Effect of Cigarette Smoking on Vitamin C in Non Pregnant and Pregnant Women

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Abstract

Introduction: It is perceived that smoking cigarettes during pregnancy is unfortunate and can prompt expanded unconstrained early abortion in the first trimester, premature abruption of the placenta, preterm delivery, decreased birth weight and SIDS. All things considered, children destined to mothers who smoke during pregnancy weigh 150-300 gram not exactly those destined to mothers who don't smoke and the danger of little for-gestational age among ladies who smoke is at any rate twice as high as among ladies who don't smoke. For more seasoned ladies, the effect of smoking during pregnancy on fetal development and preterm conveyance are more noteworthy. The danger of placental issues can be expanded by long haul smoking.

Aim: Effect of cigarette smoking in non-pregnant and pregnant women's on the blood serum level of vitamin C

Material and Methods: The present study included 150 subjects of age group 25-35 years. Out which 75 werenon-smokers pregnant women as a control group and 75 were smoker pregnant women as a study group. During this stage of pregnancy, the vitamin C levels in the maternal serum were colorimetrically determined. The respondents also answered a questionnaire about their smoking habits during pregnancy. Vitamin C intake was measured during the third trimester by monitoring food consumption over a 5-day period (including Sunday) and vitamin C registration with dietary supplements.

Results: In the present study, we found significant decreased levels of serum vitamin C and in pregnant cigarette smokers as compared to pregnant non-smokers.Vitamin C was protective for placental abruption in nonsmokers but not in smokers (P=0.01).

Conclusion: If the production of antioxidants (vitamin C) in smokers is lower compared to pregnant women who are not smokers, this could aggravate their newborn's peroxidation problems. Supplementation of vitamin C tends to be connected with a decrease in placental abruption and preterm birth in pregnant smokers.

Keywords: *Lung development, pulmonaryfunction test, Vitamin C, Preterm birth, Smoking and Pregnancy*

Introduction

Smoking during pregnancy is the key preventable cause of childhood respiratory disease[1-3] and is a significant public health issue because, despite the alert of the Surgeon General of the related health issues, more than 50 percent of smokers who become pregnant continue to smoke.[4,5]This is equal to at least 12 percent of American women who choose to smoke while pregnant, resulting in more than 450,000 babies born annually exposed to smoke.[6] Maternal smoking adversely affects lung development during pregnancy, as shown by lifelong declines in pulmonary function and increased risk of wheezing, infections of the respiratory tract and asthma.[1,2]

In spite of the well-known adverse health effects of smoking cigarettes, consumption rates remain high. In addition, smoking rates are highest among women of childbearing age (20-24 years), affecting one in six females. Increased rates of abortion, prematurity and low birth weight are among the dangers of smoking during pregnancy. In addition, maternal smoking risks to the child extend far into the neonatal period and are known to include an elevated risk of sudden infant death syndrome, low lung function, and inflammation of the lower respiratory tract[7]. Despite these known risks, only one-fourth of women will quit before pregnancy and another 20% will quit during pregnancy[8], meaning that many women are either unaware of the risks or unable to quit smoking.

The smoking is allied with a lesserconsumption of antioxidants,specifically vitamin C[9, 10]. It has also been reported that vitamin C in smokers' tissues and plasma may be at suboptimal concentrations[11]. In particular, deficiency of vitamin C during pregnancy hasbeen linked with an increased risk of contracting infections,premature rupture of the membranes[12,13], prematurity[12] andeclampsia[14]. In pregnant women, cigarette smoking is a source of oxidant tension, indicating that in infants exposed to utero[10], it may be a source of the same. At birth, compared to in utero conditions, the newborn is brought into an atmosphere that is hyper toxic and vitamin C deficiency can lead to inadequate antioxidant defences[15]

The aim of the present investigation was to determine the effect of cigarette smoking in non pregnant and pregnant women's on the blood serum level of vitamin C.

Material and Methods

Our study was carried out in the Biochemistry Department, DMMC&SMHRC, Nagpur, from April 2020 to November 2020. The study was approved by Institutional Ethical Committee and informed consent was taken prior to the study. A total 150 subjects of age between 25-35 years were enrolled in this study. Out of 150 subjects, 75 were non smoker pregnant women as a control group and 75 were smoker pregnant women as a study group. The pregnancy periods of 150 women was followed. During their third trimester (between weeks 32 to 36) dietary, anthropometric and biochemical studies were made.

Inclusion Criteria

Inclusion criteria were age between 25-35 years , mother contain either Single and multiple gestation, gestational age between 130/7 and 226/7 weeks based on clinical information and ultrasound and pregnant women's smoking history (Current cigarette smoking of at least 1 cigarette in one day).

Exclusion Criteria

- Age less than 25 and above 35 years
- Diabetics or using insulin or oral hypoglycemic agents
- Hypertensive or using antihypertensive medication
- Hyperlipidemia or using lipid lowering drugs,
- Obese
- Abnormal renal function

Blood sample collection and processing

A 2 ml venous blood sample was collected from each participant, into a plain vial. After centrifugation at 1500 rpm for 3 minutes, the serum was assayed.

Biochemical Analysis

Blood samples were taken first thing in the morning from subjects fasted overnight. Since vitamin C is unstable in storage[16], the serum component was separated and vitamin C levels determined colorimetrically[17] (BoehringerMannheimGMbH, Mannheim, Germany) immediately after extraction.

Result

Out of 150 non- gestational diabetic, non preeclampsia subjects, 75 werenon-smoker pregnant women as a control group and 75 were smoker pregnant women as a study group. The age in smoker group and non smokergroup ranged from 25 to 35 years.

Table-1: Personal and Anthropometric Data of Subject and Vitamin C Intake during the Third Trimester of Pregnancy Differences between Smokers and Nonsmokers pregnant women

Variables	Non-Smokers	Smokers
Number of subjects	75	75
Weight (kg)	68.2±8.8	62.4±4.2*
Height (cm)	180.3±9.1	178.8±3.5
BMI (kg/m2)	42.5±4.4	41.2±4.4
Anthropometric data in 3rd trimester		
Weight (kg)	71.3±9.1	68.3±7.5
Height (cm)	180.3±9.2	178.8±3.4
Body mass index (kg/m2)	45.5±4.3	45.1±3.3
No. of children previously born	0.66±0.80	0.83±0.93*
Cigarettes smoked/day (n)	0	6.9±2.8*
Vitamin C supplied by supplements (mg/day)	0	35.7±85.5
Vitamin C supplied by supplements +diet		
Total intake (mg/day)	159.1±83.4	162.3±109.6
Coverage of RI (%)	190.6±98.8	199.9±135.3
Intake, RI (%)	27.4	41.8

Mean±SD. *p<0.05 between smokers and nonsmokers

RI= Recommended intakes. No significant differences between smokers and nonsmokers.

For the purpose of the present study, the total 150 subjects divide into smokers and non-smokers pregnant women were group of non smokers (N=75) and smokers (N=75). **Table 1** shows some of the mothers''personal and anthropometric data. Smoker pregnant women's showed lower bodyweights and had previously born more children, though noother significant differences were seen between the two groups

Smoker pregnant ladies have indicated a marginally lower intake of foods grown from the ground than did Non-smoker pregnant ladies, however these distinctions were not sufficient. These outcomes legitimize the absence of finding any significant contrast between the vitamin C intake of Non-smoker and Smoker pregnant women. During the third trimester, just three Smoker subject took a vitamin C containing supplement, in amounts of 700 to 3500 mg/day. The dietetic outcomes are, accordingly, intensely modified when supplements are considered.(**Table1**).

Table No 2: Levels of Vitamin C in Maternal Serum during the Third Trimester

Variables	Non-Smokers	Smokers
Serum data, third trimester of pregnancy		
Vitamin C (µmol/L)	541.7±369.5*	312.4±108.1*
% low serum levels		
<10. 2µmol/L	31.5	60.8
<15.0 µmol/L	35.6	61.0
<24.5 µmol/L L	39.9	55.1

*P<0.05 between smokers and nonsmokers.

However, Non smoker pregnant women's showed significantly greater vitamin C levels as compared to smokers pregnant women's. (**Table 2**)

Discussion

Our analytical data indicated that a decline in serum vitamin C levels is associated with cigarette smoking. Despite correction of variables that independently affected serum vitamin C levels, such as age, gender, ethnicity, and BMI, this association persisted. In smokers, dietary vitamin C intake was lower than in non-smokers, a result that may theoretically explain this inverse association. Further adjustment for consumption of vitamin C, however, showed that the correlation between smoking and serum levels was independent of dietary intake.Smoking status actually clarified more of the overall difference in serum vitamin C levels than the self-reported vitamin C dietary intake. In addition, there was no major reduction in the increased risk of hypovitaminosis C in smokers while controlling for reduced dietary vitamin C intake associated with smoking. These results indicate that cigarette smoking has a substantial effect on the levels of serum vitamin C, which occurs mainly through a mechanism independent of reduced dietary vitamin C intake.

With regard to the consumption of supplements, **West et al.**[18] indicate that maternal use during pregnancy of a vitamin supplement supplement containing ascorbic acid can provide foetal protection against lead toxicity and/or free radical damage. Despite this, the use of supplements was rare in the current research, and was only found in subjects who smoked.

Many studies have shown a lower intake of vitamin C among smokers[19]. This was not seen in the present research, and because they were pregnant, these participants could have taken better care of their diet (pregnant women typically increase their fruit and vegetable intake[20]. Instead, it may be due to the low cigarette consumption (Table 1). Only ten women smoked 10/day, and only twenty women smoked 15/day.

Decreased preterm births among women receiving regular vitamin C supplements prior to 32 weeks of gestation have already been recorded by **Hauth et al. 2010**, which was due to a decrease in preterm PROM.20 While smoking was regulated in this research, the possible association with smoking was not discussed. Smoking, however, is associated with an increased preterm birth rate prior to 32 weeks of gestation.[20]

We found that self-reported smoking was associated withincreased incidences of the maternal compositeoutcome, neonatal composite outcome, preterm birth, low birthweight and small for gestational age.

The high percentage of subjects with serum vitamin deficiency levels is consistent with that recorded by **Pfeffer et al 1996**[21], who, despite sufficient vitamin C intake, found low levels of leukocyte vitamin C in 60 to 80 percent of a different group of pregnant women, irrespective of their weight gain.This may indicate a high prevalence of subclinical infections, according to **Pfefferet al**[21], which may be the cause of increased peripheral tissue absorption of vitamin C. This result supports the idea of using biochemical estimates for the detection of women with "low" levels of vitamin C.

It is probable that attempts to enhance the nutritional status of pregnant women will be better served by encouraging all women of childbearing age to optimise the nutritional content of their diets, **Borrud et al 1993**[22]. Special care is needed for pregnant smokers, and an increase in their fruit and vegetable intake is recommended.Considering the **West et al**.[18] criterion, it may be appropriate to recommend such nutrient supplements (e.g. vitamin C) for pregnant smokers.

Conclusion

Our findings indicate that the risk of placental abruption and preterm birth at<37 weeks of gestation may be decreased by maternal supplementation with vitamin C among smokers. We do not agree that a supplementation trial limited only to pregnant women who are smoking is recommended at this time because multiple vitamin C supplementation trials have been performed to avoid preeclampsia.Additional systematic analyses and even individual meta-analysis of patient data combining the data and women from these randomised trials with smoking status consideration will further determine the robustness of our findings and confirm them. Such research should discuss abruption and preterm birth explicitly. Therefore, the possible role of vitamin C supplementation as an adjunctive intervention in this at-risk population to prevent adverse outcomes needs further study, while smoking cessation remains the most significant intervention to prevent these outcomes in smokers.

Conflict of Interest: Nil

Source of Funding: Nil

Ethical Clearance: Taken from institutional ethics committee

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