

## Short Communication

# Analysis of Aspirin in the Urine of Female Volunteer During Winter

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## ABSTRACT

Urinary excretion of aspirin was studied in twelve healthy female volunteers after oral dose of 600mg soluble aspirin. Urine samples were collected at predetermined time intervals and the concentration of aspirin was determined colorimetrically. Mean±SE value for rate of excretion of salicylate acid was  $10.01 \pm 2.50 \mu\text{g min}^{-1}\text{kg}^{-1}$ , percent dose excreted was  $9.73 \pm 2.37\%$  and percent  $9.73 \pm 2.37$  cumulative amount excreted was  $30.20 \pm 5.59\%$ . It was found that percent cumulative excretion of salicylate was high under indigenous conditions.

**Key Words:** Soluble aspirin salicylate urine; Female volunteers; Cumulative excretion

## INTRODUCTION

Acetylsalicylic acid (Aspirin) is the most extensively employed analgesic, antipyretic and anti-inflammatory agent (Woodbury & Fingl, 1975)

After oral administration, 80-100% will be absorbed in the stomach and in small intestine. However, bio-availability is low because partial hydrolysis occurs during absorption and there is "first pass" effect in liver (Borge *et al.*, 1976).

Effectiveness of aspirin is largely due to its capacity to inhibit prostaglandin biosynthesis. It is due to irreversible blocking of cyclooxygenase enzyme which catalyses the conversion of arachidonic acid to endoperoxide compound (Stoker, 2001).

Aspirin is hydrolyzed in the stomach and in blood to salicylic acid and acetic acid. Biological half life is therefore only 15-20 minutes. The plasma salicylate half life ( $t_{1/2}$ ) following therapeutic doses is 2 to 4.5 hours, but in over doses, it increases to 18 to 36 hours (Done, 1960).

The drugs being used in Pakistan for health programs of human beings are imported from abroad. The studies carried out during part decades under the local condition have shown the differences between the foreign and local species called "geonetics". The geographical influence on genetics has been observed to be different biologically, physiologically and pharmacologically (Nawaz *et al.*, 1988; Nawaz, 1994). The current project was, therefore proceeded to carry out a study of urinary excretion of acetylsalicylic acid (Aspirin) in female volunteers under local environmental conditions.

## MATERIALS AND METHODS

**Subjects.** The experiment was conducted in twelve healthy female volunteers. They were having ages 20-22 years body weight 50-63kg and height 152.24-167.56cm. A written consent was obtained from all volunteer.

**Study protocol.** The sampling was done in the January, 2003. Volunteers did not receive any medication one week prior to and during the course of study. After overnight fastening control urine samples were collected from each volunteer before the administration of 2x300 mg Disprin (soluble Aspirin). Demographic representation is shown in Table I.

**Collection of urine samples.** Urine samples were collected at 30, 60, 120, 180, 240 and 600 minutes after oral administration of drug. The total volume of urine voided at particular time was noted. The pH of all urine samples was recorded kept in freezer at  $-20^{\circ}\text{C}$  till analysis.

**Urine Analysis.** Quantitative determination of free salicylate and was carried out by a validated colorimetric method of Levy and Prokhal as modified by Farid *et al.* (1975).

**Urinary excretion.** Urinary excretion of drug was studied by calculating the following formula.

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.

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

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

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

## RESULT AND DISCUSSION

Excretion is process by which drug or its metabolites are eliminated from body without 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. In present study, mean  $\pm$  SE value for pH of urine in 12 health female volunteers was 6.11 $\pm$ .134 and comparable to mean  $\pm$  SE value 6.5 $\pm$ 0.7 for male volunteers (Hutt *et al.*, 1986). Mean  $\pm$  SE value for diuresis was 0.077  $\pm$  0.0085 mL min<sup>-1</sup> kg<sup>-1</sup>. The value is also comparable to diuresis value for male volunteers is Mean $\pm$ SE value is 0.037 $\pm$ 0.017 mL min<sup>-1</sup> kg<sup>-1</sup> (Fauzia, 1998). The difference is due to gender difference and dosage form.

In this study the mean  $\pm$  SE value for concentration of salicylic acid in female was 183.73  $\pm$  31.15  $\pm$   $\mu$ g mL<sup>-1</sup> value is comparable to Mean $\pm$ SE value of male volunteer 93.6 $\pm$  4.91 (Iram, 2003). The difference may be due to biodisposition of drug including their excretion in urine. Mean  $\pm$  SE for amount excreted as salicylic acid in female volunteer is 10.01 $\pm$ 2.50  $\mu$ g min<sup>-1</sup> kg<sup>-1</sup> value is comparable to Mean $\pm$ SE of male volunteers 3.37 $\pm$ 1.019  $\mu$ g min<sup>-1</sup> kg<sup>-1</sup>. The conclusion drawn from the project showed that rate of excretion of free salicylic acid in urine of female volunteer higher. The variation was due to sex differences in body weight height.

Percent dose exerted as free salicylic acid in female volunteer Mean $\pm$ SE is 9.73  $\pm$  2.37% while this value in male volunteer is also compare able to Mean  $\pm$  SE values 8.1  $\pm$  6.5 % (Hutt *et al.*, 1986).

Cumulative percentage mount of salicylic acid (mg) excreted in female volunteer in Mean $\pm$ SE is 30.20 $\pm$ 5.59%. Value is comparable to cumulative percent dose exerted as free salicylic acid in male Mean  $\pm$ SE is 15.17  $\pm$  12.5% (Iram, 2003) The differences as due to sex variation, fluctation in urine pH values and gender variation (Nawaz, 1994).

## CONCLUSION

It was concluded that % urinary excretion of aspirin was higher in female volunteers during winter. The plot of percent cumulative amount excreted as salicylic acid in female volunteers versus time is shown in Table II.

**Table I. Description of female volunteers their weight, age, height, blood pressure, body temperature**

| Attributes       | Mean  | SE   |
|------------------|-------|------|
| Age (years)      | 21.08 | 0.15 |
| Weight (kg)      | 54.25 | 1.90 |
| Height (cm)      | 145.2 | 1.84 |
| BP S(mm Hg)      | 110   | 2.46 |
| BPS (mm Hg)      | 64.5  | 1.68 |
| 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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