Physicochemical Screening of Tagetes erecta Linn

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***Abstract*: *Tagetes erecta Linn*. commonly known as African Marigold is known for its high therapeutic values. These plants are rich in alkalonoids, Terpenes, flavanoids, phenolic compounds etc. Since ancient era, all the parts of the plants are used in medicine for curing many diseases. In the present investigation, the plant was subjected to physicochemical screening to prove that the floral parts are effective for alternate medicine.**

***Keywords* — Bioactive compounds, metabolites, physicochemical, therapeutic**

I. Introduction

Today, according to WHO 80% of world population depends on plant source for their medicinal value in the health sector [1]. The bioactive components (secondary metabolites) of medicinal plants have high therapeutic values in the medical field [2,3]. These bioactive compounds are widely used as an alternative source in the modern medicine [4] which has taken an exponential growth in terms of natural origin and lesser side effects [5]. The effective therapeutic value occurs by the conbinations of plant metabolites like tannins, flavanoids, resins, gums, steroids, terpenes, alkaloids etc. which have their own physiological and metabolic actions [6,7]. As per World Health Organization (WHO) about 30% of commercially available medicines are of natural origin in curing many diseases [8]. Clinical screening of metabolites from plant sources resulted in potential new therapeutics which are drug resistance against pathogens [9,10].

The classification of *Tagetes erecta* is tabulated in the Table 1 [11] and the genus *Tagetes* consists of 56 species [12]. The genus *Tagetes* (derived from Etruscan Tages) originated in North and South America and widely cultivated in other Asian countries like Bhutan, China, Nepal, India etc.[13] which has a strong historic evidence for its religious and therapeutic value[14] in the treatment of hiccups, dermatitis, athlete's foot, colitis, wound burns etc. [15]. These plants are rapid growing annuals with the height ranging from 6 inches (dwarf plants) to 3 ft. Bearing large pompon- like [6, 16] , floral heads of 4-6 cm diameter having both ray and disc florets (Blooms are golden, orange, yellow etc.). Since ancient era, various parts of *Tagetes* has been used as skin wash dye [17], food additives [18], fodders [19], pesticides [20]. The flower part of the plant are efficient therapeutic in the treatment of epileptic fits (Ayuveda), astringent, carminative, scabies etc [6]. Decoction of flowers are very effective for cold conjunctivitis, mumps and eye sore [21].

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TABLE I
SCIENTIFIC CLASSIFICATION OF T*agetes erecta Linn*

Kingdom	Plantae
(unranked)	Angiosperms
(Unranked)	Eudicots
(Unranked)	Asterids
Order	Asterales
Family	Asteraceae
Subfamily	Asteroideae
Tribe	Tageteae
Genus	Tagetes
Species	erecta

Tagetes sps. act as insecticides and pesticides due to the musky, pungent scent by which the plants are effective companion partners for tomato, eggplant, chilipepper, tobacco and potato crops [22]. These plants exudates thiopenes through roots therefore *Tagetes sps*. are not preferred near any leguminous crops [23]. All the varieties of *Tagetes sps*. are considered to have social and religious values in India [24]. *Tagetes lucida* (Pericon) has its fame in Mexico for "Anise" (flavored medicinal tea) used as a culinary herb in warm climates and as a substitute for tarragon known as " Texas tarragon" or " Mexican mint marigold" [25]. *Tagetes minuta* native of Southern South America is used as a culinary herb (Incan term huacatay) in Peru, Ecuador, Chile and Bolivia and the paste is used to make a popular potato dish (Ocopa) [26]. The essential oils extracted from leaves, stem, flowers etc. constitutes limonene, ocimene, valeric acid and lagetone which act as antibiotic, antiparasitic, antiseptic, antimicrobial, antispasmodic etc. [27,28]. The present investigation is aimed to identify the physicochemical properties of the *Tagetes erecta* flower sample for its therapeutic value.

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II. Materials And Methods

The fresh flowering *Tagetes erecta Linn* plants were collected and segregated into various parts (stem, leaf, flower and roots) after thorough wash with tap water. The various parts of the plant samples were shade dried, powdered and stored in a air tight container for future investigation. The present investigation was concentrated for the physicochemical property of flower sample to identify the effectiveness of therapeutic values. A significant amount of dried flower powdered sample was subjected to various physicochemical investigation such as total ash content, Acid insoluble ash, water soluble ash, moisture content, alcohol soluble extract, petroleum ether soluble extract and aqueous soluble extract [29,30].

The dried flower powder was exposed to day light, UV (254 nm and 365nm) with the influence of various chemicals like Conc. HCl, Conc. HNO_3, Conc. H_2SO_4 Glacial acetic acid, 5% KoH, Picric acid, Ammonia solution, Petroleum ether, Ethanal, 5% NaOH and 5% $FeCl_3$ as per standard methods [31,32]

III. Results And Discussion

The dried flower samples of *Tagetes erecta Linn.* was subjected to physicochemical analysis to evaluate the quality and purity of the chemical constituents and to identify the therapeutic value for future investigation. The flower sample was subjected to various physicochemical analysis (Table 2) such as total ash content (7.1451%w/w) and the recorded moisture content was 4.5576% w/w during the period of study. The amount of acid insoluble ash and water soluble ash during investigation were 7.44% w/w and 13.879% w/w, respectively. The ash content in a plant material is a note worthy parameter which indicates the purity of the herbal drug [6, 33]. About 4.5576% w/w of moisture content has been reordered which is lower than the value recorded by Kadam et al., [6]. The other physicochemical parameters analysed were alcohol soluble extract, petroleum ether soluble extract and aqueous soluble extract (Table.2) revealed that phytochemical constituents of flower sample are highly soluble in water than alcohol and petroleum ether.

TABLE 2
Analysis Of Flower Powder Of *Tagetes erecta*

Total Ash Content	7.1451% w/w
Acid insoluble ash	7.44% W/W
Water soluble ash	13.879% W/W
Moisture content	4.5576% W/W
Alcohol soluble extract	40.025%
Petroleum ether soluble extract	2.5%
Aqueous soluble extract	60%

In the next step of the investigation, dried flower sample was influenced with various chemicals such as acids, ammonia, petroleum ether, ethanol, NaOH, $FeCl_3$ for authentication study of the phytochemicals present in the sample and then their properties under different wavelength (visible, UV – 254 nm and 365 nm) were observed for standardization of bioactive compounds (Table 3). The powder as such was exposed to visible and UV and colour change was observed at UV 254 nm (Dark green) and UV 365 nm (Grey). It was evident that in the acid solution (Conc. HCl, Conc. HNO_3, Conc. H_2SO_4, acetic acid) the colour change ranged from light green to dark green under UV 254 nm and Grey to black under UV 365 nm. It was observed that there was no significant change in colour under picric acid exposure (Table 3). It is also proved the colour change under solvent exposure is negligible (petroleum ether and ethanol) and it also best extractor for analysis.

TABLE 3
Fluorescence Analysis Of Flower Sample Of *Tagetes erecta*

S. No	Reagent	Day light	UV 254nm	UV 365 nm
1	Powder as such	Yellow	Dark green	Grey
2	Powder + Con.HCL	Yellow	Light green	Black
3	Powder + Con.HNO_3	Yellow	Green	Violet
4	Powder + Con. H_2SO_4	Reddish brown	Dark green	Grey
5	Powder + Glacial acetic acid	Yellow	Light green	Grey
6	Powder + 5% KOH	Orange	Dark green	Black
7	Powder + Picric acid	-	-	-
8	Powder + Ammonia Solution	Dark brown	Green	Violet
9	Powder + Petroleum Ether	Yellow	Yellowish green	-
10	Powder + Ethanol	Yellow	Yellow	Grey
11	Powder + 5% NaOH	Orange	Dark green	Black
12	Powder + 5% $FeCl_3$	Black	Black	Black

IV. Conclusion

From the present investigation, it is evident that *Tagetes erecta Linn* had proved to have high therapeutic value in terms of physicochemical properties and on further investigation in depth will pave a way for an alternative economic drug for various diseases with less side effects. Isolation of phytochemicals and identity of their therapeutic value is necessary in further investigative approaches.

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