Distribución de Aedes albopictus (Skuse 1895) en Tabasco, México durante 2015-2018.

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Distribuição de Aedes albopictus (Skuse 1895) em Tabasco México 2015-2018

Répartition d'Aedes albopictus (Skuse 1895) à Tabasco au Mexique de 2015 à 2018

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ABSTRACT

Objective: To identify the distribution of Aedes albopictus (Skuse 1895) in Tabasco Mexico from 2015 to 2018.
Material and Method: A cross-sectional observational descriptive study with a quantitative component was carried out. During January 2015 to July 2018, a total of 4,090 samples of Aedes sp. mosquito larvae were sent to the state public health laboratory for taxonomic identification from the 17 municipalities of Tabasco with 38 priority localities, which were collected from the state monitoring system of entomological surveillance with ovitraps.
Results: Of the samples collected, 3,882 (94.91%) corresponded to Aedes aegypti and 208 (5.08%) to Aedes albopictus. The distribution of Aedes albopictus was identified in 9 municipalities representing 52.94% of affected municipalities with the presence of the vector and corresponds to 44.74% of localities sampled positive in the state of Tabasco.
Conclusions: In this study it was determined the presence and distribution of Aedes albopictus, its dispersion in the state is in progress since it could colonize the 17 municipalities of the state. Due to the climate and vegetation characteristics, which poses new challenges in public health in terms of the prevention and control of arboviruses.

Keywords: Aedes albopictus; introduced species; Arbovirus; Disease vectors.

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Resumen

Objetivo: Determinar la distribución de Aedes albopictus (Skuse 1895) en Tabasco México 2015-2018.
Material y métodos: Se realizó un estudio descriptivo observacional transversal con un componente cuantitativo, durante enero de 2015 a julio 2018 se enviaron al laboratorio estatal de salud pública un total de 4,090 muestras de larvas de mosquitos de Aedes sp. para identificación taxonómica proveniente de los 17 municipios de Tabasco con 38 localidades prioritarias, las cuales fueron colectadas del sistema de monitoreo estatal de vigilancia entomológica con ovitrampas.
Resultados: 3,882 (94.91%) corresponden a Aedes aegypti y 208 (5.08%) a Aedes albopictus. La distribución de Aedes albopictus se identificó en 9 municipios que representa 52.94% de los municipios afectados con presencia del vector y 44.74% de localidades muestreadas positivas en el estado de Tabasco.
Conclusiones: Con el presente estudio se logró determinar la presencia y distribución de Aedes albopictus, cuya dispersión en el estado se encuentra en progreso ya que podría colonizar los 17 municipios que componen el estado por las características de clima y vegetación, lo que plantea nuevos retos en salud pública en cuanto a la prevención y control de los arbovirus.

Palabras claves: Aedes albopictus; especies introducidas; Arbovirus; vectores de enfermedades.

Resumo

Objetivo: Analisar indicadores de saúde, com base nos resultados obtidos pelas unidades de saúde no Chile, durante o período 2010-2014.
Materiais e métodos: Um estudo descritivo é realizado e múltiplas correspondências são aplicadas. São utilizados 75 indicadores básicos de saúde publicados pelo Ministério da Saúde, indicadores demográficos, estatísticas vitais, riscos para a saúde e acesso aos cuidados. Cada indicador foi atribuído um resultado esperado e comparado com o resultado real obtido, por região e país.
Resultados: Os indicadores de risco para a saúde foram caracterizados principalmente porque, em 50% ou mais das regiões analisadas, obtiveram resultado semelhante ao esperado. Diferentemente dos indicadores estatísticos vitais, onde 49% e menos das regiões tiveram resultado semelhante ao esperado no mesmo período. Ao mesmo tempo, os indicadores demográficos foram associados an um resultado esperado positivo e, ao contrário, os indicadores de acesso ao atendimento foram associados an um resultado esperado negativo no período analisado.
Conclusão: Devido ao impacto na população, qualquer indicador de gestão em saúde deve ser considerado pelos gestores das redes de saúde para orientar as estratégias a serem implementadas nos estabelecimentos que compõem as redes públicas de saúde.

Palavras chave: Gestão em saúde; Estratégia; Indicadores de gestão.

Résumé

Objectif: Analyser les indicateurs de santé sur la base des résultats obtenus par les établissements de santé au Chili durant la période 2010-2014.
Matériel et méthodes: L'étude est descriptive et inclut de plus l''analyse des correspondances multiples en utilisant 75 indicateurs sanitaires de base publiés par le Ministère de la Santé: indicateurs démographiques, statistiques de l'état civil, risques pour la santé et accès aux soins. Un résultat attendu a été attribué à chaque indicateur et comparé au résultat réel obtenu, par région et par pays.
Résultats: Les indicateurs de risques pour la santé se sont caractérisés principalement par le fait qu'ils ont obtenu un résultat similaire à celui attendu dans 50% ou plus des régions analysées. Par contre, les indicateurs de statistiques de l'état civil ont donné, pour la même période, un résultat similaire à celui attendu dans 49% ou moins des régions. Dans le même temps, les indicateurs démographiques se sont associés à un résultat attendu positif et, au contraire, les indicateurs d'accès aux soins se sont associés à un résultat attendu négatif pour la période analysée.
Conclusions: En raison de l'impact sur la population, tout indicateur de gestion de la santé devrait être pris en compte par les gestionnaires de réseaux de santé afin d'orienter les stratégies à mettre en œuvre dans les établissements constituant les réseaux de soins de santé publique.

Mots-clés: Gestion en santé; Stratégie; Indicateurs de gestion

Introducction

The Asian tiger mosquito, Aedes albopictus (Skuse, 1894), is an invasive species native is s an invasive exotic species with a strong genetic, physiological and ecological plasticity[1]. This species is attributed characteristics and adaptive advantages over the other species, which make it a successful invader. One of its characteristics is that its eggs resists more or less to dry conditions, which allows them to survive in inhospitable environments, in addition to facilitating its transport by humans. Perhaps its greatest importance is its association with man, because the alterations caused by humans open new habitats, what benefits them, because they have characteristics of invasive species.

Ae. Albopictus has colonized all continents except Antarctica during the last 30-40 years[3]. It was first found in the continental U.S. in August, 1985, in Houston, Texas[4], and is currently found in 866 counties in 26 states, and was recently reported in Southern California[5, 6].

The first records of Ae. albopictus in Mexico were conducted in the state of Tamaulipas 1988[7], Coahuila in 1994[8,9], later in 1994[8,9] the first infested states in the Gulf of Mexico Veracruz[10], and Nuevo León 2001[11]. In September 2003, larvae samples in Tapachula, Chiapas[12]. The species was reported in the southern center of the country in Morelos[13]. In 2012, the presence of the species was confirmed in Cancún, Quintana Roo[14]. Currently, Ae. albopictus is registered in 12 states of Mexico (Chiapas, Coahuila, Hidalgo, Morelos, Nuevo León, Oaxaca, Puebla, Querétaro, Quintana Roo, San Luis Potosí, Tamaulipas and Veracruz)[15]. Recently the first record of Ae. albopictus in Tabasco reported in June 2018 in the Municipalities of Huimanguillo, Teapa, Tacotalpa and Villahermosa[16].

The epidemiological importance of Ae. albopictus is that it can transmit, experimentally or naturally, at least 22 arboviruses, most of these are of importance in human health[17]. Among these, the transmission of the four dengue serotypes and eastern equine encephalitis viruses and Japanese, as well as the Zika, Chikungunya and West Nile virus are of particular interest. In addition, it has been documented that it can transmit the Yellow Fever virus, which constitutes it as a vector between the sylvatic and urban transmission cycles. Additionally, in endemic areas for dengue, in which cases of Yellow Fever occur, there is a potential risk that this disease will be urbanized[18].

For some viruses such as Dengue, Yellow Fever, Potosí and La Crosse, it has been experimentally demonstrated that Ae. albopictus can transmit them via transovarial to their offspring. In particular, in the transovarial transmission of the Dengue virus it has been found that it can transfer the four serotypes in a more efficient way than the one exhibited by Ae. aegypti[19, 20]. Therefore, the objective of this work was to determine the presence and distribution of Ae. albopictus in Tabasco, Mexico in the period of January 2015- July 2018.

Material and methods

A transversal observational descriptive study with a quantitative component was carried out. From January 2015 to July 2018, a total of 4090 samples of Aedes sp. mosquito larvae were sent to the state public health laboratory for taxonomic identification. Each one from the 17 municipalities of Tabasco with 38 priority locations that included the municipal capitals and the main towns, which were collected from the state monitoring system of entomological surveillance using ovitraps (n = 6929), installed in the state.

The biological material collected from the ovitraps was selected according to a schedule ordered by municipality and locality, then in order to hat eggs, they were immersed in dechlorinated water at an average temperature of 27 ° C, 10 pellones in trays of 5L of volumetric capacity, from 1 to 3 days the larvae hatched to have a size of 2nd instar. They were placed in pooles of 50 larvae which tropical fish flakes of the brand BIOMAA® were added as food with the following content minimum Protein 42.0%, minimum Fat 5.0%, maximum Fiber 6.0%, maximum Ash 6.0%, maximum Humidity 8.0% and they were bred until the 4th instar for taxonomic identification in an average of 6 days.
Methodology used for the immature stages was the guide for breeding and maintenance of colonies of Aedes sp. (DIPTERA: CULICIDAE :) under insectary conditions, in the entomological research unit[21], samples were sent under the normative criteria of the state public health laboratory in 10 ml test tubes and preserved in 70% alcohol, for its taxonomic identification, a “HUND WETZALAR” optical microscope with 10-40X achromatic objective ranges was used, following the dichotomous keys for the taxonomic identification following the dichotomous keys for taxonomic identification of common mosquito larvae in urban and suburban areas of the Mexican republic[22].

Results

The distribution of Ae. albopictus in the state of Tabasco, was identified in 17 localities (44.74%) of 9 municipalities representing 52.94% and at risk (figure I). Of 4090 samples processed, 3882 (94.91%) correspond to Ae. aegypti and 208 (5.08%) to Ae. albopictus. In the municipality of Huimanguillo, it was detected in 4 localities (1.25%) followed by Cárdenas with 3 localities (1.15%) and Tacotalpa with 2 localities (1.37%). Table 1 shows the detection of Ae. albopictus in chronological order.

Figure I. Distribution of *Aedes albopictus* in the state of Tabasco, Mexico, 2015-2018, from entomological surveillance with ovitraps.

Source: Own elaboration based on the Entomological Research Unit of Tabasco.

Table 1. Detection of *Aedes albopictus* in the State of Tabasco in chronological order. Only sample data confirmed by the State Laboratory of Public Health are presented.

Municipality	Locality	Detection Date	Coordinates Lat / Long	
Huimanguillo	San Manuel	March 2015	17°39'03.24"N	93°22'54.84"W
Paraíso	Paraíso	January 2016	18°24'00.31"N	93°12'25.01"W
Cárdenas	Cuauhtemoczin	January 2016	18°12'24.90"N	94°07'35.90''W
Huimanguillo	La Venta	February 2016	18°05'32.08"N	94°02'23.50''W
Comalcalco	Comalcalco	May 2016	18°16'48.00"N	93°13'47.28''W
Tacotalpa	Tapijulapa	July 2016	17°27'54.72"N	92°46'35.40"W
Paraíso	Puerto Ceiba	August 2016	18°24'37.61"N	93°10'29.54"W
Teapa	Vicente Guerrero Lerma	November 2016	17°31'02.12"N	92°55'27.00"W
Centro	Villa Luis Gil Pérez	February 2017	17°52'12.31"N	93°04'21.70"W
Cunduacán	Cunduacán	February 2017	18°04'05.46"N	93°11'05.79"W
Huimanguillo	Villa Estación Chontalpa	March 2017	17°40'07.56"N	93°28'59.87"W
Huimanguillo	Huimanguillo	March 2017	17°49'22.38"N	93°23'42.39"W
Tacotalpa	Cerro Blanco	April 2017	17°25'15.63"N	92°47'38.83"W
Cárdenas	Villa Benito Juárez	September 2017	18°10'50.74"N	93°54'34.87"W
Cunduacán	11 de febrero	October 2017	18°06'10.23"N	93°19'10.37"W
Cárdenas	Cárdenas	July 2018	18°00'01.06"N	93°22'33.16"W
Jalpa de Méndez	Jalpa de Méndez	July 2018	18°09'10.47"N	93°07'31.55"W

Source: Own elaboration based on the Entomological Research Unit of Tabasco.

Table 2 shows the samples collected and sent from the 17 municipalities and 38 localities with entomological surveillance with ovitraps in the period January 2015- July 2018.

Table 2. Distribution of positive samples for *Ae. albopictus*, by municipality and locality in the state of Tabasco, 2015-2018

Municipalities	Localities	Total Larvae	*Ae. aegypti*	*Ae. aegypti* %	*Ae. albopictus*	*Ae. albopictus* %
Balancán	Balancán	111	111	2.71	0	0
	El triunfo	107	107	2.62	0	0
Cárdenas	Cárdenas	107	103	2.52	4	0.1
	Villa Benito Juárez	93	90	2.2	3	0.07
	Cuauhtemoczin	120	80	1.96	40	0.98
Centla	Centla	139	139	3.4	0	0
	Vicente guerrero	104	104	2.54	0	0
Centro	Villahermosa	174	174	4.25	0	0
	Rio viejo	95	95	2.32	0	0
	Macultepec	106	106	2.59	0	0
	Ocuiltzapotlan	103	103	2.52	0	0
	Luis Gil Pérez	96	94	2.3	2	0.05
Comalcalco	Comalcalco	96	95	2.32	1	0.02
	Villa Tecolutilla	148	148	3.62	0	0
Cunduacán	Cunduacán	198	175	4.28	23	0.56
	11 de febrero	108	103	2.52	5	0.12
E. Zapata	E. Zapata	96	96	2.35	0	0
Huimanguillo	Huimanguillo	105	101	2.47	4	0.1
	Villa Chontalpa	86	83	2.03	3	0.07
	San Manuel	164	129	3.15	35	0.86
	Villa la venta	85	76	1.86	9	0.22
Jalapa	Jalapa	111	111	2.71	0	0
Jalpa Mdez.	Jalpa Méndez.	113	105	2.57	8	0.2
Jonuta	Jonuta	90	90	2.2	0	0
Macuspana	Benito Juárez	107	107	2.62	0	0
	Cd. Pemex	96	96	2.35	0	0
	Macuspana	95	95	2.32	0	0
Nacajuca	Nacajuca	86	86	2.1	0	0
	Bosques de Saloya	106	106	2.59	0	0
Paraíso	Bellote	55	55	1.34	0	0
	Puerto Ceiba	132	131	3.2	1	0.02
	Paraíso	142	129	3.15	13	0.32
Tacotalpa	Tacotalpa	120	120	2.93	0	0
	Tapijulapa	119	81	1.98	38	0.93
	Cerro Blanco	18	0	0	18	0.44
Teapa	Vicente guerrero	1	0	0	1	0.02
	Teapa	125	125	3.06	0	0
Tenosique	Tenosique	133	133	3.25	0	0
Total	38	4,090	3,882	94.91	208	5.09

Source: Own elaboration based on the Entomological Research Unit of Tabasco.

Discussion

The present study shows the rapid dispersion and adaptation of Aedes albopictus, an invasive exotic species in the state of Tabasco. In a span of 3 years, it has been possible to establish in 52.94% of the municipalities that are part of the state and its arrival in the state is not surprising due to favorable factors for its reproduction; as the warm humid climate with abundant precipitation and prevalence of aquatic vegetation, as well as the proximity to the state of Chiapas[12], place where the vector is already present.

Aedes albopictus is a species native to the jungle that has been adapted to the urban environment, their preferential breeding places are the natural ones with extensive vegetation and humidity, which has taken advantage of the bamboo stumps, armpits of plants (bromeliads) and in hollows of trees and stones[23]. When this species enters the urban environment, it can easily inhabit artificial deposits such as pots, vases, tires and cans[24].

The results are consistent with recently published by Ortega-Morales et al16 and includes the municipalities of Cardenas, Comalcalco, Cunduacán, Jalpa and Paraiso, where the species is already present, providing valuable information for prevention and control of arboviruses in the state of Tabasco.

Both species reported in this entomological surveillance, are considered important vectors and also as invasive species, because they have successfully colonized many places outside of their native environment[25].

Of the 4,090 identifications, Ae. aegypti was the species found in 94.7% of localities sampled and with a higher proportion (94.91%) compared to Ae. albopictus (5.09%). When both Aedes species share the same breeding sites, there is no scientific consensus about the displacement of one species with respect to the other. While studies conducted in Southeast Asia indicate that Ae. Aegypti can replace Ae. albopictus in urban areas. In the United States and Brazil, it has been observed that this species with more jungle characteristics, can reach drastically and quickly populations of Ae. Aegypti[17]. Since, a series of ecological principles states that two species cannot occupy the same niche, which leads to a reduction in the population of one of the species due to competition with the other[25].

Conclusion

The presence and distribution of Ae. Albopictus was destermined in 9 municipalities of Tabasco, so it is recommended to strengthen the entomological surveillance of the species, in order to generate information regarding densities in immature and imago states. Because Ae. albopictus is conferred anthropophilic and zoophilic capacity as a potential vector to intervene in the transmission cycles both of anthropozoonotic diseases and exclusive occurrence of human being and with an endemic or emergent behavior[26]. The dispersion of Ae. albopictus in Tabasco is still in progress as it could colonize the 17 municipalities of the state. This poses new challenges in public health, in terms of the prevention and control of arboviruses and it requires us to generate knowledge in order to implement strategies considering the particularities of the species present.

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