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Impact of *Hemidesmus Indicus* on Mosquito Coil Exposed Rat

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Abstract
Environmental pollution and its impact on human being have well recognized during few decades. The role of air pollutants causing health hazards substances are distributed widely in ecosystems due to diverse human activities. Mosquito coils are widely used as mosquito repellent. The major active ingredients of most mosquito coil are pyrethrins. The combustion of mosquito coils generates large amounts of sub-micrometer particles and gaseous pollutants. These particles and cause the potential toxicological effects of the smoke on mammals. This study therefore aims to investigate the toxicological effects of mosquito coil smoke in rats with hope that the results would provide a guide line for proper use of these coils.

Keywords: *Hemidesmus Indicus,* Mosquito Coil, Environmental pollution, smoke in rats

Introduction
The current Indian market for various mosquito coils is in the range of Rs.500 – 600crores (US$12-15 million) with annual growth of 7 to10%. This increase in growth rate is the result of constant environmental degradation leading to the creation of mosquito – breeding grounds and also the fact that people's capacity to by mosquito coils is increasing steadily. In most urban and rural areas of the country, mosquito populations are menacing throughout the year except for some attenuation during summer and winter mosquitoes transmit diseases such as malaria, filariasis and many viral diseases such as the Japanese encephalitis dengue hemorrhagic fever, yellow fever (in Africa) etc. Mosquito coils containing (DDT) Dichlora dipheryl trichloro ethane and other organophosphorus compounds were not effective in repelling mosquitoes. [1, 2]

Material and Methods
Animals: Male albino rats weight about 120-180g were obtained from the Indian institute of science Bangalore, the animals were housed in polypropylene cages and maintained in controlled temperature with 12 hours period of light dark and fed with standard rad feed and water were provided adlibitum.

Chemicals: TBA, 2, 4, DNPH lead metal reduced Glutathione were purchased from sigma chemicals Mumbai. All other reagent and chemical used in this study was of analytical grade with high purity.

Plant materials and Drug preparation
Hemidesmus indicus root were collected locality in the mouth at September to December 2008. The *Hemidesmus indicus* were shade dried and finally powdered which was sieved through nice cloths and used as drug.

Hemidesmus indicus
Vernacular Name

English	:	Indian Sarsaparilla country sarsaparilla
Tamil	:	Nannari, Savibam
Sanskrit	:	Anantamulahsariba
Hindi	:	Anantamul, magrabu
Malayalam	:	Nannari, naruninti, naruenti
Kanatam	:	Namadaballi
Telungu	:	Sugandipala

Description

A perennial, slender, laticiferous twining or prostrate, wirg shrub with woody root –stock and numerous slender, terets having thickened nodes: leave simple, opposite very variable from elliptic – oblong to linear lanceolate, variegated with white above, silvery white and pubescent beneath: flowers greenish purple crowded in subsessik cynes in the opposite leaf axis; fruits slender follicles, cylindrical, 10cm long tapering to a point at the apex, seeds flattened, black, ovate – oblong. Coma silvery white the tuberous root is dark –brown. Coma silvery white, tortuous with transversely cracked and longitudinally fissued bark. It has a strong central vasculature and a pleasant smell and last.

Habitate : Throught India
Propagation : By seeds and vegetative method
Parts used : Roots, Leaves, Stem

Experimental Designs

Body weight at animals was rewarded and they were divided into 3 groups at 6 animals each as follows:

Group I

Normal animal received normal diet and water *adli bitum*

Group II

Rats were exposed to the smoke of mosquito coil. These rats were exposed to the smoke for 8 hours each day, for 10 days in a container.

Group III

Mosquito coil exposed rat treated with *Hemidesmus indicus* root at a dose of 1g/1kg body weight for 5 days.After the completion of experimental regent the rats were test overnight and blood samples were collected by the puncturing the retro orbital pluxes under light either anesthesia. Serum was used for the analyses of various biochemical parameters.

Bio Chemical Estimation

The serum urea was estimated by the method of Berthelot (1959). The serum total protein was estimated by Hepry [3] The serum SGPT was estimated by the method of Reitman and frankel (1957) [4]. The serum SGOT was estimate by the method of Retiman and Frankel (1957) [5]. The serum total bilirubin was estimated by the method of Mallony and Evelexn[6] Albumin was estimated by the method of Rodkey (1965) [7]. Malondialdehyde was estimated by the thiobarbituric acid assay method of Beuge and Aust (1978) [8] Reduced glutathione was estimated by method of Moron [9]

Statistical Analysis

The results were presented as mean ± SD. Data was statistically analyzed using student "t" test. P. values set as lower than 0.001, 0.01, 0.05 were considered as statistically significant [10].

Result

The present study was carried out to evaluate the role effect of *Hemidesmus indicus* on mosquito coil exposed rats the observations made on different groups of experimental and control animals were compared as follows.

MDA

Table 1: Represents the level MDA of normal experimental mast.

Parameters	Group I	Group II	Group III
MDA (mg/dl)	28.94 ± 6.51	34.51± 7.2*	28.59 ± 6.6**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
** Significantly different from Group II

Group II Mosquito coil exposed rats showed a significant increase in the level of MDA when compared to group 1 rats. Group III mosquito coil exposed rats treated with *Hemidesmus Indicus*. Significantly decreased in the level of MDA when compared to group II.

Table l effect of *Hemidesmus indicus* on MDA in experimental rats.

GSH

The present study was carried out to evaluate the mosquito coil exposed the observations male on different groups of experimental and control animals were compared as followers.

Table 2: Represents the levels of GSH in serum of normal and experimental rats.

Parameters	Group I	Group II	Group III
GSH (mg/dl)	61.66 ± 16.32	26.66± 8.16*	61.66 ± 1.08**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
**Significantly different from Group II

Group II Mosquito coil exposed rats showed a significant decreased in the level of GSH when compared to group I rats. Group III mosquito coil exposed rats treated with *Hemidesmus indicus* significantly increased in the level of GSH as compared to group II

Protein

Table 3: Represents the levels of protein in serum of normal and experimental rats.

Parameters	Group I	Group II	Group III
Protein (gm/dl)	4.45 ± 0.88	6.55± 0.27*	4.70 ± 0.40**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
** Significantly different from Group II

Group II mosquito coil exposed rats showed a significant decreased in the level of protein when compared to Group I rats. Group III mosquito coil exposed rats treated with Hemidesmus indicus. Significantly increased in the level of protein when compared to Group II. Table 3 effect of *Hemidesmus indicus* on protein in experimental rats.

SGOT

Table 4: Represents the activity of SGOT in serum of normal and experimental rats.

Parameters	Group I	Group II	Group III
SGOT (U/dl)	84.68 ± 1.91	97.24± 2.44*	85.30 ± 2.49**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
** Significantly different from Group II

Group II mosquito coil exposed rats showed a significant increase in the activity of SGOT when compared to Group I rats. Group III mosquito coil exposed rats treated with

Hemidesmus indicus significant decreased in the activity of SGOT when compared to group II.
Table 4 effect of *Hemidesmus indicus* on SGOT activity in normal and experimental rats.

SGPT

Table 5: Represents the activity of SGPT in serum of normal and experimental rats.

Parameters	Group I	Group II	Group III
SGPT (U/dl)	28.28 ± 1.13	30.22± 1.15*	28.27 ± 0.85**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
**Significantly different from Group II

Group II mosquito coil exposed rats showed a significant increased in the activity of SGPT when compared to group I rats. Group III mosquito coil exposed rats treated with *Hemidesmus indicus.* Significantly decreased in the activity of SGPT as compared to group II. Table 5 effect of *Hemidesmus indicus* on SGPT activity in experimental rats.

Urea

Table 6: Represents the levels of urea in serum of normal and experimental rats.

Parameters	Group I	Group II	Group III
Urea (mg/dl)	41.20 ± 12.09	91.51± 12.68*	50.90 ± 13.00**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
**Significantly different from Group II

Group II mosquito coil exposed rats showed a significant increased in the levels of urea when compared to group I rats. Group III mosquito coil exposed rats treated with *Hemidesmus indicus* significantly decreased in the level of urea when compared to group II. Table 6 effect of *Hemidesmus indicus* on urea in experimental rats.

Albumin

Table 7: Represents the level of Albumin in serum of normal and experimental rats.

Parameters	Group I	Group II	Group III
Albumin (gm/dl)	3.52 ± 0.33	2.23± 0.44*	3.41± 0.44**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
**Significantly different from Group II

Group II mosquito coil exposed rats showed a significant decreased in the level of Albumin in serum when compared to Group I rats. Group III mosquito coil exposed rats treated with *Hemidesmus indicus* significantly increased in the level of albumin when compared to group II. Table 7 effect of *Hemidesmus indicus* exposed rats on albumin in experimental rats.

Bilirubin

Table 8 represents the levels of Bilirubin in serum of normal and experimental rats. Group II mosquito coil exposed rats showed a significant decreased in the level of bilirubin when compared to Group I rats. Group III mosquito coil exposed rats treated with *Hemidesmus indicus* significantly increased in the level of bilirubin when compared to group II.

Table 8: Effect *Hemidesmus indicus* of bilirubin in normal and experimental rats.

Parameters	Group I	Group II	Group III
Bilirubin (mg/dl)	1.14± 1.63	5.92± 2.90*	1.14 ± 1.63**

Values were expressed as mean ± SD for six rats in each group
* Significantly different from Group I
**Significantly different from Group II

5. Discussion

Mosquito coils are widely used as mosquito repellent. The major active ingredients of most mosquito coils are pyrethrins. When a mosquito coils are pyrethrins. When a mosquito coils is burnt, the insective evaporate (pyrethrin) with smoke, which prevent the mosquito to from entering in the room and ham those already in the room. Mosquito coils are often used overnight in sleeping quarters, where continuous exposures may occur. Exposure to coil smokes occurs during rainy periods because mosquitoes are found to be more active in the environment due to collection of water and increase due to collection of water and increase in green plants (Liu, 1989) [17]. This exposure causes the potential toxicological effects of the smoke on humans. Hence the present study aims to evaluate the toxicity of allethrin based mosquito coil smoke on various biochemical Parameters. The results of bio chemical analysis in human exposed to mosquito coil smoke are shown in table 8.

MDA

Malondialdehyde (MDA) is the major reactive aldehyde resulting from the peroxidation of biological membrane polyunsaturated fatty acid. MDA, a secondary product of lipid peroxidation (LPO) used by a series of chain reactions oxidative stress represents the imbalance between oxidant like reactive oxygen species and antioxidants MDA is one of the indicator of oxidative strees.
In the present study increased MDA content in mosquito coil exposed rats as compared with control rats. The increased MDA content in mosquito coil exposed rats provide relevant estimates of oxidative stress in plasma. We found that mosquito coil exposed subject resulted in an increase of plasma MDA, indicating lipid oxidation. Supplementation of *Hemidesmus indicus* to mosquito coil exposed rats decreased the MDA content indicates the decreased oxidative strees.

GSH

Glutathione (GSH) is a ubiquitous thiol – containing tripeptide, which plays a central role in cell biology. It is implicated in the cellular defence against xenobiotics and naturally occurring deterovirues. Compounds, such as free radicals and hydroperoxide glutathione, such as of free radicals and hydroperoxide glutathione status is a highly sensitive indicator of cell functionality and viability, GSH depletion is linked to a number of disease states cancer, neurodegenerative disease cardio vascular diseas. [10] In the present study, decreased content of as it in mosquito coil exposed rats as compared to control rats. The decreased plasma GSH content, implying increased utilization for oxygen – radical cleansing activity.
Administration of *Hemidesmus indicus* mosquito coil exposed rats increased the GSH content indicates the improvement in antioxidant defence.

Protein & Albumin

The level of total protein and albumin in mosquito coil exposed subject were significantly lower compared to the

normal subjects many factors may be responsible for the increment among which are excess breakdown of blood protein and increase in tissue protein catabolism. Oedema could have resated from the inflammatory process taking place as a result of irritation of various organs by toxic chemical from coil smoke cyanide, which is released in mosquito coil smoke is known to cause reduced oxygen carrying capacity of erythrocytes, leading to reduced metabolism and consequently result in reduced energy output which may explain the body weakness. The sneezing that resulted after 6 days exposure could be the irritants released, sulphates and polycyclic aromatic hydrocarbons [11] An decrease in total protein and albumin could be the result of the inflammation, which may be result of exposure to irritants released from coil smoke. The inflammation may cause damage to the liver cells which are sites of the protein synthesis leading to decrease in synthesis of protein. Thereby causing is decrease in the amount of protein (Liu *et al*., 2003) [11] Adminstration of *Hemidesmus indicus to* mosquito coil exposed rats restructured the protein and albumin level indicates the promote the liver function.

Urea

In the present study increase level of urea was observed in mosquito coil exposed rats as compared to control rats. The elevations could probably be due to the increase the activites of urea enzymes ornithine. Carbamoyl transferase and orginase can provide evidence of liver damase in many animal species, since the urea. Cycle is confined to the liver. Elevated blood urea in this study may. Also indicate kidney damage however, no gross lesions were seen. Supplementation of *Hemidesmus indicus* to mosquito coil exposed rats decreased the urea level indicates the maintenance of kidney function.

SGOT & SGPT

The smoke also elevated the liver enzymes activities. The elevation in the activities of these enzymes sussested. Liver tissue damage. Previous studies indicated that ALT is found in high concentration in the hepatic. Tissues of dogs cats and primates and elevation of its, activity in plasma indicates hepatocellular damage smilarly another study by woodman indicated that the increase in the liver ability to synthesis that enzyme, but rather a loss of material from damaged hepatocytes dministration of *Hemidesmus indicus* to mosquito coil exposed rats restored the activity of SGOT& SGPT, indicates the proper function of the liver.

Bilirubin

In the present study, the level of bilirubin increased in mosquito coil exposed rats as compared to control rats. The increased level of bilirubin indicate. The increased level of bilirubin indicate. The increased level of bilirubin indicate the liver damage. This is confirmed by increased activity of SGOT and SGPT in mosquito coil exposed rats. Blood urea in the mosquito coil exposed rats were rats were significantly higher compared to control rats, many factors may be responsible for the increment among which are excess break down of blood protein and decrease in tissue protein catabolism similarly high urea may be associated with low blood volume. Damage to the kidney may result in reduced erythropoietin production resulting in high urea which may in turn be associated with low blood volume there by leading to an elevation in inflammatory cell types, which usually occurs during the inflammatory process inflammation exposes the body organs to infections leading to the release of high. Amount of white blood cells supplementation of *Hemidesmus indicus* decreased the level of bilirubin in mosquito coil exposed rats. [12, 13]

6. Summary and Conclusion

Chemical pesticides are one of the major sources of environmental Pollution. Thousands of new chemical formulations are synthesized introduced and widely used in best control programs. Mosquito coils are widely used to prevent from mosquito bite and from entering the room. The burning of mosquito coil to generates large amounts of sub micrometer particles and gaseous pollutants. These particles can reach the lower respiratory tract and may be coated with a wide range of organic compound. The long term exposer of mosquito coil smoke can cause potential toxicological effects on rats.

Herbal medicine is increasingly gaining greater acceptance from the public and medical profession due to greater advances in the understanding of the mechanisms by herbs positively influence health and quality of life several plant products are known to exhibit creditable medicinal properties for the treatment of heart ailments and need to be explored to identify their potential application in prevention an therapy of human. Keeping in view. The present study aims to analyse the effect of *Hemidesmus indicus* on various biochemical parameters in *mosquito* coil exposed rats supplementation with *Hemidesmus indicus* on mosquito coil exposed rats *exerts* the following results.

- Reduced the oxidative stress by decreasing lipid peroxidation and improve the antioxidant status.
- Restored the level of protein and albumin
- Normalized the liver marker enzyme such as SGOT & SGPT.
- Maintained the kidney function through the maintenance of urea level.
- Decreased the level of Bilirubin.

The above results of this study show that long term exposure of mosquito coil smoke possess toxic properties. Studies aimed at producing alternative mosquito repellents with minimal toxicity affects should be an area of practical interest. Supplementation of *Hemidesmus indicus* to mosquito coil exposed rats reduce the toxic effects of mosquito coils. The potential activity of this plant due to the presence of this plant due to the presence of phytochemical constituents.

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