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History of indigenous policies as trace of erythrocyte antigen Di^a in the current population of the American continent relationship between indigenous policies and blood phenotypes

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Abstract:

OBJECTIVE: The study aim to establish a debate on the different policies implemented at indigenous population in the American continent and their relationship with the presence of DiegoA antigen (Ag-Di^a) in blood phenotype of inhabitants of Buenos Aires, Argentina.

METHODS: It is a descriptive study with qualitative/quantitative approach. A comprehensive search of medical/social databases, using MeSH words. Limits were applied to include studies published after 1950 written in Portuguese, English and Spanish.

RESULTS: Dia antigen in the population of several American countries is relatively high, hence, it should be considered in screening panels perform to blood donors. Noteworthy, the exception of this panorama is Buenos Aires State, where the prevalence of this antigen is low. This data was correlated with indigenous policies carried out by former governments. The results showed in population living in regions where Dia is high policy performed by the colonizers towards the indigenous peoples was domination+integration+miscegenation. In Buenos Aires, however, that policy was annihilation of the natives which could explain the low presence of the antigen in the current population.

CONCLUSION: The presence of Ag-Di^a in the population of Buenos Aires is low compared to other Latin- American regions. The presence of Ag-Di^a in Buenos Aires population is low compared to other regions of Latin-America. The reason could be explained by the distinctive indigenous policy performed in this area. It might be possible then to predict the prevalence Di^a in the current population, taking into account the history of indigenous policy in colonization of American continent.

Keywords:

Di^a antigen, health, indigenous, policies, transfusion

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Introduction

Transfusion medicine has made its practice more complex over the last century, covering epidemiological,

microbiological, immunological, genetic, statistical, and therapeutic aspects.

Undoubtedly, ensuring the transfusion of blood components safely not only minimizes the risks of infectious disease transmission but also reduces the incompatibility between donor and

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recipient, avoiding transfusion reactions which are still the gold standard of this medical specialty.

In Argentina, as in most of the countries of the world, the provision of safe blood components is based on having national, regional, or local blood services from where blood units that meet the needs of the population are processed and provided to cover the daily demand.

The blood supply begins with the recruitment, selection and fidelization of donors, the collection and processing of blood to obtain blood components, and the assurance of the biological quality of the product collected, including its conservation, storage, and transport. Decisions about what should be the immunotyping tests of donor samples are generally standardized throughout the world. However, there are some antigens that, due to their particular prevalence in different population, deserved to be taken into account or not to be incorporated into the basic search panel in certain regions. These types of decisions must be analyzed in detail since they not only guarantee transfusional safety but are also associated with high costs related to these practices. Each decision requires an analysis of the benefit/risk/cost ratio. Although the safest blood will be one that includes not only a complete infectious test but also a vast number of immunotyping tests of the samples that are offered to be transfused, it is economically impossible for a health system to test the more than 300 antigens that exist in each erythrocyte. For this reason, it must be included within the regulatory framework of each country and the obligation to carry out tests that guarantee transfusional safety for each population. Although there may be global recommendations that must be respected throughout the world, each country, state, or region must decide which antigens should be considered to be tested according to the antigen prevalence of the local population, and after that, these antigens should be part of their own immunotyping panel.

Some of these antigens are used as anthropological marker like the Diego system. Information about Di^a have provided valuable data about the migration of people from ethnic groups of Mongoloid characteristics across the Bering Strait to the South of the American continent.^[1] The SLC4A1 gene presents polymorphism almost exclusively between Mongoloid people.^[2] The Di^a antigen has low incidence in European descent population, who carry their antigenic antigen Di^b high frequency, between 91.6% and 100%.^[3]

In this regard, due to the heterogeneity of ethnic groups present in Argentina, the State Institute of Hemotherapy of the Province of Buenos Aires wonders whether or not the test of Diego A (Di^a) antigen should be incorporated

in the state routine panel, as it exists in other countries of the region.

However, before taking that decision, an analysis of the prevalence of the Di^a antigen in the population of Buenos Aires is required because its presence is very heterogeneous throughout the American continent. It is known that the native population of the American continent presents a high percentage of the presence of Di^a. However, preliminary data obtained in our own studies and in other epidemiological studies extracted from the American literature indicate that the presence of this antigen in the aforementioned population is clearly lower than that presented by inhabitants of other regions.^[4] In Argentina, the indigenous policies acquire differential features with respect to other countries of Latin America, since while in Argentina, a policy of annihilation was followed predominantly, in the other countries, submission and miscegenation were preponderants. It should be underlined that the policies identified as predominant are considered and presented as ideal types, given that different political strategies coexist, configuring a complex dynamic. In the analysis of these differences in government actions, one could find the causes of this low presence of the antigen mentioned in the territory of the state of Buenos Aires.^[5-7]

The objectives of this study are to determine the prevalence of Di^a antigen in the donors of Buenos Aires, Argentina, and to establish relation between the presence of Di^a antigen in this population and the indigenous policies followed by each country.

Methods

It is a descriptive study with a qualitative-quantitative approach.

The study variables and information sources to obtain them are described in the following items:

- Variable 1: Presence of the Di^a antigen (%) in the population of Argentina and Buenos Aires. Data source: It will be explored in two ways: (a) through an own study of antigen prevalence in donors received at the Hemotherapy Institute of Buenos Aires state (using the indirect antiglobulin technique, Liss-Coombs Grifols cards, and anti-Dia Inmucor SA reagent) and (b) by a specific bibliographic search of works that determine its prevalence in Buenos Aires, Argentina, using the MESH terms Diego A, blood transfusion, population, and antigen
- Variable 2: Percentage of Di^a present in inhabitants of the different countries of Latin America. Source: this variable was objectified through a research of the scientific literature available in the main databases and search engines

- Variable 3: Demographic composition of the population of each country/region, focusing on the presence of indigenous peoples. Source: These data will be obtained from the census databases of each country
- Variable 4: Policy of the indigenous population carried forward in the region, focusing on the country's experience in relation to the indigenous issue. Source: These data have been collected from a historical-bibliographic research referred to the action that each government had to the native peoples present in their territory since the Spanish colonization
- Indicator: Di^a antigen/indigenous policies. Source: Data were extracted from a comparative analysis between the presence of Di^a in each population and the policies directed to the indigenous communities followed in each country.

Results

Literature review about the prevalence of Di^a in the different population

After reviewing the selected bibliography, it has been possible to affirm that the erythrocyte antigen Di^a is very rare in Caucasian population and in African Black population (but it is very common among the inhabitants of Latin America, especially among the native population of that continent).^[8] The presence of anti-Di^a antibodies discovered for the first time by Layrisse *et al.* can cause severe hemolytic reactions.^[9] Subsequently, other antibodies of the same blood system were detected (Di^b, Wra/Wrb)^[10,11] and caused several health problems. However, Di^a antigen has the greatest importance for transfusion safety, since the presence of the Di^a antibody is associated with moderate-to-severe transfusion reactions and hemolytic disease in the newborn.^[12,13] Hence, Di^a antigen becomes more interesting from the immunological point of view.

The prevalence of Di^a in the American population is heterogeneous; however, in most countries, it is found in a high percentage that it would merit to incorporate the test in routine pretransfusion immunological studies. For example, in the countries of Central America, the percentage exceeds 20% of the population. Thus, in Guatemala, there are works that showed a prevalence of between 7.5% and 66.0%;^[14,15] in Mexico, 20.4%;^[16] in some native Brazilian tribes, 75.7%; in Venezuela among the Caribbean Indians, 25%–29%;^[17] in Honduras, 15%; in Bolivia, 59%–71%; in Peru, 36%–47%; and in Ecuador, 25%–35.9%.^[18-21]

In Argentina, the prevalence of Di^a is heterogeneous, while in Rosario, Province of Santa Fe, it is 6.3%;^[18] in the city of Buenos Aires, it is 0.9%;^[22] and in some

specific native inhabitants living in the city of La Plata, it was 0.02% (up to 3.8%–5.1% in selected Toba's population).^[4]

Data obtained from tests performed to determinate the prevalence of Di^a in Buenos Aires population

To determine the prevalence of Di^a in the donor population of the state of Buenos Aires, this antigen was detected by the Liss-Coombs Grifols card method and anti-Dia Immunocor. With these methods, we were able to establish that the general prevalence of Di^a was 0.02%, while that in a selected population of indigenous population (of Toba ethnica), it resulted in 3.84% (own unpublished data).

From the foregoing, it is clear that the presence of the Di^a antigen in several American towns is high, even for some regions of Argentina, with the exception of the Province of Buenos Aires. The explanation for this fact lies, according to the hypothesis developed by our working group, in the different indigenous policies that were historically carried out by the different governments present in each region since the colonization of the American continent.

Literature review about policies around the indigenous issue in the American continent

All data extracted from the paper selected by the research were demonstrated that in most of the countries of the Americas, there has been a great mortality of the indigenous population. The sociodemographic situation of the indigenous people as well as their current situation cannot be understood without referring to the colonial period and the subsequent project for the conformation of the national states.

The initial submission of Aztecas, Mayas, and Incas in Mexico and Peru was certainly fierce, but this process was quickly followed by a period of domination in the figures of "encomiendas" and enslavement, in which the original population were incorporated into the classes more casualties of the colonial societies of the different regions of Latin America. This allowed miscegenation among indigenous people, Spaniards and other European migrants, getting to obtain current societies with a large component of ethnic groups originating in America.

In Latin America during the XIX century, secularist liberalism raised republics of citizens with equal rights but failed to determine a place for indigenous population – the vast majority of the population inherited from the old Spanish empire. Likewise, the ascendancy of positivist ideas during the last decades of the 19th century hardens the racial categories, validating the supposed superiority of European ethnic groups, which had

previously been attributed to them. Hence, considering that the races were the raw material of the national states, a multiethnic conformation would undermine their progress.^[23]

Specifically, the period of conformation of the national states involved a process of incorporation into economic activity of growing areas of territory occupied by indigenous peoples. In this way, those more docile could be proletarianized, while those called brave Indians were largely exterminated and/or displaced, taking them to the margins and less productive lands.^[24] Although a perspective can be recognized in relation to the indigenous question that responds to a predominant paradigm, it was never expanded uniformly throughout the continent. It is possible to recognize variants of it, and examples are present in the case-by-case countries. The indigenous population (both by its own characteristics and by the low rates of European or external migration reached) has operated as a labor force in the economic systems – put at the service of production, land exploitation, servitude, and/or subject to tax policy – in much more finished forms than in the territory that now comprises each country.^[24]

The Argentine case, although it registers processes that mark continuities with respect to what happened in other countries, has particularities that stand out for its profound denial toward indigenous people, its ethnia, social class, and economic roots and that is conjugated in hard policies against them very close to a true genocide process performed not by Spanish authorities but by the own creole Argentina Government during the first decade development. This situation might explain why today, while other countries such as Bolivia, Guatemala, Peru, and Mexico present an important number of indigenous population, Argentina reflects strikingly low percentages.

In Argentina, the indigenous population was outside the community of national identification. The positivist perspective of creole population resulted in a double

process of conquest of the indigenous land: for its intensive exploitation and for indigenous extermination, both objectives accomplished by military campaigns and hard policies performed in the name of social progress and prosperity. The authorities of the new country promoted the settlement of white immigrants from the European continent in the national territory, and they have managed to capture important flows of European migration that has offered as a dynamic and skilled labor force of the economy unlike what happened in other countries of the region.^[5] In short, Argentina made an effort to show that it was turned to a white culturally homogeneous country.^[25] The state structure was based in this way on a limitation of internal diversity, in which the figure of the Indian appears mainly as an obstacle to the constitution of the nation state.

Hence, the modern Argentine state was based on a manifest intention to exclude Indian in a process driven by the expansion of the agrarian frontier for the production of food and raw materials for export, which was combined with the political end of effective domination of the territory by the authorities. Thus, massacres of indigenous population (the “Conquest of the Desert” 1879 and “Chaco” 1884) obtained in short the submission of these population to conditions that cause harm to their subsistence.^[6,7]

The Argentine state then created a discourse that denies the indigenous reality of the country, and whose validity persists and is evidenced in multiple ways, for example, it would not undertake a statistical operation that refers to a special indigenous census until the late 1960s.^[26,27]

In this way, many authors agree that this situation conducted to a perennial subjugation and a strong social marginalization of ethnic, cultural, economic, and linguistic has no end yet.^[6,7]

The Pampean region, specifically the current Province of Buenos Aires, as the most dynamic economy, has seen an extermination highlighted by its extension as

Table 1: Prevalence of Di^a in the study population and Predominant indigenous policy adopted in each country in each country

Country	Percentage of Di ^a	Predominant indigenous policy adopted in each country	References
Argentina (R de la Plata)	0.02	Annihilation	Clapsos 2007
Argentina (Rosario)	6.5	Domination/annihilation	De la Vega <i>et al.</i> , 2009
Bolivia	71	Integration	Suarez Morales <i>et al.</i> , 1964
Ecuador	25-35.9	Integration	Gongora Martinez 2015
Guatemala	66.0	Integration/domination	Gutierrez <i>et al.</i> , 2013
Mexico	20.4	Domination/integration-miscegenation, miscegenation	Mallen and Arias, 1959
Peru	47	Domination/integration-miscegenation	Acosta <i>et al.</i> , 2011
USA (Chippewa)	10.8	Integration/domination	Lewis <i>et al.</i> , 1956
USA (Penobscots)	8.0	Domination/annihilation	Allen <i>et al.</i> , 1960

well as by the early form in which these massacres of the original population were materialized by systematic campaigns such as those of Martín Rodríguez; Roses, Rock, and Alsina among others. Each time, these campaigns were expelling the original population to the South (Patagonia) while decimating the number of native members. The result is that by the end of the XIX century, the indigenous population in Buenos Aires state was practically excluded.

Although the policies^[28-30] oriented to the indigenous population cannot be considered homogeneous in the American continent nor within each country,^[31] in a retrospective way, we can recognize that those policies were either annihilation, integration, miscegenation, or domination; they have been extended in all the countries with its own features which are; they have been extended in all countries with their own characteristics, among which -although different political strategies coexist- those predominant and identified as an ideal type are shown in Table 1.

Discussion

The aim of this study was to establish a debate on the consequences of policies aimed at indigenous population in the region and their relationship with the current phenotype of the inhabitants of Buenos Aires and the health impact of these events: the low prevalence of Ag Di^a among blood donors in Buenos Aires state.^[4,22]

It is undeniable that the Ag Di^a is associated with the Mongolian population of Asia and the native indigenous peoples of the American continent. Comparing the demographic compositions among different Latin American countries around the indigenous population has allowed us to glimpse the differences between countries and regions, and the low prevalence shown in Buenos Aires of Di^a antigen has led us to investigate government policies oriented toward the indigenous issue, as well as the perspectives on which these have settled. In the field of public health, the result of a historical action raised by the Argentine state has led to a diminished population representation of indigenous people, as a consequent of that to a low prevalence of Ag Di^a, which is reflected in a palpable way among donors of blood in Buenos Aires. In relation to strictly public health care, these results may clarify some management health policies like the decision whether to include or not the Di^a screening in the immunologic routine panel to be done to the blood donors that daily attend the Buenos Aires State Institute of Hemotherapy.

Conclusions

The presence of Di^a antigen in the population of Buenos Aires is extremely low compared to other regions and countries of Latin America. The explanation for this phenomenon lies in the indigenous policies performed in this area. It is possible to induce the prevalence Di^a (low or high) in the current population, taking into account the history of the indigenous policy carried out by the different governments since the colonization of America. Domination, the policy of entrustment and enslavement of the colonizers toward the native inhabitants, has framed the integration and miscegenation of the races and therefore of the presence in the current population of native antigens such as the Di^a present in population of many regions of the American continent. Since the indigenous policies followed by local governments ended in the practically absence of native population, Di^a is not recommended to be included in routine daily immunologic screening panel.

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Conflicts of interest

There are no conflicts of interest.

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