STUDY OF SERUM IRON,TIBC & SERUM FERRITIN LEVELS IN RURAL WOMEN SUFFERING FROM IRON DEFICIENCY ANEMIA

Ms.Shaik.Haseena, Dr.Zahida Nasreen, Dr.Mohammed Siddique Ahmed Khan, Dr.N.V.S Choudhary, Dr. Ghouse M. Ali.

ABSTRACT- Iron deficiency is the most common nutritional disorder in the world .It affects particularly women of reproductive age and constitutes a major health issue in many developing countries. The aim of the present study is to investigate the levels of Haemoglobin, serum iron, TIBC, serum ferritin in women of reproductive age group suffering from iron deficiency anaemia. There is significant difference in serum iron values among cases & controls with mean serum iron value of 18.6326± 6.05080 in cases & 69.0408±23.5248 in controls. There is significant difference in Hb values among cases & controls, with mean Hb value of 11.6184±0.9064, among controls & 6.544±1.5992 in cases. There is significant difference in TIBC values among cases & controls, with mean TIBC value of 447.245+31.3166 among cases & 340.7347 + 30.4451 in controls. There is significant difference in serum ferritin values among cases & controls, with mean serum ferritin value of 13.6747±38.2765 among cases & 61.4241 ± 56.4806 among controls. The normal physiologic iron losses among menstruating women make it inevitable for many women to develop anaemia if they do not receive supplemental iron. In developing countries, anaemia is often aggravated by repeated & and closely spaced pregnancies as well as by intestinal parasites. Well documented consequences of anaemia include diminished learning ability, reduced work capacity increase morbidity from infections and greater risk of death associated with pregnancy &child birth.Serum ferritin is the index of total body iron stores, whose levels predicts the events of iron deficiency anaemia & other infections .Serum ferritin level is decreased in iron deficiency anaemia where as it remains in normal range in some infections & sometimes it may be highly increased in the cases of chronic inflammatory disorders, infections, neoplastic disease & in chronic renal failure, there is a disproportionate increase in serum ferritin levels in relation to iron stores. TIBC is increased in(>420µg/dl) in iron deficiency but these values may fluctuate in a number of common clinical conditions and hence are less reliable indicators of iron stores than the serum ferritin. Serum iron is usually low (<50µg/dl). This in combination with serum ferritin, gives appropriate results of iron deficiency anaemia than single.

Key Words:TIBC- Total iron binding capacity.

•••••

1 INTRODUCTION

Iron deficiency anaemia is a most common disorder which occurs mostly in women of pre-menopausal age. It occurs mostly in women of rural areas who are suffering from poverty. Most of them are suffering from malnutrition, which is a primary cause of development of iron deficiency anaemia. The secondary cause of iron deficiency anaemia is excess blood loss during menstrual cycle. Most of the women in rural areas are working as farmers, factory workers, tailors, their earning is low and the family members are more so they depend on cheaper foods which are of less nutritive value.

Iron is essential to life to serve as both electron donor and electron acceptor. Iron deficiency anaemia is one of the most wide spread diseases all over the world.

In India 5-6% of general population suffers from this disease. It is prevalent in 3% among men & 10-14% among women.In specific groups like slum dwellers, plantation labourers& pregnant women the prevalence rate is 30-50% or even more.

A low serum iron & ferritin with an elevated TIBC are diagnostic of iron deficiency. While a low serum ferritin is virtually diagnostic of iron deficiency, a normal serum ferritin can be seen in patients who are deficient in iron & have co existent diseases (Hepatitis, anaemia of chronic disorders).The test findings are useful in distinguishing iron deficiency from other microcytic anaemia's.

1. Shaik.Haseena ,Tutor, Department of Biochemistry, DR.V.R.K. Women's Medical College, Teaching Hospital &Research Centre, Aziz Nagar, R.R District ,Hyderabad-500075,AP,India.

2.Dr.ZahidaNasreen,Professor, Department of Biochemistry, DR. V.R.K. Women's Medical College ,Teaching Hospital &Research Centre, Aziz Nagar,R.R District,Hyderabad-500075,AP,India.

3. Dr.MohammedSiddique Ahmed Khan ,Associate Professor, Department of Biochemistry,Shadan Institute Of Medical Sciences, Teaching Hospital & Research Centre,Hyderabad-500075,AP,India

4.Dr.NVSChoudhary, Head of the department, Department of Biochemistry, Principal, NRI Medical college &General Hospital,Guntur District,AP,India.

5. Dr. Ghouse M. Ali, Professor Emeritus, Department of Biochemistry, Dr. V.R.K. Women's Medical College,

Teaching Hospital &Research Centre, Aziz Nagar,R.R District,Hyderabad-500075,AP,India.

2 AIMS AND OBJECTIVES

a. To assess the cause of iron deficiency anaemia in reproductive age group women of rural areas.

b. To determine the Haemoglobin levels of blood & also to determine the changes of serum iron, TIBC, serum Ferritin in reproductive age group women of rural areas who are suffering from iron deficiency anaemia.

3 MATERIALS AND METHODS

The study was a hospital based study conducted at NRI Medical College& General Hospital Guntur District,AndhraPradesh

A case control type study was done on patients who attended the out patient departments in this hospital.

3.1 SOURCES OF DATA

a. INCLUSION CRITERIA

1) 50 women of rural areas & are of age group 15-45 years who are suffering from iron deficiency anaemia (microcytic hypochromic) with Hb<10 gms are selected for this study.as cases.

2) 50 women of same age who are not suffering from iron deficiency anaemia (Hb>10gm%) are selected as controls for this study.

3) Only rural areas women of reproductive age are selected for this study because of prevalence of iron deficiency anaemia is more in them when compared to urban population.

b. EXCLUSION CRITERIA

1) Women who are suffering from liver diseases & pregnant women are excluded from this study.

3.2 SPECIMEN COLLECTION:

Blood samples were collected from cases & controls & the samples are centrifuged for the estimation of serum iron, TIBC, ferritin levels.

3.3 HAEMOGLOBIN DETERMINATION

Haemoglobin is determined by Aperture Impedence method.

Principle: The number of pulsar is eqvivalent to the no. of cells passing through the orifice during the period

3.4 DETERMINATION OF SERUM IRON

PHOTOMETRIC COLORIMETRIC TEST FOR IRON WITH LIPID CLEARING FACTOR (LCF) BY CHROMOAZURAL B (CAB) METHOD

AIM: To determine the amount of iron present in the serum by chromoazural b method.

PRINCIPLE: Iron III reacts with chromoazural b (CAB) &cetyltrimethyl ammonium bromide (CTMA) to form a coloured ternary complex with an absorbance maximum at 623 nm. The intensity of the colour produced is directly proportional to the concentration of iron in the sample.

The test can also be used in combination with the TIBC kit (ref 10670)

CONTENTS:

TABLE-1

RGT	2 X 30mlor 2 x 100ml CAB reagent
CAB	0.18mmol/1
СТМА	2.2 mmol/l
GUANIDIU M BROMIDE	2.6mmol/l
Sodium acetate buffer	45mmol/l
STD	5ml standard 100µg/dl
Iron(ionized0	17.9μmol/l



REAGENT STABILITY:

RGT is stable even after opening up to the stated expiry date when stored at $2...25^{\circ}c$

Contamination of the reagents is absolutely avoided.

SPECIMEN:

Serum or heparinisedplasma.

Do not use EDTA plasma, CITRATE plasma or haemolytic sera.

NOTE:

Lipemic specimens usually generate turbidity of the sample reagent mixture which leads to false high results.

ASSAY: Wavelength: 623nm, Hg 623nm.

Optical path: 1 cm

Temperature: 20-25°c

Measurement: Against reagent blank (Rb).

Only one reagent blank per series is required.

PIPETTING SCHEME:

TABLE-2

PIPETTE INTO CUVETTES	Reagent blank	Sample/STD				
Sample/STD		50µl				
Distilled water	50µ1					
RGT	1000µL	1000µ1				
Mix well, incubate for 15 min at 20° c 25° c.Measure the absorbance of the sample (ΔA sample)and the standard (ΔA std) against the reagent blank within 60 min.						

CALCULATION OF THE IRON CONCENTRATION WITH STANDARD:

If a different wavelength (620nm-640nm) is to be used for measurement the standard provided with the kit has to be employed for the calculation.

		_		
С	=	10 x	ΔA STD	μg/dl.

ΔA sample

$\Delta A STD$	μ mol/l
----------------	---------

This test is linear up to an iron concentration of $500\mu g/dl$ or $89.5\mu mol/l$.

REFERENCE VALUES:

17.9 X

С

=

MALE:	59-148	µg/dl	or	10.6-28.3µ mol/l.
FEMALE:	37-145	µg/dl	or	6.6µ mol/l.
STANDAR	RDIZAT	TION:		

Standard provided in the kit is used.

Standard 1:1 dilution = STD50ml + water 50 ml \rightarrow 50µl =25µg.

3.5 TOTAL IRON BINDING CAPACITY

AIM: To determine the Total iron binding capacity.

PRINCIPLE: The iron binding protein transferrin in serum is saturated upon treatment with excess of FE(III)ions. Unbound (excess) iron is adsorbed onto aluminium oxide and precipitated .The transferrin bound iron (TIBC) in the supernatant is then determined.

CONTENTS:

TABLE-3

FE	1 X 100 ml iron solution
Iron III-CHLORIDE	0.09mmol/l



Measuring spoon for aluminium oxide is used

PROCEDURE:

Pipette into reaction tube

Fe

Sample

0.5ml

1.0ml

mix well after 3-5 min add one level measuring spoonful of aluminium oxide ALOX (approximately 0.25-.35g).Cap and place on a rotator or roller mixer for 10min.

Remove tubes and allow standing for 3min upright or centrifuge for 1 min at 5,000rpm.

CALCULATION OF IRON CONCENTRATION:

 $C = 100 X \Delta A \text{ sample} \mu g/dl$

 $\Delta A STD$

 $C = 17.9 X \Delta A$ sample

 $\Delta A STD \mu mol/l$

CALCULATION FOR TIBC:

To calculate the TIBC multiply the result of the iron determination in the supernatant by the diluent factor 3.

TIBC = C (IRON) X 3.

REFERENCE VALUES:

TIBC: 274-385µg/dl.

3.6 DETERMINATION OF SERUM FERRITIN BY MEIA METHOD:

AIM: To determine serum ferritin by Ax SYM micro particle enzymes (MEIA) assay technology.

BIOLOGICAL PRINCIPLES OF THE PROCEDURE:

AxSYM Ferritin is based on micro particle enzyme (MEIA) technology.

Sample and all AxSYM Ferritin reagents required for one test are pipetted in the following sequence.

SAMPLE CENTRE:

Sample and all AXSYM Ferritin reagents required for one test are pipetted by the sampling probe into various wells of a reaction vessel (RV).

Sample is pipetted into one well of the RV.

Anti-Ferritin coated micro particles, Anti ferritin Alkaline phosphatase conjugate, specimen diluent and tris buffer are pipetted into another well of RV.

The RV is immediately transferred into the processing centre.

Further pipetting is done in the processing centre with the processing probe.

PROCESSING CENTRE:

A n aliquot of the specimen diluent, conjugate, micro particles &Tris buffer mixture is pipetted and mixed with the sample .The ferritin enzyme labelled antibody and micro particles bind forming an antibody –antigen-antibody complex.

Complex bound to the micro particles is transferred to the matrix cell. The matrix cell is washed to remove unbound materials.

The substrate,4-methyl umbelliferyl phosphate ,is added to the matrix cell and the fluorescent product is measured by the MEIA optical assembly.

4. RESULTS

The present study was carried out to determine the levels of blood Haemoglobin, levels of serum iron, TIBC, serum Ferritin in reproductive age group women of rural areas suffering from iron deficiency anaemia, and to assess the causes of iron deficiency anaemia.

The Haemoglobin values of the cases and controls are taken to confirm anaemia.

The investigations performed in this study include theserum ferritin levels, serum iron & total iron binding capacity&Hb levels.

The Hb levels among cases controls are 6.544 ± 1.5992 , 11.6184 ± 0.9064 &Hb levels are decreased in cases & remains within normal range in controls. The difference is statistically significant (p<0.0001).

The serum iron levels among cases & controls are 18.6326 + 6.05080 & 69.0408 + 23.5248 serum iron is decreased in cases

& remains within normal in controls. The difference is highly significant (p < 0.0001).

The TIBC values among cases & controls are 447.245 + 31.3166 among cases & 340.7347 + 30.4451 in controls, TIBC levels are increased in cases and remains within normal range in controls. This difference is highly significant (p<0.0001).

The serum Ferritin levels among cases & controls are 13.6747 + 38.2765 & 61.4241 + 56.4806 serum Ferritin levels are decreased in cases & remains within normal range in controls .This difference is highly significant(p<0.0001).

Nearly 46% of the women in this study are suffering from iron deficiency anaemia due to blood loss during menstruation.

Nearly 18% of the women are suffering from iron deficiency anaemia due to malnutrition caused by poor socio economic conditions.

20% of the women are suffering from iron deficiency anaemia due to blood loss during menstruation & due to malnutrition.

The age group of women who were severely affected by iron deficiency anaemia in this study were of age group 30-45 years.

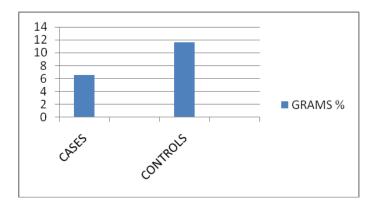
Thus the present study suggests that serum iron, serum ferritin, levels are decreased &TIBC level is elevated in iron deficiency anaemia. Blood losses during menstruation, malnutrition, due to poverty are predicted as the cause for prevalence of iron deficiency anaemia.

Thus the present study reveals that women of rural areas should be screened at the reproductive age of 30-45yrs & should be treated.

4.1 HAEMOGLOBIN: Two sample t-test t = -19.23 p<0.0001 df = 75 TABLE -1 HAEMOGLOBIN LEVELS (GMS%) IN CASES & CONTROLS

HB	CASES	CONTROLS
	n= 49	n=49
MINIMUM	2.2	10
MAXIMUM	9.4	13.3
MEAN	6.544	11.6184
S.D	1.5992	0.9064
SIGNIFICANCE	/Z/ = 706>	1.96, df=96,
	P=0.05	

HAEMOGLOBIN LEVELS (MEAN±SD) IN CASES & CONTROLS



There is significant difference in Hb values among cases & controls, with mean Hb value of 11.6184 ± 0.9064 , among controls & 6.544 ± 1.5992 in cases.

4.2 SERUM IRON

Two sample t-test

t = -14.53 p < 0.0001 df = 54

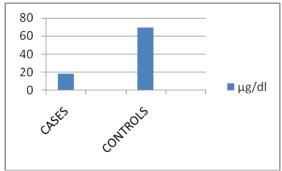
TABLE-2

Serum Iron level (µg/dl) in controls & cases

SERUM IRON	CASES n=49	CONTROLS n = 49	
MINIMUM	13	38	
MAXIMUM	25 138		
MEAN	18.6326 69.0408		
S.D	6.05080 23.5248		
SIGNIFICANCE	/z/ = 6.7186>1.96,df = 96,p = 0.05		

Serum Iron Levels (Mean+SD) in controls & cases

IJSER © 2014 http://www.ijser.org



There is significant difference in serum iron values among cases & controls with mean serum iron value of 18.6326+ 6.05080 in cases & 69.0408+23.5248 in controls.

4.3 TIBC:

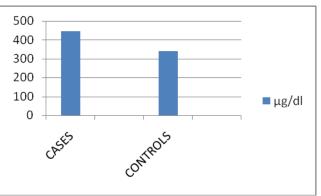
Two sample t-test

P=17.07, p < 0.0001 df = 95

TABLE-3

Serum TIBC LEVELS (µg/dl) in controls & cases

TIBC	CASES n = 49	CONTROLS n = 49
MINIM UM	413	300
MAXIM UM	525	375
MEAN	447.245	340.7347
S.D	31.3166	30.4451
SIGNIFI CANCE	/z/= 6.7186>1.96,c	df = 96, p= 0.05



There is significant difference in TIBC values among cases & controls, with mean TIBC value of 447.245+31.3166 among cases & 340.7347 + 30.4451 in controls.

4.4 SERUM FERRITIN:

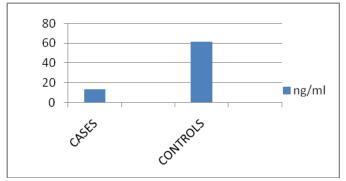
Two sample t-test $t = -4.90 \text{ p} \le 0.0001 \text{ df} = 84$

TABLE-4

Serum Ferritin levels (ng/ml) in cases & controls

SERUM	CASES	CONTROLS			
FERRITIN	n = 49	n = 49			
MINIMUM	0.41	6			
MAXIMUM	245.97	217.74			
MEAN	13.6747	61.4241			
S.D	38.2765	56.4806			
SIGNIFICANCE	E /z/=6.7186>1.96,df=96,p=0.05				

There is significant difference in serum ferritin values among cases & controls, with mean serum ferritin value of 13.6747+38.2765 among cases &61.4241 + 56.4806 among controls.



5.DISCUSSION

In the present study the main focus is to determine the levels of Haemoglobin, serum iron, TIBC& serum ferritin in reproductive age women who are suffering from iron deficiency anaemia.

The Haemoglobin Values are less than 10gm% then they are considered as anaemic and then iron ,ferritin & TIBC levels are estimated .

A low serum iron and ferritin with an elevated TIBC are diagnostic of iron deficiency. While a low serum ferritin is virtually diagnostic of iron deficiency, a normal serum ferritin can be seen in patients who are deficient in iron and have co existent diseases (Hepatitis, anaemia of chronic disorders).

These test findings are useful in distinguishing iron deficiency anaemia from other microcytic anaemia's.Anaemia is estimated to effect 2000 million people mostly in the developing countries. Whatever the underlying cause may be, poor socio economic conditions, lack of health education, & in adequate health facilities in rural areas of the developing countries further aggravate the severity of the problem.

Most of the earlier research on anaemia in different parts of the world was mainly focussed upon young children & women of childbearing age.

The red cell indices like Hb,the levels are significantly

decreased shown in a study conducted by Anne M Kis, MD&Molly Carnes, MD^1 .

By conducting this study effort was made to address this problem in reproductive age women of rural areas. This study reveals that anaemia is more severe in age group 30-35 years. Researchers like, Hameed. A, Simon. J et.al had almost similar observations as the findings in this study².

In a study done by Buchanan JG, Nixon AD, et.al³, showed that the serum ferritin values of less than 10 μ g /L. The high

prevalence of iron deficiency appears to be due to malnutrition.

In a study done byAnne MKis, MD &Molly Carnes,MD⁴. Showed serum Ferritin level of $\leq 100 \mu g/L$.

In a studyconducted byRodriquez. Blanco. A Cunningham, et.al showed,that haemoglobin concentration was low, serum iron concentration is also decreased, ferritin (<12ng/dl)and folate (<6ng/dl).Their conclusion was iron deficiency in women of reproductive age was the main cause of anaemia followed by folate deficiency. In the present study also,iron level was decreased, ferritin level was also decreased⁵.

In an article by Irene Alton⁶ the findings were as follows serum ferritin is decreased i.e. $<\!\!15\mu g/l.Iniron$ deficiency anaemia.

In the present study TIBC levels are elevated ^{7,8} in cases of iron deficiency when compared with controls with significant values of with mean \pm S.D TIBC value of 447.245 \pm 31.3166 among cases & 340.7347 \pm 30.4451 in controls (p<0.0001)

Serum iron is decreased^{9,10,11} with insufficient dietary iron, chronic blood loss, & inadequate absorption of iron & impaired release of iron stores as in inflammation, infection & chronic diseases. The combination of low iron, high TIBC indicates iron deficiency. Without all of these findings together, iron deficiency is unproven. Low ferritin supports the diagnosis of iron deficiency, reported by Finch CA & Huber's H^{12} .

In the present study the prevalence of iron deficiency anaemia in reproductive age women of rural areas is high; the causes are observed by going through their case history, are malnutrition, due to poor socio economic status, and menstrual blood loss.

Present study is supported by a study done by Assami. M, S.Galan, on assessment of nutritional status of Algerian women¹³, the study states that iron deficiency anaemia is occurring in 32% rural women ,19% semirural women ferritin levels were also low .Researchers like Vicki. L. Cleaver¹⁴ et.al in their studies stated that the causes for iron deficiency anaemia in reproductive age women of rural areas are due to parasitic infections, poor eating habits, due to poor socioeconomic status, GIT infections and menstrual blood loss.

In a study conducted by Teresa Shamah¹⁵- Levy,M.Sc, the results on the prevalence & distribution of anaemia among women of childbearing age (12-49yrs)participating in the 1999 National Nutrition Survey (NNS-1999).The results were ,the

overall prevalence of anaemia was 27.8% in pregnant women & 20.8% in non – pregnant women. Higher prevalence's were observed in rural areas women and they concluded that anaemia in women of child bearing age is a growing public health problem.

In a study done by Anshu Sharma, et.al¹⁶ .To obtain baseline data on haemoglobin (Hb) levels of adolescent girls belonging to the low-socio-economic groups. Results were 61.9% of the subjects in the urban and 85.4% in the rural area were anaemic. In adolescent girls of poor communities.In developing countries like India. These results were consistent with the present study.

In a study conducted by Rodrequez .s Blanco.ACunningham,et.al.showed ,that Haemoglobin concentration was low ,serum iron is decreased, serum ferritin decreased⁵ (<12ng/dl),&folate(<6ng/dl).Their conclusion was iron deficiency anaemia in women of reproductive age was the main cause of anaemia followed by folate deficiency.

Thus the above findings for the causes of iron deficiency anaemia in these women are due to nutritional disorders and particularly women of reproductive age and constitute a major health issue in many developing countries.

The following results for the causes of iron deficiency anaemia in these women are given by observing their dietary habits, menstrual history, which were taken in the case history and are given in percentage.

Nearly 46% of the women in our study are suffering from iron deficiency anaemia due to blood loss during menstruation.

Nearly 18% of the women are suffering from iron deficiency anaemia due to malnutrition.

20% of the women are suffering from iron deficiency anaemia due to blood loss during menstruation & malnutrition.

34% of the women suffering from iron deficiency anaemia due to other infections, because of lack of poor sanitation. When compared with cases & controls in evaluating the causes for iron deficiency anaemia.

In a study conducted byJoel Monarezz¹⁷Homerromartinez,Ted greines et.al on iron deficiency in Tarahuamara women of reproductive age in northern mexico, they stated that iron deficiency anaemia is primarily due to lack of dietary iron,hookworm infection, blood loss during menstruation, in their findings serum ferritin levels were decreased ,their findings were consistent with present study.

In a study by T Leenstra, JD Kurtis¹⁸, et.al, they stated that iron deficiency anaemia results as a cause of malnutrition, parasitic infection, poverty , Results were Hb<120g/l, ferritin <12 μ g/l. The prevalence of iron deficiency anaemia in girls was high.

Thus our study shows that the cause of iron deficiency anaemia is not only the low haemoglobin concentration but also low serum iron, high TIBC & very low Serum ferritinis the cause to assess the iron deficiency anaemia.

ACKNOWLEDGEMENT:

We are extremely thankful to Dr.SARIB RASOOL KHAN-Managing Director Dr. V.R.K. Women's Medical College, Teaching Hospital & Research Centre, and Allied Hospitals for his continuous encouragement and support.

6. REFERENCES

1.Detecting Iron Deficiency in Anaemic Patients with Concomitant Medical Problems Anne M Kis,MD and Molly Carnes,MD.

2.Prachi,pi, Hameed A,Simon j, Jamil A , Nawab G. Prevalence of anaemia in urban areas of Peshawar ,Pakistan.A challenge for health professionals & policy makers.J Pak med Assoc.1997:47(2):49-53.

3.Shah A. Iron deficiency anaemia-Part-I .Indian J Med Sci 2004; 58:79-81.

4.Detecting Iron Deficiency in anaemia patients with concomitant Medical Problems Anne M Kis,MD&Molly carnes,MD.

5. Helen Keller international, iron deficiency report, 1998 on iron deficiency anaemia throughout the life cycle of rural Bangladesh.

6. Joel Monarezz, M.C, M.en.C M.sc phd, Ted.

7.Finch, C.A & Huber's H(1982) Perspectives in iron metabolism. NewEngle.J.Med.306, 1520.

8. Firkin F & Rush B. Interpretation of Biochemical tests for iron deficiency: diagnostic difficulties related to limitations of individual tests. Australian prescribed.1997;20-74-6.

9. HannHW,Kim CY ,London WT,et al 43 (3):376-9. "Increased serum Ferritn in chronic liver disease: A risk factor for primary Hepatocellular carcinoma',Int J Cancer,1989. 10. Dallmanp.Biochemical basis for the manifestation of iron deficiency Ann Rev Nutr 1986:6:13-40.

11. Firkin F & Rush B.Interpretation of biochemical tests for iron deficiency:diagnostic difficulties related to limitations of individual tests.Australian prescribed.1997:20-74-6.

12. Finch, C.A.Hubers, H. (1982) perspectives in iron metabolism .New Engle. J.Med. 306, 1520.

13.Assessment of the nutritional status of Algerian Women in the reproductive age living in an urban ,rural&semi-rural area AssamiM,GalanP,Assami A, Potier de Courcy G. Hercberg S.

14. IRON DEFICIENCY ANAEMIA IS AN IMPORTANT CONTRIBUTOR TO ANAEMIA AMONG REPRODUCTIVE AGE WOMEN IN LEBANON by NAHLA (BABA) ^{A1.}, NADA ADRA^{A1},ROBERT JACKSON American University of Beirut ,University of Maryland, USA.

15.Teresa Shamah-Levy, M.sc; Salvador Villalpando ,MD, Sc. Dr; Juan A Rivera,MS,Phd;FabiolaMejia-Rodriguez,B.sc;Martha Camacho-Cisneros,BSc;Eric A Monte Rubio,BSc Centro de Investigacion en Nutricion Y Salud, InstitutoNacional de SaludPublica , Cuernavaca, Morelos, Mexico.

16. Identification of appropriate strategy to control anaemia in adolescent girls of poor communities. Anshu Sharma, Kantiprasad, Visweswararao.

17. Joel Monarezz, M.C, M.en. C M.sc, Phd, Ted.

18.Prevalence and severity of anaemia & iron deficiency :cross – sectional studies in adolescent school girls in western Kenya T Leenstral,SkKariukil,JD Kurtis,AJ Olool, P A kager2 & F O terKuilel.

7. CASES AND CONTROLS DATA CHART

7.1 TABLE SHOWING THE PATIENTS (CASES) NAME AND THEIR CORRESPONDING DATA

CASES:

NAME	AG	Hb(g	SERU	TIB	SERUM
	Е	m)	Μ	С	FERRIT
			IRON		IN
V.NAGALAKSHMI	15	5	25	413	6.3
B.SUNITHA	16	4.9	13	413	0.68
Y.MRUDULA	16	7.8	13	450	1.53
P.SOWRYAKUMA	17	5.7	25	488	4.9
RI					
K.VARAMMA	17	6.1	13	450	40.3

CH.BHAVANI	18	5.5	13	450	1.02
SHANTHA.R	18	7	13	450	4.3
LSIREESHA	18	6.7	25	488	2.97
LAVANYA.K	18	5.9	25	413	3.59
J.RAMADEVI.	19	8.4	13	450	93.4
L.MARY	19	4.4	13	413	43.5
P.SAMATHA	22	8.0	25	450	1.56
Y.MANGAMMA	22	3.3	25	413	2.8
D.ARUNA	23	8.0	25	413	3.89
KUMARI		0.0			2.02
SK.HASEENA	23	8.9	13	488	3.53
K.USHA	24	6.4	13	450	5.98
H.KAAVYA	25	8.3	25	413	4.94
S.RAJANI	25	8.2	25	450	5.92
JYOTHSNA	_		-		
SHANTHA	26	9.0	13	450	3.51
KUMARI					
SK.AAYESHA	27	5.3	13	450	0.53
V.NANDINI	28	4.6	25	425	3.31
Y.SUSHMITHA	29	9.4	25	413	5.94
YB	29	8.0	25	450	2.98
KOTESWARAMM	-				
Α					
J.BUJJI	30	6.4	13	450	8.28
G.RATNAKUMARI	30	8.5	25	413	5.47
M.NAGENDRAM	31	6.4	25	450	0.68
MA					
D.MANI	32	7.2	13	488	2.64
Y.KALYANI	32	3.3	13	413	4.53
K.RAMANI	32	6.1	25	450	3.58
D.SASIKALA	33	2.2	13	488	2.46
M.VENKATESWA	34	8.4	13	488	0.78
RI					
K.KAMESWARAM	35	7.1	25	450	5.8
MA					
P.LAKSHMI	35	4.3	13	450	4.3
G.VENKATARAT	35	6.5	25	488	0.41
NAM					
SRILAKSHMI	37	8.3	13	413	2.51
AAYESHA	38	5.2	25	488	3.5
KUMARI.Y					
G.LAKSHMI	38	7.8	13	413	7.78
D.VIJAYALAKSH	39	6.2	13	413	6.2
MI					
PITCHAMMA	40	6.3	13	488	4.58
P.JAHEDA	40	5.5	25	487	3.58
DAKSHESWARI	40	6.1	13	413	0.49
G.SURYAKANTH	41	5	13	413	2.75
AM					
SK.PYAARIJAAN	42	7.5	25	488	4.5
S.SREEKUMARI	42	8.2	25	413	3.53
M.PADMAVATHI	43	7.1	13	413	4.25
J.TIRUPATHAMM	44	6.9	13	450	12.6
А					
K.SESHAMMA	45	6	25	450	5.38
M.SAIKUMARI	45	6.4	13	488	2.03
SK.MEHBOOBI	45	7.0	25	414	76.5
M.KOTESWARAM	45	7.8	13	488	5.45
MA					

7.2 TABLE SHOWING THE CONTROLS NAME, AGE AND THE CORRESPONDING DATA

CONTROLS:

NAME G E HB(g m/dl) SER UM IRO N(µg /dl) TIBC(µg/dl) SERUMFERI TIN(ng/ml) G.KAMALA 17 10 50 338 11.4 DEVI 50 338 11.4 DEVI 50 338 11.4 DAGA 18 10.1 50 300 40.1 JOSEPH 13.2 88 300 22 MOUNIKA 50 375 83.4 SOUJANYA. 22 11.3 50 338 14.3 FARZANA 23 11.7 63 338 24.2 PARIMALA 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 NRADEWA 30 10.9 50 375 16.8 BEGUM 33 12.3 138 300 20.3 ORNA 71 2 75 375 16.8 BEGUM 33 11.7		А		T		1
E m/di UM IRO N(ug (d)) µg/di) TIN(ng/ml) GKAMALA 17 10 50 338 11.4 DEVI 50 300 40.1 NAGA 19 13.2 88 300 22 MOUNIKA 50 301 40.1 50 300 40.1 NAGA 19 13.2 88 300 22 50 SOUJANYA. 22 11.8 63 338 14.3 FARZANA 23 11.7 63 338 24.2 RADIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RI 30 10.9 50 375 14.3 N.RAJESWA 31 12.7 5 375 14.2 MAMAI 34 12.5 50 338 29.5 SKTAHIRA 35 11.3 50 338 2	NAME		HB(g	SER	TIBC(SERUMFERRI
Ν(μg (dl) Ν(μg (dl) Ν(μg (dl) Ν(μg (dl) G.KAMALA DEVI 17 10 50 338 11.4 PARIMALA DOSEPH 18 10.1 50 300 40.1 NAGA MOUNIKA 19 13.2 88 300 22 SOUJANYA. 22 11.8 63 338 14.3 CH.KIRANM 23 11.7 63 338 24.2 ALSAR - - - - - P.NIRMALA 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RADHIKA 27 12 50 338 12.6 SK.TAHIRA 35 11.7 38 300 20.3 ORNA - - - - - P.RAMANI 34 12.5 50 338 29		-			`	
(d) (d) (d) G.KAMALA 17 10 50 338 11.4 PARIMALA 18 10.1 50 300 40.1 NAGA 19 13.2 88 300 22 MOUNIKA 11.8 63 338 14.3 SOUJANYA. 22 11.8 63 338 14.3 CH.KIRANM 23 11.7 63 338 24.2 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RADHIKA 27 12 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 37 12 75 375 14.2 A.RAJANI 37 12 75 338 29.5 MLIRA 10.9 50 338 29.5 ATHI 0 11.3						
G.KAMALA 17 10 50 338 11.4 DEVI 11 50 300 40.1 JOSEPH 13.2 88 300 22 MOUNIKA 19 13.2 88 300 22 MOUNIKA 21 11.8 63 338 14.3 SOUJANYA. 22 11.8 63 338 24.2 Kansa 23 11.7 63 338 24.2 KAUSAR 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RADHIKA 27 12 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 37 12 75 375 14.2 MA 37 12 75 338 29.5 ATHI 11.3 50 338 29.5 ATHI 10.1						
DEVI Image: style st	G MAN CAR A	1-	10	,	220	
PARIMALA JOSEPH 18 10.1 50 300 40.1 NAGA MOUNIKA 19 13.2 88 300 22 SOUJANYA. 22 11.8 63 338 14.3 CH.KIRANM 23 11.3 50 375 83.4 FARZANA 23 11.7 63 338 24.2 P.NIRMALA 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 R R 10.9 50 375 11.7 R A.ANAPO 33 12.3 138 300 20.3 ORNA 9 31 1.7 38 375 16.8 BEGUM 11.3 50 338 12.6 338 29.5 ATHI 40 11.3 50 338 29.5 ATHI 7		17	10	50	338	11.4
JOSEPH Instruction Instruction Instruction Instruction NAGA MOUNIKA 19 13.2 88 300 22 SOUJANYA. 22 11.8 63 338 14.3 CH.KIRANM 23 11.3 50 375 83.4 FARZANA 23 11.7 63 338 24.2 KAUSAR 21 75 300 21.8 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RADHIKA 27 12 50 338 12.6 SK.TANPO 33 12.3 138 300 20.3 ORNA 9 11.7 38 375 16.8 BEGUM 11.3 50 338 12.6 SK.TAHIRA 37 12 75 375 14.2 MA 11.3 50 338 29.5						
NAGA MOUNIKA 19 13.2 88 300 22 MOUNIKA 22 11.8 63 338 14.3 SOUJANYA. 22 11.8 63 338 14.3 CH.KIRANM 23 11.7 63 338 24.2 FARZANA 23 11.7 63 338 24.2 RADHIKA 27 12 50 338 14.3 NRAJESWA 30 10.9 50 375 11.7 RADHIKA 27 12 50 338 14.3 NRAJESWA 30 10.9 50 375 11.7 RADHIKA 27 12 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 11.3 50 338 29.5 MHI 11.3 50 338 29.5 KANANI 37 13 88 300 59.4		18	10.1	50	300	40.1
MOUNIKA MOUNNIKA MOUNNIKA MOUNNIKA MOUNIKA MOUNNIKA MOUNNIKA						
SOUJANYA, K 22 11.8 63 338 14.3 CH.KIRANM 23 11.3 50 375 83.4 FARZANA 23 11.7 63 338 24.2 KAUSAR 23 11.7 63 338 14.3 P.NIRMALA 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 NRAJESWA 30 10.9 50 375 11.7 RADHIKA 27 12 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 35 11.7 38 375 14.2 MA 37 12 75 375 14.2 MA 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 16.5 SHMI.M 10.5 50 375 87.8 <td></td> <td>19</td> <td>13.2</td> <td>88</td> <td>300</td> <td>22</td>		19	13.2	88	300	22
K Image: state						
$\begin{array}{c c c c c c c c c c c c c c c c c c c $		22	11.8	63	338	14.3
AI - - - FARZANA KAUSAR 23 11.7 63 338 24.2 P.NIRMALA 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RI - - - - - K.ANNAPO 33 12.3 138 300 20.3 ORNA - - - - - P.RAMANI 34 12.5 50 338 12.6 SK.TAHIRA 35 11.7 38 375 14.2 MA - - - - - M.DURGAM 37 12 75 375 14.2 A.RAJANI. 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 16.5 SKMIMI						
FARZANA KAUSAR 23 11.7 63 338 24.2 P.NIRMALA 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 K.ANNAPO 33 12.3 138 300 20.3 ORNA 34 12.5 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 M.DURGAM 37 12 75 375 14.2 MA 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 75 338 16.5 338 29.5 RAYALAK 44 10.1 75 338 16.5 RAWMA 40 11.3 50 375 87.8 RAHIM 10.5 50 375 87.8 RAMMA 15 10.5 50 375 8.8		23	11.3	50	375	83.4
KAUSAR KAUSAR<						
P.NIRMALA 26 12.1 75 300 21.8 RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RI 33 12.3 138 300 20.3 ORNA 33 12.5 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 37 12 75 375 14.2 A.RAJANI. 37 12 75 338 29.5 ATHI 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 75 338 16.5 50 375 87.8 RAIYALAK 44 10.1 75 338 16.5 50 SK.MEHBO 45 11.5 75 338 76.5 50 RASHMI 15 10.5 50 375 8.8 8.8 RLAKSHMI 15	FARZANA	23	11.7	63	338	24.2
RADHIKA 27 12 50 338 14.3 N.RAJESWA 30 10.9 50 375 11.7 RI 33 12.3 138 300 20.3 ORNA 34 12.5 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 37 12 75 375 14.2 A.RAJANI 34 12.75 375 14.2 M.DURGAM 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 10.9 50 300 6 AKSHMI 42 10.9 50 300 6 AKSHMI 11.5 75 338 16.5 MILM 11.5 75 338 76.5 OBI 15 10.7 88 300 12 MOUNIKA 15 <td< td=""><td>KAUSAR</td><td></td><td></td><td></td><td></td><td></td></td<>	KAUSAR					
N.RAJESWA RI 30 10.9 50 375 11.7 K.ANNAPO ORNA 33 12.3 138 300 20.3 P.RAMANI 34 12.5 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 11.7 38 375 14.2 MA 37 12 75 375 14.2 A.RAJANI. 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 10.9 50 300 6 RAVIAYAL 42 10.9 50 300 6 RASHMI 10.5 50 375 87.8 RAMA 15 10.5 50 375 8.8 RLAKSHMI 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J	P.NIRMALA	26	12.1	75	300	21.8
RI Image: Solution of the second system of the second	RADHIKA	27	12	50	338	14.3
K.ANNAPO 33 12.3 138 300 20.3 ORNA 34 12.5 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 37 12 75 375 14.2 M.DURGAM 37 12 75 375 14.2 MA 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 10.9 50 300 6 AKSHMI 42 10.9 50 300 6 AKSHMI 44 10.1 75 338 16.5 SKMEHBO 45 10.5 50 375 87.8 RAMA 15 10.5 50 375 8.8 RLAKSHMI 15 10.7 88 300 12 MOUNIKA 15 10.7 88 300 12 MOUNIKA 15 11.8 63 375 16.5 J	N.RAJESWA	30	10.9	50	375	11.7
ORNA Image: stress of the stress	RI					
P.RAMANI 34 12.5 50 338 12.6 SK.TAHIRA 35 11.7 38 375 16.8 BEGUM 37 12 75 375 14.2 MA 37 12 75 375 14.2 MA 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 75 338 16.5 300 6 RAJYALAK 42 10.9 50 300 6 RASHMI 75 338 16.5 375 87.8 RAMAA 7 75 338 16.5 375 88.8 RLAKSHMI 15 10.5 50 375 8.8 300 12 MOUNIKA 15 10.5 50 375 8.8 300 12 N.MRUDUL 20 11.8 63 375 16.5 338 60 <td>K.ANNAPO</td> <td>33</td> <td>12.3</td> <td>138</td> <td>300</td> <td>20.3</td>	K.ANNAPO	33	12.3	138	300	20.3
SK.TAHIRA BEGUM 35 11.7 38 375 16.8 M.DURGAM 37 12 75 375 14.2 MA 37 12 75 375 14.2 A.RAJANI. 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 75 338 16.5 R.VIJAYAL 42 10.9 50 300 6 AKSHMI 42 10.5 50 375 87.8 RAJYALAK 44 10.1 75 338 16.5 SHMI.M 15 10.5 50 375 87.8 RAMMA 15 10.5 50 375 8.8 R.LAKSHMI 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 10.7 88 375 16.5 A <	ORNA					
SK.TAHIRA BEGUM 35 11.7 38 375 16.8 M.DURGAM 37 12 75 375 14.2 MA 37 12 75 375 14.2 A.RAJANI. 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 75 338 16.5 R.VIJAYAL 42 10.9 50 300 6 AKSHMI 42 10.5 50 375 87.8 RAJYALAK 44 10.1 75 338 16.5 SHMI.M 15 10.5 50 375 87.8 RAMMA 15 10.5 50 375 8.8 R.LAKSHMI 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 10.7 88 375 16.5 A <	P.RAMANI	34	12.5	50	338	12.6
BEGUM Image: strain of the strai						
M.DURGAM MA 37 12 75 375 14.2 A.RAJANI. 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 10.9 50 300 6 RAYALAK 42 10.9 50 300 6 RAYALAK 44 10.1 75 338 16.5 SHMI.M 10.5 50 375 87.8 RAMMA 45 10.5 50 375 87.8 RAMMA 45 10.5 50 375 8.8 RLAKSHMI 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 17 11 50 338 60 J 17 11 50 338 60 J 11.8 63 375 16.5 A 20 1						
MA 13 88 300 59.4 A.RAJANI. 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 10.9 50 300 6 AKSHMI 42 10.9 50 300 6 AKSHMI 42 10.1 75 338 16.5 SHMI.M 10.5 50 375 87.8 CH.SUNDA 45 10.5 50 375 88.8 RAMMA 15 10.5 50 375 8.8 RLAKSHMI 15 10.7 88 300 12 MOUNIKA 15 10.7 88 300 12 MOUNIKA 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 17 11.8 63 375 16.5 A 13.3 50 338 25 16.5 A 12 12.5		37	12	75	375	14.2
A.RAJANI. 37 13 88 300 59.4 V.PADMAV 40 11.3 50 338 29.5 ATHI 11.3 50 300 6 R.VIJAYAL 42 10.9 50 300 6 AKSHMI 42 10.9 50 300 6 RAJYALAK 44 10.1 75 338 16.5 SHMI.M 10.5 50 375 87.8 CH.SUNDA 45 10.5 50 375 88.8 RAMA 15 10.5 50 375 8.8 RESHMA.M 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 17 11 50 338 60 J 17 11 50 338 60 J 17 11 50 338 25 M.MRUDUL 20 11.8 63 375 16.5 A 21 12.5 <td></td> <td>0,</td> <td></td> <td>10</td> <td>0.0</td> <td>1.112</td>		0,		10	0.0	1.112
V.PADMAV ATHI 40 11.3 50 338 29.5 R.VIJAYAL AKSHMI 42 10.9 50 300 6 RAJYALAK SHMI.M 44 10.1 75 338 16.5 RAJYALAK SHMI.M 44 10.1 75 338 16.5 CH.SUNDA RAMMA 45 10.5 50 375 87.8 SK.MEHBO OBI 45 11.5 75 338 76.5 OBI 15 10.5 50 375 8.8 RLAKSHMI MOUNIKA 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 11.8 63 375 16.5 A 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI DEVI 21 12.5 75 300 30 DEVI 1 10.9 88 375 77 K.VANAJA 23 11.8		37	13	88	300	59.4
ATHI Image: system of the						
R.VIJAYAL 42 10.9 50 300 6 AKSHMI 44 10.1 75 338 16.5 RAJYALAK 44 10.1 75 338 16.5 CH.SUNDA 45 10.5 50 375 87.8 RAMMA 45 11.5 75 338 76.5 OBI 45 11.5 75 338 76.5 RESHMA.M 15 10.5 50 375 8.8 R.LAKSHMI 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 17 11 50 338 60 J 17 11 50 338 60 J 12 11.8 63 375 16.5 A 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>						
AKSHMI Image: symbol with the symbol withe symbol withe symbol with the symbol with the symbol w		42	10.9	50	300	6
RAJYALAK SHMI.M 44 10.1 75 338 16.5 CH.SUNDA RAMMA 45 10.5 50 375 87.8 CH.SUNDA RAMMA 45 11.5 75 338 76.5 SK.MEHBO OBI 45 11.5 75 338 76.5 RESHMA.M 15 10.5 50 375 8.8 R.LAKSHMI MOUNIKA 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 17 11 50 338 60 J 20 11.8 63 375 16.5 A 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI DEVI 21 12.5 75 300 30 L.SARADA 21 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75<						-
SHMI.M IO.5 50 375 87.8 CH.SUNDA 45 10.5 50 375 87.8 RAMMA 11.5 75 338 76.5 OBI 11.5 75 338 76.5 OBI 10.5 50 375 8.8 RESHMA.M 15 10.7 88 300 12 MOUNIKA 11 50 338 60 J 17 11 50 338 60 J 17 11 50 338 60 J 17 11 50 338 60 J 10.7 88 375 16.5 A 20 12 138 375 88 S.SURESHA 20 12 138 375 88 S.SUREKHA 21 12.5 75 300 30 DEVI 1 12.5 75 338 87 <td></td> <td>44</td> <td>10.1</td> <td>75</td> <td>338</td> <td>16.5</td>		44	10.1	75	338	16.5
CH.SUNDA 45 10.5 50 375 87.8 RAMMA 45 11.5 75 338 76.5 SK.MEHBO 45 11.5 75 338 76.5 OBI 15 10.5 50 375 8.8 RESHMA.M 15 10.7 88 300 12 MOUNIKA 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 17 11 50 338 60 J 17 11 50 338 60 J 20 11.8 63 375 16.5 A 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 1 12.5 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA <td></td> <td></td> <td>1011</td> <td>10</td> <td>220</td> <td>10.0</td>			1011	10	220	10.0
RAMMA Image: style s		45	10.5	50	375	87.8
SK.MEHBO 45 11.5 75 338 76.5 OBI 15 10.5 50 375 8.8 RESHMA.M 15 10.7 88 300 12 MOUNIKA 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 J 10.9 83 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 1 12.5 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2			10.0	20	0.10	0/10
OBI Image: constraint of the system of the sys		45	11.5	75	338	76.5
RESHMA.M 15 10.5 50 375 8.8 R.LAKSHMI 15 10.7 88 300 12 MOUNIKA 15 10.7 88 300 12 TEJASWINI. 17 11 50 338 60 J 16.5 16.5 16.5 16.5 A 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 11 12.5 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28						
R.LAKSHMI 15 10.7 88 300 12 MOUNIKA 17 11 50 338 60 TEJASWINI. 17 11 50 338 60 J 11.8 63 375 16.5 A 12 138 375 88 Y.SIREESH 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI - - - 375 83		15	10.5	50	375	8.8
MOUNIKA I 50 338 60 TEJASWINI. 17 11 50 338 60 J 11.8 63 375 16.5 A 11.8 63 375 16.5 Y.SIREESH 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 1 12.5 75 300 30 L.SARADA 21 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI - - - - - CH.SITALA 30						
TEJASWINI. 17 11 50 338 60 J 11.8 63 375 16.5 N.MRUDUL 20 11.8 63 375 16.5 A 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI 1 13.1 75 375 83		10	10.7	00	200	12
J Image: Signal system Junctified system Junctified system Junctified system N.MRUDUL 20 11.8 63 375 16.5 Y.SIREESH 20 12 138 375 88 Y.SIREESH 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 1 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI 1 13.1 75 375 83		17	11	50	338	60
N.MRUDUL A 20 11.8 63 375 16.5 Y.SIREESH A 20 12 138 375 88 S.SUREKHA 21 13.3 50 338 25 M.MARUTI DEVI 21 12.5 75 300 30 L.SARADA 21 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI		- /	•••	20	220	
A Image: Constraint of the system of the		20	11.8	63	375	16.5
Y.SIREESH 20 12 138 375 88 A 1 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 1 10.9 88 375 77 L.SARADA 21 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI		20	11.0	05	515	10.5
A Image: Constraint of the system of the		20	12	138	375	88
S.SUREKHA 21 13.3 50 338 25 M.MARUTI 21 12.5 75 300 30 DEVI 1 12.5 75 300 30 L.SARADA 21 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI 13.1 75 375 83		20	12	150	515	50
M.MARUTI DEVI 21 12.5 75 300 30 L.SARADA 21 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI		21	133	50	338	25
DEVI Image: Constraint of the system Constrais of the system Constraint of the sys						
L.SARADA 21 10.9 88 375 77 K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI		~1	12.5	,5	500	50
K.VANAJA 23 11.8 75 338 87 L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI - - - - - CH.SITALA 30 13.1 75 375 83		21	10.9	88	375	77
L.ANUSHA 27 12.1 75 375 12.6 Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI 1 13.1 75 375 83						
Y.SUPRIYA 27 11.2 50 300 76 M.RAMADE 28 11 88 338 40 VI 1 13.1 75 375 83						
M.RAMADE 28 11 88 338 40 VI <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td>	-					
VI						
CH.SITALA 30 13.1 75 375 83		28	11	00	338	40
		20	12.1	75	275	92
	CH.SH ALA	30	13.1	15	515	US

BJANAKI 30 12.2 75 300 14.3 M.KEERTI 31 13 88 375 217 R.RAJYALA 33 10.6 38 375 59 S.RAMULA 33 10.6 38 375 59 S.RAMULA 33 11.8 50 300 77 MMA 33 11.8 50 300 77 MMA 34 12 75 338 89 A 12.3 75 338 94 RMALA 12.3 75 338 94 M.VIJAYAN 34 12.3 75 338 94 RMALA 13 50 338 203 55 LALITHAK 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 12 50 338 83.4 HA 12	KSHMI					
M.KEERTI 31 13 88 375 217 R.RAJYALA 33 10.6 38 375 59 KSHMI 33 10.6 38 375 59 S.RAMULA 33 11.8 50 300 77 MMA 33 11.8 50 300 77 P.SUBHADR 34 12 75 338 89 A 12.3 75 338 94 IRMALA 12.3 75 338 203 SK.AAYANI 36 13 88 375 138 K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 11.7 75 375 88 1 I 9 11.2		30	12.2	75	300	14.3
R.RAJYALA 33 10.6 38 375 59 S.RAMULA 33 11.8 50 300 77 MMA 33 11.8 50 300 77 P.SUBHADR 34 12 75 338 89 A 12 75 338 94 M.VIJAYAN 34 12.3 75 338 94 MALA 13 50 338 203 Y.KALYANI 36 13 88 375 138 K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 11.7 75 375 88 1 I 11.7 75 375 88 1 I 11.7 75 375<						
KSHMI Image: Second system Second system </td <td></td> <td></td> <td>-</td> <td></td> <td></td> <td>-</td>			-			-
S.RAMULA 33 11.8 50 300 77 MMA 33 11.8 50 300 77 P.SUBHADR 34 12 75 338 89 M.VIJAYAN 34 12.3 75 338 94 M.VIJAYAN 34 12.3 75 338 94 Y.KALYANI 36 13 88 375 138 K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI - - - - - R.BINDU 43 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA - - - - - P.SREELAT 44 10.2 50 300 24.2 HA - - - - - V.SAILAJA<		55	10.0	50	515	57
MMA		33	11.8	50	300	77
P.SUBHADR 34 12 75 338 89 M.VIJAYAN 34 12.3 75 338 94 IRMALA 34 12.3 75 338 94 Y.KALYANI 36 13 88 375 138 K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 43 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 1 75 375 88 1 P.SREELAT 44 10.2 50 300 24.2 HA 11.3 88 375 30 30 ER 11.3 88 375 30 30		55	11.0	50	200	
A		34	12	75	338	89
IRMALA IRMALA IRMALA Y.KALYANI 36 13 88 375 138 K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 43 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 1 75 375 88 I 9 9 9 9 9 9 P.SREELAT 44 10.2 50 300 24.2 14A V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER						
Y.KALYANI 36 13 88 375 138 K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 11.7 75 375 88 I 1 1 1 1 1 1 P.SREELAT 44 10.2 50 300 24.2 1 HA 1 1 3 38 59.4 1 V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER 11.5 50 375 13.6 RAMMA 16 145 385 283	M.VIJAYAN	34	12.3	75	338	94
K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 11.7 75 375 88 I 1 11.7 75 375 88 I 1 11.7 75 375 88 I 1 10.2 50 300 24.2 HA 10.2 50 338 59.4 V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER 11.5 50 375 13.6 S.KOTESWA 38 11.5 50 375 13.6 RAMMA 16 145 385 283	IRMALA					
K.RAMYA 41 13 50 338 203 SK.AASHA 41 10.1 138 300 29.5 LALITHAK 42 10.6 75 300 14.3 UMARI 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 11.7 75 375 88 I 1 11.7 75 375 88 I 1 11.7 75 375 88 I 1 10.2 50 300 24.2 HA 10.2 50 338 59.4 V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER 11.5 50 375 13.6 S.KOTESWA 38 11.5 50 375 13.6 RAMMA 16 145 385 283	Y.KALYANI	36	13	88	375	138
LALITHAK UMARI 42 10.6 75 300 14.3 R.BINDU 43 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 1 75 375 88 1 P.SREELAT 44 10.2 50 300 24.2 HA 11.3 88 375 30 V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER 50 375 13.6 13.6 RAMMA 16 145 385 283	K.RAMYA		13	50	338	203
UMARI Image: Stress of the stres	SK.AASHA	41	10.1	138	300	29.5
R.BINDU 43 11.2 75 375 76.5 T.SUMALAT 43 12 50 338 83.4 HA 12 50 338 83.4 CH.DEEPTH 44 11.7 75 375 88 I 1 1 1 1 1 1 P.SREELAT 44 10.2 50 300 24.2 HA 1 12 50 338 59.4 V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER S.KOTESWA 38 11.5 50 375 13.6 RAMMA 16 145 385 283 283	LALITHAK	42	10.6	75	300	14.3
T.SUMALAT 43 12 50 338 83.4 HA 11.7 75 375 88 CH.DEEPTH 44 11.7 75 375 88 P.SREELAT 44 10.2 50 300 24.2 HA 10.2 50 338 59.4 V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER 50 375 13.6 13.6 RAMMA 16 145 385 283	UMARI					
HA Image: Chick of the system State of the system State of the system CH.DEEPTH 44 11.7 75 375 88 I Image: Chick of the system 300 24.2 HA Image: Chick of the system 300 24.2 HA Image: Chick of the system 300 24.2 HA Image: Chick of the system 338 59.4 V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER Image: Chick of the system 38 11.5 50 375 13.6 S.KOTESWA 38 11.5 50 375 13.6 CUT OFF N 16 145 385 283	R.BINDU	43	11.2	75	375	76.5
CH.DEEPTH 44 11.7 75 375 88 P.SREELAT 44 10.2 50 300 24.2 HA V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER S.KOTESWA 38 11.5 50 375 13.6 RAMMA N 16 145 385 283	T.SUMALAT	43	12	50	338	83.4
I I P.SREELAT 44 HA V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 300 ER S.KOTESWA 38 11.5 50 375 13.6 RAMMA CUT OFF N 16 145 385 283	HA					
P.SREELAT HA 44 10.2 50 300 24.2 HA V.SAILAJA 45 12 50 338 59.4 W.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER S.KOTESWA 38 11.5 50 375 13.6 RAMMA CUT OFF N 16 145 385 283	CH.DEEPTH	44	11.7	75	375	88
HA Image: Matrix of the system V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER Image: Skoteswa 38 11.5 50 375 13.6 S.KOTESWA 38 11.5 50 375 13.6 CUT OFF N 16 145 385 283	Ι					
V.SAILAJA 45 12 50 338 59.4 MD.NEELOF 45 11.3 88 375 30 ER S.KOTESWA 38 11.5 50 375 13.6 RAMMA CUT OFF N 16 145 385 283	P.SREELAT	44	10.2	50	300	24.2
MD.NEELOF ER 45 11.3 88 375 30 S.KOTESWA RAMMA 38 11.5 50 375 13.6 CUT OFF N 16 145 385 283						
ER Image: Skoteswa state State <td>V.SAILAJA</td> <td>45</td> <td>12</td> <td>50</td> <td>338</td> <td></td>	V.SAILAJA	45	12	50	338	
S.KOTESWA 38 11.5 50 375 13.6 RAMMA CUT OFF N 16 145 385 283	MD.NEELOF	45	11.3	88	375	30
RAMMA Image: CUT OFF N 16 145 385 283	ER					
CUT OFF N 16 145 385 283		38	11.5	50	375	13.6
RANGE A		Ν	16	145	385	283
	RANGE	A				

1633