

ANTI DIABETIC, ANTIHYPERLIPIDEMIC AND
ANTIOXIDANT PROPERTIES OF *VENTILAGO*
MADRASPATANA Gaertn. ON STREPTOZOTOCIN
INDUCED DIABETIC RATS

Presented by

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Under the guidance of

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PLANT PROFILE

- Botanical name** - *Ventilago madraspatana*
Family - Rhamnaceae
common name - Red Creeper



Chemical Constituents:

Plant contains anthraquinones like ventinone-A.B, chrysophanol, physcion, emodin islandicin, xanthorin and xanthorm-5-methylether. Napthoquinones like cordeauxione and isocardeauxione.

Traditional uses:

Skin problems, fever, leprosy, scabies, prurities, diabetes, carminative, digestive, stomachic, flatulence, dyspepsia and erysipelas.

Previous work done

1. Packia Lincy et al., Pharmacochemical characterization and antibacterial activity of *Ventilago madraspatana* Gaertn. *Pharmanest* 2013; 4(4): 578:586.
2. K. Mahesh Kumar et al., Evaluation of Cardio protective effect of methanolic extract of *Ventilago madraspatana* against Isoproterenol induced myocardial infarction in experimental rats. *IJAPR* 2012; 3(9): 1167-1176.
3. K. Sujith et al., Hepatoprotective effects of aqueous extract of *Ventilago maderasapatana* Gaertn. Root basic on CCL4 induced damage in rats. *Ethanopharmacology* 2013; 10(3): 808-810.
4. Amrutha et al., Preliminary phytochemical screening and cytotoxic activity of ethanolic extract of *Ventilago madraspatana* against Human breast cancer. *Int. J. Pharmacol. Bio. Sci.* 2011; 5(2): 75-78.
5. Ghosh, S et al., Antinflammatory and Anticancer compounds isolated from *Ventilago madraspatana* Gaertn. *J. Pharm Pharmacol* 2010; 62(9): 1158-66.
6. G.N. Krishna Kumari et al., Antifeedant activity of quinones from *Ventilago madraspatana*. *Fitoterapia* 2001; 72(6): 671-675.
7. P.S. Rajesh et al., Hydrolytic enzymes and quorum sensing inhibitors from endophytic fungi of *Ventilago madraspatana* Gaertn. *Biocatalysis and Agricultural Biotechnology* 2013; 2(2): 120-124.

OBJECTIVES & PLAN

- To evaluate antidiabetic, antihyperlipidemic antioxidant activity of *Ventilago madraspatana*.
- To study the effect of *Ventilago madraspatana* extract on Glucose, TG, CH, HDL, LDL, VLDL, Creatinine, Urea, Liver glycogen and Serum insulin.
- *In vivo* and *In vitro* antioxidant studies
- Histopathology of pancreas and liver

Materials and Methods

- Plant material Collection: Tirumala forest
- Preparation of extract: Soxhlet extraction. VM_{AE}, VM_{HAE} and VM_{CHCl₃}
- Pharmacological studies
 - Experimental Animals: Sprague dawley rats
 - Acute toxicity studies: 2000 mg/kg
 - Oral glucose tolerance test: 0hr, 1hr, 3hr, 5hr
 - STZ induced diabetes model: 1, 7, 14, 21 days

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- A decorative background featuring diagonal stripes in various colors (red, orange, yellow, green, blue, purple, pink) running from the top-left to the bottom-right. The stripes are set against a light, textured background.
- ❖ Serum Glucose,
 - ❖ Cholesterol,
 - ❖ HDL,
 - ❖ TG,
 - ❖ LDL,
 - ❖ VLDL,
 - ❖ Creatinine,
 - ❖ Urea
 - ❖ Liver glycogen and
 - ❖ Serum insulin

Table 1: Phytochemical screening of VMAE and VMHAE Roots

Phyto Constituents	Test	Alcoholic	Hydroalcoholic
Alkaloids	Mayers test	++	++
	Hagners test	++	++
	Wagners test	++	++
	Dragendroff's test	++	++
Glycosides	Borntrager's test	++	++
	Dam-karrer test	++	++
	Juglone test	++	++
Emodin	Specific test	++	++
Cardiac glycosides	Legal test	++	++
	Baljet test	--	++
Terpenoids	Salkowsky test	--	++
Carbohydrates	Molich test	++	++
	Fehling's test	++	++
Flavonoids	Shinoda test	++	++
Steroids	Leibermann-burchards test	++	--
Proteins	Biuret test	--	--
	Millons test	--	--
Tannins	FeCl ₃ test	++	++
Saponins	Frothing test	++	++

Present (++): Absent (--)

Table 2: Effect of *V.madraspatana* on oral glucose tolerance test

Group	Treatment (mg/kg b.wt)	Serum glucose (mg/dl) (mean± SEM)			
		0 h	1 h	3 h	5 h
I	Normal Control	73.50±2.75	75.40±3.44	79.50±4.44	77.80±3.10
II	Glucose (3 g/kg)	63.03±2.70**	102.40±3.03**	96.41±1.67**	93.31±2.85**
III	Glibenclamide(10)	69.80±3.30**	100.32±2.55	69.66±2.01** (30.56%)	66.13±2.55** (34.08%)
IV	VMAE (125)	73.55±3.11	117.33±3.55**	80.75±2.30** (31.18%)	78.63±4.23* (32.98%)
V	VMAE (250)	71.40±2.11**	115.22±3.42*	77.31±2.50** (32.90%)	73.33±3.55** (36.36%)
VI	VMAE (500)	73.40±3.04**	102.50±3.81	75.14±3.21** (26.69%)	63.55±4.03** (38%)
VII	VMHAE (125)	75.67±2.45	110.03±3.01	80.32±3.10** (27.00%)	76.37±3.95** (30.59%)
VIII	VMHAE (250)	77.60±2.55**	103.36±3.11	85.52±2.80* (17.26%)	72.66±3.10** (29.7%)
IX	VMHAE (500)	67.89±2.75*	105.66±2.45	74.66±3.45** (29.33%)	67.35±2.44** (36.26%)
X	VMCHC13 (250)	77.80± 3.03**	124.65±4.10**	115.8±3.25** (7.09%)	89.83±2.77 (27.93%)
XI	VMCHC13 (500)	73.20± 2.91**	106.73±3.99	91.34±3.71 (14.41)	90.82±3.15 (14.90%)

n=5; Group II is compared with Group I. Groups III- XI were compared with Group II. *P<0.05. **P<0.01.

Table 3: Effect of *V.madraspatana* on serum glucose levels in STZ induced diabetic rats

Group	Treatment (mg/kg b.wt)	Serum glucose (mg/dl) (mean± SEM)			
		1st day	7 th day	14 th day	21 st day
I	Normal Control	105.1±2.0	105.22±3.13	99.68±2.15	102.38±1.74
II	Diabetic Control	341.93±3.40**	350.58±4.53**	361.02±5.95**	379.16±6.03**
III	Glibenclamide(10)	337.5±4.34	278.44±3.75** (17.49%)	197.5±2.10** (41.48%)	153.12±1.59** (54.63%)
IV	VMAE (125)	337.55±4.25	310.43±4.11** (08.03%)	278.63±3.33** (17.45%)	222.11±3.15** (34.19%)
V	VMAE (250)	339.2±5.11	306.58±4.10** (9.61%)	271.76±3.45** (19.88%)	213.15±3.33** (37.16%)
VI	VMAE (500)	325.10±3.10**	286.5±2.77** (11.87%)	207.5±3.01** (36.17%)	159.45±2.40** (50.95%)
VII	VMHAE (125)	340.45±3.23	311.37±3.33** (08.54%)	249.72±3.13** (26.65%)	218.32±4.10** (35.87%)
VIII	VMHAE (250)	336.56±3.51	304.18±4.44** (9.62%)	250.94±2.65** (25.44%)	204.10±3.23** (39.35%)
IX	VMHAE (500)	353.46±3.50**	283.42±5.10** (19.81%)	199.72±2.55** (43.50%)	157.42±2.10** (55.46%)

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

Table 4: Effect of *V.madraspatana* on serum TC, TG, HDL, LDL, VLDL levels in on 1st day

Group	Treatment (mg/kg b.wt)	TC (mg/dl)	TG (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
I	Control	90±2.10	105.2±3.35	35.94±1.45	33.02±2.01	21.04±2.10
II	Diabetic Control	145.75±1.72**	172.10±3.051**	34.48±1.57**	76.85±2.11**	34.42±1.34**
III	Glibeclamide (10)	140.62±2.01**	166.90±3.51*	37.44±2.32	69.80±2.07**	33.38±2.10
IV	VMAE (125)	151.33±2.55	205.06±3.01**	30.55±2.01	79.77±3.45	41.01±2.18
V	VMAE (250)	149.55±2.22**	199.70±2.45**	34.68±1.72	74.93±3.33	39.94±1.79**
VI	VMAE (500)	141.05±2.00**	157.80±1.75**	36.28±1.14	73.21±3.04	31.56±2.53
VII	VMHAE (125)	149.12±2.01	198.32±1.55**	31.60±1.09	77.86±2.77	39.66±3.10
VIII	VMHAE (250)	147.08±3.10	189.50±2.56**	33.94±1.26	75.24±2.95	37.90±2.27
IX	VMHAE (500)	145.05±1.05**	158.90±2.03**	36.42±2.05	73.85±3.05	31.78±2.33

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

Table 5: Effect of *V.madraspatana* on serum TC, TG, HDL, LDL, VLDL levels on 21st day

Group	Treatment (mg/kg b.wt)	TC (mg/dl)	TG (mg/dl)	HDL (mg/dl)	LDL (mg/dl)	VLDL (mg/dl)
I	Control	88.32±2.71	143.7±3.11	37.24±1.34	22.34±2.55	28.74±2.0
II	Diabetic Control	253.15±4.10**	271.7±3.32**	29.16±1.75**	169.65±3.11**	54.34±2.73**
III	Glibeclamide (10)	98.68±2.35** (29.82%)	127.7±3.10** (23.48%)	46.62±3.10** (24.52%)	26.52±4.35** (62.01%)	25.54±2.80** (23.48%)
IV	VMAE (125)	130.65±4.10** (13.66%)	160.23±4.37** (21.86%)	38.43±2.31* (20.50%)	60.17±3.05** (24.57%)	32.05±1.57** (21.84%)
V	VMAE (250)	125.77±3.10** (15.90%)	155.7±3.91** (22.03%)	42.88±2.34** (23.64%)	51.75±3.42** (30.94%)	31.14±2.0** (22.03%)
VI	VMAE (500)	110.40±2.89** (21.72%)	112.9±4.89** (28.45%)	46.10±1.54** (27.07%)	41.72±2.92** (43.01%)	22.58±1.55** (28.45%)
VII	VMHAE (125)	132.55±3.11** (11.11%)	156.13±3.19** (21.27%)	37.33±1.95* (15.34%)	63.99±3.01** (17.81%)	31.23±2.07** (21.25%)
VIII	VMHAE (250)	128.62±3.75** (12.55%)	147.9±5.20** (21.95%)	42.22±2.10** (24.4%)	56.82±3.55** (24.48%)	29.58±2.07** (21.95%)
IX	VMHAE (500)	110.33±3.10** (22.33%)	119.8±4.15** (24.60%)	44.12±1.77** (21.14%)	42.25±2.66** (94.54%)	23.96±3.10** (24.60%)

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

Table 6: Effect of *V.madraspatana* on body weight (mean± SEM)

Group	Treatment (mg/kg b.wt)	Body weight (g)			
		1	7	14	21
I	Normal Control	209.00±7.45	209.80±11.75	202.20±6.15	204.60±5.35
II	Diabetic Control	298.00±8.32**	256.33±5.25**	233.66±4.11**	207.00±7.89** (30.53%)
III	Glibenclamide(10)	288.40±3.45*	250.25±5.55	231.50±4.70 (19.09%)	224.50±4.52** (22.15%)
IV	VMAE (125)	295.35±4.12	265.35±5.15	250.57±4.32* (15.16%)	246.45±5.32** (16.55%)
V	VMAE (250)	299.40±6.71	267.66±3.04*	258.33±6.15** (13.11%)	248.33±5.55** (18.47%)
VI	VMAE (500)	296.40±5.19	264.66±5.15	236.60±8.10 (11.48%)	237.00±6.10** (16.13%)
VII	VMHAE (125)	290.20±5.15	266.22±4.32	243.63±3.25 (13.65%)	235.47± 6.32*(16.04%)
VIII	VMHAE (250)	304.80±4.23	280.00±5.20**	267.00±5.55** (14.51%)	247.50±6.95** (17.39%)
IX	VMHAE (500)	283.00±5.10**	265.66±6.31	248.00±5.34** (19.97%)	222.33±7.10** (25.10%)

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

Table 7: Effect of *V.madraspata* on serum creatinine levels (mean± SEM)

Group	Treatment (mg/kg b.wt)	Serum Creatinine (mmol/L) 1 st day	Serum Creatinine (mmol/L) 21 st day
I	Control	0.546±0.01	0.594±0.01
II	Diabetic Control	0.534±0.02	2.36±0.05**
III	Glibenclamide (10)	0.536±0.03	0.585±0.05** (75.21%)
IV	VMAE(125)	0.515±0.04	1.25±0.04** (47.03%)
V	VMAE (250)	0.524±0.03	0.98±0.06** (58.47%)
VI	VMAE (500)	0.537±0.03	0.63±0.03** (73.31%)
VII	VMHAE (125)	0.523±0.01	1.23±0.05** (47.88%)
VIII	VMHAE (250)	0.538±0.01	0.946±0.02** (59.92%)
IX	VMHAE (500)	0.542±0.05	0.62±0.05** (73.73%)

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

Table 8: Effect of *V.madraspatana* on serum urea levels (mean± SEM)

Group	Treatment (mg/kg b.wt)	Serum Urea (mg/dl)	
		1 st day	21 st day
I	Control	31.55±1.57	31.8±1.75
II	Diabetic Control	30.82±2.11	61.55±5.10**
III	Glibenclamide (10)	30.46±3.75	31.55±3.54** (48.74%)
IV	VMAE(125)	33.15±3.15	53.23±3.05 (13.52%)
V	VMAE (250)	31.64±2.18	43.6±3.56** (29.16%)
VI	VMAE (500)	32.14±3.37	32.5±3.89** (47.19%)
VII	VMHAE (125)	32.01±3.55	50.15±4.35 (18.52%)
VIII	VMHAE (250)	30.46±2.45	42.7±5.33** (30.62%)
IX	VMHAE (500)	31.44±2.10	32.3±4.10** (47.52%)

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

Table 9: Effect of *V.madraspatana* on serum insulin and liver glycogen levels (mean± SEM)

Group	Treatment (mg/kg b.wt)	Serum insulin (IU/ml)	Liver glycogen (mg/gm of wet tissue)
I	Control	92.57±4.0	55.32±3.42
II	Diabetic Control	48.3±3.95**	30.36±4.10**
III	Glibenclamide (10)	91.63±5.10** (89.71%)	45.17±3.36** (48.71%)
IV	VMAE(125)	78.30±3.84** (38.31%)	38.23±2.46 (20.59%)
V	VMAE (250)	82.90±3.67** (71.64%)	40.53±2.52** (33.49%)
VI	VMAE (500)	88.17±3.42** (82.55%)	44.50±3.54** (46.57%)
VII	VMHAE (125)	75.40±3.53** (35.94%)	36.54±3.57 (16.91%)
VIII	VMHAE (250)	81.33±4.11** (68.39%)	41.73±4.41** (37.41%)
IX	VMHAE (500)	87.41±5.10** (80.97%)	43.71±3.11** (43.97%)

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

**Table10: Effect of *V.madraspatana* on Antioxidant levels
(mean± SEM)**

Group	Treatment (mg/kg b.wt)	Catalase (U/mg protein)	LPO (U/mg protein)	Glutathione (U/mg protein)
I	Normal Control	20.49±1.50	95.19±3.55	102.69±1.05
II	Diabetic Control	8.06±0.98**	189.47±3.02**	209.40±2.07**
III	Glibenclamide(10)	20.47±2.0** (60.63%)	103.38±1.77** (45.44%)	114.64±2.77** (45.25%)
IV	VMAE (125)	16.21±2.45*(50.28%)	116.72±3.11** (38.39%)	135.73±2.51** (35.18%)
V	VMAE (250)	17.5±2.75** (53.94%)	114.61±2.51** (39.51%)	137.5±3.0** (34.33%)
VI	VMAE (500)	14±1.77** (42.43%)	103.14±3.0** (45.56%)	121.33±2.83** (42.05%)
VII	VMHAE (125)	15.35±1.97* (47.49%)	125.43±2.72** (33.79%)	143.21±3.11** (31.61%)
VIII	VMHAE (250)	16±2.3** (49.63%)	120.33±2.33** (36.49%)	146.66±4.6** (29.96%)
IX	VMHAE (500)	12±2.0*(32.83%)	106.55±3.15** (43.76%)	123.11±3.9** (41.20%)

n=5; Group II is compared with Group I. Groups III- IX were compared with Group II. *P<0.05. **P<0.01.

HYDROGEN PEROXIDE SCAVENGING ASSAY

Extract (10-100 μ g/ml) in distilled water is added to hydrogen peroxide and absorbance at 230nm is determined after 10min against a blank solution containing phosphate buffer without hydrogen peroxide. The percentage of hydrogen peroxide scavenging is calculated as follows:

$$\% \text{ scavenged (H}_2\text{O}_2) = [(A_i - A_t)/A_i] \times 100$$

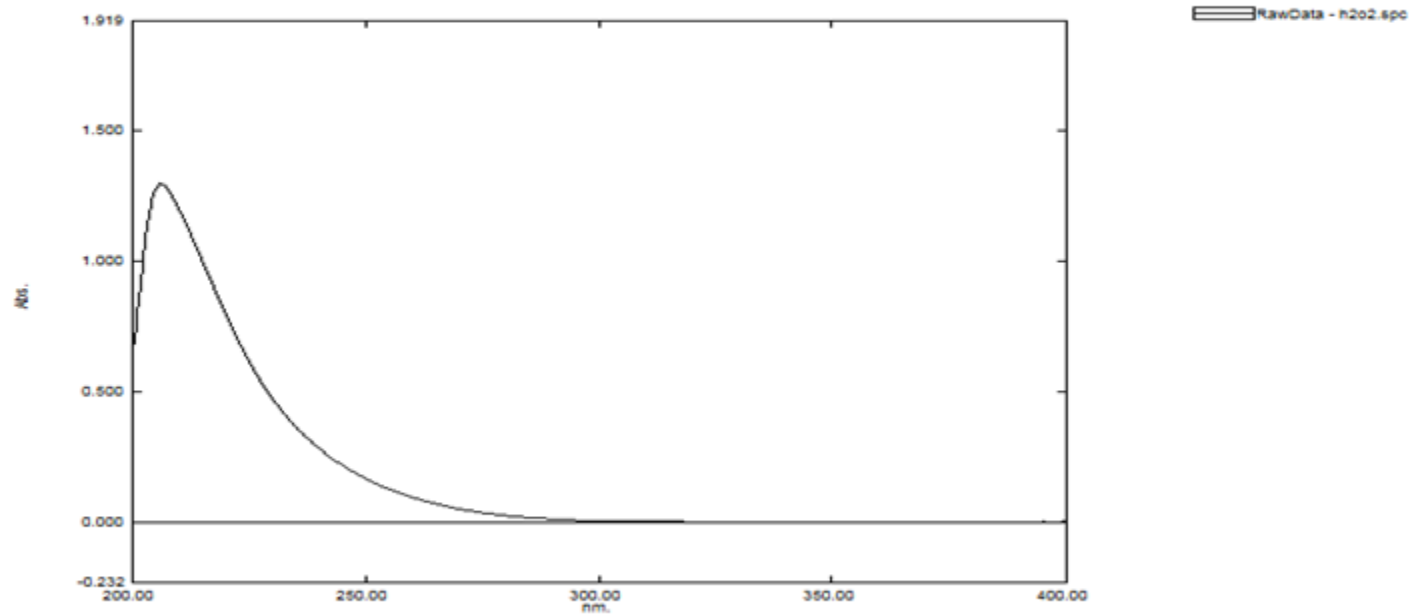
A_i is the absorbance of control

A_t is the absorbance of test.

H₂O₂ SPECTRUM OF CONTROL

Overlay Spectrum Graph Report

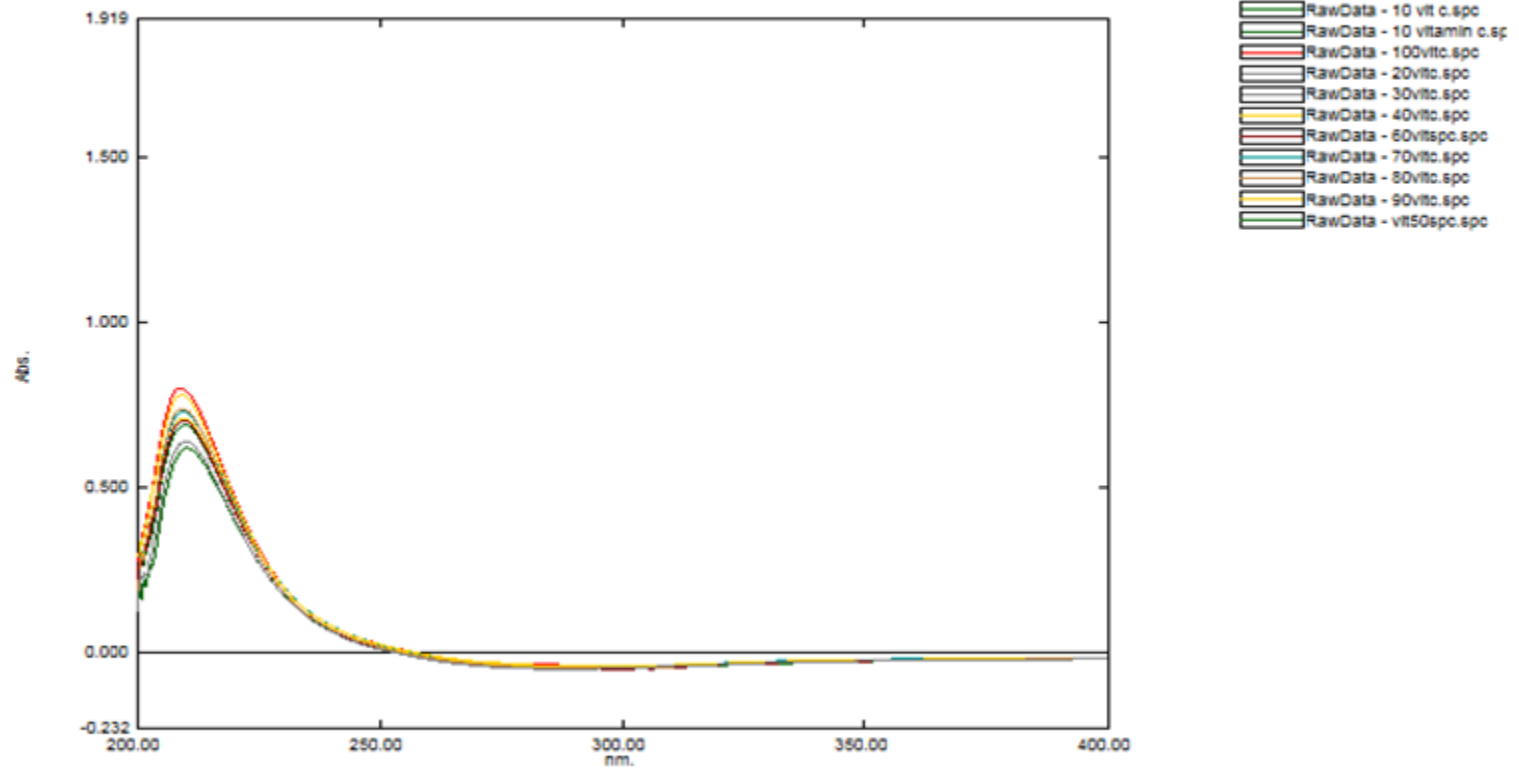
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SPECTRUM OF ASCORBIC ACID

Overlay Spectrum Graph Report

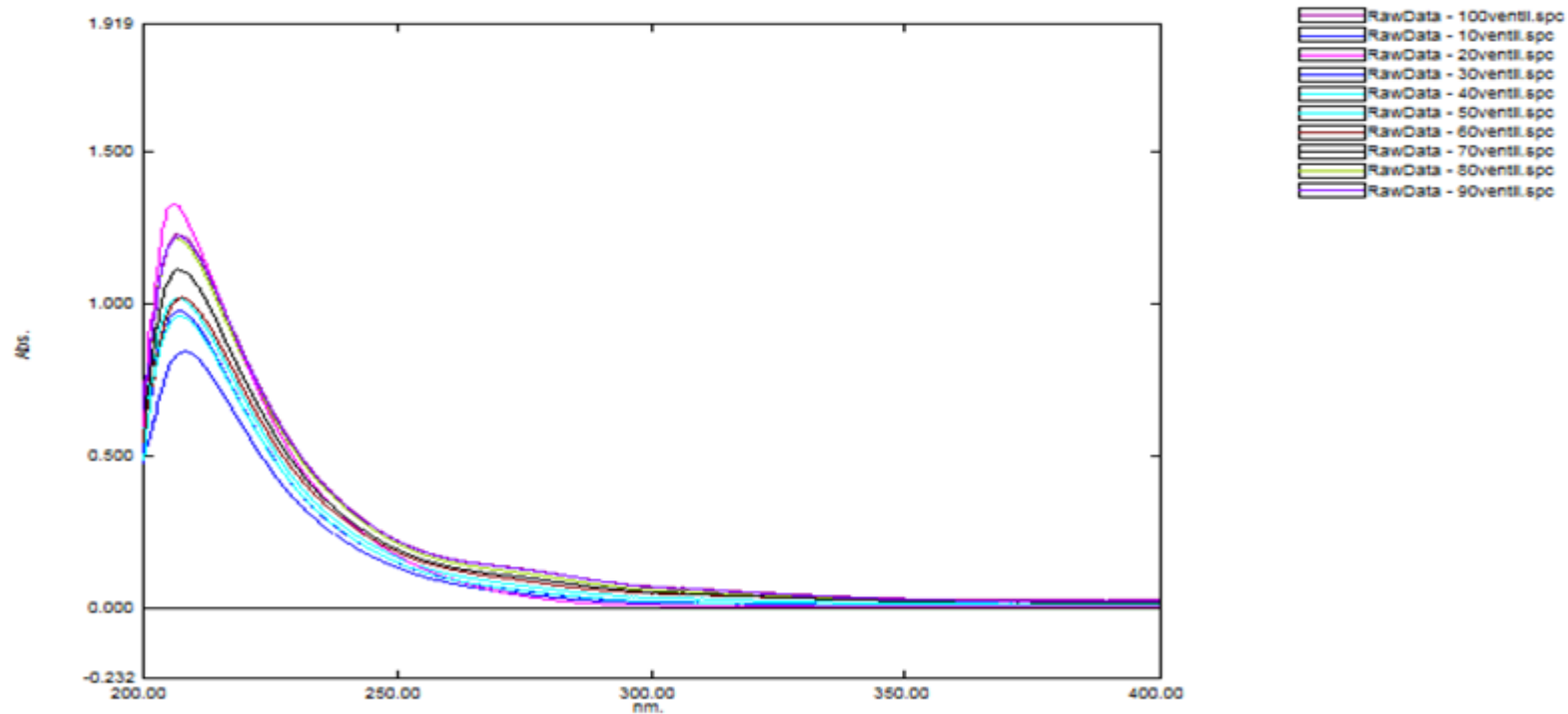
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SPECTRUM OF *V. MADRASPATANA*

Overlay Spectrum Graph Report

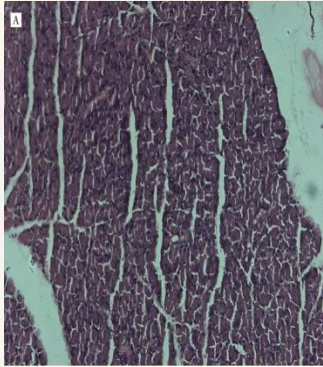
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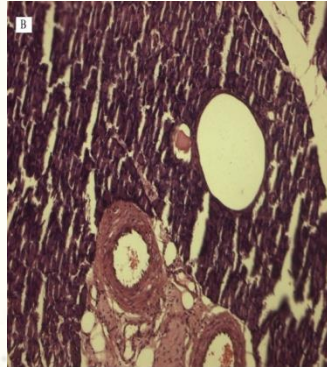
Effect of *V. madraspatana* hydroalcoholic extract on H_2O_2 scavenging activity

Concentration ($\mu\text{g/ml}$)	% Inhibition	
	Ascorbic acid	VMHAE (500mg/kg)IC 50=47.5 $\mu\text{g/ml}$
10	63.2	30.6
20	63.6	19.4
30	63.6	14.7
40	60.8	10.1
50	61.3	23.2
60	61.0	37.4
70	58.1	57.0
80	61.0	64.4
90	58.1	76.7
100	58.1	99.5

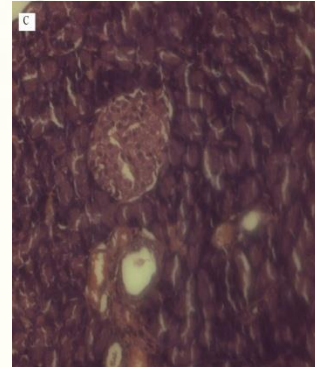
Histopathological changes showing rat pancreas



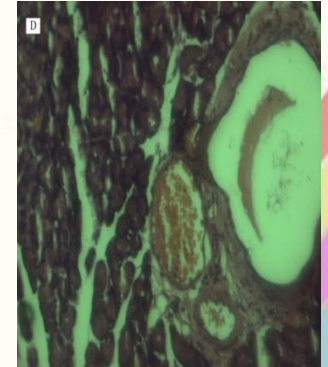
A: Normal control



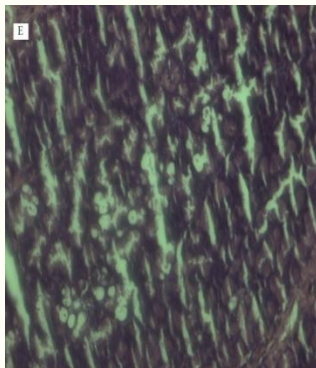
B: Diabetic control



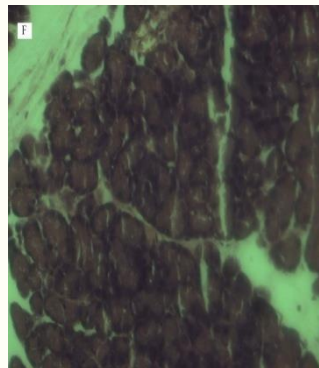
C: Glibenclamide (10 mg/kg)



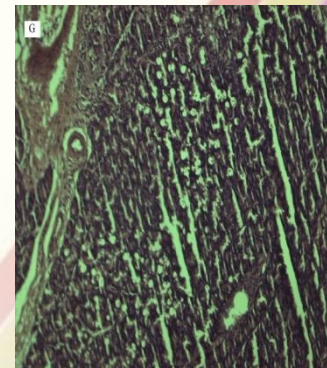
D: VMAE (250 mg/kg)



E: VMAE (500 mg/kg)

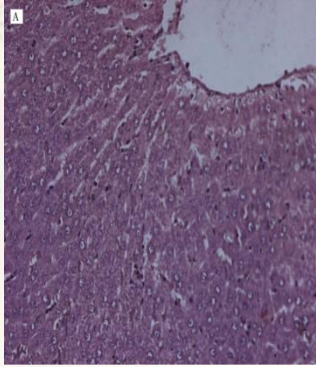


F: VMHAE (250 mg/kg)

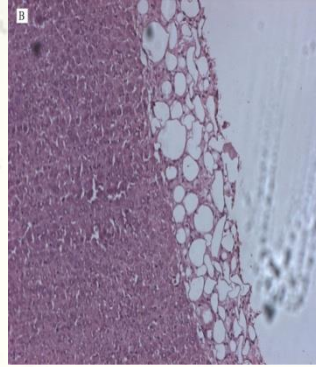


G: VMHAE (500 mg/kg)

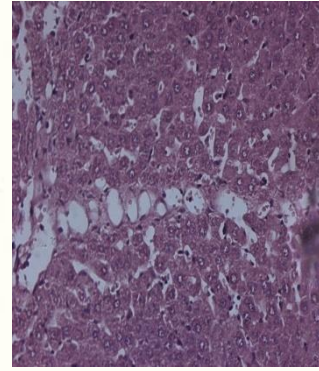
Histopathological changes showing rat liver



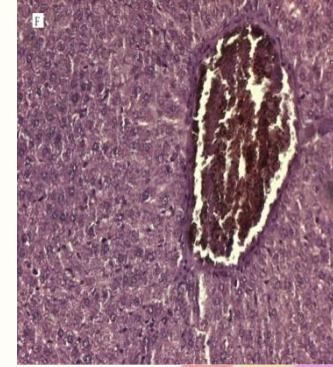
A: Normal control



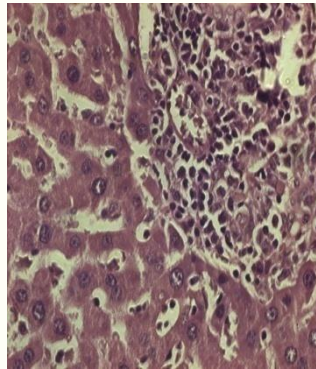
B: Diabetic control



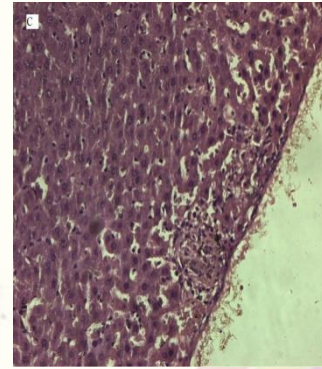
C: VMAE (250 mg/kg)



D: VMAE (500 mg/kg)



E: VMHAE (250 mg/kg)



F: VMHAE (500 mg/kg)

Conclusion

- ❖ Results enumerate significant antihyperglycemic hypolipidemic and antioxidant activities of *Ventilago madraspatana*.
- ❖ VMHAE (500 mg/kg) Antidiabetic effect
- ❖ VMAE (500 mg/kg) Antihyperlipidemic and Antioxidant effect
- ❖ Emodin (PPAR- γ)
- ❖ Phycion(Lipid lowering)
- ❖ Gives scientific evidence for the claim made in the indigenous system of medicine.



THANK YOU

Angel
Flowers