Resources and Pilot Results for Establishing a Mongolian Twin Register

Bayasgalan Gombojav,1,9 Otgonbayar Damdinbazar,2,9 Narandalai Danshiitsoodol,3,9 Gonchigsuren Dagvasumberel,4,9 Erkhembulgan Purevdorj,8 Enkhtsetseg Gombojav,9 Urjinbadam Chuluunbaatar,4 Chimedsuren Ochir,5 Purevdorj Ichinkhorloo,7,9 and Joohon Sung10

1Institute of Environment and Health, School of Public Health, Seoul National University, Seoul, Korea
2Division of Educational Policy and Management, Health Sciences University of Mongolia, Ulaanbaatar, Mongolia
3Medical Faculty, Graduate School of Biomedical and Health Sciences, Hiroshima University, Hiroshima, Japan
4Twin Union of Mongolia, Ulaanbaatar, Mongolia
5Department of Epidemiology, School of Public Health, Health Sciences University of Mongolia, Ulaanbaatar, Mongolia
6Department of Medical Care Policy, Implementation and Coordination, Ministry of Health, Ulaanbaatar, Mongolia
7Department of Molecular Biology and Genetics, Health Sciences University of Mongolia, Ulaanbaatar, Mongolia
8Department of Higher Education, Ministry of Education and Science, Ulaanbaatar, Mongolia
9Healthy Twin Association of Mongolia, Ulaanbaatar, Mongolia
10Complex Disease and Genome Epidemiology Branch, Department of Epidemiology, School of Public Health, Seoul National University, Seoul, Korea

Despite the need to provide evidence-based health policy, most developing countries suffer from a lack of resources for sound epidemiologic evidence. Most twin registers have been established in developed countries and there are relatively fewer twin registers in developing countries. Considering the immense potential of twin research, it will be worthwhile to attempt to establish a new twin register in Mongolia, where biomedical studies are still scarce. Our objectives were to initiate the process of establishing a nationwide twin register in Mongolia, based on a nationwide, population-based database. With the approval and support of the Ministry of Population Development and Social Welfare of Mongolia, we were able to access an initial list of 411 twin pairs who live in the district of Ulaanbaatar, the capital city of Mongolia. By developing a questionnaire to estimate zygosity, we conducted a pilot survey. Those who registered consisted of 822 individuals or 411 twin pairs (same sex: male — 178; female — 157; different sex — 76), two sets of triplets (same sex: female — 2). The age of twins ranged from 1 to 81 (mean age 7.3 ± 11.3), and 52.4% were males. The first twin survey in Mongolia not only resulted in interim data for the Mongolian Twin Register, but has the potential for establishing a larger register by using the national database. It has been proven possible to establish a twin register for research purposes in Mongolia.

Keywords: twin register, twin research

Methods

Setting

The Mongolian Twin Register is based in Songinokhairkhan, one of the nine districts of Ulaanbaatar, the capital city of Mongolia. In 2011, the population of Ulaanbaatar numbered 1.3 million people, which accounts for...
50% of the total population of Mongolia. Each district is divided into khoroos, which is the smallest administrative unit in terms of population size (approximately 8,000 people in each). There are a total of 32 khoroos and 240,295 people in Songinokhairkhan, which accounts for 25% of the total population of Ulaanbaatar.

Participants

Ascertainment of twins. We randomly selected nine khoroos from the Songinokhairkhan district. The municipal register in each khoro of the capital contains information such as data on births, names, and deaths of all residents. Thus, these civil registration records were used to identify the source of participants for the twin register. The national registration data lacked the 8-digit individual identification number given to all Mongolians at birth, consisting of the date of birth (first 6 digits, year-month-day). Participants are sorted by last name, birth date, and home address. Persons born on the same day and same place, and given the same surname at birth, as well as living in the same home, are almost certainly twins.

Pilot Study

Randomly selected participants for a pilot study were identified and letters sent to those participants explaining the study in more detail. The participants were offered the right to refuse to participate. They were informed that interviews could take place in their own home or at the research center. Twins were excluded if the individuals said they were not twins; one or both of the pair had died or gone abroad; or there were no twins at the given address. Fieldworkers completed the interview (consisting of four pages, and lasting 20 minutes). A group of eight individuals (mostly students from a medical college) were extensively trained as field workers.

Zygosity Determination

We assessed zygosity using a questionnaire. Six questions to estimate zygosity were asked. Pairs where both twins reported a ‘water drop-like resemblance’, and schoolteachers or friends ‘always or nearly always’ had problems distinguishing between them were categorized as monozygotic (MZ). The pairs who did not report having a ‘water drop-like resemblance’, and were ‘seldom’ or ‘never’ confused by teachers or friends were categorized as dizygotic (DZ). All remaining pairs, including those pairs whose zygosity categories conflicted, were assessed as uncertain zygosity.

Anthropometric Measure and Heritability Estimation

Birth weight, height, and weight were self-reported and body mass index was calculated as the ratio of weight (kg) to height (in meters) squared. The twin birth rates were computed by dividing the number of twins by the total number of births and multiplying the outcome by 1000.

Results

Total births and twin live births in Mongolia from 2001 to 2011 are shown in Table 1. A total of 600,211 births were recorded during this 11-year period. Of these, 11,448 were twin births. The 2001 twin birth rate was 7.8 per 1,000. This rose slightly in 2002, when the twin birth rate was 9.1 per 1,000. The twinning rate rose sharply between 2006 and 2010 (from 9.2 to 10.6) and was fairly stable in 2011.

Those who registered comprise 822 individuals or 411 twin pairs (same sex: male — 178; female — 157; different sex — 76), 2 sets of triplets (same sex: female — 2). The oldest twins and triplets are 81 and 16 years old, respectively; 79.8% of twins are less than 10 years old (Table 2). The mean age was 6.5 ± 9.3 years and 8.1 ± 12.8 years for men and women, respectively, and 52.4% were male. Interviews were performed on 77 twin pairs or 154 individuals. Those twins who were interviewed comprised 39 male pairs (18 pairs classified as MZ, 20 as DZ, and 1 as XZ) and 38 female pairs (22 pairs classified as MZ, 13 as DZ, and 3 as XZ; see Table 2). Mean observed anthropometric values are showed in Table 3. Heritability of height, weight, and birth weight as well as BMI was 0.98, 0.84, 0.45, and 0.31, respectively.

Discussion

We report the results of the pilot study for establishing twin registration in Mongolia. The rate of twin births rose sharply from 9.2 to 10.6 per 1,000 births in 2006 and 2010, respectively, and was quite stable in 2011. It is well documented that the twinning rate is much lower in Mongoloid people (Hur & Song, 2009; Rushton, 1990) to that in other races.
The highest twinning rates found across Central Africa are 18–30 twin sets per 1,000 live births, and twinning rates in the United States were reported as 31.4 per 1,000 in 2009; Fell & Joseph, 2012). In detail, the twin birth rate of countries such as China and Vietnam is 9 twins per 1,000 births on average. There are also very low twin birth rates observed in Japan (7.8 per 1,000 in 2007; Kurosawa et al., 2012) and Singapore (7 per 1,000 in 2001; Chia et al., 2004). Compared with these twin birth rates, the twinning rate in Mongolia is rising and slightly higher.

In recent years, there have been various efforts made to improve civil registration and vital statistics systems in Mongolia. However, despite these efforts, there are still significant levels of under-registration, which can be traced back to the lack of awareness of its importance. Moreover, civil migration statistics are still inadequate or deficient in Mongolia.

Conclusion

We aimed to recruit twins within a defined population, and invited a random sample to participate in the study. It has proved possible to build a twin register for research purposes in Mongolia. The potential exists to create an important new resource for twin studies in Mongolia.

Acknowledgments

This study was supported by the National Research Foundation of Korea (NRF; No. 2011-220-E00006, and NRF 2012K2A1A2032536), and the Ministry of Population Development and Social Welfare of Mongolia.

References


