



Coccidioidomycosis
STUDY GROUP

Meeting #62 April 13, 2018 in Flagstaff, AZ.



REVIEW OF COCCIDIOIDOMYCOSIS ENDEMIC PARAMETERS IN MÉXICO

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Background

Fiese Criteria (1958)

- 1) Reports of clinical cases.
- 2) Positive reaction to coccidioidin in humans and domestic animals.
- 3) Presentation of cases in domestic and wild animals.
- 4) Fungal isolate from soil.

Background



States considered **endemic** to *Coccidioides spp.* infection.

It is unknown which of them complies with those features indicated by Fiese.

BC=Baja California

SON=Sonora

CHI=Chihuahua

COA=Coahuila

NL=Nuevo León

TAM=Tamaulipas

Objective

To identify, at present, the northern Mexican states that comply with coccidioidomycosis endemicity requirements.

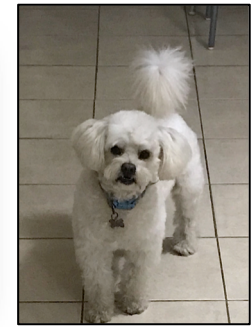
Methodology



Morbidity rates in humans
Ministry of Health (electronic databases)



Humans



Dogs

Skin Test/coccidioidin surveys



In vitro cultures
soil



Serological assays
Wild animals



OID = Ouchterlony immunodiffusion
CIEF = Counter current immunoelectrophoresis
ELISA = Enzyme-linked immunosorbent assay

RESULTS

6 years
3691 new cases

STATE	YEAR						
	1989	1990	1991	1992	1993	1994	TOTAL
Aguascalientes	1	0	2	3	0	0	6
Baja California	9	21	0	38	0	8	76
Baja California Sur	0	0	0	8	0	3	11
Campeche	45	15	1	3	5	0	69
Coahuila	139	8	0	6	20	8	181
Colima	0	1	0	2	1	2	6
Chiapas	12	23	31	102	14	161	343
Chihuahua	2	2	0	5	182	0	191
Distrito Federal	1	12	7	10	15	1	46
Durango	7	5	12	3	4	8	39
Guanajuato	36	5	5	3	3	8	60
Guerrero	0	1	1	0	0	26	28
Hidalgo	3	72	4	12	8	0	99
Jalisco	57	11	3	5	34	10	120
México	0	47	14	94	12	7	174
Michoacán	19	17	11	12	6	3	68
Morelos	0	137	21	1	1	0	160
Nayarit	0	5	5	89	9	8	116
Nuevo León	58	14	2	5	527	4	610
Oaxaca	24	29	12	8	146	5	224
Puebla	22	20	10	12	19	25	108
Querétaro	7	2	1	0	2	5	17
Quintana Roo	0	10	4	7	3	13	37
San Luis Potosí	2	10	1	5	1	4	23
Sinaloa	0	13	2	140	29	7	191
Sonora	8	30	8	11	21	6	84
Tabasco	7	23	2	2	1	1	36
Tamaulipas	30	88	5	6	13	80	222
Tlaxcala	8	2	12	9	2	6	39
Veracruz	17	50	17	24	36	23	167
Yucatán	0	1	0	0	0	5	6
Zacatecas	10	89	2	8	20	5	134
TOTAL	524	763	195	633	1134	442	3691

Source:
Anuario de estadísticas de la
Secretaría de Salud. Years: 1989,
1990, 1991, 1992, 1993 and 1994.

RESULTS

CM → New Cases

2000 – 2014

15 years = 561 new cases

Under registration

STATE	NUMBER OF NEW CASES
Aguascalientes	1
Baja California	49
Baja California Sur	1
Coahuila	6
Colima	2
Chiapas	1
Chihuahua	19
Distrito Federal	9
Durango	3
Guanajuato	3
Jalisco	7
México	2
Michoacán	9
Morelos	1
Nayarit	1
Nuevo León	5
Oaxaca	4
San Luis Potosí	11
Sinaloa	12
Sonora	293
Tabasco	1
Tamaulipas	5
Veracruz	1
No data	115
TOTAL	561

Source:

http://www.dgis.salud.gob.mx/contenidos/basesdedatos/bdc_serviciosis.html

RESULTS

SURVEY WITH COCCIDIOIDIN ON 1,081 PEOPLE (2010-2011)

RESIDENCE PLACE	No. SAMPLES	No. POSITIVES	PREVALENCE
Aguascalientes	17	1.0	5.9
Baja California	112	42.0	37.5
Coahuila	105	52.0	49.5
Distrito Federal	210	14.0	6.7
Durango	130	1.0	0.8
Guanajuato	2	0	0
Guerrero	7	1.0	14.3
Hidalgo	29	0	0
México	32	2.0	6.3
Michoacán	6	0	0
Morelos	3	1.0	33.3
Nuevo León	123	49.0	39.8
Oaxaca	4	0	0
Puebla	3	0	0
San Luis Potosí	104	6.0	5.8
Sonora	194	130.0	67.0
Global prevalence	1081	299.0	27.7



RESULTS

Castañón-Olivares, *et al.* (2016)
unpublished data

276 people {
VLP 138 → 5 (3.6 %)
HLLO 138 → 69 (50.0 %)



RESULTS



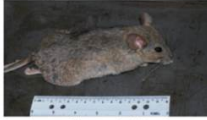
Baja California

- Coccidioidin skin test
- Municipal dog pound in Tijuana, B.C.
- 55 dogs → 3 (+) 5.5%

Anti-Coccidioides ANTIBODIES

AUTHOR AND YEAR	ANIMAL TYPE	PLACE	TEST AND NUMBER OF SAMPLES (a/b)*		
			OID	CIEF	ELISA
Castañón-Olivares, <i>et al.</i> 2013	Domestic dogs	Coahuila	1/52	1/52	-
Catalán-Dibene, <i>et al.</i> 2014	Wild rodents	Baja California	0/40	-	4/40
Castañón-Olivares, <i>et al.</i> 2014	Domestic dogs	Baja California, Coahuila and San Luis Potosí	3/100	-	-
Castañón-Olivares, <i>et al.</i> 2014	Wild rodents	Chihuahua	113/158	-	-
Castañón-Olivares <i>et al.</i> 2016	Domestic dogs	Baja California	-	-	41/87

a/b = positive samples/total samples
 OID = Ouchterlony immunodiffusion
 CIEF = Counter current immunoelectrophoresis
 ELISA = Enzyme-linked immunosorbent assay

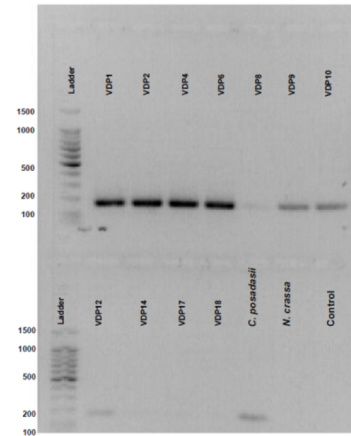


Sources:
 Castañón *et al.* *Mycopathologia* (2010) 169:427-430
 Catalán-Dibene *et al.* *Fungal Biology* (2014) 118:330-339
 Castañón-Olivares, *et al.* *Data no published*

Domestic dogs are very less sensitive to Coccidioides infection than wild animals.

RESULTS

Soil samples



AUTHOR AND YEAR	PLACE	TEST AND NUMBER OF SAMPLES (a/b)*	
		CULTURE	PCR
Baptista-Rosas, <i>et al.</i> 2012	Baja California	-	32/100
Castañón-Olivares, <i>et al.</i> 2013	Coahuila	0/27	
Catalán-Dibene, <i>et al.</i> 2014	Baja California	-	10/24
Vargas-Gastélum, <i>et al.</i> 2015	Baja California	-	11/40

*a/b = positives/total

Sources:

Castañón-Olivares, et al. Data not published

Baptista-Rosas, et al. Fungal Biology 5 (2012): 177-190

Catalán-Dibene, et al. Fungal Biology 118 (2014): 330-339

Vargas-Gastélum, et al. FEMS Microbiology Ecology 91 (2015): fiv044



Conclusions

At the moment, only the **Baja California** state meets the Fiese's criteria

However, the definition of endemic does not take into account:

- The sites of diagnosis of the disease are not always the places where the patient became infected.
- The capture of wild animals must be carried out by an expert, a situation that makes it difficult to verify that wild animals suffer coccidioidomycosis.
- The immunological response in domestic dogs is different from that of humans, so skin tests are not suitable to check previous infection in pets.
- The great difficulty of the isolation of the fungus from the soil allowed to develop molecular methods for the identification of DNA of *Coccidioides spp.* what seems to be more promising

Therefore, the experience suggests **updating** the concept of endemic area for coccidioidomycosis.

THE MEXICAN TEAM:



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ROBERTO



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RAQUEL



"FIRULAIS"



RAFAEL



ANA ROSA



JORGE



Román Chávez



José Pérez Madrigal



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Nydia Cañillo



Raúl Ponce



BERTHA MUÑOZ



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SONORA



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GLORIA GONZÁLEZ



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¡GRACIAS!! THANKS