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ORIGINAL ARTICLE

Exclusive breastfeeding and partial breastfeeding reduce the risk of overweight in childhood: A nationwide longitudinal study in Korea

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KEYWORDS

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Summary

Objective: Breastfeeding is generally known to reduce the risk of childhood overweight and obesity. However, the results are controversial between countries, and nationwide data are rare. This study assessed the relationship between breastfeeding types and overweight incidence using nationwide longitudinal data in Korea.

Methods: We analysed 774,764 infants who participated in the longitudinal nationwide data from the Korea National Children's Health Examination 2007–2013. Childhood overweight was defined by a Z-score ≥ 1.64 (95th centile) for infants under 24 months and Z-scores ≥ 1.04 (85th centile) for children over 24 months. Cox proportional hazard model was used to analyse the relationship between breastfeeding types and overweight incidence.

Results: Infants who were exclusively breastfed at 4–6 months of age had the multivariate-adjusted hazard ratio (HRs) for overweight of 0.78 (95% CI 0.77–0.79) and infants who were partially breastfed had the HRs for overweight of 0.96 (95% CI 0.94–0.98), which was lower compared to that of the exclusively formula fed group. Similar results were obtained for stratified analysis by boys and girls.

Conclusions: Exclusive and partial breastfeeding have preventive effect on childhood overweight in Korea. Therefore, it is necessary to encourage breastfeeding to prevent childhood obesity and its consequences in developed Asian countries.

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Introduction

Childhood obesity is regarded as a public health priority due to its many long-term adverse effects

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[1]. Overweight children have a high risk of being obese in adulthood [2]. In addition, major chronic diseases including cardiovascular diseases, hypertension, and type 2 diabetes originate from being overweight [3,4].

Breastfeeding is known to reduce the risk of childhood obesity [5,6]. However, it remains uncertain which mechanism of breastfeeding can protect against overweight and obesity. Dietz [7] suggested that breastfed infants may have more discretion over the amount of milk consumed than formula fed infants and that the differential endocrine response to formula fed infants may promote increased body fat deposition. Breast milk provides adequate energy and nutrients, and it is considered to be the ideal food for infants under 6 months [8]. Infant formula has higher protein/nitrogen contents compared to breast milk and it can cause metabolic responses such as increased insulin and insulin like growth factor-1 secretion in formula-fed infants, leading to excessive weight gain [9]. Moreover, breast milk contains hormones such as leptin, adiponectin, and ghrelin which can affect long-term appetite signalling [10]. Breastfed infants also gain less weight than formula-fed infants in early life, leading to lower risks of obesity in childhood and adulthood [11,12]. Infant formula can result in faster weight gain and increased adiposity, along with other adverse cardio-metabolic effects [13,14].

Several meta-analysis studies published in Western countries have reported that breastfeeding can reduce the risk of childhood overweight and obesity [15,16]. However, the relationship between breastfeeding and child obesity remains controversial across many countries. A longitudinal nationwide study from Japan showed that breastfeeding decreases the risk of overweight and obesity [17]. On the other hand, the Hong Kong's children birth cohort and the Chinese birth cohort study did not show the association between breastfeeding and child adiposity [18,19]. A British cohort revealed that breastfeeding is associated with lower BMI, whereas a Brazilian cohort revealed the opposite [20]. These differences appear to be due to variations in ethnicity, sample size, definitions of overweight and obesity, and adjusted confounding factors such as socioeconomic status, parental obesity, and birth weight, etc.

The prevalence of childhood overweight in Korea has stabilised from early 2000s but the rate of overweight is still high. The overweight rate of children at 2–9 years old was 18.1% in boys and 16.4% in girls according to the Korea National Health and Nutrition Examination Survey (KNHANES) from 1998 to 2012 [21]. Due to rapid industrialisation and the

increase in women's social participation, the exclusive breastfeeding rate in Korea decreased sharply in the early 1990s (90% in 1970, 10.2% in 1994). Fortunately, the breastfeeding rate increased to 32.3% in 2012 [22]. Which is lower than the breastfeeding rate in South-East Asia (43%) but higher than that in Europe (11%) [23].

The aim of this study was to examine the relationship between breastfeeding types and childhood overweight incidence risk using nationwide longitudinal data.

Materials and methods

Study population

The Korea National Health Insurance Corporation (KNHIC) provides medical insurance for all Koreans. All Koreans are legally obliged to become members of KNHIC, and all members of KNHIC are eligible for the Korea National Health Check-up every 2 years. KNHIC conducted the National Children's Health Examination (NCHE) in 2007. All infants and children under 6 years of age in Korea were included. NCHE was composed of seven health examinations by age groups (4–6 months, 9–12 months, 18–24 months, 30–36 months, 42–48 months, 54–60 months, and 66–71 months). The examination consisted of a medical examination conducted via face-to-face interviews and health check-ups which included eyesight tests and dental examinations. Data were collected through computer networks. KNHIC then qualified and merged the data. KNHIC provided anonymised data to researchers who used designated computers in KNHIC. This study design has been described in details previously [24].

From 2007 to 2013, a total of 2,213,602 children attended the NCHE at least once. Among them, 1,038,005 infants participated in the 4–6 months examination. For cohort design analysis, infants who were diagnosed as overweight at baseline screening were excluded ($n=53,724$). Infants who only attended the 4–6 months examination ($n=121,028$) and those who were missing the BMI data of both parents ($n=88,489$) were also excluded. A total of 774,764 infants were included in the final analysis. This study obtained ethical approval from the Institutional Review Board (IRB) of Eulji University (EUIRB2015-17).

Breastfeeding status

Breastfeeding status at 4–6 months was collected from the primary caregiver. Feeding types were

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