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PRECLINICAL EVALUATION OF HYDROALCOHOLIC EXTRACT OF LEAVES OF *CATHARANTHUS ROSEUS* FOR ITS EFFECT ON THE CENTRAL NERVOUS SYSTEM

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ABSTRACT

Catharanthus roseus is a medicinal plant of the Apocynaceae family. It mainly contains alkaloids. From previous research, it is found that these alkaloids had anticancer, antidiabetic, and antihypertensive effects. In this experiment, the study was focused to evaluate the effect of *Catharanthus roseus* on the central nervous system of albino Wistar rats. The hydroalcoholic extract of the leaves of *Catharanthus roseus* was formed by a cold percolation process. The hydroalcoholic extract of the leaves of *Catharanthus roseus* extract showed a promising effect on the central nervous system of the rat. It showed its central nervous system depression effect as well as smooth muscle relaxant activity also. The potency of *Catharanthus roseus* was also compared with the marketed standard drug. The research outcomes indicate that the

hydroalcoholic extract of *Catharanthus roseus* has a satisfactory effect as a CNS depressant and smooth muscle relaxant.

Keywords: *Catharanthus roseus*, hydroalcoholic extract, albino Wistar rat, CNS depressant activity, smooth muscle relaxant activity

INTRODUCTION:

The Latin word "herba" and the pre-French word "herbe" are combined to get the word "herb." To drain unwavering conclusions about the applicability of various medicinal herbs, researchers conducted significant research and trial. The source of both synthetic and conventional herbal medicine is natural products. In some places of the world, they continue to serve as the primary healthcare system **[1]**.

Catharanthus roseus L (Apocynaceae) also known as *Vinca Rosea*. It is known as Madagascar Periwinkle. It produces vinca alkaloids which are used to fight cancer **[2]**. European herbalists employed the plant as a folk treatment for diabetes and for illnesses ranging from headaches to gout. There are more than 400 alkaloids that are known about it, some of which have been given the go-ahead to be used as antineoplastic medicines to treat cancers like Wilms' tumour, Hodgkin's disease, malignant lymphomas, neuroblastoma, and leukaemia **[3]**. Its vasodilating and memory-enhancing properties have been shown to alleviate vascular dementia and Alzheimer's disease **[4]**. The two classes of active compounds in *Vinca* are alkaloids and tannins. The major alkaloid is vincamine and its closely related semi-synthetic derivative widely used as a medicinal agent, known as ethyl-apovincaminate or vinpocetine **[5]**, has vasodilating, blood thinning, hypoglycaemic and memory-enhancing actions **[6]**. The extracts of *Vinca* have demonstrated significant anticancer activity against numerous cell types **[7]**.

METHODOLOGY:

Collection of samples:

The most sighted part of the entire plant is its leaves. The medicinal garden of our college's campus from where the leaves were gathered. After the leaves were gathered, they were washed in clean water to remove any dirt or foreign objects. Then the leaves were dried at room temperature. *Catharanthus roseus* leaves are treated for phytochemical extraction after drying.

Preparation of the extract: [8]

The shade-dried leaves of *Catharanthus roseus* were placed in the percolator with 400 ml of 70% hydro-alcoholic solution for 72 hours to get the extract by cold percolation method. Then the extract was placed in the vacuum extractor in the pharmaceutics lab for 72 hours. Then the extract was taken and stored in a previously sterilized container.

Animal:

Albino Wistar rats, weighing between 100 and 120g were purchased from an authorised breeder and utilised in this experiment. Animals were kept in animal housing under conventional conditions with a 12-hour alternating cycle of light and dark.

Animal Models: [9]

Dose calculations:

The average body weight of animals was near about 110gm. So, after calculating the animal dose, 0.2mg/kg (animal body weight) Lorazepam (standard drug) was administered by i.p route to evaluate the Skeletal muscle relaxant activity by using the Rota rod apparatus, 0.5mg/kg (animal body weight) Diazepam (standard drug) was administered by i.p route to evaluate the CNS depressant activity by using Open Arena, Staircase apparatus, Light and Dark Area, Elevated Plus Maze. To evaluate the effect of the hydroalcoholic extract of *Catharanthus Roseus* (test substance), 500mg/kg (animal body weight) was administered by oral route, and there was no treatment for the control group. Doses were administered for 30 min. before performing the test.

Rota rod Apparatus:

The rats were introduced to the rota rod and time was taken how long they remained there before falling. The times were calculated for control, test, and standard groups.

Open Arena:

In this experiment, how many boxes the rats of each group covered were tracked in five minutes were noted. Finally, the results of the control, test, and standard tests were compared.

Staircase Apparatus:

In this experiment, rats of each group were introduced to the staircase apparatus, and the number of stairs it traversed in 5 minutes was recorded.

Light and Dark Arena

In this study, primarily rats of each group were placed in the illuminated part of the case and the total number of boxes in the dark as well as light part of the cage was noted, and time spent in the dark as well as the light part of the cage also noted within five minutes. Finally, the test result was compared to the control and standard results.

Elevated Plus Maze Apparatus:

In this experiment, it was measured how much time the rats of each group spent in the open arm and closed arm were evaluated. Then finally the control and standard results were compared with the test result.

RESULT AND DISCUSSION:

Skeletal muscle relaxant activity: (Table 1)

Rota rod apparatus:

The average time of the control group was 63.5 sec., which indicated that the animals of the control group fell from the apparatus' rod for an average of 63.5 sec.

The animals of the standard group fell from the rota rod at an average of 6.66 sec suggesting a notable effect of diazepam application on the animals. Diazepam has demonstrated its own CNS depressing activity. The motor functions similarly decline as the CNS is depressed, and they displayed apathy when supported by the device' rod. The animals of the test group fell from the apparatus' rod in an average of 17.33 sec. The extract has a detrimental effect on how well the rota rod apparatus performs.

In this study, the hydroalcoholic extract of *Catharanthus roseus* L leaves showed impressive skeletal muscle relaxant activity as compared to the control and standard.

CNS Depressant Activity (Table 2)

Open Arena:

The number of boxes covered by the animal in the open arena in 5 minutes was counted. The animals of the control group covered an average of 32.66 boxes. The standard group exhibited diazepam's strong activity. It is a CNS depressant and can also indirectly lower motor activity. The animals of the standard group covered an average of 21.33 boxes. The animals' motor activity decreased, making it impossible for them to cover more boxes in the open arena. *Catharanthus roseus*, the test extract, had demonstrated its efficacy. The test group animals were unable to move about frequently in the open arena after administering the extract. The animals of the standard group covered an average of 24.66 boxes

Staircase apparatus (Table 3)

The animals of the control group covered an average of 50.5 steps in 5 minutes. Diazepam was active prominently in the standard group. It is a CNS depressant that also lowers motor activity. The animals of the standard group covered an average of 24.33 steps. As a result of their decreased motor activity, the animals were unable to climb any additional stairs in the stairwell. Its action was demonstrated using the test extract (*Catharanthus roseus*). The animals of the test group covered an average of 29.16 steps indicating that the test group animals found it difficult to ascend the stairs in the staircase device after ingesting the extract.

Light and Dark Area: (Table 4)

The animals of the control group covered an average of 35.83 boxes in the light area and the average time spent in the light area was 1min 47 sec, and in the dark area box covered 44.66 and time spent 3 min 11 sec proving that the animals covered boxes in light and dark areas as mentioned in the table. In the standard group, diazepam showed prominent activity. it's a CNS depressant drug and it depresses motor activity. It was proven by the mean value of the standard drug. The mean value of the animals of the standard group in the light area box covered 10.66 and the time spent is

12.83 sec, in the dark area box covered 10.33 and the time spent is 4 min 45 sec. The motor activity was lessening so, the animals were unable to cover more boxes. The test extract (*Catharanthus roseus*) was shown its activity. The animals of the test group covered an average of 14.5 boxes in the light area and time spent in the light area was 15.16 sec, in the dark area boxes covered 21.33 and time spent 4 min 44 sec signified that after taking the extract, the animals in test groups found hard-to-cover boxes in both light and dark area in the light and dark arena.

Elevated Plus Maze (Table 5)

The average time spent in the open arm of the animal of the control group was 1 min 51 sec and the closed arm was 3 min 9 sec demonstrating that the animals spent more time in the dark area than was shown in the table. Diazepam exhibits its strong action in the standard division. It is a CNS depressive medication that also lowers motor activity. The average time spent in the open arm of the animal of the standard group was 26.6 sec and the dark area was 4 min 33 sec served as evidence of CNS depression. Animals were unable to spend longer time in the open arm because their motor activity was reduced. Its effectiveness was demonstrated using the extract (*Catharanthus roseus*). The test group animals stayed in the closed arm of the raised plus maze apparatus more frequently than they did in the light area, according to the average time spent in the open arm of the animal of the test group was 56.16 sec and the closed arm was 4 min 4 sec.

Table 1: Effect of *Catharanthus roseus* L on skeletal muscle relaxant activity

Serial No.	Control	Standard (Lorazepam)	Test (*Catharanthus roseus*)
1	46 sec	10sec	15 Sec
2	2min05sec	5 sec	17 sec
3	38 sec	8 sec	22 sec
4	1min04sec	8 sec	19 sec
5	52 sec	6 sec	13 sec
6	36sec	3 sec	18 sec
Average	63.5 sec	6.66 sec	17.33 sec

Table 2: CNS depressant activity in the open arena

Serial No.	Control	Standard (Diazepam)	Test (*Catharanthus roseus*)
1	35	20	19
2	26	26	24
3	30	20	27
4	22	20	20
5	37	18	31
6	46	24	27
average	32.66	21.33	24.66

Table 3: CNS depressant activity in staircase apparatus

Serial No.	Control	Standard (Diazepam)	Test (*Catharanthus roseus*)
1	51	36	28
2	41	20	22
3	47	28	35
4	62	20	31
5	58	23	28
6	44	19	31
average	50.5	24.33	29.16

Table 4: CNS depressant activity in light and dark arena

S. No.	Control				Standard (Diazepam)				Test (*Catharanthus roseus*)			
	Light Arena		Dark arena		Light Arena		Dark arena		Light Arena		Dark arena	
	Box Covered	Time Spent	Box Covered	Time Spent	Box Covered	Time Spent	Box Covered	Time Spent	Box Covered	Time Spent	Box Covered	Time Spent
1	36	1 Min 56 Sec	44	3 Min 04 Sec	7	16 Sec	9	4 Min 44 Sec	25	15 sec	25	4 Min 45 sec
2	22	1 Min 08 Sec	38	3 Min 42 Sec	9	11 Sec	10	4 Min 49 Sec	7	9 Sec	17	4 Min 51 Sec
3	31	1 Min 44 Sec	53	3 Min 16Sec	15	20 Sec	5	4 Min 40 Sec	15	13 Sec	29	4 Min 47 Sec
4	44	2 Min 04 Sec	49	2 Min 56 Sec	5	9 Sec	13	4 Min 51 Sec	20	23 Sec	23	4 Min 37 Sec
5	42	1 Min 32 Sec	48	3 Min 28 Sec	17	13 Sec	14	4 Min 47 Sec	9	14 Sec	15	4 Min 46 Sec
6	40	2 Min 20 Sec	36	2Min 40 Sec	11	8 Sec	11	4 Min 42 Sec	11	17 Sec	19	4 Min 43 Sec
Average	35.83	1 Min 47 sec	44.66	3 Min 11 Sec	10.66	12.83 Sec	10.33	4 Min 45 Sec	14.5	15.16 Sec	21.33	4 Min 44 Sec

Table 5: CNS depressant activity in the elevated plus maze

Serial No.	Control		Standard (Diazepam)		Test (*Catharanthus roseus*)	
	Time Spent in Light Area	Time Spent in Dark Area	Time Spent in Light Area	Time Spent in Dark Area	Time Spent in Light Area	Time Spent in Dark Area
1	1 Min 52 Sec	2 Min 40 Sec	33 sec	4 Min 27 Sec	1 Min 01 Sec	3 Min 59 Sec
2	2 Min 20 Sec	2Min 42 Sec	27 Sec	4 Min 33 Sec	51 Sec	4 Min 09 Sec
3	1 Min 02 Sec	3 Min 30 Sec	26 sec	4 Min 34 Sec	48 Sec	4 Min 12 Sec
4	1 Min 12 Sec	3 Min 48 Sec	23 Sec	4 Min 37 Sec	1 Min 05 Sec	3 Min 55 Sec
5	2 Min 12 Sec	2 Min 54 Sec	21 sec	4 Min 39 Sec	57 Sec	4 Min 03 Sec
6	2 Min 31 Sec	3 Min 20 Sec	30 Sec	4 Min 30 Sec	55 Sec	4 Min 05 Sec
Average	1 Min.51 sec	3Min 9 Sec	26.66 sec	4 Min 33 Sec	56.16 Sec	4 Min 4 Sec

CONCLUSION:

The study concludes that the extract of (*Catharanthus roseus*) exhibits promising CNS depressant activity as well as skeletal muscle relaxant activity in albino Wister rats. In this study, we compared our product to a common medication, diazepam, which primarily depresses the central nervous

system and also inhibits activity in the medulla oblongata. The medulla oblongata is primarily in charge of skeletal muscle voluntary action. As a consequence, both the usual medication and the *Catharanthus roseus* extract reduced the animal's total movement.

When compared to the standard, the decoction (*Catharanthus roseus*) produced a substantial and excellent result. It is not known if the extract is demonstrating its skeletal muscle relaxant function indirectly, even though other behaviours of other animal models are indirectly related to CNS depressing properties.

In the time allotted for this college-level study, we discovered that the pharmacodynamic properties of (*Catharanthus roseus*) extract were similar to those of the standard drug diazepam. However, further research is needed to determine the (*Catharanthus roseus*) extract's precise mechanism of action in preclinical studies.

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