Number and timing of pregnancies and incurring coronary artery disease in women referred for coronary angiography: a case study in Yazd, Iran

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Introduction

The level and pattern of childbearing are associated with various health conditions of the mother and child. Early childbearing entails a heightened risk of sickness and death for young mothers (i.e. mothers younger than 18 years) and their children. Similarly, old mothers (i:e:, mothers older than 34 years) and their children have disproportionately high rates of mortality and morbidity (Siegel, 2012). Several studies have examined the link between reproductive events and various maternal diseases (Pena et al. 1999; Ueno et al. 2013; Lawlor et al. 2003; Zhang et al. 2009). It is likely that pregnancy raises blood glucose and lipid levels. Because of these and other factors, pregnancy can lead to an increase in the risk of coronary artery disease (CAD) in women. Also, it is possible that the effect of pregnancy on cardiovascular risk remains even years after childbearing (Van stiphout et al. 1987; Craici et al. 2008).

In Iran, despite fertility decline to below replacement level, there are some regions whose fertility rates have remained high. Moreover, increasing age at marriage and first birth leads to the higher proportion of older women wanting to become pregnant. On the other hand, data from the 2011 census indicate that in some regions, the share of adolescent fertility amounts to 14 percent of the total fertility rate. Considering other terminations of pregnancy -such as miscarriage, stillbirth, and induced abortion- and timing of them, it appears that the risks of pregnancy-related diseases like CAD are higher than those can be expected from total fertility rates and timing of childbearing.

This paper explores the extend to which the coronary artery disease can be explained by pregnancy related variables.

Method and Data

This paper examines the relationship of pregnancy to coronary artery disease after controlling for risk factors. During three months, the 217 subjects were randomly selected among women referred to two medical centers for diagnostic coronary angiography. Data on the timing and number of pregnancies come from a cross-sectional survey on women's pregnancy histories. Inpatient records are the source of information about coronary artery disease and its risk factors. The dependent variable is incurring coronary artery disease expressed as a dichotomous variable. Independent variables used in this analysis are age, metabolic risk factors (constructed from four yes/no variables including hypertension, low HDL cholesterol, obesity, and hyperglycemia), the number of pregnancies, become pregnant under age 18 (yes/no question), and become pregnant after age 34 (yes/no question).

Logistic regression was used to assess the chance of incurring CAD in association with pregnancy-related variables. For this purpose, independent variables were entered into the regression equations in several steps. First, the relation between each of the independent variables and the outcome variable was investigated in the bivariate logistic regression models. Subsequently, only pregnancy-related variables were included in the regression equation. Finally, adding control variables to previous equation, the full regression model was built.

Findings

Findings show that the mean number of pregnancies for all women is 7.5. About two-third of respondents had been diagnosed with CAD. This diagnosis was made for 33% of women with 1-3 pregnancies and for 84% of those with more than 9 pregnancies.

In regard to timing of pregnancy, the results indicate that more than a half of women had become pregnant under age of 18 and about 60% of them had become pregnant after age of 34. The share of CAD patients in these two groups is 78% and 82% respectively.

Table 2 shows the odds ratios of incurring CAD, which are estimated by two multiple logistic regression models. In both models, women with more than 6pregnancies are at least 3.5 times more likely than those with 1-3 pregnancies to incur CAD. Moreover, women who had become pregnant after the age of 34 (even after controlling for age and metabolic risk factors) had up to 2.4 times the odds of incurring CAD compared to those who had no pregnancy after this age. While the association between teenage pregnancy and incurring CAD is not significant (in model 1), adding control variables to the regression equation significantly increases the odds ratio as shown in Model 2.

Table 1: Percentage frequency distribution of coronary artery disease by independent variables

Independent variables		Percent	Coronary artery disease	
			Yes (Percent)	No (Percent)
The number of pregnancy	1-3	13.8	33.3	66.7
	4-6	26.7	60.3	39.7
	7-9	33.2	79.2	20.8
	10+	26.3	84.2	15.8
Pregnancy under age 18	Yes	50.7	78.2	21.8
	No	49.3	59.8	40.2
Pregnancy after age 34	Yes	57.6	81.6	18.4
	No	42.4	52.2	47.8
The number of metabolic risk factors	0	10.1	22.7	77.3
	1	17.1	59.5	40.5
	2	23.5	70.6	29.4
	3	24	78.8	21.2
	4	25.3	83.6	16.4
Age	47-36	10.1	27.3	72.7
	48-59	38.2	67.5	32.5
	60-71	37.8	78	22
	72-83	13.9	80	20
Sample size			69.1	30.9

Table 2: Odds ratio for incurring coronary artery disease in women referred for coronary angiography

Independent variables	Model 1	Model 2
Number of pregnancy		
1-3 (ref)		
4-6	2.3	1.4
7-9	4*	3.5**
10+	4.6**	3.9**
Pregnancy under age 18		
No (ref)		
Yes	1.8	2.3**
Pregnancy after age 34		
No (ref)		
Yes	2.5*	2.4**
Number of metabolic risk factors		
0 (ref)		
1		6*
2		15*
3		17.7*
4		32.6*
Age		
36-47 (ref)		
48-59		6*
60-71		7.4*
72-83		7.2*
Chi-square	37.7	80.4
-2 Log likelihood	230.5	187.9
Nagelkerke R Square	0.225	.0436

*p < 0.01, **p < 0.05

Conclusion

This paper examined the association between the level and pattern of pregnancy and incurring coronary artery disease in women referred to two medical centers in the city of Yazd. Comparison of two multiple regression models indicate that relation between pregnancy-related variables and CAD remains significant after controlling metabolic risk factors. In other words, pregnancy can lead to an increase in the risk of coronary artery disease independent of exacerbating the metabolic risk factors. Pregnancy at the early or later reproductive ages is susceptible to be accompanied by stress and anxiety and hence may operate as a negative effect on coronary arteries.

The homogeneity of socio-economic characteristics of respondents is a limitation for this study. The mean age of respondents was high and most of them were from less developed regions. The number of women with low pregnancy was less than the necessary size to investigate the effect of each pregnancy on CAD separately. By conducting longitudinal studies and using large samples, researchers may be able to explore the relation between pregnancy and diseases and its implications for reproductive health and population policy in low-fertility populations.

Fertility decline and the postponement of marriage and childbearing in post-transition countries, on the one hand, increase the probability of pregnancy at later reproductive ages and, on the other hand, may lead to the neglect of family planning and reproductive health services due to pro-natal policies. Therefore, the women are increasingly exposed to unintended and teenage pregnancy. There fore, in spite of declining fertility, it seems that the relation between pregnancy and health still is an important subject for demographic research.

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