

# Age-specific incidence and prevalence of keratoconus: a nationwide registration study

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# Background

- Most cited incidence 1 new cases per 50,000 per year<sup>1</sup>
- Most cited prevalence 1 per 2,000 people<sup>1</sup>
- Computer-based technologies have improved the ability to diagnose keratoconus



- Higher rates among Asians<sup>3,4,5</sup>
- Incidence and prevalence of keratoconus in the Netherlands have never been investigated

1. Kennedy RH, Bourne WM, Dyer JA. A 48-year clinical and epidemiologic study of keratoconus. *Am J Ophthalmol* 1986;101:267–73.
2. Cozma I, Atherley C, James NJ. Influence of ethnic origin on the incidence of keratoconus and associated atopic disease in Asian and white patients. *Eye (Lond)* 2005;19:924–5; author reply 925–6.
3. Georgiou T, Funnell CL, Cassels-Brown A, O’Conor R. Influence of ethnic origin on the incidence of keratoconus and associated atopic disease in Asians and white patients. *Eye (Lond)* 2004;18:379–83.
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# Aim

What are the annual incidence and prevalence of keratoconus in the Netherlands?



# Dutch healthcare system & data

- Healthcare coverage mandatory in the Netherlands
- Basic coverage determined by Dutch government
  - Same coverage for all health insurance providers
- Healthcare consumptions carefully registered
  - Diagnosis and Treatment Combination (DTC, in Dutch: '*Diagnose Behandel Combinatie*')
- Data from Achmea
  - largest health insurance provider (31% market share)



# Methods

- DTC code 457: keratoconus / cornea dystrophy extracted
  - Selection based on disease properties: 10-40 years
- Annual incidence based on new cases
- Prevalence based on incidence, mean patient age at the time of diagnosis and average life expectancy in the Netherlands<sup>1</sup>



# Results

- Achmea covered 4.4 million people in 2014
  - 1.6 million people within age range 10-40 years
- New cases of keratoconus: 216
  - mean age 28.3 years
  - 60.6% of patients was male



# Results

- **Incidence 1 / 7,500** or 13.3 new cases per 100,000 (95% CI: 11.6 to 15.2 per 100,000)
- **Prevalence 1 / 375** or 265 cases per 100,000 (95% CI: 260 to 270 per 100,000)





## Discussion - Strengths

- Large sample size -> precise estimates
- Representative sample -> generalizable results
- Sensitive diagnostics -> up-to-date estimates



# Discussion - Considerations

- Possible overestimation because DTC code 457 is not exclusively used for keratoconus
  - UMC Utrecht: >90% indeed keratoconus
- Possible underestimation because not all DTC codes are registered
  - Open DIS data: DBC 457 in 2014: 90% complete<sup>1</sup>
- Racial information was not registered
  - No opportunity to investigate racial differences



## Discussion - Comparison with literature

	<u>Country</u>	<u>Incidence</u>	<u>Prevalence</u>	<u>Setting</u>
Our study	Netherlands	1 / 7,500	1 / 375	Nationwide registry
Kennedy (1986)	U.S.	1 / 50,000	1 / 1,800	Single centre
Ihalainen (1986)	Finland	1 / 70,000	1 / 3,500	Single centre
Georgiou (2004)	U.K. (Asians)	1 / 4,000	NA	Single centre
	U.K. (Whites)	1 / 30,000	NA	Single centre
Hashemi (2013)	Iran	NA	1 / 130	Random sample



# Take home message

Keratoconus in the Netherlands / Western society is more common than previously suggested

