



## STUDY OF VRSYA PROPERTY (TESTICULAR REGENERATIVE POTENTIAL) OF ABHRAKA BHASMA IN OBESITY INDUCED RATS

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### ARTICLE INFO

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### ABSTRACT

**Aims:** This study was conducted to evaluate vrsya property of Abhraka Bhasma in obesity induced male wistar rats. **Methods:** The current experiment was carried out on 24 healthy young male albino wistar rats divided in to 4 groups. Sahastraputi abhraka bhasma was used as the test drug with honey as a vehicle orally. G1 group were fed with normal diet for 5 weeks and honey for next 3 weeks served as normal control. G2 group were given high fat diet for 5 weeks and honey for next 3 weeks served as disease control. G3 group were given normal diet for 5 weeks and abhraka bhasma of 1.08mg/200gm of rat for next 3 weeks serves as treatment control. G4 group received high fat diet for 5 weeks and abhraka bhasma of 1.08mg/200gm of rat for next 3 weeks serves as treatment. **Statistical Analysis Used:** One –way ANOVA was used to take out the significance of the data and graph pad prism to obtain descriptive statistics. **Results:** On sacrificing animals after 50 days of experimentation it was observed that control animals (G1) had normal spermatogenesis with normal BMI. G2 group rats prevented spermatogenic profile in 50% obese rats and resulted in degenerated tubules with increase in BMI. In G3 group spermatogenic activity increased. Where as in G4 group due to the effect of test drug it contained 60% hyperactive tubules and 35% in recovery stage which are damaged due to effect of high fat diet. **Conclusion:** In conclusion, Abhraka Bhasma due to its body mass index (BMI) decreasing property has vrsya property. This study confirms that abhraka bhasma is important tool in solving the problem of infertility in obese males.

### INTRODUCTION:

Abhraka bhasma is a herbo mineral formulation of Ayurveda constituting mica nano particles. Abhraka bhasma is like supreme ambrosia, it destroys vata(air), pitta(fire), and disease ksaya(pthisis). It is a nervine tonic and increases tone of tissue, benefits in azoospermia, erectile dysfunction, haematinic. It also acts as hepatoprotective agent. According to a new study led by Babita *et al* (2012), demonstrated that abhraka bhasma reduces testicular damage induced by heat

stress in heat stroke rats. It indicates that prolonged administration will ameliorate fertility in males, especially those who are exposed to heat. Normal BMI is necessary for normal spermatogenesis and fertility in mammals. Obesity which may be due to physical, genetic and hormonal disorders cause erectile dysfunction or altered seminal parameters which results in infertility. The goals of this study was set to prove that this abhraka bhasma is highly beneficial in the treatment of infertility especially in obese

individuals. It brings forth that abhraka bhasma enhances the fertility in high fat diet fed obese rats by altering the body mass index and obviously improving the spermatogenic activity.

## **MATERIALS AND METHODS**

**Animals:** The experiment was carried out on healthy 24 Male albino wistar rats (45 – 60gm) of 4 weeks old were obtained from Teena Biolabs Pvt Ltd., Reg no 189/42/CPCSEA, Bachupally, Hyderabad. Animals are housed in cages in an air conditioned laboratory of the animal house. Animals were maintained under controlled standard conditions, with free access to pellet diet, high fat diet and water ad libitum. Before conducting the experiment, the animal ethical clearance was obtained from Institutional Animals Ethics Committee (IAEC) approved by Committee for the purpose of control and supervision of experiment on animals (CPCSEA).

**Abhraka Bhasma (Test drug):** Sahasra puti abhraka bhasma was used as the test drug. This is marketed preparation obtained from ayurvedic medical pharmacy. The dose was calculated by extrapolating the therapeutic dose of humans to rats on the basis of BSA ratio (conversion factor 0.018 for rats) by referring to the table of (Paget and Barnes 1964).

Therapeutic dose of Sahastraputi Abhraka Bhasma: 15 - 60 mg

Selected human dose: 60 mg/kg b.w

### **For Rats:**

Human dose X 0.018 = X g/200mg of rat

Vehicle = Honey is used as vehicle

### **Experimental design**

The animals were divided into four groups of 6 animals each.

**Group 1:** Receives normal diet for 5 weeks and honey for next 3 weeks serves as normal

control.

**Group 2:** Receives high fat diet for 5 weeks and honey for next 3 weeks serves as disease control.

**Group 3:** Receives normal diet for 5 weeks and abhraka bhasma of 1.08 mg/200 g of rat for next 3 weeks. (Treatment control)

**Group 4:** Receives high fat diet for 5 weeks and abhraka bhasma of 1.08 mg/200 g of rat for next 3 weeks. (Treatment)

### **Sampling and Analysis**

In brief, after 21 days of treatment, three animals from each group were sacrificed by a rapid decapitation method to dissect out testes for histopathological studies. On day 21, following the overnight fast blood samples of six animals from each group were collected by retro orbital plexus. Testis were removed and cut into small pieces, fixed in formalin fixative, and dehydrated with varying percentage of ethanol for histological studies. Sections were cut (6µm), stained with eosin, and analyzed microscopically.

### **PARAMETERS**

**Body weight:** The body weights of the animals were recorded on 0<sup>th</sup> week after treatment (5<sup>th</sup> week before treatment) and 3<sup>rd</sup> week after treatment with abhraka bhasma. The results are depicted in the table no. 2 and fig no.1.

**Body mass index:** Body mass index (BMI) of rats were recorded on 0<sup>th</sup> week after treatment (5<sup>th</sup> week before treatment) and 3<sup>rd</sup> week after treatment with abhraka bhasma was measured by using formulas, The results are depicted in the table no.3 and fig no.2.

$BMI = \text{Body weight in gm} / (\text{Height in cm})^2$

**Organ weight and Fat pad weights:** The testes, liver, kidney, spleen and ventral heart were dissected out, freed from adhering tissue, blotted on a filter paper and weighed on a sensitive balance to the nearest milligram. At the same time fat pads are dissected from the mesentery,

epididymis and retroperitonium and weighed. The results are depicted in the table no.4 and fig no.3. **Sperm count** : The cauda epididymis was chopped in 10ml normal saline, the aliquots of sperm suspension was filled up to 0.5 mark in WBC pipette and diluted with saline up to 11 mark. Sperm count was done in Neuber's chamber in WBC squares. Sperm count/ml was calculated as follows.

$X \times 20 \times 10^4 / \text{cm}^2 / \text{ml} / \text{epididymis}$ . Where 'X' is the average mean of spermatozoa of all 4 squares

### **BIOCHEMICAL ESTIMATION**

#### **Estimation of cholesterol**

**Procedure:** Pipette in a clean dry test tube labeled as Blank (B) Standard (S), and Test (T). Mix and read the optical density (OD) at 500nm against blank after 5 minute incubation (37°C). The final colour is stable for at least for 1 hour. (Table A)

Calculation: Cholesterol Conc. In mg% = A of (T)/A of (S) X 200 (std .conc)

#### **Estimation of triglycerides**

**Procedure:** Pipette in a clean dry test tube labeled as Blank (B) Standard (S), and Test (T). Mix and read the optical density (OD) at 546nm against blank after 10 minute incubation (37°C). The final colour is stable for at least for 1 hour. Calculation:

Triglycerides Conc. in mg% = A of (T)/A of (S) X 200 (std.conc).(Table B)

### **RESULTS AND DISCUSSION**

In this study, Abhraka Bhasma has been evaluated anti obesity in high fat induced rats.

#### **Anti obesity activity in rats**

##### **Body weights and fat pad weights in male rats:**

The ant- obesity effect in rats decreases body weight and fat pad weights .In the present study after administration of Abhraka Bhasma with dose of 1.08mg/200g with honey showed no significant increase in

body weight of obesity induced (high fat diet) rats. Whereas, in disease control group (only fat diet) there is a large increase in the body weight when compared with the normal group. The fat pad weights are greater in disease control and slightly more in treatment group when compared to normal group.

#### **Body mass index in male rats:**

The anti-obesity effect in male rats decreases the body mass index. This study showed that there is decrease in body mass index in (obesity induced Abhraka Bhasma treated rats) treatment group. Whereas, there is great increase in the body mass index in the disease control group compared to normal and treatment control groups.

#### **Biochemical estimation**

From the results we observed that decrease in cholesterol and triglycerides levels in the treatment group which further increased fertility potential with the treatment of abhraka bhasma. There is an increased cholesterol and triglycerides levels in disease group which caused decreased fertility activity when compared to normal and treatment control group.

**Table A: Estimation of cholesterol**

	B	S	T
Enzyme Reagent	1ml	1ml	1ml
Deionized water	-	0.01ml	-
Standard	-78	0.01ml	-
Serum/Plasma	-	-	0.01ml

**Table B: Estimation of triglycerides**

	B	S	T
Enzyme Reagent	1ml	1ml	1ml
Deionized water	0.01ml	-	-
Standard	-	0.01ml	-
Serum/Plasma	-	-	0.01ml

**OBESITY PARAMETERS**

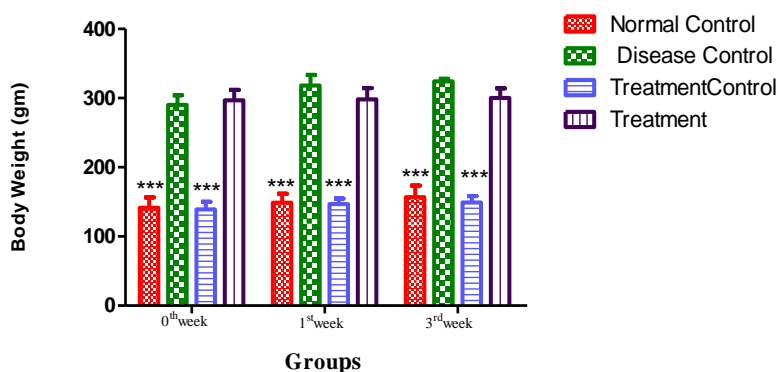
**Table 1:** Initial and final obesity parameters of 4 groups during fat diet and after treatment with abhraka bhasma.

Parameters	Before Treatment				After Treatment			
	Initial body weight (gm)	57.5±1 0.37	52.5 ±6.12	55±8.9 4	55.83± 7.36	141.67± 4.71	290±14 .14	139.17 ±11.14
Final body weight (gm)	141.67 ±14.71	290±1 4.14	139.17 ±11.14	296.67 ±15.06	156.66± 16.93	324.17 ±3.76	149.17 ±9.48	300.33±1 3.88
Body length (cm)	15.1±1. 12	18.07 ±0.42	14.88± 0.240	18.07± 0.42	15.75±0 .93	18.18± 0.29	15±0.2 2	19.47±0. 37
Abdominal circumference(cm)	10.4±0. 63	13.5± 0.34	10.43± 0.46	13.73± 0.47	10.9±0. 65	10.71± 0.46	14.6±0. 27	12.9±0.2 8
BMI (gm/cm <sup>2</sup> )	0.623± 0.03	0.89± 0.02	0.892± 0.02	0.91±0. 012	0.63±.8 8	0.98±0. 02	0.66±0. 03	0.791±0. 008

**Comparison of body weight before drug treatment and after drug treatment:**

**Table 2:** Effect of high fat diet and (AB) on body weights measured on 0,1<sup>st</sup> and 3<sup>rd</sup> week of drug treatment

Time (weeks)	Body weight (g)			
	Normal control	Disease control	Treatment control	Treatment
0	141.66 ±14.71 <sup>***</sup>	290 ± 14.142	139.17 ±11.14 <sup>***</sup>	296.67±15.06
1	148.79±12.93 <sup>***</sup>	318.19±15.21	146.83±7.94 <sup>***</sup>	298.12±16.43
3	156.67±16.93 <sup>***</sup>	324.17±3.76	149.17±9.47 <sup>***</sup>	300.33±13.88

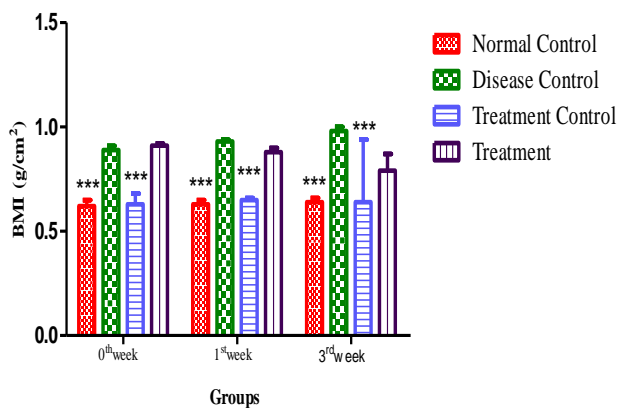


**Fig1:** Effect of high fat diet and (AB) on body weights measured on 0 week and 3<sup>rd</sup> week of drug treatment. All the values are expressed in mean ± SD of Body weights (n=6). \*P<0.05, \*\*P<0.01, \*\*\* P<0.001, ns-non significant. Data was analyzed by one way ANOVA followed by Dunnet’s test. Comparisons are done between disease control and the remaining groups.

**BODY MASS INDEX**

**Table 3:** Effect of (AB) on body mass index measured on 0 week and 3<sup>rd</sup> week of drug treatment

Time (weeks)	Body mass index (g/cm <sup>2</sup> )			
	Normal control	Disease control	Treatment control	Treatment
0	0.62±0.03***	0.89±0.02	0.63±0.05***	0.91±0.01*
1	0.63±0.02***	0.93±0.01	0.65±0.01***	0.88±0.02*
3	0.63±0.02***	0.98±0.02	0.66±0.03***	0.79±0.08*

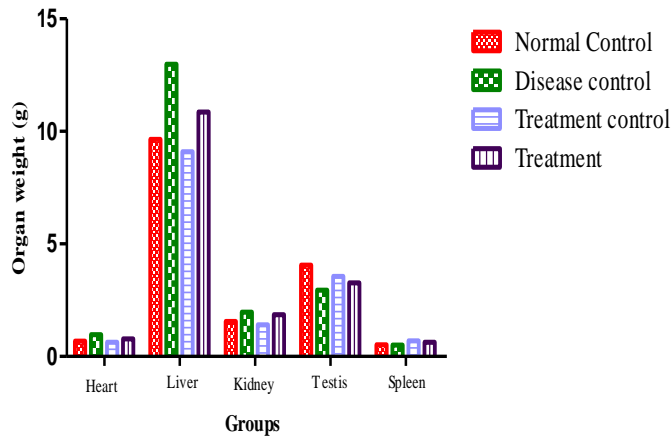


**Fig 2:** Effect of abhrika bhasma on body mass index measured on 0 week, 1<sup>st</sup> and 3<sup>rd</sup> week of drug treatment. All the values are expressed in mean ± SD of Body mass index (n=6). \*P<0.05, \*\*P<0.01, \*\*\* P<0.001, ns-non significant. Data was analyzed by one way ANOVA followed by Dunnet’s test. Comparisons are done between disease control and the remaining groups.

**MEASUREMENT OF ORGAN WEIGHTS:**

**Table 4:** Measurement of organ weights on last day:

Organs	Organ weight (g)			
	Normal control	Disease control	Treatment control	Treatment
Heart	0.68	0.97	0.63	0.78
Liver	9.64	12.98	9.09	10.85
Kidney	1.56	1.97	1.41	1.85
Testis	4.06	2.94	3.56	3.27
Spleen	0.52	0.5	0.69	0.63



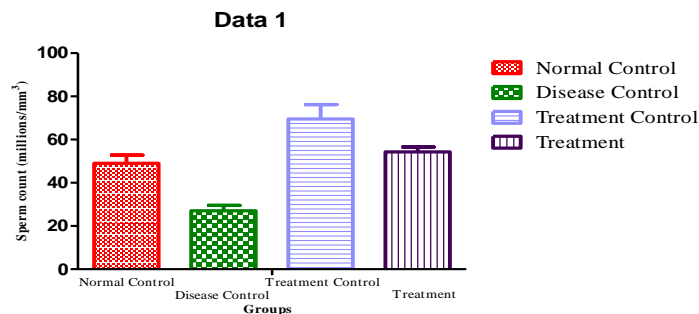
**Fig 3:** Measurement of organ weights on last day of the treatment. All the values are expressed in mean  $\pm$  SD of organ weights \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ , ns-non significant. Comparisons are done between disease control and the remaining groups.

**Table 5: Measurement of body fat pads on last day:**

Fat pads	Fat pad weight (g)			
	Normal control	Disease control	Treatment control	Treatment
Mesenteric	1.15	1.95	0.92	1.21
Epididymal	1.42	3.51	1.39	2.06
Retroperitoneal	1.19	3.78	1.03	1.70

**Table 6: Measurement of sperm count on last day:**

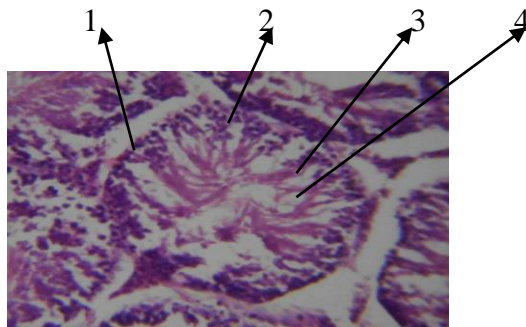
Groups	Sperm count (millions/mm <sup>3</sup> )
Normal Control	49 $\pm$ 3.8
Disease Control	27 $\pm$ 2.5
Treatment Control	69.5 $\pm$ 6.7
Treatment	54.25 $\pm$ 2.3



**Fig 4: Measurement of sperm count on last day:** All the values are expressed in mean  $\pm$  SD of sperm counts \* $P < 0.05$ , \*\* $P < 0.01$ , \*\*\* $P < 0.001$ , ns-non significant. Comparisons are done between disease control and the remaining groups.

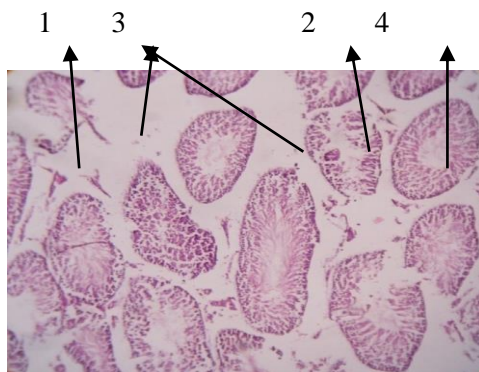
## HISTOPATHOLOGICAL STUDY OF TESTES

### Testes of Normal control (normal diet + Vehicle)



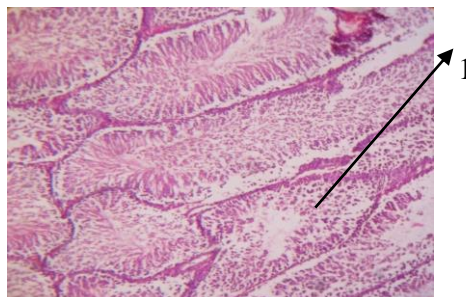
**Fig: 5 (a)** Rat Testes of Normal control Group ( $G_1$ ) showing normal spermatogenesis after 8 weeks of experimentation. (1)Spermatogonia, (2)Primary Spermatocyte, (3) Spermatozoa, (4) Tubular lumen.

### Testes of Disease control (High fat diet + Vehicle)



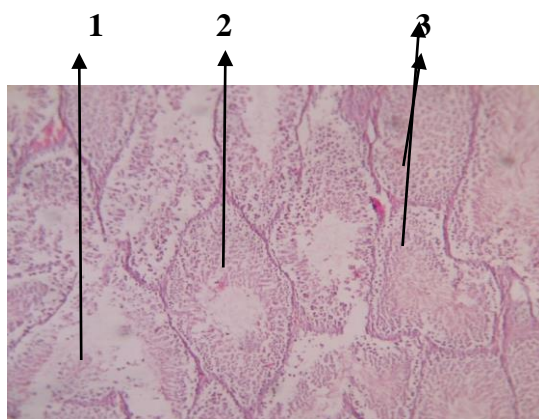
**Fig: 5(b)** Rat Testes of Disease control group ( $G_2$ ) after 8weeks of experimentation (1) Remains of interstitial cells, (2) disintegrated tubules, (3) Interstitial cells absent, (4) Normal tubule showing normal Spermatogenesis.

### Testes of Treatment Control ( $G_3$ ) (Normal diet + Abhraka Bhasma)



**Fig: 5(c)** Rat Testes of treatment control after 8 weeks of experimentation.(1) Hyperactive tubules showing greater spermatogenesis.

**Testes of Treatment Group (G<sub>4</sub>) (High fat diet + Abhraka Bhasma )**



**Fig: 5 (d)** Rat Testes of treatment Group showing cells in different stages of degeneration, recovery and fully recovered hyperactive germ cells after inducing obesity and then treatment with abhraka bhasma. 1) Dead tubule (2) Tubule showing normal spermatogenesis, (3) Hyper active tubules.

## CONCLUSION

From the results it could be concluded that abhraka bhasma showed anti obesity effect in high fat diet induced obese rats which was not in ancient literature. The overall increase in the anti-obesity effect is by reducing BMI and other biochemical parameters like triglycerides, cholesterol. Abhraka bhasma reduces obesity in high fat diet treated obese rats. This study confirms that Abhraka Bhasma is important tool in solving the problem of obesity in obese males.

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