

## Fluoride level in plasma blood and urine of first-trimester pregnant women living in a province

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### Abstract

The study was aimed to determine the fluoride level in blood and urine of 154 first-trimester pregnant women among 7 public hospitals of a province. The concentration of plasma-blood fluoride was not determined in all subjects. For concentration of urine fluoride concentration, 77 cases (50.6%) had low fluoride level (less than 0.2 mg/L), 74 cases (48.7%) revealed the normal fluoride level (0.2 to 3.2 mg/L). Only 3 subjects (1.97) had high fluoride level (more than 3.2 mg/L).

**Keywords:** Fluoride, plasma blood, urine, pregnant women

### Introduction

Community water fluoridation has been used for nearly six decades to reduce the prevalence of dental carries. The people of more than 30 countries drink water with optimal level for carries prevention. [1,2] Despite clear benefit to dental caries, there still continues the debate over the safety of fluoridation because of evidence demonstrating that excessive fluoride intake is associated with adverse event of teeth. [3] The review of health literature by the U.S. National Research Council (NRC) partly spurred the more study to address the potential impact of population level fluoride exposure, particularly among vulnerable population including pregnant women and children. [4]

The perinatal systemic administration of fluoride supplement to pregnant women for caries prevention in their offspring has continued to be controversial. [5] Even so, prenatal fluoride is still recommended by some dental authorities. [6,7] Evaluation of total fluoride exposure by measuring its concentration in blood and urine is widely used, and relatively simple. Accordingly, the study was aimed to assess the plasma blood and urine fluoride level of pregnant women living in a province, where the level varies in the range according to different source of drinking water and food.

### Material and Method

The subjects of the cross-sectional study were 154 healthy first-trimester pregnant women. Recruitment was carried out in 7 public district hospitals of Phayao province. The plasma blood and urine specimens were obtained, and analyzed in the central laboratory.

Fluoride ion selective electrode (FISE) method was used to measure fluoride content in plasma blood and urine. Total ionic strength adjustment buffer (TISAB) used to maintain the ionic strength of the solution and pH.

The descriptive statistics were used to describe the basic feature of data in term of number and proportion.

## Results

The concentration of plasma-blood fluoride was not determined in all subjects. For concentration of urine fluoride concentration, 77 cases (50.6%) had low fluoride level (less than 0.2 mg/L), 74 cases (48.7%) revealed the normal fluoride level [8] (0.2 to 3.2 mg/L). Only 3 subjects (1.97) had high fluoride level (more than 3.2 mg/L). (**Table 1**) The average fluoride level of urine was 0.5 mg/L, range of 0.01 to 5.48.

**Table 1** Distribution of urine fluoride level

Urine fluoride level	No. (%)
Below, less than 0.2 mg/L	77 (50.6)
Normal, 0.2 to 3.2 mg/L	74 (48.7)
Above, more than 3.2 mg/L	3 (1.97)

## Discussion

Absorption and accumulation of fluoride in bones is influenced by many factors: endemic contamination, nutrition status, addition of fluoride to a public water supply, the consumption of bottled or carbonated water, age and sex. [9] The limitation of the study is lack of fluoride investigation in drinking water, and did not measure the fluoride exposure throughout pregnancy.

The estimate of fluoride in the plasma is the good index of fluoride status in human system. Fluorides in human serum are found in two forms; ionic fluoride ( $F^-$ ) and nonionic fluoride (NF). The later constitutes 80 to 90% of total fluoride.

However, the ionic fluoride is commonly used to determine its physiologic variation in human. [10]

The exposure sources included fluoridated water, fluoride-containing pesticides, bottled teas, fluorinated pharmaceuticals, teflon pans, and mechanically deboned chicken. No one had been detected the concentration of plasma blood in this study. The fluoride concentration in urine is commonly used for monitoring fluoride exposure, although it does not seem to have been related to the actual fluoride concentration in plasma following fluoride exposure. The plasma fluoride levels or urinary excretion rates of fluoride may give a more correct picture of occupational fluoride exposure than fluoride concentrations in urine. [11]

The average urine fluoride level of this study (0.5 mg/L) was much more low concentration, compared with a study of prenatal women in Mexico where the mean (SD) urine fluoride was 0.90 (0.35) mg/L, [12] as well as a study in United State of America. [13] It may imply to the various sources of fluoride exposure.

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