

ABSTRACT

It has been reported that the incidence of contact dermatitis is around 90% of the reported cases of occupational dermatoses (Priatna, 1997). Contact dermatitis consists of irritant contact dermatitis (ICD) and allergic contact dermatitis (ACD). The incidence of ICD is higher than ACD and it may perhaps be related to certain occupational works today. However, beside the dose, frequency, and contact duration of irritant substances, the skin barrier function play an important role in the pathogenesis of ICD. The skin barrier function play an important roles in preventing the irritant substances penetration and the transepidermal water loss. In the literature, skin type V/VI (dark skin) has been thought to possesses a beter skin barrier function than skin type II/III (white skin) (Ruche, 1992; Reed, 1995).

The geography of Indonesia is near by the equator, therefore, solar radiation exposes the skin every day, especially in people related to their occupation (e.g. caddy). Solar radiation causes pathologic reactions of the skin e.g., DNA damage, the increase of black color skin, epidermal thickness, aging skin, and skin cancer. On the other hand, the increase of melanin index, and the epidermal thickness were suspected to give advantages to the skin barrier function. Several investigators have studied the influence of UVB radiation on mice's skin (Haratake, 1997), and others have studied the influence of UVA and UVB on human skin (Lehmann, 1992). Unfortunately, the influence of UVB radiation of mice's skin cannot be compared absolutely to human skin. The influence of solar radiation on the barrier function of the skin has never been performed and published. Actually, the study should be done by exposing a definite dose of solar radiation on the skin for a definite time and followed by the skin barrier function examination. This

procedure is not ethical, therefore, it can't be performed. This study compared the influence of solar radiation to the caddies' and students' skin on their skin barrier function. Due to their occupations, we expected the caddies to receive more solar radiation dose than did the students during the study. This study was held from July to October 2001.

The aim of this study was to investigate the impact of the natural solar radiation in Indonesia, in improving the skin barrier function. The study designs provided an analytical observation in longitudinal investigation and an experimental investigation. Concerning an experimental investigation in evaluating the skin barrier function, it was conducted by the sodium lauryl sulfate (SLS) patch test and followed by the analysis of transepidermal water loss (TEWL). SLS induced the skin irritation reaction, and increased the transepidermal water loss (TEWL). TEWL was a reflection of skin barrier function. Four analysis units were used, namely left and right forearms (analysis unit I and II), as well as left and right buttocks (analysis unit III and IV). On analysis unit I and III patch tests with 0,5% SLS were applied, and 1% SLS patch tests on analysis units II and IV. During the study (July-October,2001) the caddies' forearms received higher dose of solar radiation than the students' forearms (control group). In this study the changes of Δ TEWL (the differences between basal TEWL and post test TEWL value) during July-August, July-September, July-October 2001 were compared between the caddies and the students regarding the left, right forearms and left, right buttocks. The different changes in melanin index, epidermal thickness, between the caddies and the students were also analyzed in this investigation. The correlation between the melanin index, epidermal thickness and the Δ TEWL were proved. Twelve caddies and 12 students were participated in this study, but

two caddies dropped out (8,3%). Differences in study results were analyzed by statistical examinations (normal distribution, homogeneity and t test).

There were significant differences in Δ TEWL changes between the caddies' left forearms and the students' left forearms during July-August ($p=0,003$), July-September ($p=0,001$), July-October 2001 ($p=0,001$), and between the right forearms during the same periods. Likewise, between the caddies' left forearms and left buttocks during July-September ($p=0,019$), and July-October 2001 ($p=0,002$), and between the caddies' right forearms and right buttocks during the same periods. Statistically relevant differences in Δ TEWL changes were found between the students' left forearms and left buttocks during July-August ($p=0,009$), July-September ($p=0,001$), July-October 2001 ($p=0,001$), and between the students' right forearms and right buttocks during the same periods. There were no significant differences in Δ TEWL, in July, August, September, and October 2001, between the caddies' left, right buttocks and the students' left, right buttocks. There were also no significant differences in Δ TEWL changes during July-August, July-September, and July-October 2001, between the caddies' left, right buttocks and the students' left, right buttocks. There were significant differences in melanin index changes between the caddies' forearms and the students' forearms, but not in epidermal thickness changes. There was moreover a good correlation between the melanin index and Δ TEWL, however, not between the epidermal thickness and Δ TEWL.

In conclusion, the exposed skin area to a higher dose of solar radiation, e.g., the caddies' forearms showed only minor changes in Δ TEWL as compared to the control group. This suggests that the caddies' forearms possesses a reduced skin susceptibility to weak irritant. Therefore, the natural solar radiation seems to have a relevant impact on the

barrier function of the skin. The data also suggest that melanin index, but not the epidermal thickness, influences the skin barrier function.

Further study needs to be performed in proving that daily natural solar radiation can prevent the occurring of chronic irritant contact dermatitis and may substitute the artificial UVA/UVB treatment for patients with certain skin diseases. However, the natural solar radiation is benefit for such patients from a rural area without such medical facilities. Beside it, we have to consider the negative affects of natural solar radiation. Perhaps we have to study the correlation between the dose of solar radiation and the negative affects of solar radiation.

Furthermore, the application of devices which using skin bioengineering method should be considered in Indonesia in establishing the diagnosis of skin diseases, since objective results of the the application of devices which using skin bioengineering method are obviously more accurate than visual examination.

Key words: UV radiation, solar radiation, transepidermal water loss, skin barrier function.