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ROLE OF SHATAVARI YASHTIMADHUVATI TO MALNOURISHED MOTHERS AND ITS EFFECT ON FOETAL DEVELOPMENT: A PILOT STUDY

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ABSTRACT

Background: Today adverse pregnancy Outcome Is Due To Low Maternal BMI. This increases the risk of IUGR, premature birth, low birth weight. A*charya Charaka* says, good maternal and fetal nourishment can be achieved by *Shatavari* and *Yastimadhu*, both being *Madhur Rasatmak* (sweet taste materials & herbs) and *Bhruhniya* (enhances growth) in nature. **Aim:** To study the effect of *Shatavari Yashtimadhu Vati* in malnourished mothers and foetal outcome. **Methodology:** The study was conducted on 20 patients, 10 each in control & trial group. Iron & Calcium, as per GOI guidelines, were given to both the groups and Shatavari Yashtimadhu Vati, 500 mg twice a day, to trial group. This study was conducted at Bharati Ayurveda hospital, during 2018-2020. It was randomized, open control trial study. Patients with BMI >18 or height or >140cm or weight >40 kgs were included in the study. **Results:** Total 54 patients evaluated in this study. Out of which 34 were recruited and 20 patients completed the study. The medicine was tolerated well in trial group patients. The BMI of trial group mothers increased by 3% as compared to control group and the birth weight was recorded 100 grams more in the trial group babies. **Conclusions:** Statistically, this variation was same in both the groups as the sample size was less. For effective inference, study should be conducted on larger sample size.

KEYWORDS: Shatavari Yashtimadhu Vati**,** BMI, Nutrition.

INTRODUCTION

"Maternal health is nation's wealth". Maternal nutrition and health are considered as the most important regulators of human foetal growth. If women's nutritional needs are not fulfilled during pregnancy, they are more likely to give birth to weak children resulting in a high infant mortality / morbidity rate and unhealthy adulthood.

World Health Organisation's Global database says, body mass index less than 18.5 is considered to be an underweight and malnourished.

Low BMI in the early stage of pregnancy increases the risk of IUGR, miscarriage, Premature birth, low birth rate, birth asphyxia, etc. Malnutrition also has an adverse effect on the development of the immune system of the new born.[1]

The concept of nutrition in Ayurved & modern science are dissimilar. The Ayurvedic terms used for nutrition are *Poshan & Bruhan*. Nutrition through modern science is amended by supplementation of nutrients. Whereas, in Ayurved nourishment is provided through *bruhana dravyas* (enhance growth factors) and *Madhura rasatmak dravyas* (sweet food and herbs). Diet and herbs containing these properties helps in enriching *poshana* (nutrition).

Garbhaposhan (nourishment of fetus) is a very crucial and determining part of the pregnancy. For the nourishment of mother, acharya Kashyap[2] has explained that the *Rasa* (nutritive fluid) formed after the digestion of food consumed by the mother will be utilised for the maternal-foetal nourishment and *stanautpatti- stanapushti* (formation of the milk).

This *rasdhatu* (nutritive fluid) is responsible for *garbhautpatt*i (formation of the embryo) and *garbhaposhana* (nourishment of fetus) and thus preventing IUGR and low birth weight.

Rasa Dhatu is *Dravarupa* (fluid), *Soumya* (soft), and *Aadyadhatu* (first tissue). It nourishes *Uturottar Dhatus* (further tissues) that is *Rakt* (blood), *Mansa* (muscle tissue), *Meda* (fatty tissue), *Asthi* (bony tissue), *Majja* (nervous system) & *Shukra* (ovum or sperm) and performs role of *Jeevana* (giving life), *Lepana* (plasters), *Snehana* (oiling or greasing for smoother function), *Purana* (filling the cavities) and *Garbhautpatti* (formation of the embryo).[3]

In Ayurvedic classics, *Acharya charaka*[4], explains nourishment of the foetus in two parts. Before the foetal body parts are not perceptible it gets nourishment by *upsneh & upsweda (*absorbing moisture and by osmosis). After the body parts become observable, a part of the

nutrition is received by infusion through the *Loomkoop* (pores of skin situated in the hair roots of the body) and the *nabhinadi* (umbilical cord).

To fulfil the optimal nutrition to the foetus and the mother, Ayurvedic classics explores about *Masanumasika garbhini paricharya* i.e. month wise dietic regimen for the pregnant mother.[5] Therefore, on following *Garbhini Paricharya* (lifestyle during pregnancy) given by many acharyas, *Madhura Rasa Dravays* (sweet taste food materials & herbs)[6] majorly contributes in increasing *Garbhaposhana* (nourishment of fetus), *Garbhadharana* (stability of fetus) and in accelerating *Maans* (muscle tissue) and *Meda Dhatu* (fatty tissue) production in an undernutrition mothers.[7]

Acharya *Charaka*[8] also states, *Bruhaniya* (enhance growth) and *Balya Gunas* (strength-giving properties) are responsible for *Garbhadharana* (stability of fetus). These *gunas* are commonly acquired in *madhurrasatmakdravyas.*

According to the researches done on each drug of *madhurskanda dravyas (sweet taste)* it has been discovered that the most potent drugs to be given during pregnancy are these 2:

1. ***Shatavari-*** *Acharya Charaka*[9] has mentioned *shatavari in balaya, vayasthapana, and madhuraskanda.* It increases longevity and imparts immunity.
2. ***Yashtimadhu-*** *Acharya charaka*[10] has categorized it into *jeevaniya, sandhaniya, madhurskandagana* and indicated in *garbhiniparicharchaya.* It is a immunomodulator and supports pregnancy.

Shatavari and *yastimadhu* both being a *madhur rasatmak dravyas*, are useful in foetal & maternal nutrition.

AIM AND OBJECTIVES

Aim

To study the effect of *shatavari and yashtimadhuvati* to malnourished mothers and its effect on foetal development.

OBJECTIVES

1. To study the effect of *shatavri and yashtimadhuvati* on malnourished mothers.
2. To study the effect of *shatavari and yashtimadhuvati* on foetal development.

MATERIALS AND METHODOLOGY

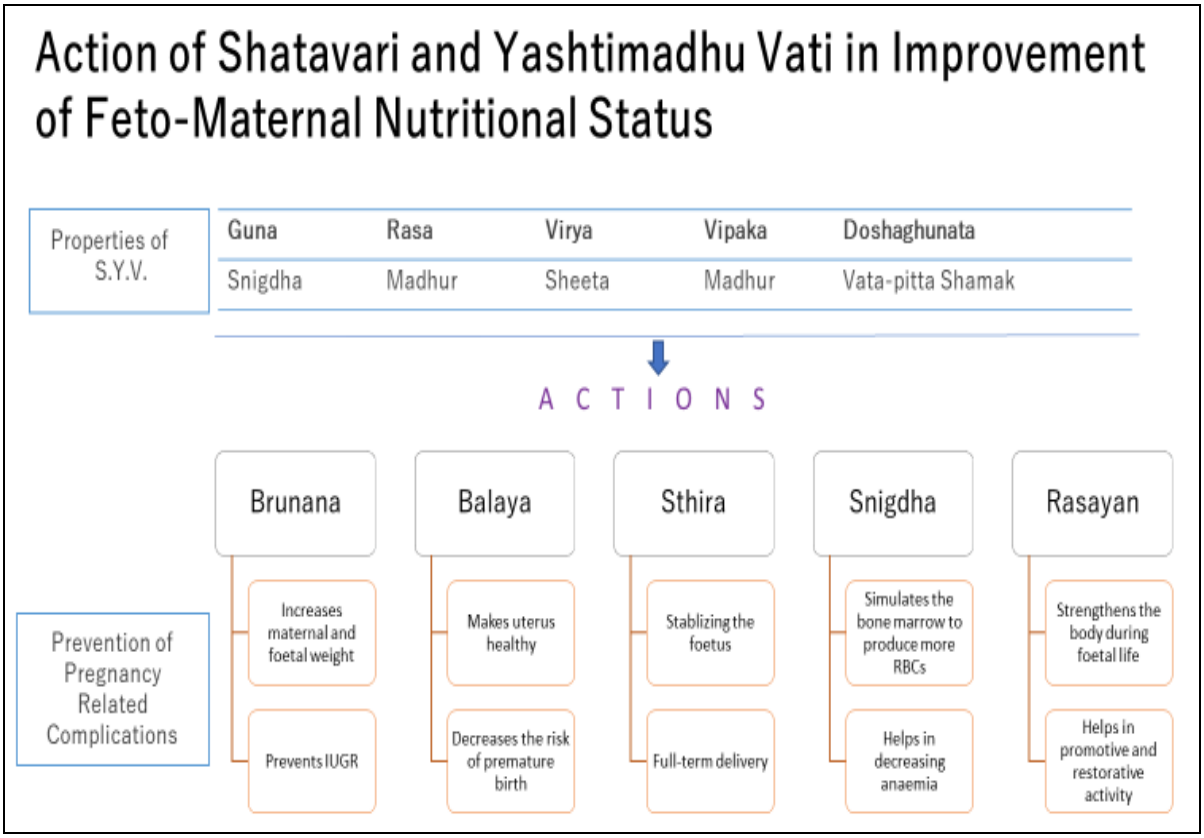
Material

Contents of *shatavari* and *yashtimadhu vati*:

- *Shatavri* (Asparagus Racemosus)
- *Yashtimadhu* (GlycyrrhizaGlabra)

Pharmacokinetics of shatavari yashtimadhu vati.

Contents	Latin name and Family	*Guna*	*Rasa*	*Vipaka*	*Veerya*	*Doshagnata*
Shatavari	Asparagus Racemosus LILIACAE	*Guru, Snigdha*	*Madhura Tikta*	*Madhur*	*Sheeta*	*Vata-pitta shamak*
Yashtimadhu	GlycyrrhizaGlabra PAPILIONACAE	*Guru, Snigdha*	*Madhura*	*Madhur*	*Sheeta*	*Vata-pitta shamak*



METHODOLOGY

1) This is randomized control clinical trial.
2) Sample size: 20 patients, 10 each in trial & control group.

   Trial group: 10 patients were given Iron & Calcium doses as per GOI guidelines with *shatavari-yashtimadhu vati* 500mg twice a day for 4-6 months.

Control group: 10 patients were given routine iron and calcium tablets once a day for 4-6 months as per GOI guidelines.

3) Place: Bharati Ayurveda Hospital, OPD and IPD.
4) Consent: written consent as per guide line in local language taken from each patient.

Statistical analysis

Paired't' test and Wilcoxon test were used to check the efficacy of shatavari and yashtimadhuvati on malnourished mothers and its effect on foetal development and birth outcome.

Treatment details

A)	Dose	500 mg (each i.e.; 1 gm daily)
B)	Form	Vati (Tablet)
C)	Time	Morning and evening
D)	Anupan	Milk (40 ml)
F)	Route of Administration	Oral
G)	Duration	From recruitment 16-20 weeks till 36th week.

Follow-up

1st visit	16 to 20th weeks
1st follow up	28th week
2nd follow up	32nd week
3rd follow up	36th week
4th follow up	40th week

A) Selection criteria

Inclusion criteria

1. Patients from age group Age >18 and <35 years.
2. Patients come up to 16 to 20 weeks.
3. All parity.
4. Patients fulfilling at least one of the following criteria:

a) Weight less than 40 kg
b) Height less than 140 cm
c) BMI less than 18.5

Exclusion criteria

1. Pregnancy induced GDM, hypertension and thyroid dysfunction.
2. Patients with history of IUGR, oligohydramnios, pre mature labor.

Discontinuation criteria

1. Noncompliance of the patient.
2. Voluntary withdrawal by the patient.
3. If patient is not regular for follow up then shall be discontinued.

B) Assesment criteria

Subjective criteria

Agni parikshan	**Mrudu**	**Madhyam**		**Tikshna**
Prakruti	Vatta	Pitta		Kapha
Mala	Days interval		Consistency	
	Daily	Alternate	Hard	Soft
Jeevah	Sam		Niram	
Sparsha	Ruksha		Snigdha	

Objective criteria

	16-20 WEEKS	**28TH WEEK**	**32ND WEEK**	**36TH WEEK**	**AT BIRTH**
Height of mother		-	-	-	-
Weight of mother					-
Body mass index		-		-	-
Birth weight	-	-	-	-	

Lab investigations

INVESTIGATION	**16 to 20 weeks**	**28th week**	**32nd week**	**36th week**	**40th week**
Haemogram		-	-	-	-
HIV		-	-	-	-
VDRL		-	-	-	-
HBSAG		-	-	-	-
TSH		-	-	-	-
Blood group		-	-	-	-
Urine (routine and microscopic)		-	-	-	-
Blood sugar random		-	-	-	-
Haemoglobin		-		-	
USG				-	

OBSERVATION AND DISCUSSION

To study the effect of *shatavari* and *yashtimadhu vati* on maternal and foetal development, in trial group total screened patients were 25, out of which 10 patients continued the study and in control group 29 patients were evaluated, out of which 14 were recruited and 10 completed the study. Total 14 patients in this study were dropped out due to non-compliance factors like covid-19 pandemic, irregular in follow-up and not willing to continue treatment. Based on the detailed analysis of 20 patients (10 in both group), the observations and discussions are done, which follows as:

1. **Age**

Age Groups	Group trial	Group control	Total
below 20	0	1	1
20-30	8	7	15
above 30	2	2	4

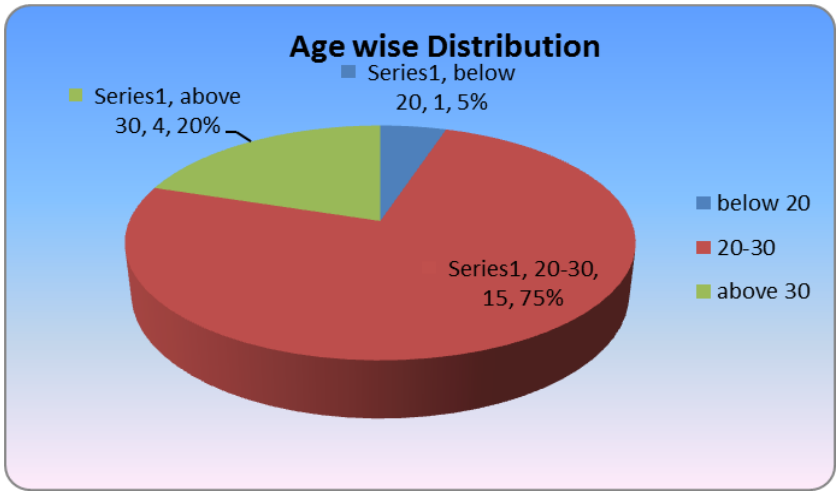


Fig no. 1: Age group stats analysis.

Maximum no. of patients were in between 20-30 years of age. This is because the marriage age in India is between 18 years and 30 years. According to "The Special Marriage Act, 1954" prescribe 18 years as the minimum age of consent for marriage for women in India.

Prakruti

Prakruti	Group trail	Group control	Total
Pitta Vata	3	3	6
Vata Kapha	2	0	2
Vata Pitta	5	7	12

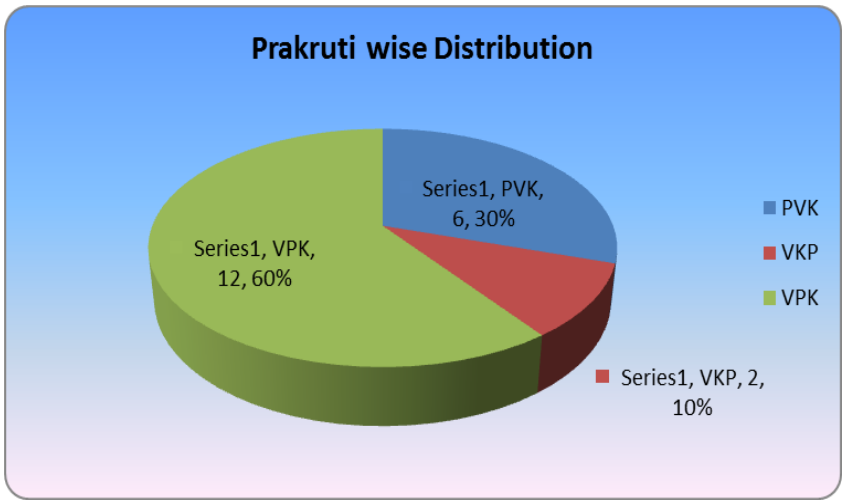


Fig. 2: Statistical analysis of *Prakruti*.

Maximum Number of patients were of vata-pradhanprakruti. Hence, *Vata* dominant *prakruti* is associated with *Krushata* i.e., less weight & height, resulting in poor BMI.

2. Residence

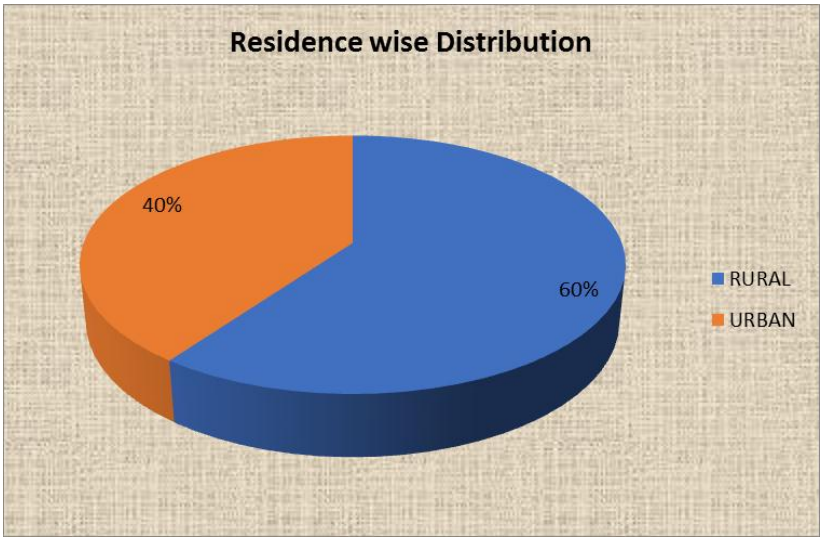


Fig. 3: Residence wise distribution.

This hospital is situated in the periphery of the Pune city that is why maximum number of patients, 60% were from rural area.

3. Parity

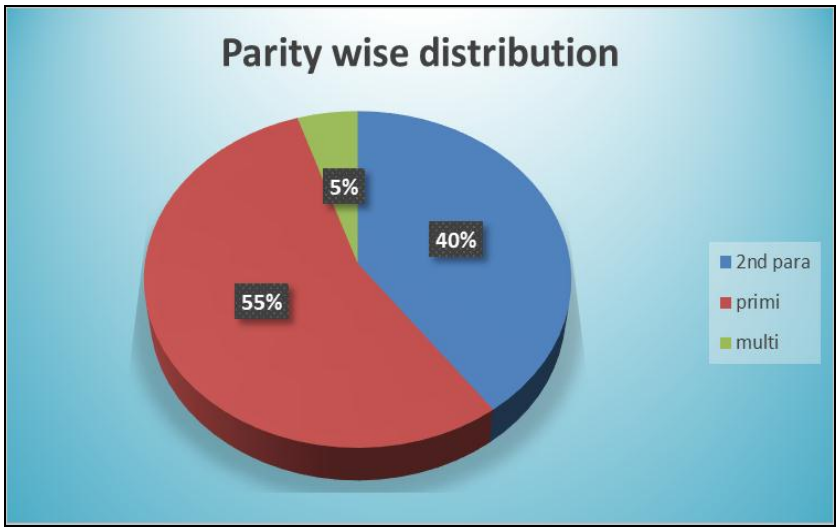


Fig no 4: parity wise distribution.

Parity	Trial Group	Control Group	Total
2nd para	4	4	8
Primi	6	5	11
Multi	0	1	1

The relation between parity and malnourished women is difficult to see in this study. However, as per textual concept it is seen that as the parity increases, weight of the baby also increases.

4. *Agni*

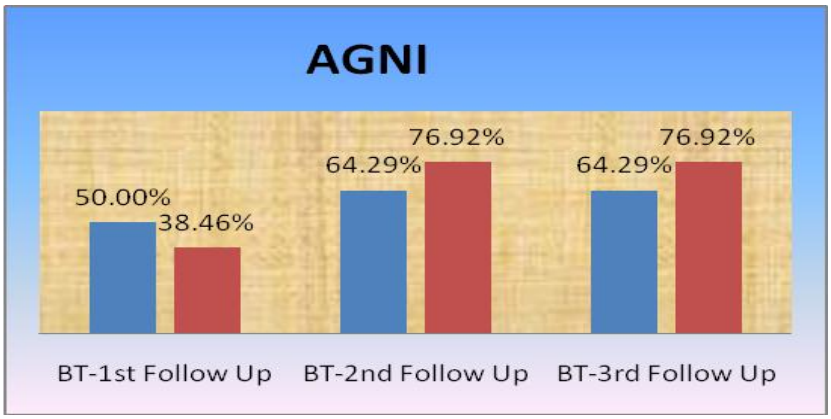


Fig. 5: Comparison of trial group drugs and control group drugs on *Agni* of mothers.

Parameter	Group	% of improvement	Mann Whitney u	Z	p value
AGNI	Trial	76.92%	50	0	1
	control	64.29%			

It can be said that the *Tikta rasa* (bitter) of *Shatavari* improves digestive power and *madhur rasa* (sweet) balances *dosha*. *Shatavari* contains digestive enzymes like amylase and lipase. This increases the activity to digest.

Yashtimadhu has active compounds like glycyrrhizin and carbenoxolone that are known to relieve constipation, acidity and stomach uneasiness.

5. Consistency of *Mala* (stool)

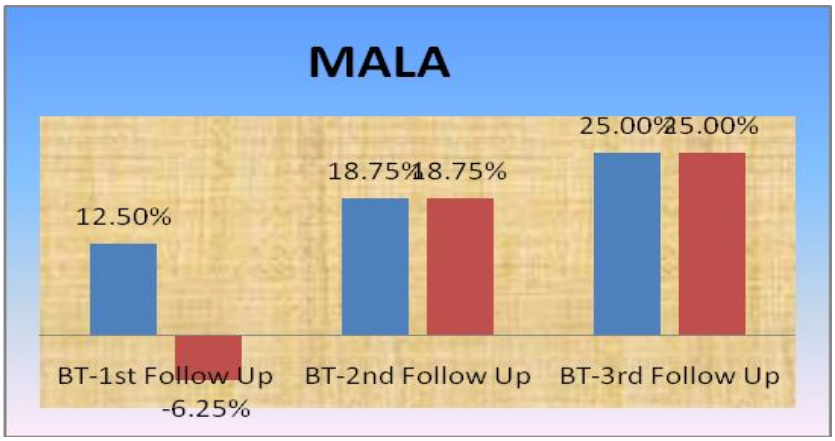


Fig 6: Comparison of trial group drugs and control group drugs on consistency of *Mala* in mothers.

Parameter	Group	% of improvement	Mann whitney u	Z	p value
MALA	trial	25.00%	50	0	1
	control	25.00%			

Consistency of *mala* indicates digestion of *ahara* (food). Soft *mala* and no straining during defecation indicates good digestion. Patients of trial group had better consistency of mala. This could be because of the *Tikta rasa* (bitter) of *shatavari*, which helps in *pachan* (digestion) and *shodhan* (purify) of *mala*. This increases the activity to digest. And *Yashtimadhu* also acts like a mild laxative.

6. *Jivha* (tongue)

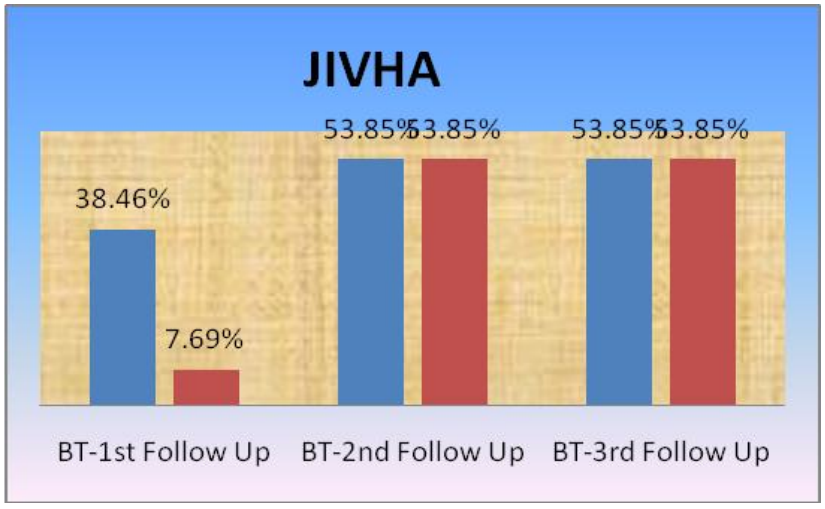


Fig 7: Comparison of trial group drugs and control group drugs on *Jivha* of the mothers.

Parameter	Group	% of improvement	Mann whitney u	Z	p value
JIVHA	trial	53.85%	50	0	1
	control	53.85%			

The *samta* (coated)/ *niramta* (uncoated) of the *jivha* (tongue) reveals the digestion power of the body. The decreased biological fire known as *mandagni* (low digestive power) leads to *samata* (coating) of tongue. *Shatavari* having *tiktarasa* helps to increase this biological fire leading to *samagni* (normal digestive power).

7. *Sparsha* (touch)

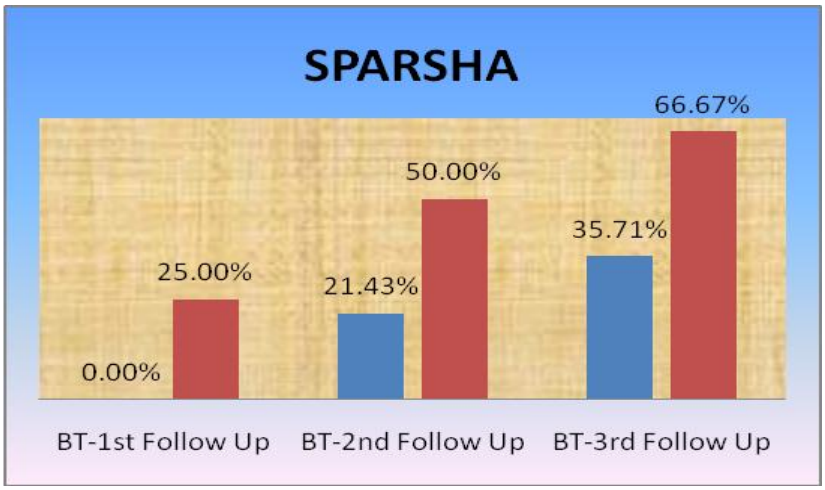


Fig 8: Comparison of trial group drugs and control group drugs on *Sparsha* of mothers.

Parameter	Group	% of improvement	Mann whitney u	Z	p value
Sparsha	trial	66.67%	45	-1	0.7393
	control	35.71%			

Spasha (touch) indicates the texture of the skin. In this study, Trial group had 66.67% of improvement. Therefore, *Shatavari* and *Yashtimadhu* being *vata-pitta nashak* and *kaph karak.* Plus, other properties like *Snigdh* (unctuous), *Guru* (heavy), *Balya* (strength) of the drugs also helps to enhance the texture of the skin.

8. Weight of mother and BMI

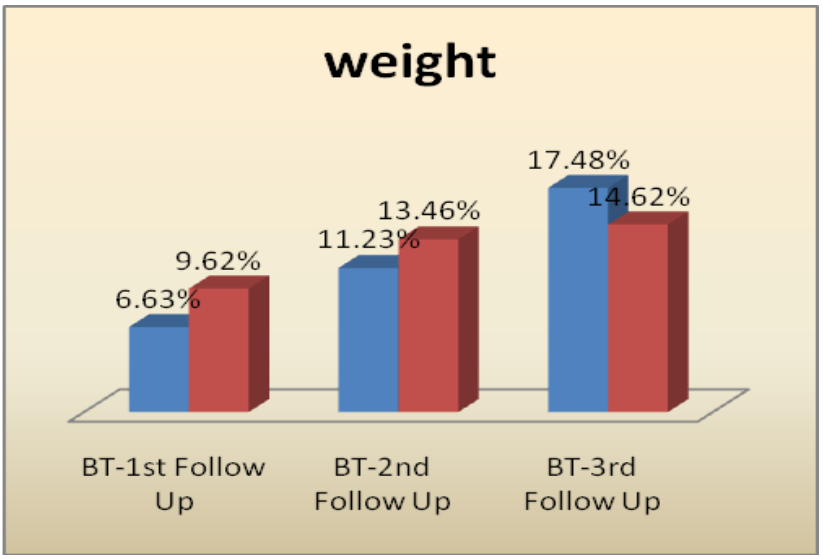


Fig 9: Comparison of trial group drugs and control group drugs on weight of the mothers.

parameter	Group	% of improvement	T	p value
weight in kgs	trial	17.48%	-0.71488	0.48
	control	14.62%		

In this study, it was observed that the BMI was increased as a result of the weight gain in mothers vividly.

The weight of the mother in trial group was recorded around 3% more than in control group. *Shatavari* and *yashtimadhu* known for its *Balya* (strength), *Snigdha* (unctuous), *Guru* (heavy), *Bhruhana Karya* (increases growth) which resulted in balcing *Dosha*, *Dhatu*, *Mala*. This ended into stabilizing *kapha dosha*, *mansa* (muscle) *& meda dhatu* (fat) in woman which helped in increasing the weight and BMI of mothers.

9. Height

Height is the constant factor in human body. In this study, patients in both the groups fulfilled the inclusion criteria of height for diagnosis of malnourished mothers.

10. Foetal Weight in USG

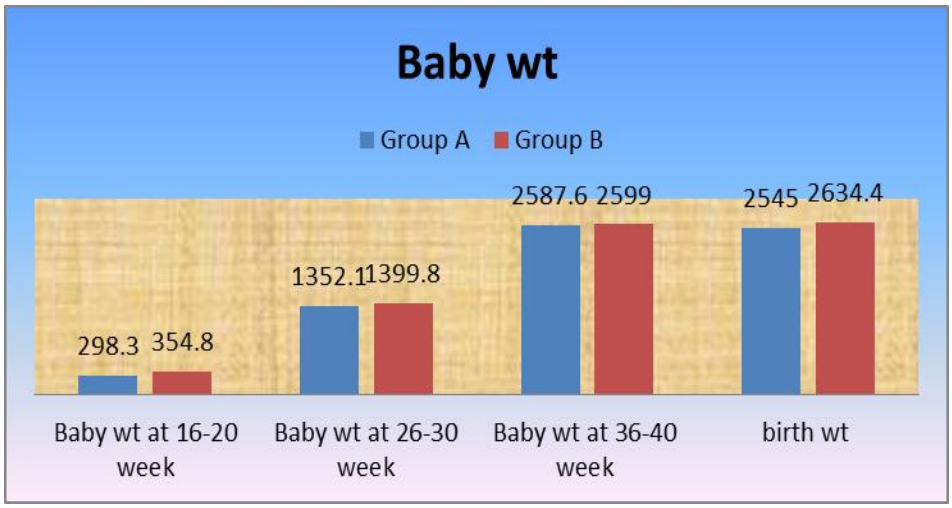


Fig no 11: Foetal weight in USG of both the groups.

Foetal weight		T	p value
Foetal weight at 16-20 week	Trial group	-2.0883	0.05
	control group		
Foetal weight at 26-30 week	trial group	-0.4671	0.64
	control group		
Foetal weight at 36-40 week	trial group	-0.82	0.93
	control group		
birth weight	trial group	-0.7392	0.47
	control group		

Statistical analysis of foetal weight in USGs.

In objective observation, foetal weight in consequent USG at 18-20 weeks, 28-30 weeks and 36-40 weeks of both groups showed same variations in range as per Shepherd's chart.

11. Baby birth weight

Parameter	Group	T	p value
Baby birth weight	Trial	0.156	0.877
	Control		

Statistical analysis of baby birth weight

Birth weight is the actual weight of the neonate at the time of birth. The range is mentioned in sonography so actual weight is more important. Average baby birth weight in trial group is 2.6 kgs and average baby birth weight in control group is 2.5 kgs thus 100 gm more weight was recorded in trial group.

CONCLUSION

Research on anomalous fetal and maternal nutrition is a need of an hour.

In this study, this is an attempt to prevent and ultimately overcome the complications of IUGR, LBW and pre term deliveries. As cited by *Acharya Charaka* good maternal and fetal nourishment can be achieved by *Madhur Rasa* (sweet food) herbs which are *Bhruhniya* (enhance growth) in nature.

Shatavari and *Yastimadhu* both being a *Madhur-Rasatmak dravyas* (sweet), which are useful in accomplishing the aim of maternal & foetal *bhruhan* (enhance growth).

Bhruhan is a process of giving *Pushti* (nourishment) and *Brihattva* (enhancing growth) to the tissues and body. *Bhruhan* (growth enhancer) having properties like *Guru* (heavy), *Snigdha* (unctuous), *Sheeta* (cold), *Manda* (slow), *Sthira* (stable) increases the weight of the body, giving bulk and tone to the muscle, resulting in a better body mass index (BMI).

In this study, it was observed that in trail group, baby birth weight was seen 100 grams more than that of control group's baby birth weight. It can be assumed that this petite difference of weight can be because of the *Bhruhan Karya* (growth increasing work) of *Madhur rasatmak dravays* (sweet food and herbs). However, for solid inference more sample size is required.

Still from this very less sample size, one can state that *Shatavari and Yashtimadhuvati* works as a *Bhruhan* (increases body mass), because of which it endows better nourishment to the mother and their baby.

There were no untoward side effects of the formulation. Patient did not report any complaint or any drug intolerance.

This study was performed on a small sample size of patients. It should be conducted on large scale, to confirm the efficiency of the *Shatavari and Yashtimadhuvati.*

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