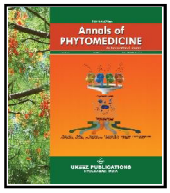
Annals of Phytomedicine 11(2): 266-273, 2022

DOI: http://dx.doi.org/10.54085/ap.2022.11.2.29

Annals of Phytomedicine: An International Journal

http://www.ukaazpublications.com/publications/index.php

Print ISSN : 2278-9839 Online ISSN : 2393-9885



Unani Concept : Open Access

Evaluation of Unani concept of therapeutic interchange (Abdaal-e-Advia)with special reference to phytochemistry

Shaista Perveen◆, Abdul Wadud and Aisha Perveen

National Institute of Unani Medicine, Kottigepalya, Magadhi Main Rd. Bengaluru-560091, Karnataka, India

Article Info

Article history

Received 14 October 2022

Revised 1 December 2022

Accepted 2 December 2022

Published Online 30 December-2022

Keywords

Phytochemistry

Substitution

Therapeutic interchange

Unani system of medicine

Abstract

The classical literature of Unani system of medicine was first to establish rules for drug interchange due to the unavailability of the desired drug for different reasons, and gave the idea of therapeutic interchange (Abdaal-e-Advia). The concept that similar drugs can be used as substitutes for the desired function is essential from a pharmacotherapeutics point of view. Renowned scholars of Unani system of medicine have discussed the concept of therapeutic interchange with available knowledge in terms of similarity in action, similarity in temperament (mizaj), and similarity in the physical property of the drug and its substitute. It is a well-known fact that herbal drug actions are due to chemical constituents, so phytochemistry, a branch that deals with the chemistry of plant products may be added as another basis for drug interchange. In the present work, the concept was thoroughly reviewed with sixty drugs which have been categorized into ten groups on the basis of activities.The phytoconstituents of the main and therapeutic interchange drugs were compared to observe the similarities. The findings showed that the activities and chemical constituents were found to be nearly similar. Based on the findings, it can be concluded that phytochemistry of the plant could be an effective parameter for the therapeutic interchange.

1. Introduction

Due to dwindling supplies of medicinal plants, high costs, rules, regional restrictions, and other factors, obtaining the necessary medications for therapeutic purposes has become more challenging. In these circumstances, Unani physicians are frequently compelled to use similar drugs that are equivalent in action.Therapeutic interchange (Abdaal-e-Advia), which literally translates to “drug substitution,” is the term used in Unani system of medicine to define the substitution of one drug for another for the same purpose. However, this term creates confusion about adulteration. Therefore, a more suitable term, “therapeutic interchange,” has been used.The interchanged drug could be from a different genus, species, or even from a different kingdom (plant/animal/mineral and vice versa), but with similar actions (Qureshi,1995; Razi, 2000). Therapeutic interchange is an accepted practice in the Unani system, but only Rhazes (865-925 AD), had stressed the concept, which too is limited. Other Unani scholars have not seriously thought about the rules. There are certain contradictions even when the drugs are substituted following the rules (Razi, 2000).

As per the Unani concept, the basis for therapeutic interchange may be due to: (1) similarity in actions, (2) similarity in mizaj (temperament), and (3) similarity in physical properties (Qureshi,1995; Razi, 2000). The similarity in action strongly supports substitutes; the other two seem to be rather theoretical, as there are certain contradictions. In many cases, it is observed that there are similar chemical constituents in both drugs. As a result, phytochemistry can be seen as a powerful parameter that complements the scientific method and supports the idea of drug interchange (Perveen *et al.*, 2020**).** Numerous herbal drugs’ effectiveness has been supported by scientific phytochemical investigations, which further suggest that medications with similar active ingredients may have similar pharmacological actions (Kokate *et al*., 2012). Increased factual information has resulted in a positive development. In recent years, understanding the traditional ideas on new dimensions has paved the path to accepting the scientific methodology and it is necessary to validate the classical concepts using scientific criteria to make them more acceptable at a global level.

Corresponding author: Dr. Shaista Perveen

National Institute of Unani Medicine, Kottigepalya, Magadhi Main Rd. Bengaluru -560091, Karnataka, India

E-mail: shaistanium@gmail.com

Tel.: +91-8630556987

2. Materials and Methods

In the present study, a total of 60 (30 main and 30 substitutes) plant-origin single drugs were selected from Unani classical books and divided into ten groups (three main and three substitute drugs in each group). The classification of groups was based on ten actions, *viz.*, carminatives (Kasir-i-Riyah), sedatives (Musakkin-i-Dimagh), purgatives (Mushil), astringents (Qabid), analgesic (Musakkin-i-Alam), diuretic (Mudirr-i-Bawl), antioxidant (Mazade Takseed), anti-inflammatory (Mulayyin-i-Waram), antipyretic (Dafi‘-i-Humma) and emmenagogue (Mudirr-i-Hayd) (Ghani,1971; Hakeem, 2002; Saeed, 2007; Wadud, 2021.) Chemical constituents were compared from authentic sources (Kokate,2012; Wadud, 2021; Khare, 2007; Trease *et al.*, 2008; Idris *et al.*,2020; Chellammal, 2022).

3. Results

The results showed common phytoconstituents in drugs of all groups mentioned in the study. Essential oils containing; carvone, cinnamic aldehyde, eugenol, limonene, and linolenic acid is common in drugs

having carminative action (Table 1). Tropane and isoquinolin alkaloids like; morphine, codeine, hyoscyamine, atropine, and hyoscine are common in sedative drugs (Table 2). Similarly, drugs having purgative action contain anthraquinone glycosides, *i.e.*, turpethin, aloein, and anthraquinones like sennosides (Table 3). Gallic acid tannins and tannic acid are responsible for the astringent effect (Table 4). Examples of tropane and isoquinolin alkaloids include morphine, narceine, codeine, papaverine, and thebaine, papaverine, noscapine, hyoscyamine, scopolamine, and atropine, all have analgesic effects (Table 5). Diuresis is due to triterpenoid glucosides and mucilage (Table 6), antioxidant action is implicated by flavonoids (chalcones, isoflavones, flavanol's, and flavones) (Table 7), Essential oils, specifically eugenol, acetyl eugenol, methyl salicylate, camphene, and limonene, have anti-inflammatory properties. (Table 8). Similarly, medications with antipyretic effects include flavonoids like quercetin, kaempferol, *etc.* (Table 9). Disogenin, steroidal saponins, phytoestrogenic lignans, and ergosane-type steroids are phytoestrogens that may act as emmenagogues (Table 10).

Table 1: Drugs having carminative (Kasir-i-Riyah) action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1.	**Kamoon** (*Carum carvi* L.)	**Essential oils** Carvone, dihydrocarvone, carveol, terpine, limonene	**Zeera safed** (*Cuminum cyminum* L.)	**Essential oil** Cumin aldehyde, (cymol, cuminol, cymene), alpha-pinene, a-terpinol, phellandrene
2.	**Saleekha** (*Cinnamomum cassia* Blume.)	**Essential oil** Cinnamic aldehyde, methoxy cinnamic aldehyde, caryophyllene, eugenol, coumarine	**Darchini** (*Cinnamomum Zeylanicum* Blume.)	**Essential oil,** Cinnamal dehyde, eugenol, benzaldehyde cuminalldehyde, phellandrene, pinene, cymene, and caryophyllene
3.	**Ajwain Desi** (*Trachyspermu mammi* (L.) Sprague.)	**Essential oil** Thymol, alpha-pipene, beta-pipene), p-cymene, carvacrol, camphene, and limonene.	**Shuneez** (*Nigella sativa* L.)	**Essential oil** Nigellone, quinone, carvone, limonene, cymene, oleic, linoleic linolenic acid

Table 2: Drugs having sedative (Musakkin-i-Dimagh) action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1.	**Afyun** (*Papaver somni-ferum* L.)	**Alkaloids** Narcotine, narceine, papaverine, morphine, codeine, thebaine	**Luffah** (*Atropa belladonna* L.)	**Alkaloids** Hyoscyamine, atropine, scopolamine, belladonine, scopoletin, pyridine
2.	**Jauz-e-Masil** (*Datura metel* L.)	**Tropane alkaloids,** Hyoscyamine, hyoscine, atropine	**Ajwain Khurasani** (*Hyoscyamus niger* L.)	**Tropanealkaloids** Hyoscyamine, scopolamine (hyoscine), atropine
3.	**Luffah** (*Atropa bella-donna* L.)	**Alkaloids** Hyoscyamine, atropine, hyoscine, belladonine, scopoletin, pyridine	**Khashkhash** (*Papaver somniferum* L.)	**Isoquinoline alkaloids** Morphine, narcotine, codeine, papaverine, and thebaine. papaverine, noscapine

Table 3: Drugs having purgatives (Mushil) action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1.	**Turbud** (*Operculinatur pethum* (L.) Silva Manso)	**Anthraquinones, resinous glycosides** Purgative-turpethin, alpha and beta-turpethein, terpenoids, tannins, saponins	**Aelva** (*Aloe vera* L.)	**Anthraquinone glycoside** Aloein (mixture of barbaloin, beta-barbaloin, iso barbaloin), aloe emodin, Resin (aloesin, p-coumaric acid, and cinnamic acid), glycoside (aloein A and B, glycoprotein A and B)
2.	**Senna** (*Cassia senna* L.)	**Anthraquinone** Glycoside (Sennoside A, B,C,D) aloe-emodindianthrone-diglucoside	**Halela Zard** (*Terminalia chebula* Retz.)	**Anthraquinenes** Chebulnic acid, tannic acid, gallic acid, resin-chebulin
3.	**Hanzal** (*Citrullus colocy-nthis* (L.) Schrad)	**Glycosides resin (Purgative)** CucurbitacinE, cucurbitacin I, cucurbitacin L, citrullol), anthranol	**Hab-un-Neel** (*Ipomoeanil* (L.) *Roth*)	**Glycosidal resin (purgative)** Alkaloids-lysergol, chanoclavine, penniclavine, iso-penniclavine, elymoclavine; mucilage, fixed oil, saponin

Table 4: Drugs having astringent (Qabid)action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1.	**Balela** (*Terminalia bellirica* (Gaertn.) Roxb.)	**Tannin** **Ellagic acid, Gallic acid,** ethyl gallate, chebulaginic acid, galloyl glucose,), phyllemblin	**Amla** (*Emblica officinalis* Gaertn.)	Tannin, pectin, glucose, **gallic acid,** phyllembelin, ascorbic acid
2.	**Amla** (*Emblica officinalis* Gaertn.)	Vitamin C (600- 900 mg/10 gm), pectin, glucose, tannin, gallic acid, phyllembelin	**Halela Zard** (*Terminalia chebula* Retz.)	Chebulnic acid, **tannic acid, gallic acid,** resin-chebulin
3.	**Hab-ul-Aas** (*Myrtus communis* L.)	**Tannin** Pyrogallol, myricetin, kaem-pferol, quercetin, volatile oil -pinene, cineole, myrtenol, nerol, geraniol, dipentene	**Hina** (*Law soniainermis* L.)	**Heno-tannic acid, tannin** Lawsone (Main), 2-hydroxy-1.4. Napthquinone, mannite Naphthoquinones- lawsone, coumarins

Table 5: Drugs having analgesic(Musakkin-i-Alam)action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1.	**Jauz-e-Masil** (*Datura stramonium* L.)	**Tropane alkaloids** Hyoscyamine, hyoscine, atropine	**Afyun** (*Papaver somniferum* L.)	**Isoquinolinealkaloids**; Narcotine narceine noscapine, papaverine, morphine, codeine, thebaine
2.	**Ajwain Khurasani** (*Hyoscyamus niger* L.)	**Tropane alkaloids** Hyoscyamine,scopolamine, and Atropine	**Ajwain Khurasani** *(Hyoscyamus reticulatus* L.)	**Tropane alkaloids** Hyoscyamine, scopolamine, and Atropine
3.	**Luffah** (Root) (*Atropa belladonna* L.)	**Tropane alkaloids** Hyoscyamine, atropine, belladonine, scopoletin, hyoscine, pyridine	**Khashkhash** (*Papaver sominiferum* L.)	**Isoquinoline alkaloids**; Morphine, narcotine, codeine, papaverine, and thebaine. Papaverine, Noscapine

Table 6: Drugs having diuretics (Mudirr-i-Bawl) action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1	**Alsi/Tukhm Katan** (*Linumusti atissimum* L.)	Fixed oil, **mucilage**, protein, cyanogenetic glucosides linumarin, lipase lotaustralin, phenylpropanoid	**Tukhm Hulba/Methi** (*Trigonella foenum-graecum* L.)	**Mucilage** Alkaloids-trigonelline, gentianine, sapogenins, carpaine, saponins, yamogenin, diosgenin flavonoids, luteolin; volatile oil
2	**Tukhm Kheyarza** (Seed) (*Cucumis melo* L.)	**Triterpinoid glucosides** Linoleic acid, amyrin, taraxerol, lupeol, astrol, avenastrol, clerosterol, Isofucosterol, stigmasterol	**Tukhm Kheyar** (*Cucumis sativus*L.)	**Triterpinoid glucosides** Rutin; cucurbitaside, cucurbitasides B and C, ferredoxin, alphaspinasterol, sterols;
3	**Khubbazi** (*Malva sylvestris* L.)	**Mucilage** Palmitic acid, oleic acid, stearic acid, B-itosterol, lauric acid, stigmasterol	**Tukhm Khatmi** (*Althaea officinalis* L.)	**Mucilage** Starch, mucilage, pectin, sugar, flavonoids

Table 7: Drugs having antioxidant (Mazade Takseed) action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1	**Suddab** (*Ruta graveolens* L.)	Essential oil, psoralen, bergapten, xanthotoxin, **rutin, flavonoids, quercetin,** coumarins-bergapten, daphnoretin, isoimperatorin, naphthoherniarin, psoralen, pangelin, rutamarin, rutarin	**Satawar** (*Asparagus racemosus*Willd.)	Steroid saponins (shatavarins I-IV), **isoflavones**, asparagamine, racemosol, polysaccharides, mucilage, vitamins, folic acid
2	**Pudinah Kohi** (*Mentha arvensis* L.)	Essential oil, menthol, pulegone, menthone, cineole, menthofuran, menthylacetate, **flavonoid,** luteolin, hesperidin, isorhoifolin, rosmarinic acid, azulenes	**Pudinah Bustani** (*Mentha spicata* L.)	Essential oil,carvone, limonene, **flavonoids,** diosmin and diosmetin, rosmarinic
3	**Zaitoon** (*Olea europea* L.)	**Major parts-flavonoids,** Oleic acid, stearic acid, linoleic acid, palmitic acid, arachidic acid myristic acid, and; minor parts-tocopherol, phytosterol, squalene	**Shuneez** (*Nigella sativa* L.)	**Flavonoids,** Essential oil-nigellone, carvone, 2-methyl-isopropyl-*p*-quinone, dlimonene, carvone cymene; myristic, palmitic, stearic, oleic, linolenic acids, linoleic, *B* sitosterol

Table 8: Drugs having anti-inflammatory (Mulayyin-i-Waram) action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1	**Biranjasif** (*Achillea millefolium* L.)	**Essential oil** Achilleine, achileic acid, camphene, limonene, tannin	**Afsantin Roomi** (*Artemisia absinthium* L.)	**Essential oil** sesquiterpene lactones, scoparone, scopoletin, azulenes, phenolic acids, tannins, and lignans
2	**Qaranful** (*Syzygiumaromaticum* (L.) Merr. & L. M. Perry)	**Essential oil** (Eugenol, acetyl eugenol, methol salicylate, pinene, vanillin), galotannic acid, caryophyllin, gum	**Jaifal** (*Myristica fragrans* Houtt.)	**Essential oil** (Sabine,camphene, pinene, p-cymene, phellandrene, limonene, terpinene, myrcene), terpene derivatives (linalool, terpeniolgeraniol,) phenylpropanpoids (myristicin, safrole, elemicin),
3	**Shibt** (*Anethum graveolens* L.)	**Volatile oil** Carvone, dihydrocarvone, dillpiol; flavonoids, qurcetin, kaemferol isorhamnetin,	**Baboona** (*Matricaria chamomilla* L.)	**Volatile oil** Alpha-bisabolol, chamazulene, guiazuline, matricine, apigenin, luteolin, patuletin and quercetin, spiroethers, coumarins, polysaccharides

Table 9: Drugs having antipyretic (Dafi'-i- Humma)actions

S. No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1	**Afsantin Roomi** (*Artemisia absinthium* L.)	**Flavonoids** Artemisetin, absinthin, artabasn, myrcene volatile oils, scoparone, scopoletin	**Ghafis** (*Gentiana dahurica*Fisch.)	**Flavonoids** Apigenin and quercetin, isoquercitrin, coumarins, Volatile oil, resin, tannins
2	**Karanjwa**(seed) (*Caesalpinia bonduc* (L.) Roxb.)	**Flavonoids** Caesalpinine,bonducin, saponins, tannins, and triterpenoids, fixed oil	**Gilo** (*Tinospora cordifolia* (Willd.) Hook. f. & Thomson)	**Flavonoid**s Tinosporin, columbin, berberin, tinosporan, tinosporic acid, tinosporal, giloin, giloinin,Quercetin, Kaempferol, Luteolin
3	**Badavard** (*Fagonia arabica* L.)	**Flavonoids** Quercetin and kaempferol, isorhamnetin, rhamnoside, glucopyranosyl glucopyranoside	**Afsantin Roomi** (*Artemisia absinthium* L.)	**Flavonoids,** Artemisetin, absinthin, artabasn, myrcene, volatile oils, scoparone, scopoletin

Table 10: Drugs having emmanogogue (Mudirr-i-Hayd)action

S.No.	Main drug	Chemical constituents	Substitute drug	Chemical constituents
1	**Kharekhasak** (Plant) (*Tribulus terrestris* L.)	Furastanol (glycoside), **disogenin,** ruscogenin, gitogenin (steroidal saponin)	**Kharekhasak** (Root) (*Tribulus terrestris* L.)	Furastanol (glycoside), **disogenin,** ruscogenin, gitogenin (steroidal saponin)
2	**Satawar** (*Asparagus racemosus*Willd.)	**Steroidal saponins** (Shatavarins I-IV), **isoflavones,** racemosol, asparagamine, polysaccharides, vitamins, mucilage, folic acid	**Asgand** (*Withania somnifera* (L.) Dunal)	Withanine, anaferine, tropine, anahygrine, choline, isopelletrine (steroidal alkaloids), withanolides, withaferine, withnone (Steroid lactones-**ergosane**-type steroids)
3	**Kunjad, Til** (*Sesamum indicum* L.)	Sterols, **lignans,** sesamin, nitrolactone, sesamolin,sesame,vitamins,folic acid galactose, planteose, raffinose, fatty acid	**Alsi** (*Linum -usitatissimum.* L.)	Phytoestrogenic-**lignans** (secoisolariciresinoldiglucoside-SDG), phenols, flavonoids, sterols, proteins, fatty acids, antioxidants

4. Discussion

When phytoconstituents of different drugs with same action were compared, similar phytochemicals that produced the same intended effects as well as other chemical constituents with numerous additional similarities were found. The substitute drugs of carminative action (Table1) were evaluated, and it was found that essential oil (E.O.) was common in all of them. Flatus occurs mainly due to the fermentation and microbial action on food. Numerous E.O.s were tested for their antibacterial action to restrict both gram-positive and gram-negative bacteria (Ali *et al.*, 2015). Antiflatulent activity reported in E.O. may be due to the antimicrobial effects of the oil or due to the presence of any one class of constituents (Khokra *et al.*, 2014). Majority of the spices in this category are those that contain E.O. Apart from improving the food taste and flavor, it has long been known that these oils have stimulating effects on the digestive system, and their carminative properties have been confirmed (Platel and Srinivasan, 2004).

Another group of drugs having sedative properties (Table 2) was evaluated, and alkaloids were found to be common in all of them.Atropine, hyoscyamine and scopolamine are the primary tropane alkaloids that promote sleep and counteract the effect of waking. For the treatment of insomnia, these isolated chemicals from *Atropa belladonna* L. and *Datura stramonium* L. are utilized (Kuponiyi, 2013). Opium comprises the isquinoline alkaloids morphine, the main compound, along with codeine, papaverine, thebaine, and narcotine, all known to have narcotic, sedative, and hypnotic effects (Khare, 2007).

For purgative activity (Table 3), plant drugs were analyzed, and found anthraquinone glycosides in all of them. Aloe and Senna, have purgative action due to the presence of anthraquinones glycosides derivate.The effects of anthraquinone are only felt in large bowls. However, it has been hypothesized that common anthraquinone and anthrol compounds affect ion transport across colon cells by inhibiting chloride ion channels (Trease and Evans, 2008).They also have a purgative effect because of their active metabolite, anthraquinones, which irritates and stimulates the colon and causes an increase in bowel movements due to local action. The loss in water absorption and increase in peristalsis results in soft and bulbous faeces. Most naturally occurring purgatives work by enhancing intestinal motility to affect the colonic epithelium (Vadivel *et al.*, 2012).

Gallic acid and tannins were found to be present in all drugs when their astringent property was analyzed (Table 4). Tannic acid is used as an astringent. Astringency is determined mainly by tannins (Trease and Evans, 2008). It has been claimed that bitterness and astringency increase with tannin concentration (He*et al.*, 2015). The plant extracts that include tannins are also used to treat diarrhea, as astringents, and diuretics, treat stomach and duodenal cancers, as well as antiseptic, anti-inflammatory, antioxidant, and hemostatic agents (Saxena *et al.*,2013).

Drug containing analgesics property (Table 5) were analyzed, and tropane alkaloids like morphine and codeine were found to be common in all of them. It is generally known that alkaloids can reduce the sense of pain. Codeine, thebaine, and morphine, the main opium alkaloid, are principally responsible for the drug's analgesic and narcotic effects. Opium contains various compounds and has hypnotic properties, making its analgesic effects less potent than those of pure morphine (Trease and Evans, 2008). Opium alkaloids exert their effects by acting on the cerebrum's sensory nerve cells. Codeine is a cough suppressant and has a weaker analgesic effect than morphine. Papaverine treats angina pectoris and hypertension because it produces noticeable vasodilatation without paralyzingthe smooth muscle. The formalin test was used to evaluate the analgesic effect of *A. belladonna* extract in mice. This study demonstrated a dose-dependent effect compared to control. At a greater drug concentration, of 300 mg, the results were statistically significant. This can be a result of phytochemicals present, that block prostaglandin production (Chalise *et al.*, 2015).

The drugs containing diuretic properties (Table 6) were analyzed, and flavonoids, saponins, and diterpenoids were found to be present. As per the available reports, phytochemical groups like flavonoids, saponins, and diterpenoids cause diuretic activity by positively affecting kidney physiological processes. For instance, they can

increase potassium-sparing capacity, bind to the adenosine A-1 receptor linked to diuretic action, or perhaps prevent the tubules from reabsorbing water and the anions that go along with it. (Aziz *et al.*, 2014). Additionally, research has shown that several substances, including other flavonoids, saponins, and organic acids, may be responsiblefor the diuretic properties. The outcome, diuresis, can be brought on by either boosting local blood flow, initiating vasodilatation, or inhibiting tubular reabsorption of anions and water (Chhatre *et al.*, 2014). The seeds of *Cucumis melo*, *Cucumis sativus*, and *Dolichos biflorus* are frequently used as a diuretic and for the removal of kidney stones. These plant drugs have a high quantity of nitrates and essential oils with diuretic properties (Gudulkar *et al.*,2020). However, not much work has been done on these plants to support the above property; however, *Dolichos biflorus* L. has been studied for its anticalculi activity (Mirza *et al.*, 2003).

The analysis of antioxidant drugs (Table 7) revealed a class of compounds known as flavonoids; natural substances with variable phenolic structures. Flavonoids were present in all of them. Chalcones, isoflavones, flavanol, and flavones, are a few subclasses of flavonoids. Flavonols include; kaempferol, quercetin, myricetin, and fisetin, which are flavonoids that can form ketone groups (Panche *et al.*, 2016). The position three hydroxyl group on the C ring of flavonols can also be glycosylated. They display a broad variety of hydroxylation and methylation patterns, and because of the different ways they are glycosylated, they may be the most common and important class of flavonoids. In addition, they are known to be effective inhibitors of a number of enzymes, such as cyclo-oxygenase (COX), lipoxygenase, phosphoinositide 3-kinase, and xanthine oxidase (XO) (Panche *et al.*,2016; Balyan and Ali, 2022). It has been proven that a number of flavonoids have antioxidative qualities, the capacity to scavenge radicals (free), andthe ability to modify the functioning of vital cellular enzymes.They are proanthocyanin's fundamental constituents. This is explained by their antioxidative, antiviral, hepatoprotective, anti-inflammatory, and anti-carcinogenic properties, therefore, are linked to a variety of health-promoting effects, particularly in cases of cancer, Alzheimer's disease, and Atherosclerosis, whereas other flavonoids showed potential for preventing coronary heart diseases (Kumarand Pandey**,** 2013; Jayashree *et al.*, 2019).

The analysis of three primary and three substitute drugs for anti-inflammatory properties (Table 8) revealed that E.O. were common. These substances are reported to fight off intruders in the body. Inflammation is a defensive reaction brought on by tissue damage or infection. The inflammatory reaction results in an increase in endothelial lining cell permeability, blood leukocyte influxes into the interstitial space, and the cytokines release. In addition, it promotes the metabolism of arachidonic acid and several other enzymes (Kushwah and Gupta, 2019). Depending on the chemical composition of the oils, the anti-inflammatory effects of E.O. may result from their interactions with signaling cascades containing cytokines and regulatory transcription factors as well as on the gene expression that cause inflammation (Miguel, 2010). E.O. obtained from *Syzygium aromaticum* has analgesic, antibacterial and anti-inflammatory properties due to the presence of eugenol, isoeugenol, and carvacrol and is commonly used in dental treatments (Kushwah *et al.*, 2019). Additionally, the chemical compounds eugenol, terpineol, myristicin, linalool, pinene, camphene, dipentene and are found in nutmeg oil. By suppressing blood substance P levels and COX-2 expression, nutmeg oil may lessen chronic inflammation and discomfort in rats by reducing allodynia, heat hyperalgesia, and joint swelling brought on by CFA injection (Zhang *et al.*, 2016).

Three main and three substitute drugs for light antipyretic properties (Table 9) were also analyzed, and flavonoids were found to be common. Flavonoids target prostaglandins, which have a role in the feeling of pain, pyrexia, and the late stage of acute inflammation; by delaying or preventing cell necrosis from starting and boosting vascularity, flavonoids lower lipid peroxidation. Therefore, flavonoids may be a factor in its antipyretic effect (Murthy, 2010). Additionally, it has been demonstrated that antipyretics can reduce fever by either inhibiting prostaglandin synthetase, which blocks prostaglandin synthesis in the brain, or by reducing the spike in interleukin-1 production that occurs after interferon production. Antipyretics have been proven to reduce fever by blocking prostaglandin synthetase, which stops prostaglandin synthesis in the brain, or by reducing the increase in interleukin-1 production after interferon synthesis. It has been demonstrated that flavonoids decrease TNFα-, and compounds linked to it also show inhibition of arachidonic acid peroxidation, which lowers prostaglandin levels and lowers fever and pain (Murthy,2010; Gomes,2008).

The analysis of three primary and three substitute drugs for emmenagogue action (Table 10) revealed that phytoestrogens were present in all of them. Because of their structural resemblance to estradiol, phytoestrogens, often known as "dietary estrogens" are a broad class of non-steroidal, plant-based polyphenolic chemicals that imitate the action of estrogen molecules that the body naturally produces. They can bind to estrogen receptors, which allows them to potentially have estrogenic actions (Kulkarni and Khobragade, 2017). It can be divided into categories based on chemical composition, including isoflavonoids, flavonoids, anthraquinones, triterpenes, coumestans, lignans, and saponins. Drugs, including Kharekhasak, Chob Chini, Satawar, Asgand, Kunjad, Alsi, and Hulba, are claimed to have a significant estrogenic effect. These can be considered good sources of phytoestrogens and established emmenagogues (Khan *et al.*, 2018). According to an *in vivo* study, phytoestrogens may influence the control of ovarian cycles, the stimulation of growth and development, and the physiological functions of various other organs like female genital tract, breast, and pituitary (Bopana and Saxena *et al.*, 2007).

According to the British Menopausal Society 2013, phytoestrogens consumption provides relief from perimenopausal vasomotor symptoms such as hot flushes and night sweats. It also has a good effect on the skeleton and cardiovascular system (Patisaul and Jefferson, 2010).

5. Conclusion

The study demonstrated that these plant-origin single drugs are valuable sources of bioactive compounds, likely responsible for their pharmacological actions. Due to the high correlations of phytochemicals between the main and substitute drugs, application of phytochemistry provides a strong foundation for choosing substitute medications and fortifies the Unani idea, which was previously absent. Ancient scholars of Unani system of medicine used logical models as evidence because they allocated substitutes merely on the basis of action of drugs. They formulated principles and guidelines which formed the basis of therapeutic interchanges and assisted in finding new therapeutic interchanges logically. It mainly consisted of three prime principles of substitution, *viz*., similarity in action, temperament, and physical properties of drugs with certain limits of confidence. However, these three parameters are interrelated and form a vicious circle. Due to phytochemicals, temperament is formed, and temperament of drugs mainly decides the action of the drug, again action of the drug is due to the chemical constituents of the drug. Consequently, phytoconstituents alone or in combination with the other three parameters may be considered a strong basis for therapeutic interchange and it offers hope for their inclusion in the core Unani medical concepts.

Conflict of interest

The author declares no conflicts of interest relevant to this article.

References

Ali, B.;Wabel, N.A.; Shams, S.; Ahamad, A.; Khan S.H. and Anwar, F. (2015). Essential oils used in aromatherapy: A systemic review. Asian Pac. J. Trop. Biomed., **5**(8):601-611.

Aziz, M.; Saqib, N.; Akhtar, N.; Asif,H.; Jamshaid, M. and Sultana, S. (2014). Phytochemical screening and evaluation of the diuretic activity of aqueous methanol extract from aerial parts of *Mentha viridis* Linn (labiatae) in albino rats. Tropical Journal of Pharmaceutical Research, **13**(7):11-1121.

Balyan, P. and Ali, A. (2022). Comparative analysis of the biological activities of different extracts of *Nigella sativa* L. seeds. Ann. Phytomed., **11**(1):577-587.

Bopana, N. and Saxena, S.(2007). Asparagus racemosus: Ethnopharmacological evaluation and conservation needs. Journal of Ethnopharmacology, **110**:1-15.

Chellammal, H. S. J. (2022). Fruits that heal: Biomolecules and novel therapeutic agents. Ann. Phytomed., **11**(1):7-14.

Chalise, U. (2015). The Poppy plant: Phytochemistry and pharmacology. Indo Global Journal of Pharmaceutical Sciences, **5**(1):58-65.

Chhatre, S.; Nesari, T.; Kanchan,D.; Somani, G. and Sathaye, S. (2014). Phytopharmacological overview of *Tribulus terrestris*. Pharmacognosy Reviews, **8**(15):45.

Trease, G. E., and Evans,W. C. (2008). Trease and Evans Pharmacognosy. Elsevier, A Division of Reed Elsevier India Private Ltd., New Delhi. pp:41-49,125,333.

Ghani, N. (1971). Khazain-ul-Advia. Idara Kitabul Shifa, Kocha Chalan., New Delhi. pp:203-205,701-703.

Gomes, A.; Fernandes, E.; José, L.; Lima; Mira, L. and Luísa M. (2008). Anti-inflammatory activity of flavonoids. Current Medicinal Chemistry, **15**(16):1586-1605.

Gudulkar,S.;Rajbhar,K.;Dawda, H. and Mukundan,U.(2020). Screening of selected plants for their effectiveness in the treatment of kidney stone. seeds. Ann. Phytomed., **9**(1):213-217.

Hakeem, Abdul Mohd (2002). Bustanul Mufredat. IdaraKitabul- Shifa, Darya Ganj, New Delhi.

He, M.; Tian, H.; Luo, X.; Qi, X. and Chen, X. (2015). Molecular progress in research on fruit astringency. Molecules, **20**:1434-1451.

Idris,S.; Mishra,A. and Khushtar, M. (2021). Phytochemical estimation of germinated Trigonella *foenum-graecum* L. seed extract for better application in phytotherapy. Ann. Phytomed., **10**(2):213-222.

Jayashree, P.;Gadade and Patil, S.(2019). Phytochemical paradigm, antioxidant status and their correlationin *Rotheca serrata* (L.) Steane and Mabb. Ann. Phytomed., **8**(2):156-166.

Khan, S.; Shameem, I.; Suhail and Aafreen. (2018). Role of phytoestrogens as an alternative to hormone replacement therapy in postmenopausal women: A review. International Journal of Current Research, **8**(6): 32585-32591.

Khare, C.P.(2007). Indian Medicinal plant: An illustrated dictionary. Springer Science, Business media, New York.

Khokra, S.L.; Kaushik, P.; Kaushik, D. and Jain, S. (2014). Anti-flatulent studies of traditional medicinal plant *Vitex negundo* Linn. In rats. International Journal of Pharmaceutical Sciences and Drug Research, **6**(4):341-344.

Kumar, S.; and Pandey, A.K. (2013). Chemistry and biological activities of flavonoids: An overview. The Scientific World Journal. **162750**:1-16.

Kokate,C.K.; Gokhale, S. B. and Surana, S.J. (2012). Pharmacognosy. Nirali Prakashan. Pune. pp:4.1-4.8.

Kuponiyi, E. (2013). Plant-derived compounds with potential sedative and anxiolytic activities. International Journal of Basic and Applied Science, **02**(01):63-78.

Kulkarni, P. and Khobragade, P.(2017). Phytoestrogens medicinal herbs - safe and effective alternative to hormone replacement therapy in menopausal syndrome. J. Res. tradit. Med., **2**(5):147-150.

Kushwah,R. and Gupta, M. (2019). Anti-inflammatory potential of some essential oils: A review. Asian Journal of Pharmaceutical Research and Development, **7**(6):68-71.

Miguel,M.(2010). Antioxidant and anti-inflammatory activities of essential oils: A short review. Molecules, **15**:9252-9287.

Mirza,M.; Kalhoro, M.A.;Yaqeen, Z.; Sarfaraz, T.B. and Qadri R.B. (2003). Physico-chemical studies of indigenous diuretic medicinal plants. Pakistan Journal of Pharmacology, **20**(1):9-16.

Murthy, J.R.; Venkataraman, S.; Meera, S.;Desmukh, K.S.; Chidambaranathan, N. and Devi P. (2010). Phytochemical investigation and antipyretic activity of leaf extract of *Vitex negundo* Linn. International Journal of Pharm. Tech. Research, **2**(2):1068-1073.

Panche, A. N.; Diwan, A. D, and Chandra, S. R. (2016). Flavonoids: An overview. Journal of Nutritional Science, **5**:1-15.

Patisaul, H.B.and Jefferson W.(2010). The pros and cons of phytoestrogens. National Institute of Health, **31**(4):400-419.

Platel, K. and Srinivasan K. (2004). Digestive stimulant action of spices: A myth or reality? Indian J. Med. Res., **119**:167-179.

Qureshi, H. (1995). Muqadma Ilmul Advia. Aijaz Publishing House, New Delhi, India. pp:120-132.

Razi, Z. (2000). Kitab Al Abdal.Ed.3rd. CCRUM, Ministry of Health and Family Welfare. Govt. of India, New Delhi. pp:10-15,33-34.

Saeed, A. (2007). Kitab al Fatah fi al Tadawi (Urdu translation). Ed.1st. NCPC Printers, Delhi.

Saxena, M.; Saxena, J.; Nema, R.; Singh, D.andGupta, A. (2013). Phytochemistry of medicinal plants. Journal of Pharmacognosy and Phytochemistry, **1**(6):168-182.

Perveen,S.; Wadud, A.; Shaikh, A.; Sofi, G. and Perveen,A.(2020). Unani concept of drug substitution (therapeutic interchange) and its validation on scientific parameters. Journal of Ayurveda and Integrative Medicine, **11**:301-307.

Vadivel, K.; Naga R. D. and Swathi, J. (2012). The purgative activity of *Abrus precatorious* Linn. seed aqueous extract in mice. Journal of Pharmacy Research, **5**(6):3575-3576.

Wadud, A. (2021). Textbook of Single Drugs. Ed.1st. Frontline Publications, Hyderabad, India.

Zhang,W.; Tao,S.; Li,T.; Li.Y.; Li, X and Tang, H. (2016). Nutmeg oil alleviates chronic inflammatory pain through the inhibition of COX-2 expression and substance P release *in vivo*. Food and Nutrition Research, **60**:30849.

Citation **Shaista Perveen, Abdul Wadud and Aisha Perveen (2022). Evaluation of Unani concept of therapeutic interchange (Abdaal-e-Advia)with special reference to phytochemistry. Ann. Phytomed., 11(2):266-273. http://dx.doi.org/10.54085/ap.2022.11.2.29.**