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Prevalence of Abnormal Gestational Weight Gain and Its Determinants in Korea



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Weight Gain and Its Determinants in Korea

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1

Introduction

1

Introduction <<

Weight gain during pregnancy is known to considerably influence the health of newborns and mothers (Siega-Riz et al. 2009). Excessive weight gain increases the risk of pregnancy complications such as preeclampsia, gestational hypertension and overweight births. It is also reported that inadequate weight gain during pregnancy is associated with premature birth or low birth weight, could lead to obesity of the baby in later stages of life because of metabolic changes after birth (Cogswell et al. 1995, Hellerstedt et al. 1997, Han & Lee 2010, Stevens-Simon & McAnarney 1992, Rooney et al. 2005, Bracero & Byrne 1998).

A number of studies in Korea also have been made on the negative impacts of inadequate gestational weight gain on the health of mothers and babies (e.g. Lee 2013, Lee et al. 2011a, Lee et al. 2011b). Some women tend to stay in shape experiencing insufficient weight gain even in pregnancy because of their concerns about appearance in Korea. Insufficient weight gain during pregnancy not only adversely affects the health of new-born babies but it also continues to negatively influence their health throughout infancy. One research (Lee et al. 2011a) found that infants born to women who had experienced low

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BMI (body mass index) before pregnancy weighed much more than their counterparts in other groups at age three.

Gestational weight gain is a natural phenomenon, but a certain level of weight gain is recommended (Ellison & Harris 2000) based on the status of mothers before pregnancy. The Institute of Medicine (IOM) published BMI-determined weight gain recommendations (1990), which suggested more weight gain for women with low BMIs and less for women with high BMIs.

As stated above, gestational weight gained is one of most important factors for the health of the woman and her infant and is largely determined by socio-cultural and lifestyle factors, such as physical activity, exercise, and diet. There have been, however, few studies on the determinants of gestational weight gain in Korea. Most existing studies were based on clinical data from hospitals and therefore, were focused mainly on clinical health during or after delivery, which seems to contribute to the failure to notice the influence of pre-pregnancy determinants and non-medical lifestyle factors.

In Korea, the rate of pre-term and low-weight births has been continuously increasing. The rate of low-birth weight infants grew by 50.3 percent from 3.8 percent in 2000 to 5.7 percent in 2014, and that of pre-term births also rose 77.2 percent from 3.8 percent to 6.7 percent during the same period. The effect of late child bearing on the increase in the rate of ad-

verse births is reported to be less than 30 percent, though lay-people and even researchers believe the fast growth of adverse birth outcomes is related with increase of old age delivery (Lee et al. 2013).

Therefore, such results in Korea can be interpreted as the result of poor health management for childbirth or pregnancy among Korean women in general. In this context, it would be meaningful to identify the prevalence and risk factors of inadequate gestational weight gain in Korea.

The purpose of this study is 2-fold: (1) to examine the prevalence of inadequate gestational weight gain; and (2) to investigate demographic and socioeconomic factors associated with inadequate gestational weight gain in Korea.

The analysis of determinants of gestational weight gain and differential distribution patterns holds significant meaning to improve reproductive health in Korea. Sorting out the determinants and risk factors of abnormal weight gain can contribute to establish preventive measures for reproductive health in the pre-pregnancy and pregnancy stage. It can also induce measures in non-medical fields including education and welfare, which are expected to serve as a basis for a comprehensive health policy that utilizes diverse resources.

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Materials and Methods

1. Study Sample and Data Analyses
2. Measures and Variables

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Materials and Methods ‹‹

Study Sample and Data Analyses

This study conducted for this study on pre-pregnancy conducted a survey on pre-conceptional preparation and birth outcomes. A total of 1,671 women who had delivered babies within the past three years (2010-2013) were recruited in accordance with the age distribution of the 2011 birth statistics for the survey. Trained interviewers met participants in person from July to September of 2013. The survey covered the birth outcomes on mothers and infants, pre-pregnancy knowledge and preparations, and dietary status before pregnancy. It also included details such as the weight at the time of the diagnosis of pregnancy and immediately before delivery and the height. Data from women in their early 20s and 40s and older were excluded from analysis as their numbers were insufficient to represent their population. Consequently, the data from 1,488 participants who complete questionnaires was employed in analysis.

Measures and Variables

The amount of weight gain, which is a main dependent variable in this study, was calculated as the difference in weight between at the time of pregnancy diagnosis and right before the delivery. The amount of gestational weight gain was categorized as shown in Table 1. Based on pre-pregnancy BMI, those who fell below the range of normal weight gain were defined as having “inadequate gestational weight gain” and those who had weight gain above the normal range were noted as “excessive gestational weight gain.”

〈Table 1〉 Categorization of Gestational Weight Gain

Pre-pregnancy BMI	BMI (kg/m ²)	Normal Gestational Weight Gain (kg)
Underweight	< 18.5	12.5 ~ 18.0
Normal Weight	18.5 ~ 24.9	11.5 ~ 16.0
Overweight	25.0 ~ 29.9	7.0 ~ 11.5
Obese	≥30.0	5.0 ~ 9.0

source: Institute of Medicine (1990)

The analysis examined features of the women’s most recent childbirth and their socioeconomic backgrounds. These variables included whether the latest pregnancy was planned or not, whether the mother had experienced pregnancy before, her level of educational attainment and self-rated economic conditions during early pregnancy. “Planned pregnancy” refers to a pregnancy resulting with the timing of childbirth in mind.

Mothers were divided into “primipara” and “multipara” groups based on their maternity experience. They were also categorized into three groups based on levels of educational attainment: high school education, junior college graduates, and those with university and higher educational attainment.

The samples were also divided into three groups based on their self-rated economic conditions: “good,” “average” and “poor.” In order to examine whether gestational weight gain actually affected birth outcomes, the study also included information concerning the weights of newborns in the analysis. Those weighing less than 2.5kg were defined as “underweight,” those weighing between 2.5kg and 4.0kg as “normal” and those weighing more than 4.0kg as “overweight.”

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Results

1. Bivariate Analyses
2. Multivariate Analyses

Bivariate Analyses

The analysis showed that 43.0 percent of Korean mothers experienced inadequate weight gain during pregnancy, followed by 37.8 percent with normal weight gain and 19.2 percent with excessive gain. Gestational weight gain showed different distribution patterns associated with the characteristics of the pregnancy or the mother's social demographic features (Table 2). The difference in gestational weight gain was found to significantly affect the weight of the infant. The rate of underweight birth among mothers who experienced inadequate gestational weight gain recorded the highest percentage of 8.9 percent. 5.3 percent of those who experienced excessive weight gain gave birth to overweight babies.

〈Table 2〉 Distribution of Birth Weight by Mother's Gestational Weight Gain

	Birth Weight (%)			Total (n)
	Under	Normal	Over	
Gestational weight gain				$\chi^2 = 12.47^{**}$
Inadequate	8.9	88.6	2.5	100.0 (639)
Normal	5.5	90.4	4.1	100.0 (563)
Excessive	4.6	90.2	5.3	100.0 (285)
Total	6.8	89.6	3.6	100.0 (1,488)

* $p < .1$, ** $p < .5$, *** $p < .01$,

Weight gain during pregnancy was also related to the mother's BMI level. The women who maintained low BMIs during early pregnancy were likely to gain less weight during pregnancy and the risk of excessive weight gain was higher among women with high BMIs. By age, the women in their early 30s, the age with the largest number of pregnancies in Korea, tended to experience weight gain in the normal range. Those in their late 20s were more likely to experience excessive gain than others and those in their late 30s, inadequate gain.

〈Table 3〉 Distribution of features of births and mothers

	Gestational weight gain (%)			Total (n)
	Inadequate	Normal	Excessive	
BMI at early pregnancy				$\chi^2 = 76.61$ ***
Underweight	49.5	39.8	10.6	100.0 (216)
Normal weight	44.5	36.5	19.0	100.0 (1,163)
Overweight	15.2	52.5	32.3	100.0 (99)
Obese	10.0	0.0	90.0	100.0 (10)
Age				$\chi^2 = 8.12$ *
25~29	41.5	35.5	23.0	100.0 (482)
30~34	43.0	39.9	17.1	100.0 (760)
35~39	45.9	36.2	17.9	100.0 (246)
Child delivery experience				$\chi^2 = 34.51$ ***
Primipara	36.6	40.6	22.8	100.0 (823)
Multipara	51.0	34.4	14.6	100.0 (665)
Pregnancy plan				$\chi^2 = 17.79$ ***
Planned	49.3	37.4	13.3	100.0 (452)
Not planned	40.3	38.0	21.7	100.0 (1,036)
Education				$\chi^2 = 3.51$
High school or less	40.8	37.4	21.8	100.0 (431)
Junior college	45.5	36.9	17.6	100.0 (347)
University or more	43.1	38.6	18.3	100.0 (710)
Economic conditions				$\chi^2 = 8.69$ *
Good	37.2	44.7	18.2	100.0 (253)
Average	43.6	36.5	19.8	100.0 (1,139)
Poor	50.0	36.2	13.8	100.0 (94)
Total	43.0	37.8	19.2	100.0 (1,488)

* $p < .1$, ** $p < .5$, *** $p < .01$.

The women who had previously given birth tended to experience inadequate gain more than others, while the primiparas were more likely to experience excessive gain. The women who had planned their pregnancies and those finding themselves in a poor economic situation during early pregnancy were more likely to experience insufficient weight gain. The association between the level of educational attainment of the mother and gestational weight gain was not statistically significant.

Multivariate Analyses

This study examined how individual features of the mother and pregnancy impacted the risk of inadequate or excessive gestational weight gain. The result indicates somewhat complicated relations between abnormal gestational weight gain and its determinants. Young maternal age is found to heighten the risks of both inadequate and excessive weight gain. The risk of excessive weight gain was lower among the women who were pregnant for the first time, but their risk of inadequate gain was higher. Planned pregnancy was related to a lower risk of excessive weight gain and a higher risk of inadequate gain.

Being listed as overweight or obese during early pregnancy did not affect a mother's risk of inadequate weight gain but did increase her risk of excessive gain. A mother's low BMI at early pregnancy contributed to lowering the risk of excessive gain,

while its effect on the risk of inadequate gain was not statistically significant. The levels of educational attainment also failed to explain different levels of weight gain. Among the mothers who self-rated their early-pregnancy economic condition as good, the probability of inadequate weight gain was relatively low.

〈Table 3〉 Multi-Nominal Regression Predicting Gestational Weight Gain

	Inadequate		Excessive	
	Exp(B)	P	Exp(B)	p
Age				
25~29	1.269	.082	1.417	.036
35~39	1.157	.384	1.139	.546
30~34				
Child delivery experience				
Primipara	.549	.000	1.388	.041
Multipara				
Pregnancy plan				
Planned	1.352	.019	.627	.008
Not planned				
Education				
High school or less	1.021	.889	1.089	.634
Junior college	1.076	.624	.928	.700
University or more				
Economic conditions				
Good	.682	.017	.793	.245
Poor	1.160	.540	.642	.198
Normal				
BMI at early pregnancy				
Underweight	1.093	.586	.475	.003
Overweight/obese	.214	.000	1.582	.049
Normal weight				
χ^2		140.391***		
Cox and Snell Pseudo R2		.090		
Nagelkerke Pseudo R2		.103		

***p < .001

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Discussion

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Discussion <<

This study shows that a majority (62.2 percent) of pregnant women in Korea fail in weight management. In particular, they are exposed to higher risks of inadequate weight gain, rather than excessive weight gain. As the negative effects of abnormal gestational weight gain on an infant's immediate and future health are well documented, the high rate of abnormal gestational weight gain needs to be taken as a serious problem. For example, inadequate weight gain during pregnancy can cause disorder in insulin secretion or insulin resistance in the beta cells of the fetus, which raises the possibility of obesity after birth(Hales & Barker 1992). In Korea, children of the women who maintained low BMIs before pregnancy but experienced excessive weight gain during pregnancy were proven to show higher insulin concentration levels (lee et al. 2011b). The high percentage of inadequate gestational weight gain in Korea is seemingly attributed to the tendency of controlling weight for physical beauty and appearance. This study showed that the percentage was high in all groups of women, regardless of educational attainment levels. This suggests that the tendency to stay in shape is widespread among Korean women. In particular, the fact that the risk of insufficient weight gain was higher

among women who had planned their pregnancy might indicate that a significant number of women had planned low weight gain as well. With regard to economic factors, good economic conditions contributed to lowering the risk of inadequate weight gain, but poor economic conditions showed little relation to a higher risk of insufficient gain. This suggests that the prevalence of low weight gain during pregnancy did not originate from malnutrition caused by economic circumstances.

Meanwhile, higher risks for both excessive and inadequate weight gain were observed among the relatively younger women, which indicates that younger women lack adequate awareness about the importance of proper weight management during pregnancy. However, since the risk of insufficient weight gain was relatively low among primiparas, it would appear that first-time mothers tend to pay more attention to traditional culture that emphasizes adequate nutrition and warns against excessive physical activities to counter the prevalence of low birthrates in society. While the gestational weight gain guidelines consider pre-pregnancy BMI levels, the pre-pregnancy BMIs worked independently on gestational weight gain. This shows that pre-pregnancy weight management is also an important factor for a healthy pregnancy and childbirth.

This study has several limitations. First, since respondents provided some data, such as early pregnancy weight, weight

immediately before delivery and height, based on their memories, there is a risk of misclassification. This risk was deemed acceptable in order to secure a sample large enough in scale to represent the population as a whole, and considering the high validity of self-administration in existing studies, the method has unlikely led to sizeable errors in the analysis results. Second, this study utilized IOM-recommended gestational weight gain levels. However, an earlier study claimed that the BMI categorization for Asian women might differ from that of western women(Hales & Barker 1992). There has been no study on whether IOM-recommended gestational weight gain could be applied to Koreans or even Asians in general.

The Korean government has exerted considerable efforts to support healthy childbirths as well as to raise the birthrate through a variety of childbirth support policies. Despite these efforts, the number of underweight or pre-term births has been continuously growing, which indicates a deterioration of the reproductive health at population level. The current Korean maternity health policy is mainly focused on the provision of postpartum medical services for the health of the mother and her infant, paying relatively little attention to prophylactic measures to improve preconceptional and prenatal reproductive health.

The findings of this study testify to the importance of pre-pregnancy health management. To promote preconception

care, medical services should be supplemented with non-medical approaches, such as education about reproductive health to raise awareness and improvement health behavior. Knowledge about the risks of inadequate weight gain, as well as excessive gain, should be widely shared.

This study indicates a high rate of insufficient weight gain in Korea, which may be attributed to misleading conceptions about gestational weight gain. It is very important for the health of both mothers and children to promote knowledge about optimal healthy pregnancy conditions and encourage pre-pregnancy preparation. Various policy measures for pre-conception care are necessary.

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