Determination of Sun Protection Factor in Herbal Extracts and Oils

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ABSTRACT

The present study aims to evaluate UV radiation absorption potential of Natural extracts and volatile and non-volatile herbal oils used in sunscreen and show them in terms of SPF values. Skin shielding from cancer like melanoma, discoloration, wrinkles are most common nowadays. As said that protection should start from earlier childhood to prevent cancer later. The most important cause of skin cancer is UV rays from the sun. A number of sunscreens are available that is physical or chemical but they have many disadvantages, therefore it becomes necessary to look out for sunscreens with natural extracts and are conventional. Herbal extracts can be great for evaluations of ultraviolet absorption for SPF. Vegetables, potatoes, tomatoes and cucumbers were soaked in water to get aqueous extract. The soaked samples were filtered and absorbance was recorded at varying wavelength using UV- visible spectrophotometer. The sun protection factor (SPF) was calculated using the Mansur equation. The highest SPF was found in aqueous extract of potato followed by tomato and cucumber. These vegetables can be used as anti-solar agents when applied on skin or consumed orally. This will be a more economical and secure option to prevent skin damage from harmful UV radiations.

**References**

[1] G. Yu, W. J. Mansur, J. A. M. Carrer, and L. Gong, “Stability of Galerkin and collocation time domain boundary element methods as applied to the scalar wave equation.” [Online]. Available: www.elsevier.com/locate/compstruc

[2] L. E. Agrapidis-Paloympis and R. A. Nash, “The effect of solvents on the ultraviolet absorbance of sunscreens.”

[3] D. Chanchal and S. Swarnlata, “Herbal Photoprotective Formulations and their Evaluation,” 2009.

[4] E. A. Dutra *et al.*, “Determination of sun protection factor (SPF) of sunscreens by ultraviolet spectrophotometry,” 2004.

[5] A. Mishra, A. Mishra, and P. Chattopadhyay, “Assessment of in vitro sun protection factor of Calendula officinalis L. (asteraceae) essential oil formulation,” *Journal of Young Pharmacists*, vol. 4, no. 1, pp. 17–21, 2012, doi: 10.4103/0975-1483.93575.

[6] S. F’guyer, F. Afaq, and H. Mukhtar, “Photochemoprevention of skin cancer by botanical agents.” [Online]. Available: http://surveillance.cancer.gov/statistics.

[7] G. J. Nohynek and H. Schaefer, “Benefit and risk of organic ultraviolet filters,” *Regulatory Toxicology and Pharmacology*, vol. 33, no. 3, pp. 285–299, 2001, doi: 10.1006/rtph.2001.1476.

[8] R. J. Cogdell *et al.*, “How carotenoids protect bacterial photosynthesis,” in *Philosophical Transactions of the Royal Society B: Biological Sciences*, Oct. 2000, vol. 355, no. 1402, pp. 1345–1349. doi: 10.1098/rstb.2000.0696.

[9] M. U. Nasir, S. Hussain, and S. Jabbar, “Tomato processing, lycopene and health benefits: A review,” 2015.

[10] A. V. Rao and S. Agarwal, “Role of Antioxidant Lycopene in Cancer and Heart Disease.”

[11] “3”.

[12] N. Packianathan and R. Kandasamy, “Functional Plant Science and Biotechnology Skin Care with Herbal Exfoliants.”

[13] A. N. Azizah, P. Agustina, S. Suparti, A. Saputra, and Y. Sidiq, “The Use of Natural Dyes from Beetroot Skin Extract (Beta Vulgaris) as Teaching Material on Cell Division for Senior High School Students,” *Indonesian Journal on Learning and Advanced Education (IJOLAE)*, vol. 2, no. 1, pp. 20–26, Oct. 2019, doi: 10.23917/ijolae.v2i1.9051.

[14] H. Murad and M. A. Nyc, “EVALUATING THE POTENTIAL BENEFITS OF CUCUMBERS FOR IMPROVED HEALTH AND SKIN CARE,” *Journal of Aging Research and Lifestyle*, pp. 1–3, 2016, doi: 10.14283/jarcp.2016.108.

[15] P. Kantivan Goswami, M. Samant, R. Srivastava, and P. K. Goswami, “Scholars Academic Journal of Pharmacy (SAJP) Natural Sunscreen Agents: A Review 2013; 2(6):458-463 Natural Sunscreen Agents: A Review”, [Online]. Available: www.saspublisher.com458

[16] K. Mandela and E. Shakave, “Sweet Potato Leaves Contain Beta Carotene and Lutein for Eye Health,” *International Journal Papier Advance and Scientific Review*, vol. 2, no. 2, pp. 82–89, Dec. 2021, doi: 10.47667/ijpasr.v2i2.128.

[17] I. G. Munteanu and C. Apetrei, “A review on electrochemical sensors and biosensors used in chlorogenic acid electroanalysis,” *International Journal of Molecular Sciences*, vol. 22, no. 23. MDPI, Dec. 01, 2021. doi: 10.3390/ijms222313138.

[18] M. Y. Naeem and S. Ugur, “Turkish Journal of Agriculture-Food Science and Technology Nutritional Content and Health Benefits of Eggplant #,” *Congress of the Turkish Journal of Agriculture-Food Science and Technology*, vol. 7, no. sp3, pp. 31–36, 2019, doi: 10.24925/turjaf.v7isp3.31-36.3146.

[19] C. Ying-Yu Cui, B.-W. Lin, C.-C. Gong, H.-F. Song, and Y.-Y. Cui, “Effects of anthocyanins on the prevention and treatment of cancer LINKED ARTICLES,” *Br J Pharmacol*, vol. 174, p. 1226, 2017, doi: 10.1111/bph.v174.11/issuetoc.

[20] B. il Yoon *et al.*, “Anti-inflammatory and Antimicrobial Effects of Anthocyanin Extracted from Black Soybean on Chronic Bacterial Prostatitis Rat Model,” *Chin J Integr Med*, vol. 24, no. 8, pp. 621–626, Aug. 2018, doi: 10.1007/s11655-013-1547-y.

[21] T. K. Lin, L. Zhong, and J. L. Santiago, “Anti-inflammatory and skin barrier repair effects of topical application of some plant oils,” *International Journal of Molecular Sciences*, vol. 19, no. 1. MDPI AG, Jan. 01, 2018. doi: 10.3390/ijms19010070.

[22] R. R. Korać and K. M. Khambholja, “Potential of herbs in skin protection from ultraviolet radiation,” *Pharmacognosy Reviews*, vol. 5, no. 10. pp. 164–173, Jul. 2011. doi: 10.4103/0973-7847.91114.

[23] C. D. Kaur and S. Saraf, “In vitro sun protection factor determination of herbal oils used in cosmetics,” *Pharmacognosy Res*, vol. 2, no. 1, pp. 22–25, Jan. 2010, doi: 10.4103/0974-8490.60586.

[24] L. Petigny, S. Périno, M. Minuti, F. Visinoni, J. Wajsman, and F. Chemat, “Simultaneous microwave extraction and separation of volatile and non-volatile organic compounds of boldo leaves. from lab to industrial scale,” *Int J Mol Sci*, vol. 15, no. 5, pp. 7183–7198, Apr. 2014, doi: 10.3390/ijms15057183.

[25] M. Gorzynik-Debicka *et al.*, “Potential health benefits of olive oil and plant polyphenols,” *International Journal of Molecular Sciences*, vol. 19, no. 3. MDPI AG, Mar. 01, 2018. doi: 10.3390/ijms19030686.

[26] A. Kotnala *et al.*, “Indian Medicinal Plants for skin care and cosmeceuticals: A review,” Article, 2019. [Online]. Available: http://pubs.iscience.in/jbts

[27] T. Aburjai and F. M. Natsheh, “Plants Used in Cosmetics,” *Phytotherapy Research*, vol. 17, no. 9. pp. 987–1000, Nov. 2003. doi: 10.1002/ptr.1363.

[28] J. Y. Oh, M. A. Park, and Y. C. Kim, “Peppermint oil promotes hair growth without toxic signs,” *Toxicol Res*, vol. 30, no. 4, pp. 297–304, 2014, doi: 10.5487/TR.2014.30.4.297.

[29] S. Kabir Mumu and M. Mahboob Hossain, “Antimicrobial Activity of Tea Tree oil against Pathogenic Bacteria and Comparison of Its Effectiveness with Eucalyptus Oil, Lemongrass Oil and Conventional Antibiotics,” *Am J Microbiol Res*, vol. 6, no. 3, pp. 73–78, Jun. 2018, doi: 10.12691/ajmr-6-3-2.

[30] S. Mulyaningsih, F. Sporer, J. Reichling, and M. Wink, “Antibacterial activity of essential oils from Eucalyptus and of selected components against multidrug-resistant bacterial pathogens,” *Pharm Biol*, vol. 49, no. 9, pp. 893–899, Sep. 2011, doi: 10.3109/13880209.2011.553625.

[31] S. S. Mali Shri Jagdishprasad Jhabarmal, S. G. Killedar Shri Jagdishprasad Jhabarmal, S. Jagdishprasad Jhabarmal, S. S. Mali, and S. G. Killedar, “The Pharma Innovation Journal 2018; 7(3): 85-90 Formulation and in vitro evaluation of gel for SPF determination and free radical scavenging activity of turpentine and lavender oil,” 2018, [Online]. Available: www.thepharmajournal.com

[32] C. Walters, A. Keeney, C. T. Wigal, C. R. Johnston, and R. D. Cornelius, “The Spectrophotometric Analysis and Modeling of Sunscreens,” 1997.

[33] J. F. Ayala-Zavala, G. A. González-Aguilar, and L. Del-Toro-Sánchez, “Enhancing safety and aroma appealing of fresh-cut fruits and vegetables using the antimicrobial and aromatic power of essential oils,” *J Food Sci*, vol. 74, no. 7, Sep. 2009, doi: 10.1111/j.1750-3841.2009.01294.x.

[34] “In vitro and in vivo determinations of sun protection factors of sunscreen lotions with octylmethoxycinnamate,” 1999.