



**International Journal of Biology, Pharmacy
and Allied Sciences (IJBPAS)**

'A Bridge Between Laboratory and Reader'

www.ijbpas.com

A CLINICAL STUDY ON DADIMA (POMEGRANATE) IN PANDU (NUTRITIONAL ANAEMIA)

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Received 19th April 2021; Revised 20th June 2021; Accepted 29th July 2021; Available online 1st Oct. 2021

<https://doi.org/10.31032/IJBPAS/2021/10.10.1008>

ABSTRACT

Introduction: Dadima (Pomegranate/*Punica granatum*), considered to be one among Nitya Sevaniya Ahara (balance diet/wholesome daily food) and used as both Ahara (food) as well as Aushadha (medicine). **Methods:** The study was an open labelled double arm clinical at tertiary Ayurveda healthcare centre attached to a teaching institute, situated at the district headquarters in South India. Total of 51 patients fulfilling the inclusion criteria were selected through convenient sampling method. In Dadima group (study group) 22 samples were included and in Pathya (diet) group (control group) 29 samples were included. They were administered with Dadima Swarasa (Fresh Pomegranate juice), 30ml once in a day at morning before food or Pathya (diet) for 7days. **Results:** The effect of therapy was assessed for signs and symptom and haemoglobin% before and after treatment. Dadima group showed statistical significance after 7 days of treatment. While comparing the effect in between the groups of Dadima and Pathya it showed no significant difference.

Keywords: Dadima, Diet, Nutritional anaemia, Pandu, Pathya, Pomegranate

INTRODUCTION

Dadima (pomegranate), one among the Nitya Sevaniya Aahara (balance diet/ wholesome daily food). It is trusted as “a pharmacy unto itself”. In Ayurveda classics, Dadima (pomegranate) is mentioned under the Hridya (good for heart), [1], Chardi Nigrahana (Antiemetic action) [2] and Shramahara Varga (relives fatigue) [3]. It is of two types- Madhura Rasa (Sweet taste) and Amla Rasa (Sour taste) variety. Living creatures are endowed with strength, complexion, happiness and longevity due to Shuddha Rakta (pure blood) [4]. Alpa Rakta (reduce blood) causes Pandu Bhava (pallor) hence the name Pandu has been given to the Vyadhi (disease). It is a Pitta Pradhana Tridoshaja Vyadhi, because of its Alpa Raktata Lakshana it is correlated to anaemia.

Anaemia is a condition in which the number of red cells or the haemoglobin concentration within them is lower than normal. The most common causes of anaemia include nutritional deficiencies, particularly iron deficiency, though deficiency in folate, vitamins B12 and A are also important causes; Anaemia is a serious global public health problem that particularly affects young children and pregnant women. Around 30 to 52% of non-industrialized population has anaemia in general. WHO has classified it

amongst the top ten selected health risks and it is the 14th leading cause of global burden of disease. It causes 8.4 lakh deaths and 35 million cases of disability adjusted life years. The estimated prevalence of nutritional anaemia in developing countries is about 42% in adult females, 30% in adult males, 45% in people more than 60yrs of age, more than 42% of children less than 5 years of age and 40% of pregnant women worldwide are anaemic [5]. Dadima (Pomegranate) can be considered as potent nutraceutical as it contains various phytoconstituents i.e., 22-25% of the fruit contains tannins. The increased content of polyphenols in Pomegranate may prevent RBC destruction due to reduced oxidative stress. It exhibits antioxidant activity that is much higher than that of red wine, green tea and other natural juices. Hence this study shall be aiming at finding the therapeutic utility of Dadima (pomegranate) in treating Nutritional Anaemia.

Aims and objectives:

- 1) To analyze the effect of Dadima (Pomegranate juice) in Pandu (Nutritional Anemia)
- 2) To analyze the effect of Pathya (diet) in Pandu (Nutritional Anemia)

- 3) To compare the effect of Dadima (Pomegranate juice) and Pathya (diet) in Pandu (Nutritional Anemia)

MATERIALS AND METHODS:

Source of data: Patients attending the OPD and IPD of at tertiary Ayurveda healthcare centre attached to a teaching institute, situated at the district headquarters in South India.

Ethical Committee Approval Number - SDM/IEC/14/2019

Clinical Trial Registry of India - CTRI/2020/01/022739

Criteria of evaluation:

Diagnostic criteria:

1. Minimum 3-5 classical signs of Pandu
2. Hemoglobin % between 10-12mg/dl

Inclusion criteria:

Individuals between the age group of 20-40 years of both sex having anaemia of minimum one month to maximum one year duration and who are ready to take part in the study with their consent were selected randomly for the study.

Exclusion criteria:

1. Anaemia due to any chronic systemic illness like Tuberculosis, Leukaemia, Jaundice, IHD, Malignant disorders, uncontrolled Diabetes and Hypertension.
2. History of Haemophilia or any bleeding disorder.

3. Pregnant and lactation women.
4. Any infectious diseases like HIV, HBsAg.

Study design:

The current study was an open label double arm clinical study in Pandu (n=40) selected using convenience/purposive sampling technique with pre and post design conducted in a tertiary Ayurveda healthcare centre attached to a teaching institute, situated at the district headquarters in South India.

Dosage and drug administration:

Group A- Drug: Dadima Phala Swarasa (Fresh Pomegranate juice)

Dosage: 30ml once in a day

Route of administration: Oral

Time of administration: Morning (Before food)

Duration: 7 days

Group B- Drug: Pathya (diet)

Duration: 7 days

Assessment criteria:

1. Subjective Parameters

Karnasweda (tinnitus), Hata Anala (reduced appetite), Durbala (muscle weakness), Sadana (exhaustion), Anna Dwesha (aversion for food), Shrama (fatigue), Brama (dizziness), Jwara (increased body temperature), Swasa (shortness of breath), Shuna Akshikuta (periorbital swelling), Harita Varna (pale skin), Shirnaloma (hair loss), Kopana

(irritability), Shishira Dweshi (aversion for cold), Nidralu (sleepiness), Alpavak (reduced speech), Stivana (expectoration), Hrudaya Dravata (palpitation).

2. Objective Criteria:

Haemoglobin %

Follow up:

Follow up done on 15th day after completion of treatment.

Statistical analysis:

Friedman's test, Wilcoxon signed rank test as post hoc with Bonferroni correction and Paired t test was used to analyze the significance of change in subjective parameters and objective parameters respectively. Mann-Whitney U test and independent t test was used to compare the significance of change in between the groups.

OBSERVATION

In the present study, out of 40 subjects, maximum number of subjects (n=23) were from the age group of 26-30 years and predominance of females (n=38) over males was found. Religion wise distribution showed that more patients were Hindus (n=35). Majority (n=21) of patients were unmarried. 26 subjects from this study were from middle class family. Majority (n=39) had mental strain and Physical strain (n=29) in profession. Maximum (n=27) subjects were accustomed to use mixed diet and majority

(n=27) had regular food habits. Majority (n=31) subjects had regular intake of Madhura Rasa dominant food.

RESULTS

The study was carried out in 51 registered subjects of Pandu in a double group. Out of which 40 subjects completed the study and 11 were dropouts. Among 51 subjects, 22 subjects were included under Group A (Dadima) Out of which 20 subjects completed the study and 2 were dropouts. Among 51 subjects, 29 subjects were included under Group B (Pathya) out of which 20 subjects completed the study and 9 were dropouts. Group A was administered with 30 ml of freshly prepared Dadima Phala Swarasa in the morning before food for 7 days. For group B diet chart with includes the Pathya and Apathya in the form of Ahara and Vihara was advised for 7 days. Friedman's test and Wilcoxon signed rank test as post hoc with Bonferroni correction was run on subjective parameters and has shown significant improvement in symptoms like Tinnitus, reduced appetite, ability to work, exhaustion, aversion for food, fatigue, breathing difficulty, pallor, hair fall, irritability, aversion to cold, excess sleep and palpitation in group A. Results are placed at [Table 1]. For Group B it showed significant result in reduced appetite, aversion for food, fatigue,

pallor and hair fall. Results are placed at [Table 2]. Paired t test was run on objective parameter and group A shows significant improvement. Results are placed at [Table 3]. Man-Whitney U test was run on subjective parameters in between the group and it was found that there was significant difference in action of drugs in symptoms like reduced appetite and exhaustion. Dadima has better results in symptoms like tinnitus (mean rank=22.03) and exhaustion (mean rank=23.80), pallor (mean rank=20.50), hair fall (mean rank=22.18), irritability (mean rank=22.40) eversion to cold (mean rank=21), excess sleep (mean rank=20) and palpitation (mean rank=21.50). Results are placed at [Table 4].

DISCUSSION

As the name denotes the main feature of Pandu Roga is Pandutva [6]. Pandu is Pitta Pradhana Vyadhi caused by vitiation of all three Dosha, it is mainly caused by dietary and behavioural habits that vitiate the Pitta. Due to Hetu Sevana (etiology), Pitta Pradhana tridosha gets vitiated and is circulated in the whole body causing Shithilata in all dhatus and Rasa Dhatvagni Mandya leading to Raktakshaya [7]. Poor eating habits, snacking, fast-food consumption and inadequate diet due to fast paced life can result in deficiencies of several vitamins like Vitamin A Vitamin

B6, Vitamin B12 and Folic acid along with the protein which can disturb the physiological formation and functioning of blood leading disease anaemia. It is widespread public health problem associated with an increased risk of morbidity and mortality, especially in pregnant and young children. Globally about 3.6 billion people are suffering from anaemia, among them 60% of adult females are suffering from nutritional anaemia [8].

Discussion on subjective Parameter

In the parameter Reduced appetite- in both the group the results were statistically significant. So, a post hoc test run to find out further difference between the intervals revealed the improvement of symptom was started from the beginning of administration of therapy in both the group with MR 7 in Dadima group and MR 5 in diet group. This effect in group A can be attributed to Agni Deepana and Pachana Karma along with Pitta Kshaya property of Dadima which helps to improve appetite.

In the parameter Ability to work- results were statistically significant in group A. The post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started from the beginning days of administration of therapy. This effect Dadima can be attributed

to Deepana, Bruhmana and Bala Vardhana Karma of Amla Rasa in Dadima.

In the parameter Exhaustion- The results were statistically significant in group A, a post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started from the beginning of administration of medicine. This effect Dadima can be attributed to Vatanulomana, Bruhmana and Bala Vardhana and correction in Pitta vitiation by Dadima.

In the parameter Aversion for food- Results were statistically significant in both the groups. Hence a post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started from the beginning in Group B whereas the improvement was not statistically significant in group A. This may be due to less subjects with this particular complaint in Group A.

In the parameter Fatigue- Results were statistically significant in both the groups. Hence a post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started from the beginning in Group A whereas the improvement was statistically significant only after 7 days in Group B. This effect can be attributed to Deepana,

Bruhmana and Bala Vardhana Karma of Dadima with the corrections in Pitta Dosha.

In the parameter, Giddiness- Results were not statistically significant in both the groups. This can be attributed to the small sample size and short duration.

In the parameter, Difficulty in breathing- results were statistically significant in group A. post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started after 7 days of intervention. This effect can be attributed to Ushna Virya, Vatanulomana, Bruhmana and Hrudya Karma of Dadima.

In the parameter, Pallor- results were statistically significant in both the groups. Hence a post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started after 7 days in both the groups. However, the MR of group A is 7 and MR of group B is 4.5 in FU which shows Dadima is clinically significant in pallor than diet. This effect can be attributed to Agni Deepana and Hrudya property of Dadima which helps in Ama Pachana there by helps in better absorption of food. Pallor is sign of Ranjaka Pitta Pradhushana and statistically significant reduction in the Pallor shows correction of Pitta by Dadima.

In the parameter, Hair fall- results were statistically significant in both the groups. Hence a post hoc test carried out to find out the further difference between the intervals revealed the improvement in symptom was started from the beginning of administration of medicine itself in group A where as in group B the improvement of symptom was started after 7 days. This effect Dadima can be attributed to Bruhmana and Pittahara property of Dadima.

In the parameter, Irritability- results were statistically significant in group A. Hence a post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started from the beginning of administration of medicine. This effect Dadima can be attributed to Bruhmana and Bala Vardhana Karma of Dadima with Deepana, Pachana and Rochana Karma as it not only helps in better absorption of food and also increases the palatability.

In the parameter, Aversion for cold- results were statistically significant only in group A. Hence a post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started from the beginning of administration of medicine. This effect

Dadima can be attributed to Ushna Virya of Dadima.

In the parameter, excessive sleep- results were statistically significant in group A. Hence a post hoc test carried out to find out the further difference between the intervals revealed the improvement of symptom was started from the beginning of administration of medicine. This effect can be attributed to Deepana, Pachana and Tridosahara Karma of Dadima.

Discussion of Objective Parameter

There was increase in the Haemoglobin level in both the groups, however it was statistically significant within study group A. Haemoglobin% is one of the major diagnostic criteria of nutritional anaemia. Mean value of Hb% of Group A BT was 10.8 gm/dl and AT 11.2 gm/dl, whereas Mean value of group B BT was 10.9 gm/dl and AT it was 10.63 gm/dl. From the above results, it can be inferred that the Dadima Swarasa helped more in the improvement of Hb% without increasing the Pitta Dosha and acts as Tridosahara.

Probable mode of action of the drug:

Dadima Phala is Amla Skanda Dravya referring to Amla Pradhana Rasa with Ushna Virya and Amla Vipaka. All Amlavarga Dravya are Pitta Vardhaka except Dadima and Amalaki [9] even Amla variety of Dadima is

Pitta Avirodhi hence it is considered under Nitya Sevaniya Dravya. Pandu being a Pitta Pradhana Tridoshaja Vyadhi where Ojo Kshaya, Bala Kashya with Alpa Rakta and Alpa Medhas is seen, Aushada having functions like Agni Deepana, Pachana, Rakta Vardhana, Bruhmana and Bala Vardhana should be a drug of choice but at the same time it should balance Tridosha. Dadima Phala fulfils these criteria.

It can be well understood by its chemical constituents- low molecular weight hydrolysable tannins which makes Dadima a good antioxidant [10]. The tannins like emblicanin-A (37%), emblicanin-B (33%), punigluconin and pedunculagin are reported to provide protection against oxygen radical included haemolysis of rat peripheral blood erythrocytes. Compounds such as citric, tartaric, malic, succinic, fumaric, glutaric and ketoglutaric acids may decrease the risk of stroke and Alzheimer's disease if consumed

on a regular basis [11]. It has been shown that consumption of products rich in polyphenolic compounds may reduce the risk of cardiac and cardiovascular disorders by antioxidant action towards low-density lipoproteins (LDLs), delaying the process of arteriosclerosis [12]. Thus, effect Dadima can be attributed to Hridya, Deepana, Pachana, Rochana, Bruhmana and Bala Vardhana Karma, which helps in proper absorption and in correcting the metabolism. Presence of low molecular weight hydrolysable tannins makes Dadima a good antioxidant. The tannins like emblicanin-A (37%), emblicanin-B (33%), punigluconin and pedunculagin are reported to provide protection against oxygen radical included haemolysis. Hence it is believed that the increased content of polyphenols in Pomegranate may prevent RBC destruction due to reduced oxidative stress and may have protected haemoglobin from oxidizing agents [13].

Table 1: Friedman test- Comparison within Group A for Subjective parameter

Variable	Grading	Mean Rank	Chi-Square	P value	Remarks
Tinnitus	BT	2.25	9.333	0.009	S
	AT	1.95			
	FU	1.80			
Reduced appetite	BT	2.65	24.326	<0.0001	S
	AT	1.78			
	FU	1.58			
Ability to work	BT	2.840	15.440	<0.0001	S
	AT	1.83			
	FU	1.78			
Exhaustion	BT	2.68	25.087	<0.0001	S
	AT	1.80			
	FU	1.53			

Aversion for food	BT	2.28	10.333	0.006	S
	AT	1.90			
	FU	1.83			
Fatigue	BT	2.70	26.085	<0.0001	S
	AT	1.78			
	FU	1.53			
Giddiness	BT	2.20	8.000	0.018	NS
	AT	1.90			
	FU	1.90			
Breathing difficulty	BT	2.33	12.286	0.002	S
	AT	1.88			
	FU	1.80			
Pallor	BT	2.45	20.462	<0.0001	S
	AT	2.13			
	FU	1.45			
Hair-fall	BT	2.65	25.120	<0.0001	S
	AT	1.95			
	FU	1.40			
Irritability	BT	2.43	15.793	<0.0001	S
	AT	1.88			
	FU	1.70			
Aversion to cold	BT	2.48	17.687	<0.0001	S
	AT	1.85			
	FU	1.68			
Excess Sleep	BT	2.40	16.000	<0.0001	S
	AT	1.80			
	FU	1.80			
Palpitation	BT	2.33	12.091	0.002	S
	AT	1.90			
	FU	1.78			

Table 2: Friedman test- Comparison within Group B for Subjective parameter

Variable	Grading	Mean Rank	Chi-Square	P value	Remarks
Tinnitus	BT	2.08	3.000	0.223	NS
	AT	2.00			
	FU	1.93			
Reduced appetite	BT	2.60	22.286	<0.0001	S
	AT	1.85			
	FU	1.55			
Ability to work	BT	2.10	4.667	0.097	NS
	AT	2.03			
	FU	1.88			
Exhaustion	BT	2.05	2.000	0.368	NS
	AT	1.98			
	FU	1.98			
Aversion for food	BT	2.70	26.533	<0.0001	S
	AT	1.73			
	FU	1.58			
Fatigue	BT	2.40	15.200	0.001	S
	AT	1.95			
	FU	1.65			
Giddiness	BT	2.03	2.000	0.368	NS
	AT	2.03			
	FU	1.95			
Breathing difficulty	BT	2.03	2.000	0.368	NS
	AT	2.03			
	FU	1.95			
Pain	BT	2.23	14.250	0.001	S

Hair -fall	AT	2.15	13.556	0.001	S
	FU	1.63			
	BT	2.35			
Irritability	AT	1.98	2.000	0.368	NS
	FU	1.68			
	BT	2.03			
Aversion to cold	AT	2.03	4.000	0.135	NS
	FU	1.95			
	BT	2.10			
Excess Sleep	AT	2.03	2.000	0.368	NS
	FU	1.95			
	BT	2.03			

Table 3: Paired t test result of both group for objective parameter

Parameter	Mean		Mean difference	SD	SE	T	p	Remarks
	BT	AT						
Dadima Swarasa	3.65	2.90	0.750	0.550	0.123	6.097	0.001	S
Diet	3.45	3.25	0.200	0.616	0.38	1.453	0.163	NS

Table 4: Result of Independent t test

	T test for equality of Means						
	T	Df	Sig (2 tailed)	Mean difference	SE Diff.	95% Confidence Interval	
						Lower	Upper
Equal variances assumed	-1.085	38	0.285	-0.350	0.323	-1.003	0.303
Equal variances not assumed	-1.085	36.48	0.285	-0.350	0.323	-1.004	0.304

CONCLUSION

Dadima is a Vichitra Pratyaharabdhya Dravya and act as Tridosahara. Subjective Parameters like ability to work, exhaustion, difficulty in breathing, hair fall, irritability, aversion for food, excess sleep and palpitation showed statistically significant result in Dadima Group. The Agni Deepana, Pachana, Bruhmana and Balavardhana Karma with Tridosahara property of Dadima makes it clinically useful in Pandu.

Financial Support and sponsorship: Nil

Conflicts of interest: There are no conflicts of interest.

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