

Frequency of Hypertension in Chronic Chagas' Disease. Retrospective Clinical Study

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Objective - To assess the frequency of hypertension in chagasic patients, as well as its clinical behavior and cardiologic findings.

Methods - We carried out a retrospective study with 225 patients with chronic Chagas' disease and hypertension (104 males), mean age of 55.1 ± 11.8 . These patients were being followed up in the outpatient care clinics from 1984 to 2000. The study assessed the clinical, electrocardiographic, and radiological viewpoints.

Results - Of the 225 hypertensive patients (prevalence = 33.3%), 78 (34.7%) had mild hypertension, 108 (48%) had moderate hypertension, and 39 (17.3%) had severe hypertension. The association of left anteroseptal divisional block and right bundle-branch block occurred in 39 cases (17.3%), and enlargement of the cardiac area on radiological examination occurred in 93 (44.9%) of the 207 cases studied. The undetermined form of Chagas' disease was the most prevalent, 30.2% of the cases, followed by the form associated with conduction disorders in 27.1%, and the isolated form of conduction disorders in 21.3%.

Conclusion - Chagasic patients had a frequency of hypertension similar to that of the general population, and the clinical profile of the hypertensive chagasic patients seemed not to differ a lot from that of the chagasic patients.

Keywords: Chagas' disease, hypertension

In the literature, data on the association of hypertension and chronic Chagas' disease are scarce. This study was justified by the well-known impairment of the parasympathetic nervous system in chagasic patients. This alteration determines a greater sympathetic activity, enabling a probable influence on the genesis of systemic hypertension in these patients. Previous studies revealed that the possibility of chagasic individuals to develop hypertension seemed to be similar to that of nonchagasic individuals^{1,2}. Other authors³, however, mainly in Argentina, reported lower blood pressure levels in chagasic individuals as compared with those of the general population.

The present study aimed at assessing the incidence of hypertension in patients with chronic Chagas' disease, and at correlating the findings according to sex, age, and the alterations on the electrocardiogram and chest radiogram.

Methods

We retrospectively studied the medical records of patients with chronic Chagas' disease followed up in the outpatient care clinics of the Chagas' Disease Study Group (Grupo de Estudos da Doença de Chagas - GEDoCh) of the Cardiology Service of the Pontifícia Universidade Católica de Campinas (PUCCAMP) from 1984 to 2000. Their clinical profile (sex and age), their electrocardiograms, and chest radiographies were assessed. The patients were considered chagasic when they had at least 2 different positive serological reactions for the disease: indirect immunofluorescence reaction or passive hemagglutination or ELISA test. The patients were classified based on the form of chronic Chagas' disease they had into the following: the undetermined form, when the patient was asymptomatic, with a normal electrocardiogram at rest, and normal radiological examinations of the heart, esophagus, and colon⁴; the neurovegetative form, in which motility disorders of the digestive system, with or without the formation of megas, predominated; the form with cardiac disease, represented by conduction disorders, sinus node disease, cardiac arrhythmias, and congestive heart failure (myopathy); and the mixed

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cardiac form, with more than 1 form of cardiac muscle impairment⁵.

Blood pressure was assessed at each medical visit by the physician in charge, using a mercury column sphygmomanometer with the patient lying in the dorsal decubitus position. Systemic high blood pressure assessment was based on at least 2 elevated measurements of blood pressure on different occasions. The III Brazilian Consensus on High Blood Pressure⁶ was used as a criterion for blood pressure classification as follows: mild hypertension, when diastolic blood pressure was between 90 and 99 mmHg and systolic blood pressure was between 140 and 159 mmHg; moderate hypertension, when diastolic blood pressure was between 100 and 109 mmHg and systolic blood pressure was between 160 and 179 mmHg; and severe hypertension, when diastolic blood pressure was ≥ 110 mmHg and systolic blood pressure was ≥ 180 mmHg.

The electrocardiogram chosen for analysis was that obtained at the last medical visit performed with a conventional FUNBEC 4.0 electrocardiograph with 12 nonsimultaneous leads. The electrocardiogram was considered normal when the rhythm was sinus with a heart rate between 60 and 100 bpm, no arrhythmias were present, the QRS axis was located between -30° and 90° , the QRS duration was shorter than 0.12 seconds, and the T waves obeyed the depolarization direction.

Chest radiography to assess the cardiac area was performed with the patient in the posteroanterior and lateral positions. The presence of cardiomegaly on chest radiography was defined as a cardiothoracic ratio above 50%.

The findings underwent statistical analysis with the arithmetic mean and standard deviation for the quantitative variables whose calculations were required. For the analysis of inferences, the chi-square test and the contingency coefficient were used, both with a significance level of $\alpha=0.05$.

Results

We assessed 675 medical records of chagasic patients, of whom 225 (33.3%) were hypertensive, 121 (53.8%) being women and 104 (46.2%) being men. No case of secondary hypertension was found. Age ranged from 26 to 87 (mean of 55.1 ± 11.8) years. The fifth decade was the most prevalent, accounting for 31.6% of the 225 patients. The population of hypertensive chagasic patients comprised 78 (34.7%) individuals with mild hypertension, 108 (48%) with moderate hypertension, and 39 (17.3%) with severe hypertension.

Moderate hypertension prevailed both in women [48.8%, $\chi^2(2) = 17.917$, $P < 0.001$] and men [47.1%, $\chi^2(2) = 14.096$, $P < 0.01$], and its distribution in the different age groups is found in tables I and II.

To enable a statistical analysis regarding the age groups and considering that the median of distribution of the ages of the patients was 55 years, we chose to regroup the age brackets in tables III and IV, whose data showed significant differences in systemic arterial hypertension in regard to age [$\chi^2(2) = 22.533$, $P < 0.001$ and $\chi^2(2) = 6.771$,

Table I - Distribution of the degree of hypertension in women according to age group

Age group (years)	Hypertension			Total
	Mild	Moderate	Severe	
21 - 30	2	0	0	2
31 - 40	8	3	0	11
41 - 50	13	12	6	31
51 - 60	17	12	12	41
61 - 70	1	23	2	26
71 - 80	0	5	1	6
81 ou +	0	4	0	4
Overall	41 (33.9%)	59 (48.8%)	21 (17.4%)	121

Table II - Distribution of the degree of hypertension in men according to age group

Age group (years)	Hypertension			Total
	Mild	Moderate	Severe	
21 - 30	1	0	1	2
31 - 40	8	1	1	10
41 - 50	9	11	3	23
51 - 60	9	14	7	30
61 - 70	10	15	6	31
71 - 80	0	7	0	7
81 ou +	0	1	0	1
Overall	37 (35.6%)	49 (47.1%)	18 (17.3%)	104

$P < 0.05$, respectively]; in addition, an association was observed between the degree of hypertension and the age groups for each sex, because a significant contingency coefficient was obtained [$C(121) = 0.396$, $P < 0.001$ and $C(104) = 0.247$, $P < 0.05$, respectively].

The most frequently found clinical form of chronic Chagas' disease was that of cardiac disease with conduction disorders, isolated or in association with other clinical forms, followed by the undetermined form (tab. IV).

An analysis of data in table V revealed the prevalence of the undetermined clinical form (68 patients) [$\chi^2(6) = 87.449$; $P < 0.001$].

Of the 225 patients studied, 207 underwent chest radiography, of which 114 (55.1%) were considered normal and 93 (44.9%) had some degree of cardiomegaly.

Table VI shows the electrocardiographic changes of the patients, and the normal findings in 76 patients were highlighted [$\chi^2(13) = 372.391$; $P < 0.001$]. When these 76 pa-

Table III - Distribution of the degree of hypertension in women according to the age group in the female population

Age group (years)	Hypertension			Total
	Mild	Moderate	Severe	
≤ 55	31	17	13	61
> 55	10	42	8	60
Overall	41 (33.9%)	59 (48.8%)	21 (17.4%)	121

Table IV - Distribution of the degree of hypertension in men according to the age group in the male population

Age group (years)	Hypertension			Total
	Mild	Moderate	Severe	
≤ 55	23	17	7	47
> 55	14	32	11	57
Overall	37 (35.6%)	49 (47.1%)	18 (17.3%)	104

tients were excluded, those with left anterosuperior divisional block and right bundle-branch block together were distinctive [$\chi^2(12)=257.756$; $P<0.001$].

Discussion

The autonomous nervous system directly or indirectly influences cardiac output, peripheral resistance, and, finally, blood pressure⁷. The trophic influence may be the major mechanism by which the sympathetic autonomous system controls the adaptation of cardiac and vascular smooth muscles in cardiovascular diseases in general. In the myocardium, sympathetic nervous terminations are present in a significant manner, which does not occur with the parasympathetic nervous terminations, whose presence in the atrial and ventricular myocardium is modest. This knowledge may justify the noxious effect of the increase in sympathetic activity in the cardiovascular system. Experimental studies of the theory of exclusion of the parasympathetic system used by Köberle⁸⁻¹⁰ showed cardiac necrosis, edema, and a mononuclear inflammatory process in rats receiving injections of isoproterenol, and these findings are very similar to those in chronic chagasic myocarditis. Finally, yet in normal conditions, the excitatory effect of the sympathetic nerve opposes the inhibitory tonic effect of the vagal system, associated with other more complex interactions. The lack of equilibrium between the 2 systems occurring in chronic chagasic disease could generate a factor favorable to the appearance of hypertension.

In Brazil, studies on the prevalence of systemic arterial hypertension throughout the entire national territory are lacking. Blood pressure measurements vary a lot, depending on how they were obtained, on the population studied, on

Table V - Distribution of the clinical forms of chagasic patients with hypertension

Clinical form	Frequency	Percentage
Undetermined	68	30.2
Conduction disorders	48	21.3
Conduction disorders+ cardiac arrhythmias	27	12
Conduction disorders+ cardiac arrhythmias + myopathy	19	8.4
Conduction disorders + myopathy	15	6.7
Myopathy + cardiac arrhythmias	6	2.7
Other forms	42	18.7
Overall	225	100

Table VI - Electrocardiographic changes in hypertensive chagasic patients

Changes	Nº of patients	Percentage
BRAD	18	8
SVES	5	2.2
VES	35	15.6
BRD + BDASE	39	17.3
BRD	24	10.7
LASDE	35	15.6
DCVR	10	4.4
LBBB	11	4.9
LVO	14	6.2
AF	7	3.1
MSB	3	1.3
ASIA	4	1.8
IDAVB	6	2.7
PM	2	0.9
Normal	76	33.8
Overall	289 *	

* Patients with multiple changes. BRAD- sinus bradycardia; SVES- supraventricular extrasystoles; VES- ventricular extrasystoles; RBBB- right bundle-branch block; LASDB- left anterosuperior divisional block; DCVR- diffuse changes in ventricular repolarization; LBBB- left bundle-branch block; LVO- left ventricular overload; AF- atrial fibrillation; MSB- medium septal block; ASIA- anterosuperior inactive area; IDAVB- first-degree atrioventricular block; PM- artificial pacemaker.

environmental factors, and on the classification of hypertension used. The estimates of the Health Ministry in 1995¹¹ indicated 30 million individuals were hypertensive, considering the values of 140-159 mmHg for systolic blood pressure and/or 90-94 mmHg for diastolic blood pressure. In March 2001, the Brazilian Health Ministry initiated a campaign to detect new cases of hypertension, and Camilo et al¹², aiming at the objectives of that campaign, studied the population of the northwestern district of the city of Campinas and found a 37.1% increase in new cases of hypertension.

The frequency of hypertension was 33%, equivalent to the 225 cases found. These data were confirmed by Fragata¹³, who, in clinical research performed in the xenodiagnosis outpatient care unit of the Instituto Dante Pazzanese de Cardiologia, also did not find a more elevated prevalence of hypertension in chagasic patients (approximately 26.5%). Guariento et al^{1,2}, studying 644 chagasic patients, found 168 (26.1%) hypertensive patients, 36 of whom had no clinical, electrocardiographic, or radiological change, 65 had only electrocardiographic changes, and 67 had evidence of congestive heart failure or cardiomegaly, or both. On the other hand, Palmero et al³ reported the occurrence of lower values of blood pressure in chagasic individuals, independent of the presence or absence of heart failure, as compared with those in the general population. These authors emphasized that mean systolic blood pressure in chagasic women aged 30 years did not exceed that of men, and a relation between overweight and hypertension was not found in chagasic individuals.

Hypertension was not found to be significantly greater in one sex over the other. However, the mean age was high (55.1±11.8 years), coinciding with the appearance of more elevated blood pressure levels, mainly among

women, which undoubtedly influenced our findings. The association with diseases in more advanced age groups was also reported in previous studies^{1,2} on the concomitance of the occurrence in patients with decompensated heart disease from the fourth decade onward, emphasizing the cumulative and progressive character of those diseases. Moderate hypertension prevailed both in men (47%) and women (49%). Only 33.8% of the patients had normal electrocardiograms. Cardiomegaly was evidenced on chest radiography in 44.9% of the cases.

In this study, the electrocardiograms of hypertensive chagasic patients were not compared with those of nonhypertensive chagasic patients. However, in another study based on autopsy material¹⁴, no significant electrocardiographic changes were evidenced between the groups of hypertensive and normotensive chagasic patients; this showed that, even when present, hypertension was not sufficient to generate changes distinct from those usually found

in chronic chagasic disease. In that same study, the frequency of cardiomegaly was also similar in both groups.

The adoption of the inclusion criteria in this study comprised a comprehensive assessment of the data available, aiming at minimizing the possible errors that usually accompany retrospective studies. Although ambulatory blood pressure monitoring (ABPM) was not used for better diagnostic assessment, we could not ignore the findings, because at no other time and through no other investigation has the value of well-taken casual blood pressure measurements has been discussed or questioned, as observed by Nobre et al¹⁵. Therefore, we believe that the results found will increase knowledge about this still controversial subject in the study of chronic Chagas' disease.

In conclusion, we found that chagasic patients have a frequency of hypertension similar to that of the general population. Further clinical studies detailing the major cardiovascular risks of this association are required.

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