



## Molecular detection of Adenovirus type 2 among conjunctivitis patients in Khartoum state- Sudan

Asmaa Yousuf Shambal<sup>1</sup>, Nasraldeen M. A. Bush<sup>1</sup>, Salwa Hassan Mohamed Basheer<sup>1</sup>, Musa Abdalla Ali<sup>2</sup> and Marwa M. A. Mohammed<sup>1</sup>

<sup>1</sup>Alneelain University-faculty of medical laboratory science-microbiology department;  
Khartoum, Sudan

<sup>2</sup> Khartoum University – faculty of medical laboratory science-microbiology department;  
Khartoum, Sudan

Email: [asmayosuf350@gmail.com](mailto:asmayosuf350@gmail.com)

### Abstract

**Background:** Adenoviruses are a group of viruses that can infect the membranes (tissue linings) of the respiratory tract, eyes, intestines, and urinary tract. Diagnosis of conjunctivitis and differentiation between bacterial, viral, and noninfectious conjunctivitis are usually clinical. PCR and other rapid, office-based immunodiagnostic tests can be useful especially when the inflammation is severer.

**Objective:** This study aimed to detect adenovirus among conjunctivitis infected patients to figure out the possibility of using PCR technique to achieve that goal.

**Methods:** By using PCR for DNA products of 45 conjunctivitis swabs, to detect adenovirus type 2.

**The Results:** Only one sample gave a positive result out of 45 samples detected (2.2%)

**Conclusion:** It seems to be no adenovirus spreading enough among patients causing their eye illness, therefore other causative agents for conjunctivitis may be existence, as in Sudan most of the year the climate not suitable for adenovirus survival as it lives in cold and wet environments unlike what above local one. However, if any signs suggest bacterial conjunctivitis (eg, purulent discharge), cultures or other studies may be useful. The prevalence of adenoviral conjunctivitis in the study population was lower than the prevalence in other regions of the world.

**Key words:** Conjunctivitis, Human adenoviruses (HAdVs), polymerase chain reaction (PCR).

### References

1. Buckwalter SP, Teo R, Espy MJ, Sloan LM, Smith TF, Pritt BS. 2012; Real-time qualitative PCR for 57 human adenovirus types from multiple specimen sources. *J Clin Microbiol.* 50(3): 766–771.
2. Buznach N, Dagan R, Greenberg D. 2005; Clinical and bacterial characteristics of acute bacterial conjunctivitis in children in the antibiotic resistance era. *Pediatr Infect Dis J.* 24(9): 823–8.
3. Chang CH, Lin KH, Sheu MM, Huang WL, Wang HZ, Chen CW. 2003; The change of etiological agents and clinical signs of epidemic viral conjunctivitis over an 18- year period in Southern Tai wan. *Graefes Arch Clin Exp Ophthalmol.* 241(7):554–60.
4. De Jong JC, Wermenbol AG, Verweij-Uijterwaal MW, Slaterus KW, Wertheim-Van Dillen P, Van Doornum GJ, Khoo SH, Hierholzer JC. 1999; Adenoviruses from human immunodeficiencyvirus-infected individuals, including two strains that represent new candidate serotypes Ad50 and Ad51 of species B1 and D, respectively. *J Clin Microbiol.* 37(12):3940–394.
5. Dalapathy S, Lily TK, Roy S, 1998; Madhavan HN. Development and use of nested polymerase chain reaction (PCR) for the detection of adenovirus from conjunctivitis specimens. *J Clin Virol.* 11(1):77–84.
6. Dalapathy S, Therese KL, Roy S, Madhavan HN. 1998; Development and use of nested polymerase chain reaction (PCR) for the detection of adenovirus from conjunctivitis specimens. *J Clin Virol.* 11:77–84.
7. Erdman DD, Xu W, Gerber SI, Gray GC, Schnurr D, Kajon AE, Anderson LJ. 2002; Molecular Epidemiology of Adenovirus Type 7 in the United States, 1996-2000. *Emerg Infect Dis.* 8(3):269–77.
8. Fitch CP, Rapoza PA, Owens S, Murillo-Lopez F, Johnson RA, Quinn TC, et al. 1989; Epidemiology and diagnosis of acute conjunctivitis at an inner-city hospital. *Ophthalmology.* 96(8):1215-20.
9. Ghazali O, Chua KB, Ng KP, Hooi PS, Pallansch MA, Oberste MS, et al. 2003; An outbreak of acute haemorrhagic conjunctivitis in Melaka, Malaysia. *Singapore Med J.* 44(10):511-6.
10. Harding SP, Mallinson H, Smith JL, Clearkin LG. 1987; Adult follicular conjunctivitis and neonatal ophthalmia in a Liverpool eye hospital, 1980-1984. *Eye (Lond).* 1( Pt 4):512-21.
11. Human Adenovirus Working Group Human Adenovirus Genotype Classification, <http://hadvwg.gmu.edu/> accessed Dec. 7th, 2013.
12. Huang GH, Xu WB., Bing Du Xue Bao. 2013; Recent advance in new types of human adenovirus *May;* 29(3): 342–348.



13. Ishiko H, Shimada Y, Konno T, Hayashi A, Ohguchi T, Tagawa Y, et al. 2008; Novel human adenovirus causing nosocomial epidemic kerato-conjunctivitis. *J ClinMicrobiol.* 46(6):2002–8.
14. Innis MA, Gelfano DH. Optimization of PCRs. In: Innis MA, Gelfano DH, Snisnsky JJ, White TJ, editors. 1990; PCR protocols: a guide to methods and applications. New York: Academic Press; p.3-12.
15. Ishii K, Nakazono N, Fujinaga K, Fujii S, Kato M, Ohtsuka H, et al. 1987; Comparative studies on aetiology and epidemiology of viral conjunctivitis in three countries of East Asia--Japan, Taiwan and South Korea. *Int J Epidemiol.* 16(1):98-103.
16. Jackson R, Morris DJ, Cooper RJ, Bailey AS, Klapper PE, Cleator GM et al. 1996; Multiplex polymerase chain reaction for adenovirus and herpes simplex virus in eye swabs. *J Virol Methods* 56:41-8.
17. Jawetz E, Kimura S, Nicholas AN, Thygeson P, Hanna L. 1955; new type of APC virus from epidemic keratoconjunctivitis. *Science.*; 122 (3181):1190–1191.
18. Jin XH, Ishiko H, Nguyen TH, Ohguchi T, Akanuma M, Aoki K, Ohno S. 2006; Molecular Epidemiology of Adenoviral Conjunctivitis in Hanoi, Vietnam. *Am J Ophthalmol.* 142(2):1064–6.
19. Maranhao AG, Soares CC, Albuquerque MC, Santos N. 2009; Molecular epidemiology of Adenovirus Conjunctivitis in Rio de Janeiro, Brazil, between 2004 and 2007. *Rev Inst Med Trop Sao Paulo.* 51(4):227–9.
20. Mandelboim M, Dror P, Azar R, Bromberg M, Mendelson E. 2011; Adenovirus Infections in Hospitalized Patients in Israel: Epidemiology and Molecular Characterization. *J ClinMicrobiol.* 49(2):597–601.
21. Maranhão AG, Soares CC, Albuquerque MCM, Santos N. 2009; Molecularepidemiology of adenovirus conjunctivitis in Rio de Janeiro, Brazil,between 2004 and 2007. *Rev Inst Med Trop Sao Paulo.* 51(4):227-9.
22. Mendes RM, Nogueira ML, Marques JT, Pereira MVC, de Souza Machado MA, Cunha AS, et al. 2004; A rapid polymerase chain reaction protocol to detect adenovirus in eye swabs.*Arq Bras Oftalmol.* 67:423–7.
23. Nimir AR, Saliem A, Ibrahim IA. 2012; OphthalmicParasitosis: A review Article. *InterdiscipPerspect Infect Dis.* 2012:587402.
24. Pinto RD, Lira RP, Arieta CE, Castro RS, Bonon SH. 2015; The prevalence of adenoviral conjunctivitis at the Clinical Hospital of the State University of Campinas, Brazil. *Clinics.* 70(11):748-750.
25. Rowe WP, Huebner RJ, Gilmore LK, Parrot RH, Ward TG. 1953; Isolation of a cytopathogenic agent from human adenoids undergoing spontaneous degeneration in tissue culture. *Proc Soc Exp Biol Med.*; 84(3): 570–573.
26. Stenson S, Newman R, Fedukowicz H. 1982; Laboratory studies in acute conjunctivitis. *Arch Ophthalmol.* 100(8):1275-7.
27. Swenson PD, Wadell G, Allard A, Hierholzer JC. 2003. *Manual of Clinical Microbiology*, vol 2. 8. Washington, DC: ASM Press; Adenoviruses.
28. Torres Rojas G, Goyenechea A, Savón C, Valdés O, Oropesa I. 1998; [The incidence of adenoviruses in viral conjunctivitis]. *Rev Cubana Med Trop.* 50(3):182-5.
29. Walls T, Shankar AG, Shingadia D. 2003; Adenovirus: an increasingly important pathogen in paediatric bone marrow transplant patients. *Lancet Infect Dis.*; 3(2):79–86.
30. Wolfel R, Pfeffer M, Essbauer S, Nerkelun S, Dobler G. 2006; Evaluation of sampling technique and transport media for the diagnostics of adenoviral eye infections.*Adenovirus sampling and transport.Graefes Arch ClinExpOphthalmol.* 244(11):1497–504.
31. Waldman EA, Takimoto S, Ishida MA, Kitamura C, Mendonca LI. 1990; [Enterovirus 70 in the metropolitan region of São Paulo, Brazil, from 1984 to 1987: infection aspects in endemic and epidemic periods]. *Rev Inst Med Trop Sao Paulo.* 32(3):221-8.
32. Weiss A, Brinser JH, Nazar-Stewart V. 1993; Acute conjunctivitis in childhood. *J Pediatr.* 122(1):10-4,
33. Zhang L, Zhao N, Sha J, Wang C, Jin X, Amer S, et al. 2016; Virology and epidemiology analyses of global adenovirus-associated conjunctivitis outbreaks, 1953-2013. *Epidemiol Infect.* 144(8): 1661–72.