



**AQARQARHA (*ANACYCLUS PYRETHRUM* DC.) A POTENT DRUG IN UNANI MEDICINE: A REVIEW ON ITS HISTORICAL AND PHYTO-PHARMACOLOGICAL PERSPECTIVE**

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**ABSTRACT**

Aqarqarha (*Anacyclus pyrethrum* DC.) is a very famous botanical origin drug in Unani system of medicine. It is used since antiquity. It is described by Dioscorides, Galen, Avicenna, Avenzoar, Ishaque bin Imran. According to Galen use of this drug is beneficial in chronic Paralysis, Khadar (numbness), toothache, intermittent fever. Rhazes and other Unani physician used it for strengthening the teeth, easy extraction of the teeth, paralysis, facial palsy, epilepsy, colitis, muqawwi-i-bah (aphrodisiac), mharrik-i-bah (sexual stimulant), and qate balgham (phlegmenagogue). Usually the root of a plant is used as medicine; flowers and leaves are also used in Unani system of medicine. Various activities were evaluated like Spermatogenic, Anti-diabetic, Immunostimulating, Antidepressant, Anti-convulsant, Memory-enhancing and Anticancer Activity. It is used in various oral (Majoone, Tiryaqi, Jawarish) and local formulation (Roghhan / oil, Tila / liniment, Sunoon / dentifrices, Qairooti / paste). These all findings reveal immense utility of Aqarqarha in Unani system of medicine and scope for developing as a potent therapeutic tool.

**Keywords:** Aqarqarha, *Anacyclus pyrethrum* DC., Unani medicine, Pyrethron.

**INTRODUCTION**

Aqarqarha (*Anacyclus pyrethrum* DC.)<sup>1</sup> is an important medicinal plant used in *Unani* system of medicine. It is described by Dioscorides in the name of Pyrethron. It is also known as Spanish Pellitory.<sup>2</sup> It is native to Mediterranean region<sup>18</sup> North Africa and Algeria. Asian and Europeans were previously not familiar with this root.<sup>3</sup> It is called *Akarkarbha* in *Sanskrit*.<sup>2</sup> Most of the time root of this plant is used in medicine.<sup>4</sup> It has pungent taste and it leaves warm and burning sensation on tongue and throats when it is chewed. The root which are hard, white inside, thick as much as finger and having pungent taste is believed to be of best quality *Khazain* however the root red inside with very pungent taste is described of good quality by Rhazes.<sup>5</sup>

**HISTORICAL BACKGROUND**

Aqarqarha was the *Anthemis pyrethrum* of Willdenow, the name was changed by De Candolle, and this plant was placed in a new genus due to difference in the structure of its seeds.<sup>6</sup> Aqarqarha is used in many Unani formulations since very long. It is present in the formulation namely Majoone Buqrat and Jawarih Buqrat which is prepared by Hippocrates (460 BC). It is also being described in the books of renowned Unani physicians such as Dioscorides (1st AD), Jalinoos (Galen 131-210 A.D.), Ibne Sina (Avicenna, the writer of *Al-qanun* 1025 AD), Abu Marwan Ibne Zuhar (1094–1162) (Avenzoar), Ishaque bin Imran.<sup>7</sup> Rhazes (865-925AD) also described this drug in formulation used for Colitis.<sup>8</sup> According to Galen (1st AD) use of this drug is beneficial in chronic Paralysis, Khadar (numbness), toothache, intermittent fever.<sup>7</sup> Unani physician Ishaque bin Imran advocated the use of this drug in the condition of relaxed uvula (condition caused by excessive phlegm) in the form of gargle after mixing it with vinegar and Ghafiqi (d. 732) stated that powder of Aqarqarha mixed with honey is useful in epilepsy

when taken orally and the same action is of the whole plants.<sup>7</sup> Rhazes used it in the formulation intended to be used in externally or internally for the purpose of strengthening the teeth, easy extraction of the teeth, paralysis, facial palsy, epilepsy and colitis.<sup>7,8,9</sup> This drug is described by the Ayurvedic writers also,<sup>2,3</sup> it is used by the Ayurvedic practitioners during the period of Samhitaas, Bhaavaprakaasha during 16th century incorporated the drug in compounds.<sup>10</sup> According to Ainslie this root is available in most Indian Bazar, he mentioned that it is a native of Arabia, Syria, Calabria, Cret, and Bohemea. It is mentioned in Arabian Nights under the name Ukhwan.<sup>6</sup>

Author of *Khazainul Advia* mentioned that European and Asians are not familiar with this root and it is native to North Africa and Algeria.<sup>3</sup> He also clarifies that this root is not the drug mentioned by Dioscorides under the name of pyrethron though it has some similarities in its function with *Anacyclus Pyrethrum* DC but this drug is known as Aqarqarha jabli.<sup>3</sup> George playfair in Taleef Shereef wrote “Akirkirra” in Yunani work called discutient and alternant powerful stimulant, sialagogue.<sup>11</sup> Antaqui mentioned two kind of Aqarqarha viz. western or kind described by Ibn al-Baitar (1197–1248), and Syrian called Udul qarah, which is the root of mountain Tarkhoon and the kind described by Dioscorides (*Smyrnum cordifolium* Boiss.). Tarkhoon is an Arabic form of Tukhoon the name of plant common in Persia, especially in Faras and about Shiraz; it is eaten like cress and other herbs with bread and cheese. There are two types, wild and cultivated; it is propagated by seed and by cuttings and has hot astringent and sweetish taste. The root of the wild plant is called Aqarqarha.<sup>2,3</sup>

According to Pliny for the treatment of intermittent fever Magians used this herb under the name of parthenium & Descoiredes used the plant under the name for the vary ailment in same manner as that of parthenium. According to Candole this drug was introduced to Britain before the Roman came and

according to Josselyn, European colonies brought it to north east America before 1669.<sup>6</sup>

#### SCIENTIFIC / TAXONOMICAL CLASSIFICATION:<sup>12</sup>

Kingdom: Plantae  
Division: Spermatophyta  
Sub Division: Angiosperms  
Class: Dicotyledons  
Sub Class: Metachlamyidae  
Order: Campanulatae  
Family: Compositae or Asteraceae  
Genus: Anacyclus  
Species: Pyrethrum  
Botanical Name: *Anacyclus pyrethrum* DC.  
Synonyms: *Anthemis pyrethrum* L.

#### VERNACULAR NAMES<sup>1, 2, 3, 5, 6, 13, 14, 15</sup>

Arabic: Aqer Qarha; Greek: Tarkhoon, Forusoon, Forsoon, Qoos, Qoobrun, Foriyun, Formad ; Persian: Kakra, Kalu, Bekhe Tarkhoon; Hindi: Akarkara; English: Spanish Pellitory, Pellitory; French: racine de pyrethre d" Afrique; Italian: Piretro; German: Bertramwurzel, Franzosenwurzel, Romische Bertramwurzel, Speichelwurzel, Zahuwurzel; Portugese: Pyrethro da Africa, Parietaria de Espanha; Spanish: raiz de pelitre pyrethro, salivaria.; Urdu: Aqarqarha; Bengali: Akarkara; Gujrati: Akarkaro; Marathi: Akarkara; Telgu: AkkalaKara ; Kaannada: Akkalakari; Tamil: Akkirakaram; Malayalam: Akkalakaram, Akkikaruka

#### HABIT AND HABITAT

It is indigenous to North Africa, where it has been introduced to south Europe<sup>16</sup> and much similar to Chamomile in habitat and appearance as well; the root is brown rough with shrivelled surface having bark closely adhered to the wood. It has slight aromatic smell and persistent pungent taste.<sup>1</sup> It does not grow wild in Europe and is commonly found the higher plans of Algeria in at some distance of the coast and also cultivated in Algeria.<sup>17</sup> In India it is found in rainy season in the eastern districts of Uttar Pradesh especially in Peeli Bheet and other than India it is also found in Africa, Algeria, Syria (Sham).<sup>18</sup> Native to the Mediterranean region. Cultivated in Algeria.<sup>10</sup>

**Propagation:** It is generally propagated through seeds, cuttings.<sup>2</sup>

#### BOTANICAL DESCRIPTION

It is perennial herb with numerous spreading, prostrate or ascending, branched stems, more or less hairy in their upper positions, nearly smooth below, and coming from the crown of a long, tapering, vertical, brown, slightly branched root.

**Leaves:** Leaves alternate, the ones at the root crown long stalked, ovate or oblong in outlines, deeply bipinnatisect, segments linear, acute, often again 2 or 3 fid, more or less hairy or nearly glabrous. Heads terminal, large, 1-11/2 inch or more wide, with a wide disk; involving in width, blunt or subacute, smooth, pale green, bordered with an edge of brown; receptacle

slightly convex, with large ovate rounded transparent scales beneath the flowers.<sup>17</sup>

Flowers: Disk-flowers bisexual, corolla tubular, contracted below, with 5 equal triangular spreading teeth, yellow; anthers apiculate, not tailed at the base, included in corolla; style exerted, stigma bifid, with two linear branches. Ray flowers female, in a single row, corolla ligulate, the limb broadly oval, trifid at the apex, white above, tinged with bright pink below.<sup>17</sup>

Root: The root obtained from the shops are simple, 3-4 inches long by 3/8 - 4/8 inch thick, cylindrical or tapering, some time terminated at the top by bristly remaining parts of leaves and having only a few hair like rootlets, externally it has brown, rough, shrivelled surface, is compact and brittle, the fractured surface being radiate and destitute of pith which is approximately eradicated, and internally radiating secondary wood occupying about 2/3 of total thickness mainly in older roots. The root is categorized with an aromatic odour and persistent pungent taste.<sup>1,2</sup>

Microscopically the cortical part of the root is notable on account of its suberous layer, which is partially made up of schlerenchyma (Thick walled cell).<sup>2</sup> The transverse section of root is more or less circular in outline and bounded by several layers of tangentially flattened, empty cork cells composed of thick sub sized walls and devoid of any cell contents some stone cell are also found in the outer bark. The cork cambium on inner side produced a few layers of parenchyma cells constituting the secondary cortex. It is followed by a single layer of endodermis.<sup>1,6</sup> Most of the parenchymatous cells are filled with inulin.<sup>19</sup> After the secondary growth takes place major portion of the stellar region is occupied by radiating secondary xylem in discrete strands capped with a few layer of secondary phloem on outer side. The secondary wood is interrupted by broad rays. The xylem and phloem are made up of usual components. Small stony pith is often noted in young roots. In older roots about 25-30 strands of secondary xylem are noticed. Vessels are mostly in tangential bands and fibres are found in small groups associated with vessels. In cross section primary phloem are between the xylem rays of rootlets showing a central tetrarch to pentarch. Schizogonous intercellular spaces form the special three dimensional structures with resin ducts each lined by 15 to 20 epithelial cells and their distribution is most common in the middle cortical layers and secondary xylem and phloem. Crystals of varying shape and sizes abundantly occur in the parenchyma cells of phloem, xylem, ray and pith region.<sup>1,6</sup> Greyish brown powder, bearing characteristic aromatic smell and pungent taste is when cleaned with 75% chloral hydrate, microscopically revealed that it is made up of abundance of stone cells, fibres and crystals of calcium oxalate of varying shape and sizes. In addition, vessels type of parenchyma and sieve tube cells also constitute the root powder. Physicochemical standards in terms of ash values gave the data i.e. total ash 6.67% Acid insoluble ash 0.85%, water soluble ash 1.31% and weight loss was 3.75% on drying at 105oc was found.<sup>1</sup> Foreign Matter- Not more than 2%, Total Ash-Not more than 6.5%, Acid Insoluble Ash -Not More than 2.5%. Extractive Value: Alcohol Soluble Extractive: not less than 4%, Water Soluble Extractives: Not less than 16%.<sup>19</sup> Successive Extractive Values: Pet. Ether: 0.9, Chloroform: 0.44, Ethanol:4.80, Distilled Water:44.03.<sup>1</sup>



Figure 1: Aqarqarha (*Anacyclus pyrethrum* DC.) root

**DESCRIPTION OF DRUG IN UNANI (MAHIYAT):** It is the root of a plant.<sup>20</sup> Whole plant looks like the plant of Chamomile with differences like branches of Aqarqarha lie on the ground arise from the root while Baboona branches are straight and upward. The root is straight cylindrical 1-2 inches in width and 2-4 inches in length, It has bunches of colourless hairy structure on its top. It is externally brownish and wrinkled internally white in colour. It has pungent test.<sup>3</sup> According to some reference roots are 3-4 inches long, 3/8 - 4/8 inches thick more or less cylindrical, sometimes bears the bristly remains of the leaves of the upper end and few rootlets below. Externally they are brown in colour, roughly shrivelled and internally radiating secondary wood occupying about 2/3 of the total thickness particularly in older roots. The pith is almost obliterated. The root is characterised with an aromatic odour and a persistent pungent taste.<sup>1</sup>

Aqarqarha is not the root described by Dioscorides under the Unani name Quryoon but it is the root of plant i.e. known as Udul Qarah Jabli in Damishq and it is freely found in Shaam (Syria). It resembles in characteristics with Aqarqarha but it is as high as human beings and has yellow colour flowers. It looks like Saunf and Soya plants. Its root is longer than Aqarqarha and it has fruit also.<sup>3</sup> Original Aqarqarha is Aqarqarha Maghribi known as Tagandast in Barbar which resembles to Baboona and also known as Baboona Hispani (Chamomile of Spain) to which Egyptian call Karkas. Its branches have white hairy structures and it is spread on ground and most of the branches arises from the root and every branch has flower like Chamomile and part of petals which face ground are red and upper part is white, its root is as long and wide as index finger.<sup>7</sup>

**PART USED:** Flowers, leaves and Roots.<sup>1, 3, 4, 7, 20</sup>

**MIZAJ (TEMPERAMENT):** Hot and dry in the third degree. But Hot and Dry in 4<sup>o</sup> Har Lateef. Some people say Cold (Sard).<sup>4,7,9,19,20,21</sup>

**AFA'AL (PHARMACOLOGICAL ACTION IN UNANI MEDICINE):** Muqawwi-i-Bah (aphrodisiac), muqawwi-i-Aam (general tonic), mukhrije Balgham (removes phlegm from body), munaqqi-i-Fuzlat-i-Damagh (removes wastes from brain), mudirr-i-Bawl (diuretic), mudirr-i-Hayd (emmenagogue), mu' arriq (diaphoretic), muhammadir (rubefacient), mudirr-i-Laban (galactagogue), mudirr-i Lu,ab-i-dahan (sialogogue), mumsik-i-Mani (retentive of semen), muhallil (resolvent), musakkin-i-Alam fil Kuzaz (analgesic in Tetanus), mufattih Sudad (deobstruent), mukhaddir Kharji (locally anaesthetic).<sup>3,4,9,19,20</sup>

**ISTEMAL (USES AS PER UNANI LITERATURE):** Waja'al-Asnan (toothache), odontoseisis and spongy gum, isterkhae Lihaf (Relaxed Uvula), khunaf (Ludwig's angina), luknat and buha al-Sawf (hoarseness) due to phlegm, speech

disorder in children and nasal congestion, recurrent cold, Faliq (hemiplegia) and Sar' (epilepsy), sudad-i-misfat (obstruction of bone of nose), khasham (In which patient is unable to distinguish between the good and bad odour), cold phlegmatic disorders (amraz-i-baridah balghamea) such as laqwa (facial palsy), istirkha (atony or flaccidity), ra'sha (tremor), kuzaz (tetanus), sar'a (epilepsy), luknat, darde eena (pleurisy), waja' al-mafasil (polyarthritis), irq al-nasa (sciatica), istisqa (ascites), humma Naiba (intermittent fever) and humma-i-nafiza (fever with chills and rigor), du'f al-Bah (sexual debility / reduction in libido), istirkha-i-qadib (flaccidity of penis), Sur'a al-Inzal (premature ejaculation).<sup>3,4,7,9,20</sup>

#### ACTION AND USES IN OTHER TRADITIONAL MEDICINES

According to Ayurvedic pharmacopoeia its root is indicated in sciatica, hemiplegia, paralysis and ammenorrhoea.<sup>10</sup> Vaid use it as sialogogue and for hardening of skin and toothache, they use its paste for headache, its gargle throat pain, for purgative its powder (6 gm) is used. Its decoction is used in chronic cough and its powder with Sunthi is used in flatulence. It is used with Musli milk for sexual debility. It is also used for different type of ailments lonely or in combination of other drugs viz. heart problems, general weakness, fevers, pain in eyes, ascites, dysmenorrhoea, dysurea, facial palsy, epilepsy.<sup>3</sup>

#### ETHANOBOTANICAL LITERATURE

This root is stimulant, pungent, rubefacient and sialogogue and it is used in tooth powders and gargle, and as a masticating agent in toothache. Interestingly its alcoholic infusion itself and ointments containing this are used in mange disease of horse.<sup>13</sup> In India it is commonly used as cordial, stimulant, in the lethargic stages of typhus fever and in paralysis especially by Mohammedans. It is not often used internally but used as gargle and masticator in the conditions like relaxed uvula, aphonia, paralysis of tongue and muscles of throat and in neuralgic affection of teeth. It acts as rubefacient on skin as it is powerful irritant and it acts as sialogogue also.<sup>17</sup>

Its infusion is used as gargle in the relaxed uvula, its root is used for toothache, rheumatic and neuralgic affections as well as in rhinitis, while in epilepsy it is useful in combination with *Withania somnifera* and *Vitis venifera*.<sup>10</sup> An infusion prepared from the roots along with *Alpinia officinarum* and *Zingiber officinale* is useful in certain stages of typhus fever, and it is commonly used as stimulant in India.<sup>15</sup>

**MIQDARE KHURAK (DOSE):** 1 gm, 2.5-3.5 gm, 1 to 3 gm.<sup>18,20,22</sup>

**NAFAE KHAS (PRINCIPAL ACTION):** wa Qate Balgham,<sup>20</sup> muqawwi wa mharrike bah.<sup>18</sup>

**MUZIR (ADVERSE EFFECT):** Muzire Riyah, Amraze Riyah, irritant to mucus membrane of intestine causing malena and tetanus like spasms and profound stupor.<sup>15,18,20</sup>

**REPORTED ADVERSE EFFECT:** Sujit K et. al. conducted study to evaluate sub chronic toxicity of ethanolic extract of *Anacyclus pyrethrum* in Albino rats, at the dose of 1000mg / kg per day for 90 days by oral gavages and concluded that ethanolic extract of A. pyrethrum had no treatment related toxicological abnormalities and can be used as safe for long term treatment. LD50 values of root extract in mouse were 750 mg/kg i.p.<sup>23</sup>

**MUSLEH (CORRECTIVE):** Rubbussoos, Samage Arabi, Kateera.<sup>3,18,20</sup>

**BADAL (SUBSTITUTE):** Dare Filfil (Piper Longum)<sup>18, 20</sup> Daroonaj and Fotinaj Jabali.<sup>24</sup>

**MURAKKABAT (COMPOUND FORMULATION):** Arastoon Kabeer Arastoon Sagheer, Bad Mahraj,<sup>25</sup> Majoone Asfar Saleem, Majoone Aswad Saleem Majoone Abi Muslim, Faloonyayee Roomi Tarsoosi, Faloonyayee Farsi, Majoone Feeroznosh, Dawa Atiyatullah Majoone Ameer<sup>4</sup>, Barshasha, Tiryaqi-Aqrab, Tiryaqul Isnan, Jawarish-i-Buqrat, Jawarish-i-Qaisar, Jawarish Zarooni, Jawarish-i-Zarooni Ambari Ba Nuskha Kalan, Jawarish Bakarmajit, Jawarish Zafran, Jawarish Hazrat Suleman, Jawarish Luluwi,<sup>25</sup> Anqaroya-e-Kabir, Laboob Sagheer, Majoone-e-Baladur, Majoone Salab, Roghan-e-Seer, Raughan-e-Sudab, Tilae-Mulazziz, Sunoo-e-Muluk, Habb-e-Falij Mulayin, Habb-e-Mumsik Qawi, Majoone-e Zabeb, Raughan-e-Qust, Sunoon-e-Mujalli, Qairooti-e-Arad-e-Karsana.<sup>19</sup>

## CHEMICAL CONSTITUENTS

Roots contain anacyclin, pellitorine, enetriyne alcohol, hydrocarolin, inulin, trace of volatile oil and sesamin, also contain tyramine amides corresponding to isobutylamides and polyacetylenic compounds.<sup>10</sup>

It gives incredibly acrid material of a resinous appearance, and is insoluble in potassium hydroxide (This is stated to contain pelletonin), dark brown, fixed oil, very acrid, soluble in potassium hydroxide; yellow acrid oil, traces of tannin; parts of gum; potassium sulphate and carbonate, calcium phosphate, potassium chloride and carbonate, silica, alumina etc., It contain lignin.<sup>2</sup> R. Buchheil claims to have discovered an active principle as crystalline alkaloid pyrethrin, which when treated with alcoholic potassium hydroxide splits up in piperidine and acid resembling picric acid, called pyrethric acid.<sup>2,6</sup> It composed of acrid fat and resin. Thompson found that the cortical portion of root contains 5% of pyrethrin. Volatile oil is also present as much as pyrethrin constituted. Crystallisable pelletonin is isolated from resin by Dunstan and Garnet which is insoluble in water, diluted acids, and alkalis and soluble in alcohol, this resembles with piperovatin, (C<sub>16</sub>H<sub>21</sub>NO<sub>2</sub>).<sup>2</sup>

A crystalline constituent, Alkyl amide of the roots of *Anacyclus pyrethrum* DC was originally called "pyrethrin" this name is now reserved for the active constituents of pyrethri flos which is later called "pellitorine" and identified as a mixture of isobutylamides of unsaturated C10, C12 and C14 acids with decadiene isobutylamide as the principal constituent. Now it is known that the alkyl amide from the *Anacyclus pyrethrum* is made up of the following isobutylamides and tyraminamides: (E,E)-N tetradecadiene-8, 10-diynoic acid isobutylamide (=anacyclin), 2E,4E-dodecadienoic acid isobutylamide, (E,E)-N-(4-hydroxyphenethyl)-2,4-decadienamamide, (E,E)-N-(4-hydroxyphenethyl)-2, 4-dodecadienamamide, N-methylanacyclin, (E,E)-N-(4-hydroxyphenethyl) 2, 4-tetradecadienamamide, N-methyl-N-(2-methylpropyl)-2,8-decadiene-4, 6-diynamide, N-methyl-N-(2-methylpropyl)-2-decene-4,6-diynamide, N-methylanacyclin, (E,E)-decadienic acid isobutylamide (=pellitorine) 0.14% relative to dry weight, (E,E)-N-(2-phenethyl)-2, 4-undecadiene-8, 10-diynamide and 2,4 tetradecadienoic acid isobutylamide. Lignans, Inorganic compounds and sesamine are present. The dried root of *Anacyclus pyrethrum* contains Mn (24.7 ± 1.51 µg/g), Zn (22.01 ± 1.3 µg/g), Cu (9.5 ± 0.7 µg/g), Na (20.13 ± 4.09 µg/g) and K (12.13 ± 0.2 µg/g). Other

compounds are approximately 30 to 50 percent inulin; tannins; resin; essential oil (traces).<sup>2,6</sup>

In the ethanolic solution extract of *Anacyclus pyrethrum* N-Alkylamides are detected as follows: Undeca 2E, 4E-diene-8, 10-diynoic acid IBA, Undeca 2E, 4E diene-8, 10-diynoic acid N-Me IBA, Undeca 2E, 4E-diene-8, 10-diynoic acid 2-PEA, Deca 2E, 4E-dienoic acid IBA (Pellitorine), Tetradeca-2E,4E-diene-8,10-diynoic acid IBA (anacycline), Deca 2E, 4E-dienoic acid 4-OH PEA, Deca 2E, 4E-dienoic acid N Me IBA, Tetradeca-2E,4E-diene-8,10-diynoic acid N-Me IBA, Tetradeca-2E,4E, XE/Z-trienoic acid 4-OH PEA, Tetradeca-2E,4E, XE/Z-tetraenoic IBA, Deca 2E, 4E dienoic acid IBA.<sup>26</sup>

## REPORTED PHARMACOLOGICAL ACTIVITY

**Spermatogenic activities:** In randomized control Study of 28 days performed using Wistar rats weighing 150-180g treated with Alkylamide rich ethanolic solution extract of *Anacyclus pyrethrum* DC conducted by Vikas Sharma *et. al.* reveals significant increase in body weight, Sperm count, motility, and viability along with serum testosterone, luteinizing hormone, follicle stimulating hormone concentrations, spermatogenic activities and seminal fructose content in all groups of different doses of test drug (containing 13 Nalkylamides), in comparison to control and testosterone treated groups, test drug is having androgenic potential and may improve male infertility by enhancing spermatogenesis.<sup>27</sup> In other 28 days control randomized animal study conducted by Vikas Sharma *et. al.* for evaluation of effects of *Anacyclus pyrethrum* DC. on sexual behaviour of 32 Wistar albino rats by dividing them in 4 groups viz. Control group, testosterone group, low dose and high dose of Petroleum Ether Extract (PEE) of *Anacyclus pyrethrum* DC. root, study shows that there were four fold increase in mount and three-fold increase in intromission frequency in rats treated with test drug and the penile reflex index was found significantly increased with reduction in mount latency and intromission latency periods. The study concluded that unlike testosterone the PEE of *Anacyclus pyrethrum* DC. shows efficacy in rats tested after the laps of 7days and 15 days of discontinuation of treatment, means drug has prolonged effect and capacitate the treated rats for improve sexual potential.<sup>26</sup>

**Anti-diabetic effect:** In a study conducted by Tyagi *et. al.* for the purpose of evaluating the anti diabetic effect of aqueous extract of root of *Anacyclus pyrethrum* DC. on alloxan induced diabetic rats showed that the elevated blood glucose level in diabetic rats reverts back to near normal when they were orally administered aqueous root extract of A. pyrethrum DC in dose of 150 to 300mg /kg b. wt.<sup>28</sup>

**Immunostimulating activity:** Bendjeddou *et al.*, studied hot water polysaccharide extracts of *Anacyclus pyrethrum* for their immune stimulating activity in mice. The fractions showed a marked stimulating activity on the reticuloendothelial system (RES) and increased the number of peritoneal exudates cells (PEC), and spleen cells of mice. The results of the in vivo effect at a doses of 50 and 25 mg/kg, showed an encouragement index better than obtained with the in vitro effect at 50 and 25 mg/ml for *Anacyclus pyrethrum* and *Alpinia galanga*, respectively.<sup>29</sup>

**Antidepressant activity:** Badhe *et al.* determined antidepressant activity. Root extract showed an increase in ambulatory behaviour indicating a stimulant effect of the actophotometer, produces a significant antidepressant effect in both Forced swim test (FST), and Tail suspension test (TST) as they reduced the immobility, was found to be effective in

reversing hypothermia produced by clonidine and reserpine, inhibited haloperidol induced catalepsy.<sup>30</sup>

**Anti-convulsant activity:** A study conducted by Suganya S, et al. with an aim to evaluate anticonvulsant activity of ethanolic extract of *Anacyclus pyrethrum* DC root (EEAP) in electrically and chemically induced seizure in mice showed that administration of EEAP significantly ( $p < 0.05$ ,  $p < 0.01$ ) the onset of convulsions delayed and minimise the time taken for recovery ( $48 \pm 2.07$ ,  $96 \pm 2.1$  sec), significantly ( $p < 0.05$ ,  $p < 0.01$ ) reduced the time taken for recovery ( $140 \pm 0.01$ ,  $122 \pm 0.12$  sec) when compared to control ( $176 \pm 0.24$  sec) respectively. In Maximal Electro Shock induced seizure, non significant reduce in Extensor phase from  $11.5 \pm 1.37$  sec (control) to  $9.66 \pm 1.63$ ,  $6.46 \pm 1.87$  sec was examined. The results recommend that the EEAP root possess significant anti-convulsant effect against Pentylentetrazole induced seizure.<sup>31</sup> An *Anacyclus pyrethrum* extract and pure pellitorine were used to evaluate the permeation of pellitorine through (1) a Caco-2 cell monolayer, (2) the rat gut after oral administration, and (3) the blood-brain barrier in mice after intravenous and intracerebroventricular administration. A validated bioanalytical UPLC-MS2 technique was used to quantify pellitorine. Pellitorine results good gut permeation and rapidly permeates the blood-brain barrier once in the blood, showing a possible role in the management of central nervous system diseases.<sup>32</sup> Kamalinejad et al. determined anticonvulsant activity in Electro-convulsive shock, inducing Hind limb tonic Extension (HLTE) in 99% of the animals.<sup>33</sup>

**Myorelaxation Activity:** Jayasree et al. demonstrate a significant dose dependant muscle relaxant effect of AP in rota rod apparatus compared to that produced by diazepam.<sup>34</sup>

**Memory-enhancing activity;** Ronald Darwin et al. studied on memory enhancing activity of *Anacyclus pyrethrum*.<sup>35</sup> Local anaesthetic effect Devasankariah et al., showed a local anaesthetic effect of *Anacyclus pyrethrum* in vivo. *Anacyclus pyrethrum* brought about a pterygo mandibular block with infiltration of the long buccal nerve. A better depth of anaesthesia was observed in 90 out of 100 patients (Xylocaine: 80 out of 100 patients); the effects of anaesthesia of the two substances are similar.<sup>36</sup>

**Insecticidal and molluscicidal effect:** Gnadinger et al. showed that the alkyl amides from *Anacyclus pyrethrum* have insecticidal and molluscicidal effect.<sup>12</sup>

**Anti-diabetic:** It reduces the dose of insulin in the patients having the insulin dependent diabetes mellitus. When it is mixed with plant *Helleborus nigar* and used orally for the period of 3-6 weeks in the ratio of 1:3, it reduces the serum glucose level and cholesterol level as well.<sup>10,15</sup>

**Anticancer Activity:** A study was evaluated on the efficacy of *Anacyclus pyrethrum* extract on human colorectal cancer cell line (HCT). It measures by 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide (MTT) assay, and trypan blue viability dye. Then, flow cytometry assay was exploited to determine cell death and apoptosis stage. The scratch test was exploited to measure the effect of *Anacyclus pyrethrum* on the migration of cancer cells. The expression levels of Caspase 3, Bcl-2, MMP1, and Vimentin genes were quantified by real-time PCR. Ultimately, cell cycle was analyzed by flow cytometry. The results indicate that *Anacyclus pyrethrum* extract can successfully induce apoptosis in HCT cells.<sup>37</sup>

A study was investigated as cytotoxic and apoptotic effect of *Anacyclus pyrethrum* plants extract in KB cancer cell lines.

Cytotoxic effects were measured using MTT assays and to illustrate induction of apoptosis by this plant TUNNEL assay and DNA Fragmentation were performed. The extract markedly killed cancer cells. TUNNEL test and DNA Fragmentation assay indicated apoptotic characteristic in *Anacyclus pyrethrum* extract treated cells. So ethanol extracts of *Anacyclus pyrethrum* is effective in apoptosis inducing in KB cancer cells which may be beneficial in cancer therapy.<sup>38</sup>

**Antioxidant activity:** Sujith et al. evaluated Antioxidant activities of ethanolic extract of *Anacyclus pyrethrum* for in vivo and ex-vivo by using different experimental model at different concentration 25, 50, 100, 200, 400 micro-gram/ml. The result suggested the Antioxidant potential of *Anacyclus pyrethrum* root may be due to their photochemical constituents such as Phenol, Flavonoids, Tannins and Alkaloids.<sup>29</sup>

**Hepato-protective activity:** A study designed to evaluate the hepato-protective effect of "extract of *Anacyclus pyrethrum* Linn" (APE) against anti-tubercular drug-induced hepatotoxicity in V groups of rats (for 28 days). The result of group IV rats illustrated significant ( $p < 0.01$ ) decrease in SGPT, SGOT, LDH, ALP, serum bilirubin, cholesterol, liver weight and relative liver weight levels, while significant ( $p < 0.01$ ) increase in final body weight, total protein and albumin levels in comparison with group II rats was observed. Hepato-protective activity of APE (400 mg/kg/day) was comparable by silymarin (100 mg/kg/day) with restored hepatic marker. These findings were also supported by the histo-pathological results. Study showed that APE root possesses hepato-protective activity against isoniazid plus rifampicin induced hepatotoxicity in rats.<sup>39</sup>

It is described as abortifacient, anesthetic, anti-inflammatory, antimutagenic, cyclooxygenase inhibitor, hypoglycemic, Insecticide, Insulin-sparing, Lacrimator, 5 Lipoxigenase inhibitor, Molluscicide, Neurotonic, Rubefacient, Sialagogue, Stimulant, Tonic. And it is used in certain ailments like, Ague; Apoplexy; Bruise; Cancer; Spleen Cancer; Stomach Cancer; Caries; Catarrh; Cerebrosis; Congestion; Dermatitis; Diabetes; Epilepsy; Fever; Gastrosis; Glossosis; Gout; Headache; Hemorrhoid; Hyperglycemia; Inflammation; Ischiosis; Lethargy; Lumbago; Mange; Neuralgia; Pain; Palsy; Paralysis; Rheumatism; Rhinosis; Sciatica; Sore throat; Splenosis; Stomatosis; Tonsilosis; Toothache; Typhus; Uvulosis; Xerostoma. It is cordial, Stimulant, Sialagogue; In rheumatism.<sup>10,16,40</sup>

## DISCUSSION

Aqarqarha (*Anacyclus pyrethrum* DC.) is one of the most useful drugs in Unani system of medicine since Dioscorides period. It is also known as Spanish Pellitory. Original Aqarqarha is Aqarqarha Maghribi known as Tagandast in Barbar which resembles to Baboona and also known as Baboona Hispani (Chamomile of Spain) to which Egyptian call Karkas.<sup>7</sup> Hot and dry in the third degree as Unani concept of Miza.<sup>7,9,21</sup> Muqawwi-i-Bah (aphrodisiac), muqawwi-i-Aam (general tonic), mukhrije Balgham (removes phlegm from body), munaqqi-i-Fuzlat-i-Damagh (removes wastes from brain) and so many other actions are mentioned in Unani classical texts.<sup>3,4,9</sup> more than 30 formulations are mentioned which have Aqarqarha as one of the ingredients.<sup>25</sup> R. Buchheil claims to have discovered its active principle as crystalline alkaloid, pyrethrine.<sup>2,6</sup>

Sharma V et al. evaluated Spermatogenic activities in Wistar albino rats.<sup>26</sup> Tyagi S et al. studied Anti-diabetic activity by aqueous extract of root of *Anacyclus pyrethrum* DC on alloxan

induced diabetic rats.<sup>28</sup> The study of Bendjeddou et al. shows immunostimulating activity in mice.<sup>29</sup> Suganya S et al. evaluated Anti-convulsant activity in mice.<sup>31</sup> Ronald Darwin et al. studied on memory enhancing activity.<sup>35</sup> The study of Mohammadi A et al. illustrated Anticancer Activity on human.<sup>38</sup> Many studies are carried out by different aspects and views on Aqarqarha (*Anacyclus pyrethrum* DC.) validate it to be a valuable and precious drug. It is used particularly in deferent types of nervine disorders and it is a both historically and therapeutically important drug.

## CONCLUSION

It can be concluded that there is immense utility of Aqarqarha in Unani system of medicine with further scope for developing it as a potent therapeutic tool.

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