

ORIGINAL ARTICLE

Improved Reproductive Efficacy of *Phyllanthus emblica* L. (Gaertn.) on Testis of Male Swiss Mice and a Pilot Study of its Potential Values

¹Chandan K Acharya, ²Dr. Nithar R Madhu, ³Dr. Naureen S Khan, ⁴Dr. Pokhraj Guha

¹Research Scholar, Department of Life Science, Dr. C.V. Raman University, Kargi Road, Kota, Bilaspur (C.G.),

²Department of Zoology, Acharya Prafulla Chandra College, New Barrackpore, Kolkata-700131, West Bengal, India, ³Department of Life Science, Dr. C.V. Raman University, Kargi Road, Kota, Bilaspur (C.G.), ⁴Department of Zoology, Garhbeta College, West Midnapore, West Bengal, India

ABSTRACT **Introduction:** The extract of 'Amlaki' [*Phyllanthus emblica* L. (Gaertn.)] of Phyllanthaceae family is high antioxidant and protective properties in damaged tissue. In this study, we investigate the histophysiological development of testis of adult Swiss mice by introducing its fruit extract. An effort has been made in combination with the experiment and review process to raise awareness for the medicinal significance and utilization of the Amlaki as natural rich sources of novel bioactive components.

Aims: This article examines to assess the efficacy of the male gonadal development of adult Swiss mice of aqueous extract (20 mg/100 gm body weight/30 days) of fruit of 'Amlaki' [*Phyllanthus emblica* L. (Gaertn.)]. Besides the experimental works, the article also aims to review its remarkable significance on pharmacology and in-vitro antimicrobial activities.

Materials and Methods: Histological parameters and major nutritional components in *P. emblica* fruit extracts (20 mg/100 gm body weight for 30 days) were noticed. Besides, briefly summarizes other medicinal and therapeutic usefulness of this valuable medicinal plant.

Results and Discussions: Treatment with low amount of aqueous extract of an Amlaki fruit, the increased seminiferous diameter, percentage of spermatid and spermatozoa of the testis than an untreated animal. A pilot study proves that every component of Amlaki is beneficial for the treatment of various disease ailments. The fruits of Amlaki in alone or in combination with other plant parts used to treat various diseases. The summarized information might be helpful for future generations who are interested in developing natural drugs also.

Keywords: Amlaki, *Phyllanthus emblica* L. (Gaertn.), Reproductive activity, germ population, Testis

Address for correspondence: Dr. Naureen S Khan, Department of Life Science, Dr. C.V. Raman University, Kargi Road, Kota, Bilaspur (C.G.). E-mail: nicks30khan@gmail.com

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INTRODUCTION

P. emblica L. is an indigenous medicinal plant, found all over India [1, 2]. The entire plant parts including fruits represent a rich source of organic compounds which are used for human health [3]. It contains a high amount of vitamin-C, tannin, polyphenol, carbohydrate, 70 organic bioactive compounds by GC-MS [4]. Treatment with 20mg *E. officinalis* Gaertn./kg bw/day to infertile male rats exhibited recovery of its fertility [5]. The aim of the study was to understand its male gonadal improvement with an introduction with *P. emblica* if faced any toxicological or smoking effect on its testis and also awareness of its medicinal significance.

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METHODS

Adult male Swiss mice were collected from local suppliers. The mice were maintained in individual metallic cages and kept under ambient temperature conditions (12 L : 12 D, hours of light, humidity 75 ± 2%) in the laboratory. Mice were fed a specially prepared diet (40 g/d/mice) and given water *ad libitum* before treatment. 12 mice of almost equal body weight (60 ± 5 g) were included. Mice were allocated into two separate groups, control and aqueous

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extract (20 mg/100 gm body weight for 30 days) of an Amlaki fruit.

The Amla fruits were freshly collected during February and March from the North Bengal hill slope of West Bengal, India. Fruits parts were dried under Sunlight, then grounded in an electric grinder and submerged in 50% methanol for 48 hrs. The extract was filtered and concentrated to dryness in a flash evaporator under reduced pressure and controlled temperature (50°-55°C) to obtain a Crude extract and was stored at 0°C. The crude extract was diluted with distilled water (20 mg/ml) before use. The aqueous extract was administered orally (20 mg/100 gm body weight for 30 days) by a glass syringe fitted with a specially designed blunt needle. The controls were similarly treated with distilled water.

After 30 days, all male mice were weighed and killed by cervical dislocation between 9:30 AM and 10:30 AM. The right testes were weighed, fixed in Bouin's solution, and embedded in paraffin. These tissues were cut into 6 µm thick sections and stained with hematoxylin- eosin. The germ cell populations were counted at a magnification of 1000× (oil-immersion objective 100× and ocular 10×) from 100 different Seminiferous tubules that had been randomly selected and counted from each mice. With the help of an all Britt disk planimeter, the Seminiferous tubular areas of the testis were noted and the area was magnified with a light microscope of low power (10×10) magnification.

Bivariate correlation analyses were performed on the different study parameters using IBM SPSS version 25. Pearson correlation coefficients were calculated based on the Z-score

values to maintain a normalized distribution. P-values less than equal to 0.05 were considered to be statistically significant. Initially, the values of the different parameters were on a different scale. Therefore, to compare them with one another and estimate their relative changes, the values were first scaled on a common range (1-10). Then the values were plotted on a box plot using SPSS software version 25.0 and were grouped based on their category (i.e., Control and treatment). In other words, each parameter is comprised of values from the Control and the treatment group. The variables were standardized by calculating their z-scores. Then the z-scores were subjected to PCA analyses with varimax rotation using SPSS version 25.

RESULTS AND DISCUSSION

The Proximate analysis of the fruit sample showed that Amla contains total ash content (0.22 g/100 g), acid insoluble ash (0.02 g/100 g), moisture content (82.59 g/100 g), total polyphenol (14.99 g/100 g), total Carbohydrate (16.54 g/100 g), tannin Content (23.68 g/100 g) and vitamin C/ascorbic acid (177.67 mg/100 g).

The size of the testis of control and treated mice were normal in shape. Numerous seminiferous tubules, spermatids, and spermatozoa were present in both mice. A very thin basement membrane also is noticed. But in post-treated mice of the 30 days, the percentage of spermatids and spermatozoa were increased significantly. On the other hand, the percentage of spermatogonia was decreased significantly. Seminiferous tubular area and diameter of Leydig cell also increased compared with control (Table 1).

Table 1: Effect of Germ Cell Population, Seminiferous Tubular Area and the Nuclear Diameters of Sertoli and Leydig Cells of Treated with Fruit Extract and Control Mice

Parameters	Control (12 L : 12 D) #	12 L : 12 D + Treatment
Spermatogonia (%)	21.07 ±0.54	14.42±0.89*
(Mean ± SE)		
Primary spermatocyte (%)	18.85±0.55	17.76±0.58ns
(Mean ± SE)		
Secondary spermatocyte (%)	17.68±0.47	19.86±0.75**
(Mean ± SE)		
Spermatid (%)	18.73±0.63	21.0±0.60 **
(Mean ± SE)		
Spermatozoa (%)	18.59±0.77	21.79±0.63***
(Mean ± SE)		
Sertoli cell (%)	4.67±0.62	5.33±0.42ns
(Mean ± SE)		

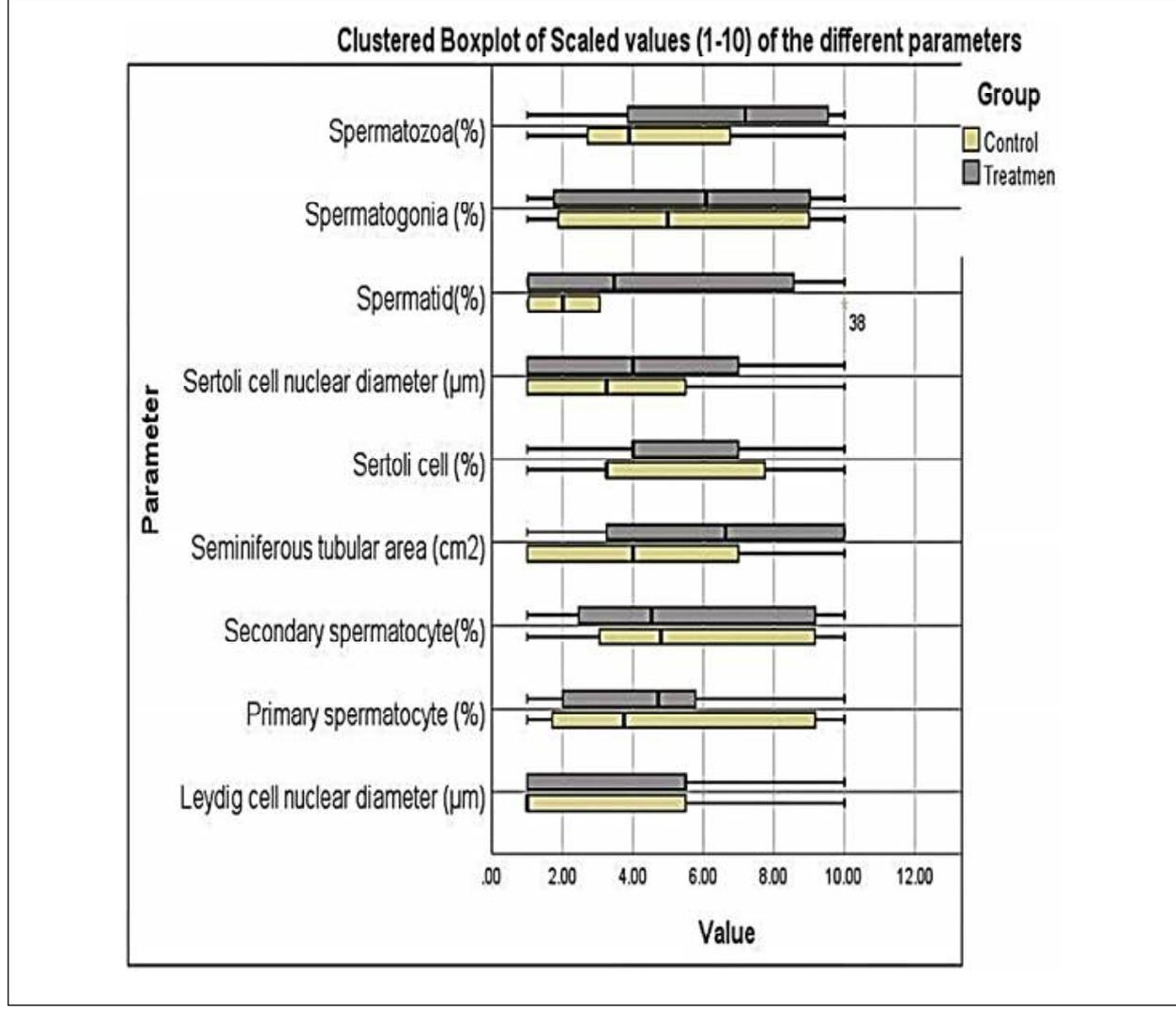
Seminiferous tubular area (cm ²)	15.17±0.48	19.33±0.67*
(Mean ± SE)		
Sertoli cell nuclear diameter (µm)	3.67±0.48	4.17±0.33ns
(Mean ± SE)		
Leydig cell nuclear diameter (µm)	3.50±0.34	4.83±0.31**
(Mean ± SE)		

Note: (# = mice number= 6; SE = Standard Error; ns = Not significant, ** = > Significant at P = 0.001; *** = > Significant at P = 0.05, **** = > Significant at P = 0.01).

From the above table, six significant correlations were observed which are as follows as Sertoli Cells(C) x Primary Spermatocyte (C) = 0.013, Leydig Cell Nuclear Diameter (C) x Primary Spermatocyte (C) = 0.032, Spermatozoa (C) x Sertoli Cell Nuclear Diameter (C) = 0.048 and Sertoli Cell (C) x Leydig Cell Nuclear Diameter (C) = 0.003. It is evident from the Box

plot that in most of the cases the median value in the treatment group is higher than the Control group for each parameter except in the case of secondary spermatocyte. In the case of spermatid (%) in the control samples, it has been found that only one case has an extremely high value compared to the others (Figure 1).

Figure 1: Clustered Box Plot to Compare the Distribution Pattern of the Different Parameters Between the Control and the Treatment Samples



seminiferous tubular area indicates the high level of testosterone and nutrients were formed in the testis due to ingestion of a low amount of aqueous fruit extract of amlaki. Ascorbic acid is known as a catalyst for both lipid peroxidation and alteration of unsaturated fatty acid composition. On the other hand, by reviewing the process, the authors are tried to

validate clinically their medicinal potentialities. Amlaki is the richest natural source of vitamin C. Due to the presence of strong antioxidants and other biological properties to prevent innumerable health disorders it can be used as a possible food additive in biopharmaceutical industries. In this review, we tried to summarize the medicinal based on therapeutic

Table 2a: Experimental Pharmacological Studies on Various Parts of *Phyllanthus emblica* L. (Gaertn.) Plant. (w = Week, d = Day, g = gram, mg = milligram, ml = millilitre, µl = microlitre, kg = kilogram, h = hour)

S. No.	Compounds/Extracts	Pharmacological Activity	Experimental Model/ Study Design	Findings of Effectiveness	Ref.
1	Fruit: Dried aqueous Extract.	Anti-cancer Activity	Human HPV16-(+Ve)(SiHa) and HPV18-(+Ve) (HeLa)cervical cancer cells.	Exhibits its anticancer activities through inhibition of AP-1 and targets transcription of viral oncogenes.	[6]
2	Fruit: Methanolic Extract.	Anti-diabetic Activity	Streptozotocin (STZ)-induced diabetic rats.	Quercetin changes in the levels of glucose, cholesterol, and triglycerides.	[7]
3	Fruit: Aqueous Extract.	Anti-inflammatory and Analgesic Activity	Male Sprague-Dawley rats, weighing 40-60, 100-120, and 200-250 g as well as male ICR mice weighing 30-40 g.	Inhibitory action on the synthesis and/or release of inflammatory or pain mediators may be the main mechanisms of action of <i>P. emblica</i> .	[8]
4	Fruit: Ethanolic Extract.	Anti-oxidant and antitumor activity	HT-29 cancer cells MTT colorimetric assay.	<i>Phyllanthus emblica</i> possessed strong antioxidant and anticancer activity.	[9]
5	Bark: Hydro-alcoholic Extract.	Anti-oxidant Activity	Male Wistar rats (150-200 g)	The IC ₅₀ value was 188.80 g/mL while that of ascorbic acid was 177.7 g/mL.	[10]
6	Fruit: n-hexane, carbon-tetrachloride, chloroform, and aqueous Extract.	Anti-viral Activity	Human Peripheral Blood Mononuclear Cells (PBMCs).	Fruit extract has anti-HIV activity via inhibition of HIV reverse transcriptase activity.	[11]
7	Fruit and leaf: Ethanol Extract.	Anticonvulsant activity	Strychnine Induced Convulsions in Mice Model.	Fruit extract have more anticonvulsant activity than leaf extract.	[12]
8	Fruit: Aqueous Extract.	Anti-apoptosis effect	Male Sprague Dawley rats on contrast-induced acute kidney injury (CI-AKI) model.	Anti-apoptotic activities of PE extract could attenuate renal injury in the CI-AKI model.	[13]
9	Fruit powder.	Anti-hyperlipidemic, hypolipidemic, and anti-atherogenic activity	30 healthy albino rats of Wistar strain (<i>Rattus norvegicus</i>) weighing 150-200 g either sex.	Amla has shown to possess significant hypolipidemic and anti-atherogenic activity slightly lesser as compared to Atorvastatin.	[14]
10	Fruit: Ethanolic Extract.	Biphasic effect on NSAID (Non-steroidal anti-inflammatory drug)-induced ulcer	Male Swiss albino mice (6-8 w, 25 ± 2 g) were kept in 12-h light/dark cycles and housed at 25°C ± 1°C	The biphasic effect is due to switching from anti-oxidant to pro-oxidant shift and immunomodulatory property.	[15]

Table 2b: In-Vitro Experimental Studies on Antimicrobial Activities of Various parts of *Phyllanthus emblica* L. (Gaertn.) Plant

S. No.	Used Extract/Plant Parts	Microbes Type	Name of Microbes	Remarks/Experimental Outcome	Ref.
1	Aqueous extracts (Fruits, seed, stem, leaves and root)	Bacteria	<i>E. coli</i> , <i>Salmonella typhi</i> , <i>S. paratyphi</i> , <i>Staphylococcus aureus</i> , <i>Bacillus sp.</i> , <i>Proteus sp.</i> , <i>Pseudomonas sp.</i> and <i>Klebsiella sp.</i>	<i>Staphylococcus aureus</i> exhibited the maximal antibacterial activity against the fruit extract. Minimum activity of the extracts was observed against <i>Salmonella paratyphi</i> .	[16]
2	Ethanollic Branch Extract (EBE) and Methanollic Branch extracts (MBE).	Bacteria	<i>Staphylococcus aureus</i> , <i>S. epidermidis</i> , <i>Escherichia coli</i> , <i>Salmonella sp</i> and <i>Pseudomonas aeruginosa</i>	Both EBE and MBE similarly inhibited <i>S. epidermidis</i> , <i>E. coli</i> , <i>Salmonella sp</i> and <i>P. aeruginosa</i> . However, EBE inhibited <i>S. aureus</i> slightly more than MBE.	[17]
3	Petroleum ether (Leaf extract)	Bacteria and Fungi	Bacteria- <i>Enterobacter feacalis</i> , <i>Staphylococcus aureus</i> , <i>Salmonella typhi</i> , <i>Escherichia coli</i> <i>Bacillus subtilis</i> . Fungi- <i>Aspergillus niger</i> , <i>Candida albicans</i> and <i>Penicillium notatum</i> .	Activity-Maximum- <i>S. aureus</i> and <i>E. Coli</i> . Moderate- <i>S.typhi</i> . Comparatively less- <i>B.subtilis</i> . Zero- <i>Enterobacter feacalis</i>	[18]
4	Hexane, Ethyl acetate, Methanol, Aqueous (Fruit extract)	Bacteria	<i>Serratia marcescens</i> , <i>Bacillus cereus</i> , <i>Pseudomonas aeruginosa</i> , <i>Escherichia coli</i> . <i>Escherichia coli</i> , <i>Staphylococcus aureus</i> , <i>Vibrio cholerae</i> , <i>Salmonella paratyphi A</i> , <i>Salmonella paratyphi B</i> , <i>Shigella spp.</i> , and <i>Bacillus cereus</i> .	All the extracts exhibited significant antibacterial activity, more against <i>S. aureus</i> than <i>E. coli</i> .	[19]
5	Aqueous (Fruit extract)	Bacteria	<i>Salmonella typhi</i> ,	Effective in killing <i>E. coli</i> , <i>Salmonella paratyphi A</i> , <i>Salmonella paratyphi B</i> , <i>Vibrio spp</i> , <i>Shigella spp</i> , and <i>Bacillus cereus</i> ; but was most effective against <i>Staphylococcus aureus</i> . APE showed a reduced antibacterial activity against <i>Salmonella typhi</i> .	[20]
6	Petroleum ether, Chloroform, Alcohol, Amphotericin (40 g/ml) (Leaf and fruit Extract)	Bacteria	<i>Escherichia coli</i> <i>Pseudomonas aeruginosa</i> , <i>Staphylococcus aureus</i> , <i>Bacillus subtilis</i> .	Alcohol leaf extracts of <i>P. emblica</i> exhibited good activity against <i>S. aureus</i> . The fruit extracts exhibited superior activity against <i>S. aureus</i> .	[21]
7	Methanollic, aqueous (Leaf and fruits extracts)	Bacteria and Fungi	<i>E. coli</i> , <i>Klebsiella . pneumonie</i> , <i>K. ozaenae</i> , <i>Pseudomonas aeruginosa</i> , <i>S.typhi</i> , <i>S. paratyphi A2</i> and <i>B</i> , <i>S. marcescens</i> . <i>Candida albicans</i> .	Maximum activity on- Aqueous infusion and decoction against <i>B. subtilis</i> and <i>S. haemolyticus</i> respectively. Minimum activity on- <i>Candida albicans</i> .	[22]
8	Methanol, water, ethyl acetate, chloroform, hexane. (Fruit extract)	Bacteria	<i>Proteus mirabilis</i> , <i>Klebsiella . pneumoniae</i> , <i>A. baylyi</i> and <i>Pseudomonas aeruginosa</i> .	The ethyl acetate extract (and the methanolic extract to a lesser extent) good inhibitor of the growth of the autoimmune bacterial triggers. Potent against <i>P. aeruginosa</i> (prevention and treatment of multiple sclerosis).	[23]
9	Methanol and aqueous. (Fruit extract).	Bacteria	<i>E. coli</i> and <i>Salmonella typhi</i> (gram -ve), <i>Staphylococcus aureus</i> (gram +ve)	Highest antibacterial activity was against gram positive bacteria (<i>S.aureus</i>) then the gram negative bacteria (<i>S.typhi</i> and <i>E.coli</i>).	[24]

Table 2b (Cont.)					
10	Aqueous and methanol (Leaf extract).	Bacteria	<i>E. coli</i> and <i>Bacillus subtilis</i> .	Combination of amla extract and ofloxacin at 5% concentration is most effective against the <i>B. subtilis</i>	[25]

usefulness and clinically proven pharmacological activities of Amla. Amla with its multi-faceted properties may occupy a prominent position in herbal medicinal systems in the next few decades because of its tremendous pharmacological applications and its high nutritious value. The authors are also tried to summarize the conventional use of sun-dried Amlaki for household treatment by indigenous people. In this context, it is essential to generate awareness among general people regarding the beneficial resources of amlaki for a healthy life. Herein, an effort has been made in this review to raise awareness for the medicinal significance and utilization of the amlaki as natural rich sources of novel bioactive components for the welfare of mankind.

REFERENCES

- Gantait S, Mahanta M, Bera S, Verma SK. Advances in biotechnology of *Emblica officinalis* Gaertn. syn. *Phyllanthus emblica* L.: a nutraceuticals rich fruit tree with multifaceted ethnomedicinal uses. *3 Biotech* 2021; 11: 62.
- Anjum A, Huda Nafees A. Comprehensive Review on a Unani Dynamic Drug: Amla (*Emblica officinalis*). *Asian Plant Res J* 2020; 5:1-6.
- Ahmad B, Hafeez N, Rauf A, Bashir S, Linfang H, Rehman M, *et al.* *Phyllanthus emblica*: A comprehensive review of its therapeutic benefits. *South African J of Bot* 2021; 138:278- 310.
- Acharya CK: Ethnicity and Scientific validation of West Bengal Amla (*Phyllanthus emblica* L.) with special reference to GC-MS screening. *Int. J. Exp. Res. Rev.* 2016; 3: 51- 59.
- Dutta AL, Sahu CR: *Emblica officinalis* Garten fruits extract ameliorates reproductive injury and oxidative testicular toxicity induced by chlorpyrifos in male rats. *Springer Plus* 2013; 2:541.
- Mahata S, Pandey A, Shukla S, Bharti AC. Anticancer Activity of *Phyllanthus emblica* Linn. (Indian Gooseberry): Inhibition of Transcription Factor AP-1 and HPV Gene Expression in Cervical Cancer Cells. *Nutrition and Cancer* 2013; 65:88-97.
- Srinivasan P, Vijayakumat S, Koth S, Palani M. Anti-diabetic activity of quercetin extracted from *Phyllanthus emblica* L. fruit: *In silico* and *in vivo* approaches. *J of Pharm Ana* 2018; 8:109-118.
- Jaijoy K, Soonthornchareonnon N, Panthong A, Sireeratawong S. Anti-inflammatory and analgesic activities of the water extract from the fruit of *Phyllanthus emblica* Linn. *Int. J. of Applied Res. in Natural Products* 2010; 3:28-35.
- Sumalatha D. Antioxidant and Antitumor activity of *Phyllanthus emblica* in colon cancer cell lines. *Int. J. Curr. Microbiol. App. Sci* 2013; 2:189-195.
- Hassan SM, Mughal SS, Aslam A. *Emblica Officinalis* (Amla):A Prospective review on distinctive properties and therapeutic applications of Amla. *Biomedicine and Nursing* 2020; 6:22-30.
- Estari M, Venkanna L, Sripriya D, Lalitha R. Human Immunodeficiency Virus (HIV- 1 reverse transcriptase inhibitory activity of *Phyllanthus emblica* plant extract. *Biology and Medicine* 2012; 4: 178-182.
- Rao AN, Priyadarshini, K, Satyanarayana T. Anticonvulsant Activity of Fruit and Leaf Extract of *Emblica officinalis* against Strychnine Induced Convulsions in Albino Mice—A Comparative Study. *Sch Acad J Pharm* 2017; 536-545.DOI. 10.21276/sajp.2017.6.12.9.
- Kongkham S, Tasanarong A, Itharat, A. Protective effect of *Phyllanthus emblica* extract prevents contrast-induced acute kidney injury in rats. *Asian J Pharm Clin Res* 2019; 12:197- 201.
- Jeevangi SK, Manjunath S, Pranavkumar MS. A study of antihyperlipidemia, hypolipidemic and anti-atherogenic activity of fruit of *Emblica officinalis* (amla) in high fat fed Albino Rats. *Int J Med Res and Health Sc* 2013; 2:70-77.
- Chatterjee A, Chattopadhyay S, Bandyopadhyay, SK. Biphasic Effect of *Phyllanthus emblica* L. Extract on NSAID-Induced Ulcer: An Anti-oxidative Trail Weaved with Immunomodulatory Effect. *Evidence-Based Complementary and Alt Med* 2010; 2011:1-13.
- Varghese LS, Alex N, Ninan MA, Soman S, Jacob S. Evaluation of in vitro antibacterial activity whole plant (fruits, seeds, stem, leaves and roots) of *Emblica officinalis* Gaertn. *IJAHM* 2013; 3:1420-1425.
- Bungorn S, Niramai F. Antioxidant, antimutagenic and antibacterial activities of extracts from *Phyllanthus emblica* branches. *Songklanakarin J. Sci. Technol* 2014;36:669-674.

18. Malliga NE, Dhanarajan MS, Elangovan. Evaluation of Antibacterial and Antifungal Activity of *Phyllanthus emblica* Leaf Extract. *Int. Res. J. of Pharma. and Biosc. (IRJPBS)* 2015; 2:59-66.
19. Darshan D, Payal P, Nupur M. Antibacterial activity of *Embelica officinalis* (Gaertn.) Fruits and *Vitex negundo* (L.) Leaves. *Curr Trends in Biotech and Pharm* 2015; 9:357-368.
20. Shah PJ, Ruchi M. Study of Antibacterial activity of *Phyllanthus emblica* and its role in Green Synthesis of Silver Nanoparticles. *J. of Drug Delivery and Therapeutics* 2019; 9:76-81.
21. Dhale, DA, Mogle UP. Phytochemical Screening and Antibacterial Activity of *Phyllanthus emblica* (L.). *Sc Res Reporter* 2011; 1:138-142.
22. Saeed S, Tariq P. Antimicrobial activities of *Embelica officinalis* and *Coriandrum sativum* against gram positive bacteria and *Candida albicans*. *Pak J Bot* 2007; 39:913-917.
23. Hutchings A, Cock IE. The Interactive Antimicrobial Activity of *Embelica officinalis* Gaertn. Fruit Extracts and Conventional Antibiotics against some Bacterial Triggers of Autoimmune Inflammatory Diseases. *Pharmacog J* 2018; 10:654-62.
24. Singh NS, Moses AS, David ADM. Antimicrobial Activity of *Embelica officinalis* extracts against selected bacterial pathogens. *Int J Basic Applied Res* 2019; 9:325-330.
25. Gautam A, Shukla S. *Embelica officinalis* (Amla) leaf extract potentiates antibacterial activity of some antibiotics. *J of Pharm and Phytochem* 2017; 6:233-236.