

**Short Report****A preliminary study on the toxic effects of an emerging detergent (Prinso) on rat skin**P B I A K Dayasiri<sup>1</sup> and E P S Chandana<sup>1,#</sup><sup>1</sup>*Department of Zoology, Faculty of Science, University of Ruhuna, Matara, Sri Lanka*

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Toxic effects of household detergents on human skin have been reported previously. Recently emerged detergent “PRINSO” is extensively gaining popularity in many areas of Sri Lanka. “PRINSO” is also sold under other trade names such as “Ever Light”, “Vihanga” and “Diamond Light”. The product contains 2 sachets, one containing pink crystals (potassium permanganate) and the other containing white crystals (oxalic acid). Several cases have been reported on deliberate intoxication of “PRINSO” in order to commit suicide. Nevertheless, effect of “PRINSO” exposure on mammalian skin has not been reported. These observations prompted us to study the effects of “PRINSO” exposure (short-term) on mammalian skin. Twenty eight rats were randomly selected. In all rats, 4 cm<sup>2</sup> area of skin was shaved on dorsal area just behind the neck. Rats were randomly assigned into four groups in which each group consisted of seven rats. Each group was randomly assigned for the treatments of distilled water, “PRINSO” and other two detergents namely “TIDE” and “SUNLIGHT”. Each shaved skin patch of the rats was treated with 5 ml of respective detergent solutions. Lesions were appeared after two days in the subjects where “PRINSO” solution was applied. Lesions were completely cured after 12 to 20 days. There were no detectable lesions in the groups treated with distilled water, “TIDE” and “SUNLIGHT”. These data indicates the primary toxic effects of “PRINSO” exposure on rat skin. Therefore effects of “PRINSO” on human skin should be tested rigorously.

**Key words: Detergents, PRINSO, Rats, Skin lesions**

## Introduction

Surfactants, builders, bleaching-agents, enzymes, fillers and other minor additives are usually the components of laundry detergents. In common usage, "detergent" refers to mixtures of chemical compounds including alkylbenzenesulfonates, which are similar to soap but are less affected by "hard water. Surface-active agents (surfactants) are a large group of chemical substances. They are capable of reducing the surface tension on hydrophilic solutions. They will allow lipophilic substances to mix with hydrophilic solutions and let hydrophilic substances to penetrate lipophilic membranes. Surfactants are broadly classified as anionic, cationic, amphoteric or non-ionic, according to the nature of the hydrophilicity resulted in aqueous solution (Effendy & Maibach, 1995). In most cases, surfactants or other components in a detergent solution are known to be most aggressive on the skin barrier (Nielsen *et al.*, 2000).

The skin is the largest organ in the body and is responsible for elimination and absorption of various substances. Human skin frequently expose to the detergents. Andersen et al (1998) has showed the effect of enzyme containing detergents on skin symptoms. Several researchers have examined the irritancy potential of 17 detergents used in Indian household (Andersen et al, 1998; Austoria et al, 2010). There are reports of eczema, predominantly localized to the hands following irritation caused by detergents (Loden et al, 2003; Basketter, 2008).

In Sri Lanka, there are several detergents or washing powders used in laundry and household washing. The powerful washing powder under the trade name of "PRINSO" is gaining popularity in Sri Lanka. "PRINSO" is produced by small scale industrialists. They are also sold under other trade names such as "Ever Light", "Vihanga" and "Diamond Light". The product contains two sachets, one containing pink crystals (potassium permanganate) and the other containing white crystals (oxalic acid) (Munasinghe & Fernando, 2009). Some people, however, deliberately ingest "PRINSO" to commit suicide (Munasinghe & Fernando, 2009). Nevertheless effect of "PRINSO" exposure on human skin has never been tested. Hence the objective of this study was to investigate the primary toxic effects of "PRINSO" exposure on mammalian skin.

## Materials and methods

Twenty eight rats were randomly selected. In all rats, 4 cm<sup>2</sup> area of skin was shaved on dorsal area just behind the neck. Rats were randomly assigned into four groups in which each group consisted of seven rats. Each group was randomly assigned for the treatments of distilled water, "PRINSO" and other two detergents namely "TIDE" and "SUNLIGHT". Each shaved skin patch of the rats was treated with 5 ml of respective detergent solutions. Control detergents were selected on the basis of their strength of detergent activity. Detergent solutions were prepared according to the guidelines indicated by the manufacturer for domestic use. Maximum widths of the lesions were measured for three weeks at an interval of two days. All

the rats were housed according to the standard laboratory conditions. Results were statistically analyzed by one way ANOVA and Nonparametric test, K related sample Kendal Walls test using SPSS version 19.

All the experiments were conducted in the Department of Zoology, Faculty of Science, University of Ruhuna.

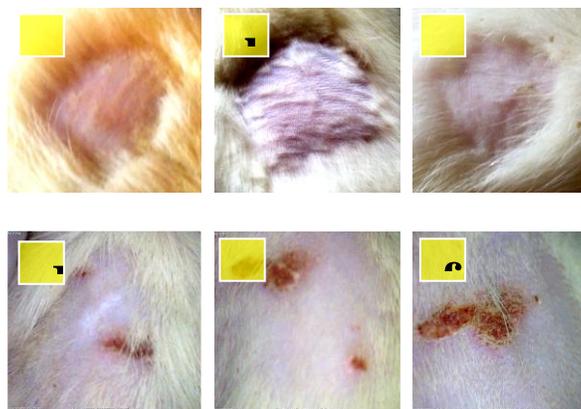
### Results

As indicated by the results of this study, skin lesions were not appeared in control skins treated with distilled water, "TIDE" solution, "SUNLIGHT" solution (Figure 1, a, b c). Single exposure to the "PRINSO" solution caused skin lesions of the treated rats (Figure 1 d, e & f). Number of

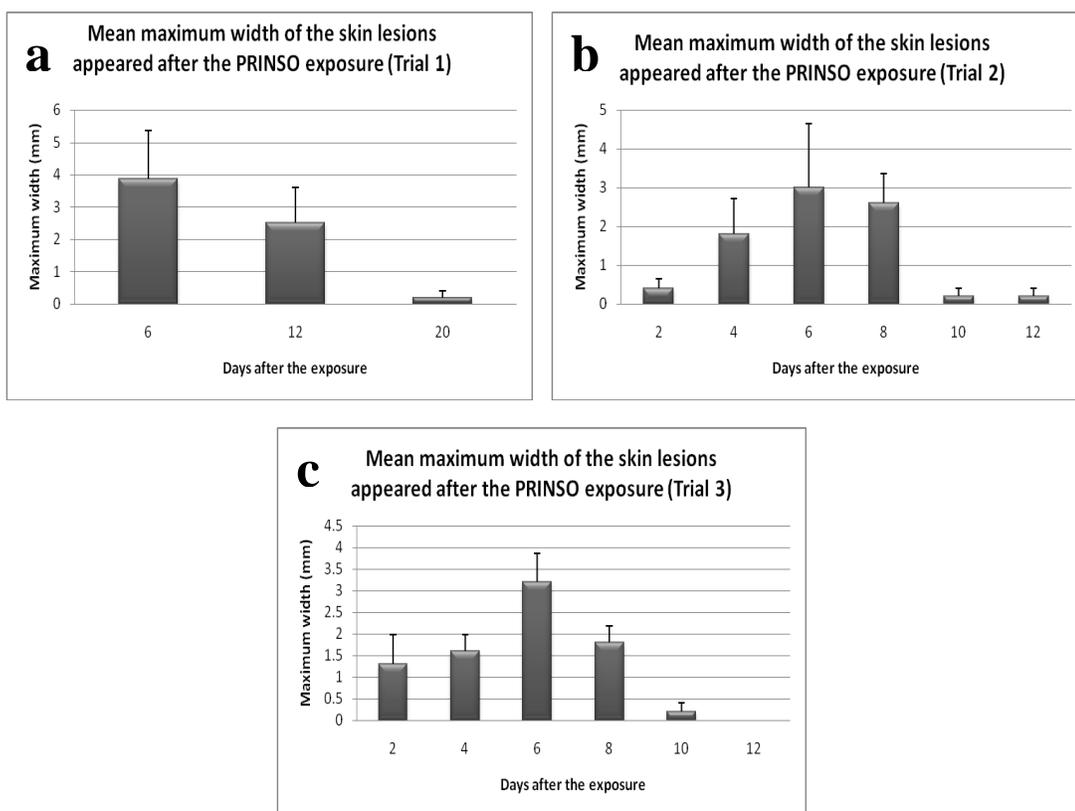
lesions appeared in each trial has been given in table 1. Maximum and minimum average width of the skin lesions varies 3.8 mm to 0.2 mm respectively. Average width of the skin lesions gradually reduced and lesions were totally disappeared after 12-20 days (Figure 2). Results also indicate that size of the skin lesion developed to maximum after the six days of application and gradually reduced afterwards (Figure 2, b & c). According to the statistical analysis (One way ANOVA) three trials did not differ significantly ( $p=0.360$ ) indicating the accurate repeatability of the experiment. As for the Nonparametric test, K related sample Kendal Walls test, size of the skin lesions significantly varied with the time in all trials (Trial1;  $p = 0.036$ , Trial 2;  $p = 0.037$ , Trial 3;  $p = 0.030$ ).

**Table 1:** Average number of lesions appeared following the "PRINSO" exposure

| Date | Trial 1 | Trial 2 | Trial 3 |
|------|---------|---------|---------|
| 2    | 0       | 2       | 1       |
| 4    | 2       | 4       | 4       |
| 6    | 5       | 6       | 5       |
| 8    | 7       | 6       | 7       |
| 10   | 5       | 4       | 5       |
| 12   | 4       | 3       | 4       |
| 20   | 1       | 0       | 0       |



**Figure 1:** Skin lesions of the rats. a, b & c (Control skin): d, e & f (“PRINSO” treated skins after 18 days)



**Figure 2:** Maximum width of the skin lesions appeared following the “PRINSO” exposure

## Discussion

Previous studies have shown the potential ability of different detergents to cause skin lesions (Griffith et al, 1969; Smeenk, 1969; Loden et al, 2003; Basketter, 2008). Nowadays detergents are mushrooming in the market. In most cases primary health hazards of these detergents have not been evaluated.

For the preliminary investigation of toxicity tests of detergents, rats have been employed by various researchers. There are several reports using rats to test the effect of detergents on skin (Jan et al, 1992; Mohammad, 2006; Prottey, 1972).

In Sri Lanka various detergents are used by consumers. Nevertheless primary toxic effects of these substances are rarely studied. "PRINSO", the emerging detergent is gaining popularity in Sri Lanka and it is also known toxic as some people drink it to commit suicide (Munasinghe and Fernando, 2009). Present study has shown the topical single application of "PRINSO" can cause skin lesions in a rat model. As our data indicated, "PRINSO" might affect the human skin as well. Long-term "PRINSO" exposure might carry serious consequences. Therefore effects of "PRINSO" on human skin should be tested rigorously.

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