ISSN No.: 2455-6130
Volume 1, Issue 10, 2016, pp. 06-11

website: www.ijoetr.com

International Journal of Emerging Trends in Research

Recent Research Assessment in Synthesis and Pharmacological Evaluation of Sesamol Derivatives

Shailesh Kumar Singh[1], Laxmi Tripathi[2], Rubal Rathi[3]

[1,3]LTR Institute of Technology, Meerut India
[2]MIT, Moradabad, India

Abstract

A recent research assessment deals with the evaluation of Sesame seeds and oil synthetic compound derived from natural precursor which are used in treatment of various diseases and their safely use. All the Sesamol derivatives (1-6)A and (1-6)B were synthesized by the given schemes and reaction process was monitored by thin layer chromatography method using silica gel-G stationary phase, ethyl acetate: ethanol (2:3) as mobile phase, and detecting the spots with iodine vapours. All the synthesized derivatives were also confirmed by FTIR, 1H NMR spectroscopy and elemental analysis method. The FTIR spectrums were shown the significant peaks at 3270-3260 cm-1 (N-H strech.), 1720- 1710 cm-1 (Cyclic C=O strech.), 1660-1640 cm-1 (Amide C=O stretch.), 1320-1310 cm-1 (C-N Strech), 695-685 cm-1 (C-S stretch) cm-1.The proton NMR spectrums were also confirmed the different Sesamol derivatives through significant signals due to change in environment of protons.

Keywords: Sesame seeds and oil, TLC, H NMR

1. Introduction

Cloud Sesame (Sesamum indicum L.) is one of the most important oilseed crops worldwide, and has been cultivated since ancient times for use as a traditional health food. (Nzikou, 2010) Sesame (Sesamum indicum) is a flowering plant in the genus Sesame. Numerous wild species of sesame were found in Africa, it is generally believed that sesame originated in Africa and a smaller number in India. Sesame oil has a mild odour and a pleasant taste and, as such, is a natural salad oil. It is used as a cooking oil, in shortening and margarine, as a soap fat, in pharmaceuticals and as a synergist for insecticides. Sesame oil is composed of the Palmitic, Palmitoleic, Stearic, Oleic, Linoleic, Linolenic, and Eicosenoic fatty acids: Sesame oil is rich in unsaturated fatty acids where the fatty acids composition is 14% saturated 39% mono-unsaturated, and 46% poly-unsaturated fatty acids (Toma and Tabekhia, 1979). Carbohydrates in sesame seed are composed of 3.2% glucose, 2.6% fructose and 0.2% sucrose while the remaining quantity is dietary fibers. Sesame oil have desirable physiological effects including antioxidant activity, blood pressure and serum lipid lowering potential as proven in experimental animals and humans (Sirato-Yasumoto et al., 2001). Sesame oil is mildly laxative, emollient and demulcent. Sesame in has been found to protect the liver from oxidative damage. The oil has been used for healing

wounds for thousands of years. It is naturally antibacterial for common skin pathogens such as *Staphylococcus* and *Streptococcus* as well as common skin fungi such as athlete's foot fungus.

Figure 1: Sesame seeds and oil

It is anti-viral and anti-inflammatory used in the treatment of several chronic diseases including hepatitis, diabetes and migraines. Analgesic activity of the ethanolic extract of *Sesamum indicum* has been tested by acetic acid-induced writhing model in mice by Nahar and Rokonuzzaman (2009).

2. Researchers Review

Parul et al., (2012) discussed on the scenario and perceptions of herbal medicine. Herbal medicines are the synthesis of therapeutic experiences of generations of practicing physicians of indigenous systems of medicine for over hundreds of years while nutraceuticals are nutritionally or medicinally enhanced foods with health benefits of recent origin and marketed in developed countries. They also offer therapeutics for age-related disorders like memory loss, osteoporosis, immune disorders, etc. For which no modern medicine is available. Who too has not systematically evaluated traditional medicines despite the fact that it is used for primary health care by about 80% of the world population. However, in 1991 who developed guidelines for the assessment of herbal medicine. Suggestions for herbal medicine standardization are outlined.

Yasothai R. (2014) they lookout for an alternate source of cheaper oil cake with low Level of aflatoxin. One such alternate is the sesame oil cake which contains on an average 32% crude protein (cp), 8-10% oil and total oil and albuminoids of 40-42% and costing lower than soya bean meal and groundnut oil cake. It has been reported to be rich in essential Amino acids namely methionine and cystine.

Raghavendra et al.,(2009) discussed on an overview of herbal medicine they are extensively used in the developing world, where in many places they offer a more widely available and more affordable alternative to pharmaceutical drugs. Increase in herbal medicines popularity brought concerns and fears over the professionalism of practitioners, and quality, efficacy and safety of their treatment methods and products from herbal and natural sources available in the market. Most research has focused on clinical and experimental medicine (safety, efficacy, and mechanism of action) and regulatory issues, to the general neglect of public health dimensions. At present, The pharmaceutical quality of many complementary medicines is a cause for concern. In 1991 who developed guidelines for the assessment of herbal medicine. They focused on safety, efficacy, quality control, clinical trials, bioavailability, herb-drug interactions, intellectual property rights, marketing, and Regulatory aspects related to botanical therapeutics.

Kumar et al.,(2010) had lookout on nutritional, medicinal and industrial Uses of sesame (sesamum indicum l.) Seeds. Sesame (sesamum indicum l.) Seeds have been grown in tropical

regions throughout The world since prehistoric times. Sesame seed, a rich source of protein, is one of The first crops processed for oil production. Sesame seeds also contain two unique substances: sesamin and sesamolin known to have a cholesterol lowering effect in humans and to prevent high blood pressure. Both of these were Also reported to increase the hepatic mitochondrial and the peroxisomal fatty acid Oxidation rate in experimental animals. Cephalin, a phospholipid from sesame Seed has been reported to possess hemostatic activity. The oil has wide medical and Pharmaceutical applications. It is mildly laxative, emollient and demulcent. The seeds And fresh leaves may be used as a poultice. The antibacterial activity of seeds against Staphylococcus and streptococcus as well as common skin fungi, such as athlete's Foot fungus has also been well recognized. The oil is also known to maintain high Density lipoprotein cholesterol (hdl) and lower low density lipoprotein cholesterol (ldl). Refined sesame oil is rich with antioxidant components like lignans allowing For greater shelf-life of foods plus improving their flavor and taste.

Chandra et al., (2012) focused on health benefits of sesame oil on hypertension and atherosclerosis. Hypertension and atherosclerosis are the major contributors of cardiovascular disease worldwide. Drug therapy alone may not be sufficient enough to treat either the hypertension or atherosclerosis without the involvement of any dietary management. Dietary intervention thus becomes an integral part in course of the cardiovascular disease therapy. Moreover, the long term treatment with medications for these chronic diseases results in several adversarial side effects. Therefore it is wise to look for any alternative measure using dietary components with least side effects as a complimentary to minimize the therapeutic costs and other undesired effects. In that course the dietary management by using several foods enriched with natural antioxidants and polyunsaturated fatty acids are gaining much importance in preventing as well as treating the hypertension or atherosclerosis.

Verma et al., (2013) studied on herbal drug delivery system: a modern era prospective. Plant based medicines are used from ancient time for treatment of diseases. In some cases desirable effect are not achieved because the biological action of herbal medicine is due to phytoconstituents which can vary batch to batch. The amount of phytoconstituent in a plant can vary according to age of plant, time of collection, environmental condition etc. Novel drug delivery system (ndds) play very important role to overcome above mentioned issues. Moreover the patient compliance also increases.

Paule (2013) they focused on extraction and characterization of oil from sesame seed. The extraction and characterization of sesame oil was carried out by solvent extraction using n-hexane as the solvent. Output yield evaluated as a function of temperature, contact time and different particle sizes gave an average of 44.80 % oil yield. The extracted oil had a ph value of 4.33 and refractive index of 1.472. The oil has a boiling point of 227^{o}c and specific gravity of 0.920. Peroxide value which is an indication of the ability of oil to get rancid was 2.0. Iodine value was 113; acid value was 5.64%, while the free fatty acid value was 2.82%. Saponification and unsaponifiable values obtained were 190.74 and 1.5% respectively.

Jordao et al., (2011) tuberculosis is an ancient infectious disease that remains a threat for public health around the world. Although the etiological agent. As well as tuberculosis pathogenesis is well known, the molecular mechanisms underlying the host defense to the bacilli remain Elusive. The innate immunity of this disease reviewing well-established and consensual mechanisms like Mycobacterium tuberculosis interference with phagosomematuration, less consensual mechanism like nitric oxide production, and New mechanisms, such as mycobacteria translocation to the cytosol, autophagy, and apoptosis/necrosis proposed mainly during The last decade.

Mukhopadhyay et al., (2012) they discussed about epilepsy and its management. Epilepsy is one of the most common neurologic disorders of the brain, affecting about 50 million individuals worldwide and 90% of them are from developing countries. Genetic factors as well as infection in

brain, stroke, tumor and high fever cause epilepsy. It imposes a large economic burden on health care systems of countries associated with stigma and discrimination against the patient and even his/her family. In the community, workplace, and school and home. Many patients with epilepsy suffer severe emotional distress, behavioral disorders and Extreme social isolation. There are many seizure types and different mechanisms by which the brain generates seizures. The two hallmarks of Seizure generation are hyperexcitability of neurons and hypersynchrony of neural circuits. A large variety of mechanisms alters the balance between excitation and inhibition to predispose a local or widespread region of the brain to hyperexcitability and hypersynchrony.

Khalid et al., (2013) they analysed field evaluation of sesame germplasm against sesame phyllody disease. Phyllody disease, caused by phytoplasma, is a major threat for the successful production of sesame worldwide, Including pakistan. Use of resistant varieties is considered as an economical and durable method of controlling this malady. Therefore, the resistance of 133 sesame genotypes belonging to different regions was evaluated in the field under high Inoculum pressure for two consecutive years.

*Lubaina et al., (2015***)** they researched on evaluation of biological efficacy of trichoderma species isolates Against alternaria leaf spot disease of sesame. Alternaria leaf spot disease is a major threat to sesame (sesamum orientale l.) caused by alternariasesami. Induced resistance is an alternative to systemic disease resistance response of plants. During in vitro bio control test, t. Harzianum colonize and parallely inhibit the growth of the fungal pathogen. Expression of various defence related enzymes observed in sesame induce resistance against the pathogen infection in The host. T. Harzianum coupled with inoculation of a. Sesami enhance the remarkable induction of defence enzyme Such as peroxidase (pox), polyphenol oxidase (ppo), phenylalanine ammonia lyase (pal) and also the phenolic Content compared with the control. The enzyme activity increased from 48 h of sampling and peaked at 72 h and then Decreased after 72 h.

Bing-lan liu et al., (2008) had studied on production of hydrolysate with antioxidative activity and functional properties by enzymatic hydrolysis of defatted sesame (sesamum indicum l.). Sesame protein isolate is produced from dehulled, defatted sesame seed and used as a Starting material to produce protein hydrolysate by trypsin and bromelain. The degree of hydrolysis (dh), molecular weight distribution, dpph radical-scavenging activity, and fibrinolytic Activity of the hydrolysates were investigated. Within 120 and 240 min of hydrolysis, the maximum Cleavage of peptide bonds occurred was found for trypsin and bromelain. The hydrolysates treated by trypsin For 30 min (hydrolysis time) showed that more than 95% of < 50 kda fraction was degraded. The Molecular weight of the major band of the hydrolysates by trypsin was centred at 28 kda. No Significant changed were observed when treating with bromelain. The results suggested that the Antioxidant activity of defatted sesame protein hydrolysates were related to its dh, hydrolysis Time and molecular weight. Furthermore, fibrinolytic activity test demonstrated that the trypsin Hydrolysate produced a lysed zone on the thrombin-clotted enzyme-induced fibrin plates.

Zdravkovic et al., (2012) was studied in the extraction kinetics and the antioxidant activity of the sesame seeds (sesames indicum l.) Aqueous extracts. the effect of ph medium (redistilled water at ph 4 and ph 7) on the yield and kinetics of total extractives (te) and inositol hexaphosphate (ip6) from the sesame seeds (*sesames indicum* l.). A higher yield of total extractives (7.8 g/100 g of the dried plant material) was obtained by the Extraction in neutral medium (ph 7) at room temperature and at solid to liquid Ratio of 1:10 (m/v). Two types of models, ponomaryov model and the model Based on non-stationary diffusion, were applied for the extraction of total extractives By using the maceration procedure. Based on the obtained coefficients B and k, both models were successfully applied. The contents of ip6 and lower inositol phosphates were determined in the aqueous extracts of sesame Seeds by using hplc method. A significantly higher yield of ip6 (2.11 g/100 g of the dried plant material) was achieved in the acidified medium. The optimal Extraction times for te and ip6 under mentioned experimental conditions were 10 and 4

min, respectively. A short extraction time for ip6 indicated a good Solubility of this molecule in water. The antioxidant activity of ip6 standard and Aqueous extracts obtained from the sesame seeds in neutral and acidic medium Was determined spectrophotometrically estimating their ability to neutralize A stable 1,1-diphenyl-2-picrylhydrazyl (dpph) radical.

Nzikou et al., (2010) was studied on characterization of seeds and oil of sesame (sesamum indicum l.) and the kinetics of degradation of the oil during heating. That the seed contained 5.7% moisture, 20% Crude protein, 3.7% ash, 3.2% crude fiber, 54% fat and 13.4% carbohydrate. The seeds were found to be good Sources of minerals. Potassium (851.35±3.44 mg/100g) was the highest, followed in descending order by Phosphorus (647.25±3.52 mg/100g), magnesium (579.53±0.42 mg/100g), calcium (415.38±3.14 mg/100g) and sodium (122.50±4.21 mg/100g). The physical properties of the oil extracts show ed the state to be liquid at room temperature. The oil was found to contain high levels of unsaturated fatty acids, especially olei (up to 38.84%) and linoleic (up to 46.26%). *Sesamum indicum* l. Oil can be classified in the oleic-linoleic acid Group. The thermal oxidation of the double bonds of the oil showed a first-order thermal oxidation kinetic and the arrhenius plot yielded a straight line with a slope Equivalent to activation energy of 12.428 kj.molg1.there is the possibility of considering the seed as feed Supplement and its oil for industrial application.

3. Conclusion

Sesamol is the natural organic component of sesame oil which is the derivative of phenol chemically. All the Sesamol derivatives (1-6)A and (1-6)B were synthesized by the given schemes and reaction process was monitored by thin layer chromatography method using silica gel-G stationary phase, ethyl acetate: ethanol (2:3) as mobile phase, and detecting the spots with iodine vapours. All the physical constant data were characterized for all the synthesized derivatives. All the synthesized derivatives were also confirmed by FTIR, 1H NMR spectroscopy and elemental analysis method. The FTIR spectrums were shown the significant peaks at 3270-3260 cm-1 (N-H strech.), 1720- 1710 cm-1 (Cyclic C=O strech.), 1660-1640 cm-1 (Amide C=O stretch.), 1320-1310 cm-1 (C-N Strech), 695-685 cm-1 (C-S stretch) cm-1. The proton NMR spectrums were also confirmed the different Sesamol derivatives through significant signals due to change in environment of protons. The solubility profile studies were also performed for all the synthesized Sesamol derivatives. As per given solubility profile, most of the derivatives were soluble in organic solvents and insoluble in water. The antiepileptic activity was performed in rat model for those synthesized derivatives using phenytoin as standard drug. All the results of antiepileptic activity study shown that the Sesamol derivative possess highly antiepileptic activity.

References

Agarwal, P., Fatima, A., & Singh, P. P. (2012). Herbal medicine scenario in India and European countries. *Journal of Pharmacognosy and Phytochemistry*, *1*(4).

Yasothai, R. (2014). Chemical composition of sesame oil cake–review. *International Journal of Science, Environment and Technology*, *3*, 827-835.

Kumar, V. (2009). An overview of herbal medicine. *Int. J. Ph. Sci*, *1*(1), 1-20.

Anilakumar, K. R., Pal, A., Khanum, F., & Bawa, A. S. (2010). Nutritional, medicinal and industrial uses of sesame (Sesamum indicum L.) seeds-an overview. *Agriculturae Conspectus Scientificus (ACS)*, *75*(4), 159-168.

Chandra, L. C., & Kuvibidila, S. (2012). Health benefits of sesame oil on hypertension and atherosclerosis. *AJBBL*, *1*, 36-42.

Verma, H., Prasad, S. B., & Yashwant, S. H. (2013). Herbal drug delivery system: A modern era

prospective. *Int J Current Pharma Rev Res*, *4*, 88-101.

Paul E Dim (2013). Extraction and characterization of oil from sesame seed. Research Journal of Pharmaceutical, *Biological and Chemical Sciences* 4(2): 752-57.

Jordao, L., & Vieira, O. V. (2011). Tuberculosis: new aspects of an old disease. *International journal of cell biology*, *2011*.

Aithal, S., Balaji, V., Geetha, S., Swetha, E. S., & Udupa, A. L. (2015). Anticonvulsant activity of Granisetron in Albino mice. *International Journal of Pharmacological Research*, *5*(5), 119-121.

Akhtar, K. P., Sarwar, G., Sarwar, N., & Elahi, M. T. (2013). Field evaluation of sesame germplasm against sesame phyllody disease. *Pak. J. Bot.*, *45*, 1085-1090.

Raihan, A., Rahman, M. A., & Nahiyan, A. S. M. (2016). Genomic DNA Extraction Method From Trichoderma Spp. Colonies Without The Use Of Phenol. *Imperial Journal of Interdisciplinary Research*, *2*(4).

Liu, B. L., & Chiang, P. S. (2008). Production of hydrolysate with antioxidative activity and functional properties by enzymatic hydrolysis of defatted sesame (Sesamum indicum L.). *International Journal of Applied Science and Engineering*, *6*(2), 73-83.

Zdravkovic A, Nikolic V, Stojanovic SI, Stanojevic L, Savic I (2012). The extraction kinetics and the antioxidant activity of the sesame seeds (sesames indicum l.) aqueous extracts. Advanced technologies 1(2): 48-57.

Idris, Y. M., Hassan, S. A., & Mariod, A. A. (2013). Physicochemical characteristics and aflatoxin levels in two types of Sudanese sesame oil. *Journal of the American Oil Chemists' Society*, *90*(7), 989-998.

.