3.2 High risk diseases

- **HSMS mentioned the pilot of the high-risk diseases, the prevalence of cardiovascular disease was the highest of 9.7% (5.36% blood pressure, myocardio bridge accounted for 1.76%), followed by cholelithiasis disease (0.9%), cerebrovascular disease (0.6%) and type 2 diabetes (0.5%), etc.**

Tabke 3-4 Pilot high-risk disease in 2016

disease	number	percent (%)
cardiovascular disease	573	9.7
cholelithiasis	57	0.9
cerebrovascular disease	35	0.6
type 2 diabetes	32	0.5
urinary calculus	22	0.3
fracture	16	0.2



3.2.1 the correlation between high risk and age

- The prevalence of cardiovascular disease increased with age, reaching a peak of 40.1% over the age of 50.

Table 3-5 Association analysis of age and high risk disease

age	cardiovascular disease		choleith disease	
	no	yes	no	yes
20~29(n,%)	2590 (97.6)	65 (2.4)	2638 (99.4)	17 (0.6)
30~39(n,%)	1858 (94.1)	116 (5.9)	1952 (98.9)	22 (1.1)
40~49(n,%)	606 (76.9)	182 (23.1)	777 (98.6)	11 (1.4)
50~(n,%)	279 (59.9)	187 (40.1)	459 (98.5)	7 (1.5)
X2	873.929		6.303	
P value	<0.01		0.098	





3.2.2 The correlation between flight time and high risk disease

- The results showed that the number of pilots with cardiovascular disease, cerebrovascular disease and urinary calculus were less than the number of pilots with no more than one disease, and the difference was statistically significant ($p < 0.05$).
- There was no statistically significant difference between the number of flight hours and the number of pilots who had not.

table 3-6 The correlation between flight time and high risk disease

disease	2016 flight hours (median , Q25,75)	P value
coronary disease		
no	914.65 (835.48~959.69)	<0.01
yes	888.73 (750.37~956.12)	
choleith disease		
no	913.04 (827.72~959.10)	0.121
yes	937.83 (835.88~972.60)	
ceebrovascular disease		
no	913.49 (828.19~959.44)	0.036
yes	890.73 (727.43~924.13)	
urinary calculus		
no	913.43 (828.50~959.37)	<0.01
yes	509.50 (253.20~847.96)	





3.2.3 High risk disease in different areas

area	coronary disease (n,%)	choleith disease (n, %)	brain disease (n,%)
Guangzhou	130 (8.5)	31 (2.82)	2 (0.1)
Heilongjiang	29 (14.1)	0	1 (0.5)
JinLin	22 (9.8)	1 (0.4)	0
Beifang	34 (10.5)	6 (1.87)	2 (0.6)
Beijing	35 (9.6)	0	7 (1.9)
XinJiang	54 (10.6)	2 (0.4)	4 (0.8)
Dalian	53 (22.0)	1 (0.4)	4 (1.7)
Guangxi	10 (5.0)	0	0
Hainan	18 (6.2)	1 (0.34)	2 (0.7)
Hubei	21 (6.8)	8 (2.55)	5 (1.6)
Hunan	15 (6.0)	0	1 (0.4)
Shenzhen	31 (8.4)	1 (0.3)	0
Zhuhai	14 (11.9)	0	0
Tongyong	5 (3.8)	1 (0.75)	0
Shanghai	2 (3.3)	1 (1.6)	2 (3.3)
Chongqing	15 (9.0)	0	3 (1.8)
Shantou	6 (4.4)	2 (1.48)	0
Hainan	38 (13.6)	1 (0.4)	0
Guizhou	17 (10.8)	0	2 (1.3)
Xi'an	1 (3.3)	1 (3.3)	0

- The prevalence of cholelithiasis in Guangzhou, Hubei and Xi'an was higher (2.82%, 2.55% and 3.33% respectively).
- The prevalence of cardiovascular disease (22.0%) in Dalian was higher than that in other regions, followed by Heilongjiang and Henan with 14.1 percent and 13.6 percent, respectively.





3.3 Temporarily grounded

In 2016, 436 pilots were grounded. Among them, the number of pilots with grounding time from one month to one year was 281, the highest proportion of the total was 64.45%.

Table 3-8 pilots temporarily grounded in 2016

time length	person-time	percent
10 days~1 month	84	19.27
1 month~12 months	281	64.45
over 12 months	71	16.28



3.3.1 Temporarily grounded diseases

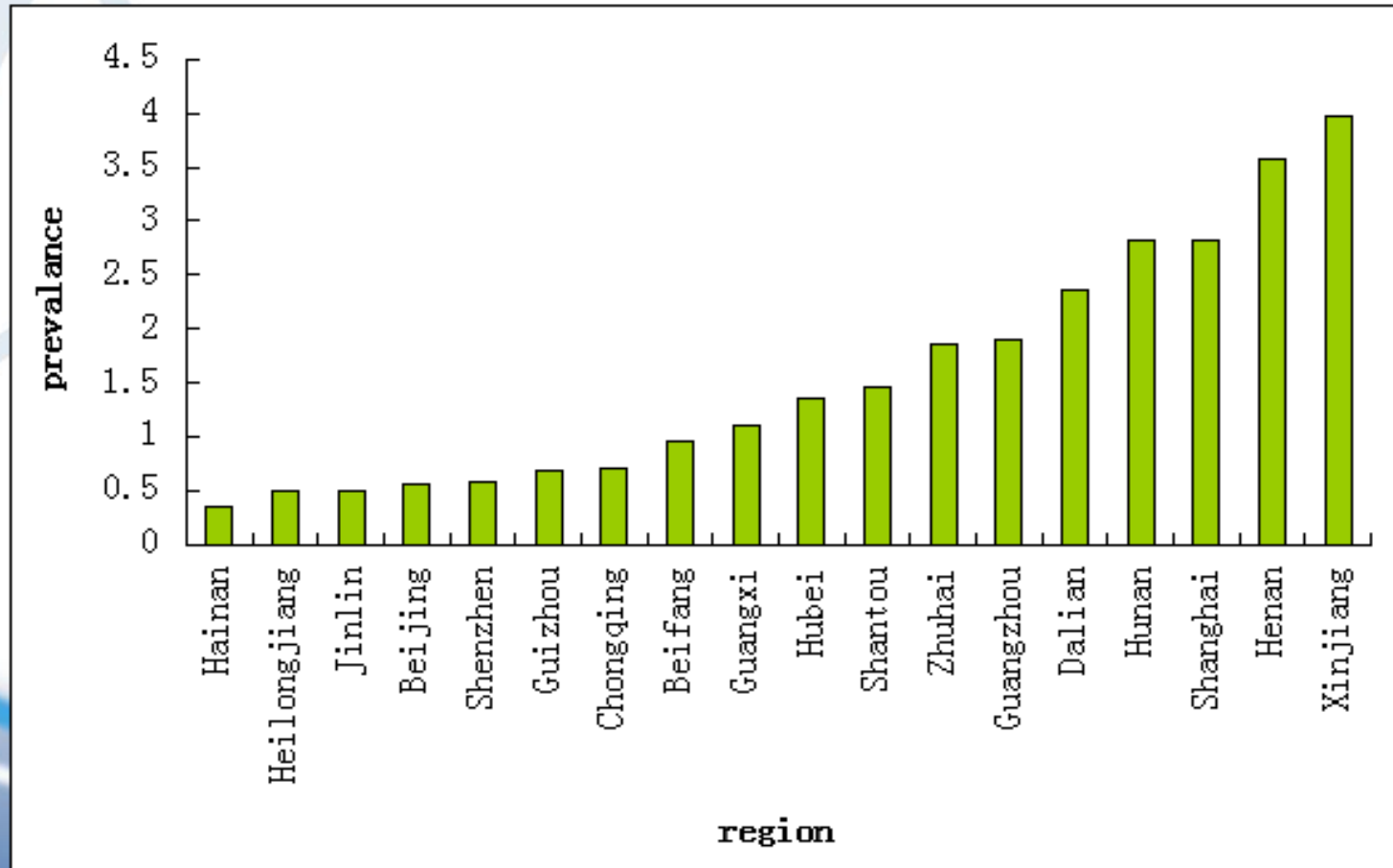
Cardiovascular disease was the first disease that caused the pilot to stop flying, accounting for 25.92% of the total. Trauma or surgery, various kinds of stones are also common diseases that cause pilots grounding.

Table 3-9 Diseases for temporarily ground

disease	number	percent
cardiovascular	113	25.92
trauma or surgery	94	21.56
various calculus	63	14.45
metabolic system disease	26	5.96
spinal and limb disorders	18	4.13



3.3.2 Due to cardiac and cerebrovascular disease in various places in 2016





Discussion

Cardiovascular disease, cholelithiasis, cerebrovascular disease, type II diabetes and urinary calculic are the top five risk diseases for pilots.

Cardiovascular disease still accounts for most of the high-risk diseases.





Discussion

The prevalence of cardiovascular disease increases with age, reaching the highest over age 50, so age should be a basis for health classification. we should strengthen the prevention work of cardiovascular disease on pilots over 50 years old.





Discussion

The regional differences in high-risk diseases are more pronounced. The prevalence of cardiovascular disease in northern provinces was higher than that in other regions.

The prevalence of cholelithiasis in southern areas was higher than the other province.

The prevalence of urinary calculus in Guangxi was significantly higher than that in other regions.





Discussion

- we should adopt the strategy of prevention and control on different areas, and make some measures about the high prevalence.
- we will make a persistence on an investigation of pilots health for a couple of years and make a more detailed research to find out a causal link between the disease and the factors.
- Multivariable analysis should be used to control the confounding bias and explore the insight relationship of the disease and other characteristics.





Thanks for listening

Zhang Zhengzheng

E-mail: 218615@csair.com

Company: Aviation Hygiene

Management Division,

China Southern Airlines

