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Original article

American tegumentary leishmaniasis in Brazil between 2007 and 2024: epidemiological study

Leishmaniose tegumentar americana no Brasil entre 2007 e 2024: estudo epidemiológico

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Abstract

Objective: To perform an epidemiological analysis of tegumentary leishmaniasis in Brazil between 2007 and 2024, based on data from patients reported to the Brazilian Unified Health System (SUS). **Materials and Methods:** This is a descriptive study based on secondary data obtained from the DATASUS database. All patients with a confirmed diagnosis of American cutaneous leishmaniasis during the study period were included. The variables analyzed were year of notification, patient sex, and region of occurrence. **Results:** A total of 340,624 new cases of American cutaneous leishmaniasis were reported in Brazil between 2007 and 2024. The peak number of notifications occurred in 2012 (25,204 cases), while the lowest number was recorded in 2024 (8,316 cases), indicating a downward trend over time. Regarding geographic distribution, the Northern region accounted for the highest number of cases, with a peak in 2014 (11,160), followed by the Northeast region, with the highest incidence in 2010 (9,553 cases). The disease predominantly affected males, with the highest proportion observed in 2015 (75.4%). However, there was a slight proportional increase in female cases, reaching 29.3% in 2024. **Conclusion:** The epidemiological analysis indicates a gradual reduction in cases of cutaneous leishmaniasis in Brazil from 2007 to 2024, with the Northern region remaining the most affected area. The disease continues to predominantly affect males, although the proportion of female cases has increased in recent years. These findings highlight the importance of region-specific surveillance and control strategies.
Keywords: Cutaneous leishmaniasis. Epidemiology. Incidence. Brazil.

Resumo

Objetivo: realizar uma análise epidemiológica da leishmaniose tegumentar no Brasil entre os anos de 2007 e 2024, com base nos dados de pacientes notificados pelo Sistema Único de Saúde (SUS). **Materiais e Métodos:** estudo descritivo, baseado em dados secundários obtidos na base do DATASUS. Foram incluídos todos os pacientes com diagnóstico confirmado de leishmaniose cutânea americana no período analisado. As variáveis observadas foram: ano de notificação, sexo dos pacientes e região de ocorrência. **Resultado:** foram registrados 340.624 novos casos de leishmaniose cutânea americana no Brasil entre 2007 e 2024. O pico de notificações ocorreu em 2012 (25.204 casos), enquanto o menor número foi em 2024 (8.316 casos), evidenciando uma tendência de redução ao longo dos anos. Em relação à distribuição geográfica, a região Norte concentrou o maior número de casos, com pico em 2014 (11.160), seguida pelo Nordeste, com maior incidência em 2010 (9.553). A doença mostrou predomínio em homens, com maior proporção em 2015 (75,4%). No entanto, houve uma leve elevação proporcional nos casos femininos, alcançando 29,3% em 2024. **Conclusão:** a análise epidemiológica indica uma redução gradual nos casos de leishmaniose tegumentar no Brasil entre 2007 e 2024, com destaque para a região Norte como área de maior incidência. A doença continua afetando majoritariamente homens, embora a proporção de casos femininos tenha aumentado nos anos mais recentes. Esses dados reforçam a importância de estratégias regionais de vigilância e controle da doença.
Palavras-chave: Leishmaniose cutânea americana. Epidemiologia. Incidência. Brasil.

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Introduction

Leishmaniasis is an infectious, but not contagious, disease caused by protozoa of the genus Leishmania, with the main subgenera belonging to the *Leishmania Viannia* group. Transmission occurs through the bite of female phlebotomine sandflies of the genus *Lutzomyia*, which infect susceptible individuals. The main reservoirs of these protozoa include wild animals, such as rodents and marsupials, as well as some domestic animals. However, the role of domestic animals in the spread of the disease is not yet fully understood[1-3].

After blood transmission by vectors, the protozoan invades the defense cells present in the skin. However, through specialized mechanisms, it manages to avoid phagocytosis. Control of its spread depends mainly on the type 13 cellular immune response. The main clinical manifestations of leishmaniasis include two variants: cutaneous and mucosal. American cutaneous leishmaniasis, or American tegumentary leishmaniasis, is characterized, in most cases, by typical painless ulcers with raised and well-defined borders, with a rounded or oval shape and a reddish base with coarse granulations[1,2]. One of the possible complications associated with this form of the disease is secondary infections resulting from the ulcerated lesions[1,2].

The diagnosis of American cutaneous leishmaniasis can be made using different techniques, with emphasis on parasitological, immunological, and molecular methods. Recommended tests include direct parasite research, culture, histopathological examinations, molecular tests such as PCR, and immunological methods, such as the Montenegro reaction[3]. The Montenegro immunoreaction usually shows a positive result in American Tegumentary Leishmaniasis (ATL) after two months, except in the diffuse form, but its interpretation requires clinical correlation. The differential diagnosis includes sporotrichosis, while the histopathology may vary according to the region of Brazil, influencing the tissue response and the pattern of lesions[4].

Control of American cutaneous leishmaniasis is challenging due to the diversity of etiological agents, reservoirs, and vectors, with immunotherapy being the main therapeutic approach[4,5]. Drug treatment uses meglumine antimoniate as the first choice, while amphotericin B is recommended in cases of resistance or contraindication[1]. The success of therapy depends on clinical and laboratory monitoring to minimize adverse effects and ensure efficacy, combined with preventive strategies, such as vector control and the adoption of individual protection measures against phlebotomine bites[6].

Leishmaniasis is still considered one of the major infectious diseases in the world, with an increase in its prevalence since 1980, although it has declined somewhat in recent years since 2005. It is considered endemic in about 90 countries, with approximately 272,000 new cases reported in

2023.7-9 Among the 51 countries that reported cases of American cutaneous leishmaniasis, Brazil remained among the 11 countries with the most cases of the disease.[7-9]

In 2021, more than 48,000 new cases of American cutaneous leishmaniasis were registered, distributed across all federative units of Brazil, with a higher prevalence among the North and Northeast regions. Minas Gerais is considered one of the states with a high incidence of new cases, within the risk classification for leishmaniasis, it falls under the category of medium risk, especially the city of Montes Claros, which fits into the high-risk classification for the disease.[3,10,11]

The objective was to analyze the epidemiological profile of American cutaneous leishmaniasis in patients from the Unified Health System in Brazil, between the years 2007 and 2024.

Materials and Methods

This is an observational, longitudinal, and retrospective epidemiological study with a quantitative approach. The population analyzed corresponds to patients reported in Brazil and treated by the Unified Health System (UHS), with a confirmed diagnosis of American cutaneous leishmaniasis. Data were obtained through the SUS Informatics Department (DATASUS), using the Notifiable Diseases Information System (SINAN) database, accessed via the TABNET[12] platform. All records with the code LT[18], corresponding to American cutaneous leishmaniasis, from 2007 to 2024 were included.

Inclusion criteria were confirmed records of American cutaneous leishmaniasis with complete information regarding sex, year of notification, and region of occurrence. Duplicate, incomplete, or inconsistent records were excluded. The variables analyzed were: year of notification, sex, confirmation criteria, clinical form, and case evolution. The organization and tabulation of the data were performed manually using tables created in Microsoft Word, without the use of additional statistical software.

Results

Analyzing the data available from DATASUS regarding American cutaneous leishmaniasis in Brazil between 2007 and 2024, 340,624 new cases were registered during this period. The highest number of cases was recorded in 2012, with 25,204 notifications, making it the year with the highest incidence of the disease. The year with the lowest number of cases was 2024, totaling 8,316 notifications nationwide.

Chart 1. Incidence of new cases of american cutaneous leishmaniasis by region/year between 2007 and 2024, based on patient data reported by the Unified Health System.

Year	North Region	Northeast Region	Southeast Region	South Region	Midwest Region	Total	Average annual value
2007	10,122	6,093	2,038	543	3,252	22,048	4,584
2008	9,299	6,586	1,769	670	3,230	21,554	4,360
2009	8,886	7,349	1,791	519	4,748	23,293	4,649
2010	7,725	9,415	2,639	307	3,437	23,523	4,754
2011	9,220	8,504	2,432	362	2,504	23,022	4,587
2012	11,014	8,860	1,616	484	3,361	25,335	5,040
2013	9,082	5,757	1,371	344	3,150	19,704	3,932
2014	11,168	5,408	1,701	416	3,278	21,971	4,398
2015	9,630	5,577	1,993	540	3,188	20,928	4,141
2016	5,861	3,761	1,675	316	2,308	13,921	2,789
2017	8,822	4,907	2,106	293	2,790	18,918	3,793
2018	8,504	4,409	2,250	254	2,502	17,919	3,572
2019	7,408	3,741	2,633	253	2,859	16,894	3,370
2020	8,293	3,459	2,530	272	2,950	17,504	3,506
2021	7,454	4,100	2,613	247	2,119	16,533	3,294
2022	6,763	3,683	1,775	221	1,836	14,278	2,827
2023	6,659	3,500	1,685	295	2,279	14,418	2,858
2024	3,660	2,389	1,120	251	1,441	8,861	1,663
Total	149,570	97,498	35,737	6,587	51,232	340,624	-

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Analysis of the annual average of cases by region reinforces the downward trend. The average annual values by region were (Total number per year/5): 2007 (4,584), 2008 (4,360), 2009 (4,649), 2010 (4,754), 2011 (4,587), 2012 (5,040), 2013 (3,932), 2014 (4,398), 2015 (4,141), 2016 (2,789), 2017 (3,793), 2018 (3,572), 2019 (3,370), 2020 (3,506), 2021 (3,294), 2022 (2,827), 2023 (2,858) and 2024 (1,663). These data demonstrate a significant reduction in the average number of new cases, especially from 2013 onwards (Chart 1).

Number of cases per region

When broken down by macro-regions, the North Region stood out for concentrating the highest number of cases over the years, peaking in 2014 with 11,160 cases, followed by the Northeast Region, which reached 9,553 cases in 2010. From these peaks, both regions began to show a downward trend. The Midwest Region showed a pattern of continuous reduction, going from 4,792 cases in 2009 to 1,396 in 2024. The Southeast Region, although with a lower incidence, fluctuated between 1,200 and 2,900 cases over the years, ending 2024 with 1,014 cases. In turn, the South Region always presented the lowest numbers, varying from 262 to 689 cases, with 338 records in 2024 (Chart 1).

Sex variable

When analyzing the sex variable, it is observed that, throughout the period from 2007 to 2024, the prevalence of American cutaneous leishmaniasis was higher in males (Table 2). In 2007, 16,877 cases were registered in men (73.7%) and 6,042 in women (26.4%). In 2008, there were 15,929 male cases (73.0%) and 5,868 female cases (26.9%). In the following years, this proportion remained: 2009 with 72.8% (n=16,927) of cases in men; 2010 with 71.2% (n=16,924); 2011 with 74.1% (n=16,270); 2012 with 72.3% (n=18,172); In 2013, 74.1% (n=14,564) of cases were in males; in 2014, 73.1% (n=16,251); and in 2015, 75.4% (n=15,096). The year with the highest proportion of men was 2012 (n=18,172) and the lowest was 2024 (n=5,876).

Chart 2. Incidence of new cases of american cutaneous leishmaniasis by sex/year between 2007 and 2024, based on patient data reported by the Unified Health System.

Year	Male	Female	Ignored	Total
2007	16,877	6,042	1	22,920
2008	15,929	5,868	4	21,801
2009	16,927	6,321	1	23,249
2010	16,924	6,850	0	23,774
2011	16,270	6,667	1	22,938
2012	18,172	7,024	8	25,204
2013	14,564	5,097	2	19,663
2014	16,251	5,742	1	21,994
2015	15,096	5,608	4	20,708
2016	10,143	3,806	0	13,949
2017	13,766	5,199	1	18,966
2018	13,206	4,656	1	17,863
2019	12,597	4,253	1	16,851
2020	12,918	4,611	2	17,531
2021	12,006	4,450	14	16,470
2022	10,352	3,780	3	14,135
2023	10,457	3,831	4	14,292
2024	5,876	2,440	0	8,316
Total	248,331	92,245	48	340,624
Annual average	13,796	5,124	2,66	18,923

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From 2016 onwards, there was a reduction in absolute numbers, but male predominance continued. 72.7% (n=10,143) of cases were registered in men in 2016; 72.6% (n=13,766) in 2017; 74.3% (n=13,206) in 2018; 74.4% (n=12,597) in 2019; 75.5% (n=12,918) in 2020; 73.1% (n=12,006) in 2021; 73.2% (n=10,352) in 2022; 73.3% (n=10,352) in 2023 and 70.6% (n=5,876) in 2024. Over the 18 years analyzed, the annual average (total number of male cases/18) of cases in males was 13,796, while in females (total number of female cases/18) it was 5,124. The total annual

average was 18,923 cases. In total, 248,331 cases were registered in men and 92,245 in women, totaling 340,624 cases with identified gender.

Confirmation criteria

In the Brazilian Unified Health System (UHS), the two most common methods for confirming the diagnosis of American cutaneous leishmaniasis are the parasitological method, performed by identifying the parasite through direct examination (scraping, biopsy), culture, or other parasitological methods, and the Montenegro intradermal reaction test, which is a positive hypersensitivity test (skin test).[4]

The clinical-laboratory diagnosis was predominant in 81.2% (n=278,001) of cases of American cutaneous leishmaniasis in Brazil (Chart 3). The North Region, with the largest absolute number of cases (150,143), presented the highest proportion of confirmations by this criterion, 90.2% (n=135,384), indicating a better diagnostic structure. The Northeast had 33.4% (n=65,275) of cases confirmed by clinical-epidemiological criteria, reflecting limitations in access to laboratory tests. In the Southeast, although low, 0.7% (n=242) of cases had missing data, indicating failures in notification. The South and Midwest regions maintained the predominance of laboratory diagnosis (78.2%, n=5,188 and 84.8%, n=43,592, respectively).

Chart 3. Confirmation criteria by macro-region for reporting the diagnosis of American cutaneous leishmaniasis between 2007 and 2024, based on data from patients reported by the Unified Health System.

Notification region/ confirmation criteria	Ignored/in blank	Clinical-laboratory	Clinical-epidemiological	Total
North Region	-	135,384	14,759	150,143
Northeast Region	-	65,275	32,670	97,945
Southeast Region	242	28,562	7,387	36,191
South Region	1	5,188	1,441	6,630
Midwest Region	-	43,592	7,802	51,394
Total	243	278,001	64,059	342,303

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Case evolution

Analyzing the available data, it is possible to establish a relationship between them. It can be seen that, among the total number of cases, excluding those where the case evolution was ignored/in blank, transferred, or where there was a change in diagnosis, the total cure rate obtained was approximately 95% (n=240,647) of the cases (Chart 4). Following the same criteria as before, disregarding blank and ignored data, and analyzing the macro-regions individually, there is little difference in the number of cases that progressed to cure. Among them, the Northeast region stands out with approximately 97% (n=63,882) cure rate, followed by the Southeast region (96.5%,

n=24,804), the Midwest region (96.4%, n=35,760), the North region (94.6%, n=111,945), and finally the South region with 94.4% (n=4,256) cure rate. Regarding deaths from American cutaneous leishmaniasis, they correspond to an outcome of 0.08% (n=290) of all registered cases. In individual analysis, the South region presents the highest outcome related to deaths (0.40%, n=22) and the North region the lowest percentage (0.05%, n=64).

Chart 4. Evolution of cases of american cutaneous leishmaniasis by notification macro-region between 2007 and 2024, based on data from patients reported by the Unified Health System.

Case Evolution/region of notification	Ignored/ In blank	Cure	Abandonment	Death from ATL	Death from other cause	Transfer	Change of diagnosis	Total
North Region	29,922	111,945	5,965	64	357	1,364	526	150,143
Northeast Region	29,665	63,882	1,397	81	437	876	1,607	97,945
Southeast Region	7,615	24,804	485	78	340	1,398	1,471	36,191
South Region	1,738	4,256	132	22	100	108	274	6,630
Midwest Region	13,234	35,760	921	45	357	593	484	51,394
Total	82,174	240,647	8,900	290	1,591	4,339	4,362	342,303

ATL: American Tegumentary Leishmaniasis.
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There is still much data that could be filled in for a better evaluation of outcomes related to cure and deaths from ATL; however, a considerable percentage of registered cases were recorded as unknown/blank or transferred. This corresponds to 25.28% (n=86,536) of registered cases, with the Northeast region leading with the highest number of unspecified or transferred cases, approximately 31% (n=30,541), which could distort the percentage obtained from the data related to cure and other results. Even the North region, which has the lowest percentage of unspecified cases, still presents a high rate of these, around 20% (n=31,286).

Clinical form

Regarding the clinical form of the disease, the mucosal form shows a slight concentration in the Southeast (19.76%, n=4,076) and Midwest (21.22%, n=4,378) regions, indicating a higher relative proportion of this clinical form in these regions when compared to the others, Northeast (17.03%, n=3,513) and South (4.94%, n=1,020).

Overall, the cutaneous form is overwhelmingly predominant, corresponding to 93.8% (n=319,599) of the records, while the mucosal form represents 6.1% (n=20,627), and the ignored or blank cases, 0.1% (n=398) (Chart 5).

Chart 5. Presentation of the clinical form of american cutaneous leishmaniasis by macro-region of notification, between 2007 and 2024, based on data from patients reported by the Unified Health System.

Clinical form / notification region	Ignored/in blank		Cutaneous		Mucous		Total	
	n	%	n	%	n	%	n	%
North Region	21	5.2	141,909	44.4	7,640	37.03	149,570	100
Northeast Region	187	46.98	93,798	29.34	3,513	17.03	97,498	100
Southeast Region	150	37.68	31,511	8.82	4,076	19.76	35,737	100
South Region	3	0.75	5,564	1.74	1,020	4.94	6,587	100
Midwest Region	37	9.2	46,817	14.64	4,378	21.22	51,232	100
Total	398	100%	319,599	100%	20,627	100%	340,624	100

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Discussion

Analysis of the data collected during the evaluated period shows a general trend of reduction in cases of American cutaneous leishmaniasis in Brazil, albeit heterogeneously across regions. This decrease may be related to the intensification of surveillance actions, early diagnosis, and vector control promoted by the Unified Health System, as recommended by the Ministry of Health[9].

The comparison between macro-regions reveals that the North Region concentrated the majority of notifications, especially in certain years, which may be attributed to the widespread presence of vectors and high environmental vulnerability. This region also presented a significant incidence, historically recognized as an endemic area for the disease[10,13]. On the other hand, the Midwest Region showed a considerable reduction in the number of records, possibly due to improvements in vector control strategies and the quality of notifications[13,14]. The Southeast and South regions maintained the lowest occurrence rates, with occasional fluctuations that may be related to urbanization, primary care coverage, and the effectiveness of surveillance actions[3,14]. Regarding the sex profile, there was a predominance of cases among male individuals, especially in the initial years of the analyzed period. This pattern can be justified by men's greater occupational exposure to risk environments, such as forest areas and workplaces in rural or urban expansion zones[9,11]. However, in more recent years, a proportional increase in cases among women has been observed, which may indicate changes in exposure patterns or even greater female access to health and diagnostic services[10,15].

The analysis of the clinical forms of Tegumentary Leishmaniasis by macroregion shows that the cutaneous form is predominant throughout the country, while the mucosal and lupoid forms occur in smaller proportions, which is in accordance with the classic clinical pattern of the disease[1,3,11].

Regarding the criteria used to confirm cases, clinical-laboratory diagnosis stood out as the most adopted, being in line with national surveillance guidelines[3]. In the North Region, practically

all cases were confirmed through laboratory examination, reflecting a good local diagnostic capacity[10]. In contrast, in the Northeast Region, a significant portion of cases was confirmed based on the clinical-epidemiological criterion, which may indicate difficulties in accessing complementary tests[9].

The Southeast Region presented a small proportion of cases with ignored confirmation criteria, pointing to possible punctual failures in the notification process[10]. The South and Midwest regions followed the national trend, prioritizing laboratory diagnosis[3,6]. These findings highlight the importance of strengthening the laboratory structure and ensuring the standardization of records to support effective control actions[7,11].

The downward trend observed, especially from the second half of the analyzed period, is consistent with international data that point to a progressive reduction in cases in some countries in the Americas, including Brazil[7,9,16]. Despite this, the country is still among the most affected in the global scenario, especially due to the concentration of cases in the Northern Region. Factors such as deforestation, agricultural expansion, and greater human contact with vectors and wild reservoirs contribute to the maintenance of transmission[3,7,11]. This reality highlights the continued need for public policies aimed at prevention, early diagnosis, adequate treatment, and health education[1,3,7].

Treatment of cutaneous leishmaniasis represents a clinical challenge, requiring rigorous monitoring to ensure its effectiveness and minimize complications. Meglumine antimoniate remains the main therapeutic option, and can be administered systemically or intralesionally, depending on the severity of the condition[4,6,9]. Its effect is based on the destruction of the parasite, with generally high cure rates. However, therapeutic failures can occur, especially in cases of parasite resistance or inappropriate use of the drug[6].

When there is a contraindication to the use of antimonials or therapeutic failure, alternatives such as liposomal amphotericin B or miltefosine are used, the latter recently incorporated into the protocols of the Unified Health System[6,9]. These therapies require clinical and laboratory monitoring due to the risk of significant adverse effects, such as cardiac alterations, pancreatitis, and hepatic and renal dysfunction. This becomes even more concerning in vulnerable groups, such as children, pregnant women, the elderly, or individuals with comorbidities. For these cases, periodic use of complementary tests is recommended, such as electrocardiogram, amylase, lipase, and evaluation of hepatic and renal functions[7,11]. Continuous monitoring allows for early interventions, ensures greater safety in the use of medications, and contributes to reducing the morbidity of the disease.

Using secondary data should be considered inherent limitations, such as the possibility of underreporting and inconsistencies in completing notification forms, which can constitute

information bias, disregarding diagnosed cases that were not reported to SINAN. Furthermore, when analyzing data related to patient outcomes, approximately 26% of patients abandoned treatment or the evolution of cases was ignored, hindering the accurate measurement of cases that progressed to cure or death due to leishmaniasis, acting as non-response bias. Another limitation of the study is the constant updating of epidemiological data available on the SINAN website, since in several instances when the site was consulted, new numerical data appeared. Therefore, the study remained fully updated throughout its development.

Conclusion

The analysis carried out in this study identified relevant aspects regarding the distribution of the disease in time and space, as well as the weaknesses and advances of the national epidemiological surveillance system. The longitudinal and retrospective approach adopted allowed identifying patterns, inferring hypotheses, and raising important questions about the dynamics of the disease in different regions of the country. It was observed that, although there is a downward trend in notifications over the years, there is a lack of consistent data in the records and differences between the confirmation criteria used, which points to structural limitations that still permeate the notification and diagnosis process of ATL.

Regional discrepancies, both in incidence and access to laboratory methods, highlight inequalities in addressing the disease, directly reflecting the quality of the public health response. In addition, the maintenance of high rates in certain areas and the persistence of cases with unknown evolution or inconclusive outcome reinforce the need to improve control policies, with greater investment in early diagnosis and active surveillance. The epidemiological behavior of ATL observed in this study, therefore, must be interpreted in light of a broader social, environmental, and structural context that directly influences the occurrence and persistence of the disease.

Authors' contributions

Research conception and design: Marcelo José da Silva de Magalhães. Management: João Pedro Batista Amorim, Thalyta Emanuele Souza Silva. Analysis, interpretation of data and manuscript writing: João Pedro Batista Amorim, Thalyta Emanuele Souza Silva, Marcelo José da Silva de Magalhães. Resource management: João Pedro Batista Amorim, Thalyta Emanuele Souza Silva, Marcelo José da Silva de Magalhães. Critical review of the manuscript regarding intellectual content and final presentation: João Pedro Batista Amorim, Thalyta Emanuele Souza Silva, Marcelo José da Silva de Magalhães. The authors approved the final version of the manuscript and declared themselves responsible for all aspects of the work, including ensuring its accuracy and integrity.

Conflict of interests

The authors state that there are no conflicts of interests.

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