Short Communication

Determination of Sun Protection Factor (SPF) number of some aqueous herbal extracts

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ARTICLE INFO
Article history:
Received on: 07/08/2013
Revised on: 21/08/2013
Accepted on: 05/09/2013
Available online: 30/09/2013

Key words: UV absorption, Sun Protection Factor (SPF), sunscreen.

ABSTRACT
The aim of the present study was to determine the ultraviolet (UV) absorption properties of aqueous herbal extracts of some commonly found vegetable sources by determining the sun protection factor (SPF) number. The in vitro SPF number is determined according to the spectrophotometric method described by Mansur et al. Aqueous herbal extracts were prepared and after dilution with alcoholic solutions the absorbance were recorded between 290–320 nm using UV-vis spectrophotometry. It was observed that all of the tested herbals showed some UV protection capabilities with aqueous coconut extract showing the highest SPF number of 7.38 while watermelon showed the lowest SPF number of 0.97.

INTRODUCTION
Solar ultraviolet radiation (UVR) is divided into three categories UV-C (200-280 nm), UV-B (280-320) and UV-A (320-400 nm). UV light has been classified by WHO as carcinogenic and produces several adverse effects including mutagenicity, immune depression of the skin, accelerated skin ageing and photodermatoses (Nohynek and Schaefer, 2001). The most biologically damaging radiation UV-C has been filtered out by the ozone layer and it is mainly UV-B that is responsible for causing the adverse effects of the UV radiation (Kaur and Saraf, 2010; Mishra et al., 2011). Application of sunscreen to the skin changes the way the body reacts to the sun rays (Mishra et al., 2012). Sunscreens and sunblocks are chemicals that absorb or block UV rays and show a variety of immunosuppressive effects of sunlight. There are several agents available from both synthetic and natural sources with UV-filtering properties. Given their potential to produce considerable human local and systemic exposure, UV filters have to be safe (Nohynek et al., 2010). Synthetic UV filters are known to have potential toxicity in humans and also showed ability to interfere only in selected pathways of multistage process of carcinogenesis (Chanchal and Saraf, 2009).

In contrast, herbal botanical sunscreens are safe, widely accepted by consumers and also work in various ways, playing multiple roles in ameliorating the process of carcinogenesis (Guyer et al., 2003). The current research work has been conducted to determine the SPF values of aqueous extracts of some commonly found fruits in the market.

The effectiveness of a sunscreen is usually expressed by sun protection factor (SPF) which is the ratio of UV energy required to produce a minimal erythemal dose (MED) in protected skin to unprotected skin. A simple, rapid and reliable in vitro method of calculating the SPF is to screen the absorbance of the product between 290-320 nm at every 5 nm intervals. SPF can be calculated by applying the following formula known as Mansur equation (Kaur and Saraf, 2010; Mishra et al., 2012):

\[
SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times Abs(\lambda)
\]

Where CF = correction factor (10), EE(\lambda) = erythmogenic effect of radiation with wavelength \lambda, Abs(\lambda) = spectrophotometric absorbance values at wavelength \lambda. The values of EE x \lambda are constants.
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Even though several synthetic sunscreens are available, they have limited applications in cosmetics due to their potential toxicity in humans and ability to interfere only in selected pathways of carcinogenesis. Botanical and herbal agents are known to be safe and have been widely accepted by consumers. They also work in various ways by stimulating the immune response, inducing gene suppression, detoxifying carcinogens, blocking oxidative damage to DNA, initiating selected pathways or by other mechanisms (Guyer et al., 2003). Thus, these herbal agents play multiple roles in ameliorating the process of carcinogenesis. Therefore, these herbal formulations at optimum concentrations could produce several beneficial effects to the skin apart from functioning as an UV filters.

CONCLUSION

The SPF values of the aqueous extracts of some commonly found vegetable sources were evaluated. It was found that most of them have the UV protection capabilities. Along with their many beneficial effects and safety, these botanicals could become a good, cheap and easily available formulation ingredients in sunscreen products.

REFERENCES


How to cite this article: