

# Offspring Sex Ratio in Smokers

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## Abstract

**Objective:** To assess the ratio of male to female gender in the offspring of smokers and non-smokers.

**Method:** The tool used for the survey was a questionnaire. Four hundred subjects were analyzed and were divided into three age groups.

**Results:** Out of 400 subjects 56.5% were smokers and 43.5% were nonsmokers. Overall offspring sex ratio in nonsmokers was 1.53 and 0.61 in smokers.

**Conclusion:** The smoking might be a contributing factor to a lower male to female sex ratio of offspring along with Estrogenic pollutants which are everywhere in the environment contaminating food, drinking water and air. (JPMA 54:442;2004).

## Introduction

Number of developed countries including USA, Canada, Europe and many Asian countries show significant decline in male to female ratio of children during the past few decades. The reasons for the recent decline in the male to female ratio are unclear but some speculate that exposure to environmental toxins that predominantly affect male and male reproductive system could play a role. A study by Misao Fukuda showed that periconceptional smoking might be a contributing factor to a lower male to female sex ratio of offspring.<sup>1</sup> Exposure of men to tetrachlorodibenzo-p-dioxin (TCDD) is linked to lowered male to female sex ratio in their offspring.<sup>2</sup> It has been proposed that environmental chemicalization is responsible for the recent decline in male ratio.<sup>3</sup> Number of industrialized countries indicates that the proportion of male born has significantly decreased.<sup>4</sup> Reduced male births in major Italian cities are interpreted as a signal of increasing exposure to hazardous environmental conditions for male conceptions.<sup>5</sup> Changing sex ratio in United State was seen during Styrene exposure.<sup>6,7</sup> Stress could also reduce the sex ratio of newborns as witnessed in connection with the Kobe earthquake, which resulted in an abrupt reduction in sperm motility and a significant decline in the sex ratio.<sup>8</sup> Use of tobacco as cigarettes and as smokeless tobacco is increasing day by day in Pakistan and becoming the global killer<sup>9</sup>, it could also be a cause for the altered sex ratio. A study was designed to see the effect of tobacco on offspring sex ratio in two major cities of Pakistan.

## Methodology

To assess the ratio of male to female in the offspring of smokers and nonsmokers a cross sectional survey was conducted from April 2002 to December 2002, at Karachi, Rawalpindi, Islamabad and Kalarkahar. The tool used for

the survey was a questionnaire with 27 questions. The important questions were about socio-economic status, age at the time of marriage, number of children, smoking, if yes since how long and daily consumption of cigarettes. An informed consent was obtained from all the subjects. Four hundred subjects were selected by convenient sampling. The subjects were divided into three groups on the basis of their age as under.

A= 20-35 years, B= 36-50 years and C= 51 and above

Daily consumption of cigarettes was divided into two categories, less than or equal to 14 cigarettes per day and more than or equal to 15 cigarettes per day.

## Results

Table 1 shows that out of 400 subjects 56.5% were smokers and 43.5% were non-smokers. Age group B has the maximum percentage of smokers and group C has maximum percentage of non-smokers.

Fifty eight point eight percent subjects were consuming =14 cigarettes per day and 41.2% subjects were consuming more than or equal to 15 cigarettes per day. Age group B shows the maximum number of smokers in both categories (Figure).

Table 2 shows offspring sex ratio in Pakistan. Highest ratio is seen in age group B (1.89) in non-smokers and lowest in-group A (0.55) in smokers.

## Discussion

Tobacco was first grown in North America. The word 'nicotine' however, is of French origin, named after French Ambassador to Portugal Jean Nicot who was honored by the Queen of France when she was presented with a jeweled box containing snuff.<sup>10</sup> Tobacco use in Pakistan is not limited to cigarette smoking. Chillum, huqqah, chewing tobacco in pan, snuff and niswar are some other common

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Normally, boys have a slight edge over girls, with almost 52 percent of all babies born worldwide being male. Couples are more likely to have a girl than a boy if either of the partners smokes heavily.<sup>1</sup> However, the comparative number of males has been declining in several industrialized countries over the past few decades and researchers suspect toxic substances may be partly to be blamed.<sup>2,3</sup> The sex ratio at birth in most countries is between 104 and 106 males to 100 females. It fluctuates within a narrow range from time to time in some area but the general trend of the last 20 years has been downward. However, when the couples were grouped according to their smoking habits, the ratio changed.<sup>12</sup> Some researchers suggest that sperms carrying the male sex chromosome are more vulnerable to toxic chemicals in tobacco smoke than sperm carrying the female chromosome. Such affected Y-sperm cells are less likely to fertilize or produce less viable embryos.<sup>8</sup> Semen analyses showed that non-smoking men have healthier sperm than smoking men (in terms of sperm viability and longevity).<sup>13</sup> The overall offspring sex ratio in nonsmokers of our study was 1.53 and 0.61 in smokers. Our results are in accordance with the results of Fukuda et al.<sup>1</sup>

It is concluded that smoking might be a contributing factor to a lower male to female sex ratio of offspring along with Estrogenic pollutants which are everywhere in our environment contaminating our food, drinking water, and air. As said by Robert O. Bonow, President of the American Heart Association. "This gives male smokers another reason to kick the habit, and provides another area of emphasis and education for smoking cessation programs."<sup>14</sup>

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