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CHAGAS' INFECTION IN UNIVERSITY STUDENTS OF SANTA CRUZ DE LA SIERRA, BOLIVIA. A SEROLOGIC-ELECTROCARDIOGRAPHIC STUDY

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SUMMARY

In order to learn the prevalence of Chagas' infection among students from Santa Cruz de la Sierra's universities, a random sample of 372 new students was drawn. All participants have had electrocardiograms (EKG) and serologic analysis (IHAT). 64/372 (17.2%) had serologic evidence of Chagas' infection, and from those, 10/64 (15.6%) had some EKG alterations. Among students presenting negative serologic test, 31/308 (10.1%) had EKG alterations. There was no statistical association between Chagas' infection and EKG alterations (X2=1.67, p=0.2). There was a positive association between Chagas' infection and intraventricular conduction defects and this association was higher among the students of 19 years of age or less (O.R. 10.4, p<0.05).

KEYWORDS: American Trypanosomiasis; Cardiopathy; Epidemiology.

INTRODUCTION

The American trypanosomiasis continues to be an important cause of harm to the health of the people in Latin America. It is estimated that there is a total of 100 million people who are at risk of *Trypanosoma cruzi* infection and that from 16 to 18 million are already infected [16].

In Bolivia, Chagas' infection is a frequent pathology since at least 40% [14] of the population is infected with *T. cruzi* and 26% of them present electrocardiographic alterations. These facts enlight the importance of Chagas' infection as a health problem in our country.

The most important visceral damage, in the chronic stage of the illness, is cardiac harm. In this aspect, some authors have suggested that the future of infected patients with *T. cruzi* is defined in the acute stage of the infection [5, 6] which would determine the appearance of early electrocardiographic disorders as an expression of myocarditis, whose mechanism and subsequent evolution is little known. It has been suggested that immunological factors [11] and the strain of the *T. cruzi* [1] can play an important role in the cause of cardiac harm.

The purpose of the present study is to know the prevalence of Chagas' infection among the university students of the city of Santa Cruz. The relation between the infection from the *T. cruzi* and the electrocardiographic abnormalities is analyzed by age groups, especially among those under 20 years old, because if the cardiac harm starts early, a larger proportion of electrocardiographic abnormalities is to be expected within this group.

MATERIALS AND METHOD

From a population of 4600 new students that entered the Gabriel René Moreno University during the first semester of 1993, a random sample of 372

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subjects was selected. An indirect hemagglutination test (IHAT) for Chagas' infection was carried out on each of the selected students and the reactors were considered positive at a dilution of 1/32. The same day the test was carried out, a conventional electrocardiogram (EKG) of 12 derivations was done, which was interpreted by only one cardiologist following the criteria of the New York Heart Association [10]. The cardiologist was blinded regarding serological results.

Sample size: The sample size (n=372) was computed assuming a prevalence of the Chagas' infection about 40% [14], with a 5% error and a confidence level of 95%.

Data was entered and analyzed using Epi Info v.5.01 package.

RESULTS

Sample

The sample was constituted by 372 students. The students means age of the sample was 19.3 (± 2.6) years old. Mean age by sex was not significant (p=0.18).

20/372 (5.4%) of the students came from rural area.

Serologic data

The Chagas' infection prevalence was 17.2% (64/372). The prevalence of Chagas' infection by gender did not show any significant statistical difference (X2=0.65; p>0.05).

In analyzing seropositivity it was observed a significant increase in seropositivity tendency related to the student's age (p=0.0003) (Table 2).

TABLE 1

IHAT results by gender.

Sex	IHAT (+)	IHAT (-)	Total	% positives
Female	34	147	181	18.8
Male	30	161	191	15.77
Total	64	308	372	17.2

Electrocardiographic data

The electrocardiographic abnormalities prevalence in the whole sample was 11.0% (41/372) of which 12.0% corresponded to the males and 9.9% to the females; this difference is not statistically significant (X2=0.42; p>0.05). In the group with a positive IHAT the prevalence of abnormal EKG's was 15.6% (10/64)and in the negative was 10.1% (31/308).

No significant association was detected between the positive serology and the abnormal EKG without specifying the type of abnormality (X2=1.67; p=0.20) (Table 3).

TABLE 2

IHAT by age groups.

Age(yrs)	<18	18	19	>19	Total
Number	67	110	80	115	372
% (IHAT +)	7.5	11.8	15	29.3	17.2

The electrocardiographic disorders were classified into three groups: 1) cardiac rhythm alterations, 2) ventricular repolarization changes, and 3) intraventricular conduction disorders (IVCD). In analyzing this classification, a significant statistical association was observed only among the positive IHAT with IVCD (p<0.01) (Table 4). This association is more noticeable in the subjects under 19 years of age (Table 5).

TABLE 3

IHAT results and EKG.

IHAT	EKG normal	EKG anormal	Total	% anormal ekg
Positive	54	10	64	15.6
Negative	277	31	308	10.06
Total	331	41	372	11.02

TABLE 4

Electrocardiographic alterations by IHAT results.

IHAT	Normal	Rit. alt.	Rep. changes	IVCD	Total
Positive	54	1	1	8	64
Negative	277	9	7	15	308
Total	331	10	8	23	372

The observed IVCD were: anterior fascicular block (AFB), right bundle branch block (RBBB) and incomplete right bundle branch block (IRBB) (Table 6). The most frequent observed IVCD was AFB in both the positive and the negative IHAT.

TABLE 5

Risk factors for IVCD.

Factor	O.R.	I.C. 95%	P
Age <19 yrs	0.37	0.19-0.69	<0.05
Gender male	0.81	0.45-1.44	0.6
IHAT positive	2.79	1.02-7.49	<0.05
IHAT positive age < 19 yrs	10.4	1.48-74.05	<0.05
IHAT positive age > 19 yrs	1.4	0.46-4.18	0.55

DISCUSSION

Serological aspects

The studied sample of students represents an homogeneous group of the population who belong to a very different socio-economical status than which is observed in rural areas and, therefore, the observed prevalence of Chagas' infection seems very high (17.2%). We do not have prevalence data of Chagas' infection among university students in other sites of the country.

The lower prevalence of Chagas' infection that was observed in the subjects under 18 years of age could be a consequence of the improved living conditions observed during the last years. If this is true, it can be hoped that there will be an even lower prevalence among the children born during the last 10 years.

In Argentina, GALLERANO [2] has observed a 3.9% prevalence of Chagas' infection among university students, which is considerably lower than what it is observed in this study.

Electrocardiographic aspects

The prevalence of electrocardiographic abnormalities among seropositive students was 15.6% (10/64) and 10.1% (31/308) among the seronegative. Similar results have been reported by other authors [13].

The electrocardiographic abnormality most frequently observed was AFB (7/8), which is one of the most vulnerable parts of the intraventricular conduction system and, therefore, it can be the expression of an early cardiac damage.

Other abnormalities, such as: a) cardiac rhythm disorders that can be observed in people without evidence of cardiopathy, and b) the non-specific disorders of the ventricular repolarization that can be expressions of cardiac alterations which cannot be discarded as no clinical examination was carried out, did not show any association with the IHAT for Chagas' infection.

The fact that 4.6% of the IVCD was observed (only AFB) among the IHAT negative subjects does not considerably differ from that observed in another study which reports a 6% (2/35) of AFB among the seronegative [15].

Upon analyzing the risk factors in the IVCD (Table 5), it is observed that those under 19 years of age have less probabilities of presenting this abnormality, which is expressed by an "odds ratio" of 0.37 ($p<0.05$). However, in the subjects under 19 years of age with a positive serology for Chagas' infection a high risk level of IVCD is observed by an "odds ratio" of 10.4 ($p<0.05$).

The observation of electrocardiographic disorders in this group of youth confirms previous reports that have shown the appearance of electrocardiographic disorders before the age of 20 [7, 8, 9]. This observation is in agreement with the affirmation of KOBERLE, which is also reported by other authors [3, 4, 7]. MOTA et al [9] showed that the development of the electrocardiographic alterations (e.a.) in people with positive serology be have in a bimodal way, with the first group developing (e.a.) in the group of 10 to 19 years of age and the other one developing (e.a.) in the group of 30 to 39 years of age.

From this study, we can say that at least one part of those presenting Chagas' infection show evidences of cardiac harm before 19 years old.

RESUMEN

Prevalencia de infección chagásica en universitarios de Santa Cruz de la Sierra Bolivia.

Desde una población de 4600 nuevos estudiantes de la Universidad Estatal de la ciudad de Santa Cruz de la Sierra, se tomó una muestra aleatoria de 372 estudiantes a los que se les realizó un test de hemaglutinación indirecta (HAI) para enfermedad de Chagas y un electrocardiograma (ECG) convencional. El 17.2% (64/373) tenían el test HAI positivo y de estos el 16.5% (10/64) tenían algún trastorno electrocardiográfico. En el grupo con HAI negativa el 10% (31/308) presentó alguna anormalidad electrocardiográfica. No se observó asociación entre serología positiva para la enfermedad de Chagas y alteración del ECG en general ($X2=1.67$ $p=0.2$). Se observó una asociación positiva

entre serología para Chagas y trastornos de conducción intraventricular (TCIV) y ésta parece intensificarse entre los menores de 19 años con un odds ratio de 10.4 ($p<0.05$).

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