

STUDY ON THE VRSYA PROPERTY (TESTICULAR REGENERATIVE POTENTIAL) OF VANGA BHASMA

NAGARAJU, V., JOSHI, D., AND ARYYA, N.C.

Institute of Medical Sciences, Banaras Hindu University, Varanasi 221 005, India.

1. *Research Scholar, Dept. of Rasa Shastra, I. M. S., B. H. U.*
2. *Head, Dept. of Rasa Shastra, I. M. S., B.H.U., Varanasi*
3. *Lecturer, Dept. of Pathology, I. M. S., B. H. U., Varanasi.*

Received: September 19, 1984

Accepted: February 23, 1985

ABSTRACT: *Vanga bhasma, a popular Ayurvedic Medicine is prepared from Tin metal. This drug is claimed to have 'Sukrala' (Semenaugmentator), 'vrsya' (good for testis) properties in the literature and is widely in vogue for genito – urinary disorders in Ayurvedic practice. An experimental evaluation of the claim has been undertaken and the results have been presented in this paper. The drug in reference is found to have testicular regenerative potential on cadmium induced testicular degeneration in albino rats, when administered orally. This effect on 'Sukravaha Srotomula' (testis) appears to corroborate "Sukrala" and "Vrsya" properties attributed to the drug in Ayurvedic literature.*

Key words:

Vanga bhasma, Sukrala, Vrsyam Sukravaha Srotas, Cadmium induced partial testicular degeneration, zinc sulphate.

INTRODUCTION

In Ayurvedic practice, Vanga bhasma, an indigenous medicine prepared from tin metal finds a place in the treatment of genito – urinary tract diseases. It is emphasized for the treatment of *Nirapatya* (male infertility), *sukrksaya* (semen – Loss), *Napumsakata* (impotency) and to augment semen production. Resume of Ayurvedic literature reveals that the drug in reference has been said to have *Vrsya* (good for testes) and *Sukrala* (semen augmentator) properties, since 18th A. D. and onwards¹. From the Ayurvedic literature, it is obvious that Vanga bhasma has a specific role on *Sukravaha srotas* (male genital tract semen

system). Caraka Samhita mentions – testis as the origin seat for semen² system. On the basis of the textual claims and clinical observations it has been contemplated to corroborate the same by animal experimentation. Partially degenerated testis of albino rats constituted the experimental model to observe the effect of the test drug. Single parenteral administration of Cadmium in any of its soluble form in minute doses is known to selectively degenerate testicular tissue³ and zinc is known to prevent the above effect of Cadmium on testis⁴. Agarval et al⁵ (1974) and Mohanty et al⁶. (1980) had succeeded

in producing testicular degeneration by cadmium chloride and compared the effect of Yasada bhasma and Vanga bhasma respectively with the preventive role of zinc sulphate on cadmium induced testicular degeneration. Initially it was observed that cadmium chloride in a dose of 0.2013 mg/100gm (0.1 mM/kg) body weight can produce partial testicular degeneration with a few viable cells of germinal epithelium in albino rats. Based on the above facts, an experimental study was carried out to evaluate the testicular regeneration potential of Niruttha Vanga bhasma⁷ prepared in our laboratory.

MATERIALS AND METHODS

1. Cadmium chloride (Sarabhai – AR)
2. Zinc sulphate (Sarabhai – AR).
3. Vanga bhasma (Niruttha prepared in our Lab).
4. 30 healthy adult male albino rats weighing 170 ± 20 gms.

The experimental animals were kept on standard laboratory diet and water *ad libitum*. Following acclimatisation to the surrounding environment, animals were divided into five groups of 6 animals in each and labeled as A, B, C, D and E and kept in separate cages. Animals of different groups received the following schedule of drugs.

Group A (Control) – No drug

Group B (CdCl_2) – Single subcutaneous injection of CdCl_2 solution was administered in the dose of 0.2013 mg/ 100 gm body weight to the animals of this group.

Group C (CdCl_2 and ZnSO_4) – The animals of this group received S/C injection of ZnSO_4 in the dose of 29.3 mg/100g body weight just before the administration of CdCl_2 in the dose of 0.2013 mg/100gm. ZnSO_4 injection was repeated after 12 hours.

Group D (CdCl_2 and Vangabhasma) – In this group Vangabhasma was administered orally in the dose of 500 mg/kg body weight 6 hours prior to the administration of CdCl_2 . The administration of Vangabhasma was continued for 10 days.

Group E (CdCl_2 and Vangabhasma after 36 hours). Animals in this group received Vanga bhasma in the dose of 500 mg/kg body weight after 36 hours of CdCl_2 S/C injection. The Vangabhasma was continued for 10 days.

After 36 hours, 3 animals from group B were sacrificed to assess the partial degeneration of testis. On 12th day remaining 3 animals in group B and all the animals belonging to groups A, C, D & E were sacrificed by decapitation method to dissect out testes for histopathological studies. Standard Laboratory techniques⁸ were followed for the same.

Observations:

- i) Animals treated with cadmium chloride and sacrificed after 36 hours showed partial degeneration and necrosis of the germinal epithelium, interstitial oedema, vascular

- congestion and neutrophilic and eosinophilic infiltration in testicular tissues. (Fig. 1).
- ii) Animals treated with cadmium chloride and sacrificed on 12th day showed degenerative changes in the testis such as – reduction in the thickness, extensive fatty vacuolization and necrosis of germinal epithelium, interstitial oedema, congestion and neutrophilic and eosinophilic infiltration (Fig. 2, 3).
 - iii) Animals treated with cadmium chloride and ZnSO₄ revealed only fatty changes and reduction in thickness of germinal epithelium, approximately ranging from <10% - 50% of the seminiferous tubules of the testis in 3 animals (Fig.4). In two animals the testicular tissues were found normal looking while in one interstitial oedema and congestion of vessels was noted. Variable number of mature sperms were noted in almost all the specimens.
 - iv) Animals treated with Vangabhasma and CdCl₂ simultaneously showed fatty change in germinal epithelium effecting <10% - 30% of tubules (Fig. 5) in two animals. In other four animals except mild interstitial oedema and congestion, no other abnormal changes were noted.
 - v) Among the animals with CdCl₂ and Vangabhasma after 36 hours showed focal reduction in thickness of germinal epithelium in one animal (Fig. 6) and a few abnormally large spermatozoa in few tubules in another animal. Remaining four animals were almost normal looking.

In terms of degree of degeneration in germinal epithelium of testis and number of animals involved, it was observed that testicular tissue attaining towards normal appearance was best achieved in group where Vangabhasma was administered after 36 hour of Cd. Administration than in the group where zinc sulphate was administered.

Discussion:

As per the reports available in the literature, cadmium chloride in the dose as low as 0.01 mM/kg produces testicular degeneration. By 7 – 10 days testis diminishes in size and entirely replaced by masses of eosinophilic material interspersed with scanty basophilic nuclear residue³. One or two parenteral administrations of zinc in a ration of zinc: Cadmium 40 or 50 ; 1 is adequate to protect the rat testis⁴. Agarwal et al. had used cadmium chloride in a single dose of 0.1834 mg/100gm (0.1 mM/kg) body weight and zinc sulphate in a dose of 29.3 mg / 100 gm body weight simultaneously and repetition of the same dose after 12 hours in albino rats for their study on the effect of indigenous drugs on testicular regeneration⁵. Mohanty et al. also utilized the above experimental model in a similar way in his study⁶.

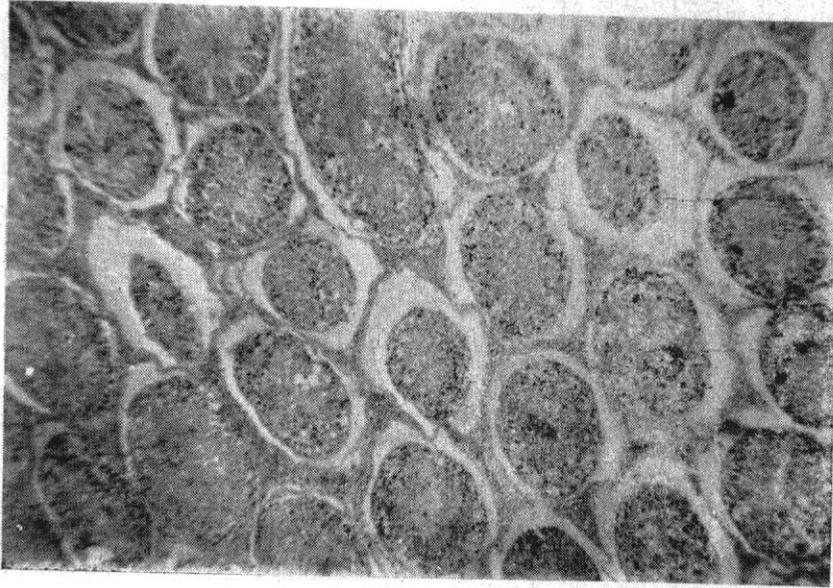


FIG. 1.

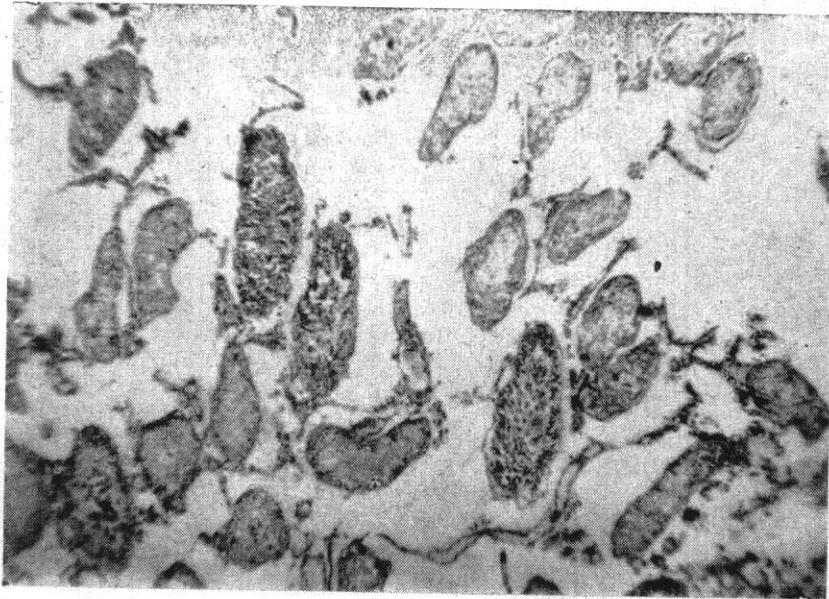


FIG. 2.

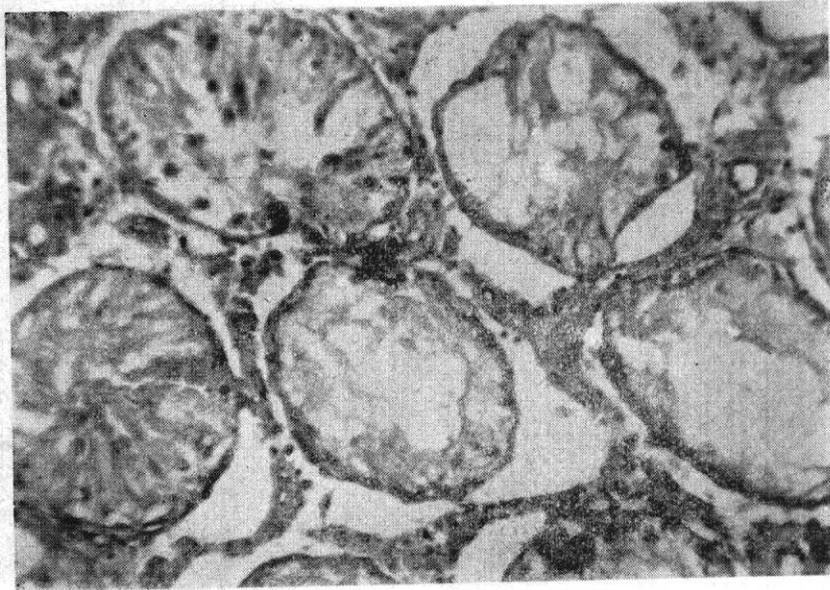


FIG. 3.

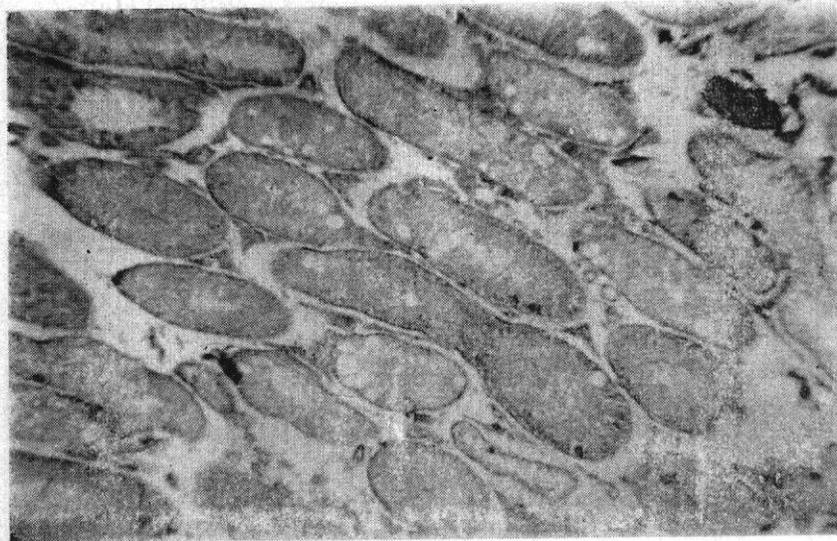


FIG. 4.

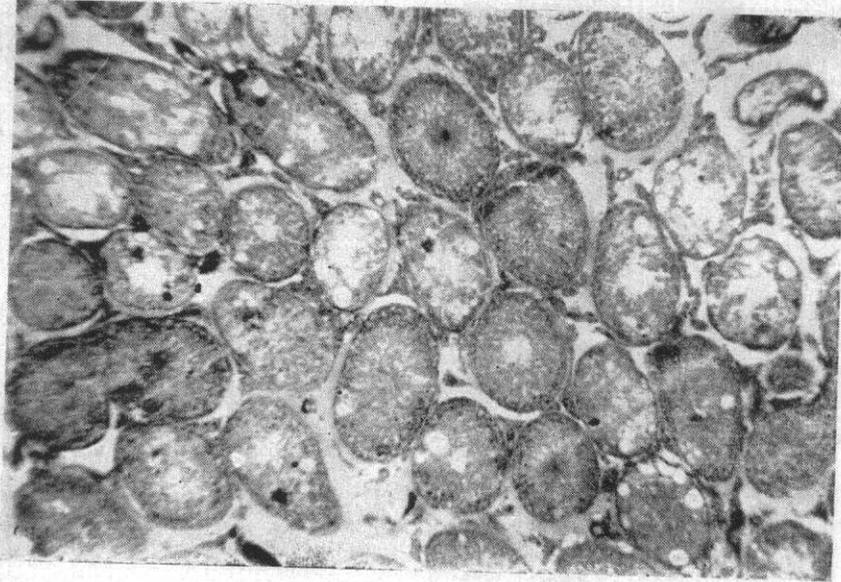


FIG. 5.

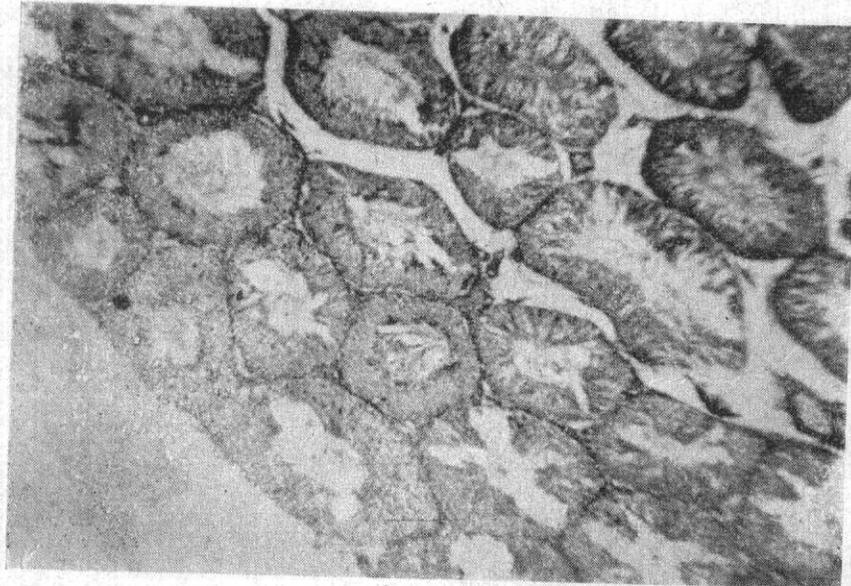


FIG. 6.

In our studies partial degeneration of testis after 36 hours of Cd. Administration was found, characterized by degeneration and necrosis of germinal epithelium with intact 2, 3 layers of cells in germinal epithelium. Associated findings include interstitial oedema, congestion and neutrophilic and eosinophilic infiltration. Fatty change and necrosis of the entire germinal epithelium, observed in animals treated with CdCl₂ and sacrificed on 12th day indicate the progressive nature of the cadmium induced testicular degeneration. Lesser intensity of degenerative changes observed in the group which received ZnSo₄ S/C injection do indicate that the ZnSo₄ has preventive role on Cd. Induced testicular degeneration. Our finding is inconformity with that of many workers.

In group D Vangabhasma was administered 6 hours prior to cd. Injection, so as to maintain the blood levels of the test drug by the time cd. Reaches in blood, so that its preventive effect could be assessed and compared with that of parenteral administration of ZnSo₄. In our study it was observed that Vangabhasma which was given simultaneously with CdCl₂ in oral route showed better preventive role than that of parenteral ZnSo₄ evaluated by comparison of histological findings. This observation is complementary to that observed by Mohanty et al⁶. in a similar study conducted earlier.

Group of animals in which partial damage to testis was induced and treated later by Vanga bhasma in oral route showed focal reduction in thickness of germinal epithelium in one animal while abnormal spermatozoa in few tubules of another animal. Saving these few changes rest of

the four animals was looking near normal under light microscope. Presence of few abnormal spermatozoa may be a normal phenomenon, individual variation, previously abnormal testis or excessive responses of germinal epithelium to Vanga bhasma. Sertoli cells, Ley dig cells, basement membrane showed no significant change in any of these specimens.

From the histopathological changes it appears that cadmium has produced partial degenerative effect on testis by 36 hours while degeneration and necrosis of testicular tissue was progressive in nature. This toxic effect of cd can be prevented by ZnSo₄ and Vanga – bhasma. Vangabhasma seems to be more effective than ZnSo₄ in this regard. Administration of Vangabhasma after producing partial degeneration in testis, showed regeneration of the somniferous tubules of testis. This indicate, tin metal in the form of bhasma is not only capable of preventing cadmium induced testicular degeneration but also can regenerate testicular tissue in partially degenerated cases.

It may be pointed out here that the degenerative changes produced by cadmium seem to be progressive in nature. Even after 10 days, no possibility of automatic regeneration was observed in the present experiment.

Conclusion

It may be concluded from the present study that from the therapeutic point of view Vangabhasma may be considered as a drug of choice in cases of male sterility due to degenerative changes in testis. Our findings are based on preliminary studies which needs further studies in larger number of

animals and clinical research, for a valid conclusion.

The findings of our experimental study confirm that Vangabhasma has a specific

role on Sukravatha Srotas. Thus *Vrsya* and *Sukrala* properties delineated in Ayurvedic texts for the drug in reference have been corroborated.

Fig – 1- Microphotograph of testis showing degeneration and necrosis of germinal epithelium interstitial oedema and congestion, viable cells in germinal epithelium, after 36 hours of CdCl₂ administration (H & E x 50).

Fig – 2 –Microphotograph showing degeneration and necrosis of the germinal epithelium of seminiferous tubules; along with interstitial oedema and congestion of vessels, after 10 days of CdCl₂ administration (H & E x 50).

Fig – 3 –Microphotograph showing fatty change and necrosis of the germinal epithelium of seminiferous tubules, after 10 days of CdCl₂ administration (H & E x 50).

Fig – 4 - Microphotograph showing fatty change in germinal epithelium in few tubules along with mild interstitial oedema and congestion of vessels following CdCl₂ and ZnSo₄ administration (H & E x 50)

Fig – 5 - Microphotograph showing fatty change in germinal epithelium, interstitial oedema and congestion, followed by CdCl₂ and simultaneous Vangabhasma administration (H & E x 50)

Fig – 6- Microphotograph showing focal reduction in the thickness of germinal epithelium of seminiferous tubules following the administration of Vangabhasma after inducing partial degeneration with CdCl₂ (H & E x 50).

REFERENCES

1. Madhava: Ayurveda Prakasha Ed. by Gulraja Sharma Mishra, Choukhamba Sanskrit Series, Varnasi, IInd Edn. 3 / 152 (1964).
2. Agnivesa: Caraka Samhita; with Ayurveda Dipika. Com. By Cakrapani. Trans. By Kashi Kantha Sastry ; Choukhamba Sanskrit Series, Varanasi, Ist Edn. Vimanasthana, 5/10 (1969).
3. Johnson, A. D.: Gomes, W. R. and Vandemarc, N. L. : The testes. Vol. III, Academic Press, U. S. A., p. 412 – 13. (1970).
4. Ibid. p. 457 – 58
5. Agarval, H. S. K et al : Effect of Indigenous drug on testicular regeneration. Ph. D. Thesis, I. M. S., B. H. U., p 75 (1974).

6. Mohanty, N. et. al: Pharmaceutical and Experimental study on Vanga Bhasma with special reference to Shukra Janana property M. D. (Ay.) Thesis, I. M. S., B. H. U. p. 107 & 108. (1980).
7. Nagaraju, V., Joshi, D: A laboratory test on Vangabhasma – Ayurvedigyan – Annual No. p. 0 - 12. (1983).
8. Culling, C. F. A.: A Hand book of histopathological techniques reprinted 2nd edn. Butterworth & Co., London (1966).