Prevalence of arterial hypertension in pilots of the Ecuadorian Air Force residing at the "Eloy Alfaro" Air Base in Manta, according to the Military Rank

Andrea Villarreal-Juris¹; María Tobar-Vallejo²; Iván Jarro-Villavicencio¹; Martín Angulo-Mejía¹; Ricardo Chacha-Suscal¹; Anna Delgado-Salas³; Juan Jaramillo-Merino² Evelyn Brito-Henriquez⁴

¹Department of General Surgery, Luis Vernaza Hospital, Guayaquil-Ecuador
²Central University of Ecuador, Quito-Ecuador
³Department of Internal Medicine, Luis Vernaza Hospital, Guayaquil-Ecuador
⁴Pontifical Catholic University of Cuenca, Cuenca-Ecuador

ABSTRACT

Introduction: Hypertension is the most common condition observed in primary care and one of the leading causes of death if it is not early detected and properly treated. Little importance has been given to this pathology in the military population, assuming that due to their strenuous physical activity they are exempt from suffering it.

Objective: To determine the prevalence of arterial hypertension in pilots of the Ecuadorian Air Force according to the Military Rank.

Methodology: In July 2018, an observational, cross-sectional, and descriptive study was conducted. Seventy pilots residing at the "Eloy Alfaro" Air Base in the city of Manta were included, with a Military Rank of Second Lieutenant, Lieutenant, Captain, Major and Lieutenant Colonel, age between 25 and 45 years, men and women. The mean of three pressures was used for the blood pressure report. Hypertension was considered with any reading of systolic pressure ≥130 and diastolic pressure ≥80 mmHg.

Results: Of the 70 participants, 4.3% were women and 95.7% men. The mean age was 25.5 years (SD: ± 0.58) and 30.7 years (SD: ± 5.39), respectively. The prevalence of arterial hypertension was 22.9%; and it was evidenced only in male pilots. Eighteen-point seven percent of hypertensive patients were Senior Officers, while 81.3% were Junior Officers.

Conclusions: There is a low prevalence of arterial hypertension in the pilots of this study, however, its control is essential to avoid events that could risk their lives, especially during flight periods.

Keywords: Military Personnel, Air Force Personnel, Hypertension, Blood Pressure, High

INTRODUCTION

Arterial hypertension is a pathology that responds to multiple economic, social, cultural, environmental, and ethnic factors, reaching a high prevalence worldwide: 691 million people [1]. It is also known that of the 15 million people deceased from circulatory diseases, 7.2 million died from coronary heart disease and 4.6 million from encephalic vascular disease; and high blood pressure was present in most of them [2]. The estimated arterial hypertension prevalence in Ecuador is around 2 million people; this, without considering those individuals who have not been treated or diagnosed; assuming that there will be many untreated and uncontrolled, thus increasing these numbers [3,4].

Citation: Andrea Villarreal-Juris¹; Maria Tobar-Vallejo²; Ivan Jarro-Villavicencio¹; Martin Angulo-Mejia¹; Ricardo Chacha-Suscal¹; Anna Delgado-Salas³; Juan Jaramillo-Merino² Evelyn Brito-Henriquez⁴. Prevalence of arterial hypertension in pilots of the Ecuadorian Air Force residing at the "Eloy Alfaro" Air Base in Manta, according to the Military Rank . Jour of Clin Cas Rep, Med Imag and Heal Sci 1(5)-2022. DOI: 10.55920/JCRMHS.2022.01.0010
The progressive and continuous increase in systolic blood pressure (SBP) and diastolic blood pressure (DBP) from optimal levels (115/75 mmHg) is related to the incidence of cerebrovascular disease [5,6]. This relationship is observed in all age groups, even in people ≥80 years, although the relative risks are greater at younger ages. The mortality risk due to cerebrovascular disease caused by the increase in blood pressure doubles for each increase of 20 mmHg in SBP or 10 mmHg in DBP [7,8].

Blood pressure can be classified into four levels according to the average clinical blood pressure: normal (SBP <120 and DBP <80 mmHg), elevated (SBP 120-129 and DBP <80 mmHg), grade 1 hypertension (SBP 130 -139 or DBP 80-89 mmHg) and grade 2 hypertension (SBP ≥ 140 or DBP ≥90 mmHg) [6,7].

This research sought to determine the prevalence of arterial hypertension in a population of pilots residing at an air base of the Ecuadorian Armed Forces.

MATERIALS AND METHODS

This observational, cross-sectional, and descriptive study was carried out in July 2018. Seventy pilots residing at the "Eloy Alfaro" Air Base in the city of Manta, with Military Rank of: Second Lieutenant, Lieutenant, Captain, Major and Lieutenant Colonel; with an age between 25 to 45 years, of both sexes, were included.

During the study, blood pressure was taken from the participants in the facilities of the ALA 23 Basic Hospital, a health unit of the "Eloy Alfaro" Air Base. The objectives, methodology and confidentiality of the data were explained to each one of the participants; likewise, written consent was requested to validate their participation.

An OMRON M6 automatic digital blood pressure monitor (HEM-7001-E) was used to obtain data, with a LARGE CUFF OMRON CL2 cuff for adults and obese subjects (arm circumference 32 to 42 cm). Three consecutive blood pressure measurements were made with the subject at rest during the previous 5 minutes, using the mean of the three measurements to reduce intra-individual variability. Hypertension was defined as any reading of SBP ≥130 and DBP ≥80 mmHg.

The information was collected manually, integrated later using Microsoft Excel 2016 and then processed with the statistical tool JASP 0.11.1 developed and supported by the University of Amsterdam.

Data was also ordered according to age groups as follows: 25 to 29 years old, 30 to 34 years old, 35 to 39 years old and 40 to 45 years old.

Table 1: Demographic characteristics

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Femene</th>
<th>Masculine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pilots (n)</td>
<td>3</td>
<td>67</td>
<td></td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>25.3</td>
<td>30.7</td>
<td></td>
</tr>
<tr>
<td>Standard deviation (years)</td>
<td>0.58</td>
<td>5.39</td>
<td></td>
</tr>
<tr>
<td>Minimum (years)</td>
<td>25</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Maximum (years)</td>
<td>26</td>
<td>45</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age group (Age in years)</th>
<th>Hypertension</th>
<th>Pilots (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29</td>
<td>No</td>
<td>31</td>
<td>79.5</td>
</tr>
<tr>
<td>30-34</td>
<td>Yes</td>
<td>8</td>
<td>20.5</td>
</tr>
<tr>
<td>35-39</td>
<td>No</td>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>40-45</td>
<td>Yes</td>
<td>4</td>
<td>57.1</td>
</tr>
</tbody>
</table>

Eighteen-point seven percent (18.7%) of hypertensive pilots were Senior Officers, while 81.3% were Junior Officers.

The prevalence of arterial hypertension was 22.9%, and it was evidenced only in male pilots.

Thirty-nine pilots were included in the 25 to 29 years age group, where hypertension reached 20.5%, of which 75% had the Military Rank of Second Lieutenant and 25% that of Lieutenant, meaning, they were all Junior Officers; twenty pilots were included in the 30 to 34 years age group, Senior Officers are understood as those with the Military Rank of Major, Lieutenant Colonel and Colonel; while Junior Officers are those who have a Military Rank of Second Lieutenant, Lieutenant and Captain. The analysis was conducted according to these grouped degrees.

RESULTS

In this study, 70 pilots aged between 25 and 45 years participated, 4.3% were women and 95.7% were men. The mean age in the former was 25.5 years (SD: ±0.58), while in men, was 30.7 years (SD: ±5.39).

Table 2: Arterial hypertension according to the age group

Made by the authors    Extracted from: database

Eighteen-point seven percent (18.7%) of hypertensive pilots were Senior Officers, while 81.3% were Junior Officers.

The prevalence of arterial hypertension was 22.9%, and it was evidenced only in male pilots.
Table 3: Hypertension according to the Military Rank categorization

<table>
<thead>
<tr>
<th>Hypertension</th>
<th>Military Rank categorization</th>
<th>Pilots (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>Junior Officer</td>
<td>50</td>
<td>92.6</td>
</tr>
<tr>
<td></td>
<td>Senior Officer</td>
<td>4</td>
<td>7.4</td>
</tr>
<tr>
<td>Yes</td>
<td>Junior Officer</td>
<td>13</td>
<td>81.3</td>
</tr>
<tr>
<td></td>
<td>Senior Officer</td>
<td>3</td>
<td>18.7</td>
</tr>
</tbody>
</table>

Table 4: Hypertension according to age group and Military Rank categorization

<table>
<thead>
<tr>
<th>Age group</th>
<th>Military Rank categorization</th>
<th>Pilots with hypertension (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29 years</td>
<td>Junior Officer</td>
<td>8</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Senior Officer</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30-34 years</td>
<td>Junior Officer</td>
<td>3</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Senior Officer</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>35-39 years</td>
<td>Junior Officer</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Senior Officer</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>40-45 years</td>
<td>Junior Officer</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Senior Officer</td>
<td>3</td>
<td>100</td>
</tr>
</tbody>
</table>

Made by the authors    Extracted from: database

where hypertension reached 15%, all having the Military Rank of Captain, corresponding to Junior Officer; in the four pilots aged between 35 and 39 years, hypertension reached 50%, where, as in the previous group, all had the Military Rank of Captain, corresponding to Junior Officer. Finally, 7 pilots were included in the 40 to 45 years age group, where hypertension reached 42.9%, with 66.7% having the Military Rank of Major and 33.4% of Lieutenant Colonel, both corresponding to Senior Officer.

DISCUSSION

There is no previously published information about arterial hypertension in the military population of Ecuador. In this study, a minimum prevalence of this pathology was determined, similar to the nationally reported level: 28.7% [9] and to that reported by other studies such as the one by Wenzel et al., carried out in military personnel from Brazil where it reached 22% [10]; contrasting with studies such as the one by Rinanty et al. in Indonesia, where it reached 10.7% [11]. Hypertension was more frequent in Junior Officers than in Senior Officers, probably due to the number of participants in the first study group, which exceeds the second group. In female pilots, arterial hypertension was not evidenced, however, this can be attributed to the predominance of males in this study due to the low recruitment of female pilots in the Ecuadorian Air Force.

It is worth clarifying that the prevalence of arterial hypertension demonstrated in this study is not representative of the total number of pilots belonging to the Ecuadorian Air Force due to its large population, so that future multicentric investigations and with larger samples will be necessary to extrapolate results in the National territory.

The Federal Aviation Administration (AFA) allows a pilot to be more hypertensive than officers from other military branches, with the maximum value of blood pressure admitted being 155/95 mmHg, while it should not exceed 140/90 mmHg for other military (land or naval force) [12].

Hunter et al. offers a management algorithm where antihypertensives are administered from values greater than 135/85 mmHg [13]; however, and, considering the international recommendations for the management of hypertension [6], these standards should be evaluated individually due to the increased cardiovascular risk that chronic hypertension without treatment represents.

There is a positive effect of high levels of physical activity on hypertension, but other stress situations, such as promotion tests, condition the elevation of blood pressure in pilots and other military [13]. The study of this relationship and that with other morbidities such as obesity or being a smoker should be carried out later to implement preventive models in Ecuadorian pilots.

During flight periods, pilots can suffer a medical disability in the cabin, and although it is rare, among its main causes are myocardial infarction and cardiac arrhythmia [14], which arise due to arterial hypertension and increase the risk of death, especially in pilots older than 35 years [15]. Future research could be based on actual in-flight medical events, standardizing a useful denominator, such as flight time [16], to allow meaningful comparison between studies.

CONCLUSIONS

There is a low prevalence of arterial hypertension in the pilots who reside at the "Eloy Alfaro" Air Base in Manta, however, its control has utmost importance to avoid future events that could risk the pilot’s life during the performance of their daily activities, especially during flight periods.

Daily blood pressure control before and after flying an aircraft may be necessary, especially in those who already have an established diagnosis, regardless of Military Rank.

Citation: Andrea Villarreal-Juris; María Tobar-Vallejo; Iván Jarro-Villavicencio; Martin Angulo-Mejía; Ricardo Chacha-Suscal; Anna Delgado-Salinas; Juan Jaramillo-Merino; Evelyn Brito-Henriquez. Prevalence of arterial hypertension in pilots of the Ecuadorian Air Force residing at the “Eloy Alfaro” Air Base in Manta, according to the Military Rank. Jour of Clin Cas Rep, Med Imag and Heal Sci 1(5)-2022. DOI: 10.55920/JCRMHS.2022.01.001046
A more thorough investigation is required to determine blood pressure before, after and/or during flight periods, both practice and aerobatics, among others; to determine if the pilots certainly maintain blood pressure within normal parameters.

ETHICS

This work was constructed based on the Helsinki Declaration.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

FINANCE

All the work was financed by the authors.

References


