

# Demographic characteristics of labial adhesion in South Korea: a population-based study from 2010 to 2014

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## ABSTRACT

**Objective** To investigate the demographic features of labial adhesion (LA) in South Korea.

**Design** A population-based nationwide study.

**Setting** Census population of South Korea.

**Participants** With the entire population of South Korea (n=47 990 761), patients under age 7 who were newly diagnosed with LA from January 2010 to December 2014 were included.

**Main outcome measure** The average incidence and the peak age of LA occurrence were estimated.

**Results** A total of 4934 newly diagnosed LAs were analysed. The incidence of LA has constantly increased since 2008, the year that the Korean Developmental Screening Test for Infants and Children registry began. The average incidence of LA was 55.0 cases/100 000 person-years (95% CI 53.5 to 56.6). The highest incidence was 183.6 cases/100 000 person-years (95% CI 175.8 to 191.6) in the age group of 13 to 24 months. The relative risk of acquiring LA in the age group of 13 to 24 months was 1.481 (95% CI 1.381 to 1.587) compared with the age group of 0 to 12 months.

**Conclusions** The demographic characteristics of LA including the average incidence and the highest incidence age group in South Korea were revealed in this nationwide, population-based study including a total of 4934 newly developed LA cases. Further studies are needed to reveal the natural disease course and the significance of diagnosing asymptomatic LA cases.

## INTRODUCTION

Labial adhesion (LA), also called labial agglutination or labial fusion, is the partial or complete adherence of labia minora in the midline.<sup>1</sup> It is known to be an acquired condition without any accompanying congenital malformation in the upper genital tract.<sup>2</sup> LA is thought to be caused by the low-oestrogen environment, which easily results in vulvar inflammation and concomitant labial re-epithelialisation.<sup>3</sup> Numerous treatment options have been suggested with varying success rates.<sup>4</sup>

Korean National Health Insurance Service (KNHIS) covers more than 90% of the whole population in South Korea since 1989, and all healthcare-related data including the disease

## What is already known on this topic?

- ▶ The cause of labial adhesion (LA) is unclear, but it is thought to be not related to a congenital pathology.
- ▶ Most patients with LA are asymptomatic and the adhesions may resolve on their own, rendering the treatment options variable.
- ▶ Urinary infection, vaginal irritation and dripping of urine are some of the possible accompanied symptoms.

## What this study hopes to add?

- ▶ In this population-based study, analysing a total of 4934 LA cases, the average incidence of LA was 55.0 cases/100 000 person-years (95% CI 53.5 to 56.6).
- ▶ The highest incidence was 183.6 cases/100 000 person-years (95% CI 175.8 to 191.6) in the age group of 13 to 24 months.
- ▶ Further studies are needed to reveal the natural disease course and the significance of diagnosing asymptomatic LA cases.

code, date of birth, history of hospital admission and prescriptions given are collected in the Korea National Insurance Claims Database (KNICD), which began in 2005. According to the International Classification of Diseases (ICD-10), Q525 is the single code assigned to LA.

From 2008, Korean Developmental Screening Test for Infants and Children (KDST) has been initiated. Rather than visiting the paediatrician after having clinical symptoms, this voluntary health check-up supports the proper growth and development. When LA is noted, the patient is referred to a paediatric gynaecologist under the discretion of the primary physician. The consulting gynaecologist examines the patient again and, if appropriate, registers the patient with the Q525 code and treats her accordingly.

Several studies have reported the incidence of LA based on a very limited number of



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patients with varying results.<sup>5–7</sup> This nationwide, population-based study with 4934 LA cases should provide an evidence based data of an accurate incidence and demographic feature of LA in South Korea.

## MATERIALS AND METHODS

### LA diagnosis in South Korea and its definition

LA is represented by diagnostic code Q525, based on the ICD-10 code system in the KNICD. From 2005 to 2014, all the cases with Q525 were obtained. As there were no newly diagnosed cases reported after the age of 7, children under age 7 were only included. The incidence of LA was calculated as the number of newly reported LA over the number of the female population of that particular age group in the particular year. The midyear population from which the census information is gathered on 1 July of each year in the resident registration of the South Korea census bureau was used. The Poisson distribution was used to estimate 95% CIs for average incidence of LA. Peak age of LA occurrence was calculated. The relative risk (RR) and 95% CI for each age group were calculated. All the values were estimated with the age group of 0–12 months as the reference.

All statistical analyses were performed using SAS V.9.4. P values less than 0.05 were considered statistically significant.

## RESULTS

The number of newly diagnosed LA has increased from 101 cases in 2005 when the KNICD took hold to 1489 cases in 2014. The abrupt increment of the reported LA cases since the initiation of KDST in 2008 was notable (figure 1).

From 2010 to 2014, a total of 4934 newly developed LA cases were noted, and the average incidence of LA was 55.0 cases/100 000 person-years. The annual incidence showed

a constant increase from 36.1 cases/100 000 person-years in 2010 to 82.7 cases/100 000 person-years in 2014 (table 1).

Sorted by age group, the group of 13 to 24 months showed the highest average incidence of 183.6 cases/100 000 person-years (95% CI 175.8 to 191.6). The group of 0 to 12 months followed with the average incidence of 124.0 cases/100 000 person-years (95% CI 117.4 to 130.8) (table 2, figure 2).

The relative risk of acquiring LA in the age group of 13 to 24 months was 1.481 (95% CI 1.381 to 1.587) compared with the reference age group of 0 to 12 months. The relative risk of acquiring LA in the age group of 25 to 36 months was 0.535 (95% CI 0.488 to 0.585), and it showed a decreasing pattern as the patient got older (table 3).

## DISCUSSION

A total number of 4934 newly developed LA cases from 2010 to 2014 were analysed. This nationwide, population-based study was based on the KNHIS and KNICD that encompasses more than 90% of the total South Korean population and includes data such as the disease code, date of birth, history of hospital admission and prescriptions given. For a rare disease such as LA, a population-based study might be considered as an ideal setting to calculate the incidence and demographic characteristics. The average incidence of LA was 55.0 cases/100 000 person-years (table 1).

With the initiation of KDST in 2008, rather than visiting the paediatrician after the development of clinical symptoms, children could get a free yearly health check-up to ensure the proper growth and development. Reported cases of LA have abruptly increased from 101 cases in 2005 when the KNICD started gathering health-care-related data to 1489 cases in 2014. This increase in LA cases with the initiation of the KDST registry can be

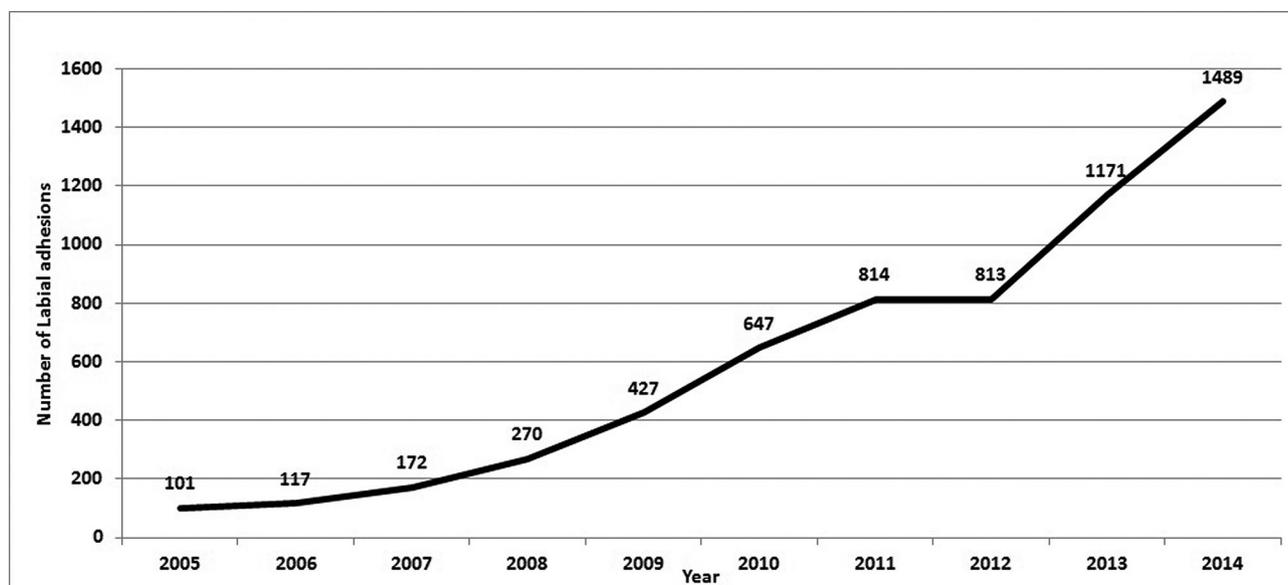


Figure 1 Number of newly diagnosed labial adhesions from 2005 to 2014.

**Table 1** Annual incidence of labial adhesions per 100 000 person-years classified by age group from 2010 to 2014

Age (months)	2010	2011	2012	2013	2014	Total	P values
0–12	56.8 (47.1 to 67.9)	84.7 (73.0 to 97.9)	98.4 (85.8 to 112.3)	165.2 (148.5 to 183.3)	219.6 (199.8 to 240.8)	124.0	<0.0001
13–24	111.3 (97.8 to 126.1)	157.2 (141.1 to 174.6)	142.1 (127.1 to 158.4)	215.2 (196.8 to 234.9)	289.5 (267.7 to 312.5)	183.6	<0.0001
25–36	53.3 (44.4 to 63.6)	56.6 (47.1 to 67.4)	59.9 (50.2 to 71.0)	68.5 (58.2 to 80.0)	92.3 (80.4 to 105.4)	66.3	<0.0001
27–48	33.4 (26.3 to 41.8)	34.3 (27.2 to 42.7)	30.3 (23.5 to 38.4)	39.1 (31.3 to 48.2)	42.6 (34.6 to 52.0)	36.0	0.0628
49–60	20.7 (15.0 to 27.7)	21.0 (15.5 to 27.9)	13.7 (9.4 to 19.4)	15.3 (10.6 to 21.4)	18.9 (13.6 to 25.5)	17.9	0.3030
61–72	12.8 (8.5 to 18.5)	6.6 (3.6 to 11.0)	11.8 (7.8 to 17.2)	8.1 (4.9 to 12.7)	9.0 (5.5 to 13.9)	9.7	0.3520
73–84	3.0 (1.2 to 6.2)	4.6 (2.2 to 8.4)	3.8 (1.6 to 7.4)	5.3 (2.7 to 9.2)	3.8 (1.8 to 7.3)	4.1	0.5720
85–96	1.3 (0.3 to 3.7)	1.7 (0.5 to 4.4)	0.9 (0.1 to 3.3)	1.9 (0.5 to 4.8)	0.9 (0.1 to 3.2)	1.3	0.7809
Total	36.1 (33.4 to 39.0)	45.6 (42.5 to 48.8)	45.5 (42.4 to 48.7)	65.1 (61.5 to 69.0)	82.7 (78.5 to 87.0)	55.0	<0.0001

Annual incidence shown as number of persons per 100 000 person-years with 95% CI in the parentheses.

explained by the role of vigilant inspection of the physician, enabling the inclusion of asymptomatic LA cases (figure 1). As the KDST registry was voluntary rather than mandatory and the referral to the paediatric gynaecologist was based on the primary physician's discretion, the data in this study fall short of representing the real number of LAs in South Korea. With all the shortcomings standing, the strength of this study still lies in the involvement of 4934 newly developed LA cases, which is quite large a number considering the rarity of LA.

In this study, the group of 13 to 24 months showed the highest average incidence of 183.6 cases/100 000 person-years (95% CI 175.8 to 191.6) (table 2, figure 2). McCann *et al* reported a much higher incidence where 35 out of 90 girls being examined (38.9%) showed LA. The use of magnified colposcopy photographs as diagnostic tool

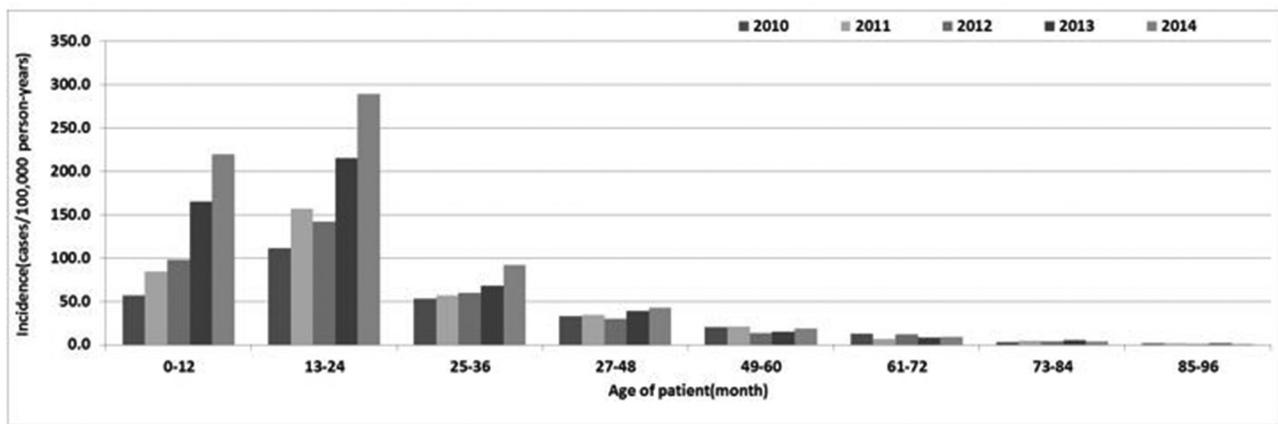
might have included very small lesions that could have been easily missed with naked-eye observation.<sup>8</sup>

Some authors even argue that LA might be considered as an incidental normal finding in female infants because the small size of the external genitalia provides a natural opportunity for the labia to lie in apposition for most of the day resulting in temporal formation of LA.<sup>9</sup> No long-term follow-up of untreated LA has ever been conducted, rendering the natural course of LA to be revealed.

In contrary to the possibility of spontaneous remission of LA, the importance of prudent physical examination and proper treatment of LA in referred patients of intractable recurrent urinary tract infection (UTI) has been emphasised by Melek *et al*. None of the primary physicians performed a gynaecological examination and only focused on urine culture, cystoscopy and

**Table 2** Average incidence of labial adhesion per 100 000 person-years classified by age group from 2010 to 2014

Age (months)	Labial adhesion	Population	Proportion in age group (%)	Incident cases/100 000 person-years	95% CI
0–12	1330	1 072 757	27	124.0	117.4 to 130.8
13–24	2072	1 128 683	42	183.6	175.8 to 191.6
25–36	755	1 138 727	15	66.3	61.7 to 71.2
37–48	408	1 134 383	8	36.0	32.6 to 39.6
49–60	200	1 118 929	4	17.9	15.5 to 20.5
61–72	108	1 115 703	2	9.7	7.9 to 11.7
73–84	46	1 126 805	1	4.1	3.0 to 5.4
85–96	15	1 129 854	0	1.3	0.7 to 2.2
Total	4934	8 965 839	100	55.0	53.5 to 56.6



**Figure 2** Annual cases of labial adhesions per 100 000 person-years from 2010 to 2014 by age groups.

ultrasonography. For the avoidance of unnecessary invasive procedures, the importance of physical examination to rule out LA was emphasised.<sup>10</sup>

The relative risk of acquiring LA in the age group of 13 to 24 months was 1.481 (95% CI 1.381 to 1.587) compared with the reference age group of 0 to 12 months (table 3). This is the age bracket where diaper usage might cause constant irritation resulting in LA. Explaining the natural progression of LA that often results in spontaneous resolution and emphasising that this is not a congenital disease should calm the overly concerned parents with respect to the appearance of their child's external genitalia occurring in the absence of overt symptoms. Fondling, masturbation, trauma or sexual abuse are some other external irritation factors causing LA.<sup>11</sup>

Management algorithms for LA start with the recognition of associated symptoms such as rash, recurrent UTI, dribbling of the urine due to outlet obstruction, and dysuria.<sup>5</sup> If asymptomatic, follow-up without intervention may suffice because the primary goal of treating LA should be no other than the resolution of the clinical symptoms associated with it. If symptomatic, either oestrogen vaginal cream application or surgical separation might be options.<sup>12 13</sup> As most of the studies published so far only included a small study population in a single institute, a larger study with the cooperation

of multiple institutes is warranted to set up the ideal treatment algorithm and methodology.

Based on the population-based national registry, a total of 4934 newly developed LA cases in South Korea were analysed. The average incidence of LA was 55.0 cases/100 000 person-years from 2010 to 2014. The age group of 13 to 24 months showed the highest average incidence of 183.6 cases/100 000 person-years (95% CI 175.8 to 191.6), coinciding with the hypo-oestrogenic milieu and persistent irritation due to diaper usage. Proper hygiene as a means of treatment should be emphasised before considering unnecessary intervention and the chance of spontaneous resolution with proper lifestyle adjustment should be kept in mind. Further studies are needed to reveal the natural disease course and the significance of diagnosing asymptomatic LA cases.

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**Competing interests** None declared.

**Patient consent** Not required.

**Ethics approval** The KNICD was accessed with the approval from the Institutional Review Board of the National Health Insurance Service Ilsan Hospital, South Korea (NHIS-2016-1-171).

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**Data sharing statement** All data concerning this study are included in this published article.

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**Table 3** Relative risk of acquiring labial adhesion classified by age group from 2010 to 2014

Age (months)	Relative risk	95% CI	P values
0–12	1	–	
13–24	1.481	1.381 to 1.587	<0.0001
25–36	0.535	0.488 to 0.585	<0.0001
37–48	0.290	0.259 to 0.324	<0.0001
49–60	0.144	0.124 to 0.167	<0.0001
61–72	0.078	0.064 to 0.095	<0.0001
73–84	0.033	0.024 to 0.044	<0.0001
85–96	0.011	0.006 to 0.018	<0.0001

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