

# Parity and Coronary Heart Disease

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## Abstract

**Background:** Pregnancy is associated with structural and functional changes in the cardiovascular system as well as obesity, high blood triglyceride concentration, and increased risk of metabolic syndrome.

**Objective:** The aim of this study was to compare parity between women with established coronary heart disease and normal women in general population.

**Materials and Methods:** Totally, 105 women referred for coronary artery bypass grafting surgery during a period of more than one year were enrolled. Total fertility rate (TFR) was evaluated in this group of patients and we also compared TFR of these women with that of normal women.

**Results:** Based on the results, 884 pregnancies were occurred in total of 105 patients (mean parity = 8.34). There was a significant difference between the TFR of the CABG patients and the TFR of the normal women in 1966 ( $p$  value = 0.038), the TFR of the normal women in the past 40 years ( $p$  value < 0.001), the TFR of the normal women in province of Sistan and Baluchistan ( $p$  value < 0.001).

**Conclusion:** Our findings suggest that the number of pregnancy is an independent risk factor associated with coronary artery disease. (*Iranian Heart Journal 2012; 13(3):11-15*).

**Keywords:** Parity ■ Coronary artery disease ■ Women

## Introduction

Coronary artery disease (CAD) is a common disease and second leading cause of mortality in women over 40 years of age in Iran (1). Studies of cardiovascular disease risk by parity show mixed results, variously reporting an increased risk, a decreased risk, or no association (table 1)(2). The largest study, of over 100000 death certificates in England and Wales found a small but significant 20% increase in death from cardiovascular disease in parous versus

nulliparous women (3). A higher number of children is associated with increased carotid atherosclerosis in both younger and older women (4).

Most studies failed to consider the effect of social class, itself a major heart disease risk factor, on parity.

Lower social-class women tend to have an earlier first pregnancy, and age at first pregnancy is a major determinant of multiparity. We investigated the total fertility rate (TFR) in women referred for

Received November 2012; Accepted for publication December 2012

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coronary artery bypass grafting (CABG) surgery from September 2009 to December 2010 in our cardiac surgery department and compare it to the TFR of normal women in Iran.

### Materials and Methods

We investigated all women referred for CABG from September 2009 to December 2010. The informations, include history of coronary heart disease in family (family history; FH), smoking, Hyperlipidemia (HLP), arterial hypertension (HTN), diabetes mellitus (DM), and parity were gathered prospectively (figure 1).

105 cases was collected that according to their ages divided into three groups (table2).

In all groups we investigated the variable, of parity, abortions, breast feeding and consumption of oral contraceptives (OCP) (table 3). We focused on parity but other variables can be used by others in future studies.

We use t-student test for comparing mean of parity in patients with the general Iranian women in highest parity according to location and time and the mean of them in Iran.

Table 1- Studies of Parity and Risk of Coronary Heart Disease (CHD)

First Author (year)	Design	No. of CHD Cases	Age at CHD Event, y	Observed Associations
Winkelstein(1958) <sup>10</sup>	Case-control	50	X64	Parity*
Winkelstein(1964) <sup>11</sup>	Case-control	59	50-80	Spontaneous abortion* 5+ pregnancies* Pregnancy loss*
Parrish (1967) <sup>12</sup>	Autopsy cases	24	40+	No association parity with degree of atherosclerosis
Bengtsson(1973) <sup>13</sup>	Case-referent	96	50+	3+ pregnancies*
Talbott (1981) <sup>14</sup>	Case-control	80	25-64	No association parity with sudden in multivariate model
Beard (1984) <sup>15</sup>	Case-control	159	<60	4+ pregnancies* first pregnancy <20 y*
Beral (1985) <sup>16</sup>	Death certificates	120 543	45-74	Parity*
Beard (1986) <sup>17</sup>	Case-control	15	<60	Nulliparity vs sudden death*
Colditz (1987) <sup>18</sup>	Cohort	308	>30	No association with parity or age at first birth; comparison group was median No. of pregnancies
LaVecchia (1987) <sup>19</sup>	Case-control	202	<55	first pregnancy <20 y* No association with parity or abortion
Croft (1989) <sup>20</sup>	Case-control	158	20-60+	No association with parity after adjustment for socioeconomic status and smoking
Talbott (1989) <sup>21</sup>	Case-control	67	25-64	Nulliparity vs sudden death in women >50 y* No association with age at first pregnancy after adjustment for smoking

\* Statistically significant associations at P<.05.

Table 2 – Patients groups characteristics

Groups	I	II	III
Age	I ≤ 49 yr.	49 yr. < II < 59 yr.	III ≥ 60 yr.
Number	13	41	51

Table 3- Patients variable

Variables	Group I Total/per one	Group II Total/per one	Group III Total/per one	Total Total/per one
Parity	67/5.2	359/8.8	458/9	884/8.4
Abortion	13/1.0	30/0.7	50/1.0	93/0.9
Breast feeding	10/0.8	40/1.0	49/1.0	99/0.94
OCP	6/0.46	26/0.63	19/0.37	51/0.48

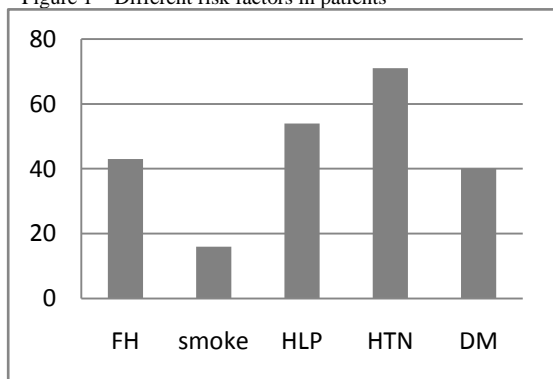
OCP = Oral contraceptive

## Results

The total fertility rate (TFR) is the average number of children that would be born to women over her lifetime. Iran has experienced one of the most successful planning programs in the developing world, with 64 percent decline in TFR between 1986 and 2000. The fertility transition in Iran has passed through different phases from 1972 to 2000 (figure 2).

TFR decreased from around 7.7 in 1966 to around 6.0 in 1976, and then rose to 7.0 in 1980. TFR declined from 6.8 in 1984 to 6.3 in 1986 and further to around 5.5 in 1988. After that fell sharply in 1989, dropping from 5.5 to below 2.8 in 1996, more than a 50 percent decline in 6 years (table 4).

Figure 1 – Different risk factors in patients



FH = Family History  
HLP= Hyperlipidemia  
HTN= Hypertension  
DM= Diabetes Mellitus

Table 4- Different TFR in different years in Iran

Total fertility rate	years	Mean TFR
7.7	1966	5.5
6	1976	
7	1980	
6.8	1984	
5.5	1986	
2.8	1996	
2.17	2000	

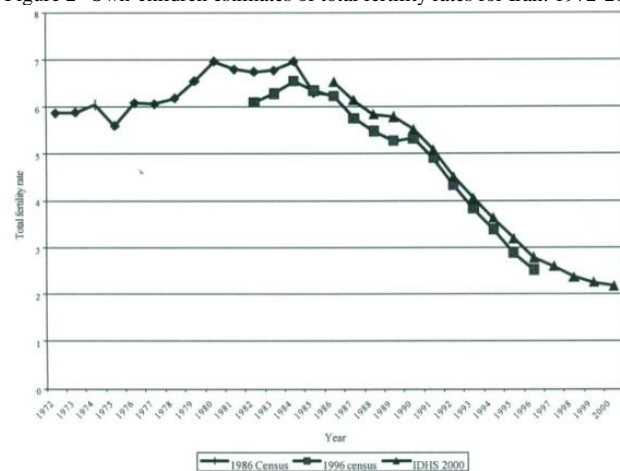
TFR = Total fertility rate

The highest TFR in Iran was recorded for Sistan and Baluchistan province (4.69).

TFR in our patients was 5.2 in group I and 9 in group III with a mean of 8.4 (table 3). According to table 4 we have different TFR in general population in different years. We brought this into account and compare our patients TFR with mean TFR in different years, with highest TFR in 1966 and with that in Sistan and Baluchistan province (table 5).

There is a significant difference between TFR of CABG patients with normal women in 1966 (p. value 0.38), with normal women in past 40 years (p. value 0.0001), and with normal women in Sistan and Baluchistan province (p. value 0.00001), with highest recorded rate in Iran.

Figure 2- Own-children estimates of total fertility rates for Iran: 1972-2000



Source: figures calculated by the author using the own-children method applied to the 1986 and 1996 censuses, and 2000 Iran Demographic and Health Survey.

## Discussion

Pregnancy is linked to obesity, high blood triglyceride concentration, and increased risk of metabolic syndrome. Each additional birth increased body-mass index by 0.3 kg/m<sup>2</sup>, waist circumference by 0.58 cm, and blood triglyceride concentrations by 0.036 mmol/L. Ness et al. found that having six or more pregnancies was associated with a small but consistent increase in the risk of coronary heart and cardiovascular disease (5). In addition, women who had their first term pregnancy before the age of 20 had an increased risk as compared with women who had a first delivery later.

Although non-biologic factors, such as stress and changes in lifestyle may be important but there is an increase in risk of about 40 to 60 percent in women with multiple pregnancies, even after adjustment for other risk factors associated with coronary heart disease(5). Indeed, reproductive history is an important consideration in the health risk of women. Women who experience pregnancy complications are more likely to report prevalent cardiovascular disease (including angina, heart attack, and arrhythmia) suggesting adverse pregnancy events are potentially early manifestations of cardiovascular disease (6). Pregnancy complications may serve as signals for future cardiovascular disease presenting an opportunity for early intervention and prevention. Interestingly; Parous women had lower mortality from breast, ovarian, and endometrial cancer than did nulliparous women but a higher mortality from diabetes mellitus, gallbladder disease, cancer of the uterine cervix, nephritis and nephrosis, hypertension, ischemic and degenerative heart disease, cerebrovascular disease, and all causes of death (3). In a large, prospective, population-based cohort study, authors found that women with earlier age at menarche had a higher body mass index, waist circumference, blood pressure, and glycated hemoglobin and a worse lipid profile during adulthood (7). In addition to coronary heart disease, peripartum cardiomyopathy in 85% of cases occurred in parous women (8).

### Conclusion

Pregnancy is associated with structural and functional changes in the cardiovascular system. Multiparity is considered a risk factor for peripartum cardiomyopathy and cardiovascular disease in later life, even after controlling for other medical, demographic or socioeconomic risk factors.

Our study has indicated that number of pregnancies was independent risk factor associated with coronary artery disease.

### Acknowledgment

The authors would like to thank Mrs. Soheila Ramezani and Alireza Gachkooban for their help.

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