Homeopathy: As Seen through Plant Nanotechnology

Article *in* International journal of plant research · March 2018

DOI: 10.5958/2229-4473.2018.00001.0

4 authors, including:

Ramesh Chaughule
University of Mumbai
29 PUBLICATIONS **203** CITATIONS
SEE PROFILE

Rajesh Barve
cmph
4 PUBLICATIONS **18** CITATIONS
SEE PROFILE

Vegetos: An International Journal of Plant Research & Biotechnology

Ramesh Chaughule,
Vegetos 31(1) March, 2018
Doi: 10.5958/2229-4473.2018.00001.0
Page No: 01-09

Review Article

A SOCIETY FOR PLANT RESEARCH PUBLICATION

Homeopathy: As Seen through Plant Nanotechnology

Ramesh Chaughule*, Kalpana Dabhade, Suhas Pednekar and Rajesh Barve[1]

Abstract

Nature always stands as a golden mark to exemplify the outstanding phenomena of symbiosis. The consumption of plant-based medicines and other botanicals has increased manifold in recent years. The use of herbal medicine due to toxicity and side effects of allopathic medicines, has led to the sudden increase in the number of herbal drug manufacturers. The plant kingdom specifically provides the source for the greater part of homeopathic remedies. The nano-particulate properties of homeopathic medicines and on adaptive nonlinear responses of living systems to low-dose treatments casts doubt on the simplistic dismissal of the entire field. Furthermore, a growing body of clinical evidence including comparative effectiveness trials on thousands of homeopathic patients, a strong safety record, and cost-effectiveness data, make homeopathy a therapeutic strategy that merits consideration. In this paper, emphasis has been given to plants used in homeopathy like *Terminalia arjuna, Holarrhena antidysenterica, Aegle marmelos.*

Keywords

Homeopathy, Nanoparticles, Clinical trials, *Terminalia arjuna, Holarrhena antidysenterica, Aegle marmelos.*

Introduction

In 1796, German physician Samuel Hahnemann first proposed the alternate form of medicine by preparing a wide form of medicines from natural products and gave a name "Homeopathy" (Hahnemann 1993). The word homeopathy is derived from two Greek words: "homoios" which means similar, and "pathos" which means suffering or disease. It is based on resonance where a relation is found between drug symptoms and disease symptoms to obtain cure. Homeopaths still believe that homeopathy works by energizing the vital force of life and works on the principle of similia similibus curenture. It is considered as one of the techniques in which nano quantities of the drug material are effectively used to cure diseases. The extracts used in homeopathy are mostly natural products and environment friendly. According to WHO (World Health Organization), homeopathy is considered as the second largest medical system for primary healthcare. The drugs are also regulated by FDA (Food and Drug Administration).

Homeopathic medicines are micro-dosed natural substances derived from botanical, animal, or mineral sources. These medicines are prepared through a process called potentization. This involves a series of systematic dilutions by trituration and succession. The succession involves vigorous shaking of the substance in alcohol or water. Potentization removes all risks of side effects due to the nanosized particles in the remedy substance and effectively acting on the body to heal the ailment. Thus in clinical practice it is confirmed that with a very dilute solution of a drug, the prepared medicine is considered to be stronger and effective for the patient. The end-product is often so diluted that it is indistinguishable from the dilutant such as pure water, sugar or alcohol. The general terminology for the dilution of the substance given by Hahnemann is centesimal or C scale, meaning the dilution of the substance by a factor of 100 at each stage (Khuda-Bukhsh 2006). At 2C dilution, this solution is further diluted by a factor of 100 meaning that one part of the original substance in 10,000 parts of the solution. Thus two times process has an original material diluted by a factor of 10^4. A 12C, dilution repeats this process 12 times, ending up with the original material diluted by a factor of 10^{24}. Homeopathic medicines work well too with the dilution factor exceeding Avagadro's number (6.023×10^{23}) so that theoretically one would not expect any measurable remnant of the starting material to be present. From the basic physics we know that if the starting material is at one molar concentration (6.023×10^{23} molecules per liter), then at about the 12th dilution (12C) there should be no or very nearly no molecules left of the starting material. Researchers showed that using TEM, Electron diffraction and atomic spectroscopy, there are nanogram quantities of the starting material still present in the high potency remedies in the form of nanoparticles (Chikramane 2010). They claimed that the original metals formed nanobubbles and floated on the surface of the highly diluted mixtures retaining their original potency. The particles of the starting material instantaneously get adsorbed onto the surface of these bubbles and cavitations. Barring controversial statements appeared in the open debate in the journals, we planned our experiments, using less than 12C dilution, to show that starting material does have nanoparticles that are effective to the patients of different ailments (Barve and Chaughule 2013). With the introduction of nanotechnology, the development in homeopathic treatments opened up the possibility of providing strong scientific explanation to other age-old medicinal practices.

Drug Preparation

In homeopathy, the preparation of original substance in natural form is a main criterion. This original substance, called a mother tincture, then goes through series of dilutions by successions or trituration methods to get required potency (Hahnemann 1993, Ghose 1984,

***Corresponding author:** Department of Chemistry, Ramnarain Ruia College, Matunga, Mumbai 400019
E-mail: rsctifr@yahoo.com

Received: 10.12.2017: Published: 31.3.2018

Doi:10.5958/2229-4473.2018.00001.0

Jutte and Riley 2005, Boericke 1989). General procedure of standard Pharmacopia is followed by adding a vehicle in a fixed proportion to the crude drug substance to prepare mother tincture. The active ingredient is dissolved in the solvent such as water or ethanol by a process called maceration or percolation. This basic mother tincture is further used for the preparation of different potencies. The diluted substance is vigorously shaken (succession) that activates the vital energy of the diluted substance. Pellets, tablets or powders are used to with this potentized liquid for medication.

Dilution and their effect as Nanomedicine

Though Homeopaths believe that the potentized medicine functions on an energetic level to stimulate the body to heal itself more efficiently, our approach is to indicate that higher dilutions do show the reduction in particle size of the diluted solutions. Small doses are effective for a range of diseases such as allergies, autoimmune, psychosomatic, and infectious diseases. Any particles ranging between 1 and 100 nanometers (nm) in size are termed as nanoparticles. Nanoparticles are of great scientific interest as they are, in effect, a bridge between bulk materials and atomic or molecular structures. Generally bulk material has constant physical properties regardless of its size, but at the nano-scale size, the material shows totally different properties because of large surface to volume ratio of the nanoparticles (Shah and Buzby 2008) and are increasingly used due to (1) improved bioavailability by enhancing aqueous solubility, (2) increasing resistance time in the body (increasing half life for clearance/increasing specificity for its cognate receptors and (3) targeting drug to specific location in the body (its site of action). This results in the reduction in quantity of the drug required and dosage toxicity, enabling the safe delivery of toxic therapeutic drugs and protection of non target tissues and cells from severe side effects (Abhilash 2010). For drug delivery, not only engineered particles are used as a carrier, but also the drug itself may be formulated at a nanoscale and then function as its own carrier. Thus targeted nanomedicine works at the molecular level to heal sickness at the cellular level, for example, identifying cancer cells to avoid metastasis, and throwing medical substances directly on sick cells so that no secondary effects appear.(Velasco 2010).

Based on the process of nanification and potentization, we will discuss a few plants used in homeopathy for their nano effect and applications.

Terminalia arjuna : A useful drug for Cardiovascular disorder

Botanical Characteristics

Plants are the components of phytomedicine since long. Plant based natural constituents can be derived from any part of the plant like bark, leaves, flowers, roots, fruits, seeds, etc. Thus any part of the plant may contain active components. The systematic screening of plant species with the purpose of discovering new bioactive compounds is a routine activity in many laboratories. Scientific analysis of plant components follows a logical pathway.

Due to its cardio protective role, *Terminalia arjuna,* called as *arjuna* is being used in Ayurveda since 2500 B.C. It has preventive and protective role in cardiovascular disorders, normalizing the increased lipids in blood and heart muscle strengthening properties. *Arjuna* tree (Fig 1) is dense and tall with cone shaped leaves and its white bark is used for medicines. It is a deciduous and ever green tree, standing 20-30 m above ground level. It is found in abundance throughout India, Sri Lanka and Myanmar. Leaves of *arjuna* are oblong or elliptic measuring 10-15 cm long and 4-7 cm broad. The plant exhibits fungicidal, antimicrobial, antibacterial, antifertility and antihuman immuno-deficiency virus induced diseases.

Arjuna herb is very effective for heart and circulatory diseases like heart failure, ischemic heart disease and hypertension. It also helps in the case of heart attack. Regular usage of *arjuna* after recovering from heart attack can reduce the chances of further heart attack. It also helps to lower the cholesterol level and maintain proper blood circulation in the body. Consuming *arjuna* bark by boiling in water every day is very effective for the heart. The bark of *arjuna* is said to be sweet, acrid, cooling and heating, aphrodisiac, expectorant, tonic, styptic, antidysenteric, purgative and laxative (Chopra 1994, Nadkarni 2002). Using *arjuna* as a drug, increased triglycerides and cholesterol levels are normalized and enhances the turnover cycle of LDL-cholesterol in liver by enhancing the synthesis of Apo-B or LDL apoprotein and inhibiting the oxidation of LDL. Lowering of Beta-lipoproteins lipids and increase in HDL of lipid profile results in the suppression of cholesterol biosynthesis in liver.

Phytochemistry of *Arjuna*

Arjunic acid, arjungenin and arjunetin are separated out by the method explained by Barve *et al*. The structures of the separated active components are shown in Fig 2. In addition *Terminalia*'s active constituents include tannins, cardenolide, triterpenoid saponins arjunolic acid, arjunglycosides, flavonoids (arjunone, arjunolone, luteolin), gallic acid, ellagic acid, oligomeric proanthocyanidins (OPCs), phytosterols, calcium, magnesium, zinc, and copper.

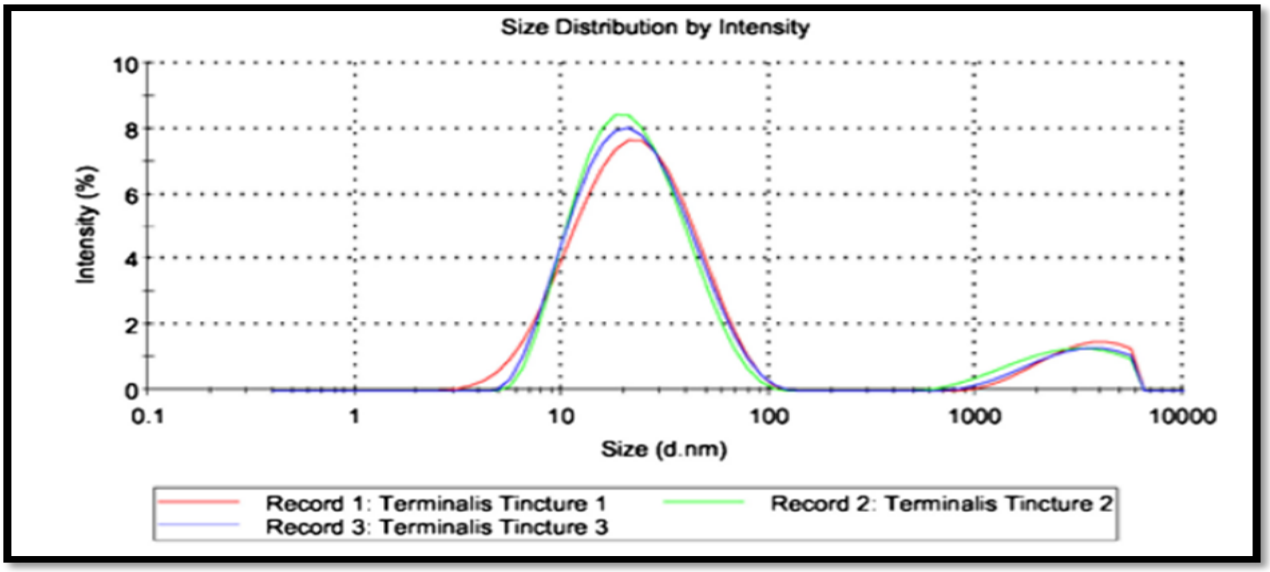
Mechanisms of Action

The primary benefit of *Terminalia* is the improvement of cardiac muscle function and pumping

Doi:10.5958/2229-4473.2018.00001.0

Fig 1. *Terminalia arjuna*

Fig 2. DLS analysis of *Terminalia* tincture.



activity of the heart. It is believed that saponin glycosides might be responsible for the inotropic effect of *Terminalia*, while the flavonoids and OPCs provide free radical antioxidant activity and vascular strengthening. A dose-dependent decrease in heart rate and blood pressure was noted in dogs by giving *Terminalia* intravenously (Das 2010). The isolation of cardinolides from root and seed has resulted to increase the force of cardiac contraction by means of a rise in both intracellular sodium and calcium (Parekh, 2006, Eloff 1998).

Nanoparticles in *Arjuna* Tincture

Dynamic Light Scattering (DLS) is employed to analyze the quantitative size distributions and a more precise quantity of mono-dispersity in colloidal solutions. DLS technique shows that homeopathic tincture is a mixture of particles in nanosize. The mean particle size was 23 nm (Fig 2).

Clinical Studies

Table 1 shows the results of ten patients who consumed *T. arjuna* doses of 0.083 g for 8 weeks or more. There was significant reduction in LDL (low density lipoprotein), VLDL (very low density lipoprotein), TG (triglyceride) and total cholesterol in patients as compared to the traditional dose of 1 to 2 g/day of *T. arjuna* powder of 50 µm particle size available in the market. There is also significant increase (20 %) in HDL (high density lipoprotein) level.

***Holarrhena antidysenterica:* A useful drug for diarrhea**

The widespread Indian species, *Holarrhena antidysenterica* (Linn) (H.A.) is an important plant in Indian medicine system (Fig 3). The seeds are called 'Indra's seeds' in Sanskrit and are said to have sprung from drops of the 'Amrita of life' which fell on the ground from

Doi:10.5958/2229-4473.2018.00001.0

Table 1. *In vivo* study of *Terminalia arjuna*

Patient number	Total cholesterol reduction (%)	HDL increase (%)	LDL reduction (%)	VLDL reduction (%)	TG reduction (%)
1	27	36	35	45	46
5	25.8	-	41.8	19	18.9
8	37	50	30	-	23.2
11	42	21	37	-	5.2
13	23	5	26.1	24.2	23.9
20	28	7.1	39	10	31.5
25	15.6	14.2	25.2	50	46.9
27	13.8	33.3	24.8	41.6	41.6
29	25.4	21	46.2	33.3	12.2
30	17.7	4.6	11.1	42.3	48.7

the bodies of the monkeys of Lord Rama, who were then restored to life by Indra (Nahak 2014).

Holarrhena antidysenterica, which is also known as Kutaja in India is a plant whose extracts are used in medicines for different ailments like diarrhea, asthama, fevers etc (Bhattacharjee 2000). Different parts of Kutaja have been reported for excellent antibacterial activity (Guha 2001). The extract from bark of H.A. is reported to have anti-diarrheal properties (Chopra 1988). The fresh juice of bark is considered good to check the diarrhea. In bleeding and piles, decoction of Kutaja bark is also very useful. Methanolic extract of H.A. stem is also effective in IBS (Inflammatory Bowl Disease) (Darji 2010).

Apart from this the drug is carminative, antispasmodic, astringent, anithelmentic, lithotripter, diuretic, aphrodisiac, tonic, cardio suppressant, antihypertensive, stomachic, anti-pyretic, tonic, antimutagenic, antibacterial, immunomodulatory, antioxidant, antihyperglycemic, anti-malarial, spasmolytic and spasmogenic and is generally administered as an extract or decoction in amoebic dysentery and diarrhoea. Bark is given either alone or with other astringent drugs in piles, colic, dyspepsia, chest affections and diuresis; also reported to be useful in skin diseases and spleen disorders.

Phytochemistry

Phytochemically, plant contains alkaloids, tannins and resin. Conessine as the major alkaloid is apparently responsible for much of its antibacterial activity and also acts as larval growth inhibitor, sterilant, anti-feedant, anti-malarial, anti-tumor, anti-diabetic and anti-plasmodic (Jolly 1996). Kurchisine, Conkurchine, Holarrhine, Kurchiline, Kurchiphyllamine, Conessimine, Hollarhimine, Norconessine, Conessidine, Conamine, Conarrhimine, Isoconessimine, Conimine, Lettocine, Conkurchinine, Holarrhesmine, Kurchessine, Holanamine, Holarrhidine, Holantosine A, B, C, D, E, Holarosine A, Trimethyl Conkurchine; Regholarrhenine A, B, C, D, E, and Holarrifine (Ganapathy 2008).

Nanoparticles in *Holarrhena* tincture

The size of nanoparticles in the tincture determined by DLS technique (Figure 4) was about 34 nm.

Clinical trials

The clinical studies of the tincture showed very good results in patients suffering from viral Gastroentritis, Bacterial gastroenteritis, Protozoal (Giardia & Amoeba) enteritis, Non-specific colitis and Irritable Bowl Disease (IBS) (Dabhade 2016) as depicted in Table 2.

***Aegle marmelos:* A useful drug for dysentery**

Aegle marmelos (A.M.) is a subtropical plant and grows up to an altitude of 1,200 m altitude from sea level (Fig 5). It grows well in the dry forests on hilly and plain areas. A.M. is a widely distributed plant and found in sub-Himalayan tracts from Jhelum eastwards to West Bengal, in central and south India. This plant is found almost in all the states of India. Among the other parts of the tree, A.M. fruit is reported to be valuable Ayurvedic and Homeopathic medicine for chronic diarrhoea, tonic for heart and brain, anti-viral activity, hypoglycaemic activity, antibacterial activity, anti-proliferative activity and against parasites as reported (Sunita 2011). The ripe

Doi:10.5958/2229-4473.2018.00001.0

Fig 3. *Holarrhena antidysenterica*

Fig 4. DLS analysis of *Holarrhena antidysenterica*.

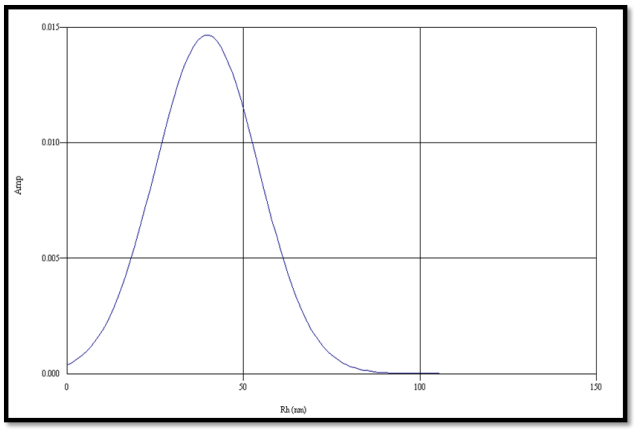


Fig 5. *Aegle marmelos*

fruit is aromatic, cool, alternative, laxative and nutritive. When taken fresh, it is useful in habitual constipation, chronic dysentery and dyspepsia. It also relieves flatulent colic in patients suffering from a condition of chronic gastrointestinal catarrh. Ripe fruit marmalade is used as prevention during cholera epidemics. Powder of the dried fruit pulp is used as febrifuge, antiscorbutic, nauseant, stimulant and antipyretic as reported (Patkar 2012). Unripe fruit powder is found to be effective against intestinal parasite Entamoeba histolytica and Ascaris lumberiodes. Some studies have found the decoction of unripe fruit to be an astringent that is useful in diarrhoea and chronic dysentery (Brijesh 2009).

Phytochemistry of *Aegle marmelos*

Various chemical constituents like alkaloids, coumarins and steroids have been identified from different parts of this tree, such as leaves, fruits, wood, root and bark. Coumarins like marmelosin, marmesin, imperatorin, marmin, alloimperatorin, methyl ether, xanthotoxol, scoparone, scopoletin, umbelliferone, psoralen and marmelide and Marmenol have been reported (Singh, 2013). Alkaloids like aegelin, aegelenine, marmeline, dictamine, fragrine , Halfordinol. Polysaccharides like Galactose, arabinose, uronic acid and 1-rhamanose are obtained on hydrolysis .Seed oil like composed of palmitic, steric, oleic, linoleic and linolenic acid Tannins are also present in leaves as skimmianine. Carotenoids like Marmelosin, skimmianine and umbelliferone are the therapeutically active principles of bael plant (Singh 2013).

Nanoparticles in *Aegle marmelos* tincture

The DLS analysis of A.M. (Fig 6) showed reduction in particle size which was around 38 nm of the tincture which resulted in improved *in vivo* activity of tincture against gastroenteritis and other ailments.

Clinical trials

The potential of nanoparticles in H.A. and A.M plants in maintaining the gastrointestinal dysfunctions like IBS (Irritable Bowel Syndrome), Acute Gastroenteritis, Dysentery, Ulcerative colitis, Post chemo colic carcinoma,

Doi:10.5958/2229-4473.2018.00001.0

Table 2. Clinical studies of *Holarrhena antidysenterica*

S. No.	Patient details	Clinical Diagnosis	Clinical Presentation	Drug and Dose	Result
1.	M/18 yrs	Viral gastro enteritis Stool: 3-4 pus cells, watery stool	h/o outside food, vomiting 6-7/day, diarrhoea watery 10-12 / day, crampy pain abdomen, fever	H.A. tincture 15 drops four times a day with water for three days	Pain abdomen, fever And vomiting cured in one day, diarrhoea reduced to 2-3/day and settled in 2 days
2.	F / 5 yrs	Gm-ve Bacterial gastro enteritis Stool: pus cells 15-20, occ.bld ++, rbc +10-12, bacteria +	h/o outside water, vomiting 3-4, pain abdomen with dysentery like stool, fever 102º F	H.A. tincture 8 drops four times a day for three days	Fever, dysentery and pain subsided in 2 days Stool : normal after 2 days
3.	F / 65 yrs	Giardiasis Stool: giardia cysts++	Pain abdomen, gaseous distention, eructations, unformed sool 3 -4/day	H.A. tincture 10 drops twice a day for one week	Gaseous distention ,pain abdo., unformed stool was better in two days. Stool report after one week no cysts
4.	M/51	Non specific colitis, irritable bowel disease Stool: mucus++ Unformed	Increased stool freq. 3-4 in morning. Gases, bloating abdomen urgency for stool	H.A. tincture 10 drops twice a day with passiflora tincture 10 drops twice a day	Anxiety and stool frequency was well controlled in two weeks
5.	F /50	Amoebiasis, giardiasis Stool: E.Histocysts++ Giardia cysts++ Pus cell- occ	Pain abdomen, diarrhoea 2-3/day Semisolid stool, gases, flatulence Hiatus hernia, gastritis	H.A. tincture 10 drops twice a day for one week	Stool consistency normal in three days
6.	F / 2 yrs	Giardiasis Stool: mucus++ Pus cells 15-20 Giardia few Macrophages+ WBC: 11700	Teething child Loose stool 2-3/day greenish yellow Vomiting, fever100ºF	H.A. tincture 8drops four times with sugar water	Fever and diarrhoea settled in 24 hrs
7.	F/ 50	*E. coli*, Gram -ve bacillary dysentery recurrent stool: mucus+, rbcocc, pus cells 8-10 culture : *E.coli*	h/o D.M., H.T. rumbling abdomen, stool with mucus pain with urge	H.A. tincture 15 drops three times/ day for 8 days	Recurrent infection cured in 8 days Stool: no pus cell No bacteria
8.	M/57	Colitis since 10 yrs Stool: pus 1-2 Epith: occ Mucus+	Milk intolerance Wheat intolerance Stool frequent 3-4/day. Frequent urge after eating Semi-formed stool Weight loss 6-7 kg	H.A. tincture 5 drops three times with Aegle folia tincture 5 drops three times/day	Urge and stool improved in three weeks Weigth gain 2 kg Still under treatment and improving
9.	M /45	Acute gastro enteritis bacterial with fever, min dehydration	h/o travel, outside food , water. fever 101 f. stool 10-12 /day weakness, pain abdo., colic B.P. 100/ 70	H.A. tincture 15 drops 3 hourly for two days	Fever controlled in one day, stool freq. 3-4 in one day and 1-2 next day
10.	F / 55	Acute gastroenteritis viral dehydration k/c/o D.M. v	h/o fried fish diarrhoea 10-12 in 2 hrs vomiting 5-6 Colic + B.P. 90 /70	HA tincture 15 drops 2 hourly Followed by Kali carb 1000	Diarrhoea and colic controlled in one day

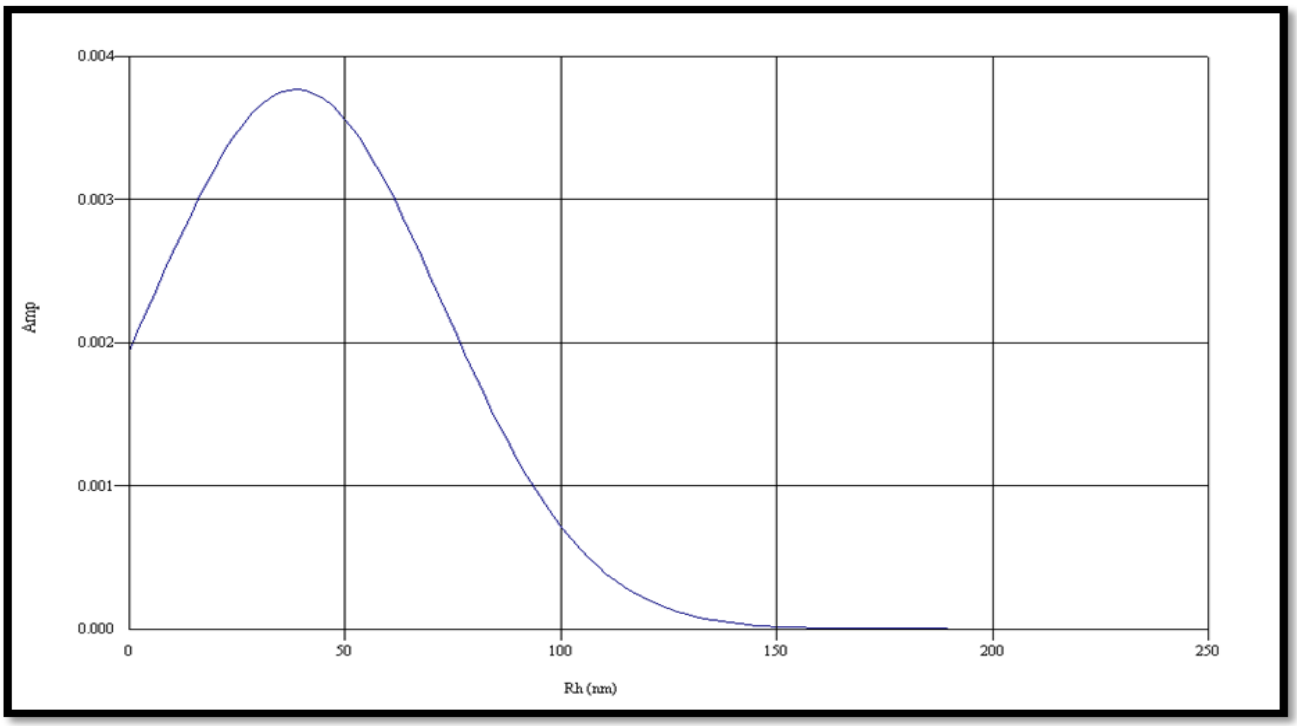
Doi: 10.5958/2229-4473.2018.00001.0

Table 3. *In vivo* study of Synergistic Effect of *Holarrhena antidysenterica and Aegle marmelos*.

S. No.	Patient details	Clinical diagnosis	Clinical Presentation	Drug and Dose
1	F/51	Neuro endocrine tumour of stomach, recurrent diarrhea, weight loss 6 kg, appetite loss	Gastric polyp, eosinopholic, lymphocytic infiltration colon, with oedema	A.M.+ H.A. tincture 15 drops three times/ day, for 1month
2	F/70	Urinary tract infection with fever 102ºF, chill.Known case of D.M. H,T., Hyperlipidemia	W.B.C 17500 Urine: pus cells250-300/hpf, blood+,proteins+Culture: *E.Coli*+, colony count more than 100000	A.M.+ H.A. tincture 15 drops four times/ day for one week
3	M/78	Urinary tract infection with fever 101ºF, dysuria,weakness, loss of appetite,(h/o recurrent urinary infection treated previously with antibiotics)	Urine : pus cells: 40-50, RB.C. : occ, albumin: trace *E.coli* infection	A.M.+ H.A. tincture 15 drops four times/ day for one week
4	M/7	Acute gastro enteritis after outside food, pain abdomen, nausea, vomiting, stool: 10-12 /day, watery, unformed stool, offensive	-clinical diagnosis	A.M.+ H.A. tincture 10 drops four times/ day for three days
5	F/66	Dysentery after spoiled milk product, pain abdomen Known diabetic, filariasis	Stool: blood++, pus cells:4-5 Epithelial cells 1-2	A.M.+ H.A. tincture 15 drops three times for three days
6	F/32	Dysentery, abdomen pain, colic Stools: 7-8 /day	Clinical diagnosis	A.M.+H.A. tincture 15 drops three times for two days
7	F/11	Fever 100ºF, acute gastroenteritis 6-7 stools, pain abdomen, vomiting 2-3 times	Clinical diagnosis	A.M.+H.A. tincture 10 drops four times/ day
8	F/72	Irritable bowel syndrome, stool frequency7-8/day diabetes, hypertension	Stool: mucus 1-2, no pus cells	A.M.+H.A. tincture 15 drops three times
9	M/72	Ulcerative colitis since few years , stool freq 4-5/day Pain abdomen, blood+, mucus+ in stool	Colonoscopic biopsy confirmative Stool; blood+, R.B.C: 8-10 MUCUS ++	A.M. + H.A. tincture 15 drops three times For one month
10	M/68	Urinary tract infection Fever 103ºF, chills, dysuria.	Urine: pus cells: 250-300 RBC: 30-40,blood:+,albumin: +,culture :*E.Coli*++, colony count more than 100000	A.M.+H.A. tincture 15 drops four times/ day For one week

Doi:10.5958/2229-4473.2018.00001.0

Fig 6. DLS analysis of *Aegle marmelos*



neuroendocrine tumor of stomach has been reported in the study and the constituents in the tincture have resulted in better activity due to synergism or lead to decrease in toxicity (Dabhade 2017) as shown in Table 3.

Conclusion

Homeopathy is a safe, effective system of natural medicine, used by millions of people worldwide for more than 200 years. *"Homeopathic remedies"* using plants significantly differ from *"home remedies"* using plants. Herbs have been used in a wide variety of dosage form since they were first discovered to have medicinal qualities. Homeopathy is a totally different therapy than ayurveda and allopathy, in which sequential dilution of the drug with vigorous shaking/stirring (potentization) makes the particle size reduced. From the nanotechnology point of view, the reduction in the particle size of the drug improves the sensitivity of the drug and the dose requirement reduces from 1 to 2 g/day to 0.083 g/day with no toxicity. The experiments are restricted to 12C, ending up with the original material diluted by a factor of 10^{24} to have at least one molecule of the original substance to avoid any scientific conflict. Also from the *in vitro* experiments with *E. coli*, reduction of particle size of tincture has improved the culture results significantly (Barve and Chaughule 2013).

References

Abhilash M (2010). Potential applications of Nanoparticles. International J Pharma Biol Sci 1(1), 1-12.

Barve Rajesh and Chaughule Ramesh (2013). Size-dependent in vivo/in-vitro results of homeopathic tincture. J Nanostr Chem 3:18-22.

Bhattacharjee S K (2000) Handbook of Medicinal Plants, Pointer publisher, Jaipur. Pp 183.

Boericke W (1989) Homeopathic Material Medica.9th Edition, B. Jain Publishers, New Delhi.

Brijesh S, Daswani P, Tetali P, Antia N and Birdi T (2009). Studies on the anti-diarrhoeal activity of Aegle marmelos unripe fruit: Validating its traditional usage. BMC Complement Altern Med 9:47.

Chikramane P S, Suresh A K, Bellare J R and Kane S G (2010). Extreme homeopathic dilutions retain starting materials: A nanoparticulate perspective. .Homeopathy 99: 231-242.

Chopra R N, Chara I C, Handa K L and Kapur L D (1988). Indigenous Drugs of India, Academic Press. New Delhi. Pp 342.

Chopra R N, Chopra I C, Handa K L and Kapoor L D (1994). 2nd Ed. (Academic Publishers Calcutta). Pp 421.

Dabhade Kalpana, Pednekar Suhas, Chaughule Ramesh and Barve Rajesh (2016). Clinical Studies Of Gastro-Intestinal Condition Using *Holarrhena Antidysenterica* Stem Tincture and Its Comparison With Silver Nanoparticles. International Research J Pharma 11:47-52.

Doi:10.5958/2229-4473.2018.00001.0

Dabhade Kalpana, Pednekar Suhas, Chaughule Ramesh and Barve Rajesh (2017). Clinical Studies of Synergistic Effect of Mixture of Aegle Marmelos and Holarrhena Antidysenterica Extracts and Use of Aegle Marmelos In Silver Nanoparticle Synthesis. International J Recent Scientific Res 8 (4): 16325-16329.

Darji Vinay C, Deshpande Shrikalp S and Bariya Aditi H (2010). Effect of Holarrhena *antidysenterica* bark against experimentally induced Inflammatory Bowl Disease in Rats. International Res J Pharma 3(9), 152-154.

Das K, Tiwari RKS and Shrivastava DK. (2010). Techniques for evaluation of medicinal plant products as antimicrobial agent: Current methods and future trends. J Medicinal Plants Res 4(2), 104 -111.

Eloff J N (1998). Which extractant should be used for the screening and isolation of antimicrobial components from plants? J Ethnopharma 60: 1–8.

Ganapathy P S, Sudeep H V, Padmalatha Rai S and Ramachandra Y L (2008). Screening of crude Extracts of Holarrhena antidysenterica Wall against clinically important pathogenic strains. Med Aroma Plant Sci Biotechnol 2: 68-71.

Ghose S C (1984). "Drugs of Hindoosthan." 9th Edition, Hahnemann Publ Company, Calcutta.

Guha Bakshi D N, Sensarma P and Pal D C (2001). A lexicon of medicinal plants in India. Naya Prakosh publishers, Calcutta. 2: 356-358.

Hahnemann C F S (1993). Organon of Medicine. 6th Edition, B. Jain Publishers, New Delhi. Pp 288-294.

Jolly C I and Mechery N R (1996). Comparative Pharmacognostictical , Physiochemical and anti-bacterial studies on seeds of Holarrhena antidysenterica Wall and Wrighita tinctoria R.Br. Indian J Pharma Sci 58, 51-53.

Jutte R and Riley D (2005) A review of the use and role of low potencies in homeopathy. Complementary Therapies Med 13: 291.

Khuda-Bukhsh (2006) A. R., Laboratory Research in Homeopathy, Proc Integral Cancer Therapy. 5: 320–332.

Nadkarni K M (2002). Indian Materia Medica3rd Ed. (Popular Prakashan Bombay). Pp 1198.

Nahak G, Satyajit K and Sahu R K (2014). Comparative Antioxidant Activity and Phytochemical Contents of Callus and Leaf Extracts of *Holarrhena antidysenterica* (L.) International J Pharma Sci Review Res 26(1): 159-164.

Parekh J, Karathia N and Chanda S (2006).Evaluation of antibacterial activity and phytochemical analysis of *Bauhinia variegata* L. bark. African J Biomed Res 9: 53-56.

Patkar A N, Desai N V, Ranage A A and Kalekar K S (2012). A review on *Aegle marmelos*: A Potential Medicinal tree. International Res J Pharma 3(8):86 -91.

Shah S I and Buzby S (2008).Drekker Encyclopedia of Nanoscience and Nanotechnology, CRS Press, Boca Raton, FL. 4356

Singh Seema, Singh Pramod, Kumar Singh Sandeep, Trivedi Mohit, Dixit R K, Shanker Pratap (2013). Biological Activities and Therapeutic Potential of *Aegle marmelos* (Bael): A Review. International Res J Pharma Appl Sci 3(1), 1-11.

Sunita S, Savikumar M and Harshada H (2011). Method validation of marmelosin from fruit pulp of *Aegle marmelos* (L) Correa using HPTLC technique. J Pharma Res 4 (5):1353-1355.

Velasco V, King B, Xu P, Wickstrom E and Panchapakesan B (2010). Nanoparticles: Synthesis, Characterization and Applications. (R S Chaughule and R V Ramanujan, Eds), American Scientific Publisher, USA .

Author Affiliations

[1]Dr. Barve's Homeopathic Clinic, Vile Parle East, Mumbai 400057