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The Medical Benefit of *Gnaphalium Luteoalbum*-A Review

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Abstract: The phytochemical screening of *Gnaphalium luteoalbum* revealed that the plant contained alkaloids, carbohydrates, phenols, flavonoids, saponins, tannins, glucoside resins, phytosterins, terpenoids and fixed oils. Pharmacoloical studies showed that *Gnaphalium luteoalbum* possessed antibacterial, antifungal, antioxidant anti- inflammatory and cytotoxic effects. The current review highlighted the chemical constituents and pharmacological effects of *Gnaphalium luteoalbum.*

Keywords: chemical constituents, pharmacology, *Gnaphalium luteoalbum*

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I. INTRODUCTION

Herbal medicine is the oldest form of medicine known to mankind. It was the mainstay of many earlycivilizations and still the most widely practiced form of medicine in the world today. Recent reviews revealed that the medicinal plants possessed wide range of pharmacological effect and represented a good alternatives in the treatment and prevention of human diseases[1-25]. The phytochemical screening of *Gnaphalium luteoalbum* revealed that the plant contained alkaloids, carbohydrates, phenols, flavonoids, saponins, tannins, glucoside resins, phytosterins, terpenoids and fixed oils. Pharmacoloical studies showed that *Gnaphalium luteoalbum* possessed antibacterial, antifungal, antioxidant anti-inflammatory and cytotoxic effects. The current review was designed to highlight the chemical constituents and pharmacological effects of *Gnaphalium luteoalbum.*

Synonyms:

Chrysocoma villosa, *Dasyanthus conglobatus*, *Bubani*, Gnaphalium dealbatum var luteo-fuscum, *Gnaphalium depressum Steud.*, *Gnaphalium dichotomum*, *Gnaphalium helichrysoides*, Gnaphalium helichrysoides var helichrysoides, *Gnaphalium luteo-fuscum*, *Gnaphalium luteoalbum var. compactum*, Gnaphalium luteoalbum var incanum, *Gnaphalium luteoalbum f. luteoalbum*, Gnaphalium luteoalbum subsp luteoalbum, *Gnaphalium luteoalbum var. luteoalbum*, Gnaphalium luteoalbum var pallidum, *Gnaphalium nanum*, *Gnaphalium pallidum*, *Gnaphalium trifidum*, Laphangium luteoalbum, *Pseudognaphalium luteoalbum*, Pseudognaphalium luteoalbum subsp luteoalbum[26-27].

Taxonomic classification:

Kingdom: Plantae, **Subkingdom**: Viridiplantae, **Infrakingdom**: Streptophyta, **Superdivision**: Embryophyta, **Division**: Tracheophyta, **Subdivision**: Spermatophytina, **Class**: Magnoliopsida, **Superorder**: Asteranae, **Order**: Asterales, **Family**: Asteraceae, **Genus**: *Gnaphalium* , **Species**: *Gnaphalium luteoalbum*[28].

Common names:

Arabic: Kutaina, Ghwbira, râraâ, Sabon Efreet; **Chinese:** si mian cao; **English**: Jersey cudweed, red-tip rabbit-tobacco; **French:** Cotonnière blanc-jaunâtre, Gnaphale jaunâtre, Gnaphale jaune blanc; **German:** gelbliches, Scheinruhrkraut; **Italian:** Canapicchia pagliata**, Swedish:** vitnoppa[29-30].

Distribution:

The plant was distributed in Africa, Asia, Europe, Australasia , Northern and Southern America. It was found in **Africa** (Kenya, Tanzania, Uganda, Kenya, Tanzania, Uganda, Eritrea, Ethiopia, Somalia, Sudan, Algeria, Egypt, Libya, Morocco, Tunisia, Angola, Malawi, Mozambique, Zambia, Zimbabwe, Botswana, Lesotho, Namibia, South Africa, Swaziland, Ghana, Mali, Nigeria, Senegal, Burundi, Cameroon, Equatorial Guinea, Comoros, Mauritius, Reunion); **Asia** (Oman; Yemen, Azerbaijan, Georgia, Russian Federation, China, Taiwan, Kazakhstan, Tajikistan, Turkmenistan, Afghanistan, Iraq, Iran, Palestine, Lebanon, Syria, Turkey, India, Pakistan, Laos, Thailand, Vietnam, Indonesia, Philippines); **Australasia** (Australia, New Zealand);

Europe (Belarus, Lithuania, Moldova, Russian Federation-European part, Ukraine, Austria, Belgium, Czech Republic, Germany, Hungary, Netherland, Poland, Slovakia, Switzerland, Sweden, United Kingdom, Bosnia and Herzegovina, Bulgaria, Croatia, Greece, Italy, Macedonia, Montenegro, Romania, Serbia, Slovenia, France, Portugal, Spain); **Northern America** (United states, Mexico) and **Southern America** (Argentina, Chile, Peru)[29].

Description:

Annual herb to 50 cm tall, all parts whitish-woolly. Stems usually several from the base, decumbent at first, later erect. Leaves sessile, up to 8 × 1 cm at base, oblanceolate, becoming smaller and lanceolate or linear above, greyish or whitish tomentose or arachnoid, on both sides; margin entire. Inflorescence consisting of dense clusters of capitula 1-several together in terminal corymbs. Involucres 3-4 mm in diameter; phyllaries in c. 3 rows, pale brown to whitish. Outer female florets very numerous, whitish. Bisexual disk florets cylindric. Achenes ellipsoid, papillose. Pappus of numerous soft bristles[31-32].

Traditional uses:

In the Punjab, the leaves of the plant were used as vulnerary and astringent. In Pakistan, It was used as anti-diarrheal, the infusion of aerial parts was used as emmenagogue. In Bangladesh, the plant was applied as a poultice to heal fractured bones. It also used in Bangladesh as tonic and for the treatment of tumor, gout, dermatitis[26, 33-34]. In Iraq, it was used traditionally as astringent, counterirritant, as vulnerary and for the treatment of gout[35]. In the Punjab leaves were used as vulnerary and astringent. In Pakistan, it was used as anti-diarrheal. Infusion of aerial parts was used as emmenagogue. It was also used as a counter-irritant for gout. In Bangladesh, plant was used by the Garo tribe, crushed along with dried fish and applied as a poultice to heal fractured bones. Also, used by the Kavirajes of Chalna as tonic, and for tumor, gout, and dermatitis[26]. In Belgium, it was used for the treatment of cancer (Breast)[36]. The leaves of *G. luteo-album* were also used as astringent, cholagogue, diuretic, febrifuge, and haemostatic[37].
Parts used: Leaves[1].

Chemical constituents:

The phytochemical screening of crude extract and its fractions revealed a wide range of phytoconstituents included: alkaloids, carbohydrates, phenols, flavonoids, saponins, tannins, glucoside resins, phytosterins, terpenoids and fixed oils[38-40].

Many flavonoids were isolated from included apigenin, apigenin 7-*O*-*β*-D- glucopyranoside, luteolin, luteolin 4'-*O*-*β*-D-glucopyranoside, luteolin 7-*O*-*β*-D- glucopyranoside, Jaceosidin and gnaphalin[16]. 5, 7, 3, 4 tetrahydroxy flavone; 5, 3, 4 trihydroxy flavonol and 3, 5 dihydroxy flavonol were isolated from the aerial parts of Gnaphalium luteo-album[41-42].

5,4′-dihydroxy-6-methoxy-7-O-β-glucopyranosideflavone (hispidulin-7-O- gluco pyranoside) and stigmasterol-3-O-β-glucopyranoside were also isolated from the leaves of the plant[43].

Three flavonols isolated from the leaves of G. *luteo-album* were structurally related to each other (gnaphaliin, calycopterin and 3'-Methoxycalycopterin). Chlorophyll a, chlorophyll b and carotenoid were also isolated from G. *luteo-album* leaves. The leave flavonoids and pigments were increased when the plant exposed to UV-B radiation[44].

The essential oil of the herbal parts of *G. luteo-album* was analyzed by gas chromatography and gas chromatography/mass spectrometry. Forty-four compounds were identified in the oil of *G. luteo-album*, representing 70.6% of the total oil with 4.4% monoterpene hydrocarbons, 5.0% oxygenated monoterpenes, 14.7% sesquiterpene hydrocarbons, 3.6% oxygenated sesquiterpenes, 29.1% aliphatic compounds, 10.4% fatty acids and esters, and 3.4% others. The main constituents were found to be decanal (9.7%), β-caryophyllene (8.0%), and α-gurjunene (6.4%). However, the compounds identified in the essential oil of *Gnaphalium luteo-album* and thier percentage were: α-Pinene 2%, 3-Hexanone 1.9%, 2-Hexanone 2%, Hexanal 1%, Undecane 0.4, β-Pinene 0.3, δ-2-Carene trace, α-Phellandrene trace, Heptanal 0.9%, Limonene 1.5%, 1,8-Cineole 1.7%, 2-Hexanol 0.4%, 2-Pentyl furan 1.2%, γ –Terpinene 0.2%, *p*-Cymene 0.4%, Octanal 1%, Hexanol 0.2%, Nonanal 4.1%, Tetradecane 0.5%, (*E*)-2-Octenal 0.2%, Decanal 9.7%, Camphor trace, α-Gurjunene 6.4%, (*E*)-2-Nonenal 0.3%, Linalool 0.4%, β-Caryophyllene 8%, Undecanal 1.1%, α-Humulene 0.3, α-Terpineol trace, Dodecanal 2,5%, Naphthalene 0.7%, (*E,E*)-2,4-Decadienal 0.5%, Octyl hexanoate 0.6, (*E*)-Geranyl acetone 1.2%, (*E*)-β-Ionone 0.3%, Caryophyllene oxide 3.6%, Octyl octanoate 2%, Hexahydrofarnesyl acetone 1.2%, Pentadecanal 2.4%, Carvacrol 1.7%, 1-Methylethyl hexadecanoic acid 3%, Dodecanoic acid 2.4%, Tetradecanoic acid 0.5%, Hexadecanoic acid 1.9%, Monoterpene hydrocarbons 4.4%,

Oxygenated monoterpenes 5%, Sesquiterpene hydrocarbons 14.7%, Oxygenated sesquiterpenes 3.6%, Aliphatic compounds 29.1% and Fatty acids and esters 10.4%[37].

However, the quantitative and qualitative analysis of the *Gnaphalium luteo-album* oil by GC and GC-MS carried out by Kushwaha, led to the identification of 14 constituents, constituting 96.13 % of the oil. The identified compounds (%) were: undecane: 2.51, indole: 8.12, 5-methyl undecane: 7.99, dodecane: 31.10, α-copaene: 2.36, limonene aldehyde: trace, isoledene 6.04, β-caryophyllene 4.12, E-β-fernecene 1.76, sesquisabinene: trace, γ-cuprenene 7.0, caryophyllene oxide 1.89, veridiflorol 4.98, 6,10,14-trimethyl 2-pentadecanone 18.23[45].

Pharmacological effects:

Antiinflammatory effect:

Several extracts from the aerial parts of *Gnaphalium luteo-album* possessed anti-inflammatory activity[37].

Antimicrobial effect:

The *Gnaphalium luteo-album* oil showed good activity against *Klebsiella pneumoniae* with zone of inhibition of (ZOI) 15.00 ± 0.00 mm and 50 µl/ mL MIC value. Oil was found to be active against E. coli with 13.00 ± 0.00 mm ZOI and 50 µl/ mL MIC value. The oil has also shown significant activity against Pseudomonas aeruginosa and Salmonella enterica (ZOI = 12.00 ± 0.00 and 78 11.00 ± 0.00 mm, respectively) with MIC value of 50 µl/ mL for each while least activity was recorded against Staphylococcus aureus (ZOI = 10.00 ± 0.58 mm and MIC = 100 µl/ml)[46].

The acetone leaf extract of the leaves was assayed for antifungal effect against plant pathogenic fungi in vitro (*Aspergillus parasiticus*, *Aspergillus niger*, *Colletotrichum gloeosporioides*, *Fusarium oxysporum*, *Penicillium expansum*, *Penicillium janthinellum*, *Phytophthora nicotiana*, *Pythium ultimum* and *Trichoderma harzianum*). The acetone leaves extract of possessed strong antifungal activity and showed excellent efficacy against *Phytophthora nicotiana* and *Fusarium oxysporum*, with MIC values of 20 and 160 µg/ml respectively. The isolated compounds (5,4′-dihydroxy-6-methoxy-7-O- β-glucopyranoside flavone (hispidulin-7-O-glucopyranoside) and stigmasterol-3-O- β-glucopyranoside) showed high activity against the selected fungal organisms with MIC values ranging from 0.02 to 1.25 mg/ml[43].

Cytotoxic effect:

The cytotoxic activity of crude methanol of the leaves of *Gnaphalium luteoalbum* was investigated against healthy mouse fibroblasts (NIH3T3), healthy monkey kidney (VERO) and four human cancer cell lines (gastric, AGS; colon, HT-29; and breast, MCF-7 and MDAMB-231) using MTT assay. The crude methanol of the leaves of *Gnaphalium luteoalbum* showed high cytotoxicity against AGS and MCF-7 cell lines with IC_{50} of 0.98 and 0.34 mg/ml respectively[47].

However, no cytotoxicity was recorded for two compounds isolated from the plant (5,4′-dihydroxy-6-methoxy-7-O-β-glucopyranosideflavone (hispidulin-7-O- glucopyranoside) against Vero kidney cells at 200 µg/ml, the highest concentration tested[48].

Antioxidant effect:

The methanol extracts *Gnaphalium luteoalbum* (50µg/ml) were subjected to preliminarily screening assay for their free radical scavenging potentialities against stable DPPH• (2, 2- diphenyl-1-picrylhydrazyl), using ascorbic acid as a positive control. DPPH• % at µg/ml m was 90.4, EC_{50} was 23.8±2.8 µg/ml[48].

The antioxidant potentiality of crude methanol extract (CME), carbon tetrachloride fraction (CTF), petroleum ether fraction (PEF), chloroform fraction (CLF) and ethyl acetate fraction (EAF) of aerial parts of *Gnaphalium luteoalbum* (GL) was studied in vitro.The CME showed the highest scavenging activity (43.28%) with IC_{50} of 398.49 µg/ml in the DPPH radical scavenging test. The IC_{50} values of EAF, CME were statistically significant ($P < 0.05$, $P < 0.01$) with respect to ascorbic acid (ACA). In OH and NO radical scavenging tests, maximum scavenging (48.39%, 69.64%) was also reported for CME compared to CTF, PEF, CLF and EAF. Compared to ACA, in case of OH and NO radical scavenging activities the IC_{50} values of CME were markedly significant ($P < 0.01$, $P < 0.05$). In the TAC test, CME showed the highest antioxidant activity (absorbance, 2.6 nm) related to other fractions. The total phenolic contents (TPC) was found to be the highest in the CME (115.96 mg of gallic acid equivalent/g of dried extract) rather than other fractions. The ranking order of CTF, PEF, CLF, EAF and CME for total flavonoids contents (TFC) was 48.67 < 55.75 < 65.29 < 71.35 < 82.29 mg quercetin equivalent/g of dried extract[39].

II. CONCLUSION

The current review discussed the chemical constituents and pharmacological effects of *Gnaphalium luteo-album* to encourage its uses in medical practice as a result of efficacy and safety.

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