

Ranunculus Multifidus: Traditional Uses, Phytochemistry and Pharmacological Activities

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Abstract

Natural products are incredibly well investigated source of bio active secondary metabolites which can be act as a source of lead compound in drug discovery program. Ranunculus multifidus called the common buttercup in South Africa is a widespread species of flowering plants in the family of Ranunculaceae. It is one of the un explored medicinal used as a traditional medicine for many human ailments. The plant has different vernacular name in different district in the same country, which shows the plant was explored ethno medicinally since the people cannot know the plants out of their interest. In South Africa this plant can be used for treatment of malaria, Tuberculosis (TB), Infertility, Blood cleansing, sore and different sexually transmitted disease as well as wounds. In the same scenario the plant was used in Ethiopia for the treatment of Hepatitis B, Toothache, eyes infection malaria, external cancer, GIT pain and etc. The plant contains fat in its leaves and root and thus used as food in Guassa Community in Debre birhan Ethiopia. The research evidence shows the plant has anti-inflammatory, Antispasmodic, in vivo antibacterial as well as anti-quorum sensing activities. It is important to investigate this miracle plant to isolate secondary metabolites which might be important to discover novel lead compound for drug design and development in current pharmaceutical industry.

Keywords: Ranunculus multifidus; phytochemistry; Ethnomedicine; pharmacology; Traditional medicine; Natural product; extraction.

Introduction

Human beings have relied on herbs and medicinal plants as a source of food and remedy from time immemorial [1]. Traditional medicine is based on indigenous theories, beliefs and experience that are conserved down from generations to generation. Many African countries have realized on traditional medicines from native and endemic for various ailments [2]. In Africa up to 80% of the population uses traditional medicine for primary health care [3]. Traditional medicine is defined by the WHO as “the sum total of all knowledge and practice, whether explicable or not, used in the diagnosis, prevention and elimination of physical, mental or social imbalances, and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing” [4].

Ethiopia is believed to be a home for about 6,500 species of plants with approximately 12% endemic, hence making it one of the six plant biodiversity-rich countries of Africa (CBD Ethiopia, 2009). The country has a long history of using medicinal plants. Hence, a wide range of medicinal plant extracts are used to treat several infections as they have potentials to antimicrobial activity [5]. *Ranunculus multifidus*, called the common buttercup in South Africa is a widespread species of flowering plant in the family Ranunculaceae [6]. It is native to SubSaharan Africa except West Africa, Madagascar and the Arabian Peninsula [7].

Up to 80% -90% of the Ethiopian population has been reported to rely on traditional medicine as a major provider of health care [4]. This is because of the distribution of health care is limited. With the increasing realization worldwide that traditional medicines based on indigenous medical systems are potential sources of natural products that can be developed into pharmaceutical drugs and health products [8].

The genus *Ranunculus* has been reviewed for distribution in the world, traditional uses, isolated chemical constituents and their pharmacological activities of some common species. Almost 600 species belong to the genus *Ranunculus*. The most common use of *Ranunculus* species in traditional medicines are anti-rheumatism, intermittent fever and rubefacient [9]. For this use, the plant is commonly prepared as decoction and infusion.

Substantial efforts have been made to investigate ethnomedicinal uses, chemical constituents, and biological activities of *R. multifidus* during the last decades. Unfortunately, no comprehensive review on this important plant species in Africa has been published that documenting the species' biology, traditional uses, phytochemistry, and pharmacological properties. Therefore, in this seminar paper, the advances in traditional utilization, botany, phytochemistry, pharmacology, and safety aspects of *R. multifidus* are systematically reviewed. In addition to this, the perspectives for the future research on *R. multifidus* are also discussed in the hope that the article will provide a better understanding of the plant species.

Methodology of the Review and Dedication

The literature search was performed using electronic search engines such as Google and Google Scholar and publishing sites such as Elsevier, Science Direct, and PubMed. The data bases and literature sources were chosen based on the topics covered (biological activities, ethnobotany, ethnomedicinal uses, ethnopharmacology, pharmacology, phytochemistry, natural product-based drug discovery and therapeutic value) and geographical coverage). This review was done due to the species ethno medicinal data at different country indicate the species is the source of many solutions for one or more human ailments alone or in combination with other medicinal plant. The following keywords were used for searching literature sources; Ranunculaceae, *R. multifidus* and vernacular name 'Etse siol', root, leaves.

Vernacular Names of *Ranunculus multifidus* in Africa

Ranunculus multifidus has several vernacular or common names in different African country where it is found or in its geographical areas of occurrence. Literature survey showed there is more than two or three vernacular names in different country, but the plant mainly has many common names in South Africa followed by Ethiopia. Local people rarely name plant species that they do not use for them especially for disease prevention [8]. The list of common or vernacular name implies that local people in South Africa and Ethiopia have an active interest in *R. multifidus*. Let us summarize the common name of the specious in different geographic location in (Table1).

Table 1: Vernacular names of *Ranunculus multifidus*

Vernacular name(s), ethnic group or geographical location	Country	References
B. Madikizela 16 (Tambo district)	South Africa	[10]
Tlhapi (Sesotho)	South Africa	[11]
Afi Deshe (Maale and Ari ethnic communities in Southern Ethiopia)	Ethiopia	[12]
Gubduu caaffee (Sigmo District, Jimma Zone)	Ethiopia.	[13]
Sherit, (Meinit ethnic in SNNPRS)	Ethiopia	[14]
Kartassa (Bale Mountains National Park)	Ethiopia	[2]
Uxhaphozi (northern Maputaland)	South Africa	[15]
Singida, Lewa (kebate)	Kenya	[16]
Kivunja homa (Butembo City)	D.R.Kongo	[17]
'Thlapi' (Sotho) (Maluti,Transkei)	South Africa	[18]

Phytochemistry

In spite of using plant as traditional remedies for many human ailments in different parts of African country there is no as such vast laboratory investigation done on this plant to identify its phyto constituents. Investigations done on other species of *Ranunculus* suggest the following compound was reported. From the aerial part of *R. Sceleratus*, phytol, β -sitosterol, stigmasterol, glycolipids, flavonoids, simple phenolics and glycosides of γ -lactone (mainly *Ranunculin*) were isolated [19]. Phytol, β -sitosterol, stigmasterol and glycolipids were reported to inhibit cyclooxygenase-1(COX-1), 5-lipoxygenase (5-LOX) and human leukocyte elastase activities. *Ranunculus arvensis* are rich source of Alkaloid, Phenol, Flavonoid and Saponins [20]. Hexadecanoic acid, β -sitosterol, Anemonin are the compounds isolated from *R. bulbosus* [21].

The Family Ranunculaceae:

Ranunculaceae (buttercup or crowfoot family) is a family of over 2,000 known species of flowering plants taxa under 50 genera, distributed worldwide. The largest genera are *Ranunculus*(600 species), *Delphinium* (365), *Thalictrum* (330), *Clematis* (325) and *Aconitum* (300) [22].

Ethnomedicinal Report of Some Genus *Ranunculus*

Some very common and dominant species of this genus has vastly known by their medicinal values around a globe. Let as summarize some common ethnomedicinal values of this genus in tabular way.

Table 2: Some reported traditional values of genus *Ranunculus*

Species	Ethno medicinal values	Parts used	References
<i>R. muricatus</i>	asthma, abscess, plague, dysentery, etc	Whole plant	[23]
<i>R. arvensis</i> L.	Arthritis, rheumatism, fever, psoriasis, gut diseases and rheumatic pain.	Leaves	[24]
<i>R. diffuses</i>	Rheumatism	Leave and stem	[9]
<i>R. chinensis</i>	diarrhoea and parasites	Whole Plant	[9]
<i>R. hirtellus</i>	Used as vermifacient and anthelmintic	Roots	[9]
<i>R. aquatilis</i>	Used in intermittent fever, asthma	Whole plant	[23]

Ethnomedicinal Uses of *Ranunculus Multifidus*

The roots, leaves, and stems of *R. multifidus* are reported to possess diverse medicinal properties and are used to treat various human and animal ailments Africa. It can be used alone or in combination therapy with other different medicinal plant. Research by De Wet et al.(2013) revealed that *E. elephantine* root decoction is taken orally in combination with *Ranunculus multifidus* (Whole plant) as remedy for shingles as well as sores with other traditional medicinal plant in combination therapy [25].

According to Worku (2016) report the root of *Ranunculus multifidus* can be used for the treatment of external tumour/cancer in Ethiopian traditional practioner [4]. Many studies have been done on the traditional treatments of various [15]. In northern Thailand the species regularly used for the treatment of dysmenorrhoea (menstrual cramps) and amenorrhoea (absence of menstrual period), followed by the relieving of morning sickness in pregnant women and for promoting foetal stabilization [26].

According to Hutchings (1989) report a boiled one handful of *Ranunculus multifidus* (whole plant) in 1L of water for 30 min and sieve and taken half a cup three or four times a day or used half a cup as an enema to treat genital warts and gonorrhoea [27]. According to Eshetu and Balakrishnan report in (2014) the plant *Ranunculus multifidus* has nutritional values around Guassa Community in (Debre birhan) and they reported as the plant contain fat (4.9%) in its root and leaves [28]. The species also used as a beauty enhancer in south Africa by producing a cosmetic from is juice sap and tattoo marks are made indelible by the application of the *Ranunculus multifidus* as well [29]. The plant has more ethno medicinal values which can be summarized in (Table3).

Table 3: Ethnomedicinal values *Ranunculus multifidus*

Medicinal use	Parts used	Country	Reference
TB	Oral infusion of root	South Africa	[10]
Infertility, cleanse blood	A whole plant is mixed with either leaf of <i>Senecio deltoideus</i>	South Africa	[15]
Shingles and sores	The Whole plant of this species can be used treat skin disease	South Africa	[30]
UTIs	Roots decoction treat UTIs		[31]
Abdominal pain	Decoction by water of Leaves treat pain	D.R. Kongo	[17]
Toothache and GIT	Soaking the leaf in water and taken orally for GIT treatment and they put the sap from leaf for the toothache in Sigmoid district jimma, Oromia	Ethiopia	[13]
Toothache, cold	The Root/leaf of the species can be macerated in water and for toothache and administered through nasal in case of cold	Ethiopia	[14]
Evil eye, Tonsillitis	The Leaves of <i>R. multifidus</i> used topically to treat evil eyes and tonsillitis.	Ethiopia	[12]
Asthma	The dried root concocted, mixed with Butter and taken orally around Bale national park	Ethiopia	[2]

Sores	The whole plant mixed with Roots of <i>E. elephantine</i> and applied topically	South Africa	[32]
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Even though the plant *Ranunculus multifidus* has this and other reported traditional ethnomedicinal use, there is also a report that indicates the plant has some toxicity. *Ranunculus multifidus* is also reported to be poisonous to livestock and a honey bee. On the other hand these plants, which are reported as poisonous, are also widely used in traditional healing for different medications [33]. An investigation on vegetation was carried out in one grazing paddock of the University of Nairobi, Veterinary Farm to investigate poisonous nature of plants [16].

Some Chemical Constituents Isolated from the Genus *Ranunculus*

Ranunculus Muricatus

Methanolic extract (10 g) of aerial parts of *Ranunculus muricatus* was fractionated on column by using silica gel 60 (40–63 μ m) as stationary phase, ethyl acetate and methanol was used as mobile phase and resulted compounds like; Caffeoyl- β -d-glucopyranoside (1), 1,3-dihydroxy-2-tetracosanoylamino-4-(E)-nonadecene (2) [22]. It also contains phenolic class of compounds such as stigma sterol, Anemonin (3), Aescin lactone dimethyl ether (4), beta-Valley sterol, protocatechuic aldehyde (5),protocatechuic acid (6), and luteolin factors(7) [9] and Ranuncoside (8) [23].

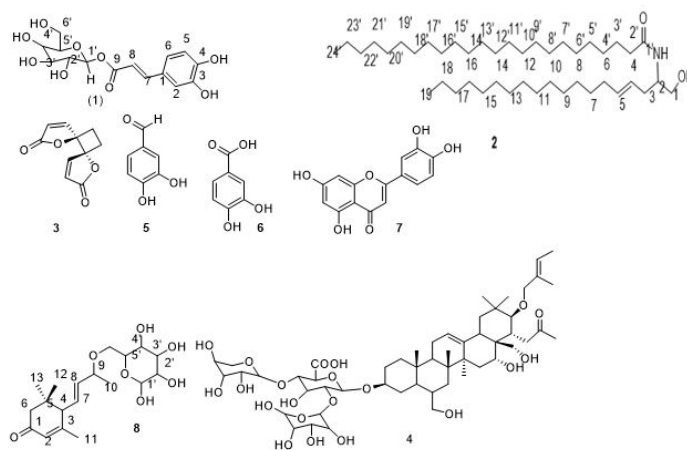


Figure 1: Chemical structures of compounds reported from *Ranunculus muricatus*

Ranunculus ternatus

Bilobetin (9), Ternatoside, Sternbin (10), methylparaben (11), 4-O-Dglucopyranosylp-coumaric acid (12), linocaffein (13), Kaya flavone (14), Podocarpus flavone A (15), isoginkgetin (16), Amentoflavone (17), Robustaflavone-4 β -methyl-ether (18) [9]

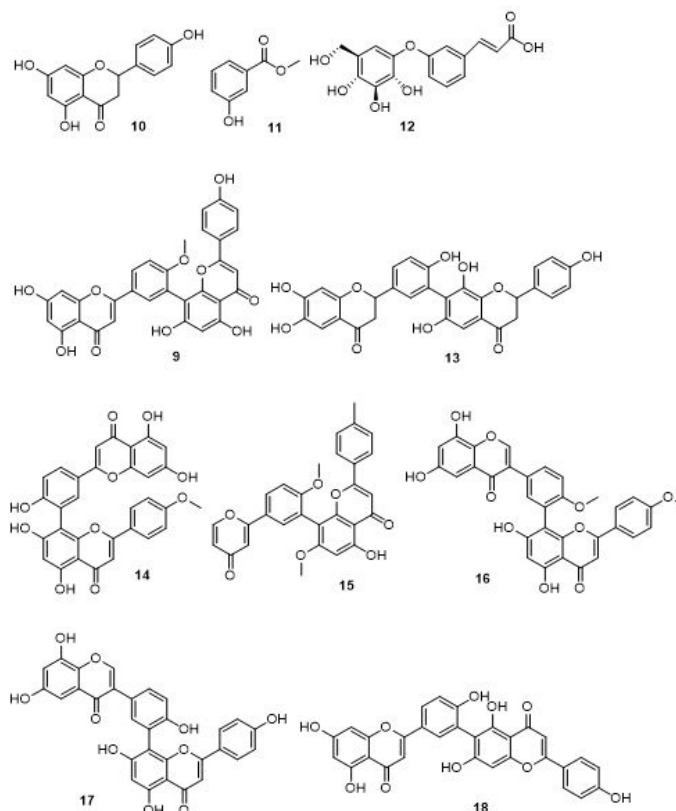


Figure 2: Chemical structures of compounds reported from *Ranunculus ternatus*

Ranunculus Repens

Using different chromatographic techniques and various tools of NMR spectral analysis as well as MS spectral analysis the structure of the following compound elucidated from this species. R(+)-Dalberg phenol (19), R(+)-4-Methoxydalbergione (20), methyl-3,4,5-trihydrobenzoate(21),4-hydroxy-2-methoxybenzoic acid(22),p-hydroxycinnamic acid(23) , Ranupenin-3-glactoside (24), β -sitosterol [9]and others.

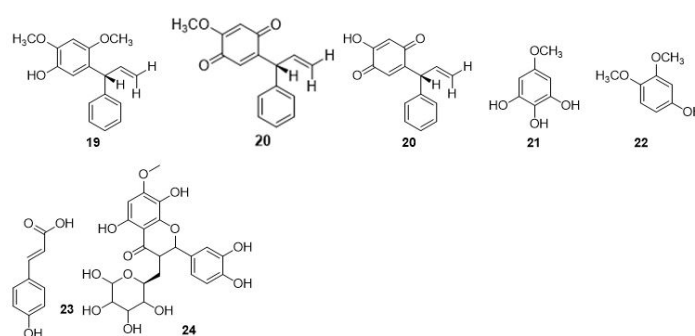


Figure 3: Chemical structures of compounds reported from *Ranunculus repens*

Ranunculus Sceleratus

From this species 5-hydroxy tryptamine (25), apigenin (26), apigenin 4'-O- α -rhamnopyranoside, apigenin 7-O- β -glucopyranosyl-4'-O- α -rhamnopyranoside, tricetin 7-O- β -glucopyranoside, isoscapoletin (27) , tricetin (28), Protocatechuyaldehyde (29) ([34]), Protoanemonin (30) [9] were reported.

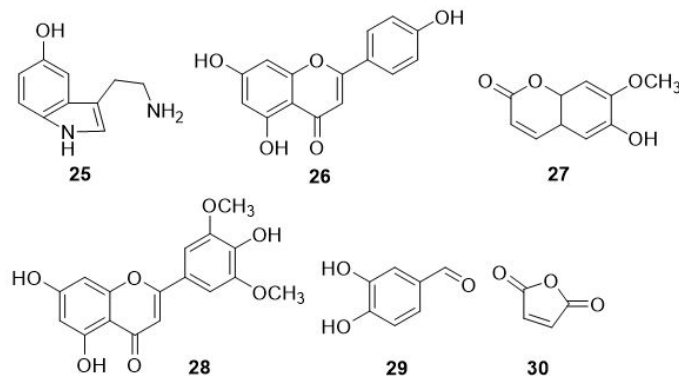


Figure 4: Chemical structures of compounds reported from *Ranunculus sceleratus*

Ranunculus Bulbosus L

According to Mares report this species consist of Hexadecanoic acid (31) β -sitosterol (32), Anemonin (3), and Protoanemonin (30) which also reported from *R.sceleratus* by Aslam as shown above [9].

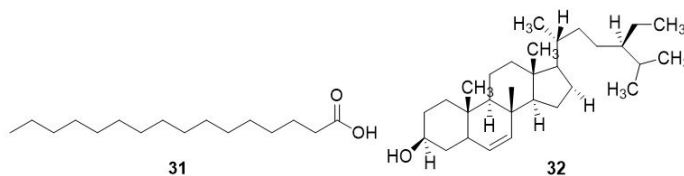


Figure 5: Chemical structures of compounds reported from *Ranunculus bulbosus* L.

Ranunculus chinensis

The following compounds are reported from *Ranunculus chinensis*; 3-O- α -L-arabinopyranosyl-(1 \rightarrow 2)- β -D-galactopyranosyl-7-O- β -D-kaempferol (33) , 3-O- α -L-arabinopyranosyl-(1 \rightarrow 2)-{4-O-[(E)-caffeoyl] β -galactopyranosyl}-7-O- β -D-glucopyranosylquercetin (33a);3-O-{2-O-[(E)-caff eoyl]- α -L-arabinopyranosyl(1 \rightarrow 2)- β -D-galactopyranosyl}-7-O- β -D-glucopyranosyl kaempferol (33b);3-O-{2-O-[(E)-caffeoyl]- α -L-arabinopyranosyl-(1-2)- β -D-galactopyranosyl}kaempferol (33c) [35].

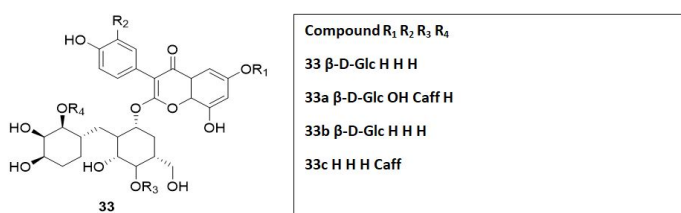


Figure 6: Chemical structures of compounds reported from *Ranunculus chinensis*

Ranunculus Laetus

Jacein (34), jacedin-5-O- β -D-glucoside (34a), Centaurein (34b), 6,7-dimethoxycoumarin (35), β -amytrin (36) and β -sitosterol-3-O- β -D-glucoside [34] where reported.

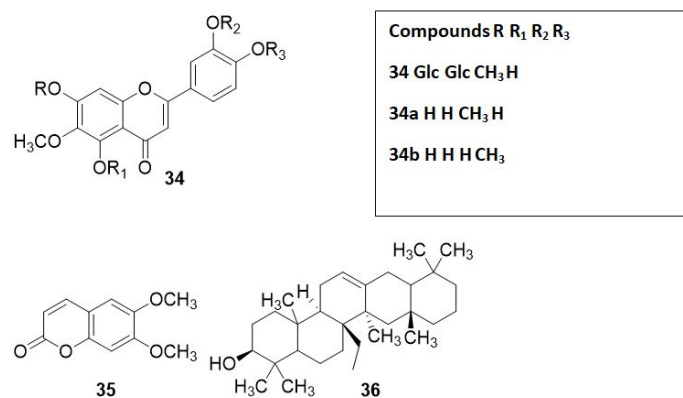


Figure 7: Chemical structures of compounds reported from *Ranunculus laetus*

As to the knowledge of literature mining only this Anemonin a dimeric lactone was isolated from leaf parts and the isolated compound have strong anti-malarial activities by increasing oxidative stress in the parasite, since it interacts with the thiol group of the precursor amino acid L-cysteine, along with the cysteine residue of GSH itself by a Michael type addition (Figure 8) [6]. Meanwhile, L-cysteine is relevant as a substrate in the synthesis of GSH [36]. The capability of Anemonin to interact with this important amino acid may suggest its potential to increase oxidative stress and inhibit growth in the parasites.

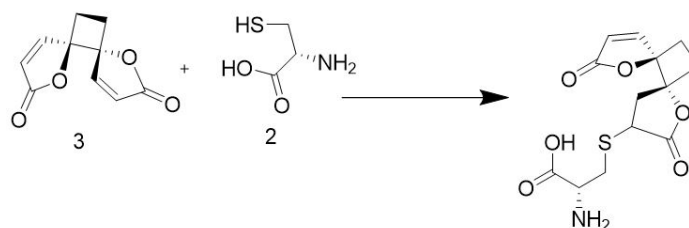


Figure 8: Possible Michael-type addition reaction between Anemonin³ and L-cysteine²

Pharmacological Activities of the *Ranunculus* Species

Various parts of the genus *Ranunculus* have been reported to have anti-bacterial, anti-inflammatory, anti-oxidant, cytotoxic, antiviral, insecticidal, anti-fungal, anti-tuberculosis properties.

Antibacterial Activities

Different species of *Ranunculus* can be reported to have antibacterial activities at different place by researchers. Methanol extract of aerial parts of *Ranunculus muricatus* reported to possess antibacterial activity [9]. Acetone and methanol fractions of *Ranunculus sericeus*, had moderate antimicrobial activity against tested against human and plant pathogenic bacteria *Pseudomonas aeruginosa*, *B. subtilis*, *S. aureus*, *E. faecalis* [37].

Khalid et al. (2019) reported that silver nanoparticle (AgNPs) were synthesized from leaf extract of *Ranunculus laetus* which have enhanced antibacterial potential against *P. aeruginosa*, *E. coli*, *S. aureus* and *B. subtilis* compared to aqueous leaf extract [38]. Extracts of *Ranunculus bulbosus* reported anti *Citrobacter* constituents in its ethyl acetate and methanol extracts. The zone of inhibition obtained from ethyl acetate extract (40.00±0.57mm) which is higher than chloramphenicol (20.67±6.80 mm) and Tetracycline (13.33±0.57 mm) [39].

Anti-fungal Activities

Acetone and methanol fractions of *Ranunculus sericeus*, had moderate anti-fungal activity against fungi *Rhizoctonia* sp., *Alternaria* sp., and *Fusarium* sp. [37]. Anemone (*Anemone cathayensis*), reported to be a source of many bioactive compound isolated from Ethanolic extract, which act as antimicrobial, including pathogenic fungi. Chloroform extract of fresh leaves of *Ranunculus Sceleratus* result in Protoanemonin and shows strong fungicidal activities [40]. *Ranunculus arvensis* L. aerial extract shows anti-fungal activity, the results show that extract from this plant have significant antifungal activity against *C. albicans* shows good result as compare with *A. niger* with growth inhibition zone ranged from 14 to 21 mm for fungal strains.

Anti-inflammatory Activities

Anemone (*Anemone cathayensis*), reported to be a source of many bioactive compound isolated from Ethanolic extract, which act as anti-inflammatory [41]. From the aerial part of *R. sceleratus*, phytol, β -sitosterol, stigmasterol and others were isolated and reported to inhibit cyclooxygenase-1 (COX-1), 5-lipoxygenase (5-LOX) and human leukocyte elastase activities [42]. There is also a report that suggest *Ranunculus japonicum* possess (Analgesic and Anti-inflammatory activities on mice test. *R. constantinopolitanus* and *Ranunculus pedatus* possess wound healing and anti-inflammatory properties in vivo test [43].

According to Dilebo et al. (2010) 80% methanol extract of from the aerial part of *R. multifidus* extracts showed oedema inhibition at both 300 and 500 mg/kg doses. It exhibited better oedema inhibition than the reference drug indomethacin (10 mg/kg) three hours after carrageenan injection [42]. The anti-inflammatory activities of these plants may partially justify the rationale for their traditional use in the treatment of skin diseases.

Anti-oxidant Activities

Phytochemicals analysis of *R. muricatus* and subsequent isolation and characterization techniques revealed new metabolite, named as Ranucoside which showed potent free radical scavenging activity. The compound exhibited lipoxygenase and xanthine oxidase inhibitory properties and therefore may provide a natural source of new drug lead for the therapeutic management of diseases associated with exaggerated activities of these enzymes [44].

Anticancer and Cytotoxic Activities

Anemone (*Anemone cathayensis*), reported to be a source of many bioactive compound isolated from Ethanolic extract, which act as anticancer (breast cancer and external tumour cells) and cytotoxic activity [41]. *Ranunculus sieboldii* (Cyto-toxicity) by in vitro MTT assay on four different human tumour cell line (KB, BEL-7407, A549, HL-60) and *Ranunculi Ternati* has anticancer activities on human breast cancer cell in-vitro the *Radix Ranunculi ternati* withdraws inhibits MCF7 cells growth via apoptosis [9].

Acetone and methanol fractions of *Ranunculus sericeus* tested on its dermal irritant activities and shows no acute or chronic irritant activity was observed at all applied dose levels (20, 40, 80 and 120 μ l at a concentration of 10 mg/ml) [37]. *R. ternatus* has been reported to be effective against malignant lymphoma, leukaemia, pulmonary tuberculosis, breast tumour, goitre, lung, gastric, oesophageal tumour, and more [45]. The root ethyl acetate extract using MTT assay and significantly reduced the viability of Jurkat cells in a dose-dependent manner with half maximal inhibitory concentration (IC₅₀) was 0.20 mg/mL. Treatment also resulted in improved hepatic, renal, and hematologic parameters. The results demonstrate the antimalarial effects of *R. japonicus* both in vitro and in vivo with no apparent toxicity [46].

Antimalarial Activities

The antimalarial activity of the extract of the young stem of *R. japonicus* was evaluated in vitro using both chloroquine-sensitive (3D7) and chloroquine-resistant (Dd2) strains; in vivo activity was evaluated in *Plasmodium berghei*-infected mice via oral

administration followed by a four-day suppressive test focused on biochemical and haematological parameters. Exposure to extracts of *R. japonicus* resulted in significant inhibition of both chloroquine-sensitive (3D7) and resistant (Dd2) strains of *P. falciparum*, with IC_{50} values of 6.29 -2.78 and 5.36 -4.93 $\mu\text{g/mL}$, respectively [46]. Administration of *R. japonicus* also resulted in potent antimalarial activity against *P. berghei* in infected mice with no associated toxicity

Ranunculus multifidus species has reported to have antimalarial activities against the parasite. A previous study demonstrated that the whole plant of *R. multifidus* extracted with Dichloromethane to methanol (1:1), possesses in vitro antimalarial activity against a chloroquine sensitive strain of *Plasmodium falciparum* with an IC_{50} value of 2.3 $\mu\text{g/mL}$ [47]. The most recent reported that 80% methanol (RM-M) and hydro distilled (RM-H) extracts of fresh leaves from *R. multifidus* and its major constituent anemonin were tested for their in vivo antimalarial activity against *Plasmodium berghei* in mice which confirming the potential of anemonin to prevent or mitigate a primary attack due to malaria [6].

There is also a report Anemonin isolated from the hydro-distilled extract of the leaves of *R. multifidus* displayed significant antileishmanial activity with IC_{50} values of 1.33 nM and 1.58 nM against promastigotes and 1.24 nM and 1.91 nM against amastigotes of *L. aethiopica* and *L. donovani*, respectively [6].

Investigational Result Reported from *Ranunculus Multifidus*

Conclusion and Future Outlooks

Natural product drug discovery is very important mechanism by which novel drug pharmacophore is derived from plant origin so as to alleviate the current drug resistance pathogen. Extraction mechanism like conventional solvent extraction (CSE), can be substituted by modern and effective extraction techniques and others technology are crucial to facilitate the task. The science of metabolomics and genome mining also recent technology in NPs based drug discovery.

The sophisticated hyphenation of spectroscopy like LC-HRMS, tandem MS-MS, LC-NMR, MS-Imaging also very important current analytical tools in structure elucidation. The present review summarizes the ethno medicinal uses and recent findings on traditional uses, phytochemistry, pharmacology, and toxicity of *Ranunculus multifidus* and put forward the general scenario of NPs based drug discovery.

The species has many traditional uses at different African Country especially in Ethiopia at different location. The herbs also known by its poisoning effect in some Ethiopia and Africa. *R. multifidus* can also be used to treat different human ailment in South Africa including Warts, Sores, Shingles, Different sexually transmitted disease like syphilis, gonorrhoea, asthma, *Plasmodium*, trachoma and many un reported disease.

Even though the phytochemistry of this plant is not deeply screened the family of Ranunculaceae consists of alkaloid, flavonoids, lactone, fatty acid, terpenoids, Saponins and other secondary metabolites which are responsible for their pharmacological activities. The main examination holes recognized in this study are as per the following:

- (1) Since *R. multifidus* is broadly utilized in mix with other plant species in different home-grown creations, there is need for broad examination to assess synergistic impacts of the various concentrates or unadulterated segregates to assess their capacity to upgrade the productivity of the added substance combinations,
- (2) Future examination ought to likewise zero in on airborne pieces of the species to guarantee full use of the conceivable restorative capability of *R. multifidus*.
- (3) There is need to explore the substance constituents and pharmacological impacts of the roots, stem, blossoms, organic

products, and seeds of *R. multifidus*.

(4) Broad in vitro and in vivo trials are expected to approve the current pharmacological exercises and involving its constituents as a pharmacophore for drug revelation. (5) Since *R. multifidus* contain possibly poisonous mixtures, future examinations ought to incorporate the ID of harmful mixtures, conceivable incidental effects brought about by taking *R. multifidus* as home-grown medication, and systems of how expected poisonous parts of the species can be made due. (6) The extraction of this species additionally still sticks on CSE and which need present day extraction procedures to see its ideal optional metabolite. (7) Application genome mining and metabolomics additionally prudent to disconnect the new optional metabolite from the host without natural impact and moral issue connected with biodiversity to seclude endophytes from it and culture them in research facility to separate dynamic metabolite. (8) Some reported activities of the constituents from genus *Ranunculus* were somewhat high which needs further work with nano to pico level concentration.

Conflict of Interest

There is no potential conflict of interest.

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