

Characteristics and trends of maternal MRI utilization in Taiwan: a nationwide retrospective cohort study

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Objective:

to compare the characteristics and trends of maternal MRI utilization in Taiwan with previous reports in US and Canada.

Methods:

Using Birth Certificate Application and National Health Insurance Database, all births between 2004 and 2016 were enrolled under the exclusion criteria of missing maternal ID and nationality. The gadolinium-based contrast agent(GBCA) cohort refer to mothers receiving GBCA-MRI during pregnancy, while the non-GBCA cohort refer to mothers receiving non GBCA-MRI during pregnancy. Other mothers without MRI use were defined as the control cohort. Descriptive statistics and trend analyses for maternal use of GBCA MRI and non-GBCA MRI were performed.

Results:

A total of 2682905 mothers were included. The utilization rates for GBCA and non-GBCA MRI were 0.5 and 1.6 per 1000 pregnancies, respectively. The non-GBCA MRI users had an increasing trend (average annual percentage changes 8.5, 95% confidence interval 7.3-10, $p < 0.05$), while the GBCA MRI users did not. Most MRI users were exposed at the 3rd trimester, with the diagnostic codes of pregnant & perinatal complications.

Discussion:

The current study is a nationwide cohort study to provide valuable data of maternal MRI utilization in Asian population for the first time.

Compared with previous studies [1-3], the rate of maternal MRI utilization in Taiwan was lower than those in US and Canada (at 2016, Taiwan: 2.6, US: 11.9, Canada: 9.8 per 1000 pregnancies). Mothers in Taiwan had a similar increasing trend on using non-GBCA MRI but not on GBCA MRI, which was different from US and Canada. Moreover, this study demonstrated the majority of maternal MRI use in Taiwan occurred in the 3rd trimester for diagnosing pregnant & perinatal complications, while reported maternal MRI use in US and Canada were focused on the 1st trimester for different medical purposes.

In conclusion, the characteristics and trends of maternal MRI use in Taiwan were much different from those in US and Canada. Further studies for the risk factors and clinical outcomes of these maternal MRI use are needed.

References:

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3. Kwan ML, Miglioretti DL, Marlow EC, Bowles EA, Weinmann S, Cheng SY, et al. Trends in medical imaging during pregnancy in the United States and Ontario, Canada, 1996 to 2016. *JAMA network open* 2019;2:e197249-e197249

Figure 1. Patient flow diagram

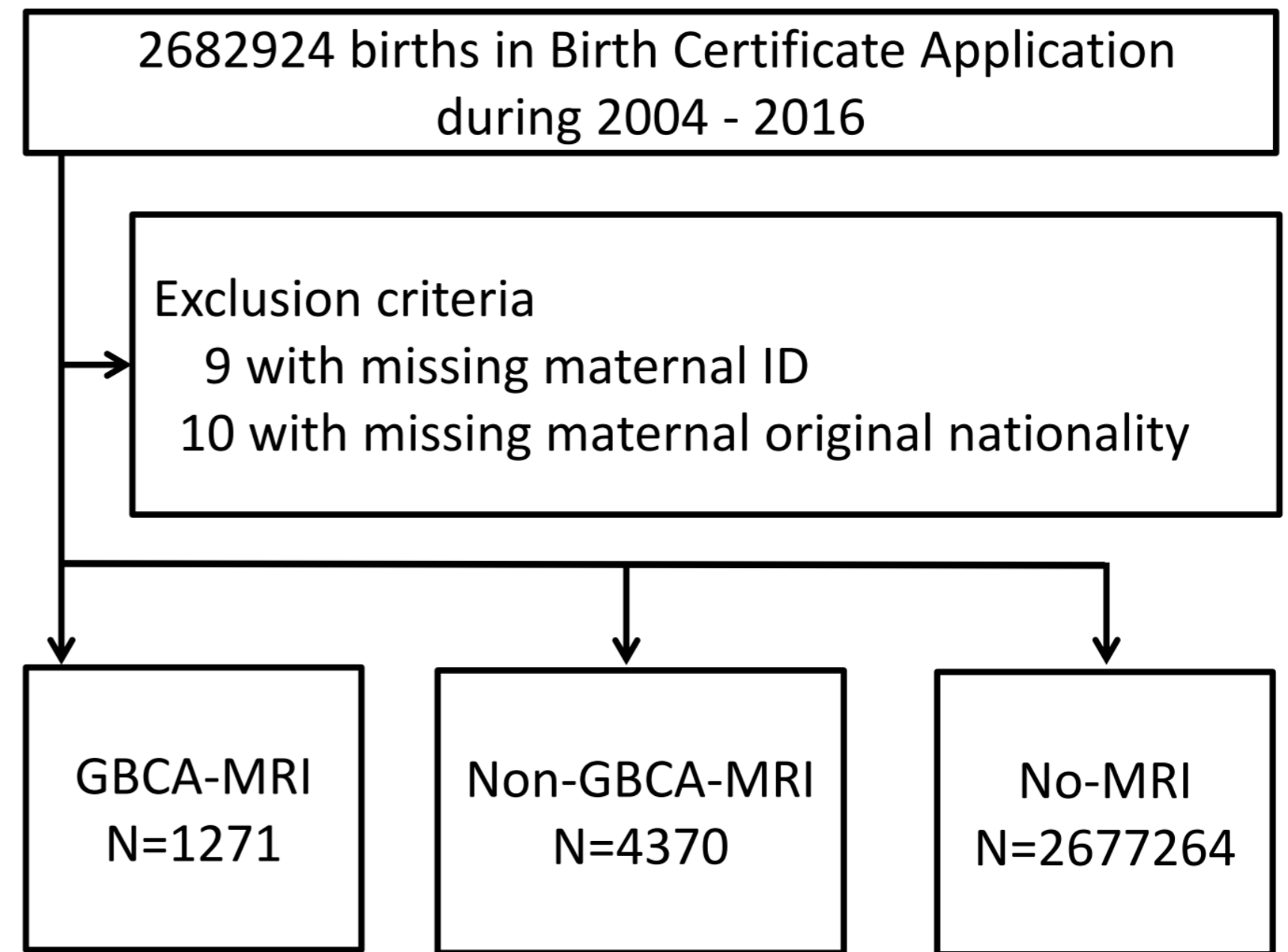


Table 1. Baseline characteristics of study cohorts during 2004-2016

Variable	GBCA n (%)	Non-GBCA n (%)	No MRI n (%)	p value
Overall	1271	4370	2677264	
Maternal characteristics				
Age at delivery, mean (SD)	31.8 (5.3)	31.8 (5)	30.4 (4.9)	*
Taiwanese nationality	1188 (93.5)	4126 (94.4)	2435379 (91)	*
Low income	167 (13.1)	918 (21)	244083 (9.1)	*
Urban residence	247 (19.4)	852 (19.5)	470588 (17.6)	*
Gestational age at first exposure (mean, SD in week)	28.2 (13.3)	24.2 (10.5)		
Exposed cases, all				
In 1 st trimester	233 (18.3)	654 (15)		
In 2 nd trimester	118 (9.3)	1495 (34.2)		
In 3 rd trimester	920 (72.4)	2221 (50.8)		
Diagnosis codes for MRI				
Infectious and parasitic diseases	55 (4.3)	62 (1.4)		
Neoplasms	287 (22.6)	343 (7.8)		
Endocrine and metabolic diseases	82 (6.5)	115 (2.6)		
Blood and immunity system diseases	36 (2.8)	79 (1.8)		
Mental disorders	16 (1.3)	23 (0.5)		
Diseases of the nervous system	165 (13)	369 (8.4)		
Diseases of the circulatory system	108 (8.5)	174 (4)		
Diseases of the respiratory system	72 (5.7)	86 (2)		
Diseases of the digestive system	61 (4.8)	260 (5.9)		
Diseases of the genitourinary system	80 (6.3)	285 (6.5)		
Pregnant & perinatal Complications	741 (58.3)	2289 (52.4)		
Diseases of the skin system	18 (1.4)	28 (0.6)		
Diseases of the musculoskeletal system	43 (3.4)	365 (8.4)		
Congenital anomalies	286 (22.5)	411 (9.4)		
Injury and poisoning	28 (2.2)	153 (3.5)		
Other ill-defined conditions	151 (11.9)	555 (12.7)		

* $p < 0.05$. SD, standard deviation

Figure 2. Comparison of exposure trends between GBCA & non-GBCA MRI

