

Peripheral Perfusion Index in Adult Patients Attending an Ophthalmology Specialty Consultation for the First Time in the Western Part of Mexico

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ABSTRACT

Abbreviations: PI: Perfusion Index; SBP: Systolic Blood Pressure; DBP: Diastolic Blood Pressure; MAP: Mean Arterial Pressure; NTG: Normal Tension Glaucomas; POAG: Primary Open Angle Glaucomas; IOP: Intraocular Pressure

Introduction

Pulse oximeters measure three parameters through photoplethysmographic signal analysis: oxygen saturation, pulse rate, and perfusion index (PI). The PI is an indirect measure of peripheral perfusion expressed as the percentage of pulsatile signals compared to non-pulsatile signals. The PI can vary when measured on different fingers. A low PI indicates vasoconstriction and therefore low blood flow, while a high PI suggests vasodilation and consequently better blood flow. (He HW, et al. [1,2]). Both the ACC/AHA recommend achieving blood pressures <130/80 mmHg to prevent cerebrovascular events (Vemu, et al. [3]).

Objective

To observe the difference in the variation of the Perfusion Index (PI), Systolic Blood Pressure (SBP), Diastolic Blood Pressure (DBP), and Mean Arterial Pressure (MAP) between healthy adult men and women (Table 1).

Table 1: Gender and number of patients.

Gender	Frequency	Percentage (%)
Females	121	72.5
Males	46	27.5
Total	167	100

Materials and Methods

Observational, nonexperimental cross-sectional study. Convenience sample recruited from a private tertiary care hospital in western Mexico (from February 10 to March 10, 2024). Measurements of SBP and DBP were taken on the left arm while seated (after 5 minutes of rest and forearm support on a table) with informed consent for each patient. MAP was calculated for each patient. Additionally, portable pulse oximetry (with 100% battery) was performed on the third finger of the right hand (middle finger) in healthy adults (18 to 90 years), and PI was measured for 1 minute. All these measurements were carried out from 9 a.m. to 12 p.m. from Monday to Saturday. The ambient temperature was 23°C with 40% humidity. Shapiro-Wilk tests were performed to compare PI between both genders.

Results

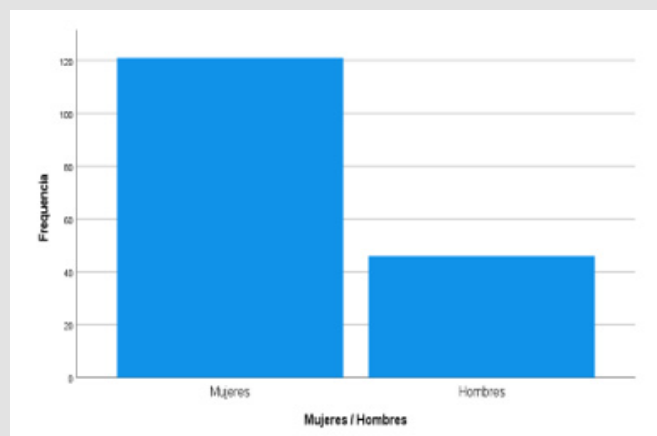
Data from 167 adult individuals (121 women [72.5%] and 46 men [27.5%]) were collected and analyzed. The mean age was 63.16 years (minimum age 18 years, maximum age 90 years). A large percentage of patients (both genders) had a PI < 5.0% (n both genders = 69/167 [41.31%]; women 49/121 [40.49%]; men 20/46 [43.47%]) versus PI > 5.1% (n both sexes = 98/167 [58.69%]; women 72/121 [59.50%]; men 26/46 [43.47%]). A PI > 5.1% was observed in women (72/167 [43.11%]) versus men (26/167 [15.52%]). Shapiro-Wilk tests for normal versus low PI values were performed for both men and women ($p < 0.001$) (Tables 2 & 3) (Graphs 1-7).

Table 2: Measure of central tendency and dispersion according to age.

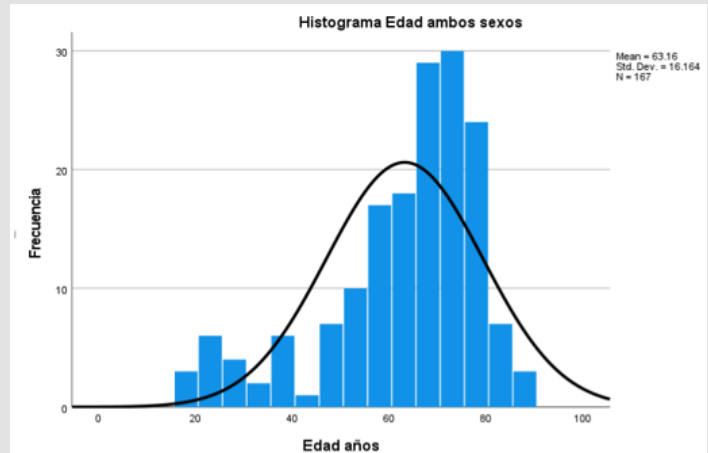
N Total	167
Mean	63.16
Mean Standard Error	1.251
Median	68
Mode	69
Standard Deviation	16.164
Variance	261.269
Rank	72
Minimum	18
Maximum	90

Table 3: Study Variables.

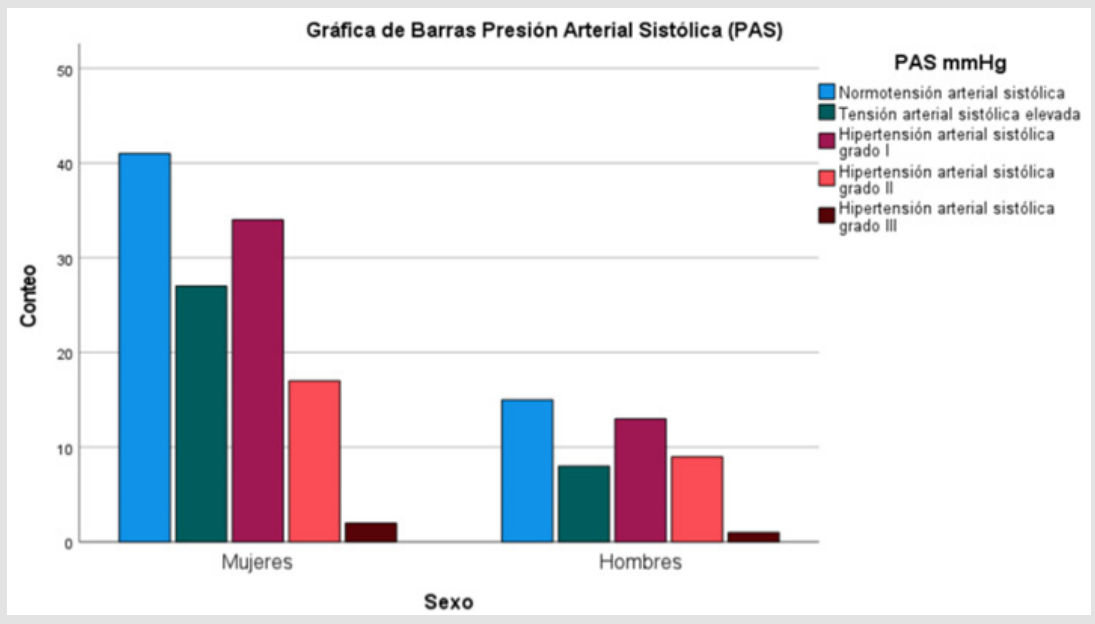
Variable	Minimum	Maximum	Mean
SBP mmHg	91	192	127.77
DBP	48	98	71.56
Diferential BP	25	114	56.2
MBP	62.33	120.33	90.2107
Pulse frequency (baumanometer)	50	120	72.07
SpO2%	87	99	95.76
P. I	0.2	19	5.32
Pulse frequency (pulse oxymeter)	53	118	72.56
Age (years)	18	90	63.16



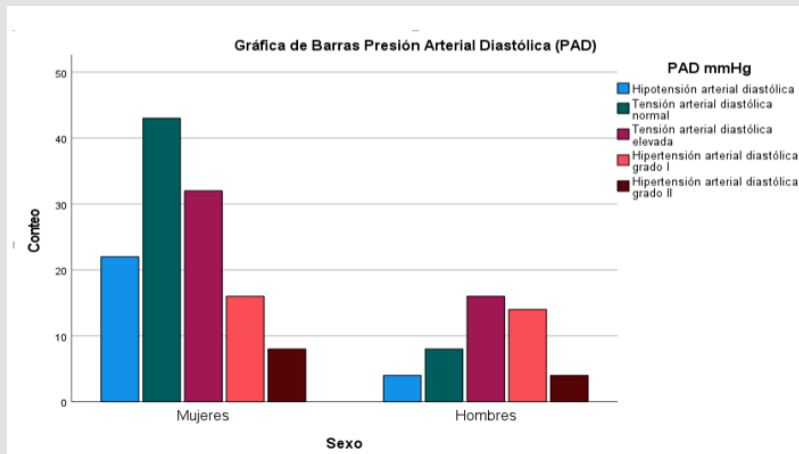
Graph 1: Frequency (female / male).



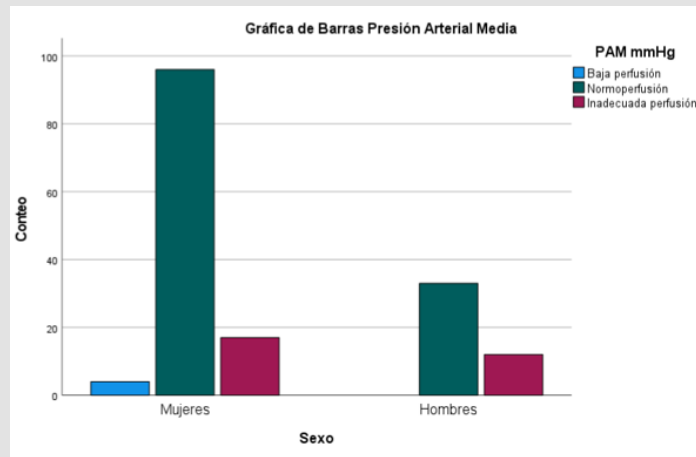
Graph 2: Frequency of intervals in age (both genders).



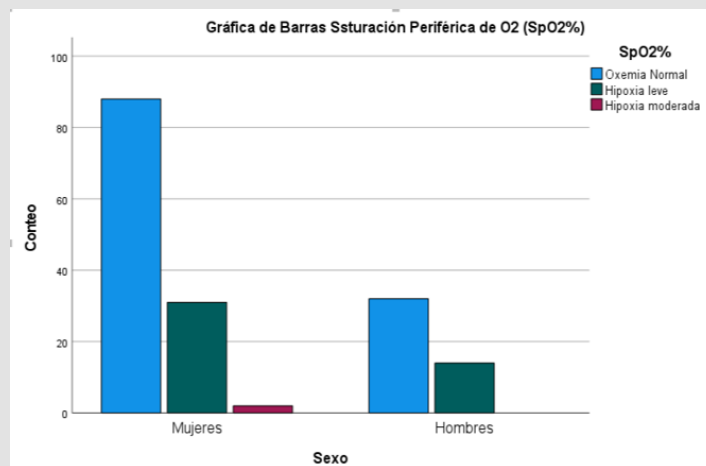
Graph 3: Systolic Blood Pressure (SBP) females / male.



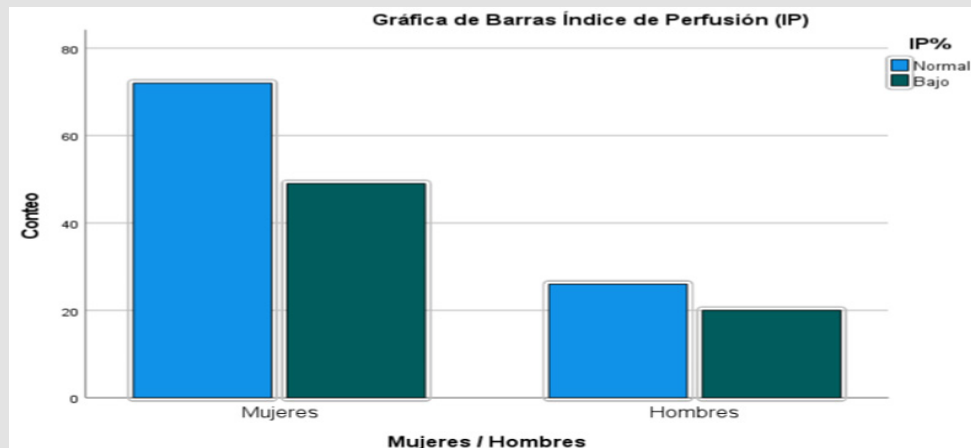
Graph 4: Diastolic Blood Pressure (SBP) females / male.



Graph 5: Mean Aterial Blood Pressure (MABP) females / males.



Graph 6: Peripheral Oxygen Saturations (SpO2%).



Graph 7: Perfusion Index (PI%) females / males.

Conclusion

PI values lower than $< 5.0\%$ are associated with hypotension or hypertension (systolic or diastolic) and can alter the nutrition of the nerve fiber layer and the optic nerve, which could explain the occurrence of normal-tension glaucomas (NTG) and/or the progression of primary open-angle glaucomas (POAG) despite optimal control of intraocular pressure (IOP). However, further studies are needed to strengthen our results.

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Protection of People and Animals

The authors declare that the procedures followed conformed to the ethical standards of the responsible human experimentation committee and in accordance with the World Medical Association and the Declaration of Helsinki.

Data Confidentiality

The authors declare that they have followed the protocols of their work center regarding the publication of patient data.

Right to Privacy and Informed Consent

The authors have obtained informed consent from the patients and/or subjects referred to in this paper. This document is in the possession of the corresponding author.

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Conflict of Interest

The authors declare that they have no conflicts of interest.

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