Epidemiology and Transmission Dynamics of COVID-19 in two Indian States

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Summary

Methods

- The study was conducted in Tamil Nadu and Andhra Pradesh, known for their primary health care models. Both states initiated rigorous disease surveillance and contact tracing early in response to the pandemic.
- The first case was detected on 5th March. Syndromic surveillance and SARS CoV-2 testing for all individuals seeking care for severe acute respiratory illness (SARI) or influenza like illness (ILI) was done at health care facilities
- Delineation of 5 km containment zones surrounding cases was done with house-to-house surveillance to identify individuals with symptoms and daily follow-up of all contacts of laboratory confirmed or suspect cases. Testing of these individuals was done 5–14 days after their contact with a primary case irrespective of symptoms.
- Comprehensive surveillance and contact tracing data from these programs were analysed to understand clinical outcomes of Covid-19 and transmission dynamics

Results:

- The analysis includes data collected through 1 August at which time Tamil Nadu and Andhra Pradesh had identified 263,330 and 172,209 cases, respectively
- Contact tracing reached 3,084,885 known exposed contacts of confirmed cases
- Individual level epidemiological data on cases and contacts as well as laboratory test results were available from 575,071 tested contacts of 84,965 confirmed cases.
- The mean number of contacts tested per index case was 7.3 (2–9)
- The estimated overall secondary attack rate was 10.7% for high risk contacts and 4.7% for low risk contacts
- The overall case fatality ratio was 2.06% (1.98%–2.14%). Age-specific estimates ranged from 0.05% at 5–17 years to 16.6% at ages >85 years. Risk of death was higher among males than females. Half of the cases succumbed within <6 days of testing.
- The cases showed a younger age distribution as compared to USA
- Only 17.9% of Covid-19 deaths were among individuals >75 years as compared with 58.1% of Covid-19 deaths in USA
- Among those who died the most prevalent comorbid conditions were diabetes (45%), sustained hypertension (36.2%), coronary artery disease (12.3%) and renal disease (8.2%).
- No secondary infections were linked to 71% of cases whose contacts were traced and tested
- High prevalence of infection was seen among children who were contacts of cases around their own age

Conclusions:

- Reported cases and deaths have been concentrated in younger cohorts as compared to higher income countries
- The results suggest that social interaction among children may be conducive to transmission
- Time to mortality is less than what has been observed internationally

Appraisal:

- Strengths

  - First largeepidemiological study from India characterising the disease pattern, outcome and transmission dynamics
  - Study takes into consideration transmission dynamics across all age groups thereby allowing a better understanding of the role of different age groups in Covid-19 transmission and susceptibility.
- Weakness
  - Contact tracing done for 20% of reported cases
  - Data is representative of the population who participated in contact tracing and surveillance. Therefore, may not be reflective of the complete population.
  - Possibility of false negatives particularly among contacts tested as few as 5 days after exposure
  - Lack of data on timing of exposure and symptom onset in relation to testing dates
  - Co-morbid data was not collected for all diagnosed cases
  - Life expectancy at birth is lower in India (69 years) as compared to USA (79 years), China (77 years) or Italy (83 years). Therefore, there may be a survivorship bias in the study and there may be other socio-economic factors in play which are difficult to tease out in this study.

Opinion:

This study highlights some significant differences with regard to the disease pattern between lower- and middle-income countries (like two states in India) and advanced countries, in that both cases and deaths were commoner in the younger cohorts. This has important implications to formulate preventive strategies in India especially with regard to school re-opening.The study highlights the importance of integrating public health measures such as active prospective surveillance, optimized data recording, and contact tracing in order to understand the nature of transmission and infectivity of an infectious agent like Covid-19. While the study focuses on two states which provided this data, additional primary data is required from the other states.

Appraisers

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