

Brown et al, Supplementary material

Search terms

Database: Journals@Ovid Full Text <July 26, 2018>, Embase <1974 to 2018 July 26>, Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily, and Versions(R) <1946 to July 26, 2018>

Search Strategy:

-
- 1 Fungal keratitis {Including Limited Related Terms} (4387)
 - 2 Mycotic keratitis {Including Limited Related Terms} (4387)
 - 3 Keratomycosis {Including Limited Related Terms} (4387)
 - 4 Oculomycosis {Including Limited Related Terms} (199)
 - 5 Corneal ulcer {Including Limited Related Terms} (13894)
 - 6 Fungal infection of cornea] {Including Limited Related Terms} (4387)
 - 7 Infectious keratitis {Including Limited Related Terms} (10036)
 - 8 microbial keratitis {Including Limited Related Terms} (11687)
 - 9 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 (27705)
 - 10 incidence {Including Limited Related Terms} (47901)
 - 11 prevalence {Including Limited Related Terms} (114018)
 - 12 rate {Including Limited Related Terms} (114299)
 - 13 burden {Including Limited Related Terms} (28728)
 - 14 epidemiology {Including Limited Related Terms} (15781)
 - 15 10 or 11 or 12 or 13 or 14 (317552)
 - 16 9 and 15 (131)

Supplementary Figure 1

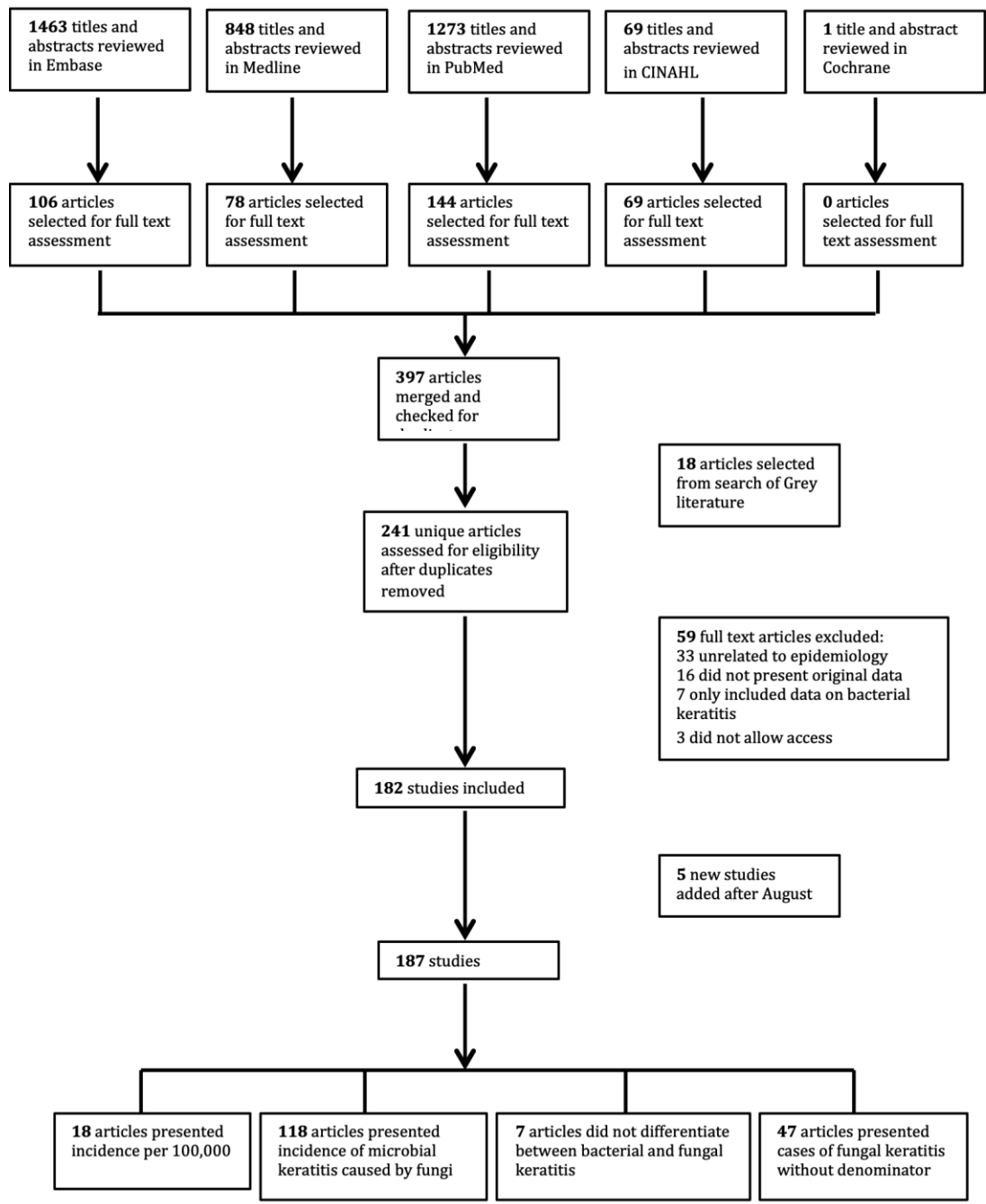
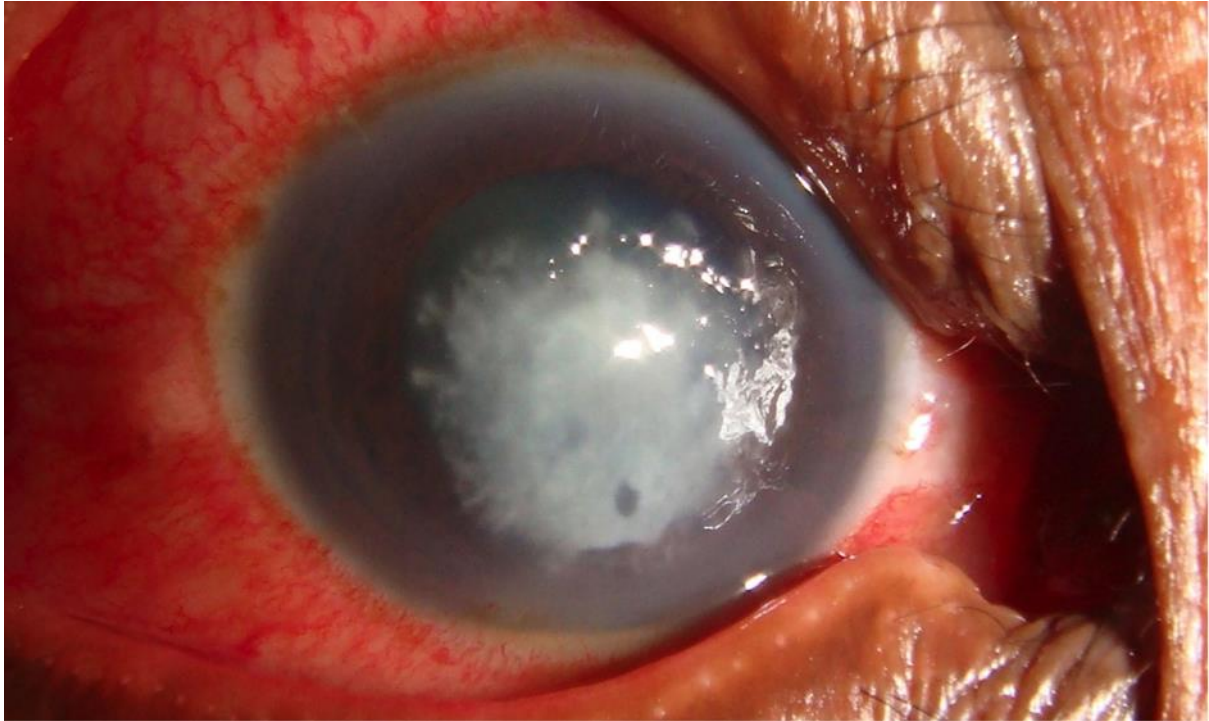


Figure 1 Literature search and study selection.

Supplementary Figure 2

Two examples of severe fungal keratitis:

A. Fungal keratitis caused by *Fusarium spp.*

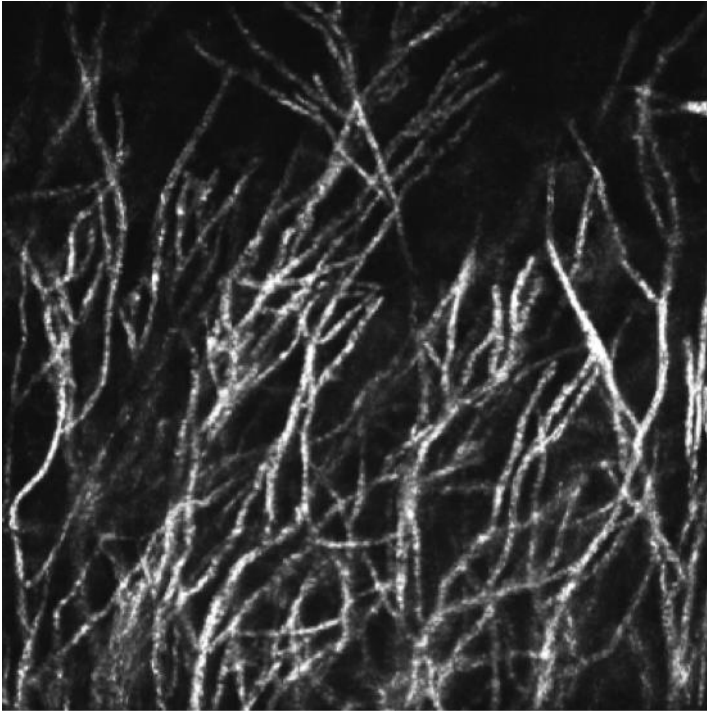


B. Fungal keratitis caused by *Curvularia lunata*



Supplementary Figure 3

In vivo confocal microscopy (IVCM) image of ulcer caused by *Fusarium* spp.



Supplementary Table 2: Scoring system for modified GRADE criteria. Age refers to the study publication year.

PCR/IVCM + Culture/smear	2
Culture, smear	1
Clinical suspicion only	0
Age	Score
≤5 yrs	2
5yrs < x ≤10 yrs	1
>10 yrs	0
Patient no	Score
≥30	1
<30	0
%FK/MK given	Score
Yes	1
No	0

Supplementary Table 3: Modified GRADE score for 18 papers that comprise the papers used for estimating annual incidence of fungal keratitis

Country (year)	Diagnostic accuracy (/2)	Patient n >30 (/1)	Up to date (/2)	%FK/MK (/1)	Overall score (/6)	Reference in supplementary
Malawi (2017)	0		2	0	2	2
Egypt (2012)	1	1	1	1	4	9
China (2013)	1		2	1	4	38
China (2010)	1	1	1	1	4	39
India (1993)	1	1	0	1	3	69
Nepal (2014)	1	1	2	1	5	96
Malaysia (2017)	1		2	0	3	108
Philippines (2013)	1		2	1	4	109
Thailand (2012)	1	1	1	1	4	114
Vietnam (2012)	2	1	1	0	4	118
Turkey (2017)	1	1	2	1	5	128
Denmark (2015)	2	0	2	0	4	130
Ireland (2011)	2	1	1	1	5	131
United Kingdom (2016)	2	1	2	1	6	134
Brazil (2011)	1	1	1	0	3	148
Columbia (2017)	1	1	2	1	5	153
USA (2010)	1	0	1	1	3	161
Australia (2008)	1	1	1	1	4	173

Supplementary Table 4: Fungal keratitis as a proportion of all microbial keratitis, and cases without a confirmed pathogen, GDP and distance from the equator. Where more than one study in past 10 years, a weighted mean has been calculated. Reference numbers refer to supplementary references

Country	Year	%FK/MK	Culture negative cases (%)	GDP per capita at median time of study (\$USD)	Mean distance from equator (km)#	Reference in supplementary or (in main text)
AFRICA						
Egypt	2011-2015	44.3*	192/608 (31.6)	3213	3003	6, 8, (m14), 9 189
Ethiopia	2014-5	45.1	-	571	1001	1
Ghana	1995	56.0	85/199 (42.7)	386	9110	17
Libya	2008-10	32.9	-	10,297	3114	11
Nigeria	1995-2005	15.8	71/169 (42)	379	1112	20
Sierra Leone	2005-6	39.0	4/73 (5)	292	941	22
South Africa	2013-15	2.2	-	6434	3399	16
Tanzania	2008-10	24.6	26/52 (46)	659	667	5 (m1)
Tunisia	1995-2016	15.4*	12/30 (40)	3195	3782	13, 15
ASIA						
Bangladesh	2008	39.2	24/120 (20)	616	2670	47
China	2009-2014	51.0*	1663/2973 (60.0)	5634	3893	28 (m16), 38 (m15)
China - Hong Kong	2004-2013	9.2	238/398 (59.8)	31,516	10,372	39, 40
China - Taiwan	2012-2014	8.2	-	24,818	7341	23
India	2003-2015	54.9*	9443/23799 (39.7)	1090	2447	49, 51-55, 58-60, 64, 66, 67, 75, 76, 78, 81, 83 (m6), 84, 85, 87-89
Iran	2007-2013	7.2*	55/70 (78.6)	6532	3559	90, 92, 93
Iraq	2013-2018	23.6*	32/105 (30.5)	4974	2281	178, 181
Japan	1999-2003	8.4 *	51/123 (41.5)	33,846	3969	43
Korea (RO)	2012-2014	10.0	-	18,640	3994	45
Malaysia	2007-2016	26.0	132/207 (63.8)	10,405	278	107, 108
Nepal	1981-2014	44.8	455/1745 (26.1)	220	3114	
Oman	2000-2007	23.0*	100/176 (56.8)	9070	1451	120, 121
Pakistan	2013	29.5	-	1272	3337	104
Philippines	2012-2014	27.0	-	2768	1446	109
Saudi Arabia	2006-2009	3.8	-	16,472	2781	123
Singapore	2012-2014	0.7	-	56,389	142	23
Sri Lanka	2012	40.4	-	3351	876	106
Thailand	2013	15.0	166/223 (74.4)	6168	8991	113 (m18), 114 (m19)
Turkey	2014-2015	9.4	395/620 (63.8)	12,127	4338	126
Vietnam	2008	60.0	-	1143	1798	119
EUROPE						
Netherlands	2014-2017	14.0	92/185 (50)	44,746	5812	142
Spain	2010-2016	1.0	92/297 (31)	29,212	4449	138
UK	2006-2017	6.9	-	41,791	6160	134 (m7), 183
LATIN AMERICA AND THE CARRIBEAN						
Brazil	1975-2013	13.9	581/2049 (28.4)	3495	1112	146, 147, 150-152

Mexico	2016	33.4	-	8444	2558	177
Paraguay	1988-2011	46.3*	-	1615	2595	154-156, 180
NORTH AMERICA						
USA	1976-2014	12.1	79/232 (34)	45,056	2748	158-161, (m22), 162, 163, 166, 167
OCEANIA						
Australia	1999-2004	7.3	-	19,483	2781	172
New Zealand	2003-2007	1.7	91/265 (34.4)	27,751	4549	174

FK = fungal keratitis; MK= microbial keratitis; GDP = gross domestic product

*Weighted mean

One degree of latitude is equivalent to about 111 kilometers (69 miles).

Supplementary Table 5: Trends in fungal keratitis as a proportion of all microbial keratitis over time. Reference numbers refer to supplementary references

Country	Year	%FK/MK	Size of study (eyes) (n)	Reference (in supplementary)
Tanzania	1994-1995	15.1	212	4
	2008-2010	24.6	170	5
Egypt	2012	55.0	60	9
	2011-2013	43.3	834	189
	2013-2015	55.5	247	6
Tunisia	1995-2012	12.4	60	13
	2016	30.0	100	15
Ghana	1995	56.1	199	17
	1999-2001	74.7	290	18
China (west)	1999-2004	61.9	1054	34
	2009-2013	71.7	2973	28
Hong Kong	1997-1998	6.4	223	39
	2004-2013	9.2	347	40
Japan	1999-2003	6.1	123	43
	2003	10.6	261	42
India – Aravind, South	1994	51.9	434	70
	1999-2002	52.1	3183	68
	2006-2009	63.0	5221	75
	2012-2013	75.8	252	67
Iran	2007-2009	9.4	466	92
	2011-2013	5.6	2180	90
	2012-2013	18.2	220	93
Nepal	1981	23.1	133	102
	1992-1993	22.1	558	98
	1998-1999	65.5	86	95
	2004-2008	61.1	351	94
	2006-2007	36.5	1880	99
	2007-2008	60.0	44	100
	2011	70.0	1644	103
	2011-2012	27.5	2768	97
Sri Lanka	1976-1981	33.3	66	105
	2012	40.4	1069	106
Malaysia	2007-2011	25.3	186	107
	2016	26.7	207	108
Thailand	1982-2003	13.6	556	112
	1988-2000	24.6	292	111
	2001-2004	39.2	127	117
	2004-2005	37.5	176	116
	2003-2006	50.8	310	115
Vietnam	1974-1982	23.6	1219	176
	2008	59.6	1153	118, 119

List of studies for full-text analysis

1. Kibret T, Bitew A. Fungal keratitis in patients with corneal ulcer attending Minilik II Memorial Hospital, Addis Ababa, Ethiopia. *BMC ophthalmol.* 2016;**16**(1):148.
2. Kalua K, Zimba B, Denning DW. Estimated burden of serious fungal infections in Malawi. *J Fungi.* 2018;**4**(2):61.
3. Hoarau G, Albrieux M, Martin-Phipps T, Zitte-Zehler K, Borry L, Peytral J, Garcia-Hermoso D, Picot S. Fungal keratitis: A 5-year monocentric retrospective study on Reunion Island. *J Fr Ophthalmol.* 2018;**41**(4):321-5.
4. Mselle J. Fungal keratitis as an indicator of HIV infection in Africa. *Trop Doct.* 1999;**29**(3):133-5.
5. Burton MJ, Pithuwa J, Okello E, Afwamba I, Onyango JJ, Oates F, Chevallier C, Hall AB. Microbial keratitis in East Africa: why are the outcomes so poor?. *Ophthal Epidemiol.* 2011;**18**(4):158-63.
6. Badawi AE, Moemen D, El-Tantawy NL. Epidemiological, clinical and laboratory findings of infectious keratitis at Mansoura Ophthalmic Center, Egypt. *Int J Ophthalmol.* 2017;**10**(1):61.
7. Saad-Hussein A, El-Mofty HM, Hassanien MA. Climate change and predicted trend of fungal keratitis in Egypt. *East Mediterr Health J.* 2011;**17**(6):468-73.
8. Zaki SM, Denning DW. Serious fungal infections in Egypt. *Eur J Clin Microbiol Infect Dis.* 2017;**36**(6):971-4.
9. Shabrawy RM, El Badawy NE, Harb AW. The incidence of fungal keratitis in Zagazig University Hospitals, Egypt and the value of direct microscopy and PCR technique in rapid diagnosis. *J Microbiol Infect Dis.* 2013;**3**(04):186-91.
10. Gharamah AA, Moharram AM, Ismail MA, AL-Hussaini AK. Bacterial and fungal keratitis in Upper Egypt: in vitro screening of enzymes, toxins and antifungal activity. *Indian J Ophthalmol.* 2014;**62**(2):196.
11. Mehta, Rishi & Mehta, Pratibha & V Raghavendra Rao, M & Acharya, Yogesh & Bala, Sireesha & Sowmya, Krishna. A Study of Fungal Keratitis in North Africa: Exploring Risk Factors and Microbiological Features. *IJLSSR.* 2016;**2**:579-582.
12. Anane S, Ayed NB, Malek I, Chebbi A, Lejri S, Bouguila H, Kaouech E, Belhadj S, Kallel K, Ayed S, Chaker E. Keratomycosis in the area of Tunis: epidemiological data, diagnostic and therapeutic modalities. *Ann Biol Clin-Paris.* 2010;**68**(4):441-447
13. Cheikhrouhou F, Makni F, Neji S, Trigui A, Sellami H, Trabelsi H, Guidara R, Fki J, Ayadi A. Epidemiological profile of fungal keratitis in Sfax (Tunisia). *J Mycol Med.* 2014;**24**(4):308-12.
14. Neji S, Trabelsi H, Cheikhrouhou F, Sellami H, Guidara R, Trigui A, Feki J, Boudaya S, Turki H, Makni F, Ayadi A. Fusariosis diagnosed in the laboratory of an UH in Tunisia: epidemiological, clinical and mycological study. *J Mycol Med.* 2013;**23**(2):130-5.
15. Zbiba W, Baba A, Bouayed E, Abdessalem N, Daldoul A. A 5-year retrospective review of fungal keratitis in the region of Cap Bon. *J Fr Ophthalmol.* 2016;**39**(10):843-8.
16. Schaftenaar E, Peters RP, Baarsma GS, Meenken C, Khosa NS, Getu S, McIntyre JA, Osterhaus AD, Verjans GM. Clinical and corneal microbial profile of infectious keratitis in a high HIV prevalence setting in rural South Africa. *Eur J Clin Microbiol Infect Dis.* 2016;**35**(9):1403-9.
17. Hagan M, Wright E, Newman M, Dolin P, Johnson G. Causes of suppurative keratitis in Ghana. *Br J Ophthalmol.* 1995;**79**(11):1024-8.
18. Leck AK, Thomas PA, Hagan M, Kaliyamurthy J, Ackuaku E, John M, Newman MJ, Codjoe FS, Opintan JA, Kalavathy CM, Essuman V. Aetiology of suppurative corneal ulcers in Ghana and south India, and epidemiology of fungal keratitis. *Br J Ophthalmol.* 2002;**86**(11):1211-5.
19. Dawodu OA, Osahon AI, Emifoniye E. Prevalence and causes of blindness in Otiabor Okhae teaching hospital, Irrua, Edo State, Nigeria. *Ophthal epidemiol.* 2003;**10**(5):323-30.
20. Oladigbolu K, Rafindadi A, Abah E, Samaila E. Corneal ulcers in a tertiary hospital in Northern Nigeria. *Ann Afr Med.* 2013;**12**(3):165.
21. Roth PN, Ba EA, Wane AM, De Meideros M, Dieng M, Ka A, Sow MN, Ndiaye MR, Wade A. Problème diagnostique et thérapeutique de la kératite mycosique en zone intertropicale. Intérêt de l'usage local de la polividone iodée. *J Fr Ophthalmol.* 2006;**29**(8):943-e1.

22. Capriotti JA, Pelletier JS, Shah M, Caivano DM, Turay P, Ritterband DC. The etiology of infectious corneal ulceration in Sierra Leone. *Int Ophthalmol*. 2010;**30**(6):637-40.
23. Khor WB, Prajna VN, Garg P, Mehta JS, Xie L, Liu Z, Padilla MD, Joo CK, Inoue Y, Goseyarakwong P, Hu FR. The Asia cornea society infectious keratitis study: A prospective multicenter study of infectious keratitis in Asia. *Am J Ophthalmol*. 2018;**195**:161-70.
24. Cao J, Yang Y, Yang W, Wu R, Xiao X, Yuan J, Xing Y, Tan X. Prevalence of infectious keratitis in Central China. *BMC Ophthalmol*. 2014 Dec;**14**(1):43.
25. Song X, Xie L, Tan X, Wang Z, Yang Y, Yuan Y, Deng Y, Fu S, Xu J, Sun X, Sheng X. A multi-center, cross-sectional study on the burden of infectious keratitis in China. *PLoS One*. 2014;**9**(12).
26. Chow J, Xu SC, Li L, Maslin J, Chadha N, Chen B, Teng CC. Epidemiology of Corneal Disease in Changsha, China. *Investig Ophthalmol Vis Sci*. 2015;**56**(7):6200.
27. He, H., Liu, H.S., Chen, X.L., Wu, J.C. and Zhong, X.W., 2017. Pathogenologic analysis on fungal keratitis in 81 eyes in Hainan Province. *Guoji Yanke Zazhi*. 2017;**17**(7):1330-3.
28. Lin L, Lan W, Lou B, Ke H, Yang Y, Lin X, Liang L. Genus distribution of bacteria and fungi associated with keratitis in a large eye center located in southern China. *Ophthal Epidemiol*. 2017;**24**(2):90-6.
29. Li Z, Cui H, Zhang L, Liu P, Bai J. Prevalence of and associated factors for corneal blindness in a rural adult population (the southern Harbin eye study). *Curr Eye Res*. 2009;**34**(8):646-51.
30. Sun XG, Zhang Y, Li R, Wang ZQ, Luo SY, Jin XY, Zhang WH. Etiological analysis on ocular fungal infection in the period of 1989-2000. *Chin Med J*. 2004;**117**(4):598-600.
31. Hua G, Yiwei T, Xiangming G, Jiahui L, Zhiwei C. Spectrum of fungal keratitis change in South China. *Chin J Exp Ophthalmol*. 2017;**35**(2):161-4.
32. Wang L, Sun S, Jing Y, Han L, Zhang H, Yue J. Spectrum of fungal keratitis in central China. *Clin Exp Ophthalmol*. 2009;**37**(8):763-71.
33. Sheng XL, Li HP, Liu QX, Rong WN, Du WZ, Ma L, Yan GH, Ma RQ, Zhang JL, Xu HF, Zou WQ. Prevalence and associated factors of corneal blindness in Ningxia in northwest China. *Int J Ophthalmol*. 2014;**7**(3):557.
34. Zhong WX, Sun SY, Zhao J, Shi WY, Xie LX. Retrospective study of suppurative keratitis in 1054 patients. *Chin J Ophthalmol*. 2007;**43**(3):245-50.
35. Zhong WX, Xie LX, Shi WY, Sun SY. Spectrum of infection of fungal keratitis: analysis of 654 cases. *Chin J Ophthalmol*. 2006;**86**(24):1681-5.
36. Wang LY, Zhang YQ, Wang Y, Wang G, Lu J, Deng J. Spectrum of mycotic keratitis in China. *Chin J Ophthalmol*. 2000;**36**(2):138-40.
37. Zhang Y, Wang ZQ, Sun XG. Analysis of etiology and in vitro drug susceptibility of fungal keratitis in northern China. *Chin J Ophthalmol*. 2018;**54**(6):432-6.
38. Zhu L, Wu J, Perlin DS, Denning DW. Burden of serious fungal infections in China. In Proceedings of the 23rd European Congress of Clinical Microbiology and Infectious Diseases (ECCMID), Berlin, Germany 2013;**2013**:27-30.
39. Houang E, Lam D, Fan D, Seal D. Microbial keratitis in Hong Kong: relationship to climate, environment and contact-lens disinfection. *T Roy Soc Trop Med H*. 2001;**95**(4):361-7.
40. Ng AL, To KK, Yuen LH, Yim SM, Chan KS, Lai JS, Wong IY. Predisposing factors, microbial characteristics, and clinical outcome of microbial keratitis in a tertiary centre in Hong Kong: a 10-year experience. *J ophthalmol*. 2015;**2015**.
41. Fong CF, Tseng CH, Hu FR, Wang IJ, Chen WL, Hou YC. Clinical characteristics of microbial keratitis in a university hospital in Taiwan. *Am J Ophthalmol*. 2004;**137**(2):329-36.
42. National Surveillance of Infectious Keratitis in Japan. National Surveillance of Infectious Keratitis in Japan--current status of isolates, patient background, and treatment. *Jpn J Ophthalmol*. 2006;**110**(12):961.
43. Toshida H, Kogure N, Inoue N, Murakami A. Trends in microbial keratitis in Japan. *Eye Contact Lens*. 2007;**33**(2):70-3.
44. Han SB, Lim TH, Wee WR, Lee JH, Kim MK. Current characteristics of infectious keratitis at a tertiary referral center in South Korea. *Jpn J Ophthalmol*. 2009;**53**(5):549.
45. Huh K, Ha YE, Denning DW, Peck KR. Serious fungal infections in Korea. *Eur J Clin Microbiol Infect Dis*. 2017;**36**(6):957-63.

46. Dunlop AA, Wright ED, Howlader SA, Nazrul I, Husain R, McClellan K, Billson FA. Suppurative corneal ulceration in Bangladesh: a study of 142 cases examining the microbiological diagnosis, clinical and epidemiological features of bacterial and fungal keratitis. *Aust New Zeal J Ophthalmol.* 1994;**22**(2):105-10.
47. Talukder AK, Halder SK, Sultana Z, Bhuiyan SI. Epidemiology and outcome of non viral keratitis. *Mymensingh Med J.* 2011;**20**(3):356-61.
48. Basak SK, Basak S, Mohanta A, Bhowmick A. Epidemiological and microbiological diagnosis of suppurative keratitis in Gangetic West Bengal, eastern India. *Indian J Ophthalmol.* 2005;**53**(1):17.
49. Bandyopadhyay S, Das D, Mondal KK, Ghanta AK, Purkait SK, Bhaskar R. Epidemiology and laboratory diagnosis of fungal corneal ulcer in the Sundarban Region of West Bengal, eastern India. *Nepalese J Ophthalmol.* 2012;**4**(1):29-36.
50. Sundaram BM, Badrinath S, Subramanian S. Studies on Mycotic Keratitis: Untersuchungen über Pilzkeratitis. *Mycoses.* 1989;**32**(11):568-72.
51. Saha S, Banerjee D, Khetan A, Sengupta J. Epidemiological profile of fungal keratitis in urban population of West Bengal, India. *Oman J Ophthalmol.* 2009;**2**(3):114.
52. Padmaja N, Rao PN. Microbiological study of corneal ulcers at Kims, Amalapuram. *J Evol Med Dent Sci.* 2014;**3**(17):4525-9.
53. Rautaraya B, Sharma S, Kar S, Das S, Sahu SK. Diagnosis and treatment outcome of mycotic keratitis at a tertiary eye care center in eastern India. *BMC ophthalmol.* 2011;**11**(1):39.
54. Nath R, Baruah S, Saikia L, Devi B, Borthakur A, Mahanta J. Mycotic corneal ulcers in upper Assam. *Indian J Ophthalmol.* 2012;**60**(4):336.
55. Roy P, Das S, Singh NP, Saha R, Kajla G, Sneha K, Gupta VP. Changing trends in fungal and bacterial profile of infectious keratitis at a tertiary care hospital: A six-year study. *Clin Epidemiol Glob Health.* 2017;**5**(1):40-5.
56. Kumari N, Xess A, Shahi SK. A study of keratomycosis: our experience. *Indian J Pathol Micro.* 2002;**45**(3):299-302.
57. Bashir G, Shah A, Thokar MA, Rashid S, Shakeel S. Bacterial and fungal profile of corneal ulcers-a prospective study. *Indian J Pathol Micro.* 2005;**48**(2):273.
58. Ghosh AK, Gupta A, Rudramurthy SM, Paul S, Hallur VK, Chakrabarti A. Fungal keratitis in North India: spectrum of agents, risk factors and treatment. *Mycopathologia.* 2016;**181**(11-12):843-50.
59. Gill PK, Devi P. Keratomycosis—a retrospective study from a North Indian tertiary care institute. *J Indian Acad Clin Med.* 2011;**12**:271-3.
60. Binnani A, Gupta PS, Gupta A. Epidemio-clinico-microbiological study of mycotic keratitis in north-west region of Rajasthan. *Mycopathologia.* 2018;**183**(4):717-22.
61. Chander J, Singla N, Agnihotri N, Arya SK, Deep A. Keratomycosis in and around Chandigarh: a five-year study from a north Indian tertiary care hospital. *Indian J Pathol Micro.* 2008;**51**(2):304.
62. Chowdhary A, Singh K. Spectrum of fungal keratitis in North India. *Cornea.* 2005;**24**(1):8-15.
63. Chander J, Sharma A. Prevalence of fungal corneal ulcers in northern India. *J Infection.* 1994;**22**(3):207-9.
64. Gupta A, Capoor MR, Gupta S, Kochhar S, Tomer A, Gupta V. Clinico-demographical profile of keratomycosis in Delhi, North India. *Indian J Med Micro.* 2014;**32**(3):310.
65. Saha R, Das S. Mycological profile of infectious keratitis from Delhi. *Indian J Med Res.* 2006;**123**(2):159.
66. Gupta N, Vashist P, Tandon R, Gupta SK, Dwivedi S, Mani K. Prevalence of corneal diseases in the rural Indian population: The Corneal Opacity Rural Epidemiological (CORE) study. *Br J Ophthalmol.* 2015;**99**(2):147-52.
67. Chidambaram JD, Venkatesh Prajna N, Srikanthi P, Lanjewar S, Shah M, Elakkiya S, Lalitha P, Burton MJ. Epidemiology, risk factors, and clinical outcomes in severe microbial keratitis in South India. *Ophthal Epidemiol.* 2018;**25**(4):297-305.
68. Bharathi MJ, Ramakrishnan R, Meenakshi R, Padmavathy S, Shivakumar C, Srinivasan M. Microbial keratitis in South India: influence of risk factors, climate, and geographical variation. *Ophthal Epidemiol.* 2007;**14**(2):61-9.

69. Gonzales CA, Srinivasan M, Whitcher JP, Smolin G. Incidence of corneal ulceration in Madurai district, South India. *Ophthalm Epidemiol.* 1996;**3**(3):159-66.
70. Srinivasan M, Gonzales CA, George C, Cevallos V, Mascarenhas JM, Asokan B, Wilkins J, Smolin G, Whitcher JP. Epidemiology and aetiological diagnosis of corneal ulceration in Madurai, south India. *Br J Ophthalmol.* 1997;**81**(11):965-71.
71. Gopinathan U, Garg P, Fernandes M, Sharma S, Athmanathan S, Rao GN. The epidemiological features and laboratory results of fungal keratitis: a 10-year review at a referral eye care center in South India. *Cornea.* 2002;**21**(6):555-9.
72. Gopinathan U, Sharma S, Garg P, Rao GN. Review of epidemiological features, microbiological diagnosis and treatment outcome of microbial keratitis: experience of over a decade. *Indian J Ophthalmol.* 2009;**57**(4):273.
73. Lalitha P, Prajna NV, Manoharan G, Srinivasan M, Mascarenhas J, Das M, D'Silva SS, Porco TC, Keenan JD. Trends in bacterial and fungal keratitis in South India, 2002–2012. *Br J Ophthalmol.* 2015;**99**(2):192-4.
74. Kotigadde S, Ballal M, Kumar A, PN SR, Shivananda PG. Mycotic keratitis: a study in coastal Karnataka. *Indian J Ophthalmol.* 1992;**40**(1):31.
75. Lin CC, Prajna L, Srinivasan M, Prajna NV, McLeod SD, Acharya NR, Lietman TM, Porco TC. Seasonal trends of microbial keratitis in South India. *Cornea.* 2012;**31**(10):1123.
76. Shenoy, K. Epidemiological pattern and risk factors of corneal ulcers in Malabar region of coastal Kerala. *Res J Pharm Biol Chem Sci.* 2013; 4(2):1479-1488
77. Venugopal PL, Venugopal TL, Gomathi A, Ramakrishna ES, Ilavarasi S. Mycotic keratitis in Madras. *Indian J Pathol Microbiol.* 1989;**32**(3):190-7.
78. Mascarenhas J, Lalitha P, Prajna NV, Srinivasan M, Das M, D'Silva SS, Oldenburg CE, Borkar DS, Esterberg EJ, Lietman TM, Keenan JD. Acanthamoeba, fungal, and bacterial keratitis: a comparison of risk factors and clinical features. *Am J Ophthalmol.* 2014;**157**(1):56-62.
79. Sathyanarayan MS, Sonth SB, Surekha YA, Mariraj J, Krishna S. Epidemiology and aetiological diagnosis of keratomycosis in a tertiary care hospital in north Karnataka. *Int J Curr Res.* 2013;**5**(6):92.
80. Leck AK, Thomas PA, Hagan M, Kaliamurthy J, Ackuaku E, John M, Newman MJ, Codjoe FS, Opintan JA, Kalavathy CM, Essuman V. Aetiology of suppurative corneal ulcers in Ghana and south India, and epidemiology of fungal keratitis. *Br J Ophthalmol.* 2002;**86**(11):1211-5.
81. Ranjini CY, Waddepally VV. Microbial profile of corneal ulcers in a tertiary care hospital in South India. *J Ophthalm Vis Res.* 2016;**11**(4):363.
82. Rajmane VS, Ghatole MP, Kothadia SN. Prevalence of oculomycosis in a tertiary care centre. *Al Ameen J Med Sci.* 2011;**4**:334-8.
83. Deorukhkar S, Katiyar R, Saini S. Epidemiological features and laboratory results of bacterial and fungal keratitis: a five-year study at a rural tertiary-care hospital in western Maharashtra, India. *Singapore Med J.* 2012;**53**(4):264.
84. Katara RS, Patel ND, Sinha M. A clinical microbiological study of corneal ulcer patients at western Gujarat, India. *Acta Med Iran.* 2013;**51**(6):399-403.
85. Kumar A, Pandya S, Kavathia G, Antala S, Madan M, Javdekar T. Microbial keratitis in Gujarat, Western India: findings from 200 cases. *Pan Afr Med J.* 2011;**10**:48.
86. Deshpande SD, Koppikar GV. A study of mycotic keratitis in Mumbai. *Indian J Path Microbiol.* 1999;**42**(1):81-7.
87. Tewari A, Sood N, Vegad MM, Mehta DC. Epidemiological and microbiological profile of infective keratitis in Ahmedabad. *Indian J Ophthalmol.* 2012;**60**(4):267.
88. Satpathi, P. and Satpathi, S. Study of microbial keratitis in central India. *J Infect Dev Ctries.* 2011;**6**:295-298
89. Pichare A, Patwardhan N, Damle AS, Deshmukh AB. Bacteriological and mycological study of corneal ulcers in and around Aurangabad. *Indian J Path Microbiol.* 2004;**47**(2):284-6.
90. Ebadollahi-Natanzi A, Arab-Rahmatipour G, Tabatabaei SA. Prevalence of fungal keratitis (FK) in patients with corneal ulcers in Tehran, Iran. *Asia Pac J Med Toxicol.* 2016;**5**(3):94-7
91. Nowroozpoor-Dailami, K. Fungal keratitis in patients with corneal ulcer in Sari, Northern Iran. Archives of Iranian Medicine. *Arch Iran Med.* 2006;**9**(3):222-7.

92. Berenji F, Elahi SR, Fata AM, Khakshour H, Darakhshan A. Fungal keratitis in patients at Imam Reza Hospital, Mashhad (1982–2001). *Med J Mashhad Univ Med Sci.* 2003;**45**(78):49-54.
93. Mohammadi, F., Peyman, A., Dehghan, P., Razmjou, H., Maherolnaghsh, M., Falahati, M. and Aminian, N. Prevalence of fungal keratitis in patients with corneal ulcer. *J Isfahan Med Sch.* 2015;**32**(308):1863-1869
94. Amatya R, Shrestha S, Khanal B, Gurung R, Poudyal N, Bhattacharya SK, Badu BP. Etiological agents of corneal ulcer: five years prospective study in eastern Nepal. *Nepal Med Coll J.* 2012;**14**(3):219-22.
95. Khanal B, Kaini KR, Deb M, Badhu B, Thakur SD. Microbial keratitis in eastern Nepal. *Trop Doct.* 2001;**31**(3):168-9.
96. Khwakhali US, Denning DW. Burden of serious fungal infections in Nepal. *Mycoses.* 2015;**58**:45-50.
97. Bastola P, Mishra A, Chaudhary N, Nath HK, Mehrotra AN. Spectrum of Mycotic corneal ulcers in Mid Western peripheral region of Terrain belt of Nepal and Indo-Nepal Border. *Nepal J Med Sci.* 2013;**2**(1):42-7.
98. Upadhyay MP, Karmacharya PC, Koirala S, Shah DN, Shakya S, Shrestha JK, Bajracharya H, Gurung CK, Whitcher JP. The Bhaktapur eye study: ocular trauma and antibiotic prophylaxis for the prevention of corneal ulceration in Nepal. *Br J Ophthalmol.* 2001;**85**(4):388-92.
99. Ganguly S, Salma KC, Sharma M, Bastola P, Pradhan R. Pattern of fungal isolates in cases of corneal ulcer in the western periphery of Nepal. *Nepal J Ophthalmol.* 2011;**3**(2):118-22.
100. Lavaju P, Arya SK, Khanal B, Amatya R, Patel S. Demographic pattern, clinical features and treatment outcome of patients with infective keratitis in the eastern region of Nepal. *Nepal J Ophthalmol.* 2009;**1**(2):101-6.
101. Suwal S, Bhandari D, Thapa P, Shrestha MK, Amatya J. Microbiological profile of corneal ulcer cases diagnosed in a tertiary care ophthalmological institute in Nepal. *BMC Ophthalmol.* 2016;**16**(1):209.
102. Upadhyay MP, Rai NC, Brandt F, Shrestha RB. Corneal ulcers in Nepal. *Graef Arch Clin Exp Ophthalmol.* 1982;**219**(2):55-9.
103. Sitoula RP, Singh SK, Mahaseth V, Sharma A, Labh RK. Epidemiology and etiological diagnosis of infective keratitis in eastern region of Nepal. *Nepal J Ophthalmol.* 2015;**7**(1):10-5.
104. Gugnani HC, Denning DW. Estimated burden of serious fungal infections in Jamaica by literature review and modelling. *West Indian Med J.* 2015;**64**(3):245.
105. Gonawardena SA, Ranasinghe KP, Arseculeratne SN, Seimon CR, Ajello L. Survey of mycotic and bacterial keratitis in Sri Lanka. *Mycopathologia.* 1994;**127**(2):77-81.
106. Jayasekera PI, Denning D, Perera P, Fernando A, Kudavidanage S. The burden of serious fungal infections in Sri Lanka. *Mycoses.* 2013;**56**:103.
107. Mohd-Tahir F, Norhayati A, Siti-Raihan I, Ibrahim M. A 5-year retrospective review of fungal keratitis at Hospital Universiti Sains Malaysia. *Interdiscip Perspect Infect Dis.* 2012;**2012**(3).
108. Ratnalingam V, Umapathy T, Sumugam K, Hanafi H, Retnasabapathy S. Microbial keratitis in West and East Malaysia. *Int Eye Sci.* 2017;**17**(11):1989-92.
109. Batac MC, Denning D. Serious fungal infections in the Philippines. *Eur J Clin Micro Infect Dis.* 2017;**36**(6):937-41.
110. Wong TY, Fong KS, Tan DT. Clinical and microbial spectrum of fungal keratitis in Singapore: a 5-year retrospective study. *Int Ophthalmol.* 1997;**21**(3):127-30.
111. Boonpasart SA, Kasetwan NG, Puangsricharn VI, Pariyakanok LA, Jitpoonkusol T. Infectious keratitis at King Chulalongkorn Memorial Hospital: a 12-year retrospective study of 391 cases. *J Med Assoc Thai.* 2002;**85**:S217-30.
112. Hirunpat C, Masae N. Fungal keratitis in Songklanagarind Hospital. *J Res Health Sci.* 2005;**23**(6):429-34.
113. Imwidthaya P. Mycotic keratitis in Thailand. *J Med Vet Mycol.* 1995;**33**(1):81-2.
114. Chayakulkeeree M, Denning DW. Serious fungal infections in Thailand. *Eur J Clin Microbiol Infect Dis.* 2017;**36**(6):931-5.

115. Tananuvat N, Punyakhum O, Ausayakhun S, Chaidaroon W. Etiology and clinical outcomes of microbial keratitis at a tertiary eye-care center in northern Thailand. *J Med Assoc Thai.* 2012;**95**(4):S8-17.
116. Prabhasawat P, Trethipwanit KO, Prakairungthong N, Narenpitak S, Jaruroteskulchai S, Anantachai J. Causes of corneal blindness: a multi-center retrospective review. *J Med Assoc Thai.* 2007;**90**(12):2651.
117. Sirikul T, Prabripataloong T, Smathivat A, Chuck RS, Vongthongsri A. Predisposing factors and etiologic diagnosis of ulcerative keratitis. *Cornea.* 2008;**27**(3):283-7.
118. Beardsley J, Denning DW, Chau NV, Yen NT, Crump JA, Day JN. Estimating the burden of fungal disease in Vietnam. *Mycoses.* 2015;**58**:101-6.
119. Nhung PH, Thu TA, Ngoc LH, Ohkusu K, Ezaki T. Epidemiology of fungal keratitis in North Vietnam. *J Clin Exp Ophthalmol.* 2012;**3**(7):238.
120. Idiculla T, Zachariah G, Keshav BR, Basu S. A retrospective study of fungal corneal ulcers in the south Sharqiyah region in Oman. *Sultan Qaboos Univ Med J.* 2009;**9**(1):59.
121. Keshav BR, Zacheria G, Ideculla T, Bhat V, Joseph M. Epidemiological characteristics of corneal ulcers in South Sharqiya Region. *Oman Med J.* 2008;**23**(1):34.
122. Taj-Aldeen SJ, Chandra P, Denning DW. Burden of fungal infections in Qatar. *Mycoses.* 2015;**58**:51-7.
123. Alkatan H, Athmanathan S, Canites CC. Incidence and microbiological profile of mycotic keratitis in a tertiary care eye hospital: a retrospective analysis. *Saudi J Ophthalmol.* 2012;**26**(2):217-21.
124. Jastaneiah SS, Al-Rajhi AA, Abbott D. Ocular mycosis at a referral center in Saudi Arabia: A 20-year study. *Saudi J Ophthalmol.* 2011;**25**(3):231-8.
125. Khairallah SH, Byrne KA, Tabbara KF. Fungal keratitis in Saudi Arabia. *Doc Ophthalmol.* 1992;**79**(3):269-76.
126. Erdem E, Yagmur M, Boral H, Ilkit M, Ersoz R, Seyedmousavi S. Aspergillus flavus keratitis: experience of a tertiary eye clinic in Turkey. *Mycopathologia.* 2017;**182**(3-4):379-85.
127. Yilmaz S, Ozturk I, Maden A. Microbial keratitis in West Anatolia, Turkey: a retrospective review. *Int Ophthalmol.* 2007;**27**(4):261-8.
128. Hilmioglu-Polat S, Seyedmousavi S, Ilkit M, et al. Estimated burden of serious fungal infections in Turkey. *Mycoses* 2018;**62**:22-31.
129. Beardsley J, Denning DW, Chau NV, Yen NT, Crump JA, Day JN. Estimating the burden of fungal disease in Vietnam. *Mycoses.* 2015;**58**:101-6.
130. Nielsen SE, Nielsen E, Julian HO, Lindegaard J, Højgaard K, Ivarsen A, Hjortdal J, Heegaard S. Incidence and clinical characteristics of fungal keratitis in a Danish population from 2000 to 2013. *Acta Ophthalmol.* 2015;**93**(1):54-8.
131. Farrell S, McElnea E, Moran S, Knowles S, Murphy CC. Fungal keratitis in the Republic of Ireland. *Eye.* 2017;**31**(10):1427-34.
132. Galarreta DJ, Tuft SJ, Ramsay A, Dart JK. Fungal keratitis in London: microbiological and clinical evaluation. *Cornea.* 2007;**26**(9):1082-6.
133. Tuft SJ, Tullo AB. Fungal keratitis in the United Kingdom 2003–2005. *Eye.* 2009;**23**(6):1308-13.
134. Ong HS, Fung SS, Macleod D, Dart JK, Tuft SJ, Burton MJ. Altered patterns of fungal keratitis at a London ophthalmic referral hospital: an eight-year retrospective observational study. *Am J Ophthalmol.* 2016;**168**:227-36.
135. Seal DV, Kirkness CM, Bennett HG, Peterson M, Keratitis Study Group. Population-based cohort study of microbial keratitis in Scotland: incidence and features. *Cont Lens Anterior Eye.* 1999;**22**(2):49-57.
136. Bassetti M, Carnelutti A, Peghin M, Aversa F, Barchiesi F, Girmenia C, Pagano L, Sanguinetti M, Tortorano AM, Montagna MT, Viale P. Estimated burden of fungal infections in Italy. *J Infect.* 2018;**76**(1):103.
137. Arsenijević VA, Denning DW. Estimated burden of serious fungal diseases in Serbia. *J Fungi.* 2018;**4**(3):76.
138. Gordillo MM, Cano NB, Luquin AG, Gutiérrez CL, Verdú EM, Cabrera GT, Fierro JG, Mateu JL, España JS, Álvarez PM, Lera RF. Queratitis secundaria a Fusarium spp. en España 2012-2014. *Arch Soc Esp Oftalmol.* 2018;**93**(6):283-9.

139. Gaujoux T, Borsali E, Goldschmidt P, Chaumeil C, Baudouin C, Nordmann JP, Sahel JA, Laroche L, Borderie VM. Fungal keratitis in France. *Acta Ophthalmol.* 2011;**89**(2):e215-6.
140. Giacomazzi J, Baethgen L, Carneiro LC, Millington MA, Denning DW, Colombo AL, Pasqualotto AC, in association with the LIFE program. The burden of serious human fungal infections in Brazil. *Mycoses.* 2016;**59**(3):145-50.
141. Walther G, Stasch S, Kaerger K, Hamprecht A, Roth M, Cornely OA, Geerling G, Mackenzie CR, Kurzai O, von Lilienfeld-Toal M. Fusarium keratitis in Germany. *J Clin Microbiol.* 2017;**55**(10):2983-95.
142. Birker IL, Cheng YY, Luyten GP. Infectious corneal ulcers: a rising incidence in a Dutch referral centre. *Acta Ophthalmol.* 2018;**96**:3-3
143. Iselin KC, Baenninger PB, Schmittinger-Zirm A, Thiel MA, Kaufmann C. Fungal Keratitis: A Six-Year Review at a Tertiary Referral Centre. *Klin Monatsbl Augenhe.* 2017;**234**(04):419-25.
144. Denning DW, Chakrabarti A. Pulmonary and sinus fungal diseases in non-immunocompromised patients. *Lancet Infect Dis.* 2017;**17**(11):e357-66.
145. Vanzzini Zago V, Alcantara Castro M, Naranjo Tackman R. Support of the laboratory in the diagnosis of fungal ocular infections. *J Inflamm Res.* 2012;**27**(2):57-61.
146. Cariello AJ, Passos RM, Yu MC, Hofling-Lima AL. Microbial keratitis at a referral center in Brazil. *Int Ophthalmol.* 2011;**31**(3):197.
147. Furlanetto RL, Andreo EG, Finotti LG, Arcieri ES, Ferreira MA, Rocha FJ. Epidemiology and etiologic diagnosis of infectious keratitis in Uberlandia, Brazil. *Eur J Ophthalmol.* 2010;**20**(3):498-503.
148. Ibrahim MM, Vanini R, Ibrahim FM, Fioriti LS, Furlan EM, Provinzano LM, De Castro RS, De Faria Esousa SJ, Rocha EM. Epidemiologic aspects and clinical outcome of fungal keratitis in southeastern Brazil. *Eur J Ophthalmol.* 2009;**19**(3):355-61.
149. Ibrahim MM, de Angelis R, Lima AS, de Carvalho GD, Ibrahim FM, Malki LT, de Paula Bichuete M, de Paula Martins W, Rocha EM. A new method to predict the epidemiology of fungal keratitis by monitoring the sales distribution of antifungal eye drops in Brazil. *PLoS One.* 2012;**7**(3).
150. Marujo FI, Hirai FE, Yu MC, Hofling-Lima AL, Freitas DD, Sato EH. Distribution of infectious keratitis in a tertiary hospital in Brazil. *Arquivos brasileiros de oftalmologia.* 2013;**76**(6):370-3.
151. Müller, G.G., Kara-José, N. and Castro, R.S.D. Epidemiological profile of keratomycosis at the HC-UNICAMP. *Arq Bras Oftalmol.* 2012;**75**(4):247-250.
152. Cury ES, Chang MR, Pontes ER. Non-viral microbial keratitis in adults: clinical and laboratory aspects. *Braz J Microbiol.* 2018;**49**:205-12.
153. Alvarez-Moreno CA, Cortes JA, Denning DW. 2018. Burden of Fungal Infections in Colombia. *J Fungi* 2018;4:41
154. Laspina F, Samudio M, Cibils D, Ta CN, Fariña N, Sanabria R, Klauß V, de Kaspar HM. Epidemiological characteristics of microbiological results on patients with infectious corneal ulcers: a 13-year survey in Paraguay. *Graef Arch Clin Exp Ophthalmol.* 2004;**242**(3):204-9.
155. De Kaspar HM, Zoulek G, Paredes ME, Alborno R, Medina D, de Morinigo MC, de Fresco MO, Aguero F. Mycotic keratitis in Paraguay: Mykotische Keratitis in Paraguay. *Mycoses.* 1991;**34**(5-6):251-4.
156. Nentwich MM, Bordón M, Di Martino DS, Campuzano AR, Torres WM, Laspina F, Lichi S, Samudio M, Farina N, Sanabria RR, de Kaspar HM. Clinical and epidemiological characteristics of infectious keratitis in Paraguay. *Int Ophthalmol.* 2015;**35**(3):341-6.
157. Erie JC, Nevitt MP, Hodge DO, Ballard DJ. Incidence of ulcerative keratitis in a defined population from 1950 through 1988. *Arch Ophthalmol.* 1993;**111**(12):1665-71.
158. Varaprasathan G, Miller K, Lietman T, Whitcher JP, Cevallos V, Okumoto M, Margolis TP, Yinghui M, Cunningham Jr ET. Trends in the etiology of infectious corneal ulcers at the FI Proctor Foundation. *Cornea.* 2004;**23**(4):360-4.
159. Pachigolla G, Blomquist P, Cavanagh HD. Microbial keratitis pathogens and antibiotic susceptibilities: a 5-year review of cases at an urban county hospital in north Texas. *Eye Cont Lens.* 2007;**33**(1):45-9.

160. Truong D, Cavanagh HD. Microbial Keratitis in North Texas: Public and Private Patient Populations. *Investig Ophthalmol Vis Sci.* 2016;**57**(12):2345-.
161. Jeng BH, Gritz DC, Kumar AB, Holsclaw DS, Porco TC, Smith SD, Whitcher JP, Margolis TP, Wong IG. Epidemiology of ulcerative keratitis in Northern California. *Arch Ophthalmol.* 2010;**128**(8):1022-8.
162. McLeod SD, Kolahdouz-Isfahani A, Rostamian K, Flowers CW, Lee PP, McDonnell PJ. The role of smears, cultures, and antibiotic sensitivity testing in the management of suspected infectious keratitis. *Ophthalmol.* 1996;**103**(1):23-8.
163. Liesegang TJ, Forster RK. Spectrum of microbial keratitis in South Florida. *Am J Ophthalmol.* 1980;**90**(1):38-47.
164. Iyer SA, Tuli SS, Wagoner RC. Fungal keratitis: emerging trends and treatment outcomes. *Eye Cont Lens.* 2006;**32**(6):267-71.
165. Gower EW, Keay LJ, Oechsler RA, Iovieno A, Alfonso EC, Jones DB, Colby K, Tuli SS, Patel SR, Lee SM, Irvine J. Trends in fungal keratitis in the United States, 2001 to 2007. *Ophthalmol.* 2010;**117**(12):2263-7.
166. Ho JW, Fernandez MM, Rebong RA, Carlson AN, Kim T, Afshari NA. Microbiological profiles of fungal keratitis: a 10-year study at a tertiary referral center. *J Ophthal Inflamm Infect.* 2016;**6**(1):1-4.
167. Ritterband DC, Seedor JA, Shah MK, Koplín RS, McCormick SA. Fungal keratitis at the New York eye and ear infirmary. *Cornea.* 2006;**25**(3):264-7.
168. Jurkunas U, Behlau I, Colby K. Fungal keratitis: changing pathogens and risk factors. *Cornea.* 2009;**28**(6):638-43.
169. Yildiz EH, Abdalla YF, Elsahn AF, Rapuano CJ, Hammersmith KM, Laibson PR, Cohen EJ. Update on fungal keratitis from 1999 to 2008. *Cornea.* 2010;**29**(12):1406-11.
170. Tanure MA, Cohen EJ, Sudesh S, Rapuano CJ, Laibson PR. Spectrum of fungal keratitis at Wills eye hospital, Philadelphia, Pennsylvania. *Cornea.* 2000;**19**(3):307-12.
171. Bhartiya P, Daniell M, Constantinou M, Islam FA, Taylor HR. Fungal keratitis in Melbourne. *Clin Exp Ophthalmol.* 2007;**35**(2):124-30.
172. Green M, Apel A, Stapleton F. A longitudinal study of trends in keratitis in Australia. *Cornea.* 2008;**27**(1):33-9.
173. Thew MR, Todd B. Fungal keratitis in far north Queensland, Australia. *Clin Exp Ophthalmol.* 2008;**36**(8):721-4.
174. Pandita A, Murphy C. Microbial keratitis in Waikato, New Zealand. *Clin Exp Ophthalmol.* 2011;**39**(5):393-7.
175. Lai TH, Jhanji V, Young AL. Microbial keratitis profile at a university hospital in hong kong. *Int Sch Res Notices.* 2014;**2014**.
176. Nguyễn DT, Nguyễn H. Keratomycoses in Viet-Nam. *Revue internationale du trachome et de pathologie oculaire tropicale et subtropicale et de sante publique: organe de la Ligue contre le trachome avec la collaboration de l'International Organization against Trachoma et des organisation.* 1990;**67**:203-6.
177. Parra-Rodríguez DS, García-Carmona KP, Vázquez-Maya L, Bonifaz A. Incidencia de úlceras corneales microbianas en el Servicio de Oftalmología del Hospital General de México Dr. Eduardo Liceaga. *Rev Mex Oftalmol.* 2016;**90**(5):209-14.
178. Al-Shakarchi F. Initial therapy for suppurative microbial keratitis in Iraq. *Br J Ophthalmol.* 2007;**91**(12):1583-7.
179. Al-Shakarchi FI, Hussein MA, Al-Shaibani AB. Profile of Microbial Keratitis at a Referral Center in Iraq. *Al-Nahrain J Sci.* 2015;**18**(1):141-7.
180. Arrúa M, Laspina F, Samudio M, Fariña N, Cibils D, Sanabria R, Carpinelli L, Stanley J, Kaspar H. Infectious keratitis: clinical and microbiological characteristics. 2003-2006 period. *Mem Inst Investig Cienc Salud.* 2008;**6**(1):05-14.
181. Khalil ZK, Hadi AM, Al-Kamil SS. Determination and Prevalence of Bacterial and Fungal Keratitis among Patients in Baghdad City. *J Pure Appl Microbio.* 2018;**12**(3):1455-64.
182. Chew R, Woods ML. Epidemiology of fungal keratitis in Queensland, Australia. *Clin Exp Ophthalmol.* 2019;**47**(1):26-32.

183. Tavassoli S, Nayar G, Darcy K, Grzeda M, Luck J, Williams OM, Tole D. An 11-year analysis of microbial keratitis in the South West of England using brain–heart infusion broth. *Eye*. 2019;**33**(10):1619-25.
184. Maurin JF, Renard JP, Ahmedou O, Bidaux F, Dordain Y, Pariselle J, Froussart F, Dot C, Rigal-Sastourne JC. Corneal blindness in tropical areas. *Med Trop (Mars)*. 1995;**55**(4 Pt 2):445-9.
185. Roth M, Daas L, Renner-Wilde A, Cvetkova-Fischer N, Saeger M, Herwig-Carl M, Matthaei M, Fekete A, Kakkassery V, Walther G, von Lilienfeld-Toal M. The German keratomycosis registry: Initial results of a multicenter survey. *Ophthalmologe*. 2019;**116**(10):957.
186. Minervini P, Albera P, Villada M. Fungal Keratitis: Epidemiological Profile in Argentina. *Curr Fung Infect Rep*. 2018;**12**(4):144-8.
187. Mahmoudi S, Masoomi A, Ahmadikia K, Tabatabaei SA, Soleimani M, Rezaie S, Ghahvechian H, Banafsheafshan A. Fungal keratitis: An overview of clinical and laboratory aspects. *Mycoses*. 2018;**61**(12):916-30.
188. Tena D, Rodríguez N, Toribio L, González-Praetorius A. Infectious keratitis: microbiological review of 297 cases. *Japanese J Infect Dis*. 2019;**72**(2):121-123
189. Khater MM, Shehab NS, El-Badry AS. Comparison of mycotic keratitis with nonmycotic keratitis: an epidemiological study. *J Ophthalmol*. 2014;**2014**.