Extraction and Evaluation of Anti-Oxidant Activity of Tinospora Cordifolia and Eclipta Alba Compared with Commercially Marketed Products

Article · March 2023

CITATIONS
0

READS
61

2 authors, including:

Mrunal Krishnarao Shirsat
SBSPMs B-Pharmacy Ambejogai
166 PUBLICATIONS **141** CITATIONS

SEE PROFILE

Extraction and Evaluation of Anti-Oxidant Activity of *Tinospora Cordifolia and Eclipta Alba* Compared with Commercially Marketed Products

Pandhare Yuraj Limbaji1[1], Mrunal K.Shirsat[2*]

1. Research Scholar, Sunrise University, Alwar

2. LSDP. College of Pharmacy, Mandavgan Pharata,Shirur

***Corresponding Author: mrunalvir@gmail.com**

Abstract:

Medicinal plants are the seedbed for biologically active chemicals like primary metabolite and secondary metabolites, used for various applications in medicines. Antioxidants impair the shielding to living organisms from discretions pawn by unstrained fabrication of reactive oxygen species and coetaneous lipids peroxidation, Protein impairment and DNA strands breaking. Several ingredients from natural resources have been manifest to posses antioxidants were selected for study. The current study was ventured to assess antioxidant activities of Tinospora cordifolia, Eclipta Alba assessing with the commercially available Vit. C and Liv52. The barometers used to assess antioxidant activities are Malondialdehyde (MDA), Superoxide dismutase (SOD), Protective index and the Stress index. In the research work randomized open investigational blueprint was used. The research work was regulated over the duration of around 3 years maneuver 120 rabbits. All the mentioned drugs were administered orally. On price contrast of various drugs under present study Tinospora cordifolia which is as effectual as Liv52 was turned out to be the economical medication possessing antioxidant activity followed by Eclipta Alba, Vit. C tablets, Liv52 syrup.

Key Words: Anti-Oxidant, Activity, Tinospora Cordifolia and Eclipta Alba

Introduction:

In the current global scenario, medicines from natural sources are gaining eminence, because they are quite easily available, economical and relatively lower in terms of side effects. In lots of the developed and developing countries, traditional medical practices are contemplated as an inherent part of their habitat. As we know that the population of whole world is increasing, three fourth (a very major part of society) of the population cannot afford the modern synthetic medicines and they have to hang on the use of conventional and traditional medicines mainly acquire from plants. WHO has foreground the importance of better exertion of the indigenous system of medicine, 'save plants to save lives' was a call that was given by WHO a few years ago to underscore the part of plants in achieving the goal of 'A good health for everyone'. The recommence interest in herbal medicines is likely to pursue globally because of increasing population, reasonable and paragon shift in outlooks towards complementary or alternative medicines.

Estimation of the Malondialdehyde (MDA) in serum:

Principle:

Thiobarbituric acid interacts with Malondialdehyde, Aldehyde products of lipid peroxidation to produce a coloured complex which was extracted in Butanol and then the

absorbance was measured by means of spectrophotometer at 530 nm.

Procedure:

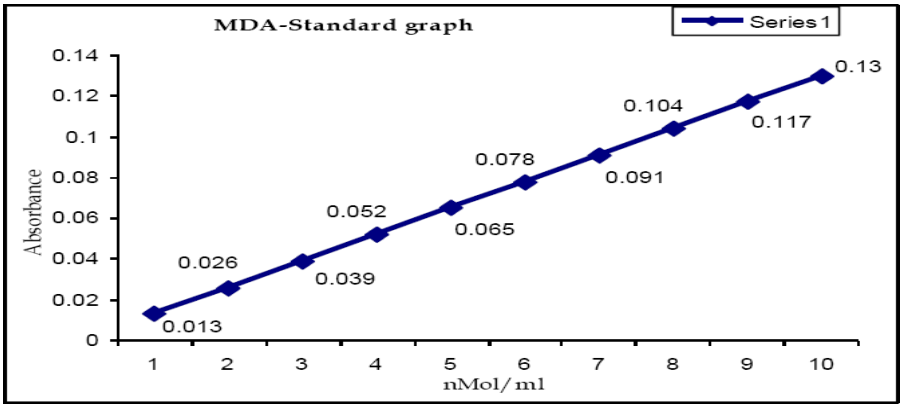
Incorporation of reagents for MDA estimation

Parameters	Standard (ml.)	Test (ml.)
Std. solution	0. 200	---
Sample	---	0. 200
Trichloroacetic acid (20%)	2.00	2.00
Thiobarbituric acid (0.67%)	0.800	0.800

2ml of Trichloroacetic acid was add on to all test tubes, and (0.2) ml of the standard or sample was added to their respective tubes. 0.8 ml of Thiobarbituric acid (0.67%) was also was added to every test tube. Then it was mixed congruously and then was kept in the water bath for about 30 min. then cooled under running water. Then 4 ml of n-Butyl alcohol was also added to every test tube. Then all the test tubes were kept for centrifugation at 3000rpm for 10 min. The absorbance of resilient fluid was measured at 530nm and the nButyl alcohol was placed as a blank reagent.

Calculations of MDA:

Conc. (nMol/ml) test = Absorbance (test)/Absorbance (std.) X Conc. of standard (nMol).



Standard Graph of MDA

Estimation of Superoxide dismutase (SOD):-

Principle:

Superoxide dismutase arrest the oxidation of pyrogallol and this impediment is evaluated by the means of spectrophotometer at 420 nm.

Procedure:

The solution mixture in a 3ml vol. comprise of 300µl of Pyrogallol (0.2mM).

Table 1 – Incorporation of reagents to estimate SOD

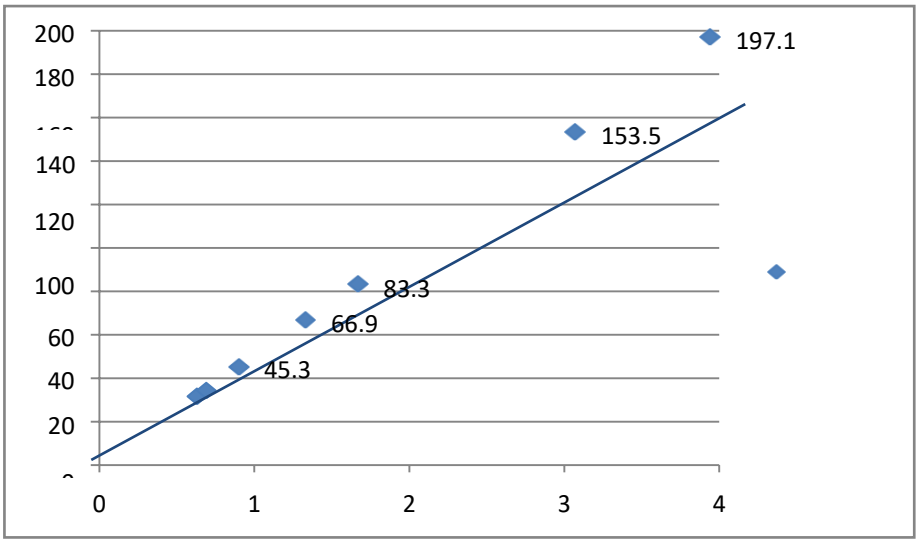
Reagents	Control (ml)	Standard (ml)	Test (ml)
Tris-buffer	2.7	2.7	2.699
Standard/ Haemolysate	---	0.001	0.001
Working Pyrogallol	0. 300	0. 300	0. 300

Total vol.	3. 000	3. 000	3. 000

Standard – A known strength of Superoxide dismutase in various concentrations were added to the assay mixture to reach introversion of Pyrogallol auto-oxidation.
Test – The haemolysate of all samples were added in place of standard superoxide dismutase units.
Pyrogallol was added on at the last. For the initial 90 seconds period was contemplated as the investiture time of enzyme. After 90seconds changes in absorbance at 420 nm at 20 seconds interim was noted for a period of 270 seconds. Changes in absorbance were valuated and inhibition percentage in standard and test was resolute by the formula:

$$\% \text{ Inhibition} = 100 - \frac{\text{Difference in Blank - Difference in STD/ Diff. Sample}}{\text{Difference in Blank}} \times 100$$

For standard, different concentrations of standard sample were added and the absorbance was measured at 420nm. Before going for the samples a std. graph of absorbance opposed to the concentration was hatched. A straight line graphs imply obduracy and accuracy.



Standard Graph SOD

Randomization:

Procedure for simple randomization:

Step 1: Rabbits (weight between 1.5-3kg) were given numbers from 1 to 120 and Chits with the numbers 1 to 120 were designed.

Step 2: A random person unassociated with the study was asked to pickup the chit from the set of chits.

Step 3: For nominating the rabbit specific group in the study a set of sampling chits from 1 to 12 was prepared now a random person who not linked with the study picked up the chit and the rabbit was included in that group.

The same procedure was repeatedly followed till there are 10 rabbits in each group.

Group A-control:

Group B: divided into two sub-groups:

D_1-PCM+Tinospora Cordifolia extract after PCP administration and continued for seven days.

D_2-PCM+Tinospora Cordifolia leaf extract after PCM administration.

Results and Discussion:

Table no-2

Tinospora cordifolia on MDA

Group ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	2.27 ± 0.62	2.51 ± 0.90	2.28 ± 0.73	2.49 ± 0.87	2.38 ± 0.56	2.62 ± 0.89	2.36 ± 0.57	2.58 ± 0.76
B	2.17 ± 0.40	10.69 ± 0.43	10.73 ± 0.77	10.19 ± 0.67	10.34 ± 0.79	10.25 ± 0.14	10.87 ± 0.67	8.28 ± 0.11
C1	2.70 ± 0.57**	6.03 ± 0.58**	4.47 ± 0.71**	3.19 ± 0.60**	2.46 ± 0.63**	2.54 ± 0.69**	2.36 ± 0.76**	2.17 ± 0.69**
D1	2.48 ± 0.56*	6.23 ± 0.23*	6.35 ± 0.38*	5.89 ± 0.91*	4.38 ± 0.86*	3.82 ± 0.08*	2.76 ± 0.8*	2.34 ± 0.09*

A= Control no drug. B= PCM alone.

C_1 = PCM+ Tinospora cordifolia daily for 7 days.

D_1= PCM Tinospora cordifolia single dose immediately after PCMadministration.

**P< 0.001 in contrast with PCM control.

*P< 0.05 in contrast with immediately.

Table 3- Tinospora cordifolia on SOD

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	0.116 ± 0.018	0.116 ± 0.017	0.115 ± 0.013	0.115 ± 0.019	0.116 ± 0.017	0.116 ± 0.012	0.115 ± 0.016	0.116 ± 0.013
B	0.116 ± 0.017	0.063 ± 0.007	0.064 ± 0.008	0.064 ± 0.009	0.063± 0.010	0.064 ± 0.011	0.077± 0.012	0.085 ± 0.013
C_1	0.116 ± 0.017**	0.076 ± 0.010**	0.097 ± 0.011**	0.109 ± 0.012**	0.116 ± 0.013**	0.116 ± 0.014**	0.116 ± 0.015**	0.116 ± 0.016**

D_1	0.115 ± 0.018*	0.078 ± 0.010*	0.088 ± 0.010*	0.097 ± 0.010*	0.102 ± 0.012*	0.107 ± 0.012*	0.116 ± 0.017*	0.116 ± 0.014*

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
D_1= PCM+Tinospora cordifolia single dose immediately after PCMadministration.

**P<0.001 in contrast with PCM control.
*P<0.05 in contrast with immediately.

Table 4- Tinospora cordifolia on Protective Index

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	0.054 ± 0.010	0.055 ± 0.010	0.056 ± 0.011	0.054 ± 0.011	0.054 ± 0.010	0.054 ± 0.010	0.055 ± 0.011	0.054 ± 0.011
B	0.053± 0.012	0.006 ± 0.002	0.006 ± 0.001	0.007± 0.001	0.007± 0.001	0.009 ± 0.002	0.016 ± 0.002	0.021± 0.005
C1	0.053 ± 0.009**	0.024 ± 0.009**	0.036 ± 0.012**	0.041± 0.008**	0.054± 0.013**	0.055± 0.001**	0.054 ± 0.007**	0.055 ± 0.008**
D1	0.055± 0.011*	0.026 ± 0.003*	0.031± 0.004*	0.035 ± 0.003*	0.037 ± 0.005*	0.042 ± 0.007*	0.054 ± 0.009*	0.054 ± 0.008*

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
D_1= PCM+ Tinospora cordifolia single dose immediately after PCMadministration.
**P<0.001 in contrast with PCM control.
*P<0.05 in contrast with immediately.

Table 5- Tinospora cordifolia on Stress Index

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	22.06 ± 1.23	22.45 ± 1.28	20.34 ± 1.74	22.25 ± 1.09	21.2 ± 1.45	22.27 ± 1.70	21.03 ± 1.60	22.58 ± 1.99
B	22.76 ± 1.08	91.1 ± 8.33	119.72 ± 17.34	122.31± 7.26	125.21 ± 4.13	129.81 ± 13.49	118.83 ± 10.39	109.16 ± 11.23
C1	22.47 ± 2.27	54.18 ± 6.14	42.88 ± 5.05	34.08 ± 3.41	24.10 ± 2.11	24.43 ± 3.81	24.38 ± 2.95	24.13 ± 2.11
D1	22.83 ± 2.15	56.83 ± 7.25	52.39 ± 7.97	46.48 ± 5.53	37.86 ± 5.01	29.50 ± 8.34	24.42 ± 1.66	23.17 ± 2.47

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia for 7 days.
D_1= PCM+ Tinospora cordifolia single dose immediately after PCM administration.
**P<0.001 in contrast with PCM control.
*P<0.05 in contrast with immediately.

Table 6-Tinospora cordifolia on ALT

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	51.8 ± 4.56	52.4 ± 5.19	51.8 ± 5.37	50.9 ± 4.32	51.7 ± 4.47	52.7 ± 5.79	52.5 ± 4.87	52.8 ± 5.65
B	51.7 ± 5.43	98.5 ± 7.23	112.7 ± 9.32	118.4 ± 10.59	127.2 ± 12.56	136.4 ± 20.73	123.8 ± 17.12	113.7± 11.35
C_1	51.6 ± 5.83**	82.5 ± 9.57**	71.6 ± 8.79**	63.2 ± 7.13**	52.4 ± 6.14**	51.3 ± 6.99**	53.1 ± 7.19**	52.9 ± 6.45**
D_1	52.8 ± 5.25	86.2 ± 7.43	92.6 ± 7.47	86.5 ± 6.99	70.3 ± 6.98	61.4 ± 5.90	51.7 ± 5.66	51.1 ± 5.88

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
D_1= PCM+ Tinospora cordifolia single dose immediately after PCM administration.
**P<0.001 in contrast with PCM control.

Table 7 Tinospora cordifolia on AST

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30th Day	45th day	60th day	75th day	90th day
A	22.5 ± 1.23	21.3 ± 1.98	22.8 ± 1.43	20.8 ± 1.37	21.7 ± 1.34	20.9 ± 1.69	21.1 ± 1.45	22.7 ± 1.56
B	20.7 ± 1.43	51.5 ± 5.23	66.7 ± 7.32	77.4 ± 8.59	87.2 ± 8.56	99.4 ± 9.73	87.8 ± 8.99	85.4 ± 7.39
C_1	20.4 ± 1.56**	39.5 ± 5.00**	34.7 ± 4.36**	29.4 ± 2.67**	22.9 ± 2.19**	21.7 ± 2.44**	20.3 ± 2.16**	22.3 ± 2.19**
D_1	21.7 ± 1.20	42.3 ± 4.88	39.5 ± 4.33	35.9 ± 6.12	30.5 ± 4.02	26.9 ± 3.99	22.5 ± 3.16	22.1 ± 1.49

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
D_1= PCM+ Tinospora cordifolia single dose immediately after PCM administration.

**P<0.001 in contrast with PCM control.

Table No: 8-Vitamin C on MDA

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	2.27 ± 0.62	2.51± 0.90	2.28 ± 0.73	2.49 ± 0.87	2.38 ± 0.56	2.62 ± 0.89	2.36 ± 0.57	2.58 ± 0.76
B	2.17 ± 0.40	10.69 ± 0.43	10.73 ± 0.77	10.19 ± 0.67	10.34 ± 0.79	10.25 ± 0.14	10.87 ± 0.67	8.28 ± 0.11
C_4	2.93 ± 0.77**	6.04 ± 0.87**	5.20 ± 0.72**	4.57 ± 0.69**	3.46 ± 0.80**	2.61 ± 0.70**	2.48± 0.75**	2.25 ± 0.69**
D_4	2.42 ± 0.64*	6.09 ± 0.72*	6.18 ± 0.92*	5.34 ± 0.83*	4.58 ± 0.80*	3.79 ± 0.94*	2.73 ± 0.04*	2.45 ± 0.64*

A= Control no drug. B= PCM alone.
C_4 = PCM+ Vitamin C daily for 7 days.
D_4= PCM+ Vitamin C single dose immediately after PCM administration.
**P<0.001 in contrast with PCM control.
*P<0.05 in contrast with immediately.

Table No: 9 -Vitamin C on SOD

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30th Day	45th day	60th day	75th day	90th day
A	0.116 ± 0.018	0.116 ± 0.017	0.115 ± 0.013	0.115 ± 0.019	0.116 ± 0.017	0.116 ± 0.012	0.115 ± 0.016	0.116 ± 0.013
B	0.116 ± 0.017	0.063 ± 0.007	0.064 ± 0.008	0.064 ± 0.009	0.063 ± 0.010	0.064 ± 0.011	0.077 ± 0.012	0.085 ± 0.013
C_4	0.115 ± 0.018**	0.081 ± 0.011**	0.095 ± 0.013**	0.105 ± 0.010**	0.109 ± 0.015**	0.116 ± 0.014**	0.116 ± 0.012**	0.116 ± 0.015**
D_4	0.115 ± 0.020*	0.083 ± 0.011*	0.086 ± 0.010*	0.094 ± 0.012*	0.101 ± 0.017*	0.107 ± 0.013*	0.116 ± 0.015*	0.116 ± 0.016*

A= Control no drug. B= PCM alone.
C_4 = PCM+ Vitamin C daily for 7 days.
D_4= PCM+ Vitamin C single dose immediately after PCM administration.
**P<0.001 in contrast with PCM control.
*P<0.05 in contrast with immediately.

Table No: 10 -Vitamin C on Protective Index

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	0.054 ± 0.010	0.055 ± 0.010	0.056 ± 0.011	0.054 ± 0.011	0.054 ± 0.010	0.054 ± 0.010	0.055 ± 0.011	0.054 ± 0.011
B	0.053 ± 0.012	0.006 ± 0.002	0.006 ± 0.001	0.007 ± 0.001	0.007 ± 0.001	0.009 ± 0.002	0.016 ± 0.002	0.021 ± 0.005
C_4	0.055 ± 0.011**	0.031 ± 0.0012**	0.039 ± 0.011**	0.044 ± 0.012**	0.047 ± 0.011**	0.054 ± 0.014**	0.054 ± 0.016**	0.054 ± 0.015**
D_4	0.056 ± 0.0013*	0.032 ± 0.008*	0.035 ± 0.009*	0.038 ± 0.0013*	0.042 ± 0.009*	0.047 ± 0.012*	0.054 ± 0.012*	0.054 ± 0.011*

A= Control no drug. B= PCM alone.
C_4 = PCM+ Vitamin C daily for 7 days.
D4= PCM+ Vitamin C single dose immediately after PCM administration.

**P<0.001 in contrast with PCM control.
*P<0.05 in contrast with immediately.

Table No 11- Vitamin C on stress index

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 Day	45th day	60th day	75th day	90th day
A	22.06 ± 1.23	22.45 ± 1.28	20.34 ± 1.74	22.25 ± 1.09	21.2 ± 1.45	22.27 ± 1.70	21.03 ± 1.60	22.58 ± 1.99
B	22.76 ± 1.08	91.1 ± 8.33	119.72 ± 17.34	122.31 ± 7.26	125.21 ± 4.13	129.81 ± 13.49	118.83 ± 10.39	109.16 ± 11.23
C_4	22.47 ± 1.89**	47.25 ± 3.55**	35.52 ± 3.45**	32.87 ± 2.53**	29.29 ± 2.43**	22.73 ± 2.18**	22.59 ± 1.32**	22.26 ± 1.11**
D_4	20.77 ± 1.14*	48.11 ± 6.05*	44.96 ± 5.52*	39.76 ± 4.45*	34.58 ± 3.75*	30.23 ± 2.87*	22.47 ± 2.73*	22.28 ± 2.23*

A= Control no drug. B= PCM alone.
C_4 = PCM+ Vitamin C daily for 7 days.
D_4= PCM+ Vitamin C single dose immediately after PCM administration.

**P<0.001 in contrast with PCM control.
*P<0.05 in contrast with immediately.

Table No 12-Vitamin C on ALT

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30th Day	45th day	60th day	75th day	90th day
A	51.8 ± 4.56	52.4 ± 5.19	51.8 ± 5.37	50.9 ± 4.32	51.7 ± 4.47	52.7 ± 5.79	52.5 ± 4.87	52.8 ± 5.65
B	51.7 ± 5.43	98.5 ± 7.23	112.7 ± 9.32	118.4 ± 10.59	127.2 ± 12.56	136.4 ± 20.73	123.8 ± 17.12	113.7 ± 11.35
C_4	51.9 ± 5.83**	76.7 ± 9.38**	71.5 ± 8.49**	66.1 ± 7.16**	62.6 ± 6.55**	51.7 ± 6.21**	51.9 ± 6.39**	52.4 ± 5.99**
D_4	52.8 ± 5.25	80.3 ± 8.65	80.2 ± 9.12	75.7 ± 9.19	70.4 ± 7.01	64.1 ± 7.76	51.7 ± 6.17	51.4 ± 6.73

A= Control no drug. B= PCM alone.

C_4 = PCM+ Vitamin C daily for 7 days.

D_4= PCM+ Vitamin C single dose immediately after PCMadministration.

**P<0.001 in contrast with PCM control.

Table No 13-Vitamin C on AST

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30th Day	45th day	60th day	75th day	90th day
A	22.5 ± 1.23	21.3 ± 1.98	22.8 ± 1.43	20.8 ± 1.37	21.7 ± 1.34	20.9 ± 1.69	21.1 ± 1.45	22.7 ± 1.56
B	20.7 ± 1.43	51.5 ± 5.23	66.7 ± 7.32	77.4 ± 8.59	87.2 ± 8.56	99.4 ± 9.73	87.8 ± 8.99	85.4 ± 7.39
C_4	20.5 ± 1.24**	46.3 ± 5.37**	41.5 ± 3.66**	37.8 ± 2.05**	30.5 ± 2.29**	22.7 ± 1.33**	22.4 ± 1.17**	22.3 ± 1.84**
D_4	23.4± 1.97	47.5 ± 5.24	42.1 ± 6.16	38.7 ± 6.11	33.1 ± 5.09	26.9 ± 2.59	22.5 ± 1.66	22.4 ± 1.38

A= Control no drug. B= PCM alone.

C_4 = PCM+ Vitamin C daily for 7 days.

D_4= PCM+ Vitamin C single dose immediately after PCMadministration.

**P<0.001 in contrast with PCM control.

Table no- 14- Contrast of Antioxidants on MDA levels.

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30th Day	45th day	60th day	75th day	90th day
A	2.27 ± 0.62	2.51 ± 0.90	2.28 ± 0.73	2.49 ± 0.87	2.38 ± 0.56	2.62 ± 0.89	2.36 ± 0.57	2.58 ± 0.76
B	2.17 ± 0.40	10.89 ± 0.43	10.73 ± 0.77	10.19 ± 0.67	10.34 ± 0.79	10.10 ± 0.14	9.87 ± 0.67	8.28 ± 0.11
C1	2.70 ± 0.57**	6.03 ± 0.58**	4.47 ± 0.71**	3.19 ± 0.60**	2.46 ± 0.63**	2.54 ± 0.69**	2.36 ± 0.76**	2.17 ± 0.69**
C2	2.60 ± 0.79**	6.55 ± 0.82**	5.74 ± 0.92**	4.78 ± 0.79**	3.94 ± 0.62**	2.57 ± 0.77**	2.59 ± 0.80**	2.44 ± 0.93**
C3	2.57 ± 0.78**	6.19 ± 0.71**	5.12 ± 0.64**	4.17 ± 0.92**	3.24 ± 0.69**	2.56 ± 0.75**	2.35 ± 0.88**	2.19 ± 0.85***
C4	2.93 ± 0.77**	6.04 ± 0.87**	5.20 ± 0.72**	4.57 ± 0.69**	3.46 ± 0.80**	2.61 ± 0.70**	2.48 ± 0.75**	2.25 ± 0.69**

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
C_2 = PCM+ Ricinus communis daily for 7 days.C_3= PCM+ Eclipta Alba daily for 7 days.
C_4 = PCM+ Vitamin C daily for 7 days.

Table 15 Contrast of Antioxidants on SOD levels.

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30th Day	45th day	60th day	75th day	90th day
A	0.116 ± 0.018	0.116 ± 0.017	0.113 ± 0.013	0.115 ± 0.019	0.116 ± 0.017	0.116 ± 0.012	0.115 ± 0.016	0.116 ± 0.013
B	0.116 ± 0.017	0.063 ± 0.007	0.064 ± 0.008	0.065 ± 0.009	0.066 ± 0.010	0.067 ± 0.011	0.077 ± 0.012	0.085 ± 0.013
C1	0.116 ± 0.017**	0.076 ± 0.010**	0.097 ± 0.011**	0.109 ± 0.012**	0.116 ± 0.013**	0.116 ± 0.014**	0.116 ± 0.015**	0.116 ± 0.016**
C2	0.115 ± 0.028**	0.077 ± 0.009**	0.095 ± 0.013**	0.098 ± 0.011**	0.105 ± 0.013**	0.114 ± 0.011**	0.114 ± 0.015**	0.114 ± 0.016**
C3	0.115 ± 0.019**	0.082 ± 0.013**	0.096 ± 0.016**	0.103 ± 0.017**	0.108 ± 0.018**	0.116 ± 0.015**	0.116 ± 0.013**	0.116 ± 0.011**
C4	0.115 ± 0.018**	0.081 ± 0.011**	0.095 ± 0.013**	0.105 ± 0.010**	0.109 ± 0.015**	0.116 ± 0.014**	0.116 ± 0.012**	0.116 ± 0.015**

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
C_2 = PCM+ Ricinus communis daily for 7 days.C_3= PCM+ Eclipta alba daily for 7 days.
C_4 = PCM+ Vitamin C daily for 7 days.

Table 16-Contrast of Antioxidants on ALT levels.

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30 th Day	45th day	60th day	75th day	90th day
A	51.8 ± 4.56	52.4 ± 5.19	51.8 ± 5.37	50.9 ± 4.32	51.7 ± 4.47	52.7 ± 5.79	52.5 ± 4.87	52.8 ± 5.65
B	51.7 ± 5.43	98.5 ± 7.23	112.7 ± 9.32	118.4 ± 10.59	127.2 ± 12.56	136.4 ± 20.73	123.8 ± 17.12	113.7 ± 11.35
C_1	51.6 ± 5.83**	82.5 ± 9.57**	71.6 ± 8.79**	63.2 ± 7.13**	52.4 ± 6.14**	51.3 ± 6.99**	53.1 ± 7.19**	52.9 ± 6.45**
C_2	51.1 ± 5.83**	83.8 ± 8.22**	72.6 ± 8.76**	64.4 ± 7.61**	60.6 ± 6.25**	54.5 ± 6.76**	53.8 ± 6.86**	52.7 ± 5.47**
C_3	51.4 ± 5.83**	88.7 ± 8.52**	74.6 ± 7.75**	67.9 ± 6.47**	61.5 ± 6.54**	52.5 ± 6.88**	52.4 ± 7.12**	52.1 ± 5.96**
C_4	51.9 ± 5.83**	76.7 ± 9.38**	71.5 ± 8.49**	66.1 ± 7.16**	62.6 ± 6.55**	52.7 ± 6.21**	52.9 ± 6.39**	52.4 ± 5.99**

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
C_2 = PCM+ Ricinus communis daily for 7 days.
C_3= PCM+ Eclipta alba daily for 7 days.
C_4 = PCM+ Vitamin C daily for 7 days.

Table 17 -Contrast of Antioxidants on AST levels.

Groups ↓	Time interval →							
	0 day	2nd Day	15th Day	30th Day	45th day	60th day	75th day	90th day
A	22.5 ± 1.23	21.3 ± 1.98	22.8 ± 1.43	20.8 ± 1.37	21.7 ± 1.34	20.9 ± 1.69	21.1 ± 1.45	22.7 ± 1.56
B	20.7 ± 1.43	51.5 ± 5.23	66.7 ± 7.32	77.4 ± 8.59	87.2 ± 8.56	94.4 ± 9.73	87.8 ± 8.99	85.4 ± 7.39
C_1	20.4 ± 1.56**	39.5 ± 5.00**	34.7 ± 4.36**	29.4 ± 2.67**	22.9 ± 2.19**	21.7 ± 2.44**	20.3 ± 2.16**	22.3 ± 2.19**
C_2	20.3 ± 1.25**	41.6 ± 3.46**	39.2 ± 3.13**	35.9 ± 2.76**	30.5 ± 2.22**	22.8 ± 1.99**	22.6 ± 1.55**	22.3 ± 1.86**
C_3	20.1 ± 1.23**	48.6 ± 3.29**	40.2 ± 3.77**	34.9 ± 2.35**	28.5 ± 1.22**	22.7 ± 1.28**	22.8 ± 1.23**	22.5 ± 1.73**
C_4	20.5 ± 1.24**	46.3 ± 5.37**	41.5 ± 3.66**	37.8 ± 2.05**	30.5 ± 2.29**	22.7 ± 1.33**	22.4 ± 1.17**	22.3 ± 1.84**

A= Control no drug. B= PCM alone.
C_1 = PCM+ Tinospora cordifolia daily for 7 days.
C_2 = PCM+ Ricinus communis daily for 7 days.
C_3= PCM+ Eclipta alba daily for 7 days.
C_4 = PCM+ Vitamin C daily for 7 days.

Conclusion: The study was regulated to collate the antioxidant activity of the plants Tinospora cordifolia, Eclipta Alba contrast with Vit.C and Liv52. The benchmarks used to assess the antioxidant properties are MDA,SOD,Protective index and Stress index. The broach drugs were orally administered as the ensuing schedule from immediately after Paracetamol administration, immediately after PCM administration every day for the continue 7 days. The blood sample were collected at 0 day ,2nd day,15th day, 30th day, 45th day, 60th day, 75th day and 90th day.On distinction of the effectiveness of the various antioxidants kept in this study manifestly Tinospora cordifolia was found to be highest effective with respect to expanse in reducing MDA,ALT,AST level and enhanced SOD level. Tinospora cordifolia also brought Malondialdehyde, Superoxide dismutase, ALT, and AST levels to the well controlled values on the 45th days. Liv52 induces more or less similar results. Eclipta Alba, Vit. C outreach the control values on 60th days.

References:

1. Irshad M and Chaudhuri Oxidant –antioxidant system: Role and significance in human body. Indian journal of experimental Biology.2002; 40 (9): 1233-1239.
2. Handa SS. Medicinal Plants for Health Care. Central council of Ayuruveda and Siddha New Delhi.2006; 14.
3. Gibanananda Ray and syed Akhtar Husain. Oxidants, antioxidant and carcinogenesis. Indian journal of experimental Biology.2002; 40 (9): 1213-1232.
4. Ramon Rodrigo, Cristian Guichard, Roberto Charles. Clinical Pharmacology and therapeutic use of antioxidant Vitamins. Fundamental and Clinical Pharmacology.2007;14(2)111-127.
5. Shrinivas Bumrela and Suresh R Naik. Hepatoprotective Activity of Methanolic Extract of Dipteracanthus Patulus (jacq) nees: Possible Involvement of Antioxidant and Membrane Stabilization Property. International Journal of Pharmacy and Pharmaceutical Sciences.2012; 4(2): 685-690.
6. Norina Abdullah, Nur zakiah Mohd Saat, Hazlin Abu Hasan, Siti Balkis Budin & Sazlina Kamaralzaman. Protective Effect of the Ethanol Extract of Zingiber officinale Roscoe on PCM Induced Hepatotoxicity in Rats. J. Sains Kesihatan Malaysia.2004; 2(2): 85-95.
7. B Hemabarathy, Siti Bbudin and Victor Feizal. PCM Hepatotoxicity in Rats Treated with crude Extract of Alpinia galangal. Journal of Biological Sciences 2009; 9 (1): 57-62.
8. Suresh C, Sikka. Oxidative stress and Role of Antioxident in Normal and Abnormal Sperm Function. Frontiers in Bioscience.1996; 19(8):78-86.
9. De Varies J. Hepatoxicity metabolic activation of PCM and its Derivatives Phenacetin and Benorilate:Oxygenation or Electron Ttansfer Biochem Pharmacol 1981; 30(1) 299-402.
10. Laura P,James,Philp R, Mayeur and JackA. Hinson. Acetaminophen-induced

Hepatotoxicity. The American Society for Pharmacology and Experimental Therapeutics. 2003; 31(12):1499–1506.

11. Sjodin T, YH Westing and FS Apple. Biochemical mechanisms for oxygen free radical formation during exercise. Sports Med. 1990; 10 (1): 236-254.
12. Paolo Scartezzini, Ester Sperini. Review on some Plant of Indian traditional medicine with antioxidant activity Journal of Ethonopharmacology.20071(1):23-43
13. Pryor WA. Oxy-radicals and related species, their formation, lifetimes, and reactions, Anu Rev Physiol. 1986; 48: 657.
14. Mohazzab HKM & Wolin MS. Properties of a Superoxide anion- generating microsomal reductase, a potential pulmonary artery PO_2 sensor. Am J Physiol. 1994; 26 (7): 823.
15. Boguslaw Lipinski. Hydroxyl Radical and Its Scavengers in Health and Disease. Oxidative Medicine and Cellular Longevity. 2011; 4(3) 1-27
16. André B Konan, Jacques Y Datté, and Paul A Yapo. Nitric oxide pathway-mediated relaxant effect of aqueous sesame leaves extract (*Sesamum radiatum* Schum. & Thonn) in the guinea-pig isolated aorta smooth muscle. Complement Altern Med. 2008; 8(2): 231-27
17. Nicholas D Manzo, Adriana J LaGier. Nitric oxide and superoxide mediate diesel particle effects in cytokine-treated mice and murine lung epithelial cells implications for susceptibility to traffic-related air pollution Prev Fibre Toxicol. 2012; 43 (9):1-27
18. Panchwat S, Rathore KS, Sisodia SS. Review on Herbal antioxidant. International Journal of Pharm Tech Reseearch.2010;2 (1):232-239.
19. Talim Manisha. antioxident and their role in diabetes mellitus, heart disease and cancer. Journal of diab Assoc .India 1999; 39(3):69-73.
20. Torn M, YardimS, Gonenc A, sargin H, Menevse A and Simsk B. Serum B-carotene, Vitamin E, Vitamin C and Malondialdehyde levels In several types of cancer J. clin. Pharmacol. 1995; 20(2); 259.
21. Flemming Nielsen, Bo Borg Mikkelsen, Jesper Bo Nielsen, Helle Raun

Andersen, and Philippe Grandjean. Plasma malondialdehyde as biomarker for oxidative stress: reference interval and effects of life-style factors: Clinical Chemistry. 1997; 43(7): 1209–1214.

22. Gutteridge JMC & Halliwell B. The measurement and mechanism of lipid peroxidation in biological systems. Trends Biochem. Sci. 1990; 15(2): 129–135.
23. Richard W. Strange, Michael A. Hough .Structural Evidence for a Copper-Bound Carbonate Intermediate in the Peroxidase and Dismutase Activities of Superoxide Dismutase. Can. J. Appl. Physiol .2012; 34 (1) 1-24.