

# Disease burden and epidemiological characteristics of influenza in Mongolia

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## 論文内容要旨

The Mongolian influenza surveillance system has gradually improved over the last four decades since its beginning in 1970s. The current study was aimed to investigate the disease burden and epidemiological characteristics of influenza by analyzing the data collected from the ongoing national influenza like illness (ILI) and severe acute respiratory infection (sARI) surveillance in Mongolia.

In this study, both the weekly ILI and sARI surveillance data from the 2007/8 to 2013/14 influenza seasons were included. The data included the number of patients with ILI, total visits to outpatient clinics, the number of patients with sARI, total admissions to hospitals, the number of laboratory-confirmed influenza cases by virus type/subtype, and the number of specimens tested from the sentinel sites located in seven provinces and Ulaanbaatar city. For laboratory testing, nasopharyngeal swabs were collected from selected patients with ILI and sARI per site and per week for the entire year and tested using real time-reverse transcription-polymerase chain reaction (rt-RT-PCR). Selected samples negative for influenza were tested for other respiratory pathogens including respiratory syncytial virus (RSV), rhinovirus (RV), parainfluenza virus (hPIV), and human metapneumovirus (hMPV) by multiplex rt-RT-PCR. The spatio-temporal spreads of influenza were mapped for the study

periods.

During the seven influenza seasons, ILI cases occupied 1,797,655 (5.1%) out of total 35,572,137 outpatient visits and the average incidence rate was 14.6 per 100 population. The overall ILI incidence rate for the seven seasons was highest among those aged less than 5 years (86.0 per 100 population) and lowest in the age group of 25–44 years (2.5 per 100 population).

A total of 106,003 sARI patients were recorded. The overall sARI incidence rate for the seven seasons was calculated to be 0.9 per 100 population. The highest rate was observed in those aged less than 5 years for all seasons with the overall rate of 6.9 per 100 population.

During the study period, a total of 22,582 (1.3%) specimens from ILI cases were tested and the overall positive rate for influenza viruses was 11.4%. It was highest in children aged 5–9 years (14.4%) and lowest in adults aged 45–64 years (7.5%). Among sARI cases, 14,536 (13.7%) cases were tested and 1,511 (10.4%) were positive for influenza viruses. The highest positive rate was observed in young adults aged 16–24 years (23.1%), and the lowest positive rate in children aged less than 5 years old (7.1%).

Predominant strains of influenza virus were varied between the seasons.

Selected samples negative for influenza viruses from ILI and sARI cases from the 2010/11 to 2013/14 seasons were tested for other respiratory viruses. Among sARI cases, RSV was a major causative virus in 2010/11 and 2011/12 whereas RV was in 2012/13 and 2013/14. RSV positive rate was higher in hospitalized children less than 5 years than outpatient cases. Among ILI episodes, RV was the most frequently detected virus.

A plot of weekly number of influenza positives showed a clear seasonal pattern of influenza nationwide. Typically, first influenza cases were detected from late October to early January and reached a peak in February.

The distribution of influenza positives in a map showed the synchronization of predominant strains across provinces in the seven consecutive seasons except the 2013/14 season. In summary, this study highlights that in Mongolia, influenza viruses as well as other respiratory viruses like RSV and RV contributed to a significant burden in both ILI and sARI children aged less than 5 years old.

## 審査結果の要旨

博士論文題目 Disease burden and epidemiological characteristics of influenza in Mongolia  
(モンゴル国でのインフルエンザの疫学的特徴及び疾病負荷に関する研究)

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本研究は2007年~2014年までの7シーズンにわたるモンゴルでのインフルエンザ・サーベイランスのデータの疫学解析を行ったものである。定点医療機関を、インフルエンザ様疾患（Influenza-like illness : ILI）で外来受診した患者と、重症急性呼吸器感染症（severe acute respiratory infection: sARI）で入院した患者の情報を収集し、またILIとsARI患者から採取された検体をreal time reverse-transcription polymerase chain reaction (rt-RT-PCR)でインフルエンザウイルスの検査を行った。さらに一部検体についてはその他の呼吸器ウイルスについての検索も行った。この結果、7シーズンのILIによる外来受診は1,797,655例になり、これは総外来受診者の5.1%にあたり、人口100人当たりの罹患率の平均は14.6であった。年齢別のILI罹患率は5歳未満が最も高く（人口100人当たり86.0）、25~44歳が最も低かった（人口100人当たり2.5）。sARIは106,003例が報告され、全体での罹患率は人口100人当たり0.9で、sARIの罹患率も5歳未満が最も高かった（人口100人当たり6.9）。ILI症例からは22,582件の検体が採取され、うち11.4%がインフルエンザウイルス陽性であった。sARI症例からは14,536件の検体が採取され、1,511件（10.4%）がインフルエンザウイルス陽性だった。最も多いインフルエンザ型・亜型はシーズンによって異なっていた。インフルエンザ以外のウイルスとしてはrespiratory syncytial virus (RSV)とrhinovirus(RV)が多く検出された。週ごとのインフルエンザ陽性数を解析すると、明確な季節性を認め、通常は10月から翌年の1月までに最初のインフルエンザウイルスが検出され、2月にピークを迎えていた。インフルエンザウイルスの地理的分布を解析した結果、ほとんどのシーズンではほぼ同時期に同じ型・亜型が見られることが明らかになった。

本論文の研究はモンゴルのインフルエンザサーベイランスのデータを始めて詳細に解析したものであり、いくつかの新たな知見も得られており、学術的価値も高い。よって、本論文は博士（医学）の学位論文として合格と認める。

### 学力確認結果の要旨

審査委員出席のもとに、学力確認のための試問を行った結果、本人は医学に関する十分な学力と研究指導能力を有することを確認した。

なお、英学術論文に対する理解力から見て、外国語に対する学力も十分であることを認めた。