



Study The Effect Of *Bilwadi Panchamula* Decoction In The Secondary Prevention Of *Athisthaulya*

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Abstract: There are 2.8 million people were died world widely each year as a result of being overweight or obese. It was due to having risk of coronary heart disease, ischemic stroke and type 2 diabetes mellitus increase with the increasing of body mass index (BMI). The aim of this study is to evaluate the efficacy *Bilwadi Panchamula* in the secondary prevention of *Athisthaulya*. A simple random sampling technique was used. each sample was selected from random number generator applied to BMI criteria which is $25 < \text{BMI} < 34.99$ patients of *Athisthaulya* attending to the outdoor patient of the National Ayurvedic Hospital was registered for this study. Patients were given treatments for four weeks with 1 month follow-up. Patients were given specific instructions on diet and lifestyle modifications without giving especial diet control schedule. This was carried out during the period of six months. Sample size is 45. The mean value of Body weight, BMI, waist circumference in patients was reduced highly significantly ($p < 0.001$). But the mean value of mid upper arm circumference is insignificant ($p > 0.05$). It has shown that the improvement of the mean value of *sphik chalata*, *sthana chalata*, *udara chalata*, movements of cheek, Movement of Thigh from, *ayasena swasa*, *alpa vyayama*, *swedadhikya*, *nidradhikya*, *ati pipasa*, *daha*, *Kshudra swasa* and *Janusandhi shoola* was statistically highly significant ($p < 0.001$).

Key words: *Athisthaulya*, *Bilwadi Panchamula*, *BMI*

I. INTRODUCTION

In 2022 World Health Organization has estimated that 2.5 billion adult's aged 18 years and older over weight including over 890 million adults who were living with obesity. Also it was 16% of adults' aged 18 years and older world widely. Further it reveals that overweight is on the rise in low –and middle income countries ⁽¹⁾. 2.8 million people were died world widely each year as a result of being overweight or obese. It was due to having risk of coronary heart disease, ischemic stroke and type 2 diabetes mellitus increase with the increasing of body mass index (BMI). Also it has categorized as risk of co-morbidities for body mass index 25.0 to 29.9 and moderate to severe risk of co-morbidities for body mass index greater than 30 ⁽²⁾. Further reveals in 2012 the WHO regions as Africa, Eastern Mediterranean and South East Asia women had approximately doubled the obesity prevalence of men proving that women more likely to be obese than men. According to the demographic data during 2000 to 2006 has found out that women overweight and obesity were 24% and 31.2% respectively. During the same period a national study found out the prevalence of overweight, obesity and abdominal obesity among adults as 25.2%, 9.2% and 26.2% respectively ⁽³⁾.

When comparing the prevalence of obese among the physically inactive adolescents and with physically active adolescents the risk of becoming obese is higher among physically inactive adolescents⁽⁴⁾. World Health Organization has defined overweight and obesity as abnormal or excessive fat accumulation of the body that present a health risk. When the Body mass index in between 18 -25 is called the BMI normal range and over 25 is overweight and more than 30 is called obese⁽⁵⁾. In 2019 it has identified that 5 million non-communicable disease deaths were caused due to higher BMI. Because of that it was considered as a chronic disease. As a result of this conditions are also prone to discrimination in their personal and day to day work, low self- esteem, and depression⁽⁶⁾. Not only that but also identified that Obesity is a state of excess adipose tissue mass⁽⁷⁾ which plays in contributing to diabetes, dyslipidemia, heart diseases, non-alcoholic fatty liver disease, obstructive sleep apnea and many other chronic diseases⁽⁸⁾.

With the history of more than 3000yrs of Ayurveda has mentioned “*Athisthaulya*” in Charaka Samhitha under the chapter “*Ashtaunindeetiya*”. It has mentioned that there are eight types of undesirable persons depending on the physical constitution. “*Athisthaulya* person” is the one of those types.⁽⁹⁾ According to *Acharaya Charaka* described this *Athisthaulya* reference to *Nanathmaja vikara of Kapha*. In *Sutra sthana* he has mentioned that a person having excess deposition of *Meda* and *Mansa Dhatu* at the sites of *Sphik*, *Udara* and *Stana* is called *Sthula Purusha* which is a synonym for *Athisthaulya*. A same etiopathology of *Athisthaulya* condition in the modern medicine called as Obesity⁽¹⁰⁾.

Ayurveda is a science of life that emphasizes avoiding harmful side effects by adapting individual’s life styles according to geographical location, seasonal changes and daily routine with *Pathya Ahara*, *Viharana* and *Nidra*. Due to these reasons, the Ayurveda system of medicine should have the role in the management of obesity without and side effects. So it is need manage the obesity by using herbs easily available and safe for the healthy life.

Aim and objective

The present clinical trial was planned to evaluate the efficacy *Bilwadi Panchamula* in the secondary prevention of *Athisthaulya*.

3 RESEARCH METHODOLOGY

3.1 Population and Sample

The total of 45 patients of *Athisthaulya* attending to the outdoor patient of the National *Ayurvedic* Hospital, Colombo 08 was registered for this study. An open clinical trial was conducted on patients at the *Swasthavritta* clinic. Patients were given treatments for four weeks with 1 month follow-up. Patients were given specific instructions on diet and lifestyle modifications without giving especial diet control schedule. This was carried out during the period of six months. Sample size is 45.

A simple random sampling technique was used. Each sample was selected from random number generator applied to BMI criteria which is $25 < \text{BMI} < 34.99$. (Overweight and Obesity class 1)⁽¹¹⁾. According to the inclusion, exclusion, and diagnostic criteria, patients were selected randomly from *Swasthavritta* Clinics of National Ayurveda Teaching Hospital, Rajagiriya, Sri Lanka. Inclusion and exclusion criteria mentioned below were led to avoid confusion with other related diseases, to avoid overlapping of drug effects, and to make a nearly similar condition throughout the sample.

- **Inclusion criteria**

Sample collecting was done from the patients who came to the open-door clinic at the National Ayurvedic Teaching Hospital, Borella.

- Patients with a BMI of more than 25 & less than 34.99. (Overweight and obesity class 1)⁽¹²⁾
- Age group 30 - 60 years.⁽¹³⁾

- **Exclusion criteria**

- Pregnant mothers,
- Who are with a BMI less than 25 and more than 34.99 will be excluded.
- Patients had disorders of the thyroid gland such as Hypothyroidism, carcinoma, and congenital deformities.
- Patients suffered from other chronic illnesses, cardiac diseases, Hypertension, severe insulin resistance, diabetes, and organ-secreting neoplasm, etc.

To assess the changes, OPD patients were examined once in two weeks. The suitable scoring method and objective signs and subjective signs were recorded. The efficacy of the therapy was assessed based on subjective as well as objective criteria and biomedical tests.

a) Objective criteria

It was assessed on body weight, BMI, mid-upper arm circumference, and waist circumference reports before starting the treatments and after completion of treatment through statistical evaluation.

Anthropometric measurements are as,

- Height in centimeters
- Weight in Kilograms
- BMI (30-40) (kgm^2)
- Waist circumference in centimeters
- Mid-upper arm circumference in centimeters

Selected Patients were given *Bilwadi panchamula* decoction with bee honey 2 times per day continuously for 1 month and did the investigations. Patients were given treatments for four weeks with 1-month follow-up. Patients were advice on *Pathya Apathya* on diet and lifestyle modifications with duration of six months

Preparation and method of administration

Add one packet (60g of row medicines) into 960 ml (8 patha) of water and boil it to 120 ml (1 patha). Low heat was maintained during the process. Then filtered and divided into 2 equal parts one part is 60ml one part morning (8 am) and the other part in the evening (8 pm) with bee honey before meals. Patients were advised to correct their dietary habits. Especially they were advised not to consume instant artificial food, starchy food, and too much oil food. However, a specific diet pattern was not recommended. They were also advised not to follow aerobics or any other exercises. The total duration of the intervention was 1 month. Follow-up was carried up for 1 month. During the visit progress of measurements was recorded. Investigations were carried out using appropriate testing methods as follow.

Investigation-based variables (Objective parameters):

- a) Weight
- b) Height
- c) Mid-upper arm circumference
- d) Total Cholesterol

b) Biochemical tests:

In this clinical study, patients were only those who were free from Hyperlipidemia and Blood glucose (who were with normal Total cholesterol levels) done only the Total cholesterol level pre and post-treatment schedule. Biochemical measurements are as follows, Total Cholesterol

c) Subjective Criteria

Most of the signs and symptoms of *Athisthaulya*, described in Ayurveda are subjective and statistically analyzed by using a multidimensional scoring system. This score was obtained before and after the treatment through statistical analysis and percentage relief. The score was given according to the severity of symptoms as follows,

Absence of Symptoms -0, Mild degree of symptoms – 1, Moderate degree of Symptoms -2, Severe degree of symptoms -3

Method of drug preparing the Drug

As mentioned in "*Charaka Samhitha*" and "*Susrutha Samhitha*" the decoction of *Bilwadi panchamula* is used with Bee honey as a drug in the reduction of obesity. ^(14,15)

Table 1 shows the ingredients of the drug

Sanskrit Name	Scientific Name	Part used
Bilwa	<i>Aegle marmelos</i>	Root
Agnimantha	<i>Premna serrotifolia</i>	Root
Syanaka	<i>Oroxylum indicum</i>	Root
Kashmari	<i>Gmelina arborea</i>	Root
Patala	<i>Fernandoa adenophylla</i>	Root

Prepared equal quantity of drugs, measuring cups and written instructions for decoction preparation were given to each patient. Instructions for decoction preparation were given according to *Kuwatha Paribhasha*. Dried plant material was washed thoroughly and dried in the air separately. Then they made it into small pieces. Each research drug was weighed and packed separately. Patients were given 14 packets at one visit and asked to prepare the decoction at home according to the given instructions and use the bee honey which is available at the Ayurveda drug cooperation. The patient visited the clinic once in two weeks. Patients were given treatments for four weeks with 1-month follow-up. Patients were given specific instructions on diet and lifestyle modifications. Every patient followed the treatments for one month. In the beginning and during the treatments to diagnosis purposes once a month followed investigations carried out.

1) Total Cholesterol

RESULTS

Results are which describe the outcome of the clinical study. The total number of the participated patients in the study was 45.

Table 02 shows the Socio-demographic characteristics of the patients.

Socio-demographic characteristics	N (%)
Gender	Female 45 (100%)
Marital status	Married 40 (88.88%)
	Unmarried 5(11.12%)
Religious	Buddhist 39 (86.67%)
	Muslim 3 (6.67%)
	Hindu 3 (6.67%)
Residence	Urban 35 (77.78%)
	Suburban 7 (15.56%)
	Rural 2 (6.66%)
Education level	Primary 2 (4.44%)
	Ordinary level 27 (60%)
	Advance level 10 (22.22%)
	Degree 4 (13.34%)
Occupation	No 08 (17.78%)
	Self-employer 12 (26.67%)
	Officer 15 (33.33%)
	Labor 10 (22.22%)
Age Group	30-40 8 (17.8%)
	41-50 20 (44.4%)
	51-60 17 (37.8%)

All of the patients were female and majority of them were age group between 41-50 years (44.4%). The mean ages of them were 47.36 ± 7.487 . The majority of them were married (88.88%), Buddhist (86.67%), Educational level is Ordinary level (60%), worked as officers (33.33%), and lived in urban areas (77.78%).

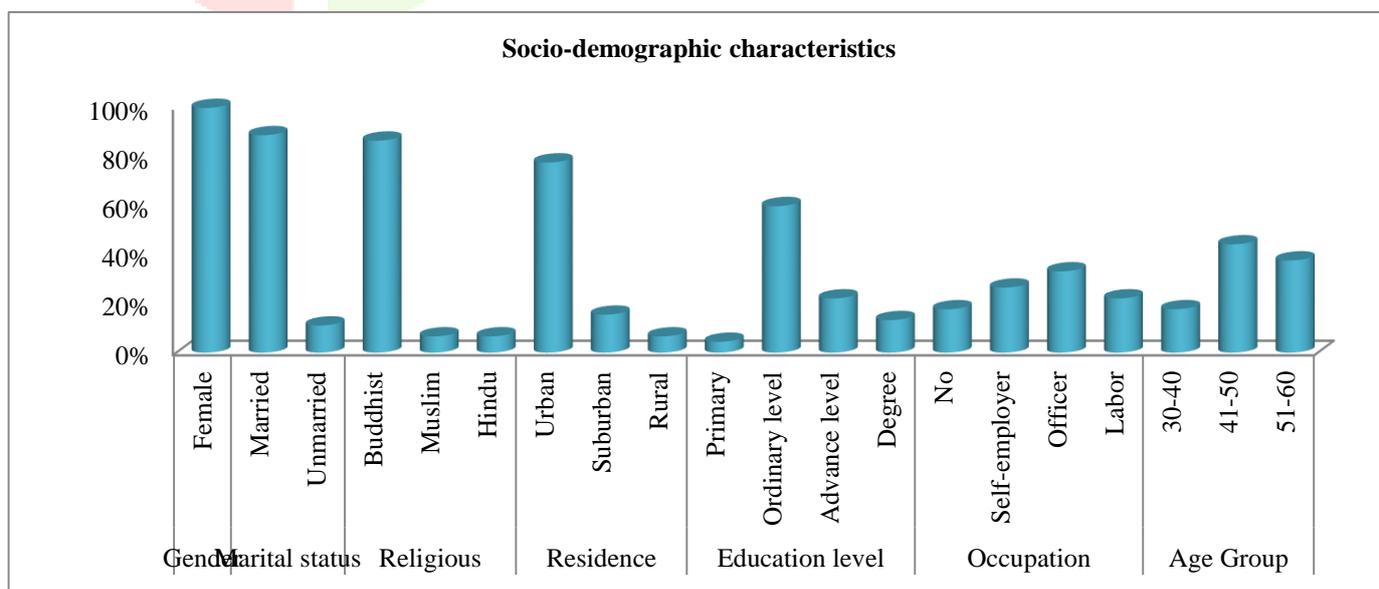


Figure 1 shows the distribution of Socio-demographic data of the participants

Distribution of *Deha prakurti* of the patients

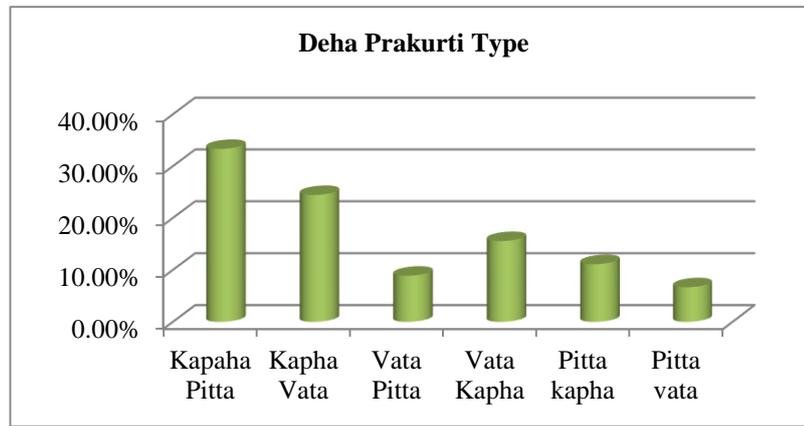


Figure 2 shows the distribution of *Deha prakurti* types of the patients.

According to the study sample, *Kapha vata* dominant *deha prakurti* are very prominent among the obese patients which is 33.33%. But very

few of them were *Pitta vata* dominant among these obese patients

Effect of *Bilwadhi Panchamula* decoction on *Athiathaulya*

Table 03 shows the effect of *Bilwadhi Panchamula* decoction on objective parameters of *Athisthaulya* (with a 95% confidence interval)

Objective parameter	Mean		Relief %	SD		SEM		t value	P value
	BT	AT		BT	AT	BT	AT		
Weight	73.96	71.62	3.1%	10.531	10.435	1.570	1.585	9.324	< 0.001
Body Mass Index	32.28	31.27	3.12%	8.737	8.559	1.302	1.275	9.771	< 0.001
Waist circumference	106.49	104.24	2.11%	10.841	11.403	1.616	1.700	7.861	< 0.001
Mid-upper arm circumference	33.82	34.22	No	3.670	12.364	0.547	1.843	-0.229	> 0.05

Comparing and analyzing the pre-data and post-data, here it was observed that the mean values of participants were significantly reduced and the significant of the findings the p-value is less than 0.001 ($p < 0.001$). The mean value of weight in patients was reduced from 73.96 ± 10.531 to 71.62 ± 10.435 ($p < 0.001$). The mean value of BMI of patients was reduced from 32.28 ± 8.737 to 31.27 ± 8.559 ($p < 0.001$). The mean value of waist circumference in patients was reduced from 106.49 ± 10.841 to 104.24 ± 11.403 ($p < 0.001$). But the mean value of mid upper arm circumference is not reduced as such the p-value is 0.820 which is not less than the p-value of 0.05. It is observed that above mentioned mean values of objective parameters from the pre-test to the post-test have been decreased except for the value of mid-upper arm circumference. The statistical value of the objective parameters of *Athisthaulya* is greater than the critical value and the p-value is less than 0.001 which is statistically highly significant in most variables of obesity except the mid-upper arm circumference.

Table 04 shows the effect of *Bilwadi Panchamula* decoction on the chemical parameter of *Athisthaulya* (Total cholesterol)

Subjective parameter	Mean		SD		SEM		t value	P value
	BT	AT	BT	AT	BT	AT		
Pendulous hanging of Buttocks (<i>Spik chalata</i>)	2.20	1.2	0.75	0.72	0.11	0.10	24.81	< 0.001
Movement of breast (<i>Sthana chalata</i>)	1.96	1.1	0.95	0.81	0.14	0.12	10.31	< 0.001
Movement of the abdomen (<i>Udara chalata</i>)	1.93	1.1	0.96	0.80	0.14	0.12	7.857	< 0.001
Movement of cheeks	2.02	1.1	0.86	0.82	0.12	0.12	12.71	< 0.001
Movement of Thigh	1.91	1.2	0.97	0.78	0.14	0.11	7.620	< 0.001
Dyspnoea on excursion (<i>Ayasena swasa</i>)	0.96	0.5	0.82	0.69	0.12	0.10	4.781	< 0.001
Exercises (<i>Daurbalya/ Alpa vyayama</i>)	1.29	0.4	0.79	0.37	0.23	0.17	7.520	< 0.001
Sweating (<i>Swedadhikya</i>)	1.29	0.4	0.89	0.47	0.13	0.07	8.552	< 0.001
<i>Nidradhikya</i>	0.96	0.5	0.99	0.57	0.23	0.17	3.538	< 0.001
Thirst (<i>Ati pipasa</i>)	0.78	0.2	0.82	0.47	0.12	0.47	4.748	< 0.001
Burning sensation (<i>daha</i>)	0.24	0.0	0.35	0.14	0.53	0.22	4.532	< 0.001
Shortness of Breath (<i>Kshudra swasa</i>)	0.22	0.1	0.38	0.34	0.05	0.05	0.813	< 0.001
Pain in knee joints (<i>Janu sandhi shoola</i>)	1.42	0.9	0.94	0.99	0.14	0.14	3.944	< 0.001

When comparing the data pre and post-test of total cholesterol it is observed that the mean value of total cholesterol is reduced from 170.89 ± 12.953 to 167.09 ± 13.216 ($p < 0.001$) which is statistically significant.

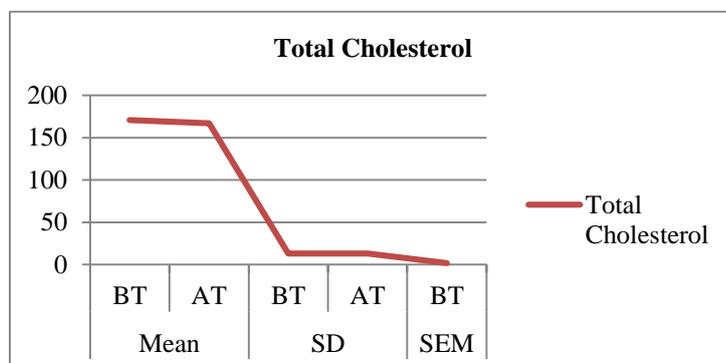


Figure 3 shows the changes in the Total cholesterol levels after the treatment.

Bio-chemical Parameter	Mean		Relief %	SD		SEM		t value	P value
	BT	AT		BT	AT	BT	AT		
Total Cholesterol	170.8 9	167.0 9	2.22 %	12.95 3	13.21 6	1.93 1	1.97 0	10.71 1	< 0.001

Table 5 shows the effect of Bilwadi Panchamula decoction on the subjective parameters of Athisthaulya.

It has shown that the improvement of the mean value of *sphik chalata* from (2.20 to 1.27), *sthana chalata* from (1.96 to 1.13), *udara chalata* from (1.93 to 1.18), movements of cheek from (2.02 to 1.16), Movement of Thigh from (1.91 to 1.20), *ayasena swasa* from (0.96 to 0.51), *alpa vyayama* from (1.29 to 0.49), *swedadhikya* from (1.29 to 0.49), *nidradhikya* from (0.96 to 0.51), *ati pipasa* from (0.78 to 0.22), *daha* from (0.24 to 0.04), *Kshudra swasa* from (0.22 to 0.13 and *Janusandhi shoola* from (1.42 to 0.91) was statistically highly significant ($p < 0.001$)

Table 06 shows the improvement of the patients from drug therapy (n=45)

Effect of Therapy	Group A (No=45)	
	No. patients (%)	
	BT	AT
Normal BMI	0	7 (15.55)
Overweight	19 (42.22)	23 (51.11)
Obese	26 (57.77)	15 (33.34)
Total	45 (100%)	45 (100%)

Figure 4 shows the changes in of the improvement in BMI of the Athisthaulya.

The overall effects of therapy indicate that markedly improved in Normal BMI (15.55%) of the sample. Also there were improvement in over weight and obese with getting the relief in 24.44% and 24.44% respectively.

DECISSION

Effect of Bilwadi panchamula decoction on Athisthauily

Shodhana and *Shamana* are the therapies that have been recommended for *Athisthauilya* in Ayurvedic texts. The ingredients of the drug which consist of *Katu*, *tikta*, and *Kashaya rasa* and also with *ushna ruksha guna* help to the remove *Kapaha* and *meda*. The roots of these drugs in *Bilwadi Panchamula* have the action of *tridosagna*, *Kapaha vata samana deepana guna*, and *Makshika* (Bee honey) also with *tridosaghna* and *Kapha pitta shamaka*. Phytochemicals that are contained in these roots such as Flavonoids, Alkaloids, and tannins also effect on reduction of adipose tissue which is the main physiological factor of *Athisthauilya*. Because of these actions of the drug, it has increased *agni* and reduced *kapha* and *meda* to reduce weight, Body mass index, and waist circumference remarkably except in the mid-upper arm circumference. A similar study has given different results on mid-upper arm circumference due to the duration of the intervention being much longer than this study⁽¹⁶⁾. Most of the symptoms occur due to the *Athisthauilya* which is *Chalata* of *spik*, *Uadara*, and *Stana*, movement of cheeks and thigh, *Ayasena swasa*, *daurbalya*, *Swedhadhikaya*, *Nidradhikya*, *ati pipasa*, *kshudra swasa* and *janu sandhi shoola* has improved by the *Bilwadhi panchamula* decoction. Also, the total triglyceride level was remarkably reduced. All these objective parameters, subjective parameters, and biochemical

parameters are statistically highly significant ($p < 0.001$) except mid-upper arm circumference ($p > 0.05$). *Bilwadi Panchamula* decoction can be recommended for in the secondary prevention of *Athisthaulya* as a economical and side effects free treatments. For the accuracy repeat the study in a large scale of sample.

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