



CODEN [USA]: IAJPBB

ISSN: 2349-7750

INDO AMERICAN JOURNAL OF PHARMACEUTICAL SCIENCES

<http://doi.org/10.5281/zenodo.1486090>

Available online at: <http://www.iajps.com>

Research Article

HEPATIC CHANGES IN LIVER OF ALBINO RATS INDUCED BY MONOSODIUM GLUTAMATE AND HEPATO- PROTECTIVE ROLE OF GINKGO BILOBA

Muhammad Ishaque M.R.¹, Dr. Piriha Abbasi², Dr. Mozna Talpur³, Taufiq Ahmed¹,
Amjad Hussain¹, Muhammad Arsalan⁴, Gul Muhammad⁵, Nagina sooner khan¹

¹Department of Eastern Medicine, Faculty of Pharmacy and Health Sciences, University of Balochistan, Quetta-Pakistan.

²Department of Anatomy, Faculty of Basic medical sciences, ISRA University, Hyderabad-Pakistan.

³Department of Pharmacology, Faculty of Basic medical sciences, ISRA University, Hyderabad-Pakistan

⁴Department of Pharmacognosy, Faculty of Pharmacy and Health Sciences, University of Balochistan, Quetta-Pakistan.

⁵Department of Pharmaceutical Chemistry, Faculty of Pharmacy and Health Sciences, University of Balochistan, Quetta-Pakistan.

Abstract:

Background: To determine the histological Hepatic changes in liver of albino rats induced by monosodium glutamate and Hepato-protective role of ginkgo biloba.

Methods: 21 Albino Wistar rats were taken for this study and divided into 3 parallel groups ($n=7$ in each group). All the healthy adult Wistar rats with normal average weight (150-200g) and without any gross abnormality were selected for the study. All effected disease or any moribund rats were excluded. On 46 day after the completion of experiment all rats were scarify and the Liver of wistar rats rapidly collected and fixed in formaldehyde.

Results: Group of rats received MSG for 45 days shows changes of congestion of central vein in 7 out of seven, there also changes in infiltration of leukocyte observed in 6 rats, centrilobular hemorrhagic necrosis see in all 7 rats, and only one animal observed with changes of hepatic fibrosis.

Conclusion: It is concluded that MSG have significant effects on histology of liver.

Keywords: Liver, monosodium glutamate, histological changes in the Liver.

Corresponding author:

Muhammad Ishaque M.R,

Department of Eastern Medicine,

Faculty of Pharmacy and Health Sciences,

University of Balochistan,

Quetta-Pakistan.

QR code



Please cite this article in press Muhammad Ishaque M.R et al., *Hepatic Changes in Liver of Albino Rats Induced By Monosodium Glutamate and Hepato-Protective Role of Ginkgo Biloba.*, Indo Am. J. P. Sci, 2018; 05(11).

INTRODUCTION:

Monosodium glutamate.

Monosodium glutamate (MSG) is most common using food ingredient for taste enhancer in cooking dishes and preservative agent for canned foodstuff also used at industrial level [1]. Monosodium glutamate (MSG) sold ingredient is available in open market and Super mart in Pakistan by name of "Ajinomoto" [2]. World Health Organization (WHO) recommendation about the MSG average daily intake is 1.0 g [3] but with the increase consumption of MSG in Pakistan, either in cooking food or by utilizing of packed food may be exceed 1.0 g. The exceed amount of MSG affect at all body systems including vital organs, MSG affect to the hepatic structure and its functions [4]. The effect of MSG on the renal system has been studied by investigators, they found MSG effect on two factors " Glucose metabolism and oxidation" both are significant factors for vital organ damage [5].

Ginkgo biloba.

Ginkgo biloba is one of the popular medicine herb it have been used as curative agent in current pharmacology [6]. GBE contain several constituent terpenoids or terpen lactoids, flavonoids, Biflavonoids, polyprenols and iron-superoxide dismutase (Fe-SOD) these constituents are responsible for there anti-oxidants activities and have the protective effects against ischemic injury of the vital organs [7-8], GBE flavonoids components are believed to effective and act as antioxidants, it reducing edema caused by tissue injury, memory enhancing agent, protect against the neural damage [9]. Many research studies have been reported that GBE decrease tissue damage in different organs by its antioxidant properties of flavonoids [10].

The Liver is vital organ of mammals it is also known as filter organ, it consist million numbers of hepatic cells which are responsible for many functions. Liver receiving blood from alimentary tract and regulate metabolic functions of different substances [11-12-13].

To the best of our knowledge there are no studies concerning the hepatic protective effects of ginkgo biloba against the MSG intoxication. Therefore this study was an aimed to investigate the adverse effect of MSG intoxication on the hepatic tissue and assess the possible hepatoprotective effect of oral supplementation of ginkgo biloba against the MSG through Histological examination in wistar rats [14].

MATERIAL AND METHODS:

Animal Protocol:

For research study the animal protocols was monitored at animal house of Sindh Agriculture university Tandojam's department of animal husbandry sciences. Twenty one adult albino Wister rats weighing were (150-200g) housed in plastic cage with hygienic environment were provided with well-ventilated room temperature between (22±2°C) with cycle of 12 hours light/dark with daily base with humidity between (65-70%), changes the bedding with saw dust and Cage were equipped with stainless steel feed containers and plastic drinkers with stainless nozzles for water drinking. They were given standard pellet chow and water.

Experimental procedure:

Duration of study was 45 days on 21 number of albino Wister all albino rates were equally divided into the three gourps (n=7 in each group). Group 1 was control group which served as normal control feed with distilled water. Group II (experimental group) served monosodium glutamate (MSG) 0.08mg/gm/po for the 45 days, [15] Group III (experimental group) served monosodium glutamate (MSG) 0.08mg/gm/po with GBE 0.05mg/gm/po for 45days [16]. On 46 day after the completion of experiment the Liver of wistar rats rapidly collected and fixed with in 10% formaldehyde solution and processed routinely by embedding in paraffin for histopathologic examination. Paraffin embedded liver for slides prepared in 4-6 µm in thickness slices and stained with hematoxylin and eosin to observe changes through light microscope at the laboratory of Postgraduate and Histo-Anatomy of ISRA University of Hyderabad Sindh [17].

Drug and chemicals:

Ginkgo biloba leaves dry extract was received from supplier the green area company Lahore, GBE contain 18.62% flavone glycosides (primarily composed of kaempferol, isorhamnetin, and quercetin) and 5% terpene lactones(2=2.5-3.2% ginkgolides A,B and C as well as 2.5-3.1% bilobalide). Other constituents include proanthocyanidins, glucose, rhamnose, organic acid, D-glucaric and ginkgolic acid.

Monosodium glutamate (MSG) purchase from local market used for food enhancing and flavoring agent

Statistical analysis:

The statistical analysis data were carried out as mean ± S.E. comparisons between mean of different group were carried out by One-way analysis of Variance (ANOVA). P value <0.05 were considered significant.

RESULT AND DISCUSSION:

As shown in table 1 (*figure:1*) in control group there are no changes of congestion of central vein, infiltration of leukocyte and centrilobular hemorrhagic necrosis see in all 7 rats. Table show only one animal observed with changes of hepatic fibrosis out of 7.

As shown in table 2 (experimental group of MSG) changes of congestion of central vein in seven animals out of seven (*figure:2*), there also changes in infiltration of leukocyte observed in 6 animal out of 7 (*figure:3*), centrilobular hemorrhagic necrosis see in all 7 rats(*figure:4*). Table show only one animal observed with changes of hepatic fibrosis out of 7.

As shown in table 3 (experimental group of MSG+GB) changes of congestion of central vein in one animals out of seven rest of six remain healthy without changes, there also changes in infiltration of leukocyte observed in 2 animal out of 7 and five remain healthy, centrilobular hemorrhagic necrosis see in one out off seven and rest of six rats remain healthy (*figure:5*). Table show in 3 animal out off seven observed with changes of hepatic fibrosis.

As shown in table#4 (graf:1) Comparison in all groups (number of rats 7/group) significant changes of congestion of central vein P value 0.001. There also significant changes observed in infiltration of leukocyte P value 0.001. There are also significant changes in centrilobular hemorrhagic necrosis P value 0.001. But table # 4 shows that no significant changes in hepatic fibrosis P value 0.27. There need of further evaluate or research on hepatic fibrosis.

The sodium glutamate is one of common using food enhancing and preservative agent this present research study show daily use of MSG 0.8mg/gm/po body weight adverse effects on liver parenchyma and histology. MSG effects on the congestion of central veins of liver with changes in infiltration of leukocyte and cintrilobular hemorrhagic necrosis and hepatic fibrosis [18]. Liver damage occurs due to the increased level of MSG in body. Therefore it could be concluded that low dose of MSG may be hepatotoxic [19]. These alterations appear in the liver probably because liver mainly responsible for detoxify and metabolize the external compounds in the body [20]. While Ginkgo biloba leave extract show repairing and hepato-protective effect on liver, GB accelerates the regeneration process and the production of liver cell [21].

Tables 1: (Group A control)

	Yes	No
Congestion of central vein	0	7
Infiltration leukocyte	0	7
Centrilobular hemorrhagic necrosis	0	7
Fibrosis	1	6

Tables 2: (Group B MSG)

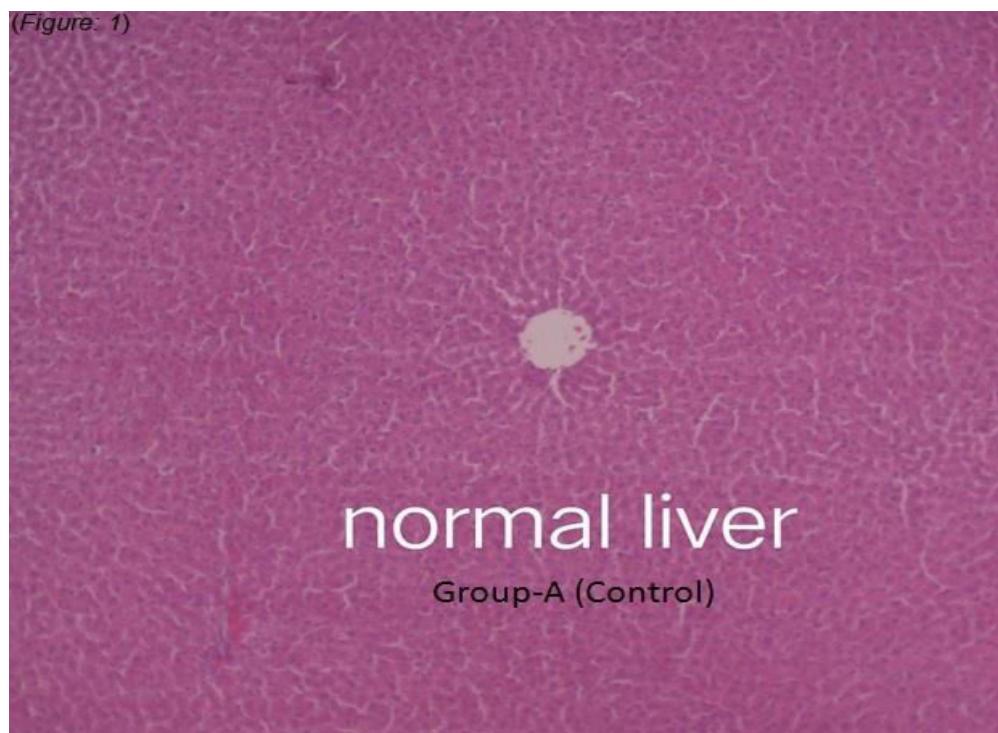
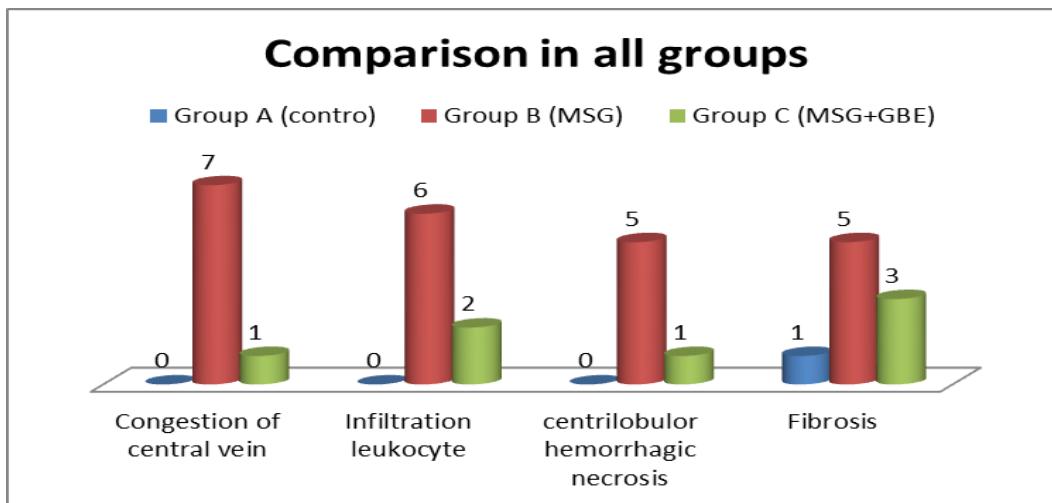
	Yes	No
Congestion of central vein	7	0
Infiltration leukocyte	6	1
Centrilobular hemorrhagic necrosis	5	2
Fibrosis	5	2

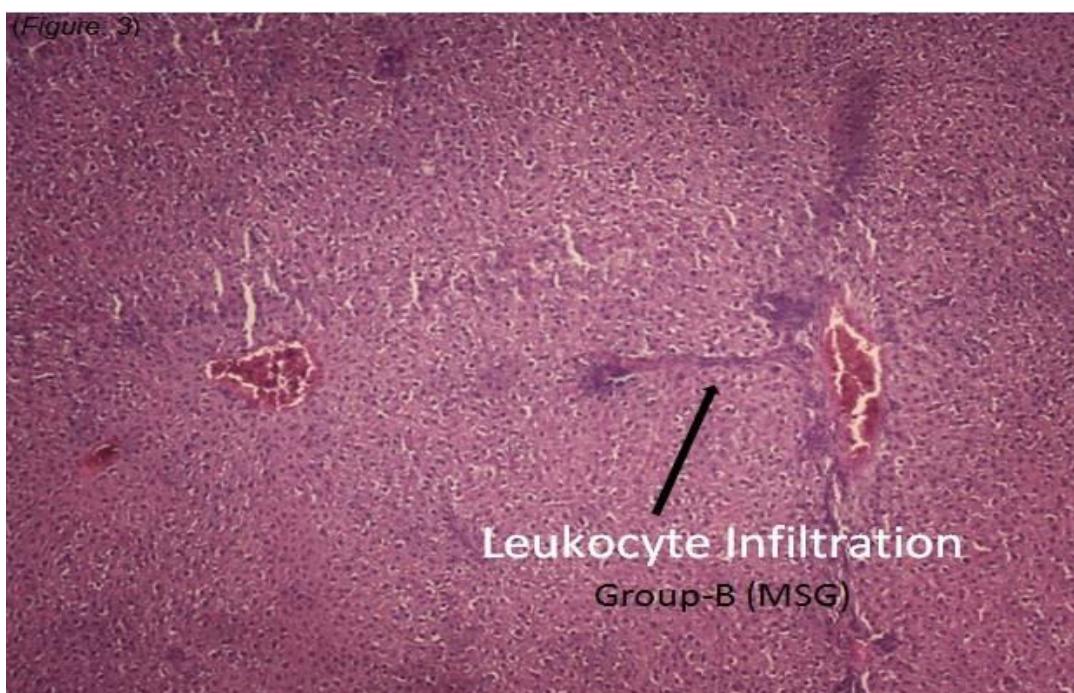
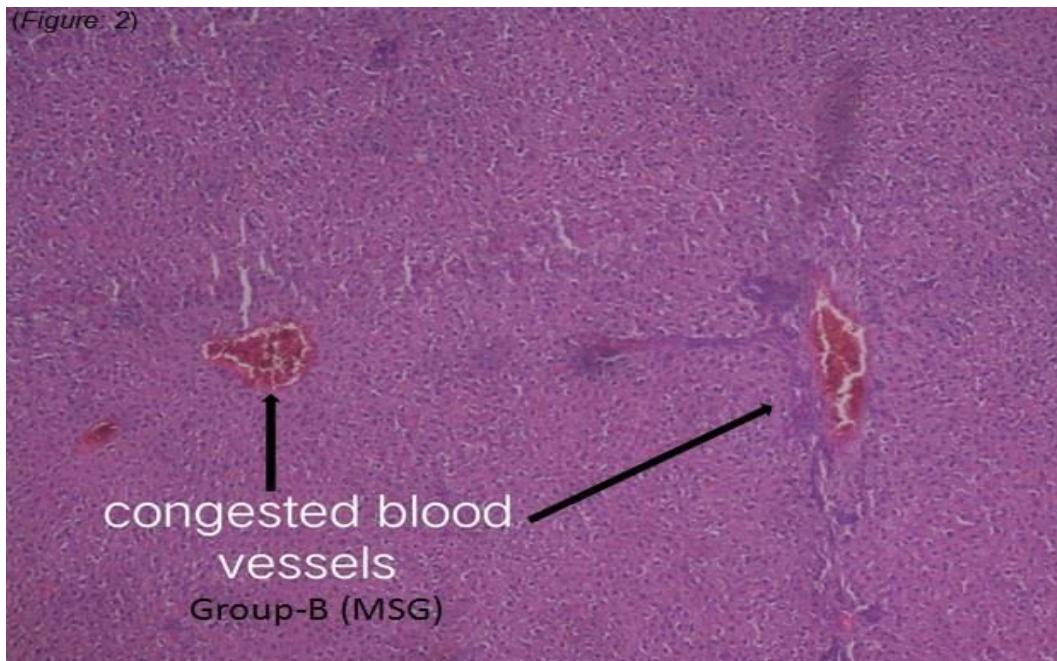
Tables 3: (Group C MSG+GB)

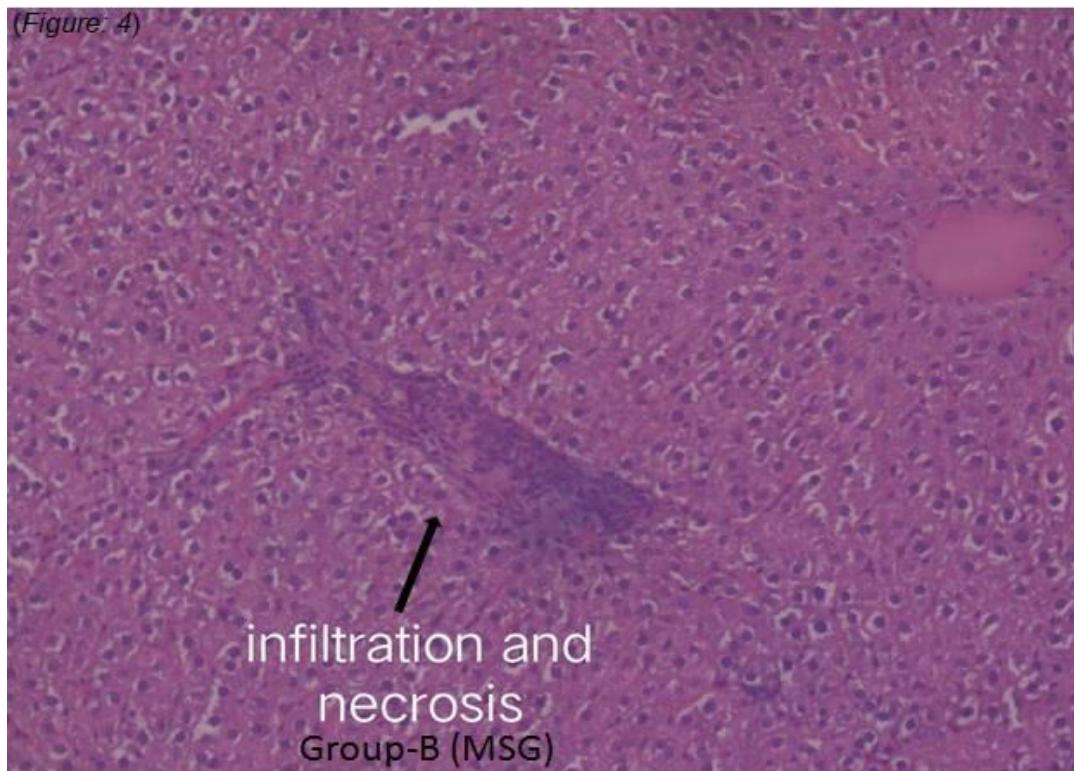
	Yes	No
Congestion of central vein	1	6
Infiltration leukocyte	2	5
Centrilobular hemorrhagic necrosis	1	6
Fibrosis	3	4

Table 4: Comparison in all groups (number of rats 7/group)

	Comparison in all groups (number of rats 7/group)			
	Group A (Control)	Group B (MSG)	Group C (MSG+GB)	P-value
Congestion of central vein	0	7	1	0.001
Infiltration leukocyte	0	6	2	0.001
Centrilobular hemorrhagic necrosis	0	5	1	0.001
Fibrosis	1	5	3	0.27







CONCLUSIONS:

It is concluded that MSG have significant effects on congestion of central vein, infiltration of leukocyte and centrilobular hemorrhagic necrosis and also concluded that the hepato-protective activity of EGB but no significant changes in hepatic fibrosis, so need of further research about the hepatic fibrosis.

REFERENCES:

- Oladipo, I. C., Adebayo, E. A., & Kuye, O. M. (2015). Effects of monosodium glutamate in ovaries of female sprague-dawley rats. *Int J Curr Microbiol Appl Sci*, 4(5), 737-745.
- Zerasky K. Nutrition and healthy eating; monosodium glutamate: is it harmful? Available at: <http://www.mayoclinic.com> [Last assessed on 2010 Dec 23].
- Marshal WE (1994). Amino acids, peptides and proteins. In: Goldberg I edited Functional Foods: Designer Foods, Pharmafoods, Nutraceuticals. New York. Chapman and Hall, Thomson Publishing;ISBN: 0-412-98851-8
- Ortiz, G. G., Bitzer-Quintero, O. K., Zárate, C. B., Rodríguez-Reynoso, S., Larios-Arceo, F., Velázquez-Brizuela, I. E. & Rosales-Corral, S. A. (2006). Monosodium glutamate-induced damage in liver and kidney: a morphological and biochemical approach. *Biomedicine & pharmacotherapy*, 60(2), 86-91.
- de Oliveira Mora, L., Antunes, L. M. G., Francescato, H. D. C., & Bianchi, M. D. L. P. (2003). The effects of oral glutamine on cisplatin-induced nephrotoxicity in rats. *Pharmacological Research*, 47(6), 517-522.
- Mahady, G. B. (2002). Ginkgo biloba for the prevention and treatment of cardiovascular disease: a review of the literature. *Journal of Cardiovascular Nursing*, 16(4), 21-32.
- van Beek, T. A. (2002). Chemical analysis of Ginkgo biloba leaves and extracts. *Journal of Chromatography A*, 967(1), 21-55.
- van Beek, T. A., & Montoro, P. (2009). Chemical analysis and quality control of Ginkgo biloba leaves, extracts, and phytopharmaceuticals. *Journal of Chromatography A*, 1216(11), 2002-2032.
- Zheng, W., & Wang, S. Y. (2001). Antioxidant activity and phenolic compounds in selected herbs. *Journal of agricultural and food chemistry*, 49(11), 5165-5170.
- G. Giebisch and E. Windhager, "Organization of the urinary system," in *Medical Physiology*, W. F. Boron and E. L. Boulpaep, Eds., pp. 747-766, Saunders, Elsevier Science, Philadelphia, Pa, USA, 2008.
- Deutsch, S. I., Burkett, J. A., & Rosse, R. B. (2009). Valproate-induced hyperammonemic encephalopathy and normal liver functions: possible synergism with topiramate. *Clinical neuropharmacology*, 32(6), 350-352.
- Czaja, M. J., Ding, W. X., Donohue, T. M., Friedman, S. L., Kim, J. S., Komatsu, M., ... & Perlmutter, D. H. (2013). Functions of autophagy in normal and diseased liver. *Autophagy*, 9(8), 1131-1158.
- El-Shenawy, S. M., & Hassan, N. S. (2008). Comparative evaluation of the protective effect of selenium and garlic against liver and kidney damage induced by mercury chloride in the rats. *Pharmacological Reports*, 60(2), 199.
- Shenoy, K. A., Somayaji, S. N., & Bairy, K. L. (2001). Hepatoprotective effects of Ginkgo biloba against carbon tetrachloride induced hepatic injury in rats. *Indian Journal of Pharmacology*, 33(4), 260-266.
- Eweka, A. O., & Om'Iniabohs, F. A. E. (2011). Histological studies of the effects of monosodium glutamate on the ovaries of adult wistar rats. *Annals of medical and health sciences research*, 1(1), 37-44.
- Charan, J., & Biswas, T. (2013). How to calculate sample size for different study designs in medical research?. *Indian journal of psychological medicine*, 35(2), 121.
- Panda, V. S., & Naik, S. R. (2009). Evaluation of cardioprotective activity of Ginkgo biloba and Ocimum sanctum in rodents. *Alternative Medicine Review*, 14(2), 161.
- Onyema, O. O., Farombi, E. O., Emerole, G. O., Ukoha, A. I., & Onyeze, G. O. (2006). Effect of vitamin E on monosodium glutamate induced hepatotoxicity and oxidative stress in rats.
- Egbuonu, A. C. C., Obidoa, O., Ezeokonkwo, C. A., & Ejikeme, P. M. (2009). Hepatotoxic effects of low dose oral administration of monosodium glutamate in male albino rats. *African Journal of Biotechnology*, 8(13).
- Tawfik, M. S., & Al-Badr, N. (2012). Adverse effects of monosodium glutamate on liver and kidney functions in adult rats and potential protective effect of vitamins C and E. *Food and Nutrition Sciences*, 3(05), 651.
- Shenoy, K. A., Somayaji, S. N., & Bairy, K. L. (2001). Hepatoprotective effects of Ginkgo biloba against carbon tetrachloride induced hepatic injury in rats. *Indian Journal of Pharmacology*, 33(4), 260-266.