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TAMRA BHASMA PREPARATION & IT'S EFFICACY IN OBESITY

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ABSTRACT

Introduction: Now a day *Sthaulya* (obesity) has become a burning problem in the world. The world population is estimated at about 6.5 billion. There are more than a billion, overweight people in the world. Many theories have been put forward with many new hypothesis describing this disorder in Ayurveda as well as in modern science, there is enough scope to work out on its etio-pathology and management aspect of the *Sthaulya*, because in modern medical science its management aspect remains symptomatic with troublesome side effects. On the light of above, present study has been selected. **Aim:** To study efficacy of *Tamra Bhasma* in obesity on albino rats
Method: *Tamra Bhasma* was prepared in Rasshastra dept .24 albino rats were taken for experiment. A specialized high fat diet was given to 18 rats and then treated with *Tamra Bhasma*. The weight, BMI, abdominal girth was done to evaluate its effect on 0, 10th, 20th, 30th days & result were compared. **Result:** Data was collected and analysed using student 't' test. As per weight, abdominal girth & BMI value it can says that it is best drug for obesity

Keywords: *Tamra Bhasma*, Ayurveda, *Sthaulya* (obesity)

INTRODUCTION

Rasa shastra means the "science of mercury" mercury was used after its various kinds of processing called *samskaras* for the purpose of converting cheap metals into costly metal in alchemy. It is also used for the incineration of metals and minerals for the elimination of their toxic components and generates therapeutic value in the end product generally known as *Bhasma* used as medicines[1]. Once the metal is converted into the *Bhasma* it should not reverse into the metal by any means called *Apunarbhava*. It should be so light so that it must float on the surface of water after sprinkling called *Varitartva*. Its particles should be so small which can pierce in between the lines of the figure and become invisible at the surface of the figure called *Rekha purnata*[2]. Creation of nano particles of metals and minerals through fusion with the help of mercury and various plant materials and heating process is the basics of *Rasshastra* apart from the purification of toxic materials from plant and animal origin for making their uses for therapeutic values. *Ras shastra* texts classify the metals, Minerals, diamond, Gemstones and poisons in various category and describes their processing called *Samskaras* to generate therapeutic properties and make them detoxic to the body in comparison to its therapeutic efficacy.

Now a day's *Sthaulya* (obesity) has become a burning problem in the world. The world population is estimated at about 6.5 billion. There are more than a billion-overweight people in the world. This data reflects the world wise distribution of obesity and at least 300 million who are clinically the obese. More ever the report shows due obesity about 2,20,000 men and women death occurs yearly in the United States of America and Canada alone, and about 3,20,000 in 20 countries of Western Europe. Thus "The World Health Report-2002" represents one of the largest projects ever undertaken by W.H.O., in collaboration with expert's worldwide. Dr. Gro Harlem Brundtland, Director-General of W.H.O. describes this report as "a wakeup call to the Global community"[3] Many theories have been put forward with many new hypothesis describing this disorder in Ayurveda as well as in modern science; still there is enough scope to work out on

its etio-pathology and management aspect of the *Sthaulya*, because in modern medical science its management aspect remains symptomatic with troublesome side effects. On the light of above, present study has been selected.

Aim and Objective:

1. To prepare *Tamra Bhasma*

2. To Evaluate its efficacy in obesity on albino rat (Sprague Drawley).

Material and Methods

The whole topic of this work can be divided into following sub-headings

1. Preparation of *Tamra Bhasma*

2. Evaluating its effect in obesity (*Staulya*)[4] preclinically

1. Preparation of *Tamra Bhasma*[5]

Parada, Gandhaka and *Tamra* were obtained from the market of Pune & authentication was done. *Tamra Bhasma* was carried out in Department of *Rasashastra* and *Bhaishajya Kalpana*, Government Ayurved college Osmanabad.

2. Evaluating its effect on the obesity preclinically

The pre-clinical study for evaluating the effects of *Tamra Bhasma* was carried out in the animal laboratory of National Toxicology Centre, Pune. The rats were procured from the same laboratory

Species used – Albino rats (Sprague Dawley)

Number of animals – 24

Daily diet – 20 gm of rat chow

Pattern – 12 hrs light and 12 hrs dark

Weight – 50 to 110 gm

The experiment can be divided into two phases as

a. Induction of obesity

b. Treating them with *Tamra Bhasma* to evaluating its effect.

We shall see both the phases in detail

a. Induction of obesity

- 24 healthy lab animals (12 male and 12 female) were taken initially for the experiment.

- The rats were divided into 8 groups of 3 animals each and kept in separate cages.

- Male and female rats were kept in different cages.

- A specialized high fat diet composed as follows[6]

Content	High fat diet
(gm / 100 gm)	
Wheat flour -	56
Milk powder -	23.2
Dried yeast powder -	3.2
Sodium chloride -	1.2
Multivitamins -	1
Cholesterol powder-	2.5
Ground nut oil -	16

Fat diet was given to the 18 animals (9 males, 9 females) and remaining 6 animals (3 males, 3females) were kept on standard rat feed. Fat diet was given to the animal up to 30 days. The rats were divided into 4 groups

Group 1 - Normal (control) - The rats were given commercially available rat feed and water

Group 2 – obese (control) -Animal were fed   high fat diet and water

Group 3 – This group kept on high fat diet and treated With *Tamra Bhasma*

Group 4 – (standard- kept on high fat diet and treated With *Madhu*

Calculation of dose

Dose for *Tamra Bhasma*

The dose to be administered in animals was calculated according to the reference of S.O.P. for drug trial of *Rasa Bhasmas* and *Kalpas* in rats. Accordingly, dose was calculated   by the formula as (Human dose-1 ratti)[7]

Dose in Rat[8]

= Human dose X   Conversion factor

=   120   X   0.018

= 2.16 mg

this is the dose *of Tamra Bhasma* for 200 gms rats

suspension used -

Distilled water was used as suspension for administration.10.80mg of drug added to 10 ml of distilled water and vortexing the mixture thoroughly 2ml of this dose was equal to the 2.16 mg of drug which was required to be administered to a rat at a time.

Thus, all the animals were dosed and fed by the above said amount of diet and drug for a period of 28 days.

Dose of *Madhu*- Human dose X Conversion factor = 10ml   X 0.018

=   0.18 ml

This is the dose of *Madhu* for 200 gm rats

The weight, BMI, abdominal girth[10] to evaluate effects on Obesity was done on the 10th 20th and 30th days and the results were compared for the effect.

Observation and Results: -

As described above, all the procedures were carried out and observations were kept for comparison. Details of observation are as follows. Weight, BMI, abdominal girth was done on the 0 day,10day,20 day,30day the standard deviation and standard values are shown in the table

Table 1: Observation for weight in Group 1

Group 1					
Weight (gm)					
Animals	**O days**	**10days**	**20 days**	**30 days**	**difference**
H(m)	210	220	240	258	48
B(m)	195	202	209	210	15
T(m)	165	173	184	188	23
H(f)	152	162	183	186	34
B(f)	150	153	163	170	20
T(f)	140	147	159	162	22
MEAN	168.6667	176.1667	189.6667	195.6667	27
SD	27.79688	28.93729	30.44777	34.74286	12.03329
SE	11.3480	11.8135	12.4302	14.1837	4.9125

Table 2: Observation for weight in Group 2

Group 2					
Weight (gm)					
Animals	O days	10days	20 days	30 days	difference
T(m)	158	173	200	214	56
HT(m)	215	230	258	270	55
HBT(m)	200	225	242	250	50
BT(f)	159	172	187	190	31
HT(f)	165	176	187	195	30
HBT(f)	162	178	194	200	38
MEAN	176.5	192.3333	211.3333	219.8333	43.33333
SD	24.59878	27.36908	30.76145	32.74396	11.82652
SE	10.0424	11.1733	12.5583	13.370	4.8281

TABLE 3: Observation for weight in Group- 3

GROUP 3					
WEIGHT (GM)					
ANIMALS	O DAYS	10DAYS	20 DAYS	30 DAYS	DIFFERENCE
B(M)	157	164	170	180	23
HB(M)	153	161	180	200	47
RF(M)	155	164	180	200	45
H(F)	146	162	170	170	24
HB(F)	152	169	180	175	23
RF(F)	148	163	165	170	22
MEAN	151.8	163.8333	174.1667	182.5	30.66667
SD	4.168	2.786874	6.645801	14.05347	11.91078
SE	1.701	1.1377	2.7131	5.7373	4.8625

Table 4: Observation for weight in Group 4

Group 4					
Weight (gm)					
Animals	O days	10days	20 days	30 days	Difference
H(m)	120	126	145	148	28
BT(m)	128	147	160	172	44
LF(m)	137	166	175	172	35
B(f)	130	136	150	147	17
T(f)	123	129	145	148	25
LF(f)	145	160	186	180	35
MEAN	130.5	144	160.1667	161.1667	30.66667
SD	9.224966	16.50454	17.03428	15.07868	9.395034
SE	3.7660	6.7379	6.9542	6.1558	3.8355

Observation for **BMI (weight in gm /length in cm2)**

Table 5: Observation for BMI (weight in gm /length in cm2) Group 1

Group 1					
BMI (g/cm2)					
Animals	**O days**	**10days**	**20 days**	**30 days**	**difference**
H(m)	0.47	0.45	0.47	0.50	0.03
B(m)	0.48	0.45	0.47	0.45	-0.03
T(m)	0.50	0.47	0.50	0.49	-0.01
H(f)	0.44	0.40	0.45	0.46	0.02
B(f)	0.37	0.38	0.40	0.42	0.05
T(f)	0.42	0.42	0.39	0.40	- 0.02
MEAN	0.446667	0.428333	0.446667	0.4533	0.00666
SD	0.047188	0.034303	0.043205	0.3881	0.031411
SE	0.01926	0.01400	0.01763	0.1585	0.1282

Table 6: Observation for BMI (weight in gm /length in cm2) Group 2

Group 2					
BMI (g/cm2)					
20 days	**O days**	**10days**	**20 days**	**30 days**	**difference**
T(m)	0.48	0.50	0.58	0.59	0.11
HT(m)	0.56	0.57	0.58	0.61	0.05
HBT(m)	0.52	0.56	0.57	0.59	0.07
BT(f)	0.46	0.50	0.51	0.47	0.01
HT(f)	0.50	0.54	0.51	0.54	0.04
HBT(f)	0.50	0.52	0.53	0.50	0.0
MEAN	0.503333	0.531667	0.546667	0.55	0.046667
SD	0.034448	0.029944	0.033862	0.056214	0.040332
SE	0.0140	0.0122	0.0138	0.0229	0.0164

Table 7: Observation for BMI (weight in gm /length in cm2) Group 3

Group 3					
BMI (g/cm2)					
20 days	**O days**	**10days**	**20 days**	**30 days**	**difference**
B(m)	0.51	o.50	0.44	0.42	-0.09
HB(m)	0.59	0.55	0.49	0.50	-0.09
RF(m)	0.50	0.47	0.49	0.47	-0.03
H(f)	0.45	0.50	0.49	0.42	-0.03
HB(f)	0.52	0.49	0.49	0.41	-0.11
RF(f)	0.54	0.42	0.49	0.40	-0.14
MEAN	0.518333	0.488333	0.481667	0.436667	-0.8167
SD	0.046224	0.042622	0.020412	0.039328	0.07808
SE	0.01887	0.0174	0.00833	0.0160	0.31880.44

Table 8: Observation for BMI (weight in gm /length in cm2) Group 4

Group 4					
BMI (g/cm2)					
20 days	O days	10days	20 days	30 days	difference
H(m)	0.44	0.43	0.47	0.43	-0.01
BT(m)	0.39	0.39	0.46	0.40	0.01
LF(m)	0.42	0.49	0.48	0.40	-0.02
B(f)	0.47	0.47	0.47	0.45	-0.02
T(f)	0.40	0.42	0.44	0.38	-0.02
LF(f)	0.44	0.44	0.43	0.42	-0.02
MEAN	0.426667	0.44	0.458333	0.413333	-0.01333
SD	0.029439	0.035777	0.019408	0.025033	0.012111
SE	0.0120	0.01460	0.0079	0.0102	0.0049

Observation for abdominal girth (cm)

Table 9: Observation for abdominal girth (cm) Group 1

Group 1					
Abdominal Girth (cm)					
Animals	O days	10days	20 days	30 days	difference
H(m)	13.5	14	14	14	0.5
B(m)	13.4	14.5	14.2	13.6	0.2
T(m)	11	13.5	12	12	1
H(f)	12	13.5	13	13	1
B(f)	11	12.5	12	12	1
T(f)	11.2	13	12	11.5	0.3
MEAN	12.01667	13.5	12.86667	12.68333	0.666667
SD	1.170328	0.707107	1.032796	1.000833	0.377712
SE	0.4777	0.2886	0.4216	0.4085	0.1542

Table 10: Observation for abdominal girth (cm) Group 2

Group 2					
Abdominal Girth (cm)					
Animals	O days	10days	20 days	30 days	difference
T(m)	14	16	15	15	1
HT(m)	15.5	16.5	16	15.5	0
HBT(m)	15	16	16.5	16	1
BT(f)	13.5	15.5	14.5	15.5	2
HT(f)	13.5	15	14	15	1.5
HBT(f)	13	16	13	15	2
MEAN	14.08333	15.83333	14.83333	15.33333	1.25
SD	0.970395	0.516398	1.290994	0.408248	0.758288
SE	0.3961	0.2108	0.5270	0.1666	0.3095

Table 11: Observation for abdominal girth (cm) Group 3

Group 3					
Abdominal Girth (cm)					
Animals	**O days**	**10days**	**20 days**	**30 days**	**difference**
B(m)	12.5	13	12.5	13.5	1
HB(m)	12	13	12	12.5	0.5
RF(m)	13	12.5	12.5	12	-1
H(f)	14	13.5	12.5	11	-3
HB(f)	13.5	13	11.5	12.5	-1
RF(f)	14	12.5	12	13	-1
MEAN	13.16667	12.91667	12.16667	12.41667	-0.75
SD	0.816497	0.376386	0.408248	0.861201	1.405347
SE	0.33333	0.1536	0.16666	0.3515	0.5737

Table 12: Observation for abdominal girth (cm) Group 1

Group 4					
Abdominal Girth (cm)					
ANIMALS	**O days**	**10days**	**20 days**	**30 days**	**difference**
H(m)	12	12	11.5	12.5	0.5
BT(m)	13.5	13	12	12.5	-1
LF(m)	13	13	12	12.5	-0.5
B(f)	12.5	12	11.5	12.5	0
T(f)	13	12.5	12	11	-2
LF(f)	13	13.5	12.5	12.5	-0.5
MEAN	12.83333	12.66667	11.91667	12.25	-0.58333
SD	0.516398	0.60553	0.376386	0.612372	0.861201
SE	0.2108	0.2472	0.1536	0.24999	0.3515

Statistical Analysis

Data was collected and analysed using student t test. standard deviation and standard error were calculated.

DISCUSSION

Obesity has been named as *Atisthula* and *Medo-roga* in Ayurveda. It is described under the *Santarpanotthavikara* (diseases occurring due to high calorie diet and lack of physical exercises)[11]. *Atistaulya* (obesity) is considered as one of the eight disgraceful condition as described by Acharya Charaka[12]. A person in whom there is excessive accumulation of *Meda* (fat/adipose tissue) leading to flabbing of hip, abdomen and breast has been categorized as *Atisthula*[13]. *Meda* is body tissue predominant in *Prithvi* and *Aap Mahabhuta* similar structure of *Kapha Dosha*[14]. *Tamra Bhasma* is the rich source of copper and like other metals copper is also considered as an essential element of body for normal physiological functions[15]. *Tamra Bhasma* has the capacity to act on almost all the *Strotasas* in the body and thus can be used in majority of the ailments. However, here its *Lekhana and Kaphaghna* properties have been used. Its ability to scrap up unwanted coatings may be fat too.

There was remarkable increase in body weight of all groups of animals. Body weight of rat treated with *Tamra Bhasma* i.e. group 3 in Table no 3 is less increase as compared to group 2 in Table no 2, so it can say that a reduction on body weight suggests the potential against the obesity.

BMI value of group 3 as shown in Table no 7 is less as compared to group 2 as shown in Table no 6. Group 4 in Table no 8 shows less BMI as compared to group 2 in Table no 6.

Abdominal girths were found significantly increased in obese control group as compared to normal control group. In treated group of animals, it was found Significantly decreased in the animals of group 3 in Table no 11 and group 4 in Table no 12 as compared to group 2 in table no 10.

CONCLUSION

1. *Tamra Bhasma* Possesses activity to reduce weight.
2. It reduces fat present on abdomen
3. As per weight, abdominal girth & BMI value it can say that it is best drug for obesity.
4. As no physiological or adverse behavioral change was seen in the laboratory animals, it is a safer drug of choice.

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