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Review Article

A Comparative Review on Allium Sativum and Phyllanthus Emblica

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ABSTRACT

Allium sativum and Phyllanthus emblica have the ability to treat a variety of disorders through diverse formulations. The goal of this comparative analysis is to assess the extractive properties of both plants in various solvents based on their polarity. I've noticed that ethanol has a high potential for extracting the API from the crude medicine, which may be emblica or sativum. As a result, additional assessment and research will be conducted with the consideration of plant potential and extractive production. This review article provides information about these plants, their common names, and their diverse activities in relation to various ailments.

Keywords: Allium sativum, Phyllanthus emblica, evaluation, extraction, crude drug etc

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INTRODUCTION

Natural products and indigenous medicines are of real importance. Modern medicine shall not be the sole antidote for the disease induce today. Therefore, human beings positively discern 'back to nature' make conversation with like phytotherapy as plant products are in pharmaceuticals [1–3].

Allium sativum

Allium sativum, which is popular as garlic, belongs to the family Amaryllidaceae. It antiquated known to humankind for numerous ages for its bioceutical properties. Garlic is indigenous to central Asia and has enduringamain crop in the Mediterranean region and as seasoning in continents like Africa and Europe. India ranks second in garlic producing, where the first is China [4]. Since earliest times, humans have used innate products, such as plants, animals, microorganisms, and marine organisms, in medicines to reduce and treat diseases. According to fossil records, the human use of plants as medicines possibly traced back at least 60,000 years [5,6].The use of natural products as medicines must, of course, have presented a colossal challenge to early humans. It is highly expected that when seeking food, early humans often swallow poisonous plants, which lead the way to vomiting, diarrhoea, coma, or other toxic reactions perhaps even death. Though, in this way, cave-dweller were able to enlarge the knowledge about wholesome materials and natural medicines [7].In due course, humans innovate fire, learned how to make alcohol, grow religions, and made technological breakthroughs, and they learned consequently to develop brand new drugs.

Traditional medicines (TMs) make the utilization of natural products and are of great dominant. alike forms of medicine as traditional Chinese medicine (TCM), Ayurveda, Kampo, traditional Korean medicine (TKM), and Unani recruit natural products and wasrun through all over the world for hundreds or drawn thousands of years, and they have inflorescence into orderly-regulated systems of medicine. In their several forms, they mightcertainly defects, but they are still a beneficial repository of human knowledge[5,8].

Modern medicine cannot be the single antidote for the disease persuade today. For that reason, people emphatically perceive 'back to nature' approaches like phytotherapy as plant by products are rich in pharmaceuticals [9–10]. Allium sativum, that is popular as garlic, belongs to the family Amaryllidaceae. It has been

known to mankind for many ages for its bioceutical properties. Garlic is aboriginal to central Asia and has long been an important crop in the Mediterranean region and as seasoning in continents like Africa and Europe. India ranks second in garlic production, where the first is China [11]. Allium sativum is conventionally working to cure infections, common cold, diabetes, and heart diseases. early Egyptians used garlic for both culinary and curative purposes. In Egypt, garlic was catered for to the working class intricate in large labour during the raising of the pyramids and in Greece, during the earliest Olympics, it was supply as "performance enhancers" in competitive athletics, for the moment, among the Romans, garlic was known to decontaminate the arteries [12,13]. In India, the outstandingpull through medical book, Charaka- Samhita, suggested the consumption of garlic to tend heart disease and arthritis 1900 years ago [14].

Garlic (Allium sativum) is a plant-locate food which is obsessquotidian and is known to undergo strong natural antibiotic with an inclusive spectrum. Phytochemical contents that act as antibacterial incorporate essential oils, allicin, ajoene and flavonoids. Essential oils and allicin hinder the synthesis of RNA, DNA and bacterial proteins. All four of the phytochemicals soothe exceedingly successfully eradicate the bacterial wall. [15,16-17].

Figure 1: Allium sativum photographic presentation of fruit and fresh plant

Phyllanthus emblica

In Ayurvedic medicine, Phyllanthus emblica is used to avoidthesequel of tumors, inflammatory, and as well gastric ulcer [18]. On the authority of Bandyopadhyay et al. (2000), P. emblica come up with cytoprotective action on gastric ulcer formation. P. emblica is generally known as gooseberry (in English) or amla, in which this fruit belongs to phyllanthaceae family. Preliminary research on this fruit also demonstrated that this fruit also has antiviral and antimicrobial activity [19]. This plant also carries abundant tannins as its secondary metabolites [20].

Amla demonstrates several biological activities, including antioxidant,[21] anti-cancer activity,[22],[23] anti-diabetic activity,[24] anti-inflammatory activity,[25],[26] anti-microbial activity,[27] treatment of gastric ailments, [28,29] adaptogenic activity,[21] rejuvenating,[30],[31] and promoting health and longevity [32,33]. Also, it is a wealthyorigin of nutrients, such as amino acids, vitamin C, carbohydrates, alkaloids, and phenolic acids. All parts of amla, particularly fruit, have been studied and reported to possess a variety of pharmacological activities in prevention and treatment of diseases.[30],[34],[35] Due to the fluctuations in fruit productivity and time of fruiting, other parts of amla have been investigated to use as the substituent for fruit.[35],[36]

The plant genus Phyllanthus (Euphorbiaceae) is broadly distributed in most of tropical and subtropical countries. It is very huge genus consisting of approximately 550 to 750 species and is subdivided in to ten or eleven subgenera. Phyllanthus emblica L. (syn. Emblica officinalis) is regularly known as Indian gooseberry. In Ayurveda, P. emblica has been greatly used, both as edible (tonic) plants and for its therapeutic potentials. It is most nutritious and is announce as amain nutrients source of vitamin C, minerals and amino acids. All parts of the plant are used for medicinal motive, especially the fruit, which has been used in Ayurveda [37].

The fruits of Phyllanthus emblica (Phyllanthaceae) frequently well known as amla, is wealthy in polyphenols including tannins, phenolic glycosides and flavonoids. It also accommodates terpenes, sterols, and essential trace elements, vitamins (mainly vitamin C) and amino acids [38]. Amla extract is known to exhibit potent antioxidant properties and safeguard skin fibroblasts against oxidative strain. It also persuadesfibroblast proliferation, controls collagen metabolism and promotes production of procollagen [39]. Gallic acid, the active constituent of amla has a powerful antioxidant activity, acts as a depigmenting agent and inhibits UV induced immunosuppression [40].

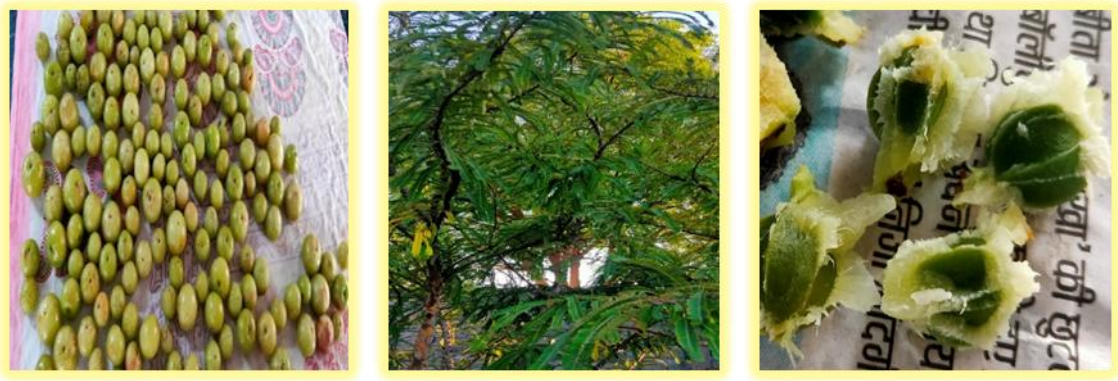

Figure 2: Phyllanthus emblica photographic presentation of fruit, tree and seed.

Vernacular names

These names are general names used to call by localises in their personal language for understandings.

Table 1: Synonyms of both plants in various languages

SYNONYMS	ALLIUM SATIVUM	PHYLLANTHUS EMBLICA
Bengali	Rosun	Amlaki
Hindi	Lashan, lahsun	Amla
Sanskrit	Lasuna, Rosona, Yovanesta	Amaliki
English	Garlic, poorman's treacle	Emblicamyroblan
Italian	Aglio	Mirabolanoemblica
German	Knoblauch, Lauch	Amla
French	Ail	Phyllantheemblica

Taxonomy of plant

Table 2: Taxonomy of both plants in various languages

TAXONOMY	ALLIUM SATIVUM	PHYLLANTHUS EMBLICA
Kingdom	Plantae	Plantae
Division	Magnoliophyta	Flowering plant
Class	Liliopsida	Magnoliopsida
Order	Asparagales	Malpigphiales
Family	Alliaceae	Phyllanthaceae
Genus	Allium	Phyllanthus
Species	Allium sativum	P. emblica

MATERIALS AND METHODS

Collection of the fruits (Phyllanthus emblica) and the bulb of garlic (Allium sativum): The selected parts these plants were collected from Dr. K. N. Modi university, Newai, tonk,Rajasthan during the months of November to December, 2021. They were then washed, chopped into pieces and oven-dried at 80ºc for 3 hours and ground using blender till a uniform powdery form was achieved.

EXTRACTION

Extraction is the first move to separate the desired natural products originating at the raw materials. Extraction procedure involve solvent extraction, distillation method, acute and purify according to the extraction principle. Solvent extraction is the most broadly used method. The extraction of natural resultdevelopment between the following stages: (1) The solvent penetrates toward the solid matrix; (2) The solute dissolves in the solvents; (3) The solute is shake out of the solid matrix; (4) The extracted solutes are collected. Any factor increasesthe diffusivity and solubility in the exceeding steps will facilitate the extraction. The belongings of the extraction solvent, the particle size of the raw substance, the solvent-to-solid ration, the extraction temperature and the extraction time span will affect the extraction efficiency [41,42,43,44,45].

TYPES OF EXTRACTION [45]

a. Maceration

b. Percolation

c. Decoction

d. Reflux extraction

e. Soxhlet extraction

f. Pressurized liquid extraction (PLE)

g. Supercritical fluid extraction (SFE)

h. Ultrasound assisted extraction (UAE)

i. Microwave assisted extraction (MAE)

j. Pulsed electric field (PEF) extraction

k. Enzyme assisted extraction (EAE)

Pure culture preparation

With the help of an inoculating lop, the test organisms were transferred from the pure culture to the agar slants in a laminar unit, the incubated satins were then incubated at 37ºC for 18-24 hours to make sure the growth of test organisms. This culture prepared fortheused for sensitivity test. [46]

Drying and pulverization

The fresh plant products were firstly washed with water to remove adhering dirt and then cut into small pieces, dried at room temperature for 15 days. After finished drying, the entire portions were pulverized into a coarse powder with the help of a blender machine and were stored in an airtight container for further use.[46]

PROCESSAND RESULTS OF EXTRACTS

Mechanical process

Aqueous extract of A. sativum and P. emblica were make ready according to methods previously declared by Onyeagba et al. (2004). 100 g of fresh, washed A. sativum cloves become macerated in a sterile, ceramic mortar. The homogenate was then filtered away with a sterile, muslin cloth and used directly for the sensitivity test. To ensure aseptic conditions, sterile gloves and face masks were worn and the entire extraction was carried out in a media room of the Microbiology Laboratory,

Ethanolic process

The powdered 10gm powders were added with 100ml distilled ethanol in a conical flask. Then the solution was kept in room temperature for 24-72 hours. After that the homogenate was vacuumed filtered with a sterile filter paper. At the time of extraction has beenhold on in a sterile container and stored at -20-degreeCelsius.

Table 3: Extraction value chart of allium sativum and Phyllanthus emblica [47,48,49,50,51]

Extract	Extract Of allium sativum	Extract of Phyllanthus emblica
Methanol	7.55	10.86
Water	NA	36.69
Ethyl acetate	6.88	36.17
Chloroform	0.97	2.04
Petroleum ether	0.14	2.26
n-Hexane	0.1	5.14
Ethanol	15.31	31

CONCLUSION

Both plants allium sativum and Phyllanthus emblica are having potential to treat different diseases with various formulations. Some formulations are available in the market and some are in pipeline. So, this comparative review has a moto to evaluate the extractive values of both the plants in various kind of solvents according to their polarity. I have observed that ethanol is having very good potential to extract the API from the crude drug it could be emblica or sativum. So, for further evaluation and studies will be continue with the consideration of plant potential and the extractive yield.

REFERENCES

1. Kumar, M., Devi, H., Prakash, S., Rathore, S., Thakur, M., Puri, S., &Mekhemar, M. Ethnomedicinal plants used in the health care system: Survey of the mid hills of solan district, Himachal Pradesh, India. *Plants*, 2021; *10*(9):1842.
2. Prakash, P., Kumar, M., Kumari, N., Prakash, S., Rathour, S., Thakur, M., ... &Mekhemar, M. (2021). Therapeutic uses of wild plants by rural inhabitants of Maraog region in district Shimla, Himachal pradesh, India. *Horticulturae*, 2021; *7*(10):343.
3. Prakash, P., Kumar, M., Pundir, A., Puri, S., Prakash, S., Kumari, N., ... & Abdel-Daim, M. M. Documentation of Commonly Used Ethnoveterinary Medicines from Wild Plants of the High Mountains in Shimla District, Himachal Pradesh, India. *Horticulturae*, 2021; *7*(10):351.
4. Srivastava, S. C., Sharma, U. C., Singh, B. K., & Yadava, H. S. (2012). A profile of garlic production in India: facts, trends and opportunities. *International Journal of Agriculture, Environment and Biotechnology*, 2012; *5*(4):477-482.
5. Shi, q.w.; li, l.g.; huo, c.h.; zhang, m.l.; wang, y.f. study on natural medicinal chemistry and new drug development. Chin. Tradit. Herb. Drugs 2010; 41:1583–1589.
6. Fabricant, D. S., & Farnsworth, N. R. The value of plants used in traditional medicine for drug discovery. *Environmental health perspectives*, 2001; *109*(suppl 1):69-75.
7. Gao, x.m.; zhang, t.m.; zhang, j.r.; guo, j.s.; zhong, g.s.chinesemateria medica; china press of traditional chinese medicine: beijing, china, 2007.
8. Alves, R., & Rosa, I. M. Biodiversity, traditional medicine and public health: where do they meet?. *Journal of ethnobiology and ethnomedicine*, 2007; *3*(1):1-9.
9. Kumar, M., Devi, H., Prakash, S., Rathore, S., Thakur, M., Puri, S., & Mekhemar, M. Ethnomedicinal plants used in the health care system: Survey of the mid hills of solan district, Himachal Pradesh, India. *Plants*, 2021; *10*(9):1842.
10. Prakash, P., Kumar, M., Kumari, N., Prakash, S., Rathour, S., Thakur, M., & Mekhemar, M.Therapeutic uses of wild plants by rural inhabitants of Maraog region in district Shimla, Himachal pradesh, India. *Horticulturae*, 2021; *7*(10):343.
11. Prakash, P., Kumar, M., Pundir, A., Puri, S., Prakash, S., Kumari, N., ... & Abdel-Daim, M. M. (2021). Documentation of Commonly Used Ethnoveterinary Medicines from Wild Plants of the High Mountains in Shimla District, Himachal Pradesh, India. *Horticulturae*, 2021; *7*(10):351.
12. Srivastava, S. C., Sharma, U. C., Singh, B. K., & Yadava, H. S. A profile of garlic production in India: facts, trends and

opportunities. *International Journal of Agriculture, Environment and Biotechnology*, 2012; *5*(4):477-482.
13. Sasi, M., Kumar, S., Kumar, M., Thapa, S., Prajapati, U., Tak, Y., & Mekhemar, M. Garlic (Allium sativum L.) Bioactives and Its Role in Alleviating Oral Pathologies. *Antioxidants*, 2021; *10*(11):1847.
14. Lawson, L. D. (1998). Garlic: a review of its medicinal effects and indicated active compounds. *Blood*, *179*, 62.
15. Amagase, H., Petesch, B. L., Matsuura, H., Kasuga, S., &Itakura, Y. (2001). Intake of garlic and its bioactive components. *The Journal of nutrition*, 2001; *131*(3):955S-962S.
16. Ventola, C. L. The antibiotic resistance crisis: part 1: causes and threats. *Pharmacy and therapeutics*, 2015; *40*(4):277.
17. Yunus, F. T., &Suwondo, A. (2021, February). Phytochemical Compound of Garlic (Allium sativum) as an Antibacterial to Staphylococcus aureus Growth. In *IOP Conference Series: Materials Science and Engineering* (Vol. 1053, No. 1, p. 012041). IOP Publishing.
18. Milanda, T. I. A. N. A., Kusuma, A. S. W., & Shanmuganathan, K. U. G. A. N. E. S. H. Antibacterial activity of malacca fruit (Phyllanthus emblica L.) ethanolic extract and fraction againts Bacillus cereus FNCC0057 and Shigella dysentriae ATCC13313. *Asian Journal of Pharmaceutical Clinical Research*, 2017; 8-10.
19. Saeed, S., & Tariq, P. Antibacterial activities of Emblica officinalis and Coriandrum sativum against Gram negative urinary pathogens. *Pakistan journal of pharmaceutical sciences*, 2007; *20*(1):32-35.
20. Anila, L., & Vijayalakshmi, N. R. Antioxidant action of flavonoids from Mangifera indica and Emblica officinalis in hypercholesterolemic rats. *Food chemistry*, 2001; *83*(4):569-574.
21. Rege, N. N., Thatte, U. M., &Dahanukar, S. A. Adaptogenic properties of six rasayana herbs used in Ayurvedic medicine. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*, 1999; *13*(4):275-291.
22. Krishnaveni, M., &Mirunalini, S. Chemopreventive efficacy of Phyllanthus emblica L.(amla) fruit extract on 7, 12-dimethylbenz (a) anthracene induced oral carcinogenesis–A dose–response study. *Environmental toxicology and pharmacology*, 2012; *34*(3):801-810.
23. Vadde, R., Radhakrishnan, S., Kurundu, H. E. K., Reddivari, L., &Vanamala, J. K. Indian gooseberry (Emblica officinalis Gaertn.) suppresses cell proliferation and induces apoptosis in human colon cancer stem cells independent of p53 status via suppression of c-Myc and cyclin D1. *Journal of Functional Foods*, 2016; *25*: 267-278.
24. Kasabri, V., Flatt, P. R., & Abdel-Wahab, Y. H. A. Emblica officinalis stimulates the secretion and action of insulin and inhibits starch digestion and protein glycation in vitro. *European Journal of Medicinal Plants*, 2014; *4*(6):753.
25. Rao, T. P., Okamoto, T., Akita, N., Hayashi, T., Kato-Yasuda, N., & Suzuki, K. Amla (Emblica officinalis Gaertn.) extract inhibits lipopolysaccharide-induced procoagulant and pro-inflammatory factors in cultured vascular endothelial cells. *British journal of nutrition*, 2013; *110*(12):2201-2206.
26. Middha, S. K., Goyal, A. K., Lokesh, P., Yardi, V., Mojamdar, L., Keni, D. S., & Usha, T. (2015). Toxicological evaluation of Emblica officinalis fruit extract and its anti-inflammatory and free radical scavenging properties. *Pharmacognosy Magazine*, *11*(Suppl 3), S427.
27. Mehrotra, S., & Srivastava, A. K. Comparative antimicrobial activities of Neem, Amla, Aloe, Assam Tea and Clove extracts against Vibrio cholerae, Staphylococcus aureus and Pseudomonas aeruginosa. *Journal of Medicinal Plants Research*, 2010; *4*(22):2393-2398.
28. Al-Rehaily, A. J., Al-Howiriny, T. S., Al-Sohaibani, M. O., & Rafatullah, S. (2002). Gastroprotective effects of 'Amla'Emblica officinalis on in vivo test models in rats. *Phytomedicine*, 2002; *9*(6):515-522.
29. Mehmood, M. H., Rehman, A., Rehman, N. U., & Gilani, A. H. Studies on prokinetic, laxative and spasmodic activities of Phyllanthus emblica in experimental animals. *Phytotherapy Research*, 2013; *27*(7):1054-1060.
30. Fujii, T., Wakaizumi, M., Ikami, T., & Saito, M. Amla (Emblica officinalis Gaertn.) extract promotes procollagen production and inhibits matrix metalloproteinase-1 in human skin fibroblasts. *Journal of Ethnopharmacology*, 2008; *119*(1):53-57.
31. Yokozawa, T., Kim, H. Y., Kim, H. J., Okubo, T., Chu, D. C., &Juneja, L. R. Amla (Emblica officinalis Gaertn.) prevents dyslipidaemia and oxidative stress in the ageing process. *British Journal of Nutrition*, 2007; *97*(6):1187-1195.
32. Pathak, P., Prasad, B. G., Murthy, N. A., & Hegde, S. N. The effect of Emblica officinalis diet on lifespan, sexual behavior, and fitness characters in Drosophila melanogaster. *Ayu*, 2011; *32*(2):279.
33. Rawal, S., Singh, P., Gupta, A., & Mohanty, S. (2014). Dietary intake of Curcuma longa and Emblica officinalis increases life span in Drosophila melanogaster. *BioMed Research International*, *2014*.
34. Yokozawa, T., Kim, H. Y., Kim, H. J., Tanaka, T., Sugino, H., Okubo, T., & Juneja, L. R. Amla (Emblica officinalis Gaertn.) attenuates age-related renal dysfunction by oxidative stress. *J. of Agricultural and Food Chemistry*, 2007; *55*(19):7744-7752.
35. Variya, B. C., Bakrania, A. K., & Patel, S. S. Emblica officinalis (Amla): A review for its phytochemistry, ethnomedicinal uses and medicinal potentials with respect to molecular mechanisms. *Pharmacological research*, 2016; *111*:180-200.
36. Sripanidkulchai, B., &Junlatat, J. Bioactivities of alcohol based extracts of Phyllanthus emblica branches: antioxidation, antimelanogenesis and anti-inflammation. *Journal of natural medicines*, 2014; *68*(3):615-622.
37. Bhandari, P. R., &Kamdod, M. A. Emblica officinalis (Amla): A review of potential therapeutic applications. *International Journal of Green Pharmacy (Medknow Publications & Media Pvt. Ltd.)*, 2014; *6*(4).
38. Zhu, X., Wang, J., Ou, Y., Han, W., & Li, H. Polyphenol extract of Phyllanthus emblica (PEEP) induces inhibition of cell proliferation and triggers apoptosis in cervical cancer cells. *European Journal of Medical Research*, 2013; *18*(1):1-5.
39. Fujii, T., Wakaizumi, M., Ikami, T., & Saito, M. Amla (Emblica officinalis Gaertn.) extract promotes procollagen production and inhibits matrix metalloproteinase-1 in human skin fibroblasts. *Journal of Ethnopharmacology*, 2008; *119*(1):53-57.
40. Kumar, K. S., Vani, M. G., Wang, S. Y., Liao, J. W., Hsu, L. S., Yang, H. L., &Hseu, Y. C. In vitro and in vivo studies disclosed the depigmenting effects of gallic acid: A novel skin lightening agent for hyperpigmentary skin diseases. *Biofactors*, 2013; *39*(3):259-270.
41. Li, P., Xu, G., Li, S. P., Wang, Y. T., Fan, T. P., Zhao, Q. S., & Zhang, Q. W. Optimizing ultraperformance liquid chromatographic analysis of 10 diterpenoid compounds in Salvia miltiorrhiza using central composite design. *Journal of agricultural and food chemistry*, 2008; *56*(4):1164-1171.
42. Li, P., Yin, Z. Q., Li, S. L., Huang, X. J., Ye, W. C., & Zhang, Q. W. Simultaneous determination of eight flavonoids and pogostone in Pogostemoncablin by high performance liquid chromatography. *Journal of Liquid Chromatography & Related Technologies*, 2014; *37*(12):1771-1784.
43. Yi, Y., Zhang, Q. W., Li, S. L., Wang, Y., Ye, W. C., Zhao, J., & Wang, Y. T. Simultaneous quantification of major flavonoids in "Bawanghua", the edible flower of Hylocereusundatus using pressurised liquid extraction and high-performance liquid chromatography. *Food chemistry*, 2012; *135*(2):528-533.
44. Zhou, Y. Q., Zhang, Q. W., Li, S. L., Yin, Z. Q., Zhang, X. Q., & Ye, W. C. Quality evaluation of semen oroxyli through simultaneous quantification of 13 components by high performance liquid chromatography. *Current Pharmaceutical Analysis*, 2012; *8*(2):206-213.
45. Du, G., Zhao, H., Song, Y., Zhang, Q., & Wang, Y. (2011). Rapid simultaneous determination of isoflavones in Radix puerariae using high-performance liquid chromatography–triple quadrupole mass spectrometry with novel shell-type column. *Journal of separation science*, 2011; *34*(19):2576-2585.
46. Nair, A., Balasaravanan, T., Jadhav, S., Mohan, V., & Kumar, C. Harnessing the antibacterial activity of Quercus infectoria and Phyllanthus emblica against antibiotic-resistant Salmonella Typhi and Salmonella Enteritidis of poultry origin. *Veterinary World*, 2020; *13*(7), 1388.
47. Gangadhar, M., Shraddha, K., & Ganesh, M. Antimicrobial screening of garlic (Allium sativum) extracts and their effect on glucoamylase activity in-vitro. *Journal of Applied Pharmaceutical Science*, 2012; *2*(1):16.
48. Shakya, V. K., Saxena, R. C., & Shakya, A. (2010). Effect of ethanolic extract of Allium sativum bulbs on Streptozotocin induced diabetic rats. *J. Chem. Pharm. Res*, 2010; *2*(6):171-175.
49. Fauzi, N. I., Ardiansyah, S. A., &Hidayat, S. (2018, December). SkriningMekanismeKerjaDaunMalaka (Phyllanthus emblica L.) SebagaiAntidiabetes. In *Talenta Conference Series: Tropical Medicine (TM)* 2018; 1(3):106-110).