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# Effect of U.V. Irradiation in Vitro on the Chemical Constituents of Snake Ptyas (*Ptyas mucosus*) Sloughs

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**Abstract**

*Mineral content Na, Ca, Mg, P are reported before U.V. irradiation. We have used three types of exposure on the mineral content i.e. 1 hour, 10 hours, 20 hours. Both mineral and ash content unchanged form after exposure but moisture content has decreased result. Chemical constituents of the snake ptyas slough have been reported before U.V. irradiation. We have used three types of exposure on the chemical constituents i.e. 1 hour, 10 hours, 20 hours exposure. Total nitrogen crude fat, crude protein and uric acid shows continuous decreased in time of exposure i.e. percentage decrease after 20 hours exposure are 2.88, 7.00, 2.971 and 4.52 respectively. Like wise amino acid also exhibited decreases in their content, decrease being maximum at the maximum time of exposure i.e. percentage decrease of amino acid after 20 hours exposure is 5.12 (methionine).*

***Keywords : UV irradiation, chemical constituents, snake ptyas sloughs.***

## Introduction:

Radiations beyond the violet Region are called the Ultraviolet Radiations. Wave length range of this region is from 4000 to 20Å. The radiations have a high energy near ultraviolet region corresponding to 2000 Å (frequency $1.5x10^{15}$) have energy per Einstein equal to $1.43x10^{15}$ calories and U.V. (frequency $1.5xl0^{15}$cycles/seconds) have an energy $1.43x10^{7}$ calories [Bajpai and Mishra (1990), Gurdeepraj (1991) William kemp (1986)]. Ultraviolet light has three wavelength designations UV-A, UV-B and UV-C, Research points to dramatic health benefits with full spectrum light that includes trace amount of ultraviolet in the same proportion that the sun, emits not the proportion that is used in tanning beds. We believe light is healthiest when it has trace amount of ultraviolet that is balanced in the same proportion. We wanted with grades in school- mostly A, Some B, and on C. that's what the sun emits, more UV-A than UV-B. Ultraviolet (UV) light is commonly divided into three sections depending on its wavelengths near UV (UV-A), mid-UV (UV-B), and far UV (UV-C) UV-A tans us UV-B stimulates the production of vitamin D3 in our skin and is essential for the absorption of calcium into bones. The natural oils produce the Nobel Prize in 1903 for successfully treating tuberculosis and skin lesions with U.V. light. In fact, until penicillin was discovered in 1938, the preferred method of treating a wide variety of infectious diseases was exposure to the sun and its U.V. light because sun light was so effective in stimulating the patients own immune system. A snake sheds its skin between one to six times each year. It does this by rubbing the front of its head on a rough surface until the skin splits. The snake then slowly sloughs out of the skin turning it inside out as it does so. In all snakes the new skin (with the same colour and patterns as the old) is underneath and when shed the old skin is almost transparent. When a snake is about to slough, the scale forming the spectacle over its eye will become 'Milky' affecting its vision. Of the many thousands of snakes kept around the world few are kept for reasonable periods (years) and even fewer have accurate records kept on them. Calculation of sloughing frequency is near impossible in snakes, excluding relatively young crotalus species, which leave on extra rattle after each shedding. Snake Scales are dry and not slimy unlike fish and amphibians. Snake's Scales are made of the Keratin like our hair and finger nails. Keratins are the main constituent of structures that grow from the skin:

- The ℑ-keratins in the hair (including wool), horns, nails, claws and hooves of mammals.

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The harder α-keratins found in nails and in the scales and claws of reptiles, their shells (chelonians, such as tortoise, turtle, terrapin), and in the feathers, beaks, claws of birds and quills of porcupines. (These keratins are formed primarily in beta sheets. However, beta sheets are also found in β-keratins).
Arthropods such as crustaceans often have parts of their armor or exoskeleton made of keratin, sometimes in combination with chitin. The baleen plates of filter feeding whales are made of keratin. They can be integrated in the chitinophosphatic material that makes up the shell and setae in many brachiopods. Keratins are also found in the gastrointestinal tracts of many animals, including roundworms (which also have an outer layer made of keratin).

**Materials and Methods:**

Slough was acquired from the local snake charmer Mr. Rajveer Nath. To obviate the effect of habitat and environment on the result sample for the study were obtained from the sample places during the same period of the year. Sloughs were washed thoroughly in separate beakers in several changes of distilled water and dried in air at room temperature for 36 hrs and whole slough of each snakes taken together were ground separately in an electrical grinder. Moisture was determined by keeping 1gm of the air dried material in an aluminum cup in an electric oven at 100°C for 24 hrs. Ash content was determined by keeping 1gm of the material in a muffle furnace at 900°C. Ca was determiner with the help of Calcium oxalate. Mg is determiner calorimetrically after removing calcium as calcium sulphate precipitate using the reagent eriochrome. Na was determined by flame photometer. Crude fat was determined soxhiet extractor using petroleum ether (40 – 60°C) time of extraction being 6-8 hrs. Total nitrogen was determined by Kjeldhal methods. Crude protein was determined with the help of total N. uric acid was determined by using phospho–18–tungstic acid (Snell and Srell 1953) and amino acid was determined with the help of HPLC method.

**Result and Discussion:**

Before U.V. Irradiation moisture content of air dried sloughs is 10.40, Na is very little i.e. almost in traces calcium and P are obviously the major constituents of the sloughs of this make Mg content are too small, ash unaccounted for is 0.05. After 10 hours exposure moisture content of air dried sloughs decrease extensively and both mineral (Na, Ca, P, Mg) are unchanged. After 20 hours exposure moisture content of air dried sloughs decreases both minerals (Na, Ca, Mg, P) are unchanged change in the fat contents results due to free radical formation of fat. Percentage decrease after 1 hour exposure is 2.00, after 10 hours is 3.67, after 20 hours is 7.00. Decrease in the protein content after 1 hour is 0.62, after 10 hours 2.10 and after 20 hours exposure percentage decrease is 2.97. Decrease in the uric acid content after 1 hour is 2.14, after 10 hours is 3.33 and after 20 hours is 4.52 and after 1 hour exposure maximum percentage decrease of amino acid is 2.56 after 10 hours is 3.11 and after 20 hours exposure the maximum percentage is 5.12 (methionine) respectively.

**TABLE – 1**

**Mineral composition of slough of snake ptyas (*Ptyas mucosus*) before Irradiation (Value are expressed by g/100 gm of the dry matter)**

| Average of 5 snake | | | Moisture | Ash | Mineral | Values | Mineral oxide | Value | Ash Unaccounted for |
|---|---|---|---|---|---|---|---|---|---|
| Length (cm) | Girth (cm) | Weight (gm) | | | | | | | |
| 210 | 12 | 1.708 | 10.4 | 4.20 | Ca<br>Mg<br>Na<br>P | 1.61<br>0.03<br>0.0003<br>0.81 | CaO<br>MgO<br>$Na_2O$<br>$P_2O_5$ | 2.25<br>0.05<br>0.0004<br>1.85 | 0.05 |
| | | | | | | | Total | 4.1504 | |

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**TABLE – 2**

**Mineral composition of slough of snake Ptyas (*Ptyas mucosus*) after irradiation (Values are expressed by g/100 gm of the dry matter)**

| Hours of Irradiation | Moisture | Ash | Mineral | Values | Mineral Oxide | Value | Ash Unaccounted for |
|---|---|---|---|---|---|---|---|
| 1 hour | 9.7 | 4.20 | Ca | 1.61 | CaO | 2.25 | 0.05 |
| | | | Mg | 0.03 | MgO | 0.05 | |
| | | | Na | 0.0003 | $Na_2O$ | 0.0004 | |
| | | | P | 0.81 | $P_2O_5$ | 1.85 | |
| | | | | | **Total** | **4.1504** | |
| 10 hour | 8.67 | 4.20 | Ca | 1.61 | CaO | 2.25 | 0.05 |
| | | | Mg | 0.03 | MgO | 0.05 | |
| | | | Na | 0.0003 | $Na_2O$ | 0.0004 | |
| | | | P | 0.81 | $P_2O_5$ | 1.85 | |
| | | | | | **Total** | **4.1504** | |
| 20 hour | 8.30 | 4.20 | Ca | 1.61 | CaO | 2.25 | 0.05 |
| | | | Mg | 0.03 | MgO | 0.05 | |
| | | | Na | 0.0003 | $Na_2O$ | 0.0004 | |
| | | | P | 0.81 | $P_2O_5$ | 1.85 | |
| | | | | | **Total** | **4.1504** | |

**TABLE – 3**

**Crude fat, total nitrogen and crude protein content of slough of the snake Ptyas (*Ptyas mucosus*) before Irradiation (Values are expressed as g/100 gm of the dry matters)**

| Average of 5 snake | | | Crude Fat | Total Nitrogen | Crude Protein | Uric Acid |
|---|---|---|---|---|---|---|
| Length (cm) | Girth (cm) | Weight (gm) | | | | |
| 210 | 12 | 1.708 | 0.30 | 15.28 | 95.50 | 4.20 |

Total Ash + Crude Fat + Crude Protein = 100

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**TABLE – 4**

**Crude fat, total nitrogen and crude protein content of slough of the snake ptyas (*Ptyas mucosus*) After irradiation (values are expressed as g/100 gm of the dry matter)**

| Hours of Irradiation | Crude Fat | % decrease of crude fat | Total Nitrogen | After Irradiation % decrease of nitrogen | Crude protein after Irradiation | After Irradiation % decrease of crude protein | Uric Acid | After Irradiation % decrease of uric acid |
|---|---|---|---|---|---|---|---|---|
| 1 Hour | 0.294 | 2.00 | 15.20 | 0.523 | 94.91 | 0.62 | 4.11 | 2.14 |
| 10 Hours | 0.289 | 3.67 | 14.97 | 2.02 | 93.49 | 2.10 | 4.06 | 3.33 |
| 20 Hours | 0.279 | 7.00 | 14.84 | 2.88 | 92.66 | 2.97 | 4.01 | 4.52 |

Total Ash + Crude fat + Crude protein = 1 Hour = 99.40
10 Hours = 97.98
20 Hours = 97.14

**Table – 5**

**Component of amino acids of sloughs of the snake ptyas (*Ptyas mucosus*) before Irradiation (Values are expressed as gm/100 gm of the dry matter)**

| S.No. | Name of Amino Acids | Values |
|---|---|---|
| 1. | Alanine | 4.18 |
| 2. | Glycine | 6.18 |
| 3. | Valine | 6.08 |
| 4. | Leucine | 8.87 |
| 5. | Iso-Leucine | 1.09 |
| 6. | Proline | 0.99 |
| 7. | Phenyl alanine | 4.18 |
| 8. | Tyrosine | 5.88 |
| 9. | Serine | 9.27 |
| 10. | Threonine | 7.18 |
| 11. | Cystine | 1.09 |
| 12. | Methionine | 0.39 |
| 13. | Arginine | 9.77 |
| 14. | Histidine | 3.09 |
| 15. | Lysine | 0.89 |
| 16. | Aspartic acid | 7.38 |
| 17. | Glutamic acid | 16.35 |
| 18. | Hydroxy proline | 0.99 |
| 19. | Cysteine | 3.49 |
| 20. | Tryptophan | 2.29 |
| | **Total** | **99.63** |

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**TABLE – 6**

**Component of amino acid of sloughs of the snake ptyas (*Ptyas mucosus*) after U.V. Irradiation (Values are expressed as gm/100 gm of the dry matter)**

| Name of Amino acid | Values After Irradiation at different time interval | | | | | |
|---|---|---|---|---|---|---|
| | 1 Hrs | | 10 Hrs | | 20 Hrs | |
| | Values | % Decrease | Values | % Decrease | Values | % Decrease |
| Alanine | 4.17 | 0.24 | 4.06 | 2.87 | 4.02 | 3.98 |
| Glycine | 6.14 | 0.65 | 5.99 | 3.07 | 5.91 | 4.53 |
| Valine | 5.98 | 1.64 | 5.90 | 2.96 | 5.82 | 4.28 |
| Leucine | 8.78 | 1.01 | 8.61 | 2.93 | 8.50 | 4.17 |
| Iso-Leucine | 1.08 | 0.92 | 1.06 | 2.75 | 1.05 | 3.67 |
| Proline | 0.98 | 1.01 | 0.96 | 3.03 | 0.95 | 4.04 |
| Phenyl alanine | 4.14 | 0.96 | 4.05 | 3.11 | 4.01 | 4.07 |
| Tyrosine | 5.80 | 1.36 | 5.76 | 2.04 | 5.68 | 3.40 |
| Serine | 9.23 | 0.47 | 9.03 | 2.59 | 8.92 | 3.77 |
| Threonine | 7.12 | 0.84 | 7.00 | 2.51 | 6.91 | 3.76 |
| Cystine | 1.08 | 0.92 | 1.06 | 2.75 | 1.06 | 2.75 |
| Methionine | 0.38 | 2.56 | 0.38 | 2.56 | 0.37 | 5.12 |
| Arginine | 9.72 | 0.51 | 9.52 | 2.56 | 9.42 | 3.58 |
| Histidine | 3.07 | 0.65 | 3.03 | 1.94 | 2.96 | 4.21 |
| Lysine | 0.88 | 1.12 | 0.87 | 2.25 | 0.85 | 4.49 |
| Aspartic acid | 7.30 | 1.08 | 7.23 | 2.03 | 7.11 | 3.66 |
| Glutamic acid | 16.18 | 1.03 | 16.00 | 2.14 | 15.77 | 3.55 |
| Hydroxy proline | 0.98 | 1.01 | 0.97 | 2.02 | 0.96 | 3.03 |
| Cysteine | 3.47 | 0.57 | 3.39 | 2.86 | 3.36 | 3.72 |
| Tryptophan | 2.27 | 0.87 | 2.23 | 2.62 | 2.21 | 3.49 |

N – Terminal residue not determined

–$CONH_2$ Not determined

* corrected for the loss during hydrolysis

**References**


- Mclaren, A.D. and Shugar, D. Photochemistry of Proteins and Nucleic Acids., Pergamon Press, Oxford (1963).
- Luse, R.A. and Mclaren, A.D. Mechanism of enzyme inactivation by U.V. light and the photochemistry of amino acids, Photo chemistry and Photo Biology, 2, 343 (1963).
- Barnard, J.A.R. Chayen, Modern methods of chemical analysis Me Graw Hill publishing company Ltd., London, 215 (1965).
- Victer, H.H., Herndon, G.D. and Allen V. Thermoregulation in a Brooding Female Indian Python, Python molurus bivittatus, Science, 151, 3711, 694-695 (1966).
- Davidson, R.J. and Cooper, D.R. The effect of U.V. irradiation on acid soluble collagen, Bio. Chem. J., 105, 965 (1967).

- Cooper, D.R. and Rusell, A.E., The decomposition of soluble collagen by -irradiation, Bio. Chem. J., 113, 263 (1969).
- Minton, S., Snake Venoms and Envenomation., Marcel Dekker Inc. New York, CY (1971).
- Garg, R.K. and Saraswat, R.C., Component amino acids of the moult, Naja russele, Indian J. Ant. Res., 6(2), 50-52 (1972).
- Rheinwald, 1. G. and Green, H., Serial cultivation of strains of human epidermal keratinocytes: the formation of keratinizing colonies from single cells, Cell, 6, 331-343 (1975).
- Fuchs, E. and Green, H. Changes in keratin gene expression during terminal differentiation of the keratinocyte, Cell, 19, 1033-1042 (1980).
- Geisler, N; Weber, K., The amino acid sequence of chicken muscle desmin provides a common structural model for intermediate filament proteins EMBOJ., 1(12), 1649-1 656 [PubMed] (1982).
- Russell, F.: Snake Venom Poisoning, 2nd. Edition,. Scholium International, Great Neck, New York (1983).
- Stasiak, P.C., Purkis, P.E., Leigh, I.M. and Lane, E.B., Keratin 19, Predicted amino acid sequence and broad tissue distribution suggest it evolved from keratinocyte keratins. J. Invest. Dermatol., 92, 707-716 (1989).
- Theakston, R.D.G., Phillips, R.E., Warrell, D.A. et al., Envenoming by the common krait (*Bungarus caeruleus*) and Sri Lanka cobra (*Naja naja naja*): efficacy and complications of therapy with Haffikine antivenom, Trans R Soc Trop Med Hyg., 84, 301-308, Pub Med Citation (1990).
- Liberman, J., The ten Benefits of the U.V. Light, O.D. Ph.D. (1991).
- Kulartane, S.A.M. Common krait (*Bungarus caeruleus*) bite in Anuradhapura, Sri Lanka: a prospective clinical study, [1996-98]. Postgrad Med J., 78, 276-280, PubMed Citation (2002).
- Bawaskar, H.S. and Bawaskar, P.H., Profile of snakebite envenoming in western Maharashtra India, Trans R Soc Trop Med Hyg., 96, 79-84(2002).
- Mallow, D., Ludwig, D., Nilson, G. True Vipers: Natural History and Toxicology of World Vipers. Krieger Publishing Company, Malabar, Florida. 359, ISBN 8764-8772 (2003).
- Alibardi, L., Adaptation to the land: the skin of reptiles in comparison to that of amphibians and endotherm amniotes, Journal of Exp. Zoology, 298 (1), 12-41 (2003).
- Sharma, V., Effect of ultraviolet Irradiation in vitro on the chemical constituents of Epithelial tissue of some fresh water fishes, Ph.D. Thesis, Dr. B.R. Ambedkar University, Agra (2004).
- Alibardi, L., Spinsi, E., Frassanito, A.G., and Toni, M., The characterization of beta-keratins and associated proteins in adult and regenerating epidermis of lizards., Tissue and Cell, 36(5), 333-349 (2004).
- Alibardi, L. and Toni, M., The skin structure and certification protein in the soft-shelled turtle trionyx spiniferus., Zoology Gena), 109(3), 182-195(2006).
- Steinmann, A.C. Banet, N., Simanov, L., Grinfeld, N., Aizenberg, Z., Levi, O., Lahav, D., Malkinson, M., Perk, S. and Shpigel, N.Y. The experimental infection of common garter snakes with west Nile virus (2006).
- Bennis, M.J., Reperant, R., Ward, J.P., Rio, S.B.A. M'hamed and Jay, B. Determined the postnatal development of the optic nerve of a reptile (*Vipra aspis*) : a quantitative ultra-structure study, Anatomy and Embryology, 211(6), 0340-2061 (2006).