EFFECTIVENESS OF DATES AND HONEY MIX ON SELECTED BIOCHEMICAL PARAMETERS IN IRON DEFICIENCY ANEMIA AMONG PREGNANT WOMEN – A PILOT STUDY

Nazia Meeran[1*], Dr. Tamilselvi S[2], Dr. Timsi Jain[3], Dr. Sheela Shenoy N A[4]

ABSTRACT

Background: An extensive public health problem, with much concern for human health, associated with an accelerated risk of morbidity, and a causal agent of death in pregnant women both in developed and emergent nations. Iron, the essential component of hemoglobin and related physiological parameters would affect the whole journey of pregnancy and have an ill effect on the outcome. Therefore, natural remedies like dates and honey mix along with iron and folic acid supplementation would aid in the prevention of anemia-related complications.

Methods: Quantitative – true experimental study was conducted among 30 pregnant women with iron–deficiency anemia who were on iron and folic acid supplementation, by random sampling and experimental group clients were provided 50 grams of dates and honey mix in the morning daily from the beginning of third-trimester up to delivery after assessing their selected physiological parameters. The Pretest and post-test results of the experimental and control group were analyzed statistically.

Result: There was a significant difference and reduction in the clinical symptoms experienced by the pregnant women with anemia and an increase in the biochemical parameters of IDA between the pretest and post-test scores of the experimental groups and the control group.

Conclusion: Despite routine Iron and folic acid supplementation, the pregnant women with IDA improved the biochemical parameters more than the control group. Dates and honey mix have a great effect on anemic pregnant women with compliance than a usual remedy.

Keywords: Iron deficiency anemia (IDA), pregnant women, dates and honey mix, physiological parameters, biochemical parameters.

[1*]Research Scholar, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.
[2]Associate Professor, Saveetha College of Nursing, Saveetha Institute of Medical and Technical Sciences, Thandalam, Chennai, India.
[3]Professor Community Medicine, Sree Balaji Medical College, BIHER, Chrompet, Chennai, India.
[4]Principal, MOSC College of Nursing, MOSC Medical College, Kolencherry, Ernakulam, Kerala, India.

***Corresponding author:** Mrs. Nazia Meeran
*Research Scholar, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, Tamil Nadu, India.

DOI: 10.48047/ecb/2023.12.si10.00349

Introduction

Anaemia is a global health problem affecting both developed and underdeveloped countries with a major consequence on human being especially pregnancy and growing fetus [(1)]. In developing countries, iron deficiency anaemia is becoming more common. Anaemia is due to a decrease in the concentration of circulating red blood cells and hemoglobin levels, this will lead to impaired oxygen transport [(1)]. Anaemia in pregnancy is defined as a haemoglobin concentration below 11g/dL or haematocrit of <33% according to WHO. More than half of all pregnant women have haemoglobin levels indicative of anaemia. In industrialized countries, the prevalence of anaemia among pregnant women is 15% and in developing countries, prevalence ranges between 33% and 75% [(2)]. According to WHO, the most common causes of anemia include nutritional deficiency, particularly iron deficiency. It is reported that 40% of pregnant women as well as 42% of under-five children worldwide are in an anaemic state. [(3)] Iron is a crucial constituent with carrying out functions such as carrying oxygen, DNA production, and muscle metabolism.

According to the WHO, the prevalence of anaemia in pregnant women in the developing world is 51% [(3)]. According to the National Family Health Survey - 5, 52.2 percent of pregnant women in the age group 15 - 49 years are estimated to be anaemic in the country and 20.9 percent in Lakshadweep islands [(4)]. Amit Kumar Yadav, and Anwar Salih, conducted a study on anaemia in Kavaratti Island, Lakshadweep pointed out that 47.5 percent of pregnant women are suffering from anaemia, which is much higher than non-pregnant women (37.6%). also, the study revealed that 42.4 percent of younger children are suffering from anaemia which is highly related to anaemia in pregnant women [(5)]. Anaemia Mukt Bharat strategy was launched in India by the Central Government in 2018 with the initiative to reduce anaemia among vulnerable groups through prophylactic Iron and folic acid supplementation, year-round behaviour change, testing and treatment of anaemia, Management of severe anaemia in pregnant women by administering Intravenous Iron Sucrose / Blood transfusion. India carries the largest burden of anaemia worldwide [(4)]. 3.29% and 15.88 % of pregnant women reported very severe anaemia and severe anaemia respectively, majority of them (41.76%) fall in the category of mild anaemia, and the rest (37.05%) had moderate anaemia, the mean haemoglobin level was found to be 8.845 according to ICMR classification of anaemia [(3)].

IDA can cause the woman to appear pale and tired, if anemia is not mentioned, it can cause threatening complications. Typical features of IDA are caused by decreased oxygen delivery to the tissues and cause pallor, fatigue, apathy, fainting, and breathlessness [(6)]. Other symptoms like headache, palpitation, hair loss and tinnitus are also found. Chronic iron deficiency anemia diminishes work tolerance, and even reduces living standards [(7)]. When the body doesn't have enough red blood cells the heart has to work firmer to get plenty of oxygen to other organs [(8)]. The heart has to work tougher even before a woman notices any symptoms. Several reasons could develop iron–deficiency anemia such as blood loss, especially in women who have heavy menstrual periods, do not have enough iron in their diet, are not able to absorb enough iron from foods, due to digestive tract disorders, or some gastric surgeries [(9)].

Pregnant mothers with hemoglobin levels less than 11.0 g/dl in the first and last trimesters and 10.5 g/dl or less in the second trimester are considered anemic, based on WHO classification. Anemia during pregnancy is dangerous to fetal growth and pregnancy outcome [(10, 11)]. Evidence from studies has shown that hemoglobin (Hb) and hematocrit (HCT) concentrations gradually come down during the first trimester and reach the lowest levels at the end of the second trimester and gain during the third trimester of pregnancy [(12)].

Dates and honey are abundant sources of vitamins and minerals. It can improve hemoglobin levels by shooting up erythrocyte production [(13)], antioxidants, and Vitamin C, Honey's concentration of Vit C is from 0.34 to 75.9 mg/100g of honey[(14)]. It leads to an elevation in hemoglobin, packed cell volume, and a raise in 20% of serum iron as well as honey-decreases fasting blood sugar[(18,20)]. Dates provide B vitamin (folate),15 mcg of folate per 100 grams of serving[(11)]. The investigator used Mabroom dates in this study, which are deliciously sweet and rich in iron, calcium, magnesium, and potassium also fiber, carbohydrates, minerals, vitamin B complex, and proteins, offering almost all twenty amino acids which are essential for the growth of the fetus [(13)].

Several studies have been carried out to improve iron and hemoglobin levels in women viz, iron and folic acid supplementation, natural products like beetroot juice, honey, the combination of tomato juice and honey, and honey dates amla mix, dates only [(22,23,24,25,26).] Animal studies on rats with date

combination syrup and bee pollen to increase erythrocyte index and body weight of birth, Wister white rats showed an increase in the erythrocyte index level and body weight of puppies after the intervention (W. Aotari) [27]. Therefore, the above-mentioned articles and research studies point out that dates alone and honey alone could give good results by increasing the hemoglobin levels of pregnant women. The investigator could not find a single study in combination of dates and honey which shows a significant improvement in iron deficiency anemia. So this made the investigator do a study on dates and honey mix in increasing the hemoglobin levels in pregnant women with iron deficiency anemia.

Materials and Methods

Study design: Experimental study

Study participants: The study participants were taken from different islands of the Union Territory of Lakshadweep based on the inclusion criteria. The participants of the control group were selected from different islands of Lakshadweep except from Kavaratti and Agatti, which contributed to the experimental group (n=15) based on the prevalence of anemia (ascertained by the preliminary survey conducted by the Directorate of Health Services on the selected areas), willingness and cooperation of the people residing in these areas, accessibility of investigator, and administrative support from the Directorate of Health Services.

Ethical considerations: The study was approved by the Institution Ethical Committee (DCC/IEC/057/2021) of Dhanvantri Critical Care Center, Dhanvantri Multispecialty Hospitals, Karungalpalayam, Erode. The participants were informed about the purpose of the study and a written consent was obtained.

Intervention: This study focused on pregnant women who had completed their second trimester, aged between 15 and 49 years, with a hemoglobin level of less than 11 mg/dl. Participants were also required to take iron and folic acid supplements, read,write and understand Malayalam or English, and not have chronic diseases, gestational diabetes, or physical and mental impairments. Data collection includes demographic information such as age, education, occupation, and wealth index, as well as baseline information on anemia, menstruation regularity, excessive menses, chronic illness, dietary habits, iron and folic acid intake, and deworming history. The researcher created a WhatsApp group for easy communication with the participants to know their compliance with the dates and honey mix. After having the mix, the mothers were instructed to report to the group to ensure that all of them ate the dates and honey mix early in the morning. If anybody has not taken it till 9 am, the researcher makes a call back to remind them.

Outcome measures; Biochemical parameters consist of hemoglobin, hematocrit, red blood cell, platelet, OGCT, Bilirubin, Aspartate aminotransferase (AST), Alanine Transaminase (ALT), and Alkaline Phosphatase (ALP). The 50 grams of dates and honey mix were given every morning after the pretest serological investigation and symptom assessment. The re-investigation and symptom assessment after intervention were conducted on admission for safe confinement and the findings were recorded in the post-test entry sheet. The final analysis was done by descriptive and inferential statistics.

Data analysis:

Demographic and baseline variables in categorical/ dichotomous were given in frequencies with their percentages. The scores of biochemical parameters were given as mean and standard deviation using a one-way analysis of variance. Quantitative data difference between the experiment and the control was analyzed using non-parametric repeated measures analysis of variance for one-factor repetition with Bonferroni t-test for post hoc multiple comparisons. A probability of 0.05 or less was considered statistically significant. Sigma Plot 14.5 version (systat software Inc, San Jose, USA) was used for statistical analysis and graph plotting.

Results;

Table 1: Demographic variables of study participants

Demographic Variables			Group			
			Experimental (n=15)		Control (n=15)	
Sl no			No	%	No	%
1	Age in Years	Below 30	8	53.33	8	53.33
		Above 30	7	46.66	7	46.66
2	Education	Elementary	2	13.33	3	20
		seconadary	9	60	6	40

		College/University	4	26.66	5	33.33
		Professional	0	0	1	6.66
		Vocational	0	0	0	0
3	Occupation	Home Maker	11	73.33	9	60
		Coolie	0	0	0	0
		Private Employee	2	13.33	3	20
		Govt Employee	2	13.33	3	20
4	Health	Low	2	13.33	1	6.66
	Status	Middle	11	73.33	10	66.66
		High	2	13.33	4	26.66
5	Wealth	Upper class	4	26.66	5	33.33
	Index	Middle Class	11	73.33	10	66.66

With relation to the collected demographic profile of fifteen Pregnant women with iron deficiency anemia, the majority wise percentage were explained likewise. Among the fifteen women, 53.33% were below 30 years and 60 percent reported a history of anemia in both the experimental and control groups, all of them would prefer to have a mixed diet in both groups, 60% have secondary education, 73.33% of them are homemakers and middle-income family, 33.33% have excessive menstrual flow. 86.88% and 73.33% of pregnant women in the experimental and control group respectively on iron and folic acid supplementation. 40% have secondary education, 60% of women are homemakers, and 66.66% are in the middle class in the control group.

Table 2: Comparison of pre-test biochemical parameters of the experimental and control groups

Sl no	Biochemical Parameters	Experimental (n=15)		Control (n=15)		Mean Difference	RM ANOVA with Bonferroni t-test
		Mean	SD	Mean	SD		
1	Hemoglobin	9.58	0.691	9.23	0.5	0.35	t=1.896, p=0.064
2	Hematocrit	29.77	2.016	30.43	2.71	0.66	t=0.081, p=0.423
3	RBC	3.66	0.28	3.688	0.28	0.028	t=0.265, p=0.792
4	Platelet	1.99	0.33	2.5	0.813	0.518	t=0.063, p=0.95
5	OGCT	105.33	22.71	101.67	16.31	3.667	t=0.619, p=0.539
6	Bilirubin	0.6	0.13	0.65	0.14	0.052	t=1.304, p=0.198
7	AST	29.67	6.75	32.67	3.96	3	t=1.243, p=0.219
8	ALT	19.07	4.57	22.2	2.98	3.133	t=1.54, p=0.129
9	ALP	122.2	20.55	117.93	19.15	4.267	t=0.462, p=0.646

Table 3: Comparison of pre-test and post-test biochemical parameters among experimental groups

Sl no	Biochemical Parameters	Group Pre-test		Post-test		Mean Difference	RM ANOVA with Bonferroni t-test
		Mean	SD	Mean	SD		
1	Hemoglobin	9.58	0.691	12.28	0.45	2.7	t=19.946, p<0.001
2	Hematocrit	29.77	2.016	38.01	2.41	8.24	t=10.99, p<0.001
3	RBC	3.66	0.28	4.38	0.32	0.723	t=7.116, p<0.001
4	Platelet	1.99	0.33	13.91	45.39	11.923	t=1.440, p=0.161
5	OGCT	105.33	22.71	113.87	11.99	8.533	t=1.366, p=0.183
6	Bilirubin	0.6	0.13	0.56	0.11	0.04	t=0.994, p=0.329
7	AST	29.67	6.75	25.8	6.58	3.867	t=1.624, p=0.116
8	ALT	19.07	4.57	16.87	5.84	2.2	t=1.056, p=0.300
9	ALP	122.2	20.55	111.8	16.24	10.4	t=1.341, p=0.191

Table 4: Comparison of pre-test and post-test biochemical parameters among control groups

Biochemical Parameters	Group Pre-test		Post-test		Mean Difference	RM ANOVA with Bonferroni t-test
	Mean	SD	Mean	SD		
Hemoglobin(g/dl)	9.23	0.5	11.07	6.33	1.78	t=13.12, p<0.001
Hematocrit(%)	30.43	2.71	34.06	1.69	3.643	t=4.86, p<0.001
RBC ($x10^6$/ µL)	3.688	0.28	3.94	0.28	0.252	t=2.481, p=0.019
Platelet ($x10^5/mm^3$)	2.5	0.813	2.33	0.36	0.179	t=0.022, p=0.983
OGCT (g/dl)	101.67	16.312	113.53	11.269	11.867	t=1.899, p=0.068
Bilirubin (mg/dl)	0.65	0.14	0.57	0.05	0.08	t=1.988, p=0.057
AST (U/L)	32.67	3.96	28.73	8.38	3.933	t=1.65, p=0.110
ALT (U/L)	22.2	2.98	17.07	7.76	5.133	t=2.463, p=0.02
ALP (U/L)	117.93	19.15	113.87	38.83	4.067	t=524, p=0.64

The effectiveness of dates and honey mix in increasing the selected biochemical parameters of iron deficiency anemia was ascertained by comparing the pre-test and post-test biochemical parameters of IDA among the experimental and control groups which showed significant differences (p<0.001) portrayed in Tables 3 and 4.

Table 5: Comparison of post-test biochemical parameters between experimental and control groups

Biochemical Parameters	Group Experimental Post -test		Control Post-test		Mean Difference	RM ANOVA with Bonferroni t-test
	Mean	SD	Mean	SD		
Hemoglobin(g/dl)	12.28	0.45	11.07	6.33	1.276	t=6.847, p<0.001
Hematocrit(%)	38.01	2.41	34.06	1.69	3.937	t=4.814, p<0.001
RBC ($x10^6$/ µL)	4.38	0.32	3.94	0.28	0.443	t=4.187, p<0.001
Platelet ($x10^5/mm^3$)	13.91	45.39	2.33	0.36	11.584	t=1.397, p=0.168
OGCT (g/dl)	113.87	11.99	113.53	11.269	0.3337	t=0.056, p=0.955
Bilirubin (mg/dl)	0.56	0.11	0.57	0.05	0.0133	t=0.326, p=0.736
AST (U/L)	25.8	6.58	28.73	8.38	2.933	t=1.216, p=0.229
ALT (U/L)	16.87	5.84	17.07	7.76	0.2	t=0.098, p=0.922
ALP (U/L)	111.8	16.24	113.87	38.83	2.067	t=0.224, p=0.824

Table 5 shows statistical significance among the post-test of both the experimental and control group in the level of hemoglobin, hematocrit, and RBC (P<0.001).

Table 6:Comparison of control and experimental groups on symptom score, by Kruskal Wallis one way ANOVA on ranks with Tukey's multiple comparison test.

S.No.	Groups	Median	Percentiles	Statistical analysis
1	Control Pre-test	11	10 – 11	H = 42.056
				P < 0.001
	Control Post-test	8	7 – 9	
	Experimental pre-test	11	9 – 12	
	Experimental Post-test	4	3 - 5	
2	Significance between Pre-test			q = 0.473
	(Control and Experimental)			P = 0.987
	Significance between Post-test			q = 4.332
	(Control and Experimental)			P = 0.012
3	Significance within Control			q = 3.718
	(Pre-test and Post-test)			P = 0.043
	Significance within Experimental			q = 7.577
	(Pre-test and Post-test)			P < 0.001

n = 15 each
Percentiles = 25 and 75

Table 6 shows the between-groups comparison, experimental post-test, and control post-test, which showed significance (P = 0.012) on symptom assessment. The within-groups comparison experimental pretest and experimental post-test also showed significance (P < 0.001) and had significance in the with-in-group comparison of the control group (P = 0.043).

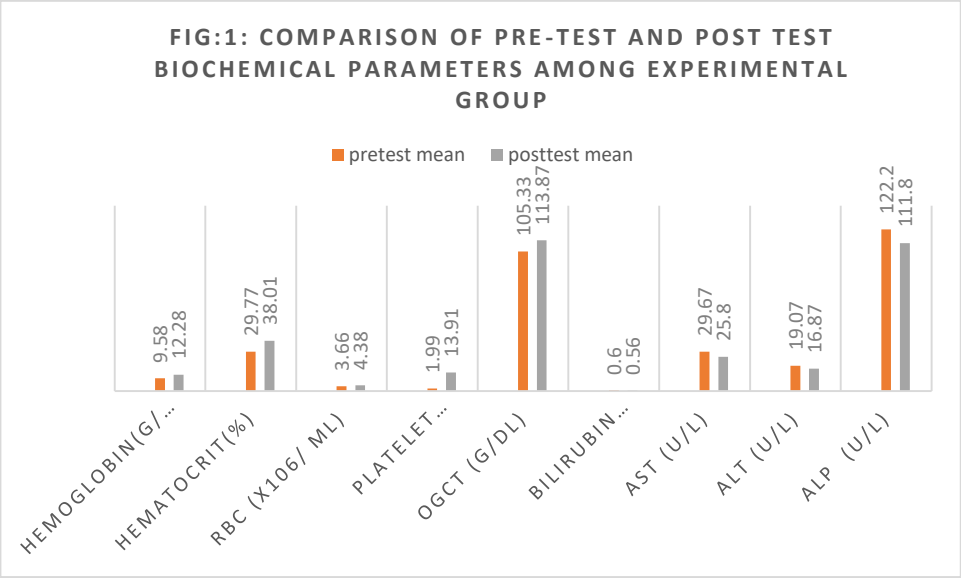

Figure 1 depicts the comparison of pre-test and post-test biochemical parameters of pregnant women in the experimental group with iron deficiency anemia by clearly pointing out the increase in the values after the intake of dates and honey mix.

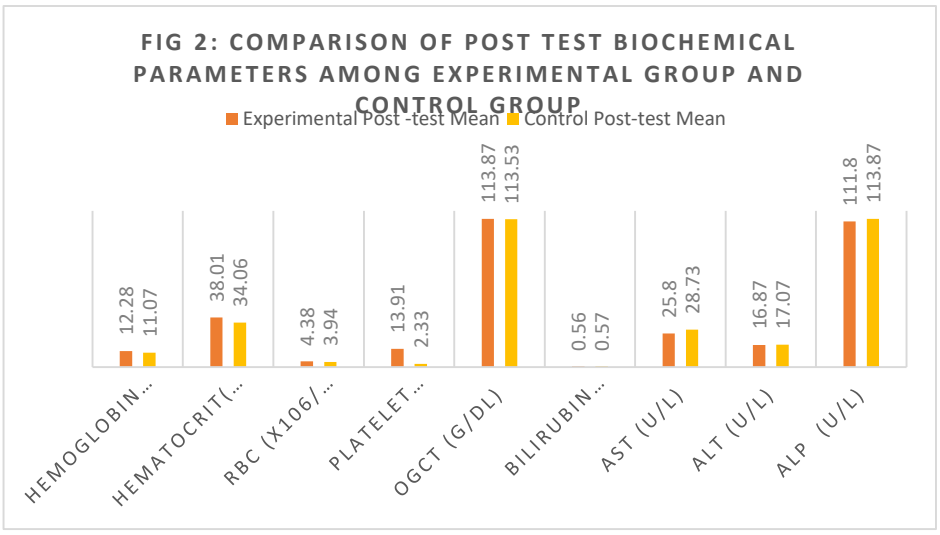

Figure 2 depicts the comparison of post-test scores of biochemical parameters of experimental and control groups among pregnant women with iron deficiency anemia and clearly shows the variations in the scores after intervention.

DISCUSSION

The lower threshold hemoglobin value in pregnant women is <11 g/dL during the first and the third trimester, and <10.5 g/dL during the second trimester. In the postpartum period Hb concentration <10 g/dL indicates clinically significant anemia. The quantitative study was conducted to assess the effectiveness of dates and honey mix on selected biochemical parameters in iron deficiency anemia among pregnant women. Oral iron therapy is given as the first-line treatment for IDA. Intravenous Iron Therapy was given as an alternative therapeutic option in patients who do not respond to oral iron therapy. In the present study, 73.34 % were on regular oral iron therapy along with vitamin C, wherein 46.66% of mothers required intravenous iron sucrose injection to maintain their hemoglobin level. Intravenous iron

sucrose is a safer alternative for the treatment of pregnant women with severe anemia. In women with good compliance to oral therapy, intravenous iron sucrose might not have any added advantages in case of moderate anemia. It might be used in cases of poor compliance to oral iron or iron intolerance[28].

The primary objective was to evaluate the effectiveness of dates and honey mix in the experimental group. (Risza C, Retno W, Astrid E P, 2021) In a quasi-experimental study, the control group consumed oral iron tablets on univariate analysis the mean increase in the hemoglobin was 0.3 g/dL whereas, the experimental group consumed dates showed an increase of 1.8 g/dL. In the present study, the control group has a mean increase in hemoglobin of 1.77g/dL and for those with dates and honey mix was 2.77g/dL. The group comparison showed a significant mean difference of 0.815 g/dL. In the Bivariate analysis, with the Bonferroni t-test the p-value of the experimental group was $p<0.001$($p<0.05$). It is necessary to add additional supplement along with iron tablets to steady the hemoglobin level in a third trimester pregnant women based on the current study.

As per the second objective, the findings revealed that there is a significant increase in the post-test scores of biochemical parameters of anemia among pregnant women between the experimental and control group at $p<0.001$ ($p<0.05$) and the group comparison also showed a significant difference, a t value of 5.095, and a P value <0.001 ($p<0.05$). Not only the hemoglobin but also the hematocrit, (mean difference of 1.639,g/dL, t=2.630, P=0.014, P<0.05) and RBC (mean difference of 0.487g/dL, t= 6.786, P<0.001, P<0.05) has shown a significant rise in its value when compared with the control group. If the hematocrit level is less than the normal that shows the person doesn't have enough red blood cells[30]. Hemoglobin is the iron-containing protein responsible for carrying oxygen in red blood cells whereas hematocrit is the volume of red blood cells compared to the total blood volume. Inadequate tissue oxygen delivery may be indicated by physical signs such as tachycardia, tachypnea or symptoms like chest pain, deteriorating cognitive function[31].

Another study by Romadana showed that the average hemoglobin level before giving honey was 9.4 g/dL, while after giving honey for 15 days the average was 12.6 g/dL. There was a significant effect (p-value 0.000 < 0.05) of giving honey on the hemoglobin levels of pregnant women with anemia[23]. From the stated studies the dates and honey were given and tested in separate times and to different mothers. Ultimately from those studies, it could not find out the total effectiveness of both dates and honey. From different studies, it has been proved that these two were effective but when the honey is been added with dates it doubles its effectiveness as the honey contains Vitamin C, and the concentration of vitamin C ranged from 0.34 to 75.9 mg/100g of honey [17]. It causes an elevation in hemoglobin, packed cell volume, honey-decreased fasting blood sugar level, and a raise in 20% of serum iron.

A comparative study on hemoglobin levels of amla with honey and dates by Akilaroon, Devi, and Jothipriya (2019) states that, to increase hemoglobin levels over a short period people can prefer a combination of amla and honey over dates alone[15]. In the current research, the investigator also points out that, the iron in the dates can be easily absorbed when it is combined with honey, which has a high source of Vit C, and 1.02mg of iron.

Sugita (2019) claimed that consuming 7 dates in 14 days could rise hb levels in the last three months of pregnancy. This shows that dates are rich in iron which can help increase hemoglobin levels, protein, carbohydrate, fat, Ca, Fe, Zn, Cu, P, and Niacin, and is rich in Vit A which supports hemoglobin synthesis[32]. This study had done only for 14 days and showed a significant effect on its participants. When compared to this the present study pointed out that when the intervention of dates ad honey mix is given for three months in pregnancy, it will have a high impact on its participants in the long run.

The between groups comparison, control post-test and experimental post test showed significance (P = 0.012). The within groups comparison, control pre-test and control post-test showed significance (P = 0.043). The within groups comparison experimental pre-test and experimental post-test also showed significance (P < 0.001). The control group showed 3 scores decrease from pre-test to post-test, while the experimental group showed 7 scores decrease from pre-test to post-test.

So, it can concluded that giving dates and honey mix increases the Hb as well as associated biochemical elevations in pregnant women with anemia in the third trimester. Hence, it is very well recommended to the pregnant women in the last trimester who are suffering from anemia to consume dates and honey mix to raise their Hb,

RBC, and Hematocrit values without disturbing any other factors in the blood to benefit well for the growth of the fetus.

Furthermore, 100 grams of dates contain 2.81 grams of protein, 7.1 grams of fiber, 35 mg of calcium, 88.78 grams of carbohydrates, 0.4 mg of vitamin C, and 1.02 mg of iron. Iron is a component of hemoglobin in red blood cells which determines the oxygen-carrying capacity of blood and helps treat anemia. As hemoglobin level rises other components also raised simultaneously that eventually decreased the associated signs and symptoms experienced by the participants.

CONCLUSION

The research findings revealed that the dates and honey mix along with iron and folic acid supplementation, are effective in increasing the selected biochemical parameters of iron deficiency anemia than usual iron and folic acid which will improve the felt growth and better outcome in the near and the times to come in future.

FINANCIAL SUPPORT AND SPONSORSHIP

Self-funding

CONFLICTS OF INTEREST

None declared

REFERENCES

1. Alemayehu Bekele, MarelignTilahun and AlemeMekuria, "Prevalence of Anaemia and its associated factors among Pregnant women attending Antenatal care in Health institutions of Arba Minch Town, GamoGofa Zone, Ethiopia; A Cross-sectional study", Hindawi Publishing Corporation, Anemia, Volume 2016, Article ID 1073192, 9 pages, http://dx.doi.org/10.1155/2016/1073192
2. Fatma Abdallah,Sauli E. John,Adam Hancy,Heavenlight A. Paulo, Abraham Sanga, et.al, Prevalence and factors associated with anaemia among pregnant women attending reproductive and child health clinics in Mbeya region, Tanzania, PLOS Global Public Health, October 5, 2022 https://doi.org/10.1371/journal.pgph.0000280
3. World Health Organization; Anemia, overview; https://www.who.int/health-topics/anaemia#tab=tab_1
4. pib.gov.in/PressReleaseframe Page.asx? PRID=1776544 posted on 30 November 2021, 6.18 PM by PIB Delhi.
5. Amit Kumar Yadav, Anwar Salih, Anemia in Kavaratti Island, Lakshadweep: Perspectives from a Hospital Based study, Aug 2015, DOI : https://doi.org/10.47739/2333-6684/1037
6. Mishu Mangala, Deepak Singla, Prevalence of anemia among pregnant women in rural India: a longitudinal observational study, International Journal of reproduction, Contraception, Obstetrics and Gynecology, 2016, Oct: 5(10): Pg: 3500-3505, http://dr.doi.org/10.18203/2320-1770.ijrcog.20163431
7. Shill K B, Karmakar P, Kibria G, Das A, Rahman M A, et al; Prevalence of iron deficiency anemia among university students in Noakhali region, Bangladesh; Journal of Health Popular Nutrition;2014, Vol:32; pg:103-110.
8. Abbaspour N, Hurrel R, Kelishadi R; Revision on iron and its importance for human health; Journal of Research in Medical Sciences; 2014; Feb 19(2); pg: 164-174.
9. Anemia; Cleveland Clinic; my.clevelandclinic.org/health/diseases/3929-anemia#
10. Iron Deficiency Anemia, Mayo Clinic, mayoclinic.org/diseases-conditions/iron-deficiency-anemia/symptoms-cause/syc-20355034#.
11. F Moghaddam Tabrizi, S Barjasteh; Maternal hemoglobin levels during pregnancy and their association with a birth weight of neonates, Iranian Journal of Pediatric Hematology Oncology; 2015, Vol 5(4); 211- 217, PMC 4779156.
12. Bencaiova G, Breymann C. Mild Anemia and Pregnancy Outcome in a Swiss Collective. *Journal of pregnancy.* 2014; 2014:307535. doi: 10.1155/2014/307535
13. Elise M Laflamme, Maternal hemoglobin concentration and pregnancy outcome: a study of the effects of elevation in el alto, Bolivia, Mc Gill Journal of Medicine; MJM: An International forum for the advancement of medical sciences by students; 2011 Jun; vol 13(1);47; pubmed.ncbi.nlm.nih.gov/22399871.
14. Zen ATH, Peritiwi D, the effect of dates juice on hemoglobin level an experimental study in Iron supplemented rat. Perpustakann.litbang.kemker.go.id/index.php ?p=show_detail&id=35442; SAINS Medika, 5(1), 2013; 17-19, Publisher – Jakarta: FK Univ. Sultan Aging (Unisula) Semarang; 2013.
15. Akilarooran, A.; Devi, R. Gayatri; Jyothipriya, A, Comparative study on hemoglobin levels on amla with honey and dates, Drug Invention

Today . Jun2019, Vol. 11 Issue 6, p1324-1326. 3p. 1 Chart, 1 Graph.

16. Resti Dona Saputri, Andi Nilawati Usman, Yuyun Widaningsih, Nurhaedae Jafar, Mardiana Ahmad, Sri Ramadhani, Andi Dirpan; Date palm (Phoenix Dactylifera) consumption as a nutrition source for mild anemia; Gaceta Sanitaria; Vol 35(2); 5271 - 5274; http://doi.org/10.1016/j.aceta.2021.10.32 ; https://www.sciencedirect.com/science/article/pii/S0213911121002211
17. Mabroom Dates, Farzana, farzana.ac/dates-mabroom# https://www.google.com/search?q=Mabroom+Dates%2C+Farzana%2C+farzana.ac%2Fdatesmabroom%23&rlz=1C1CHBF_enIN1031IN1031&oq=Mabroom+Dates%2C+Farzana%2C+farzana.ac%2Fdatesmabroom%23&aqs=chrome..69i57.2262j0j7&sourceid=chrome&ie=UTF-8
18. 8 BENEFITS OF HONEY AND ITS TRADITIONAL USES; Sadhguru exclusive; isha.sadhguru.org/in/en/blog/article/health-benefits-honey-uses#point1-2
19. Noori s Al-Waili; Effects of daily consumption of honey solution on hematological indices and blood levels of minerals and enzymes in normal individuals; Journal of Medicinal food; 2003 Summer; 6(2): 135 – 40, doi:10.1089/109662003322233549 ; pubmed.ncbi.nlm.nih.gov/12935325/
20. Juraj Majtan, Martin Sojka, Helena Palenikova, Marcela Bucekova, Viktor Majtan; Vitamin C enhances the antibacterial activity of honey against Planktonic and Biofilm- Embedded Bacteria Molecules, 2020, Feb 25(4): 992; doi:10.3390/molecules25040992
21. A, A., Astuti, A., Leli, L., & Saad, R. (2022). Effect of Honey to Levels Hemoglobin and Levels of 8-Hydroxy-2-Deoxyguanosin (8-Ohdg) in Pregnant Women with Anemia. *Journal of Asian Multicultural Research for Medical and Health Science Study*, *3*(3), 25-31. https://doi.org/10.47616/jamrmhss.v3i3.310
22. Dr. N Gayathri Priya, M. malavizhi, Annal Jegajothi, Beetroot juice on hemoglobin among adolescent girls, IOSR Journal of Nursing and Health Science, e-ISSN: 2320-1959, p-ISSN: 2320-1940, Volume 2, Issue I(Sep-Oct, 2013) pp 09-13, www.iosrjournals.org
23. Romadana Hotima, Risza Choirunisa, Retno Widowati, the effect of honey giving to hemoglobin level in pregnant mothers third trimester with anemia at Sumaja Makmur Village Muara Enim Regency in the year of 2022, Multiscience, A multidisciplinary scientific journal, Vol 3; No:2, August 2022, e-ISSN: 2722-2985, Pg: 36-44.
24. Fausia Laili, Weni Tri Purnani, Siti Aminah, The effect of administering honey on the increase of hemoglobin level in Pregnant women with anemia, the second Stroda International Conference on Health, Kediri-East Java, Indonesia, 2020, August 28-29, DOI: 10.30994/sich2.v2i1.10 pg: 49-52
25. Yuhendri Putra, Evi Susanti, Aya Nurdiyan, Effects of Tomato juice and honey on hemoglobin level of pregnant women, advances in Health science research, volume 39, Proceedings of the 2nd Syedz Saintika. International Conference on Nursing, Midwifery, Medical Laboratory Technology, Public Health, and Health Information management (SeSICNiMPH 2021), Atlantic Press.
26. Manjeshwar Shrinath Baliga, Bantwal Raghavendra Vittaldas Baliga, Shaun Mathew Kandathil, Harshith P Bhat, Praveen Kumar Vayalil; A review of the chemistry and pharmacology of the date fruits (Phoenix Dactylifera L); Food Research International; Aug 2011; Vol:4(7), Pg: 1812- 1822.
27. Wanti Aotari, Satini, Veni Hadju, The effect of date Combination syrup (Phoenix Dactylifera) and bee pollen on erythrocyte index and Body Weight of birth Wistar White Rats (Rattus Norvegiccus), European Journal of Molecular and Clinical Medicine, ISSN: 2515-8260, Volume 7, Issue 08, 2020, Pg:4034-4046.
28. Olu Api, Christian Breyman, Mustafa Cetiner, Cansun Demir, Tevfik Ecder; Diagnosis and treatment of iron deficiency anemia during pregnancy and the post partum period. Iron deficiency anemia working group concensus report, Turkish Journal of Obstetrics and Gynaeccology, 2015, Sep 12(3), 173-181; doi:10.4274/tjod01700.
29. Sutapa B Neogi, Nivedita Devasenapathy, Ranjana Singh, Himanshu Bhushan, Duru Shah, Hema Divakar, et al, Safety and effectiveness of intravenous iron sucrose versus standard oral iron therapy in pregnant women with moderate -to - severe anemia in India: a multi centre, open - label, phase 3, randomized controlled trial, December 2019,

Volume 7, Issue 12, E1.706-E1.716, https://doi.org/10.1016/s2214-109X(19)30427-9

30. Hematocrit, Cleveland Clinic, https://my.clevelandclinic.org/health/diagnostics/17683 hematocrit#:~:text=What's%20the%20difference%20between%20a,carry%20oxygen%20throughout%20your%20body .
31. J Eric Russell, Melissa Wilson, Anemia; Low heamoglobin, low hematocrit, low red cell count, Critical Care Medicine, Cancer Therapy Advisor, https://www.cancertherapyadvisor.com/home/decision-support-in-medicine/critical-care-medicine/anemia-low-hemoglobin-low-hematocrit-low-red-cell-count/
32. Risza Choirunissa, Rerno Widowati, Astrid Estiyana Putri, The Effect of dates consumption on increased hb levels in third trimester pregnant women at BPM "E" Serang STRADA Jurnal Ilmiah Kesehatam, May 2021, ISSN: 2252-3847, Vol 10, No.1, 938-942