

Short Communication

Urinary Excretion of Aspirin in Male Volunteers During Winter

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ABSTRACT

The project was designed to study urinary excretion of acetylsalicylic acid (Aspirin) in healthy young male volunteers during winter after oral dose of 600 mg soluble aspirin. Urine samples were collected at pre-determined time intervals. Salicylate urine levels were determined by spectrophotometric method. The value for pH of urine was 6.25 ± 0.107 , diuresis was $0.044 \pm 0.0063 \text{ mL min}^{-1} \text{ kg}^{-1}$, concentration of ASA as free salicylate excreted was $93.6 \pm 24.91 \mu\text{g mL}^{-1}$, percent dose excreted was $4.97 \pm 1.55\%$. The value for rate of excretion was $3.37 \pm 1.019 \text{ mg min}^{-1} \text{ kg}^{-1}$ and percent cumulative amount excreted was $15.17 \pm 4.125\%$. It was found that percent cumulative excretion of aspirin was high under indigenous conditions.

Key Words: Aspirin; Salicylate; Urine; Male volunteers

INTRODUCTION

Aspirin is used as an antibiotic primer, antihistaminic, decongestant, arthralgia, myalgia, dysmenorrhoea and fever (Anonymous, 1970). Aspirin also increases the bleeding time, decrease platelet adhesions (Reynolds, 1989), and is used in the prophylaxis of ischemic heart disease and strokes (Babu & Salvi, 2000). The effectiveness of aspirin is largely due to its capacity to inhibit prostaglandin biosynthesis. It is due to irreversible blocking cyclooxygenase enzyme which catalyses the conversion of arachidonic acid to endoperoxide compounds (Payan, 1992). Metabolism is affected by many factors such as age, species, season, strains, disease conditions, hormones, sex, drug and climatic conditions (Pottage, 1979).

Genetic and environmental factors contribute a major role in inter and intra individual variability in drug metabolism. A series of indigenous studies in human beings and animals have clearly indicated that the metabolism and urinary excretion of investigated drugs were different under indigenous conditions when compared with values given in literature (Nawaz *et al.*, 1994).

Thus, keeping in view the indigenous conditions of Pakistan the present study was under taken to study the urinary excretion of acetylsalicylic acid (aspirin) in healthy male volunteers after its oral administration.

MATERIALS AND METHODS

Subject. The experiment was conducted in the Department of Chemistry on 12 healthy male volunteers. They were having age between 21-26 years, body weight 52-90 kg and height 162.58 to 177.8 cm. Each volunteer was apprised of study project and a written consent was obtained from all the volunteers.

Study protocol. Sampling was done in the month of January, 2003. No other medications were permitted one week prior to and during the study. After an overnight fastening, drug free urine sample was collected from each volunteer before the administration of 2x300 mg Dispirin (soluble aspirin).

Collection of urine samples. The urine samples were collected at 30, 60, 120, 180 240 and 600 minutes after an oral administration of drug (ASA). The total volume of each, urine sample voided during period was recorded. The pH of urine samples was recorded and kept in freezer at -20°C till analysis.

Urine analysis. Quantitative determination of salicylate was carried out by a validated calorimetric method of Levy and Procknal as modified by Farid *et al.* (1975).

Urinary excretion. Urinary excretion of drug was studied by using the following formulae:

Concentration of drug ($\mu\text{g mL}^{-1}$) = Standard factor x absorbance

$$\text{Diuresis (mL min}^{-1} \text{ kg}^{-1}) = \frac{\text{Volume of urine in collection period (mL)}}{\text{Time (min)} \times \text{body weight (kg)}}$$

Amount of drug excreted $U_c \times U_v$

Where, U_c = concentration of drug in urine (mg); U_v = total volume of urine voided

$$\% \text{ age of dose excreted} = \frac{\text{Amount of drug excreted (mg)}}{\text{Total dose (mg) given}} \times 100$$

$$\% \text{ age Cumulative dose} = \frac{\text{Cumulative amount excreted (mg)}}{\text{Total dose of drug given}} \times 100$$

Statistical analysis. Results were subjected to statistical analysis according to mean \pm SE values (Steel *et al.*, 1997).

RESULTS AND DISCUSSION

Excretion is a process by which drug or its metabolites are eliminated from the body with out chemical change

(Mary *et al.*, 2000). Urinary excretion of drug depends upon pH of urine, dose of drug given and diuresis i.e. rate of urine flow. The demographic representation of 12 healthy male volunteers is shown in Table I.

In the present project, mean \pm SE value for pH of urine in 12 healthy male volunteers was 6.25 \pm 0.107 and is comparable to mean value 6.11 \pm 0.134 for female volunteers (Shahnaz, 2003). Mean \pm SE value for diuresis was 0.044 \pm 0.0063 mL min⁻¹ kg⁻¹; whereas, it was reported as 0.037 \pm 0.017 ml min⁻¹ kg⁻¹ (Fauzia, 1998). This variation may be due to body weight, gender variation, volume of urine voided etc. In this project, the mean \pm SE value for concentration of salicylic acid in males volunteers was 93.6 \pm 24.91 μ g mL⁻¹ while in female volunteers this value was 183.73 \pm 31.15 μ g mL⁻¹ (Shahnaz, 2003). Concentration of drug depends upon the pH of fluid and pka value of drug. Mean \pm SE value for rate of excretion in this study was 3.31 \pm 1.019 μ g min⁻¹ kg⁻¹; whereas it was reported as 9.73 \pm 2.50 μ g min⁻¹ kg⁻¹ (Shahnaz, 2003) from female volunteers. This difference is due to different pH. Mean \pm SE value for amount excreted as salicylic acid was 14.85 \pm 9.24 mg. While mean \pm SE value for percent amount or dose excreted as salicylic acid was 4.97 \pm 1.55 % which is less than earlier reported value mean \pm SE 8.3 \pm 5.9% This difference may be due environmental conditions such as temperature Mean \pm SE value of cumulative amount (mg) excreted as salicylic acid in males was 89.69 \pm 20.59 mg while percentage cumulative amount excreted was 15.17 \pm 4.125 % which is less than the value present after 10 h of oral drug administration.

The plot of percent cumulative amount excreted as salicylic acid in male volunteers versus time is shown in Table II.

It was concluded that urinary excretion of aspirin during winter in male volunteers was different than that in females.

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Table I. Description of male volunteers their weight, age, height, blood pressure, body temperature and body surface area

Attributes	Mean	SE
Age (years)	25.25	0.41
Weight (kg)	67.08	0.53
Height (cm)	156.84	1.32
BP S(mm Hg)	105.83	3.19
BPS (mm Hg)	72.5	1.99
Temperature (°C)	36.8	0.31

Table II. Cumulative percentage amount of acetylsalicylic acid (mg) excreted as free salicylic acid in urine of female volunteers following oral administration (2x300 mg) aspirin

Time (min)	Mean	SE
30	4.61	1.53
60	8.59	2.01
120	22.15	4.26
180	34.85	6.40
240	51.53	8.54
600	59.50	10.81

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