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***Corresponding author:**
Dr. Kouser Fathima Firdose
Department of Ilmul Qabalat wa Amraze Niswan (OBG), National Institute of Uanani Medicine, Bangalore, Karnataka, India
Email: kouser2fathima@gmail.com

Efficacy of *Qurs Kushtae Faulad* and *Jawarishe Amla* in Iron Deficiency Anemia among Women of Reproductive age

Nagesh CS[1], Wajeeha Begum[2], Kouser Fathima Firdose[3]

1 *PG Scholar,* ***2*** *Reader,* ***3*** *Lecturer; Department of Ilmul Qabalat wa Amraze Niswan (OBG), National Institute of Uanani Medicine, Bangalore, Karnataka, India*

ABSTRACT

Back ground and objective: Anemia is the most widespread nutrient deficiency in the world, most often associated with iron deficiency. The functional consequences of anemia include an increased risk of maternal and perinatal mortality; poor pregnancy outcomes viz. low birth weight and preterm birth. Anemia is a major public health concern globally, especially among women and children. Anemia affects 24.8% of the population, the highest prevalence is among preschool-aged children (47.4%), followed by pregnant women (41.8%) and women of reproductive age. **Methods:** This randomized, single blind, standard controlled study compared efficacy of *qurs kushtae Faulad* and *jawarishe Amla* against cap Fefol on diagnosed subjects of iron deficiency anemia. Test group (n=20) received *jawarishe Amla* 7g with water and *qurs kushtae Faulad* (Hamdard) 2 twice a day for 2 months after meals. Whereas control group received cap Fefol 1 bid after meals for 2 months. The primary outcome measure was improvement in Hb% and PCV. **Results:** Iron deficiency anemia is significantly improved (P <0.001**) after intervention in two groups. There is significant improvement in Hb% with the mean±SD before treatment is 9.68±1.16 and after treatment 11.24±1.51 with p value is <0.001**. The mean±SD of PCV before treatment is 30.36±2.75 and after treatment is 33.92±4.76 with p value of 0.002**, which is more significant clinically and statistically. **Interpretation & Conclusion:** Test drug provide statistically significant improvement in iron deficiency anemia. It can serve an alternative treatment for Iron deficiency anemia. Further research is certified on large sample size.

Keywords: *Glinus oppositifolius*, Radicals, Antioxidants.

INTRODUCTION

Iron Deficiency Anemia (IDA) is one of the commonest nutritional disorders and its public health importance in developing countries is emphasised. It is often seen in adolescents and women of reproductive age.[1] Globally 50% of anemia is attributed to iron deficiency and accounts for approximately 841,000 deaths annually[1]. In India alone 80% of women are iron deficient. IDA is the most prevalent disorder among Indian women in the reproductive age (15 to 45 years) from the lower socio-economic strata. In Bangalore 39% of the women were found to be anemic of which 95% were having iron deficiency.[2] The WHO has suggested that anemia is of "moderate" public health importance where its prevalence is between 20% and 39.9% and "severe" if it occurs in 40% or more of the population. It is recommended that an approach to IDA be especially targeted toward women of reproductive age who risk the attendant consequences of anemia during pregnancy.[3] According to WHO, anemia is categorised as mild if HB% ranges from 11- 11.9g, moderate if HB% ranges from 8-10.9 g and severe if it is less than 8g.[2]

Iron deficiency is primarily due to a lack of bio-available dietary iron or increased requirements such as in childhood and pregnancy. Anemia increases risk for maternal and child mortality and has negative consequences on the cognitive and physical development of children, and on work productivity in adults. Clinical signs of anemia include breathlessness, dizziness, and perceived paleness or change of skin color. Because of its negative consequences, anemia is a priority nutritional problem in most of the developing world[4]. IDA occurs when iron deficiency is sufficiently severe to diminish erythropoiesis and causes the development of anemia. A total of 149 million people in the EMR are iron deficient or anemic according to the WHO criteria. Eighty three million of them are women[5]. Anemia in the classical literature of unani medicine has been described under the heading of *Su'al qinya* (an umbrella term which stands for "lack of vital treasure -blood") and it is literally translated as *Faqr al dam* (anemia), and it is being in use profusely (Anonymous, 2012). According to unani physicians (IbnSina (980-1037 AD), Ismail Jurjani (1041-1136A.D), Ibn Hubal Baghdadi (1117-1213 AD) and Hakim Azam Khan (1813-1902A.D), blood is considered to be the vital fluid of human body which is formed in the liver. Due to derangement of the liver functions and weakness of hepatic faculties or sometimes due to associated diseases, the resultant formation of blood is

not normal for nourishment (*nuqstaghzia*) there by leading to anemia.[6]

The clinical features of IDA appear to have recognized in the earliest times. Avicenna described a disease *Su'al qinya* which is quite similar to iron deficiency anemia, with manifestations like pedal edema, puffiness of face and peri orbital area, pallor, dyspnoea, amenorrhea, inflammation and cracked lips, lethargy etc. In late 1920s and early 1930s, a distinct form of anemia was identified, which corresponds to the iron deficiency anemia as we know today. In *unani* system of medicine, many drug formulations *muffarad*(single) and *murakkab*(compound) are available for the management of *faqr al dam ba sababe qillate faulad* (Iron deficiency anemia).[7]

In view of this it is the need of the present era to evaluate the efficacy of unani drugs in iron deficiency anemia in reproductive aged women. To avoid anemia, nausea and vomiting,[8] there are many unani drugs used to improve the hemoglobin level such as*anjeer, foulad, munaqa, shelgum, amla, gannekaras, yekhni, kushte khubsul hadeed, sharbate anar etc*. Out of which *Faulad* and *Amla* [9,10,11] are selected, which are easily available and cost effective. Considering all these facts it has been decided to conduct a clinical trial to evaluate the efficacy of *Faulad* and *Amla* in the management of Iron deficiency anemia in reproductive age women.

MATERIALS AND METHODS

Study design Randomized single blind Standard controlled study was carried out from Nov 2015 to March 2016 in Dept. of OBG, NIUM Hospital,. Ethical clearance was obtained from the institutional ethical committee vide IEC No. NIUM/IEC/2013-2014/014/ANQ/06 and all participants gave written informed consent prior to study.

Participants Total 67 patients were screened for the study,02 patients denied participation and 25 patients didn't meet the inclusion criteria, hence were excluded. 40 patients were randomly allocated in two equal groups (test and control) by computer generated simple randomization table.

Selection criteria Women of reproductive age between 18-49 years, having mild (9.9-11.9 gm/dl) to moderate (7-9.9 gm/dl) iron deficiency anemia with or without heavy & irregular menses were included in the study and those with severe anemia (Hb% < 7gm/dl) and other types of anemias, patients having systemic and metabolic diseases and pregnant and lactating women were excluded from the study by clinical evaluation and investigations viz. CBP, RBS, peripheral blood smear, ESR..

Study procedure The patients fulfilling the inclusion criteria were enrolled after receiving the informed consent. History was evaluated and a complete physical examination including breast, abdominal examination and per vaginal examination in married women only, was performed. Demographic details, history, clinical features and investigations were recorded in the CRF structured for the study.

Initial assessment and laboratory screening:

Case evaluation:

History was taken thoroughly from those women chosen under test and control groups, and was analyzed in full details regarding age, socio-economic status by Kuppaswamy scale, and detail history includeing diet, literacy, parity, LCB, age of marriage, family income, habitation and religion etc.

Chief complaints like pallor, pedal oedema, early fatigue, glossitis, stomatitis were recorded.

Significant past history was noted especially for menstrual disorders like menorrhagia, metrorrhagia and bleeding disorders like piles, haematuria and about chronic infections and infestations like passing of worms particularly in stools.

Careful family history recorded for tuberculosis, hereditary anemia's apart from diabetes, hypertension, personal history was elicited keeping in view of diet, appetite, addiction etc.

Menstrual history was given importance regarding cycle duration and its flow and amount of flow, apart from LMP and age of menarche.

Obstetrical history regarding gravida, parity, live births and deaths and also married life, last child birth was recorded.

Subjects' physical examination like built, nutrition, weight, oedema, pallor, stomatitis and neck for lymph nodes and thyroid enlargement apart from vitals were recorded.

Assessment of *mizaj* was done according to temperament chart attached with the CRF,

Systemic examination included RS, CVS, and CNS, in addition to abdominal examination for organomegaly etc was carried out.

All above examinations were carried and according to case record proforma prepared for the study.

INVESTIGATIONS

For exclusion: CBP, RBS, peripheral blood smear, ESR.

Pre and post test: HB%, PCV, MCV, MCH, MCHC and RBC Count.

Safety profile: Serum creatinine, blood urea, alkaline phosphatase, SGOT, SGPT

All the study subjects were carefully followed in the OPD and equal attention was given.

Intervention Qurse gulnar(tablet gulnar)1gm contains; Punicagranatum200mg, gum Acacia Arabica 200 mg, Armenian bole 200mg, extract of Acacia Arabica 150 mg, Rosa damascena 150mg, gum Coch lospermumgossypium 100 mg, Qurse gulnar were prepared according to the standard method of preparation. Qurse gulnar (1gm) 2 TDS orally for 4 days during menses in test group and Tranexamic acid (500mg) 2 TDS for first 4 days during menses in control group for2 consecutive cycles.

Jawarishe Amla 7 gm twice a day with water and *qurs kushtae Faulad* (Hamdard) 2 *qurs* morning and evening, up to 2 months in test group after meals. Cap Fefol tablet twice daily after meals in control group up to 2 months was given.

Method of preparation:

- *Jawarishe amla: 62, 73*
- *Amla* 8 *tola*, white sugar 1kg, soak *amla* in milk for one day and one night, washed with water and boil, then filter with cotton cloth, add sugar to same boiled water and make *qewam*. 62, 73

Dose: 7 gm twice a day with water.

Qurs kushtae faulad **(Hamdard) – procured from GMP certifies compnany**

Dose: 2qurs BD

Subjective parameters: pallor, puffiness of face, pedal oedema, glossitis, fatigue

Objective parameters: Hb%, PCV.

Outcome measures: Primary outcome measures: Includes Hb% and PCV, measured at 0 day, 30th day, and 60th day of the study duration.

Secondary outcome measure: Includes knowledge regarding anemia recorded through questionnaire before starting the study.

Statistical Analysis: Descriptive and inferential statistical analysis has been carried out. Results on continuous measurements are presented on Mean±SD and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The Statistical software namely Stata 10.1, MedCalc 9.0.1, Systat 12.0, SAS 9.2, SPSS 15.0 and R environment ver.2.11.1 were used for the analysis of the data.

RESULTS

Table 1: Baseline characteristics in patients with anaemia

Baseline characteristics	Test group No. (%)	Control group No. (%)	P value
Age(years) 18-25 26-33 34-41 42-49	3(15) 11(55) 2(10) 4(20)	2(10) 6(30) 9(45) 3(15)	P=0.417
Marital status Married Unmarried	18(90) 2(10)	17(85) 3(15)	P= 1.000
SES Lower Lower middle Upper lower Upper middle Upper	0(0) 7(35) 0(0) 9(45) 4(20)	1(5) 10(50) 4(20) 5(25) 0(0)	P=0.019
Habitat Rural Urban	4(20) 16(80)	6(30) 14(70)	P=0.465
Diet Mixed Veg	19(95) 1(5)	16(80) 4() 20	P=0001

Test used: fisher exact test.

Table 2: Assessment of pallor in anemia patient

Pallor	BT	T1	AT	% change	Test Used
Test group (n=20)					
Nil	0(0%)	16(80%)	20(100%)	100.0%	
Mild	16(80%)	4(20%)	0(0%)	-80.0%	
Moderate	4(20%)	0(0%)	0(0%)	-20.0%	
Control group (n=20)					Fisher Exact test
Nil	0(0%)	18(90%)	20(100%)	100.0%	
Mild	18(90%)	2(10%)	0(0%)	-90.0%	
Moderate	2(10%)	0(0%)	0(0%)	-10.0%	
P value	0.661	0.661	1.000	-	

Table 3: Assessment puffiness of face in anemia patient

Puffiness of face	BT	T1	AT	% change	Test Used
Test group (n=20)					
Nil	1(5%)	18(90%)	20(100%)	95.0%	
Mild	17(85%)	2(10%)	0(0%)	-85.0%	
Moderate	2(10%)	0(0%)	0(0%)	-10.0%	
Control group (n=20)					Fisher Exact test
Nil	7(35%)	20(100%)	20(100%)	65.0%	
Mild	13(65%)	0(0%)	0(0%)	-65.0%	
Moderate	0(0%)	0(0%)	0(0%)	0.0%	
P value	0.024*	0.487	1.000	-	

Table 4: Assessment of pedal edema in anemia patient

Pedal edema	BT	T1	AT	% change	Test Used
Test group (n=20)					
Nil	4(20%)	19(95%)	20(100%)	80.0%	
Mild	15(75%)	1(5%)	0(0%)	-75.0%	
Moderate	1(5%)	0(0%)	0(0%)	-5.0%	
Control group (n=20)					Fisher Exact test
Nil	10(50%)	20(100%)	20(100%)	50.0%	
Mild	10(50%)	0(0%)	0(0%)	-50.0%	
Moderate	0(0%)	0(0%)	0(0%)	0.0%	
P value	0.096+	1.000	1.000	-	

Table 5: Assessment of Glossitis in anemia patient

Glossitis	BT	T1	AT	% change	Test Used
Test group (n=20)					
Nil	19(95%)	20(100%)	20(100%)	5.0%	
Mild	1(5%)	0(0%)	0(0%)	-5.0%	
Moderate	0(0%)	0(0%)	0(0%)	0.0%	
Control group (n=20)					Fisher Exact test
Nil	20(100%)	20(100%)	20(100%)	0.0%	
Mild	0(0%)	0(0%)	0(0%)	0.0%	
Moderate	0(0%)	0(0%)	0(0%)	0.0%	
P value	1.000	1.000	1.000	-	

Table 6: Assessment of early fatigue in anemia patient

Early fatigue	BT	T1	AT	% change	Test Used
Test group (n=20)					Fisher Exact test
Nil	0(0%)	20(100%)	20(100%)	100.0%	
Mild	20(100%)	0(0%)	0(0%)	-100.0%	
Moderate	0(0%)	0(0%)	0(0%)	0.0%	
Control group (n=20)					
Nil	1(5%)	17(85%)	20(100%)	95.0%	
Mild	17(85%)	3(15%)	0(0%)	-85.0%	
Moderate	2(10%)	0(0%)	0(0%)	-10.0%	
P value	0.231	0.231	1.000	-	

Table 7: Comparison of Haemiglobin Indices in patients with anemia

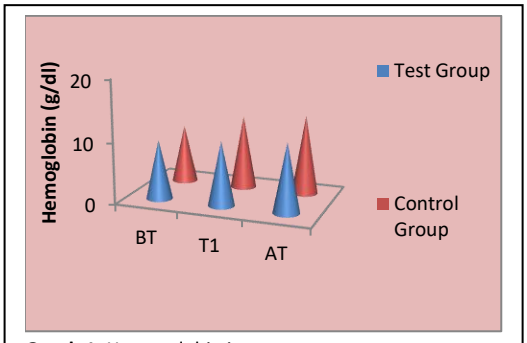
MCH	Test group	Control group	P value
BT	22.12±3.13	23.00±4.76	0.495
AT	24.03±4.08	24.99±4.46	0.482
Difference	1.91	1.99	-
P value	0.070+	0.108	-
MCHC	**Test group**	**Control group**	**P value**
BT	32.02±2.07	31.96±2.60	0.940
AT	33.95±3.35	33.14±4.40	0.517
Difference	1.94	1.18	-
P value	0.035*	0.207	-
MCV	**Test group**	**Control group**	**P value**
BT	67.56±6.62	67.96±12.90	0.901
AT	69.79±6.35	70.49±11.82	0.816
Difference	2.23	2.53	-
P value	0.190	0.137	-
RBC	**Test group**	**Control group**	**P value**
BT	4.37±0.56	4.01±0.84	0.112
AT	4.55±0.43	4.64±0.52	0.579
Difference	0.18	0.63	-
P value	0.193	<0.001**	-

Between Group: Student t test (un-paired) **Within group**: Student t test (paired)

Table 8: Comparison of hemoglobin values in anemia patients

Hemoglobin	Test group	Control group	P value
BT	9.68±1.16	9.57±1.05	0.766
T1	10.47±1.30	12.03±3.23	0.052+
AT	11.24±1.51	12.98±3.28	0.037*
Difference @AT	1.55	3.41	-
P value @ AT	<0.001**	0.001**	-

Between Group: Student t test (un-paired)
Within group: Student t test (paired)

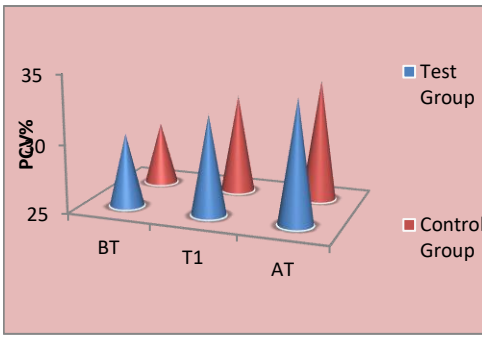


Graph 1: Haemoglobin in two groups

Table 9: Comparison of PCV values in anemia patients

PCV	Test group	Control group	P value
BT	30.36±2.75	29.68±3.29	0.479
T1	32.26±4.32	32.30±3.68	0.977
AT	33.92±4.76	33.89±4.01	0.985
Difference @AT	3.559	4.22	-
P value @ AT	0.002**	<0.001**	-

Between Group: Student t test (un-paired)
Within group: Student t test (paired)



Graph 2: PCV% in both groups

Table 10: Therapeutic Outcome measures

Primary Outcome measures	Test group		P value
	BT	AT	Inter gr
Hb%	9.68±1.16	11.24±1.51	<0.001**
PCV	30.36±2.75	33.92±4.76	0.002**

Table 11: Secondary outcome measure in anemia studied in both the groups

S. No.	Structure knowledge questionier	Test group n=20	Control group n=20
1	Inadequate(< 27)	16(80%)	19(95%)
2	Moderately adequate (27-36)	3(15%)	1(5%)
3	Adequate (>36)	1(5%)	0(0%)
Mean ±SD		22.6 ± 7.09	20.7±4.90
P value		>0.10	0.0027

Table 12: Comparative evaluation of safety Profile in two groups of patients

Investigations	BT	AT	*P* value
SGOT			
Test group	16.40±5.95	16.05±4.10	0.778
Control group	20.30±7.83	19.50±8.81	0.729
SGPT			
Test group	19.90±6.84	16.69±6.63	0.034*
Control group	21.70±9.21	20.80±8.15	0.682
Alkaline phosphatase			
Test group	100.70±18.38	108.90±21.70	0.148
Control group	102.20±24.61	102.45±25.83	0.559
Blood urea			
Test group	23.90±5.18	20.69±5.22	0.003**
Control group	24.75±4.17	20.80±4.24	0.001**
Serum creatinine			
Test group	0.78±0.11	0.55±0.22	0.003**
Control group	0.70±0.07	0.58±0.11	<0.001**

Test used: Student t test (un-paired)

DISCUSSION

Unani system of medicine is bestowed with a cache of herbal and mineral origin medicinal wealth. A number of drugs have been mentioned in *unani* authentic literature to treat IDA. Hence, it was decided to conduct a trial to see the efficacy and safety of *jawarishe amla* and *qurs kushtae faulad* in management of IDA.

Anemic women of reproductive age between 18-49 years were enrolled by clinical assessment and confirming the same by lab investigations. A total of 67 participants were found eligible, of which 25 were not fulfilling the inclusion criteria and 2 refused to participate. 40 participants were randomly allocated to test (n=20) and control (n=20) group. Cap Fefol was used as standard control.

The observations from the trail have been depicted in tables and graphs in order to draw inferences and to arrive at conclusion.

No significant difference observed between the groups concerning baseline characteristics with p=>0.05 (**Table.01**)

Age: The Mean±SD of age of the participants included in the study were 32.05±7.52 in test group and 33.95±7.10 in control group ranging from 18- 49 years. Maximum number of participants belongs to age group of 26-33(42.5%) years followed by 34-41(27.5%) years, 42-49(17.5%) years and lowest incidence was found among age group 18-25(12.5%) years. Our study is consistent with study conducted by Patel *et. al.* who have reported highest incidence of IDA in age group 26-33(40%) years followed by 33-43(27%) years and lowest incidence in age group 43-50 years.[32] The risk for iron deficiency is due to iron loss, low iron intake, decreased iron absorption and physiological demand in women of reproductive age.[12]

Marital status: The present study shows that out of 40, 36(87.5%) women were married and 4(12.5%) were unmarried. Jamel *et. al.* who have reported in their study found that highest incidence of IDA in married women (82.2%), and lower incidence in unmarried women (17.8%).[4]

Socioeconomic status: In present study 17(42.5 %) participants belongs to lower middle, followed by 14(35%) participants in upper middle and 4(20%) participants each belongs to upper and upper lower class and I (2.5%) belonged to lower class. Our study is consistent with studies conducted by Shabir *et. al.* and Mamta *et. al.*

Habitat: In the present study majority of the participants 30 (75%) belonged to urban area and 10(25%) were from rural sector. Our study is contradictory with studies conducted by Johran *et. al.* who have reported in their study that IDA is more in rural (83.5%) compare to urban (16.5%); Jamel *et. al.* who have reported that (80%) women belongs to rural area. Remaining (20%) were in urban area. This might be because the hospital is situated in metropolitan city, Bengaluru and maximum participants visiting to our hospital are from surrounding areas.

Diet: In this study 84.5% of participants were non vegetarian (mixed diet) and 15.5% were vegetarian.

Assessment of chief complaints

Pallor (Table 02): In the present study, test group out of 20 participants, 16(80%) had mild pallor, 4(20%) had moderate pallor. In first follow up 16(80%) participants improved and 4(20%) had moderate pallor, after treatment there was improvement in all the participants. In control group out of 20 participants, 18(90%), had mild pallor and 2(20%) had moderate pallor. In first follow up 18(90%) participants improved, and 2(10%) with moderate pallor, after treatment all participants showed improvement.

Akhtar *et. al.* have reported in their study that after treatment pallor was reduced by only 65% with their drug .[7] It shows our drug is more effective than that drug.

Puffiness of face (Table 03): In the present study, in test group out of 20 participants 17 (85%) were having mild and remaining 2 (10%) were with moderate POF, 1(5%) with no POF. In first follow up 18(90%), participants were improved, 2(10%) with mild and after treatment there was an improvement in all the participants. In control group out of 20 participants, 13(65%) were with mild POF, 7(35%) were with no pallor. In first follow up all 20 participants improved.

Akhtar *et. al.* it was found in their study that POF was reduced by 68% with their drug.[7]

Pedal edema (Table 04): In the present study, in test group out of 20 participants, 1(5%) had moderate pedal edema, 15(75%) had mild pedal edema 4(20%) were with no pedal edema. In first follow up 19(95%), participants were improved, 1 had mild, and after treatment there was an improvement in all the participants. In control group out of 20 participants, 10(50%) had mild pedal edema, 10(50%) were no pedal edema. In first follow up all the participants got improved. Akhtar *et. al.* too found complete resolution of pedal oedema after treatment.[7]

Glossitis (Table 05): In the present study, in test group out of 20 participants 1(5%) had moderate glossitis, 19(95%) had no glossitis and 1(5%) with mild glossitis, in first follow up all 20 participants were improved (100%). In control group there was no glossitis patients

Akhtar *et. al.* have reported in their study that all patient with glossitis were completely reduced with their drug after treatment. [7]

Early fatigue (Table 06): In the present study, in test group all 20, participants had mild early fatigue, and in first follow up all 20(100%) participants were improved. In control group out of 20 participants 2(10%) were having moderate early fatigue, 17(85%) were with mild fatigue, and 1(5%) with no early fatigue. In first follow up 17(85%) participants had improved. 3(15%) were with mild early fatigue, after treatment all participants got improved. Our study is consistent with study conducted by Akhtar *et. al.* It was found in their study all participantswere with early fatigue (100%). After treatment early fatigue was completely reduced in (87%) with their drug. [7]

MCH (Table 07): In the present study the Mean±SD of MCH in test group before treatment is 22.12±3.13 and after treatment was 24.03±4.08 with a P value of 0.070. In control group the Mean±SD of MCH before treatment is 23.00±4.76 and after treatment was 24.99±4.46, with a P value of 0.108. In Inter group before treatment P =0.495, after treatment is P= 0.482. Inter group comparison of test drug and control drug is statistically non significant indicating that test drug is as efficacious as control drug in the management of IDA. Our study is consistent with study conducted by Erhabor *et. al.* Who have reported in their study the Mean±SD of MCH in test is 25.4±3.6, and control is 27.8±3.4.[13]

MCHC (Table 07): In the present study the Mean±SD of MCHC in test group before treatment was 32.02±2.07 and after treatment was 33.95±3.35 with a P value 0.035*. In control group the Mean±SD of MCH before treatment was 31.96±2.60 and after treatment is 33.14±4.40 with a P value of 0.20. Inter group p value before treatment is 0.940, after treatment is 0.517. Inter group comparison of test drug and control drug is not statistically significant indicating that test drug is as efficacious as control drug in the management of IDA. Our study is consistent with study conducted by Erhabor *et. al.* who have reported in their study the Mean±SD of MCHC in test was 31.9±1.6 and 32.9±2.0 in control group.[13]

MCV (Table 07): In the present study the Mean±SD of MCV in test group before treatment is 67.56±6.62 and after treatment is 69.79±6.35 with a P value of 0.190. In control group the Mean±SD of MCH before treatment is 67.96±12.90 and after treatment is 70.49±11.82, with a P value of 0.13. In inter group, P value before treatment is 0.901 and after treatment it is 0.816. The results are clinically significant where as statistically non significant, indicating that test drug is as efficacious as control drug in the management of IDA.

Red blood cells (Table. 07): The Mean±SD value of RBCs in the present study, in test group before treatment is 4.37±0.56 and after treatment 4.55±0.43 with P=0.193 and in control group Mean±SD before treatment 4.01±0.84 and after treatment 4.64±0.52, with P= <0.001**. Inter group before treatment P= 0.112 and after treatment P= 0.579. Clinically the results are significant in both the groups where as statistically it is more significant in control group. Our study is consistent with study conducted by Sungnan *et.al.* it has been reported in their study that the Mean±SD of RBCs in test 4.42±0.28 and in control group 4.21±0.59 after treatment.[14] these results are similar to our study.

Primary outcome

Hemoglobin (Table 08): All the participants in test and control group got improvement in Hb%. The Mean±SD of Hb% before treatment in test group is 9.68±1.16 and after treatment it is 11.24±1.51 with P <0.001**. In control group the Mean±SD of Hb% before treatment was 9.57±1.05 and after treatment it is 12.98±3.28 with a P value 0.001**, which is more significant statistically and clinically indicating that test drug is as effective as control drug in the management of IDA. Inter group P value before treatment is 0.766 and after treatment is 0.037*. Our study is consistent with study conducted by Akhtar *et. al.* who have reported in their study that the Mean±SD of Hb% before treatment in test group 06.48±1.214 and after treatment is 08.72±1.207, with their test drug. [7] in this study along with *qurs kushtae Foulad*, *jawarishe Amla* had shown very good improvement in Hb% compare with the study carried with the drug *majoon khubsul hadeed*.[7]

PCV (Table 09): The Mean±SD of PCV before treatment in test group is 30.36±2.75 and after treatment 33.92±4.76 with a P value of 0.002**. In control group Mean±SD of PCV, before treatment is 29.68±3.29 and after treatment is 33.89±4.01 with p < 0.001**, which is more significant statistically and clinically indicating that test drug is as effective as control drug in the management of IDA. Our study is consistent with studies conducted by Sungnan *et.al* [14]. who have reported in their study the Mean±SD of haematocrit (PCV) in test group 29.2±5.5, and in control group 38.8±4.3Akhtar *et. al.* who have reported in their study that the Mean±SD of PCV before treatment in test group 23.70±3.299 and after treatment is 28.35±2.992, with their test drug. [7]

Secondary out come

Structured knowledge questionnaire (Table 11): In the present study it has been observed that, in test group out of 20 participants 15(75%) had inadequate knowledge, 4(20%) were with moderately adequate knowledge and 1(5%) patient had adequate knowledge of anemia. In control group out of 20 participants 18(90%) participants had inadequate knowledge and 2(10%) had moderately adequate knowledge of anemia.

In this study the effect of test drug is more appreciable than the standard drug. The parameters considered to see the efficacy of *qurs kushtae Faulad* is appreciably responded as like with standard drug.

Safety profile (Table 12): The biochemical parameters were comparable and statistically not significant in both groups. Except SGOT and alkaline phosphatase which were statistically significant but laboratory values were within normal range. However no side effects were reported.

Future recommendations: It needs more studies on large sample size with longer duration. Lot of awareness concerned with anemia and diet to the public is very much needed.

DISCUSSION

Free radicals and other reactive oxygen species play a important role for causing diseases such as asthma, diabetes mellitus, hypertension, inflammation, myocardial damage, cardiac arrhythmias and aging.[2,10,11] In the present study, four *in vitro* antioxidant assays were performed and *G. oppositifolius* methanolic extract had shown potent antioxidant activity (Table 1). Antioxidants, by providing a hydrogen atom or by donation of electrons, can quench DPPH· free radicals and convert them to a colorless bleached product resulting in a reduction in absorbance.[12] $ABTS^{\cdot+}$ is a stable radical that not found in the human body. In this assay, a blue/green $ABTS^{\cdot+}$chromophore is generated by the oxidation of ABTS with potassium persulfate. Presence of hydrogen donating antioxidants, the blue/green color of $ABTS^{\cdot+}$ is reduced. This can be measured by spectrophotometrically at 745 nm.[13] $DPPH^{\cdot}$ assay determines only the hydrophilic antioxidants whereas $ABTS^{\cdot+}$ assay measures both hydrophilic and lipophilic antioxidants.[7] In the present study, *G. oppositifolius* methanolic extract showed better radical scavenging activity against $ABTS^{\cdot+}$ than that of $DPPH^{\cdot}$. This indicates in addition to hydrophilic antioxidants, lipophilic antioxidants also play a major role in scavenging free radicals. In a previous study, Sri Lankan grown *G. oppositifolius* has shown to contain high amounts of proteins and vitamins.[14]

Table 1: Anti-oxidant activity of *Glinus oppositifolius* methanolic extract

Antioxidant assays	Results
DPPH assay	12.50 ± 0.68 mg Trolox equivalents/g of extract
ABTS assay	54.85 ± 0.48 mg Trolox equivalents/g of extract
Total flavonoid content	185.20 ± 0.80 mg quercetin equivalents/g of extract
Total phenol content	210.36 ± 0.45 mg gallic equivalents/g of extract

In conclusion, *G. oppositifolius* can be recommended as a useful green leafy vegetable and can get many health benefits by including in diet.

Conflict of interest- None declared

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