ISSN: 0976-3031

Available Online at http://www.recentscientific.com

CODEN: IJRSFP (USA)

International Journal of Recent Scientific Research
Vol. 9, Issue, 4(H), pp. 26083-26089, April, 2018

International Journal of Recent Scientific Research

DOI: 10.24327/IJRSR

Research Article

EXTRACTION, IDENTIFICATION, ESTIMATION OF PHYTOCONSTITUENTS AND PHARMACOLOGICAL EVALUATION OF AQUEOUS AND CHLOROFORM EXTRACT OF CYMPOBOGON CITRATUS (LEMON GRASS)

Jansi Rani K and Vidya S*

Dr.Ambedkar Govt Arts College Chennai -39

DOI: http://dx.doi.org/10.24327/ijrsr.2018.0904.1988

ARTICLE INFO

Article History:
Received 5th January, 2018
Received in revised form 20th February, 2018
Accepted 8th March, 2018
Published online 28th April, 2018

Key Words:

- Anti-oxidant
- Antibacterial
- Lemongrass
- Optical density
- Phytoconstituents

ABSTRACT

Phyto Chemistry is a fast growing study of Phyto Chemicals which are chemicals derived from plants.
The phyto chemical include the flavanoids terpenoids, lignans, polyphenotic etc. In the present study lemon grass was taken for many pharmacological activities. Lemon grass belongs to poacea family, lemon grass were collected, dried, powdered and extracted with water and chloroform. and Extraction done by soxhlet apparatus.
Separation of lemon grass extracts were done by column chromatography method. Phytochemical screening tests were carried out and analysis showed that it contain alkaloids, flavanoids, tannins and phenols. The constituted were estimated using electrometric method. Alkaloids estimated by "SINGHMBTH" method flavanoids estimated by ZHISHEN $Alcl_3$ Method. Phenols were estimated by FOLIN – CIOCALTEAU method and finally tannins by Prussian blue method. Concentration of the extracts were known and amount of phyto constituents were calculated.
Pharmacological evaluation of extracts done by Anti-Oxidant method Namely Nitric Oxide, hydroxyl free radical scavenging activity.
The Anti Bacterial activity were detected by disc diffusion method the dispenser method using species Ecoli and staphylococcus aureas. The result of analysis establish the pharmacological potential of lemon grass.

INTRODUCTION

Lemongrass (Cympobogan Citratus)

Plants are utilized as therapeutic agents since time immemorial in both organized (Ayurveda, Unani) and unorganized (folk, tribal, native) form. Plants have been identified as the potent therapeutic agent, due to the presence of nutritional (minerals and vitamins) and non-nutritional (fibres, active phytochemicals, including the flavonoids, terpenoids, lignans, sulfides, polyphenolics, carotenoids, coumarins, saponins, plant sterols, curcumins, and phthalides) component, hence promoted as "functional food".

Lemon grass Cymbopogoncitratus is an aromatic perennial tall grass with rhizomes and densely tufted fibrous root. It has short underground stems with ringed segments, coarse, green slightly leathery leaves in dense clusters (Carlin, *et al*., 1986). The plant is a native herb from India and is cultivated in other tropical and subtropical countries. (Figueirinha *et al* 2008).

Tissue inflammation is one of the main health issues worldwide. The hike in its prevalence has been attributed to sophisticated lifestyles occasioned by technological advancement. Therefore, inflammation accounts for more cases of mortality among people. Importantly, it has been linked with other health problems like cancer, cardiovascular rheumatoid, neurodegenerative and diabetes (Jaswir and Monsur, 2011).

Solvent extracts, polyphenol rich extractants and citral isolate are the chief components of lemongrass exhibiting anti-inflammatory activities as reported by several investigators. Similarly, aqueous extracts devoid of lipid and essential oil and polyphenol fractions (phenolic acids, flavonoids and tannins) of lemongrass leaves were investigated for their anti-inflammatory properties. The mechanism of action is by inhibiting the secretion of NO and pro-inflammatory cytokine tumor necrosis factor TNF-α (Tiwari *et al.*, 2010).

Corresponding author:* **Vidya S
Dr.Ambedkar Govt Arts College Chennai -39

Oxidation is a fundamental process in human cells, tissue and systems leading to formation of reactive oxygen species (ROSs) which include hydrogen peroxide (H2O2), superoxide anion (O^{2-}) and free radicals (Heo*et al*., 2003). Antioxidants have to be present in the body to offer protective mechanism against damaging effects of oxidation process caused by these radicals (Finkel, 1998; Thannickal and Fanburg, 2000).

Anti-bacterial activity in extracts of plant materials has been elucidated from various sources in recent times with promising results. These components demonstrate their antibacterial activity by inhibiting the growth of both Gram positive and Gram negative bacteria. Several investigations have been carried out on the potentials of lemon grass extract as a source of hypolipidemic and hypoglycemic substances which may lower the risks of hypertension and obesity. The presence of anti-hypertensive compounds such as flavonoids and alkaloids has been reported to assist in the hypoglycemic properties exhibited by lemon grass aqueous extract since it contains essential oil and other extractants (Onabanjo*et al.*, 1993; Oladele*et al.*, 1995). In order to elucidate its efficacy in curing anxiety related conditions, researchers have investigated anxiolytic properties of lemongrass tea (Liberalli*et al*., 1946; Alves *et al.*, 1960; Olaniyi*et al.*, 1975; Nogueira, 1983). The results showed that both leaves and stalk extracts possess radical scavenging ability in a dose dependent manner (Mirghani*et al*., 2012). The possibility of lemon tea possessing antinociceptive effects has been well researched over the years. Earlier reports showed that lemon grass extracts has little or no positive actions thereby negating the claims in folk medicine (Carlini*et al*., 1986; Leite*et al*., 1986; Souza-Formigoni*et al.*, 1986). The action of essential oils extracted from lemon grass decoction against both pathogenic and edible fungi is of immense contribution as investigated by researchers. Lemon grass oil showed a promising prospect among several essential oils by inhibiting the growth of fungi cells which are implicated in secreting mycotoxins during storage of grains and other food products (Fandohan*et al.*, 2008; Nguefacka*et al.*, 2012). Here, the synergistic effects of oil fractions showed both synergistic and antagonistic effects among different portion of characterized oils (Viana *et al*., 2000; Nguefacka*et al.*, 2012). Several studies (both *in-vivo* and *in-vitro*) have been conducted to investigate cytotoxicity and mutagenicity effects of lemongrass extract in order to confirm the safety of lemongrass tea. All phenolic compounds isolated from methanolic extract of lemongrass were nontoxic to human lung fibroblasts even at high concentration (1 mM) (Cheel*et al*., 2005). Although, slight increase in bilirubin and amylase in some of the volunteers observed, such increase did not exhibit any medical implication. Furthermore, lemongrass tea did not show any hypnotic and anxiolytic properties (Leite*et al*., 1986). essential oil from lemongrass is safe for human consumption and can be used for maize storage at prescribe concentration (Fandohan*et al*., 2008).

The Scope of the Present Work

Pyto chemistry is a fast growing area of research various including chemistry physics biology and medicine .Lemongrass had a phytoconstituents. The Estimation of pytoconstituents carried out it has been used as a pharmacological evolution studies

MATERIALS AND METHODS

The plant was collected from Chitannavassel rock near Pudukottai district of, Tamilnadu and identified by the botanist of Sri Sairam Siddha Medical College, Tambaram, Chennai and a specimen was kept in their laboratory. The collected plant material was allowed to dry in sunshade for a week and after that it was crushed and powdered and soaked in chloroform for 3 days (72 hrs). The extract were done by soxhelet apparatus and prepared chloroform and aqueous extract then it is separated by columns chromatography method.

Test for Alkaloids

Mayers test

2 ml of the extract was added with Meyers reagent (1.36 g Mercuric chloride + 3.0 gm Kl in 100 ml of water). Appearance of greyish white precipitate indicates the presence of alkaloids**.** Morquies,Dragendorffs,Hayers,Wagnerstest were also carried out brown precipitate indicates presents of Alkaloids

Test For Flavanoids (shinoda's test)

2 ml of exctractl was warmed and to the warmed solution a piece of Magnesium ribbon was added followed by 2 drops of concentrated HCl drop by drop**.** Absence of orange or yellow colour indicates the presence of flavanoids.

Test For Phenols OH Group ($FeCl_3$ test)

2 ml of extract was warmed then 2 drops of neutral ferric chloride and the colour was observed. Presence of brown green colour indicates the presence of phenolic hydroxyl group.

Test for Tannins

2 ml of extract in 20 ml of water in a test tube. Filter the above mixture add few drops of 0.1% ferric chloride. Development of a brownish green or a blue-black colouration indicated the presence of tannins.

The results of the above tests are showed in TABLE 1(phyto chemical screening test).

Estimation of Phyto Constituents

Alkaloid Estimated By Singh MBTH Method

Procedure

1. 1.0.2,0.3,0.4,0.5,0.6 ml of standard solution was pipetted out in to a series of 50 ml standard flasks.
2. 2 ml of the sample was pipetted out in a separate 50 ml standard flask.
3. To all the flask including the blank 1 ml of standard were added and 0.5 ml of 0.1 M acid.
4. All the flasks were kept in a boiling water bath for 10 minutes.
5. 2 ml of 0.01M MBTH was added into all the flasks and boiled in a water bath for 2 minutes.
6. All the flasks were cooled and made up to the mark with distilled water.
7. The Optical Density (OD) of the blue colour formed was measured at 630 nm for all the sample.

8. A graph was plotted by taking concentration of Theophylline along X-axis and optical density along Y-axis .
9. From the standard curve on the graph, the concentration of unknown sample was calculated.

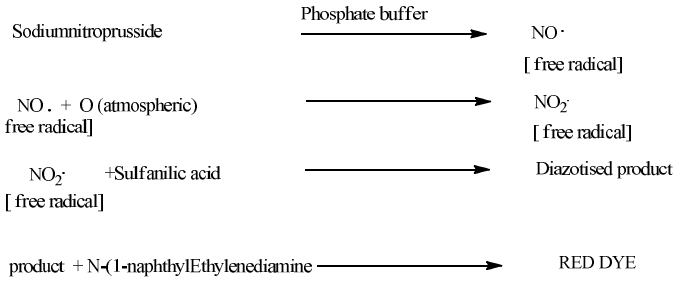
In the same way following phytoconstituents were estimated

Flavanoids Estimated By Zhishen $Alcl_3$ Method
Total Phenolics By *Folin* –Ciocalteau Method
Tanins By Prussian Blue Method

Pharmocological Evaluation

Anti-Oxidant Studies

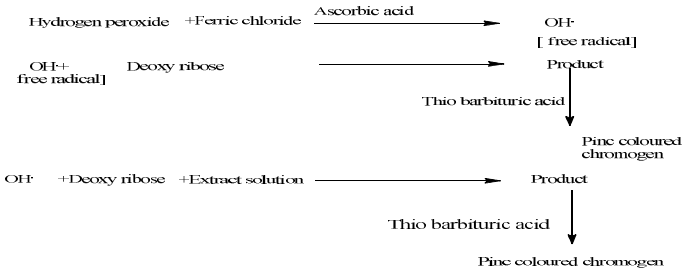
Chemical Reactions in Nitric Oxide Scavenging Assay



measured at 540 nm

Chemical Reactions in Hydroxyl Radical Scavenging Assay

Hydroxyl Radical Scavenging Assay



Anti Bacterial Activity

Disc Difusion Method

When a filter paper disc impregnated with a chemical is placed on agar, the impregrated chemical will diffuse from the disc into the agar. This diffusion will place the chemical on the agar only around the disc. The solubility of the chemical and itsmolecular size will determine the size of the area of chemical infiltration around the disc. If an organism is placed on the agar it will not grow in the area around the disc if it is susceptible to the chemical. This area of no growth around the disc is known as a "zone of inhibition".

Dispenser method

1. Dispenser was made containing the correct antibiotic disks for thetest sample of organism.
2. It was emulsified using a sterile loop in the sterile saline solution.
3. Dispenser was placed over the surface of the plate and used the lever/plunger to dispense the disks.
4. The disks used gently pressed onto the surface of the agar, taking care not to press them into the agar.
5. The plates were inverted and incubated for 24 hours at 37° C.
6. The zone of inhibition (if present) for each antibiotic were measured using metric ruler.
7. The measurement obtained from the individual antibiotics were compared to the table of standards to determine if the bacterial species tested was resistant or sensitive to the antibiotic

RESULTS AND DISCUSSION

Phyto chemical screening results **Table 1**

	Name of the tests	Result		Inference
		Chloroform extract	Aqueous extract	
1	Morquies test	+	-	Presence of Alkaloids in chloroform extract and absence in aqueous extract
2	Mayers test	+	-	
3	Dragendorffs test	+	-	
4	Hayers test	+	-	
5	Wagners test	+	-	
6	Brmine– ammonia test	-	-	Absence of Quinine
7	Iodic acid test	-	-	Absence of Morphine
8	LeibermannBuchard test	-	-	Absence of Terpenoids
9	Shinoda's test	+	+	Presence of Flavanoids
10	Labat test	-	-	Absence of Methelenedioxy group
11	$FeCl_3$ test	+	+	Presence of phenols
12	Gelatin test	+	+	Presence of tannins

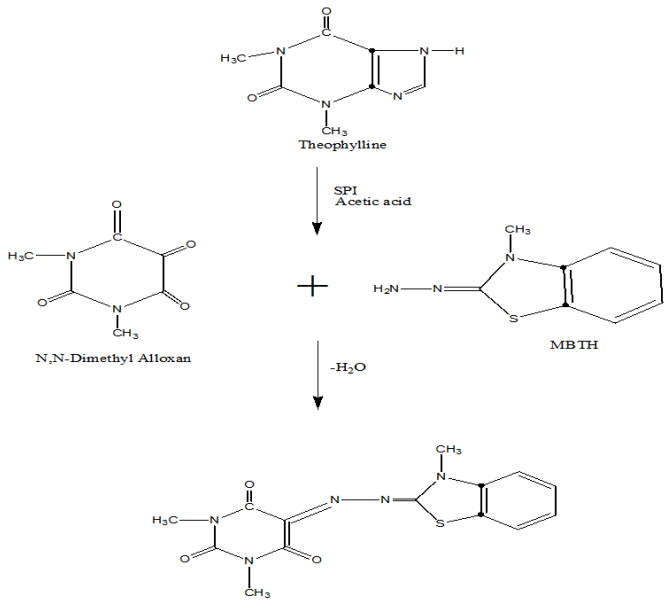


Fig 1 Structure of Alkaloid

Estimation of Phytocostituents

Estimation of Alkaloid by Singh Mbth Method

Standard: Thyophyline

The quantitative determination of alkaloid was carried out by SINGH MBTH method.

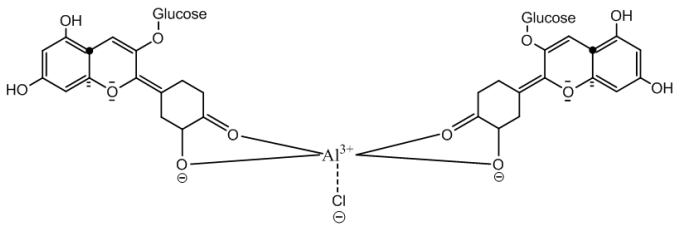


Fig 2 Struture of Flavonoids

In this method, a series of theopyline solution were prepared and after adding the required reagents the OD was measured for each concentration. The concentration of theophylline and corresponding optical density values are showed in figure 3

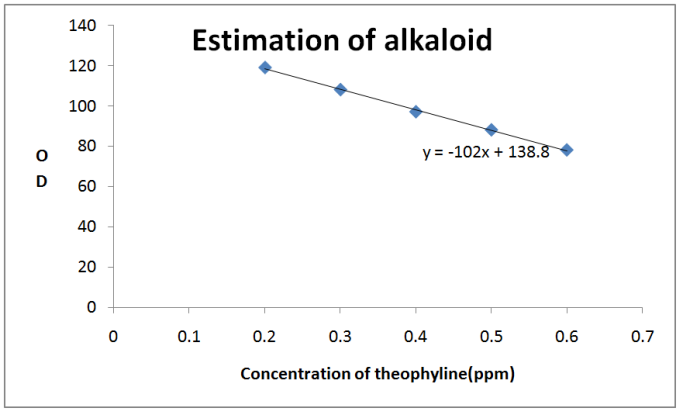


Figure 3

The above calibration graph is best fitted to the equation y=102x+138.8
Using this equation
Percentage of alkaloid in Chloroform extract = 0.4098 ppm
Percentage of alkaloid in aqueous extract = 0.733 ppm

Estimation of Flavanoids by Zhishen $ALCL_3$ Method

Standard: Rutin

The quantitative determination of Flavonoids was carried out by ***ZHISHEN $AlCl_3$*** method. In this method, a series of Rutin solution were prepared and after adding the required reagents the OD was measured for each concentration. The concentration of Rutin and corresponding optical density values are showed in figure 4.

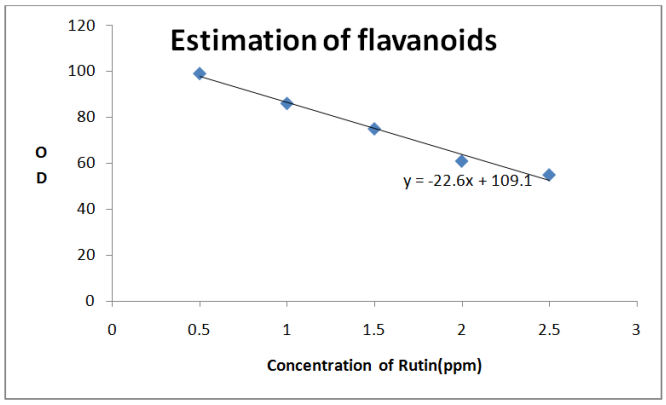


Figure 4

The above calibration graph is best fitter to the equation y=22.6*x*+ 109.1 from this equation
Using this equation
Percentage of Flavanoids in Chloroform extract = 1.8628 ppm
Percentage of Flavanoids in aqueous extract = 2.5265 ppm

Estimation of Total Phenolics By Folin –Ciocalteau Method

Standard: Gallic Acid

The quantitative determination of Phenolics was carried out by ***Folin –Ciocalteau*** method. In this method, a series of Gallic acid solution were prepared and after adding the required reagents the OD was measured for each concentration. The concentration of Gallic acid and corresponding optical density values are showed in figure 5

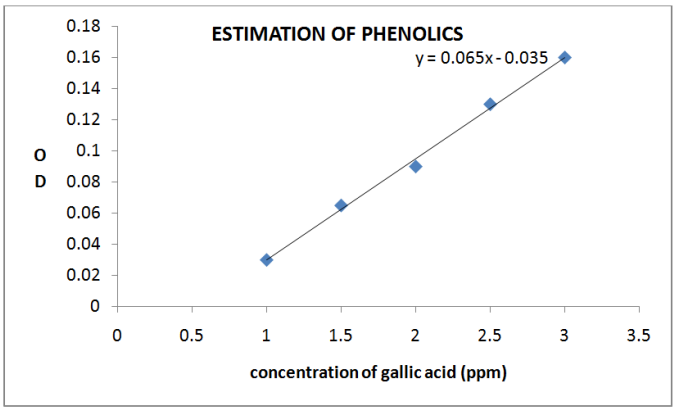


Figure 5

The above calibration graph is best fitter to the equation y=0.065*x*-0.035
Using this equation
Percentage of Phenolics in Chloroform extract is *x*= 2.5384 ppm
Percentage of Phenolics in aqeous extract.is *x*= 2.6923 ppm

Estimation of Tannins by Prussian blue Method

Standard: Tannic Acid

The quantitative determination of Tannins was carried out by Prussian Blue method In this method, a series of Tannic acid solution were prepared and after adding the required reagents the OD was measured for each concentration. The concentration of Tannic acid and corresponding optical density values are showed in figure 6.

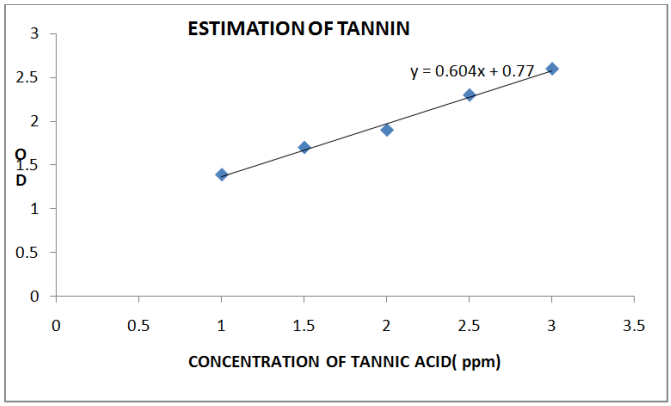


Figure 6

The above calibration graph is best fitter to the equation y=0.065*x*-0.035
Using this equation
Percentage of Phenolics in Chloroform extract is *x*= 2.5384 ppm
Percentage of Phenolics in aqeous extract.is *x*= 2.6923 ppm

Anti-Oxidant Studies

Nitric Oxide Radical Scavenging Assay of Extract

The nitric oxide scavenging assay of chloroform extract and aqueous extract were studied and the results obtained are showed in figure7.

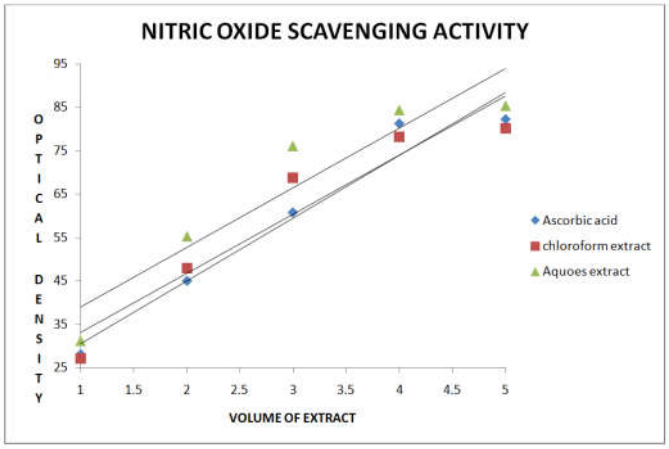


Figure 7

Calculation of Percentage Inhibition

Using the OD values the percentage inhibition of standard ascorbic acid chloroform extract, and aqueous extract were calculated.The percentage inhibition results showed in figure 8

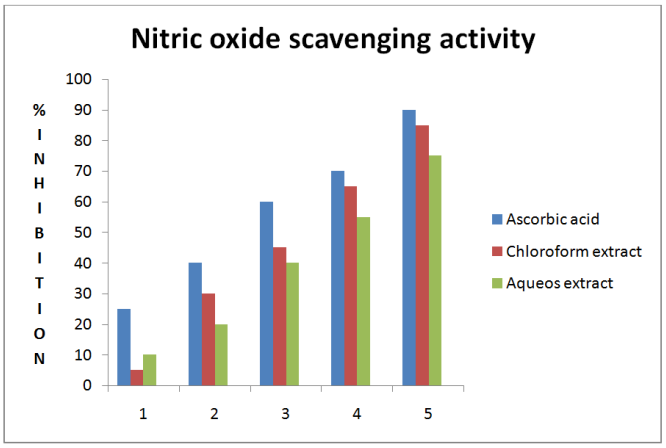


Figure 8

Hydroxyl Radical Scavenging Assay of Extract

The hydroxyl radical scavenging assay of chloroform extract and aqueous extract were studied and the results obtained are showed in figure 9

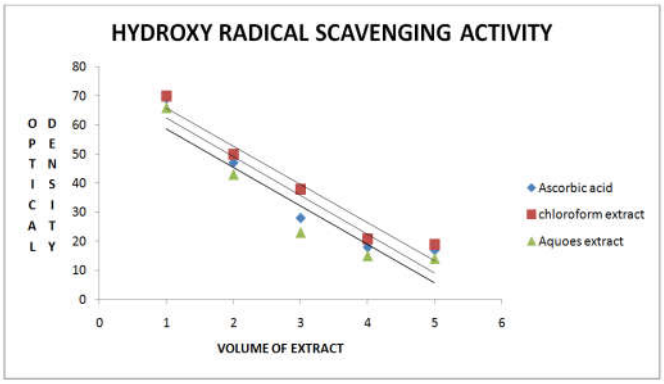


Figure 9

Calculation of Percentage Inhibition

Using the OD values the percentage inhibition of standard ascorbic acid chloroform extract, and aqueous extract were calculated showed in figure 10.

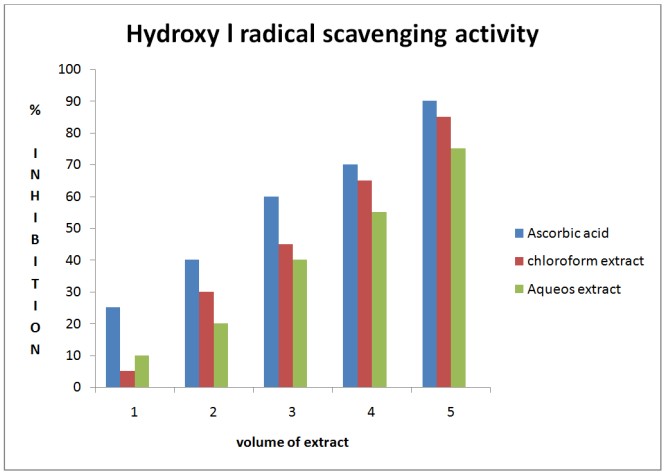


Figure 10

Antibacterial Activity

The anti bacterial activity of chloroform and aqueous extract were tested for a gram negative bacteria (*E.coli*) and gram positive bacteria (*staphylococcus aureus*), using chloramphenicol as standard by disk diffusion method. The zone of inhibition for *E.coli* bacteria was measured in milli meter for different concentration of the sample.

The zone of the inhibition for various concentration for the sample were tabulated as showed in table 2 and table 3.

Anti-Bacterial Activity

Table 2 Zone of Inhibition Species *E.coli*

	100 mg	200 mg	300mg	500 mg
Chloroform extract	16.63	18.2	19.5	20.5
Aqueous extract	18.4	19.3	20.6	21.7
Standard: chloramphenicol	22.3	25.6	28.2	29.8

Table 3 Species: *Staphylococcus Aureus*

	100 mg	200 mg	300mg	500 mg
Chloroform extract	6.63	8.2	9.5	11.5
Aqueous extract	8.4	9.3	10.6	11.7
Standard: chloramphenicol	10.2	11.4	12.1	13.5

SUMMARY AND CONCLUSIONS

In the present study lemongrass plant was collected, dried and powdered. The powder was subjected to Soxhlet extraction using chloroform and water as solvent. The extracts were concentrated and the constituents were separated by column chromatography using Petroleum ether, 10% Benzene in Petroleum ether, 50% Benzene in Petroleum ether, 100% Benzene, 10% chloroform in Benzene, 50% chloroform in Benzene, and 100%chloroform as eluent. The various fractions were collected and TLC was run with chloroform as developing solvent. The fraction which gave only one spot in TLC test was used to identify the specific constituent. Test for alkaloid, flavonoids, Tannins and phenolic were carried out.. The phyto chemical analysis shows that it contains alkaloid, flavonoids, Tannins and phenolic. The constituents were estimated using colorimetric method. The anti oxidant study of the extracts were carried out by in vitro trials. Nitric oxide free radical scavenging characteristics and hydroxyl radical scavenging activity of the extracts were determined. Their inhibition towards the free radical produced, were determined

using optical density measurements. The values obtained were compared with the standard natural anti oxidant ascorbic acid. Concentration versus inhibition graphs were drawn. The graphs obtained reveal the fact that the anti oxidant property is concentration dependent. The bar diagram shows the quantitative inhibition. Antioxidant effectiveness in vivo depends on the bioavailability of responsible compounds; which was assumed to be low. However, recent studies with improved methodology indicate that some plant phenolics appear in plasma and body tissues and, thus, may be important nutritional antioxidants. It is necessary to conduct clinical trial study, to support the laboratory analysis of having high antioxidant capacity, There are no clinical trials with lemon grass on the Indian population, either on healthy or on diseased populations to support its antioxidant claims or its use in any therapeutic condition. Thus efforts need to be directed to assess the pharmacological potential of lemon grass.

References

1. Carlin, E., Contar, J. de., & Silva-Filho, D.P. (1986). Pharmacology of lemon grass (CymbopogoncitratusStapf) 1 Effects of teas prepared from leaves on laboratory animals. *J. Ethnophamacology,*17 (1),37-64.
2. Figueirinha, A., Paranhos, (2008). Cymbopogoncitratus leaves. Characterisation of flavonoids by HPLC-PDA-ESI/MS and an approach to theirpotential as a source of bioactive polyphenols. Fd. Chem, 110, 718-728
3. Figueirinha, A., Cruz, M. T., Francisco, V., Lopes, M. C. and Batista, M. T. 2010. Anti-inflammatory activity of *Cymbopogoncitratus*leaf infusion in lipopolysaccharide-stimulated dendritic cells: contribution of the polyphenols. *Journal of Medicinal Food* 13: 681-90.
4. Figueirinha, A., Paranhos, A., Pe´rez-Alonso, J. J., Santos-Buelga, C. and Batista, M. T. 2008. *Cymbopogoncitratus*leaves: Characterisation of flavonoids by HPLC–PDA–ESI/MS/MS and an approach to their potential as a source of bioactive polyphenols. *Food Chemistry* 110: 718–728
5. Finkel, T. 1998. Oxygen radicals and signalling. *Current Opinion in Cell Biology* 10: 248–253
6. Francisco, V., Figueirinha, A., Neves, B. M., García-Rodríguez, C., Lopes, M. C., Cruz, M. T. and Batista, M. T. 2011. Cymbopogoncitratus as source of new and safe anti-inflammatory drugs: bio-guided assay using lipopolysaccharide-stimulated macrophages. *Journal ofEthnopharmacology* 133: 818–827.
7. Heo, S. J., Lee, K. W., Song, C. B. and Jeon, Y. J. 2003. Antioxidant activity of enzymatic extracts from brown seaweeds. *Algae* 18: 71-81.
8. Jaswir, I. and Monsur, A. H. 2011. Anti-inflammatory compounds of macro algae origin: A review. *Journal of Medicinal Plants Research* 5: 7146-7154
9. Katsukawa, M., Nakata, R., Takizawa, Y., Hori, K., Takahashi, S. and Inoue, H. 2010. Citral, a component of lemongrass oil, activates PPARα and γ and suppresses COX-2 expression. Biochimica et Biophysica Acta (BBA) - *Molecular and Cell Biology of Lipids* 1801: 1214-1220.
10. Kulinsky, V. I. 2007. Biochemical aspects of inflammation. *Biochemistry* 72: 595-607.
11. Lee, H. J., Jeong, H. S., Kim, D. J., Noh, Y. H., Yuk, D. Y. and Hong, J. T. 2008. Inhibitory effect of citral on NO production by suppression of iNOS expression and NF-kappa B activation in RAW264.7 cells. *Archives of Pharmacal Research* 31: 342-349.
12. Leite, J. R., Seabra, M. L., Maluf, E., Assolant, K., Suchecki, D., Tufik, S., Klepacz, S., Calil, H. M. and Carlini, E. A. 1986. Pharmacology of lemongrass (*Cymbopogoncitratus*Stapf). III. Assessment of eventual toxic, hypnotic and anxiolytic effects on humans. *Journal ofEthnopharmacology* 17: 75–83.
13. Liberalli, C. H., Helou, J. H. and Franca, A. A. 1946. Contribuicaoaoestudo das gramineasaromaticas. O capim-cidrao: *Cymbopogoncitratus*DC.) Stapf. ReuistaBrasileira de Farmacia 4: 189-209.
14. Lorenzetti, B. B., Souza, G. E. P., Sarti, S. J., Filho, D. S. and Ferreira S. H. 1991. Myrcene mimics the peripheral analgesic activity of lemongrass tea. *Journal of Ethnopharmacology* 34: 43-48.
15. Lucia, M. O., Formigoni, S., Lodder, H. M., Filho, O. G., Ferreira, T. M. S. and Carlini, E. A. 1986. Pharmacology of lemongrass (*Cymbopogoncitratus*Stapf). II. Effects of daily two month administration in male and female rats and in offspring exposed "in utero". *Journal of Ethnopharmacology* 17: 65-74.
16. Marongiu, B., Piras, A., Porcedda, S. and Tuveri, E. 2006. Comparative analysis of the oil and supercritical CO_2 extract of *Cymbopogoncitratus* Stapf. Natural Product Research 20: 455–459.
17. 18.Meevatee, U., Boontim S., Keereeta, O., Vinitketkumnuen, U. and Oariyakul, N. 1993. Antimutagenic activity of lemon grass, in: Boot-in S. (Ed.), Man and Environment, Chiang Mai University Press p. 346.
18. Mirghani, M. E. S., Liyana, Y. and Parveen, J. 2012. Bioactivity analysis of lemongrass (*Cymbopogancitratus*) essential oil. *International Food Research Journal* 19: 569-575.
19. Negrelle, R. R. B. and Gomes, E. C. 2007. Cymbopogoncitratus (DC.) Stapf: chemical composition and biological activities. RevistaBrasileira de PlantasMedicinais 9: 80-92.
20. Nguefack, J., Tamgue, O., Dongmo, J. B. L., Dakolea, C. D., Leth, V., Vismer, H. F., Zollo, P. H. A. and Nkengfack, A. E. 2012. Synergistic action between fractions of essential oils from *Cymbopogoncitratus*, *Ocimumgratissimum*and *Thymus vulgaris* against *Penicillium expansum*. Food Control 23: 377-383.
21. Nogueira, M. J. C. 1983. Fitoterapia popular e enfermagemcomunitária. São Paulo, Tese (Livre-Docência) - Escola de Enfermagem, Universidade de São Paulo 12: 8-11.
22. Oladele, S. B., Ayo, J. O. and Adaudi, A. O. 1995. Medicinal and physiological properties of flavonoids, coumarin derivatives and anthraquinones of plant origin. West African *Journal of Pharmacology and Drug Research* 11: 134–144.

23. Olaniyi, A. A., Sofowora, E. A. and Oguntimehin, B. O. 1975. Phytochemical investigation of some Nigerian plants used against fevers. II. *Cymbopogoncitratus.* Planta Medica 28: 186-189.
24. Onabanjo, A. O., Agbaje, E. O. and Odusote, O. O. 1993. Effects of Aqueous Extracts of *Cymbopogoncitratus*in Malaria. *Journal of Protozoological Research* 3: 40–45.
25. Onawunmi, G. O., Yisak, W. A. and Ogunlana, E. O. 1984. Antibacterial constituents in the essential oil of *Cymbopugoncitratus*(dc.) Stapf. *Journal of Ethnopharmacology* 12: 274-286.
26. Patil, A. S. 2010. Exploring Passifloraincarnata (L.): A medicinal plants secondary metabolites as antibacterial agent. *Journal of Medicinal Plants Research* 4: 1496-1501.
27. Quintans-Júnior, L. J., Guimarães, A. G., Santana, M. T., Araújo, B. E. S., Moreira, F. V., Bonjardim, L. R., Araújo, A. A. S., Siqueira, J. S., Antoniolli, A. R., Botelho, M. A., Almeida, J. R. G. S. and Santos, M. R. V. 2011. Citral reduces nociceptive and inflammatory response in rodents. *Brazilian Journal of Pharmacognosy* 21: 497-502.
28. *Olorunnisola et al./IFRJ 21(2): 455-462* Nanoemulsions: Effect of Ultrasound Processing Parameters. *Food and Bioprocess Technology* 6: 2439-2446.
29. Sawyerr, E. 1982 Traditional medicine in Sierra Leone - a critical appraisal. *Nigerian Journal of Pharmacy* 13: 28-33.
30. Sforcin, J. M., Amaral, J. T., Fernandes Jr., A., Sousa, J. P. B. and Bastos, J. K., 2009. LG effects on IL-1 and IL-6 production by macrophages. *Natural Product Research* 23: 1151–1159.
31. Shah, G., Shri, R., Panchal, V., Sharma, N., Singh, B. and Mann A. S. 2011. Scientific basis for the therapeutic use of *Cymbopogoncitratus*, stapf (Lemon grass). *Journal of Advanced Pharmaceutical Technology and Research* 2: 3–8..Shigeharu, I., Toshio, T. and Hideyo, Y. 2001. Antibacterial activity of essential oils and their major constituents against respiratory tract pathogens by gaseous contact. *Journal of Antimicrobial Chemotherapy* 47: 565-573.
32. Thannickal, V. J. and Fanburg, B. L. 2000. Reactive oxygen species in cell signalling. *American Journal of Physiology Lung Cellular and Molecular Physiology* 279: 1005–1028.
33. Tiwari, M., Dwivedi, U. N. and Kakkar, P. 2010. Suppression of oxidative stress and pro-inflammatory mediators by *Cymbopogoncitratus*D. Stapf extract in lipopolysaccharide stimulated *murine alveolar macrophages. Food* and Chemical Toxicology 48: 2913-2919.
34. United States Environmental Protection Agency, 1997. EPA REDS Fact sheet Oil of *Citronella* (*Cymbopogoncitratus*) no: EPA-738-F-97-002.
35. Viana, G. S. B., Vale, T. G., Pinho, R. S. N. and Matos, F. J. A. 2000. Antinociceptive effect of the essential oil from *Cymbopogoncitratus* in mice. *Journal of Ethnopharmacology* 70: 323–327.

How to cite this article:

Jansi Rani K and Vidya S.2018, Extraction, Identification, Estimation of Phytoconstituents and Pharmacological Evaluation of Aqueous and Chloroform Extract of Cympobogon Citratus (Lemon Grass). *Int J Recent Sci Res.* 9(4), pp. 26083-26089. DOI: http://dx.doi.org/10.24327/ijrsr.2018.0904.1988

****