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Traveller's Dengue: Tropical Diseases Outside the Tropics in Bolivia

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Abstract: Introduction: The occurrence of tropical diseases outside the tropics is a priority in the prevention of emerging infectious diseases in Bolivian health system in the 21st century. Objective: Evaluate the presence of tropical diseases in La Paz city, with an emphasis on dengue, defying the traditional vision that their presence is restricted to tropical areas. Materials and methods: From November 2012 to February 2013, a descriptive, cross-sectional, and retrospective study was carried out for 876 patients who came by referral or on their own initiative to the recently implemented Tropical Medicine Clinic at the National Institute of Health Laboratories (INLASA) in the city of La Paz. Results: During 4 months of care, specialty clinical examinations were performed on all patients from 6 departments, resulting in 44 presenting febrile syndrome. With the support of the general and specific laboratory tests requested, it was concluded that 34 suffered from dengue, 3 from plasmodium vivax malaria, 1 from leptospirosis, and 3 from etiologies of bacterial origin. Conclusion: In the city of La Paz, there is a significant presence of tropical pathologies cases, mainly dengue and malaria, so the health system must consider the need for specific care services for these pathologies, in order to provide timely care for these increasingly prevalent diseases in the Andean area of the country.

Key words: dengue; neglected tropical diseases; arbovirosis and aedes aegypti

1. Introduction

International agencies consider infection control in travellers and migrants with Neglected Tropical Diseases (NTD) as a basic strategy for the prevention of emerging infectious diseases in the 21st century. These diseases cause significant morbidity and mortality rates due to increased internal and external travel by land and air. Travellers are susceptible to contracting diseases or being carriers of diseases in controlled or tropical disease-free geographic areas, and there is no specific strategic approach to their care [1, 2, 3]. The medical records of the National Health Information Service (NHIS) collect epidemiological information on infections that are useful in many respects, however, these data have some limitations when it comes to specifically assessing diseases imported by travellers and migrants.

The dense and continuous temporary, mobile, or final transit of settlers between different ecological floors in the

country to the subtropical and tropical regions of the country has led to the city of La Paz becoming a frequent transit point for population movements (immigrants, businessmen, professionals, truck drivers, and tourists), traveling to over 40 medium-sized cities and hundreds of small towns in La Paz, Beni, and Pando provinces. These returning travelers use the city as their station or destination on their journey (an important factor affecting the dynamics of imported NTD). After family and herbal knowledge has not given results in the treatment of their illness, they consult a health centre, a pharmacy, a neighbourhood doctor or finally the Miraflores Hospital Complex. This population can be grouped according to their origin and activity into: 1) Populations that live in the tropical zone (colonisers) or itinerant migrants (living in the Andean and tropical zones), following the agricultural calendar of sowing and harvesting in each region. 2) Indigenous peoples of the Andean zone (Aymara and Quechua) who migrate for days or weeks to harvest coca and rice. 3) City-dwelling populations who travel for work activities (teachers, various professionals, students, university students, traders). 4) Amazonian native people who come to the city to solve their illnesses. 5) People who visit for tourism [5].

2. Materials and Methods

The creation of the Tropical Medicine Clinic in 2012, with a close relationship with the National Laboratory of Parasitology and Entomology of INLASA (similar to health institutes in other countries), in order to implement the specialized medical consultation and triage of patients who request laboratory tests or who are referred by the different rural or urban health service networks for care. A descriptive, horizontal, and retrospective study of 876 individuals was conducted, with inclusion criteria based on the patient's "fever status" at the time of consultation (44 cases of fever).

Considering accessibility, sensitivity, and specificity, the analyzed signs and symptoms were assisted by different laboratory tests: haemogram (to verify leuco-neutropenia and thrombocytopenia); direct methods: Ag NS1 detection (rapid test) and genome detection (PCR); indirect methods: Ig G, Ig M serology (ELISA), to reach immediate diagnosis and treatment of special cases (such as Plasmodium falciparum and P. vivax malaria); dengue without alarm signs (DSSA) or dengue with alarm signs (DCSA) and outpatient treatment of leishmaniasis, Chagas disease, enteroparasitosis and other pathologies.

3. Results

During the study period, "traveller" was the main activity category of persons with imported NTD [5]. During four months, the Tropical Medicine/Parasitology Laboratory Clinic treated 876 patients (an average 10.3 patients per day); 44 people (5% of the total) had a febrile syndrome; 36 were referred (29 are based on instructions from pharmacies, health departments, or general practitioners; 4 are due to previous examinations at the institution; 1 is due to a relative at the institution and 2 professionals with knowledge of the institution). Of the 29 patients referred by a health professional (pharmacist or doctor), 12 had a presumptive diagnosis of typhoid fever, 8 with malaria, 2 with influenza and 7 with dengue.

After the clinical examination, a presumptive diagnosis was made and laboratory tests (rapid tests, serology and PCR) were carried out, and it was concluded that 34 patients had dengue fever: 9 with DCSA and 25 with DSSA; 3 patients with plasmodium vivax malaria (confirmed by smear and thick drop); 1 patient with leptospirosis (serology and PCR) and 6 with other aetiologies; 26 of these patients (63%) were originally from La Paz, 6 (14%) from Beni, 3 (7%) from Potosi, 3 from Tarija, and 2 (5%) from Santa Cruz. (see Table 1).

Out of the 9 patients with ACSD, 3 had bleeding, 1 had increased haematocrit and presented bleeding, 3 had vomiting and 2 had oedema of the lower limbs. All patients were immediately referred for hospitalisation, accompanied by a specialized medical report and laboratory results. In approximately 120 days, 34 patients were diagnosed with dengue (2 in November, 5 in December, 16 in January and 11 in February), which coincided with the national epidemic period. Analysis

by sex showed male predominance and the highest number of patients corresponded to economically active age groups (see Table 2).

Table 1. Number of patients by origin and diagnosis. November 2012 to February 2013, SMP/INLASA/2013

Origin (potential source of infection)	Dengue DSSA, DCSA	Malaria	Leptospirosis	Other causes	Total
Cochabamba	0	1	0	1	2
Pando	2	0	0	0	2
Beni	16	0	0	1	17
Santa Cruz	5	0	0	0	5
La Paz	11	2	1	3	17
Tarija	0	0	0	1	1
Total	34	3	1	6	44

Table 2. Number and percentage of dengue fever patients (DSSA, DCSA) by age and gender. SMP/INLASA/2013

Age group	Sex		Total
	Male	Female	Number and percentage
0 to 10 years old	1	0	1/3%
11 to 20 years old	6	1	7/20.5%
21 to 30 years old	4	3	7/20.5%
31 to 40 years old	6	3	9/26.5%
41 to 50 years old	4	4	8/23.5%
51 to 60 years old	0	0	0
61 years old and over	0	2	2/6%
Total	21/62%	13/38%	24/100%

Until 2012, three dengue serotypes had been recorded as circulating nationally: serotype 1 (DENV-1), registered in 1987; serotype 2 (DENV-2), registered in 1996; and serotype 3 (DENV-3), registered in 2003. In November 2012, during the course of this work, we were able to confirm for the first time the circulation of dengue serotype 4 (DENV-4) in a male patient, 40 years old, veterinarian, native of La Paz, who travelled a week earlier to the department of Pando (Puerto Evo), and on his return he consulted us for fever, general malaise, headache, chills. After ruling out other pathologies, the virology laboratory detected the presence of serotype 4, confirming the finding at CENETROP and CDC Atlanta [6]. (see Table 3).

A review of medical history indicates that due to the severity of symptoms and interruptions in work activities, patients have not received sufficient response to empirical medications (such as infusion or plaster) recommended by family or friends, and accessibility barriers have been overcome. They seek help from doctors or pharmacies, while the proportion of seeking help from regular doctors is relatively low. The hypothetical diagnosis of the professional referred to the patient was correct only in 7 patients (20.5%), and all patients received antibiotics (injection and oral), typing, and analgesics before consulting INLASA.

Table 3. Annual registration of dengue fever serotypes in Bolivia

Year	Dengue fever serotype			
	DENV-1	DENV-2	DENV-3	DENV-4
1999	X			
2000	X			
2001	X			
2002	X	X	X	
2003		X	X	
2004		X	X	
2005			X	
2006		X	X	
2007		X	X	
2008	X		X	
2009	X	X	X	
2010	X	X		
2011		X		
2012		X		X
2013	X	X		X
2014		X		X
2015		X		X

Source: National Dengue Programme; Ministry of Health. Presence of each of the dengue serotypes according to the year of their registration in the country. Our work allowed the registration of DEN-4 in the city of La Paz, in a patient from Pando.

Traditionally, Bolivia and particularly the department of La Paz is known as "Andean or Altiplano". Unfortunately, this statement masks another reality, since more than 60% of the national territory and 67% of the departmental territory are sub-tropical and/or tropical. The presence and impact of tropical diseases on public health in the valleys and the Altiplano is currently unknown. The availability of a clinical-epidemiological register of pathology imported by travellers and migrants, which would also reveal emerging infections associated with the flow of human mobility, as is done in other countries, would be highly desirable [1, 7].

50% of malaria cases in both Spain and Europe were immigrants, therefore, human migration is changing the geographical distribution of NTD that was formerly limited to Africa and Latin America [7]. The total number of dengue cases in Bolivia is underestimated, due to its often asymptomatic or oligosymptomatic characteristics and non-specific infection with polymorphic manifestations, with a rapid and spontaneous cure similar to that found in other countries [8, 9].

During dengue epidemics, malaria morbidity and mortality rates are higher because of delayed diagnosis and treatment by health professionals who lack the expertise to manage these cases [3, 5]. The first way to raise community awareness about dengue and other NTD should be to provide health professionals who care for migrants or travellers to the tropics with NTD detection and prevention protocols, and to provide timely advice to travellers and migrants. [6, 8, 9].

a) Protection against mosquito bites by wearing long clothing (maximum body surface area); b) Impregnation of clothing with insecticide; c) Use of skin repellents on the remaining uncovered parts of the body; d) Sleeping under a mosquito net preferably impregnated with insecticide; e) Vaccination against yellow fever; f) Consult a doctor in case of fever on return from tropical areas (7 days after return from travel); g) Adherence to basic precautions (safe food/water consumption, protection against arthropod bites and avoidance of barefoot walking) may help prevent most NTD.

The high abundance and variety of disease producing germs in subtropical and tropical areas, as well as the potential for their multiplication and spread, mean that patients usually present with polyinfection.

In a large part of the low-income population, there is a vicious circle established between malnutrition and infection, in such a way that the former favors the establishment of the latter and the latter determines caloric expenditure in already insufficient inputs. Future studies should examine in greater depth data on the trip (destination, duration, time spent in consultations since arrival) or the migratory process (department/province of origin, time spent in consultations since arrival in La Paz), preventive measures taken (request for advice before the trip, indication of antimalarial chemoprophylaxis, drug used and its correct application), reason for consultation and final diagnoses of travellers [1, 2, 3]. We need to understand the main types of work, activities, and businesses that create the context of vulnerability to NTD in the Andean area, and travellers could also play a role as sentinels of epidemics [3, 9].

5. Conclusion

Our assessment alerts to the increasing presence of NTD in the Andean area are becoming increasingly important. Although the transmitting mosquitoes have limited mobility, human mobility is already a perceivable key variable in understanding the relevance of the presence of dengue patients in non-tropical geographic areas.

Future studies should provide more in-depth data on the trip (destination, duration, time spent in consultations since arrival) or the migratory process (department/province of origin, time spent in consultations since arrival in the Andean region or the city of La Paz), preventive measures taken (request for advice before the trip, indication of antimalarial chemoprophylaxis, drug used and its correct application), reason for consultation and final diagnoses of travellers.

Tropical Medicine Clinic of INLASA has made it possible to begin to recognize and quantify NTD in the most important city in the Andean region. This underestimated data has begun to provide clinical and epidemiological background information of great importance, so that the health system needs to have better strategies for the timely care of tropical pathologies, not only in chronic stages.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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