

Hair growth activity of *Nardostachys jatamansi* and *Cyperus rotundus* rhizomes extract on chemotherapy induced alopecia

Sanjay Kumar Yadav^{1*}, S.K.Gupta² and Shashi Prabha³

1, Dept. of Pharmaceutical Chemistry, BBS Institute of Pharmaceutical & Allied Sciences, Greater Noida, U.P., India
2, Dept. of Pharmacognosy, BBS Institute of Pharmaceutical & Allied Sciences, Greater Noida, U.P., India

Abstract

Ethanol extract of *Nardostachys jatamansi* (Valerianaceae) and *Cyperus rotundus* (Cyperaceae) was evaluated for hair growth on albino rats. The hair growth activity that was worked on Chemotherapy induced alopecia model were investigated by using various parameters like hair density, lymphocyte count and testosterone level along with histopathological study. Hair growth initiation time was markedly reduced to half on treatment with extract as compared to control animal the time required for complete hair growth was also significantly reduced. Overall results of this study suggest that the both extract possess significant hair growth activity.

Keywords: *Nardostachys jatamansi*, *Cyperus rotundus*, hair growth activity, hair density, lymphocyte count, testosterone level

Introduction

Hair loss is major problem of society. It is a distressing condition for number of men & women. There are number of allopathic medicines available for treating this condition. Presently, Minoxidil & Finasteride are two USFDA approved synthetic drugs widely used for treatment of androgenic alopecia. Now a days approach has been tried to develop herbal formulations for curing this conditions, to avoid harmful side effects of allopathic system. In traditional Indian system of medicine many plants and herbal formulations are reported for hair growth promotion as well as improvement of quality of hair, but lack of sound scientific backing and information limits their use (Rho.S.S *et al.*, 2005 and Roy R.K. *et al.*, 2005). From the introduction, plant profile and literature review of *Nardostachys jatamansi* and *Cyperus rotundus* it was found that these drugs possess antiestrogenic by preventing the estrogen synthesis (Chopra R.N., *et al.*), hypolipidaemic (Dixit V.P., *et al.*, 1988), hypoglycemic (Raut Nishikant A., *et al.*, 2006), protein oxidation protection (Ardestani, R. *et al.*, 2007), sedative and depressive (Bose B.C., *et al.*, 1957 and Rucker G., *et al.*, 1978), 5 α - reductase inhibitor (Jie Liu.Ryo *et al.*, 2007), anticandida (Duarte Marta Cristina Teixeira, *et al.*, 2005), antibacterial and antifungal (Kumar V. Prashanth., *et al.*, 2006, Sarbhoy A. K., *et al.*, 1978 and Puratchikody A., *et al.*, 2001) as biological activity. *Nardostachys jatamansi* also possess hair fall retardation and hair growth promotion activity (Mohd. A., *et al.*, 1997, Kumar S.Akhila., *et al.*, 1994, Kumar S., *et al.*, 1994, and Kumar S., *et al.*, 1994).

Material and Methods

Plant material

Nardostachys jatamansi (dried rhizomes) purchased from Azad market Bhopal and *Cyperus rotundus* (fresh rhizomes) are collected from Bhojpur River Bhopal. The plant material was authenticated by Department of Pharmacy Barkatullah University, Bhopal. (Herbarium No. BUPH-4033 A/B). *Nardostachys jatamansi* and *Cyperus rotundus* rhizomes were clean and wash. The plants material was dry under shade. Then the both plant material was added in mechanical grinder for size reduction and store in air tight container.

Preparation of extract

The dried coarse powder drug were separately extracted with ethanol (95%) by double maceration and The alcohol was recovered by steam distillation under reduced pressure and the concentrate extract was air dried (Harbone J.B., *et al.*, 1984).

Selection and procurement of animals

After taking permission for animal studies from Institutional Animals Ethics Committee (IACE) (Reg. No.CPCSEA/444), albino mice was procured and mice of either sex weighing 150-200g was selected, maintained at 24-28°C, housed individually with free access to food and water. The animals were left for 48 hour to acclimatize to the animal room conditions. They were fed with standard diet.

Statistical Analysis

The results were analyzed by one-way ANOVA and a P-value less than 0.01 was considered significant (Armitage, P., *et al.*, 1971).

Chemotherapy Induced Alopecia Model (7-week-old mouse model)

7 weeks old mice weighting 45-50g was used. Animals are divided in five groups containing six mice each. Group I: Control receives no treatment, Group II: Negative control receives cyclophosphamide (i.p.) without any test drug treatment, Group III: Receives cyclophosphamide (i.p.) with *Nardostachys Jatamansi* (800mg/kg) oral treatment, Group IV: Receives cyclophosphamide (i.p.) with *Cyperus rotundus* (250mg/kg) oral treatment, Group V: Receives suspension of polyherbal orally after Chemotherapy treatment (1:1 ratio of suspension of *N. jatamansi* and *Cyperus rotundus*) On experimental day 0 anagen was experimentally induced by depilation by wax/rosin mixture that was applied to the dorsal skin of mice with all hair follicles in telogen. Peeling-off the wax/rosin mixture removes all hair shafts and immediately induces homogeneous anagen development over the entire depilated back skin area of the mice, thus inducing a highly synchronized anagen development. When the depilated skin entered the late anagen phase i.e. on 14th day of the experiment cyclophosphamide (freshly prepared as a stock solution at 10 mg/ml in phosphate-buffered saline [PBS], pH 7.4) was injected by the intraperitoneal route 125mg/kg of body weight to group

*Corresponding Author

E-mail: sanjay_yadav3333@yahoo.co.in
Mob. +91880023137

II, III, IV and V. On 14th day of the experiment the mice showed prominent hair loss on the depilated dorsal skin. On 15th day the blood sample from the group II was taken for further analysis. From 15th to 20th day the test extract was given orally group III, IV and V as mention above. On 20th and 21st day the blood sample and skin sample was collected respectively. After collection of sample the different hematological and histopathological parameter was performed (Noboru Sato., *et al.*, 2001).

Results and discussion

Chemotherapy induced alopecia which is a result of damage of hair follicle that causes hair loss. Hair density:- All the treated animals shows much significant increase in hair density as compared to group II and I except group III that shows less activity as compared to group I. Data was tabulated in **table 1**. Lymphocyte count:- Chemotherapy is immunosuppressant agent thus the lymphocyte count will decrease in group II as compared to group I. All the treated groups show more decrease in lymphocyte count as compared to group II and I. Also decrease in lymphocyte count in treated group show following order – Group V > group IV > group III. All the data was tabulated in **table 1**. Testosterone level: The entire treated group shows decrease in testosterone level as compare to group II and I. Also decrease in testosterone level in treated group show following

order – Group V > group IV > group III. All the data was tabulated in **table 2**. Histopathology:- From the result of histopathological study and figure given below it was clear that all the treated groups i.e. III and IV shows the percentage populations of hair is more than group II and less than group I where as group V show much percentage than group II and I. Also it was observed that the hair density was much more in group V, followed by group IV and then group III. All the data was tabulated in **table 1**.

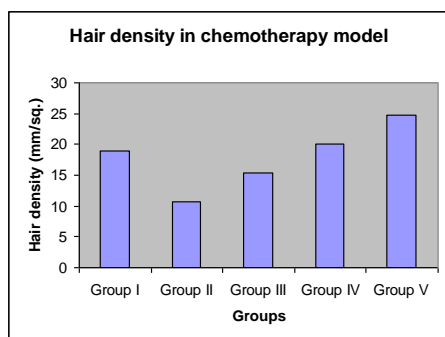
Conclusion

Cyperus rotundus (Rhizome) shows best result as compared to *Nardostachys jatamansi* (Rhizome). *Cyperus rotundus* (Rhizome) may show its activity due to the presence of insulin like effect as it is useful in treating diabetes. The insulin growth factor is responsible for hair growth as we have already seen that testosterone causes hair growth on chin and other parts of body except scalp where as *Nardostachys jatamansi* (Rhizome) may shows its activity due to sedative, depressive, transquizing, antiserotonin effect. This effect may also be coupled with its hypolipidemic effect and antiarrhythmic effect.

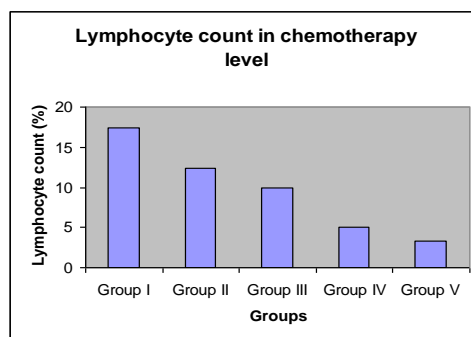
Aknowledgement

The authors are thankful to Department of Pharmacy, Barkatullah University, Bhopal for providing facilities to carry out the research work.

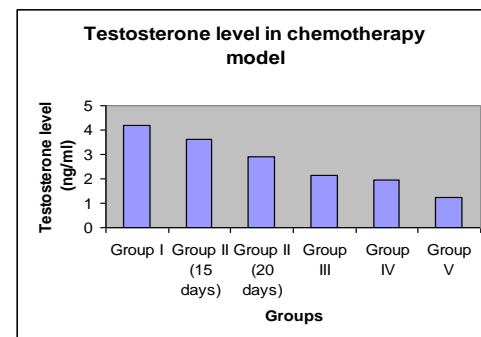
Histopathology



Graph 1: Hair density



Graph 2: lymphocyte count



Graph 3: Testosterone level

References

- 1) Ali M. and Ansari S.M., 1995, *Nat sem on med plant* CIMAP Lucknow; 20.
- 2) Ardestani, Yazdanparast R., (2007) *Food Chem.* 104, 21–29.
- 3) Armitage, P., “Statistical Methods in Medical Research”, 1971, *Blackwell Scientific Publications*, London, 1st Ed., 217.
- 4) Bose B.C., Gupta S.S., 1957 “*Indian J. Med Science*”, Oct; 11(10):8037.
- 5) Chopra R.N., Nayer S.L., Chopra I.C., “Glossary of Indian medicinal plants”, 173-174.
- 6) Dixit V.P., Jain P., 1988 “*Indian J. Physiol Pharmacol*” Oct-Dec; 32(4): 299-304.
- 7) Duarte Marta Cristina Teixeira, Figueira Glyn Mara , Sartoratto Adilson, Rehder Vera L’ucia Garcia, Delarmelina Camila (2005) “*Journal of Ethnopharmacology*” 97, 305–311.
- 8) Harbone J.B., 1984, “*Phytochemical methods*” IInd edition, published by Chapman and Hall, 4-6.
- 9) Jie Liu., Ryo Ando., Kuniyoshi Shimizu, Koh Hashida, Rei Makino, Seiji Ohara, Ryuichiu Kodo., 2007 “*J. wood science*” DOI10.007/S 10086-007-0905-9.
- 10) Kumar S. Akhila, A. Nagvi, Farooqui A.A., A.H.A., Singh K., Anil, Singh, D., Uniya, G.C., Shrivastava G.N., Gupta ,M.M., Bindra R.L., Hasan, S.A., kumar, V.S. and Shukla ,Y.N., 1994. “*Medicinal plant in skin care*” central institute of medicinal and aromatic plant, Lucknow, 2.
- 11) Kumar S., Kumar V.S., Sharma, A., Shukla, Y.N., Singh, A.K., 1994, “*traditional medicinal plants in skin care*”, central institute of medicinal and aromatic plants., Lucknow, 103.
- 12) Kumar V. Prashanth, Chauhan Neelam S., Padh Harish, Rajani M., (2006) “*Journal of Ethnopharmacology*”, 107 & 182–188.
- 13) Mohd. A. and Ansari, S.H., 1997 “*Indian journal Natural product*”, 13 (1)4.
- 14) Noboru Sato, Philip L. Leopold, Ronald G. Crystal; 2001, “*Journal of the National Cancer Institute*”, Vol. 93, 24, December 19, 1859-1864.
- 15) Puratchikody A., Devi C. Nithya , & Nagalakshmi G., 2001, “*Indian Journal of Pharmmaeetical Science*” 63(4), 326-327.
- 16) Raut Nishikant A., Gaikwad Naresh J., (2006) “*Journal of Fitoterapia*” 77, 585-588.
- 17) Rho.S.S, Park S.J, Hwang S.L., Lee H.M., Kim C.D., Lee I.H., 2005, “*Journal of Dermatological Science*”, 38(2), 89 – 97.
- 18) Roy R.K., Thakur M, Dixit V.K.; 2006 “*Indian drugs*”, 43 (12), 951-956.
- 19) Rucker G., Tautges J., *Arzneittelforschung*, 1978; 28(1):7.
- 20) Sarbhoy A. K., Varshney J . L., *Zentralbl Bakteriell Naturwiss*, 1978; 133 (7-8):723-5.

Table: 1

Sr. No.	Group	Hair density (mm/sq.)	Lymphocyte count (%)	Population of hairs (%)		
				Anagen	Catagen	Telogen
1	I	18.89 ± 0.75	17.38 ± 0.75	62	4	37
2	II	10.75 ± 0.55	12.33 ± 0.82	40	2	58
3	III	15.33 ± 0.82	9.98 ± 0.83	54	4	40
4	IV	20.00 ± 0.89	5.05 ± 0.89	59	2	37
5	V	24.83 ± 0.98	3.33 ± 0.55	71	2	25

Table: 2

Sr. No.	Group	Testosterone level (mg/ml)
1	I	4.2 ± 0.04
2	II (15 th day)	3.6 ± 0.03
3	II (20 th day)	2.9 ± 0.13
4	III	2.15 ± 0.008
5	IV	1.96 ± 0.075
6	V	1.23 ± 0.02