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A REVIEW OF BAKUCHI AND BAKUCHIOL W.S.R. TO RETINOL

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ABSTRACT

Bakuchi is a well known herb to the Ayurvedic world. From ethnobotanical, pharmacological and chemical point of view, this plant is of importance. Bakuchi is used widely in the treatment of Leucoderma, Vitiligo, Leprosy (Shwitra kushtha), Psoriasis (Kitibha kushtha) externally and internally. It is advised by sages of Ayurveda to consume Bakuchi rasayana for complete irradiation of Kushtha (Inflammatory skin diseases). Powder of Bakuchi seeds, the decoction made from all the parts of the herb (Panchanga Kashaya), seed oil are used in the treatment of various ailments. The Chinese traditional medicine uses this herb for treatments. The Bakuchiol is an active derived from Bakuchi seeds. It is now a buzzing word in the cosmetic industry due to its action found to be similar to retinol, which has anti-aging and anti-acne action. Bakuchiol could serve as natural alternative to synthetically produced retinol. The review of the studies done on this subject will be convenient to the aspirants willing to use Bakuchiol as an ingredient in their anti-aging products.

Keywords: Psoralea corylifolia, Bakuchi, Bakuchiol, Retinol, Anti-aging, collagen

Introduction: Ayurveda is a vast science which covers every aspect of human health. It advises preventive measures as well as treatments of various ailments. Ayurveda mainly focuses on maintaining the quality of one's health by suggesting a multi-dimensional approach. Ayurveda also deliberately described anti-aging regimen called Rasayana. Nobody wants to look or feel old. In the current era of smartphones everyone has access to camera. The looks and appearances have never been of more importance than now. So looking younger than your age is of utmost importance. The market is flooding with anti-aging products which have promising results. There is an active called Retinol which works as an anti-aging agent by reducing the appearance of fine lines and wrinkles. But it also has some side effects. So there is a need to find an alternative which is also naturally derived, so it will pose less harmful effects and will be easily accepted by our bodies. There is one such ingredient which is derived from a herb which is known from ancient times. It is Bakuchi! The use of Bakuchi in skin conditions is well known. The active derived from Bakuchi seed oil termed as Bakuchiol, is one of the many actives found. Its action is found to be similar to that of Retinol but with lesser side effects.

Materials and methods:

Various classical Ayurvedic textbooks, published articles are reviewed. The relevant information about Bakuchi plant, its identity and classical uses is collected. Then the retinol

ingredient, its uses in skincare are described. The reviews of studies undertaken to detect action of Bakuchiol and how it stands when compared to retinol is described.

Common name: Babchi, Purple Fleabane

Taxonomy of Bakuchi plant is as follows:

Kingdom: Plantae, Division: Angiospermea, Class: Dicotyledoneae, Order: Rosales, Family: Leguminosae, Subfamily: Papilionaceae, Genus: Psoralea, Species: Psoralea corylifolia

Ayurvedic/ Sanskrit Names –

Avalguja, Somaraji, Shashilekha, Kushthag hni, Suparnika, Krushnafala, Pootifala [1]

Traditional Chinese Medicinal Name – Bu Gu Zhi, Ku Tzu, Pu Ku Chih, Bu Ku Zhi, Cot Chu **Vernacular Name –** [2]

- Bavachi (Gujrathi) □ Babchi (Hindi)
- Bauchige, Bhavantibeeja (Kannada) □ Karkokil (Malyalam)
- Bawchi (Marathi) □ Karpokarisi (Tamil) □ Babchi (Hindi)
- Latakasturi, Kakuch (Bengali)
- Babchi seeds, *Psoralea* seeds, Malay tea, Scurf-pea, Fountain bush, West Indian Satinwood (English)

Parts Used – [3]

Seeds, Seed oil, leaves, roots, flowers, stems, fruits

Phytochemicals – To date, more or less than hundreds of compounds have been separated from *P. corylifolia*. [4]

Some of them include Essential oil, fixed oil, Psoralen, Psoralidin, Isopsoralen, and Bakuchiol.

Extraction Method –

- Here is the presentation of extraction method and the % of actives it could yield. [7]
1. Cold soaking – not significant
 2. Water decoction – 4.19%
 3. Ethanol extraction - 22.02%
 4. Ethanol ultrasonic extraction – 29.78%

Drying Method – drying of seeds in shade. [6]

Description of Plant –

- Bakuchi is an erect herb which grows upto 300 to 1800 centimeters. Branched stems are covered with thin white colored hair like projections
- Leaves have petiolate arrangement. They are 7cm long with round shape, have pointed margins with brown/ black coloured glandular spots.
 - It bears light purple coloured flowers which then develops into one seeded fruits.
- The seeds are kidney shaped, has bitter taste. The oleaginous pericarp exterior exudes a therapeutic oil.

Origins / Found in – humid parts of India, Southern African regions, China. In India, it is found commonly in Uttar Pradesh, Bengal and Maharashtra.

Propagation Material – seed

Harvesting Periods - The crop matures after 200 days of sowing when pods turn purple in colour. The seeds are collected after complete drying of the pods. Bakuchi is an annual herb. [20] The fruits are perennial. [21]

Essential Oil of Bakuchi – [7] preparation is done by steam distillation of seeds

Color- dark red-brown color

Odor - sweet balsamic aroma, strong nutty aroma

Therapeutic effect of Bakuchiol– [7], [4]

- Bakuchiol is a useful compound against oral pathogens. It has a great potential for use in food additives and mouthwashes for preventing and treating dental caries.
 - Bakuchiol have proven anti-tumor activity. It is useful in treatment of cancer.
 - Bakuchiol showed broad antioxidant activities
- It has shown bioactivity against various *Candida* species associated with oral biofilm. It could serve as a better alternative over currently available antifungal drugs. As they have substantial side effects at high concentrations. Bakuchiol acts by altering cell surface properties of *Candida* Which results in decreased adhesion and subsequently reduced biofilm formation and virulence. [11]

Dosage- Seed powder: 1–3 gm

Oil: applied externally

Tincture: 3–15 mL/day

Ayurvedic proeprties- [1],[12]

Rasa : Tikta (bitter), Katu (pungent) Guna : Ruksha (drying)

Virya : Ushna (hot potency)

Vipaaka : Katu (pungent properties after digestion) Prabhava:

Shvitrukushthanashaka

Tridosha state: Alleviates Kapha and Vata, aggravates Pitta

- Ruchya- improves taste sense
- Kushthaghna- treats skin disorders
- Krimighna- destroys the intestinal parasites
- Keshya- good for hair health
- Shwasahara- alleviates breathing and respiratory problems
- Jwarahara- helps reduce fever
- Mehahara- treats urinary tract ailments
- Grahi- helps in indigestion and loose stools
- Vranapaha- wound healing enhancer

- Hrudya- improves heart health

Properties as per Traditional Chinese

medicine – [3] Temperature- warm

Taste- pungent, bitter

Organ relationship- Kidney, Spleen

Direction of action- ascending

Site of action-Middle and lower burner, Spleen and Stomach

Retinol and its importance in skin care:

Retinol is one of the major forms of vitamin A- specifically, the form of the vitamin that your body absorbs from animal products.[24]

1. Skin aging occurs in two ways. One is chronological which is inevitable. Another type of aging is photoaging, occurring prematurely due to cumulative exposure of skin to ultraviolet radiations.[22] Retinoids are some of the most effective anti-aging cosmetic ingredients. [13]
2. Topical isotretinoin (retinoic acid) is the only single agent that is effective against all four major pathophysiological features that cause acne. [14]
3. Retinol is effective in fighting and reversing the signs of ageing.[15]
4. Retinol is a pivotal regulator of differentiation and growth in developing as well as adult skin.[25]
5. But as effective as Retinol is, it is not without any downside.
 - i) The first being, Retinol is not stable when exposed to air or sunlight.
 - ii) Retinol application increases sun sensitivity of skin, may cause redness, irritation.
 - iii) Its topical as well as internal use is teratogenic.
- iv) It is contraindicated during pregnancy.[15] The recent advances in nanoparticle drug delivery system

showed a good potential in improving the stability, tolerability and efficacy of retinoids like tretinoin and retinol.[22]

What is Bakuchiol?

A specific natural 95% pure meroterpene obtained from the edible seeds of *Psoralea corylifolia*^a, 4-[1E, 3S)-3-ethenyl-3, 7-dimethyl-1, 6-octadienyl[14]. Although it was first isolated in 1966 its popularity increased recently. It has started showing up in cosmetics as a vegan alternative to retinol.[24]

What various studies say about effectiveness of Bakuchiol?

- 1) A study was conducted where the actions of retinol and bakuchiol were assessed on the basis of following parameters for acne treatment. [16], [17]

- effects on 5- α -reductase expression, antibacterial and antifungal inhibition, collagenase and elastase inhibition, inflammation, clinical evaluation

Results were as follows: both bakuchiol and retinoic acid showed approximately 40% reductions in 5- α -reductase expression, compared with the placebo

- a) A study demonstrates that bakuchiol exhibits excellent *P. acnes* inhibitory activity. Whereas retinoic acid and retinol did not exhibit any antibacterial activity.
 - b) Retinol had no statistically significant elastase-inhibitory effect. The elastase inhibitory activity for

- bakuchiol was found to be between 1 µg/mL and 5 µg/mL
- c) Cyclooxygenase (COX) inhibition by bakuchiol and salicylic acid was measured. The results were promising.
 - d) In this same study, a clinical study was done on 60 Acne having individuals divided in four groups. Four formulations were evaluated. [14]
 - i) Bakuchiol 1% - 57% reduction
 - ii) Salicylic acid 2% - 48% reduction
 - iii) Bakuchiol 1% + Salicylic acid 2% - 70% reduction
 - iv) Placebo - no reduction
- 2) Bakuchiol and retinol both act by regulation of gene-expression. Hence their anti-aging action is a result of modulation of gene involved in the production of the extracellular matrix and dermal-epidermal junction.[13]
 - 3) A study was published in the *International Journal of Cosmetic Science* in 2014. The research was to test the anti-aging effects of bakuchiol using synthetic skin and collagen cell cultures to test.[24] The researchers conducted a comparative gene expression profiling of both substances i.e. bakuchiol and retinol. The outcome showed that bakuchiol had very similar gene expression and collagen regulation properties to retinol. The study states that bakuchiol, having no structural resemblance to retinoids, can function as a functional analogue of retinol. The conclusion being bakuchiol can function as an anti-ageing compound through retinol-like regulation of gene expression.[25]
 - 4) A study was published by the British Association of Dermatologists in 2018. The researchers observed the effects of topical application of retinol as well as Bakuchiol in 44 individuals on week 0, 4th, 8th and 12th. The anti-aging effects were assessed by applying 0.5% retinol product once-daily or bakuchiol 0.5% cream twice daily . It was a double blind trial. The results say that Bakuchiol and retinol both significantly decreased wrinkle surface area and hyperpigmentation with no statistical difference between the compounds. The retinol users reported more facial skin scaling and stinging.[26] It concluded to say that bakuchiol's ability to improve photoaging effects is comparable to that of retinol. Also Bakuchiol is better tolerated than retinol with fewer side effects.
 - 5) Structurally Sytenol A is phenol, 4-[1E, 3S)-3-ethenyl-3, 7-dimethyl-1, 5-octadienyl [INCI: Bakuchiol]. Dramatic similarities are demonstrated in a study in gene expression profile between Sytenol A and retinol. The data confirms the functional analogy of Sytenol A to retinol. It seems Sytenol A is indeed a true retinol-like compound.[15]
 - 6) A study was conducted on 60 sensitive skin individuals for assessing anti-aging effect of Bakuchiol cleanser and moisturiser. It was found to be suitable for use in sensitive skin subjects with eczema/ atopic dermatitis, rosacea, or cosmetic intolerance syndrome. The skin moisture content was improved by 16%.[23]
 - 7) Bakuchiol is stable photochemically. It has a good safety profile and showed no skin irritation or sensitisation when applied at 5% dilution. It is easy to formulate due to its miscibility with a wide variety of emollients and solubilisers.[15]
 - 8) A study was published in 2021, which studies Bakuchiol extract transdermal delivery in nanoemulsion form. Various stability tests were performed to determine the best suitable method. The formulation then studied on human subjects. Ex vivo and in vivo animal and human skin tests confirm the excellent bio availability

of the emulsion. The improved permeability and antiaging potential of the bakuchiol-encapsulated rich extract were observed at 0.02-0.2mg/ml concentration. These obtained ecological nanoemulsions were found to be competitive with the commercial preparations of retinol. [27]

- 9) Few other studies were done where bakuchiol was not the only compound to be studied. It was used in combination with other active ingredients and anti-oxidants. The results were promising.

Formulating with Bakuchiol [14]-

- Bakuchiol is easily miscible in wide variety of emollients. It can be added to oil phase at temperature 50° or less. Or it can be added after the emulsion is formed. For preparation of anhydrous serums or transparent gels, silicone derivatives such as dimethicone, cyclomethicone can be used.
 - Contact with iron or copper compounds should be avoided.
- The recommended use level of bakuchiol is from 0.5% to 1% w/w of finished formulation.
 - The effective acidic pH range (< 6.5) is necessary.

Conclusion- Bakuchiol is a plant derived agent in anti-acne formulations. It is likely the only agent after retinoic acid shown to be effective against multiple pathophysiologic features of acne. It has proven anti-aging action at par with that of Retinol. Bakuchiol is vegan and plant derived. It will serve as good alternative to retinol in the world of natural cosmetics. Further, bakuchiol has an excellent safety profile. It is non-irritating and non-sensitizing based on human repeat insult patch testing. [14] It has good stability in formulations and thus can be used throughout the day. If

added to the current available topical treatment protocol for acne, the Bakuchiol formulations will improve the outcome for patients.

References -

- [1] Dravyaguna Shastram by Vd.G.A. Fadke, First edition, Pg.260
- [2] BAKUCHI | National Health Portal of India (nhp.gov.in)
- [3] Tonifying herbs - ScienceDirect
- [4] Psoralea corylifolia L: Ethnobotanical, biological, and chemical aspects: A review - Alam -2018 - Phytotherapy Research - Wiley Online Library
- [5] (PDF) Quality Control of Psoralea corylifolia L. Based on High-Speed Countercurrent Chromatographic Fingerprinting (researchgate.net)
- [6] Psoralea corylifolia Linn. .pdf (echarak.in) (PDF) Quality Control of Psoralea corylifolia L. Based on High-Speed Countercurrent Chromatographic Fingerprinting (researchgate.net)
- [7] Psoralea corylifolia Linn.— "Kushtanashini" (nih.gov)
- [8] Phytochemical-Screening-and-Antibacterial-Potentiality-of-Essential-Oil-from-Psoralea-corylifolia-Linn.pdf (researchgate.net)
- [9] Psoralea Corylifolia Oil, Psoralea Corylifolia Oil Manufacturer (indiaessentialoils.com)
- [10] The health components of spices and herbs: The medicinal chemistry point of view -ScienceDirect
- [11] Insights of Phyto-Compounds as Antipathogenic Agents by Mohd

SajjadAhmad Khan, Mohd MusheerAltaf, MohammadSajid, 2019, pg. 367-389, Publisher Elsevier Inc.

[12] Bhavaprakash Nighantu

[13] Journal of Drugs in Dermatology: JDD, 01 Dec 2020, 19(12):1181-1183, PMID: 33346506 DOI: 10.36849/jdd.2020.5522

[14] Bakuchiol in the Management of Acne-affected Skin | Cosmetics & Toiletries (cosmeticsandtoiletries.com)

[15] The miracle of retinol - Cosmetics Business- Ratan Choudhari

[16] RK Chaudhuri, R Sharma, KR Ranganathan, G Gutierrez and M Serrar, Is plant-derived meroterpene an effective replacement of retinoid for the treatment of acne-affected skin? Proceedings of 25th IFSCC, Barcelona, Spain 3 65–70 (2008)

[17] US Patent 20090137534 and EP 2144590A1, Skin treatment composition and methods, RK Chaudhuri, assigned to Sytheon Ltd., (May 28, 2009; Jan 20, 2010)

[18] S Nishijima, I Kurokawa, N Katoh and K Watanabe, The bacteriology of Acne vulgaris and antimicrobial susceptibility of Propionibacterium acnes and Staphylococcus epidermidis isolated from acne lesions, *J Dermatol* 5 318–323 (2000)

[19]. L Slobododnikova, D Kostalova, D Labudova and V Kettman, Antimicrobial activity of Mahonia aquifolium crude extract and its major isolated alkaloids, *Phytother Res* 18(8) 674–676 (2004)

[20] Psoralea corylifolia — Vikaspedia

[21] Bakuchi: Health Benefits, Uses In Ayurveda, Formulations, Dosage, Side Effects (netmeds.com)

[22] Bakuchi: Health Benefits, Uses In Ayurveda, Formulations, Dosage, Side Effects (netmeds.com), Siddharth Mukherjee, PMID: 18046911, PMCID: PMC2699641, DOI: 10.2147/ciia.2006.1.4.327

[23] Clinical Evaluation of a Nature-Based Bakuchiol Anti-Aging Moisturizer for Sensitive Skin, by Zoe Diana Draelos MD,^a Hemali Gunt PhD,^b Joshua Zeichner MD,^c Stanley Levy MD, JDD, December 2020 | Volume 19 | Issue 12 | Original Article | 1181

[24] Is Bakuchiol Really Effective Enough to Be a 'Natural Retinol Alternative'? | SELF

[25] Bakuchiol: a retinol-like functional compound revealed by gene expression profiling and clinically proven to have anti-aging effects - PubMed (nih.gov)

[26] Prospective, randomized, double-blind assessment of topical bakuchiol and retinol for facial photoageing - PubMed (nih.gov)

[27] IJMS | Free Full-Text | Design and Engineering of "Green" Nanoemulsions for Enhanced Topical Delivery of Bakuchiol Achieved in a Sustainable Manner: A Novel Eco-Friendly Approach to Bioretinol (mdpi.com)