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論文題目	Caesarean delivery and anaemia risk in children in 45 low- and middle-income countries （低中所得 45 か国における帝王切開と出生児の貧血リスク）		

（論文内容の要旨）

Introduction

The proportion of caesarean deliveries (CD) in the world has increased to unprecedented levels. CD has been linked to adverse maternal, neonatal, and perinatal outcomes and to long-term effects such as type 1 diabetes and asthma in the offspring. The rising CD rates and the potential risks to offspring health have prompted calls to consider the risks of CD on long-term child health. Anaemia is a major public health problem that affects 43% of children younger than 5 years. CD may reduce placental transfusion and cause poor iron-related haematological indices in the neonate. This study aimed to explore the association between CD and anaemia in children younger than 5 years in low- and middle-income countries (LMICs).

Methods

Data from Demographic and Health Surveys of women and their children younger than 5 years from 45 LMICs were utilized. The surveys collected data on CD and determined haemoglobin (hb) levels of index children through blood testing. Anaemia was defined based on altitude adjusted hb levels as follows: none [hb ≥ 11.0 grams/decilitre (g/dl)], mild (hb 10 - 10.9 g/dl), moderate/severe (hb < 10 g/dl). Each country's data were analysed separately using propensity-score weighting to adjust for confounding, and the country specific odds ratios (ORs) were pooled using random effects meta-analysis. Meta-regression was performed to determine whether the association between CD and anaemia varied by national CD rate, anaemia prevalence, and gross national income. Analyses stratified by age, and by wealth status and type of health facility for countries with CD rate > 15% were also performed.

Results

This study included 132,877 children of whom 80,375 had any anaemia, 32,617 had mild anaemia, and 47,758 had moderate/severe anaemia. The pooled ORs showed no evidence for an association between individual-level CD and any anaemia (OR 0.95, 95% confidence interval (CI) 0.86 - 1.06; I^2 = 40.2%), mild anaemia (OR 0.91, 95% CI 0.81-1.02; I^2 = 24.8%), and moderate/severe anaemia (OR 0.97, 95% CI 0.85 - 1.11; I^2 = 47.7%) in children. CD tended to be positively associated with moderate/severe anaemia in upper middle-income countries (OR 1.22, 95% CI 1.01-1.47; I^2 = 0.0%) and negatively associated with mild anaemia in lower middle-income countries (OR 0.84, 95% CI 0.74 - 0.95; I^2 = 0.0%), however, meta-regression did not detect any significant variation in the association between anaemia and CD by the level of income, CD rate, and anaemia prevalence. There was no evidence for an association between CD and any anaemia among children younger than 2 years (OR 1.01, 95% CI 0.86 - 1.18; I^2 = 45.4%, N = 64,037) and among those aged 2 or more years (OR 0.88, 95% CI 0.78 - 1.00; I^2 = 22.6%, N = 68,840). In 7 countries with CD rate of > 15%, there was no association when data were stratified by wealth index quintile (lower two or upper two) and by type of health facility (private or public).

Conclusions

There was no evidence for an association between CD and anaemia in children younger than 5 years in low- and middle-income countries. However, the effect estimates varied moderately across countries. These conclusions were consistent when analysis was restricted to countries with CD rate > 15% with data stratified by individual-level wealth status and type of health facility of birth.

（論文審査の結果の要旨）

帝王切開術（Caesarean delivery: CD）による出生は、胎盤からの血液成分の移行機会を減少させ、胎児の血色素値の低下を引き起こすことが示唆されている。本研究では、2005 年から 2015 年までに低中所得 45 か国で実施された Demographic and Health Surveys データを用いて、CD と出生児貧血との関連を重み付けプロペンシティスコアを用いて検討した。

結果として、CD は児の貧血と関連せず［OR 0.95, 95% 信頼区間（CI）: 0.86-1.06, I^2 = 40.2%）、軽度の貧血（OR 0.91, 95% CI: 0.81-1.02, I^2 = 24.8%）、中度・重度の貧血（OR 0.97, 95% CI: 0.85-1.11, I^2 = 47.7%）の分類においても同様であった。一方、高中所得国では CD と児の中度・重度の貧血に正の関連が見られ、低中所得国では CD と児の中度・重度の貧血に負の関連が見られた。しかし、メタ回帰の結果からは、各国の CD 実施率、貧血有病率、GNI によるばらつきは検出されなかった。

結論として、低中所得 45 か国 5 歳未満の児 132,877 人を対象とした本研究では、CD と児の貧血に関連は認められなかった。

以上の研究は、45 か国の低中所得国の代表性あるデータを用いて帝王切開術と児の貧血を検討した初の疫学研究であり、国際保健の向上に寄与するところが多い。

したがって、本論文は博士（　社会健康医学　）の学位論文として価値あるものと認める。

なお、本学位授与申請者は、平成 30 年 2 月 13 日実施の論文内容とそれに関連した試問を受け、合格と認められたものである。

要旨公開可能日：　　年　　月　　日　以降