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Risk Factors Associated with the Prevalence of the Zika Virus

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Abstract

Zika is a viral infection caused primarily by the bite of the Aedes aegypti mosquito. It is asymptomatic and may present: fever, headache, myalgia, arthralgia, asthenia and maculopapular rash. Neurological or autoimmune complications.Objective: To analyze the behavior of the Zika virus and its association with risk factors in the population of Herrera.Methodology: Retrospective cross-sectional prevalence study, using the digitalized mandatory notification form of the Surveillance System and the report on the presence of breeding sites from the MINSA vector department. A database was developed in the Excel program and inferential analysis in epiinfo.

Index terms— risk factors, zika virus, prevalence, zika confirmatory test.

1 Introduction

ika virus is an emerging viral infection of the flaviviridae family, transmitted mainly by the Aedes aegypti mosquito. It was first identified in 1947 in the Zika forests deriving from there its name, this incidence was given by the investigations of yellow fever in Rhesus monkeys. Then the virus spread in various populations throughout the continent, especially in countries where climatic conditions were appropriate for the spread and proliferation of mosquitoes.That is why the Zika virus has spread from various epidemiological outbreaks in the world, research of the virus requires

Author: e-mail: cinthiabdt@hotmail.com knowing more about the factors associated with prevalence and complications in populations.As an emerging disease in the scientific community, which is prevalent in the study population, it is necessary to know about the risk factors associated with this virus. This study aims to analyze the behavior of the Zika virus and the association with risk factors in the population of Herrera from January 2016 to December 2017; using the Epidemiological Surveillance System (SISVIG) with the use of mandatory notification forms and national database for Zika in Herrera„ as well as the report of the presence of hatcheries according to sector by vector personnel of the Ministry of Health. This article details the methodology and presents the main results found, among which we can mention that the highest concentration of cases was in the districts of San Juan Bautista with 11.1% (38), Monagrillo with 9.6% (33) and Llano Bonito 5% (18). The risk factors that had statistical significance were: the presence of breeding sites in the months of October, November and December, ages from 20 to 39 years and male sex, in addition there is no relationship between the characteristics of people and the infection of the Zika virus. With the contributions of this study, it is expected to contribute to the construction of new forms of approach that lead to health strategies, in the field of public health, that promote alternatives favorable to health by the authorities.

2 II.

3 Methodology

Study design: The type of study is a retrospective crosssectional prevalence study because the aim is to determine the prevalence and the various factors associated with the acquisition of Zika virus in Herrera.

Prevalence describes the proportion of the population suffering from the disease, which we want to study, at a given time, that is, it is like a still photo. **??**Ibanez, 2012). So it is also cross-sectional. In the Institute of Statistics and Census, the estimated population for the Province of Herrera for the year 2016 was 114,254 and for 2017 it was 114,353 inhabitants, respectively.

For this prevalence study, all suspected symptomatic cases with Zika virus captured in the Epidemiological Surveillance System (SISVIG) in the period January 2016-December 2017 were taken, corresponding to 342 suspected cases. This database is continuously fed by medical and nursing staff (37), both from the Ministry of Health and the Social Security Fund that work in the province of Herrera, Republic of Panama.

Due to the fact that all the information was captured in the epidemiological surveillance system and the report of the vector control personnel in home visits; we worked with 100% of the same, that is, no sample was used, which allows us to know the real prevalence of the Zika virus in the population studied. Inclusion and exclusion criteria: The inclusion criterion that was taken into account in the case definition was that it had all the complete information in the Epidemiological Surveillance System through the mandatory notification form and zika virus databases. No cases were excluded because all forms were completed according to the registry of notifiable disease forms.

4 Ethical considerations:

The development of the study did not require direct intervention; the participants were not subjected to any risk of complications or toxic or adverse effect. However, it was governed by the Declaration of Helsinki of the World Medical Association, the Code of Dentistry and Good Clinical Practices. Each of the participants was registered in the SISVIG system, so it was necessary to comply with the authorized signatures of the authorities of the Ministry of Health. The information received was used confidentially. Subjects were identified with numbers from 01 to 342 for confirmed cases of Zika virus disease. The results obtained were evaluated and are kept confidential for research purposes.

Procedures for data collection: Secondary sources were used in this study. The database of the Epidemiological Surveillance System, SISVIG, was used, as well as the mandatory notification disease forms and the reports provided by the vector staff of the Ministry of Health. An instrument was developed and used to determine the risk factors associated with the prevalence of Zika virus in the Herrera Health Region. In it, epidemiological variables of person and place were found, such as: age, sex, origin, presence of breeding sites detected in sectors visited and reported by the vector staff of the Ministry of Health. In addition, they handled the data on the condition of care or clinical management of the patient, such as: suspected and confirmed diagnoses of the virus, date of onset of symptoms grouped by epidemiological quarter according to years, confirmation or ruling out of cases, presence of the Zika virus.

Procedures for the presentation and analysis of results: the Epiinfo program was used, where a database was generated that dynamically allowed the crossing of variables and the calculation of descriptive and inferential statistics to determine the prevalence of the Zika virus. Analytical tables of both qualitative and quantitative variables and measures of central tendency and statistical significance with the chi square test (x2), set at 95% certainty and degree of freedom (x2: 3.84) with a percentage of 5% error (p: 0.05); in order to prove or reject the null hypothesis of the investigation. As well as determining the strength of association of risk factors measured through the OR risk test, attributable risks and attributable risks of the exposed population. To know if the results can be generalized to the population, the confidence limits test will be used.

5 III.

6 Results

The incidence of Zika virus in the Herrera health region is unknown. When the outbreak was declared with 39 cases at the end of December. The population with suspected Zika virus is mostly between the ages of 30 to 39 years with 21.9% (75), of which 15.8% (54) are female. In second place are young people between 10 and 19 years old 18.1% (62), where there is also a greater increase in women 10.8% (37); followed by the ages of 20 to 29 years with 17.5% (60) with no difference between the sexes.

Regarding gender, it was found that the majority of people with suspected Zika virus are female, 61.7% (211). In the ages, it was observed that in the majority, more than 50% of the cases occurred between the economically productive and reproductive ages of 10 to 49 years.

Men and women become fertile in adolescence, after puberty from the age of 14; Reproductive potential declines as women age, and fertility typically ends five to ten years before menopause. (Birmingham, 2013). When relating Zika virus infection according to sex, it was shown that males represent 38.3% (131) and females 61.7% (211). The positive tests determined the male sex in 19.0% (65), in negative tests 19.3% (66), the female sex positive tests 28.1% (96) and negative tests 33.6% (115). The statistical association in both sexes and Zika virus infection was shown to be non-existent (x2: 0.55, p 0.2290). When measuring the relationship of variables, Zika virus infection applied to sex, it was shown that male sex is a risk factor for becoming infected with Zika virus (OR: 1.18), and female sex as a protective factor (OR: 0.85).). The confidence interval does not allow to generalize to the study population, since the sample is small; it is necessary to expand the sample to measure the variable according to female sex. (I.C: 0.55-1.31) and male (I.C: 0.76-1.83).

In publications of the magazine Vida Actual for 2019 they refer that According to Dutch experts, mosquitoes locate their victims by the carbon dioxide they emit. That is, people who exhale more carbon dioxide in their breath, such as pregnant women or large people, will surely suffer more from their bites. Some studies suggest

that they prefer women because their skin is thinner, which makes it easier to bite. In addition, the "sweet blood" attracts. (Michelin, 2019).

There is a relationship with saccharides in the blood, but it is because this compound feeds the bacteria on the skin (the bacteria that give sweat its bad smell). Dutch studies found that mosquitoes avoid people with a high number of bacteria on their skin and also those with very few. They prefer those that have a more balanced ecosystem. (Michelin, 2019).

However, the research shows that the risk factor for Zika virus infection is being male, which could be related to current behavioral changes in men, in relation to personal hygiene, wearing shorts, waxing of their villi, and probably even the fragrance or body scents they wear, could attract mosquitoes.

7 Factor de riesgo Factor protector

Ra. De Expuestos: 58.5%.

In relation to the detection of the Zika virus, it was determined that 47.1% (161) of the confirmatory tests came out positive, of which the majority are found in the corregimiento of San Juan Bautista at 11.1% (38), followed by the Corregimiento of Monagrillo with 9.6% (32) and Chitré with 9.4% (32). Regarding the number of samples, the Corregimiento de Monagrillo was obtained with 20.0% (69), followed by the Corregimiento de San Juan Bautista 19% (65). These results are due to the density of the population in urban areas and close to the head of the District of Chitré. When measuring the relationship of variables, Zika virus infection and habitual residence, statistical significance was demonstrated in the Corregimiento San Juan Bautista with (X2: 4.18, p: 0.0205), that is, there is a statistical association between both variables; In addition, this corregimiento is a risk factor for the population to acquire the Zika virus (OR: 1.76), being able to generalize the results (CI: 1.02-3.05). The district of Llano Bonito also showed a statistical association between Zika virus infection and residence (X2: 54.1, p: 0.0099). This corregimiento becomes a protective factor against becoming infected with the Zika virus (OR: 0.48), a result that can be generalized to the population of this corregimiento (CI: 0.026 -0.90). The AR result in exposed patients showed that with a Zika virus prevention program, the prevalence of cases in this population in the province of Herrera can be reduced by 32.7%. In the different investigations reviewed on the Zika virus, it is evident that one of the greatest risks of becoming infected with the Zika virus is staying in endemic areas of the vector. This refers to the potential risk of disease transmission, which lies in the fact that the virus-transmitting mosquitoes live in the region and its population density. (BBC, 2016). Transmission occurs in urban and wild cycles, depending on the mosquito vectors involved. Thus, Aedes aegypti is related to urban transmission. (Castro, 2016). The II and III epidemiological trimester is a risk factor for the presence of mosquito breeding sites. 55% of the cases yielded positive results. Of the confirmed cases with positive Zika tests, 55.3% were tested in the fourth quarter, of which 4.7% have the presence of breeding sites. In the rest of the quarters the presence of breeding sites was the same. Regarding the association, it found that the I, II, III quarters have statistical significance, that is, there is an association between these quarters and the presence of breeding sites in the cases of positive tests (X2 greater than 3.84 in each of they). The risk estimate showed that the I and III trimesters are risk factors for having breeding sites (OR: 0.49, OR: 8.25 respectively), both results can be generalized to the total population as indicated by the CI (1.012-17 .97, 1.31 to 52.01). Although it is advisable to expand the sample due to the disperse of the intervals. These results explain that it may be due to the fact that they coincide with the country's rainy season.

The I trimester constitutes a protective factor (OR: 0.26) for not having breeding sites and the results can be generalized in CI 0.08 -0.79; a result that coincides with the dry season where the presence of breeding sites decreases. When measuring the relationship of the variables, it was shown (X2 = 6.33, p 0.0059) that the cases confirmed by Zika virus in the I trimester is a protective factor (OR= 0.26) and the III trimester, as risk factor (OR= 8.25). It is considered good, but not very precise to apply it to the population (CI=1.31-52.01). The female of the 'Aedes Aegypti' is capable of laying 700 eggs and biting and infecting several people (WHO, 2015).

Humidity, temperature, the sex of the mosquito and the time of year are factors that allow the life of mosquitoes; males usually live for short times, about a week, while females survive up to a month. (WHO, 2016). The eggs can withstand very dry conditions (desiccation) and remain viable for several months without water. (WHO, 2019). That is why staying with mosquito breeding sites is a risk factor for Zika virus infection.

Table **??**°3: Statistical Summary of Risk Factors for Zika Viral Infection.

The I trimester and the II trimester were protective factors for not having the Zika virus (I trimester OR: 0.44, II trimester OR: 0.37), respectively. Both quarters can be generalized to the Health Region of Herrera by the results of the confidence intervals of the sample, (I quarter CI: 0.28 -0.67 and II quarter CI: 0.17-0.81).There are times of the year when the different species of mosquitoes may be more abundant than others, but not all mosquitoes are affected or favored by the same climatic-environmental conditions.

For each species there are certain environmental characteristics that are more or less favorable. "If we refer to Aedes Aegypti, vector of dengue, fiebre amarilla, Zika and Chikungunya, Chikungunya, among other viruses, we say that the time of highest temperatures and rainfall is the most favorable for reproduction. And that the low temperatures of winter (below 13°C) affect adult females and males and they die. But the eggs resist these low temperatures and even lower, spending the embryo all winter inside the egg" (Álvarez, 2017.)

In the Herrera Region in 2016 and 2017, 342 suspected cases of Zika virus were detected, in which 161 cases distributed throughout the Chitré district were confirmed. Of these, they occurred with the highest concentration

in the districts of San Juan Bautista with 11.1% (38), Monagrillo with 9.6% (33) and Llano Bonito with 5% (18). Therefore, it is important to increase epidemiological surveillance measures for the Zika virus at all levels of care, both in public and private facilities, for timely detection of the virus; as well as the follow-up and complications that it produces.

The risk factors were: the presence of breeding sites in the months of October, November and December, it is frequent in the ages of 20 to 39 years and the male sex, in addition there is no relationship between the characteristics of people and the infection of the virus of Zika. Therefore, the Zika virus test should be mandatory for the timely detection of all pregnant women, blood donors, organ donors, all couples in the process of contracting marriage, and all men and women of childbearing age who request it. [1] [2]

Figure 1:

[1] © 2022 Global JournalsRisk Factors Associated with the Prevalence of the Zika Virus
[2] K © 2022 Global JournalsRisk Factors Associated with the Prevalence of the Zika Virus

RESIDENCIA HABITUAL	TOTAL		INFECCIÓN DEL VIRUS ZIKA							
			SÍ		NO					
	N°	%	N°	%	N°	%	X^2	p	OR	IC
TOTAL	342	100.0	161	47.1	181	52.9				
Chitré	59	17.3	32	9.4	27	7.9	1.47	0.1131	1.42	0.81-2.49
La Arena	56	16.4	29	8.5	27	7.9	0.60	0.2200	1.25	0.71-2.22
Monagrillo	69	20.2	33	9.6	36	10.5	0.02	0.4444	1.04	0.61-1.76
Llano Bonito	55	16.1	18	5.3	37	10.8	5.42	0.0100	0.49	0.27-0.90
San Juan Bautista	65	19.0	38	11.1	27	7.9	4.18	0.0205	1.76	1.02-3.05
Parita	25	7.3	8	2.3	17	5.0	2.46	0.0584	0.50	0.21-1.20
Santa María	1	0.3	0	0.0	1	0.3	0.89	0.1725	0.00	0-0
Pesé	11	3.2	3	0.9	8	2.3	1.79	0.0963	0.41	0.11-1.58
Los Pozos	1	0.3	0	0.0	1	0.3	0.89	0.1725	0.00	0-0

Fuente: Base de datos del sistema de vigilancia Epidemiológica de la Región de Salud de Herrera 2016 y 2017.

1

Figure 2: Graph 1 :

FACTOR DE RIESGO	X^2	p	OR	IC
Procedencia en San Juan Bautista	4.18	0.0205	1.76	1.02-3.05
Con criaderos de mosquitos	4.88	0.0136	2.08	1.08-4.11
IV trimestre epidemiológico con población afectada	27.01	0.0000	3.24	2.07 -5.08
II trimestre con presencia de criaderos	5.23	0.0111	4.49	1.12 - 17.97
III trimestre con presencia de criaderos	6.91	0.0043	8.25	1.31- 52.01

Fuente: Base de datos del Sistema de Vigilancia Epidemiológica de la Región de Salud de Herrera 2016 y 2017.

Figure 3:

FACTOR DE PROTECTOR	X^2	p	OR	IC
Procedencia en Llano Bonito	5.42	0.01	0.49	0.27-0.90
Sin criaderos	4.88	0.0136	0.48	0.25-0.93
I trimestre epidemiológico en población en estudio	14.14	0.0001	0.44	0.28- 0.67
II trimestre epidemiológico en población en estudio	6.43	0.0056	0.37	0.17-0.81
I trimestre epidemiológico con criaderos	6.33	0.0059	0.26	0.08-0.79

Fuente: Base de datos del Sistema de Vigilancia Epidemiológica de la Región de Salud de Herrera 2016 y 2017.

2

Figure 4: Graph 2 :

N°2

Figure 5: Table N°2 :

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