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Medical causes and diseases leading to early permanent disqualification in IRIAF pilots based on their service categories

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Abstract: *Background and Aim: Efficient manpower is the most important capital and studies have shown the relationship between health and performance.Understanding the factors leading to disability has preventive importance.Our aim is determine the causes and diseases leading to early permanent medical disqualification of the Islamic Republic of Iran Air Force pilots based on their service categories.*

Methods: This is a descriptive, cross-sectional, retrospective study with target population of the Islamic Republic of Iran Air Force pilots with early and permanent medical disqualification from 1986 to 2016.

Results: Out of 508 cases of early medical discharges, 239 items were considered medical disqualification, 17 war captives, 34 service exchange and the remaining 218 was for on service killed or missed persons.The main medical causes were neurosurgery, cardiovascular and psychiatric, while common diseases include lumbar discopathy, myocardial infarction and cardiac arrhythmia.The lost service years was 3233 person year and the average was 12.63 person year per individual.

Conclusions: Based on the previous similar studies, it was expected that the common cause include neurosurgery, cardivascular and psychiatric with more prevalence in fighter, transportation, and helicopter service categories.At the end, we found that our results were in line with initial expectations.

Keywords: *disabilities, medical disqualification, health, prevention, performance*

INTRODUCTION

Human resources are the most important capital of armed forces, and many studies have shown the strong links between personal health and organizational performance. In order to increase productivity, organizations have adopted numerous measures not only to evaluate pre-employment health status, but also monitor staff health during their service life. Nonetheless, health risks remain the most important reducing factor of personal productivity. Disability is defined as the effect of a disorder on physical, mental, and social activity of a person where the work environment and the family status are also effective elements [1, 2, 3, 4]. According to statistics, effective prevention of cardiovascular risk factors in aviation population has a significant role in improving the professional health index of aviators (pilots). The study of aviator's work environment and their lifestyle, active intervention, periodic regular examinations and screening tests for early detection of diseases are among the basic measures [10].

These days, the economic, mental and social problems caused by disability in armed forces are critical burdens. Regardless of the huge cost to run and maintain a powerful army, the supportive burden of victims can be devastating for any society [22]. In 1993, the United States (U.S) army paid 500 million dollars to compensation newly recruited armed forces [7, 8] In a study between 1980 and 1994 on the

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causes of disability in U.S. air and sea forces, it has been shown that disability in armed forces had led to an excessive cost of about 1.5 billion dollar in form of a compensation [2].

The preparation of military pilot volunteers to enter professional trainings and the provision of optimal services in the form of well-trained pilots require a huge amount of resources, both physical and intellectual [1]. The ultimate goal of present study was to determine the causes and diseases which led to early permanent medical disqualification (EPMD) of Islamic Republic of Iran Air Force (IRIAF) pilots based on their service categories from 1986 to 2016. Other objectives include; determine the causes and diseases which led to EPMD in IRIAF pilots who captured during the war, killed or missed in actions or have been forced to change their service category due to medical reasons, their lost service years (LSY) and its average and provision of scientific and practical solution to prevent the EPMD of IRIAF pilots, all based on their service categories.

METHODS

This is a descriptive-cross sectional-retrospective research which ethically approved by the ethics committee of the Aerospace and Sub-aquatic Medical Faculty in Aja University of Medical Sciences (with registration No# 10167118) and was conducted by the personal expenses of the corresponding author. However, like other up-to-date military articles, we are reluctant to disclose a number of military confidential information (i.e. total number of assessed cases).

All the IRIAF pilots(which all are male) with EPMD who had relevant official records from 1986 to 2016 was included in the study and those who had medical disqualification due to physical or mental illness and death in non-occupational accidents, non-medical reasons, personal requests or disciplinary punishments were excluded. In this study, all pilots were captured during the war, killed or missed in actions, and those who confronted with service exchange were classified as permanent disqualification. However, this is one of the study advantages and all data was illustrated in detail separately. In order to observe the principle of confidentiality a non-disclosed random ID code were assigned for every person.

Main disease of the participants was classified based on the ICD-10 (10th version of international classification of diseases) and registered in to the Microsoft excel-based pre-designed electronic data sheet. Other recorded information included; date of entry into the service, date of departure from the service and service categories. Indeed, the total lost service years and average lost service years were calculated for each service category. Finally, this data was analyzed and displayed as graphs and figures for better presentation.

RESULTS

During the period of 1986 to 2016, 508 cases of early permanent discharges occurred in IRIAF pilots which contained; 239 medical disqualification, 218 killed or missed in actions, 34 service exchange and 17 war captives (Table 1).

Table 1: Study data

Service pilots categories / Status	Fighter	Transportation		Helicopter	Total
		light	heavy		
Medical disqualification	171	20	26	22	239
War captives	16	0	0	1	17
Killed or missed in actions	159	7	30	22	218
Service exchange	28	0	3	3	34
	374	27	59	48	508
		86			

The most prevalent medical causes of EPMD in IRIAF pilots were neurosurgery, cardiovascular and psychiatric (Figure 1).

A gynecological and urological consultation was requested for a non-functioning urethral-vesical catheter of a 60 years-old female patient admitted in the Orthopedic Department that underwent surgery with external fixation 2 days prior for a complex pelvic fracture (transverse fracture of the right acetabulum, left obturator ring fracture, left sacral fracture, fifth lumbar transverse apophysis fracture with paralysis of the external left sciatic nerve) (Figure 1).

The most common diseases led to EPMD in IRIAF pilots included; lumbar discopathy, myocardial infarction, cardiac arrhythmia, generalized anxiety disorder and post-traumatic stress disorder (Table 2).

Figure 1: Causes lead to the EPMD of IRIAF pilots based on their service categories

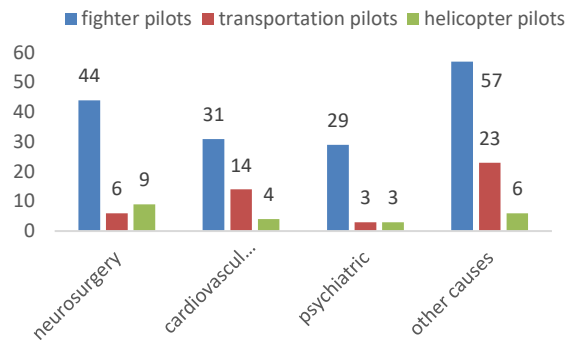
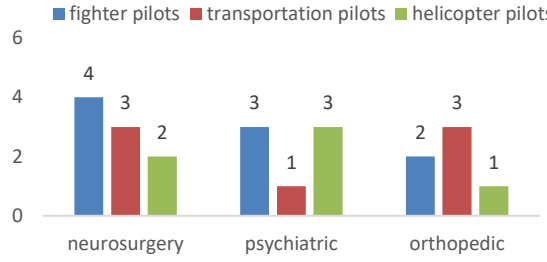


Table 2: Diseases lead to the EPMD of IRIAF pilots based on their service categories

Service pilots categories / Status	Fighter	Transport	Helicopter
Lumbar discopathy	18	5	5
Myocardial infarction	12	6	2
Cardiac arrhythmia	10	2	1
Generalized anxiety disorder	10	0	1
Post-traumatic stress disorder	10	0	0
Other diseases	111	33	13

The most prevalent medical causes of EPMD in war captive IRIAF pilots were neurosurgery, psychiatry and orthopedics (Figure 2).

Figure 2: Causes lead to the EPMD of war captive IRIAF pilots based on their service categories.



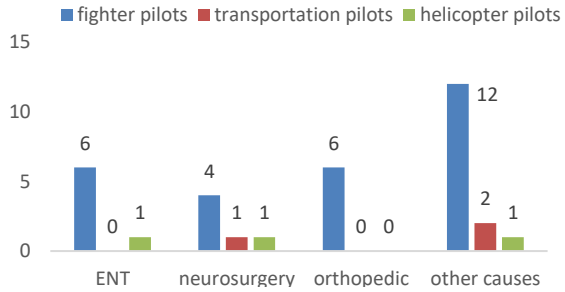
The most common diseases led to EPMD in war captive IRIAF pilots included; post-traumatic stress disorder, lumbar vertebral fracture with fusion and complicated bone fracture (Table 3).

The most prevalent medical causes of permanent medical service exchange (PMSE) in IRIAF pilots were ear, nose and throat (ENT), neurosurgery and orthopedics (Figure 3).

Table 3: Diseases lead to the EPMD of war captive IRIAF pilots based on their service categories

Service pilots categories / Status	Fighter	Transport	Helicopter
Post-traumatic stress disorder	3	1	1
Lumbar vertebral fracture with fusion	2	0	1
Complicated bone fracture	1	0	1
Lumbar discopathy	1	1	0
Cervical discopathy	1	0	1
Other diseases	3	0	0

Figures 3: CT-scan showing complex pelvic fracture and the communication between the bladder and the left labia.



The most common diseases led to PMSE in IRIAF pilots included; motion sickness, complicated bone fracture, lumbar discopathy (Table 4).

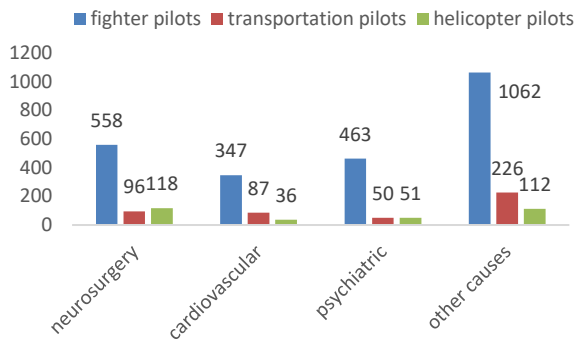
Table 4: Diseases lead to the PMSE in IRIAF pilots based on their service categories

Service pilots categories / Status	Fighter	Transport	Helicopter
Motion sickness	6	0	0
Complicated bone fracture	4	0	0
Lumbar discopathy	2	1	0
Cervical discopathy	2	0	1
Generalized anxiety disorder	2	0	0
Other diseases	12	2	2

As 3233 LSY, 2457 (%76) was belong to fighter pilots, 459 (%14.4) to transportation pilots and 317 (%9.8) to helicopter pilots. The most prevalent medical causes of LSY in IRIAF pilots with EPMD were neurosurgery, psychiatry and cardivascular (Figure 4).

The most LSY in IRIAF pilots with EPMD were belong to lumbar discopathy, generalized anxiety disorder and cardiac arrhythmia (Table 5).

Figure 4: Causes lead to the most LSY in IRIAF pilots with EPMD based on their service categories.



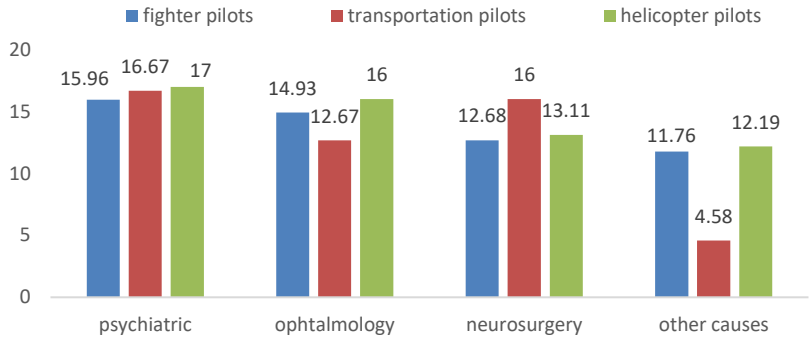
The average of LSY in IRIAF pilots with EPMD was 12.63 person year per individual (13.14 in fighter, 9.98 in transportation and 13.78 in helicopter pilots).

The most prevalent medical causes of LSY average in IRIAF pilots with EPMD were psychology, ophthalmology and neurosurgery (Figure 5).

Table 5: Diseases lead to the most LSY in IRIAF pilots with EPMD based on their service categories

Service pilots categories / Status	Fighter	Transport	Helicopter
Lumbar discopathy	225	80	56
Generalized anxiety disorder	187	0	12
Cardiac arrhythmia	136	19	18
Complicated bone fracture	151	0	0
Post-traumatic stress disorder	151	0	0
Other diseases	1067	360	231

Figure 5: Causes lead to the most LSY in IRIAF pilots with EPMD based on their service categories.



The diseases resulted in the highest average of LSY in IRIAF pilots with EPMD included; migraine, cardiac arrhythmia and lumbar discopathy (Table 6).

Table 6: Diseases lead to the most LSY average in IRIAF pilots with EPMD based on their service categories

Service pilots categories / Status	Fighter	Transport	Helicopter
Migraine	13	16	23
Cardiac arrhythmia	13.6	9.5	18
Lumbar discopathy	12.5	16	11.2
Generalized anxiety disorder	18.7	0	12
Epilepsy	14	12	0
Other diseases	11.92	6.58	11.56

DISCUSSION

In the study of Whitton-1984 on United State Air Force (USAF) pilots and navigators, the common causes were cardivascular and neurologic [17], while in the same study of Mc Crary-2002, the most common causes in 1995 to 1999, include cardivascular, musculoskeletal, neurologic and endocrinology [12]. Also, in the study of Montazeri-2005, the most common causes of EPMD in IRIAF pilots included cardivascular and musculoskeletal [20]. In the study of Ghazizade-2010 on the same population in 1992 to 2003, cardivascular, nervous-skeletal and gastrointestinal were the most common causes [19].

In the study of Dark-1986 with the help of The Federal Aviation Administration (FAA), on medical disqualification of American airlines pilots in 1983 and 1984, the most commonly reported causes were cardiovascular and Neuropsychiatric events [18]. In the Nakanishi study on permanent disability of 260 Japanese crews, significant causes include malignancies, neurodegenerative, cardiovascular, gastrointestinal and musculoskeletal disorders [9]. In the review of trained pilots on Commonwealth countries from 1994 to 2004, the causes of cardiovascular were prevalent [19]. In the Arva study on 257 Norwegian civil pilots, the main causes were cardiovascular,

neurologic, musculoskeletal and psychiatric disorders [11]. In the studies of Mitchell-2004 and Evan-2006 on sudden incapacitation of British civil pilots, 36 cases have been diagnosed and half of them were due to cardiovascular, cerebrovascular and psychiatric disorders [13, 14]. In the Nezami study on 200 civil pilots of Vnukovo airport in Moscow, cardivascular, neurologic and digestive have been the main causes of medical disqualification [10].

In the Mc crary's study, the more common diseases were ischemic heart diseases, high blood pressure, back pain, inter vertebral disc disorders and migraine [12]. In the study of Nezami, ischemic heart diseases, myocardial infarction, high blood pressure, cerebrovascular sclerotic lesions and peptic ulcer have been common [10]. FAA has conducted a great comprehensive study in 2014 on the causes of medical disqualification of pilots listing fifteen major causes, including; pectoris angina, bipolar mood disorder, cardiac valve replacement, coronary artery diseases, diabetes mellitus, loss of consciousness with unknown reason, seizure, cardiac replacement, myocardial infarction, permanent pace maker, disabling personal disorder, psychosis, drug abuse and dependency and lack of neural control, in order of significance [16].

In the study of Montazeri, the mean LSY of IRIAF retired with EPMD was 6.5 person year per individual [20]. In the Ghazizade study, the mean LSY was 6.14 and the highest was 10 person year per individual [19].

The present study has limitations that include: 1) missing details due to the lack of presence of a comprehensive electronic system for recording personal medical records; 2) the possibility of oriented malingering in disorders where specific objective diagnostic methods are not available and were mostly diagnosed subjectively, such as motion sickness, migraine and etc, and 3) flying device factors (ergonomics and exhaustion), operational and airbase factors (work and rest schedule), Personal factors (life style, physical and psychological capabilities, socioeconomic state, use of legal and illicit drugs and habits), medical factors (medical and psychological advices and hygiene education) are important items which have effective influence on pilots health.

The current investigation has important advantages such as: 1) so far, in terms of quantity and quality, there is a limited number of similar studies have been conducted about military pilot's health; 2) it has the longest cross-sectional period (35 years), the closest was performed during a 10-years period [18]; 3) express the statistics of IRIAF pilots which captured during the war, killed or missed in actions and those who confronted with service exchange, and 4) Records given were sorted according to the service categories.

CONCLUSIONS

More studies should be conducted on military and civil aviator's (pilots) health in the future. We believe that the life style modifications, regular fitness training, hygiene and health education and use of medical and psychological counseling for preventing the EPMD in military pilots are necessary preventive steps to take. Also, use of up-to-date comprehensive electronic system, upgrading on-the-job examinations, sufficient periodic in-service examination in occupational health centers are recommend by authors.

List of Abbreviations

U.S = United States; IRIAF = Islamic Republic of Iran Air Force; EPMD= Early and Permanent Medical Disqualification; LSY= Lost Service Years; ICD-10 = 10th International Classification of Diseases; PMSE= Permanent Medical Service Exchange; ENT = Ear, Nose and Throat; USAF= United State Air Force; FAA= Federal Aviation Association

Authors' contribution:

MD – data collector and supervisor, statistical analyzer and literary editor; HS – main owner of the idea, scientific supervisor, executive author and editor.

Ethics approval and consent to participate:

The ethical approval of this study was issued with registration No#10167118 by the ethics committee of the Aerospace and Sub-aquatic Medical Faculty in Aja University of Medical Sciences.

Patient consent for publication: Not applicable.

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Competing interests:

The authors declare that they have no competing interests.

Availability of data and materials:

All the data of this study is available and could be accessible for publication by that valuable military journal.

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