ARCHIVES OF HELLENIC MEDICINE: ISSN 11-05-3992

CLINICAL CASE
ΚΛΙΝΙΚΗ ΠΕΡΙΠΤΩΣΗ

ARCHIVES OF HELLENIC MEDICINE 2020, 37(Suppl 2):171–176
ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2020, 37(Συμπλ 2):171–176

Urolithiasis and hypertension
The apparent and the hidden in the Ancient Greek and Oriental medical traditions

C. Grivas

Academy for the Ancient Greek and Traditional Chinese Medicine, Athens, Greece

Ουρολιθίαση και υπέρταση: Το εμφανές και το κρυμμένο στις αρχαίες ελληνικές και ανατολικές ιατρικές παραδόσεις

Περίληψη στο τέλος του άρθρου

In the systems of traditional medicine, symptoms like renal colic, dysuria and haematuria were easily associated with the urinary system and urolithiasis. On the contrary, a modern symptom like hypertension could not be readily identified with a specific pathology. The investigation in the Greek, Ayurvedic, Chinese and Tibetan medical systems on the pathology, diagnosis and treatment of urolithiasis and hypertension was based on the classical texts and the long tradition of application. Although the causation of disease varied in the different medical systems, it was possible to detect similarities in both the theory and the treatment, some of which still play an important role in Greece, India and China. Several herbs present a widespread distribution of usage, common in most of the traditions studied. The careful examination of these data can contribute to a better understanding of medical thought in different civilisations, enlightening their similarities and differences. It could also reveal a possible and plausible materia medica for modern applications.

Key words

Ayurveda
Chinese medicine
Greek medicine
Hypertension
Urolithiasis
Tibetan medicine

1. INTRODUCTION

Comparing different medical systems is not a new idea. Prestigious personalities in various traditions felt curiosity towards other cultures, eager to understand the possible differences and similarities. Only recently has this direction attracted the attention of scholars and researchers from various scientific disciplines. Two of the most persistent problems affecting these comparisons are compatibility issues between traditional and modern medical systems, as well as the different cultural background of the various medical traditions themselves. Two extreme examples –urolithiasis and hypertension– were used to further investigate these questions. Urolithiasis on the one hand is a very obvious internal disease, in terms of pathogenesis. Ancient physicians had no doubt about the causes of colic pain and their association with the kidney or urinary stones. On the contrary, hypertension is a condition that has developed from symptom to disease only in recent times. The suggested treatments covered the whole medical arsenal of antiquity, from surgical operations, like perineal lithotomy for cystolithiasis, mentioned in Sushruta Samhita,[1] to bloodletting and leeches, a rational way to relieve excess blood and hypertension. The present study focused on the herbal remedies used extensively in the treatment of urolithiasis and hypertension, and are still preferred by a considerable number of patients around the Mediterranean, in India and China.

The main questions that have to be addressed are the possibility and usefulness of comparing different traditional systems, as well as the best approach to be followed.

2. METHODOLOGY

This research was conducted with horizontal comparisons, between different geographical areas (the Mediterranean, India, China and Tibet), as well as vertical ones, between different historical periods. The traditional pathology and the respective diagnostic methods had to be examined, so as to understand the fundamental ideas on the disease. All four medical traditions (Greek, Indian, Chinese and Tibetan) mainly used the diagnostic methods of pulse taking and uroscopy, offering a relatively common ground, keeping in mind the differences in terminology. Furthermore, it was necessary to investigate the treatment methods for the specific ailments, both in terms of single herbs, as well as compound ones (formulas), although the results presented here belong only to the first category. Typically, all herb names were identified taxonomically

and their habitats were taken into account. Herbs with a geographically limited distribution were excluded. The traditional plant uses were based on textual sources, like the Corpus Hippocraticum (CH), the works of Aretaeus of Cappadocia (1st c. CE),* Dioscorides (1st c. CE)** and Galen (129–210? CE),*** in the Greek tradition. The Ayurvedic texts included *Caraka Samhita*, *Sushruta Samhita* and *Ashtanga Hridaya*. Two major works on Chinese pharmacopoeia, separated by almost fourteen centuries, were consulted: the *Shennong Bencao Jing* (possibly 200–250 CE) and *Bencao Gangmu* (1578 CE). The major Tibetan medical work of *rgyud bzhi* (Four Tantras, 12th c.?) was also examined.

2.1. Urolithiasis

All of the examined medical traditions perceive urolithiasis as a blockage somewhere in the urinary system. The causes may vary, but water quality was identified as one of them quite early, for example in the CH (*De aere aquis et locis* 9.1). In the same paragraph, the writer describes the stone formation and observes that women are less likely to have kidney stones than men, something that is still correct.[2] Both Dioscorides and Galen use the term "stone-breaking" *power* (*lithōn thruptikas dunameis*) (DSMTF 11.711.13 Kühn). Furthermore, Galen clearly differentiates between diuretic and stone-breaking actions (for example in DSMTF 12.89.13 Kühn). As explained in the case of the blackberry root (*Rubus fruticosus* L.), the combination of astringent (*stuptikon*) and fine-grained (*leptomeres*) qualities allow the herb to break the kidney stones (DSMTF 11.849.1 Kühn).

The Ayurvedic text *Sushruta Samhita* describes four types of lithiasis (*ashmari*), according to the dogma of *tridosha*:**** *vatashmari*, *pittashmari*, *shleshmashmari* and *shukrashmari*. In Chinese Medicine, the term *lín zhèng* (literally "pour disease") is used to describe painful urinary dysfunction, which can be distinguished in nine different categories, one of which is urolithiasis (*shí lín*).[3] The causes behind these categories can be mainly Damp-Heat in Kidneys and Urinary Bladder, Spleen and Kidney Excess or Liver Qi Stagnation. Tibetan Medicine is even more thorough in terms of classification. According to *rgyud bzhi* (91) dysuria has 12 types in total. One of them is urinary stones.[4]

* De causis et signis acutorum morborum, De causis et signis diuturnorum morborum, De curatione acutorum morborum and De curatione diuturnorum morborum.

** De materia medica (DMM).

*** De simplicium medicamentorum temperamentis ac facultatibus (DSMTF), De compositione medicamentorum per genera (DCMG), De compositione medicamentorum secundum locos (DCML) and De alimentorum facultatibus (DAF).

**** The dogma of *tridosha* (three aggravates), common in Ayurveda and Tibetan Medicine, involves *vata* (air), *pitta* (bile) and *kapha* (phlegm).

2.2. Herbal treatment for urolithiasis

In DMM, there are 37 substances used for dissolving the stones, most of them of herbal origin (32 or 86.5%). Galen confirms the stone-breaking and/or diuretic use of 23 out of the 37 drugs (62.2%), while 5 are not mentioned at all. Nevertheless, Galen adds 7 more drugs that are useful in his experience, like blackberry root (*Rubus fruticosus* L.) (DSMTF 11.849.1 Kühn). The list of herbs suggested by both Dioscorides and Galen includes some that are widely used for kidney stones, even in contemporary folk treatment. The best examples are the fruit of *tribolos (Tribulus terrestris* L.*)*, rustyback fern *(Asplenium ceterach* L.*)*, chamomile roots, leaves and herb *(Matricaria chamomilla* L.*)*, marshmallow root *(Althaea officinalis* L.*)* and Venus hair fern *(Adiantum capillus-veneris* L.*)*. Cardamom *(Elettaria cardamomum* [L.] Maton.), imported from India, is considered lithotryptic only in DMM. In an 18th c. *iatrosofion* influenced by Michael Kontopides Markellos (1651–1717),[5] several interesting species are proposed as stone-breaking herbs: the seeds of *malathron* (105, *Foeniculum vulgare* L.), *pentaneuro* leaves (123, *Plantago* spp.), corn leaves (*fylla kalampoukou,* 123, *Zea mays* L.) and *Malva* spp. root (*agriomolocha*, 137). The later work titled *Akeso or Unified Pharmacopoea and Pharmacology* (f. 155v), by Charisios Megdanis (1768–1823) mentions tobacco *(Nicotiana tabacum* L.*)* as a useful remedy in urinary bladder and kidney stones, "since we don't have stone-breaking drugs", an astonishing statement. As noted by the editor Agamemnon Tselikas, the specific text deviates from the Greek tradition and has much to share with the contemporary Vienna Pharmacopoeia.[6] In the ethnobotanical collection by Fragkaki[7] there are in total 15 herbs used for kidney stones, out of which only three (25%) are actually included in DMM:***** *Asplenium ceterach* L., *Cynodon dactylon* (L.) Pers., and *Prunus avium* L.

In Chinese Medicine, there are some similar herbs used for urolithiasis:

- dōng kuí zǐ (the seed of *Malva verticillata* L. or *Abutilon theophrasti* Medik.), in *Bencao Gangmu* (16.12)
- jīn qián cǎo, the herb from several species, according to geographical area (*Lysimachia christinae* Hance, *Desmodium styracifolium* (Osbeck) Merr., *Glechoma longituba* (Nakai) Kuprian., *Hydrocotyle sibthorpioides* var. *batrachium* (Hance) Handel-Mazzetti ex R.H. Shan, and *Dichondra repens* (J.R. Forst. & G. Forst), often used alone for expelling stones[8]

***** A fourth herb called *atrivolos* is usually identified with *Medicago disciformis* DC., but it could also be associated with *Tribulus terrestris* L. (*trivolos* in DMM).

- jīn shā téng (the herb of *Lygodium japonicum* (Thunb.) Sw.), mentioned in the *Bencao Gangmu* (16.63) as especially effective in Damp-Heat urolithiasis
- bái jí lí (the fruit of *Tribulus terrestris* L.), first mentioned in *Shennong Bencao Jing* for dissolving hard masses and accumulations,[8] while in *Bencao Gangmu* (16.61) it is noted to "treat haematuria with swelling and pain", and
- yù mǐ xū (the stylus of *Zea mays* L., an American species), is mentioned in *Bencao Gangmu* (23.4) as Yushushu, a plant from the West, not cultivated in a large scale in China. The corn leaf and root is indicated for stranguria due to urolithiasis with intolerable pain.

Although rustyback *(Asplenium ceterach* L.*)*, a famous lithotryptic herb in the Mediterranean region, actually exists in Xinjiang (Uyghur) & N. Xizang (Tibet) at an altitude of 1400–2600 m,[9,10] it is not mentioned in *Bencao Gangmu* (1578), the modern herbal pharmacopeias of Traditional Chinese Medicine (TCM) or in the Tibetan Medicine herbals examined. It seems that its limited distribution in western China and its high-altitude habitat contributed to its noted absence in the texts.

In Tibetan Medicine, the fruits of *Tribulus terrestris* L. (gze ma), *Elettaria cardamomum* (L.) Maton (sug smel), *Malva verticillata* L. (lcam pa ma ning), the roots and flowers of *Alcea rosea* L. (mdog ldan), as well as the herb *Pedicularis pyramidata* Royle ex Benth (glang sna), are all used for kidney disorders (cold, hot or wind type), including dysuria and stones.[4,11–14]

It is quite interesting that similar herbs are used in Ayurveda for kidney disorders, including urolithiasis: the root and flower of *Elettaria cardamomum* (L.) Maton (elā), the roots of *Cynodon dactylon* L. (doorva), the herb and fruit of *Tribulus terrestris* L. (gokshura), the fern *Asplenium polyodon* G. Forst (pana), the root of *Althaea officinalis* L. (khatmi) and the stylus of *Zea mays* L. (makkaya).[15]

3. HYPERTENSION

Hypertension is a symptom defined after the invention of the sphygmomanometer by Samuel Siegfried Karl Ritter von Basch (1837–1905). Today it is distinguished into primary (90–95% of cases), attributed to nonspecific lifestyle and genetic factors and the secondary hypertension, due to identifiable causes. Possible symptoms include headache, epistaxis, shortness of breath, light-headedness, vertigo, tinnitus, altered vision or fainting episodes. These symptoms, however, might be related to associated anxiety, rather than the high blood pressure itself. Therefore, in traditional medical systems, hypertension, contrary to urolithiasis, needs an indirect approach, based on the pathological theories and some characteristic symptoms, like headache, epistaxis etc.

In the TCM, the related pathology is divided into four different patterns, three of deficiency (Liver Yang Rising types) and one of excess (Liver Phlegm Fire). The diagnosis is based on the different pulse motifs, but all types share the same "chord-like" pulse.* Jú huā (flowers of *Chrysanthemum morifolium* Ramat.) was mentioned for the first time in the Shennong Bencao Jing, while according to Bencao Gangmu (15.1): "When severe intermittent headache is to be treated, white chrysanthemum is the best among all the species". In the TCM, it is used for headaches and hypertension caused by Liver Wind syndrome, with Liver Yang Rising (Liver and Kidney Yin Deficiency).[8] Mulberry (*Morus alba* L.) root bark or sāng bái pí was originally used to drain Heat from the Lungs (to stop coughing and calm wheezing), though more recently it is used in hypertension.[8] This application is still based on old texts, since Bencao Gangmu (36.1) notes that: "it brings down ascending Wind" and "is good for smoothing urination". Hawthorn fruit or shān zhā (*Crataegus pinnatifida* Bge. var. *major* N.E.Br. or *Crataegus cuneata* Sieb. & Zucc.) was used to disperse Qi Stagnation (Bencao Gangmu 30.9) and more recently for the treatment of hypertension, coronary artery disease and elevated serum cholesterol.[8] Another example, following this same motif, is dà jì (the herb and root of *Cirsium japonicum* DC.), mentioned in Bencao Gangmu (15.30) for stopping hematemesis and epistaxis, while more recently it is used against hypertension, especially due to Liver Heat.[8]

Ayurvedic texts include several interesting herbs, like sarpagandha (the root of *Rauwolfia serpentina* Benth ex. Kurz.), mentioned already in *Caraka Samhita* (Chikitsa Sthana 9), that balances Vata and Pitta, reduces heart rate and dilates blood vessels, as well as lowering blood pressure.[15,16] One of its drastic constituents, reserpine, is used specifically in hypertension and the treatment of psychiatric patients. In China, the same herb (yìn dù luó fú mù or the "Indian vine tree") is mentioned in modern pharmacopoeias, but not in traditional texts. Garlic or rasonam (*Allium sativum* L.), is a well-known herbal treatment for hypertension, mentioned already in *Caraka Samhita* (Sutra Sthana 27), for its quality of balancing Vata and Kapha. With the Chinese name dà suàn, it is mentioned in Bencao Jingji Zhu (500

* This is usually translated as "wiry pulse". The correct version would be "chord-like pulse", in total agreement with the galenic term spasmodic pulse (*spasmōdēs*, *De Differentia Pulsuum* 8.554.18 Kühn) that has a tensed chord-like sensation, comparing the feeling with that of a string from a musical instrument and not a wire.

AD). Bencao Gangmu (26.9) informs us that garlic was brought to Han China by Zhang Qian, a renowned envoy to the western regions (206 BC- 220 AD), and can disperse pathogenic Wind, Cold and Damp, dissolve hard masses and undigested food.

Ashwagandha (the root of *Withania somnifera* (L.) Dunal), is considered today one of the most important Ayurvedic herbs, administered mainly to relax the nervous system.[15,17] In *Caraka Samhita,* there are 28 references to ashwagandha for neurological disorders (Chikitsa Sthana 28.166, 28.170 and 28.173, Siddhi Sthana 4.4 and 9.87). In Ashtanga Hridaya, there are 20 references, again on the treatment of neurological disorders (13.41) and epilepsy (14.14). Although ashwagandha is mentioned (cuī mián shuì qié) in the modern Chinese pharmacopoeias, it is absent in the examined traditional texts. It does not seem to be a part of the Tibetan flora, but it has a name (ba dzi gandha) probably for imported quantities.[11] Another famous Ayurvedic herb, used for hypertension today, is the amla or amalaki fruit (*Phyllanthus emblica* L.), mentioned in *Caraka Samhita* (Sutra Sthana 27) for balancing Kapha and Pitta, a property found also in Tibetan medical texts.[11]

In the Hippocratic world, hypertension could be categorised as abundance of blood (*plethora*). In Greek medical texts, there are several herbs associated with the treatment of hypertension. Similar species with those already mentioned in the oriental traditions include the three chamomiles (*anthemides* are identified with *Matricaria recutita* (L.) Rausch, *Chamaemelum nobile* (L.) All and possibly other *Anthemis* spp.) mentioned in DMM (3.137), their roots and flowers considered diuretic and lithotryptic,* effective also for jaundice and liver diseases, coinciding with the use of chrysanthemum in Chinese Medicine. Galen suggested the use of chamomile oil in headaches from intoxication or fever (DCMSL 12.507.10, 12.519.2, 12.561.1), a condition similar with the Ascending Yang Fire in TCM. In DMM (1.126), the cooling effect of mulberry leaves (*Morus nigra* L.) was used externally to soothe burns, but Galen administered the leaf extract in hypertension caused by heat or cold (DCMSL 12.502 and 12.507). *Mespilon* or *arōnia* in DMM (1.118) (very possibly *Crataegus monogyna* Jacq., *Crataegus orientalis* Pallas ex M.Bieb. or *Crataegus azarolus* L.) was considered to have styptic fruits, used for the treatment of diarrhoea, but in recent centuries were found effective against both hypertension and hypotension, in insomnia related with stress, arteriosclerosis and atherosclerosis. In DMM (2.152) garlic (*skordon,* the bulb of *Allium sativa* L.), a well-known hypotensive today, is considered wind-expelling and diuretic, among else. Galen regards *skorodon* (*De Alimentorum Facultatibus* 6.659.1 Kühn) as an unblocking and differentiating medicine, especially when taken raw.

Withania somnifera (L.) Dunal is recorded in various regions of Greece (Sterea, Peloponnesus, Crete, East and North Aegean Islands)[18] and it has been identified with the *struchnos upnōtikos* in DMM (4.72), although its uses diverge from the Ayurvedic ashwagandha: the root bark is considered a hypnotic, the fruit a strong diuretic, but in a larger quantity it can induce ecstasy. In any case, the particular root it did not seem to play such an important role as in the case of Ayurveda.

4. CONCLUSIONS

In some cases, the pathology in traditional medical systems can be easily associated with the modern terminology, as for example with urolithiasis, while in other cases, contemporary diseases, like hypertension, cannot be readily identified with the traditional terms. Yet, the old texts can be used as valuable sources in terms of the traditional diagnostic methods, in relation to the symptoms (e.g. the "chord-like" pulse as a criterion for hypertension). Simple ailments can be addressed successfully with single herbs (monotherapy in urolithiasis), while more complicate conditions can be treated with herbal formulas (hypertension).

Medical traditions are not homogenous and they actually represent a matrix of interconnected information from a multitude of sources. Therefore, we should take into consideration the primary and secondary sources of a text, as well as the MSS tree. Materia medica texts – including the practical Greek *iatrosofia* – are actually complicate collections, heavily influenced by cultural backgrounds, locale and historical period. The actual goal of their writers or compilers was not to reproduce exact copies of previous texts, but to

Table 1. Herbs used for urolithiasis.

Greek	Ayurveda	Tibetan	Chinese
Asplenium ceterach	(Asplenium polyodon)		
Cynodon dactylon	X		
Althaea officinalis and Malva spp.	(Malva verticillata)	X	(Malva verticillata)
Elettaria cardamomum	X	X	
Tribulus terrestris	X	X	X
Zea mays	X		X

* Used especially in that fashion by Rufus the Ephesian (*De renum et vesicae morbis* 1.12, 3.13 and 12.1).

provide useful lists of medical substances. In that context, the dissemination of knowledge for the American herbs was quite rapid, since within a century they were established in both East & West (e.g. *Zea mays* L.). As evident in tables 1 and 2, *Tribulus terrestris* L. and *Malva* spp. are used against urolithiasis in all of the medical systems examined, while *Elettaria cardamomum* (L.) Maton and *Zea mays* L. in three of them. In the hypertension group, three species are used in all the medical systems: *Allium sativum* L., *Crataegus* spp. and *Morus* spp. A few species remain problematic, like the examples of *Asplenium ceterach* L. and *Withania somnifera* (L.) Dunal. In any case, the systematic and interdisciplinary study of such sources can provide valuable information for future drug research.

Table 2. Herbs used for hypertension.

Chinese	Tibetan	Ayurveda	Greek
Chrysanthemum morifolium			Matricaria recutita/Chamaemelum nobile
Morus alba	X	X	Morus nigra
Crataegus spp.	X	X (ethnobotanical use)	X
Cirsium japonicum	(Cirsium souliei)		Not present
	Not present	Rauwolfia serpentina	Not present
X (Western origin)	X	Allium sativum	X
Present	Not present?	Withania somnifera	Present
	X	Phyllanthus emblica	Not present

ΠΕΡΙΛΗΨΗ

Ουρολιθίαση και υπέρταση: Το εμφανές και το κρυμμένο στις αρχαίες ελληνικές και ανατολικές ιατρικές παραδόσεις

Κ. ΓΡΙΒΑΣ

Ακαδημία Αρχαίας Ελληνικής και Παραδοσιακής Κινεζικής Ιατρικής, Αθήνα

Αρχεία Ελληνικής Ιατρικής 2020, 37(Συμπλ 2):171–176

Στα παραδοσιακά ιατρικά συστήματα τα συμπτώματα όπως ο κολικός των νεφρών, η δυσουρία και η αιματουρία συνδέονται εύκολα με το ουροποιητικό σύστημα και την ουρολιθίαση. Αντίθετα, η υπέρταση, τουλάχιστον ως ορολογία, δεν υπήρχε πριν την εφεύρεση του σφυγμομανόμετρου και δεν ήταν άμεσα συνδεδεμένη με κάποια συγκεκριμένη παθογένεια. Η έρευνα πάνω στην παθολογία, τη διάγνωση και τη θεραπεία της ουρολιθίασης και της υπέρτασης, όπως τα αντιλαμβάνονταν η αρχαία ελληνική και οι ανατολικές Ιατρικές, βασίστηκε τόσο στα κλασικά κείμενα, όσο και στη μακρόχρονη παράδοση. Παρ' όλο που η αιτιολογία της νόσου μπορεί να διαφέρει, κατέστη εφικτό να εντοπιστούν ομοιότητες, τόσο στη θεωρία, όσο και στην πράξη. Κάποια βότανα παρουσίασαν ευρύτητα εφαρμογής, στα περισσότερα συστήματα που εξετάστηκαν. Η προσεκτική μελέτη των δεδομένων αυτών μπορεί να συνεισφέρει στην καλύτερη κατανόηση της ιατρικής σκέψης στους διαφορετικούς πολιτισμούς, υπογραμμίζοντας τις ομοιότητες και τις διαφορές τους, ενώ θα μπορούσε να αποτελέσει μια πιθανή πηγή φαρμακευτικών υλών για το άμεσο μέλλον.

Λέξεις ευρετηρίου: Ayurveda, Ελληνική Ιατρική, Θιβετανική Ιατρική, Κινεζική Ιατρική, Ουρολιθίαση, Υπέρταση

References

1. RAFFENSPERGER JG, RAVEENTHIRAN V. Pediatric vesicolithotomy from ancient India to Greece, Arabia and the western world. *Pediatr Surg Int* 2019, 35:737-741
2. STROPE SA, WOLF JS Jr, HOLLENBECK BK. Changes in gender distribution of urinary stone disease. *Urology* 2010, 75:543-546
3. XU B, YUAN CS. *Clinical handbook of Chinese medicine.* World Scientific Publishing Co, Singapore, 2013
4. DORJEE P, RICHARDS E. Cures and concepts of Tibetan medicine: Chapters 60–102 of the four Tantras. *Tibetan Medicine* 1985, 2:3-56

5. MINAS K. *An 18th c. Iatrosofion Manuscript*. Verettas Publ, Athens, 2012 [in Greek]
6. TSELIKAS A (ed). *Megdanis' Akeso or unified pharmacology and pharmacopoeia*. Koventarios Public Library of Kozani, Kozani, 2015 [in Greek]
7. FRAGKAKI EK. *The folk medicine of Crete*. Athens, 1978 [in Greek]
8. BENSKY D, CLAVEY S, STOGER E, BENSKY LL. *Chinese herbal medicine: Materia medica*. 3rd ed. Eastland Press, Seatle, WA, 2015:303, 973
9. PINTER I, BAKKER F, BARRETT J, COX C, GIBBY M, HENDERSON S ET AL. Phylogenetic and biosystematic relationships in four highly disjunct polyploid complexes in the subgenera *Ceterach* and *Phyllitis* in *Asplenium* (Aspleniaceae). *Org Divers Evol* 2002, 2:299-311
10. WU Z, RAVEN PH, HONG D; MISSOURI BOTANICAL GARDEN. *Flora of China*. Science Press, Beijing and Missouri Botanical Garden, St. Louis, 1994:279
11. ARYA PY. *Dictionary of Tibetan materia medica*. Motilal Banarsidass Publ, New Delhi, 1998:61, 108, 225, 276
12. DASH VB. *Pharmacopoeia of Tibetan Medicine*. Sri Satguru Publ, Delhi, 1994:5, 6, 14, 33, 221 etc.
13. DAWA G. *A clear mirror of Tibetan medicinal plants*. Tibet Domani, Rome, 1999:54, 220, 336
14. TSARONG TJ. *Tibetan medicinal plants*. Tibetan Medical Publ, Kalimpong, 1994:17, 41, 57
15. NADKARNI KM. *Indian materia medica*. Popular Prakashan, Bombay, 1908
16. PANDEY GS (ed). *The Bhavprakash nighantu with elaborated Hindi commentary by Padmashri Prof. K.C. Chunekar*. Chaukhamba Bharati Academy, Varanasi, 1998
17. PRATIBHA, RATH SK. Medicinal uses of *Ashwagandha* (Indian ginseng) – a historical review. *International Journal of Science and Research Methodology* 2017, 7:149-162
18. www.greekflora.gr

Corresponding author:

C. Grivas, 40 Aidiniou street, 172 36 Ymittos, Greece
e-mail: cosgrivas5@gmail.com