COPP MODULE

COMMON OFFICE PRACTICE PEDIATRIC PROBLEMS

[A MODULE OF IAP TAMILNADU STATE CHAPTER 2017]

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HEMATENICS & VITAMINS - HOW TO CHOOSE ?

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Recommended Dietary Allowances (RDA) for Iron

AGE	MALE	FEMALE
Birth- 6 month	0.27 mg*	0.27mg*
7-12 months	11 mg	11mg
1-3 yrs	7 mg	7 mg
4-8 yrs	10 mg	10mg
9-13 yrs	8 mg	8 mg
14-18 yrs	11 mg	15mg

* Adequate Intake (AI)

WHO NEED HAEMATINICS ?

- Maternal iron deficiency(1)
- Premature(2) &low birth weight babies
- Fetal-maternal hemorrhage (FMH)
- Twin-twin transfusion syndrome (TTTS)
- Perinatal hemorrhagic events
- Insufficient dietary iron in early infancy
- Cow's milk before 12 months of age(3)

Healthy term newborn’s iron stores last for 5-6 months(4)

WHY & WHEN SHOULD I TREAT ?

- Hemoglobin that = or > 2 (SD) below the mean (1)
- 74 % children (6-35 months)are anemic (2)
- NCCNA recommends targeting children 6 to 24 m(3)

Age	Hb level
6 months-< 5 yrs	11 gm/dL
5 yrs - <12 yrs	11.5 gm/dL
12-15 yrs	12 gm/dL

How to decide whether the anemia needs iron prescription?

Clinical entity	HB	RBC count	MCV	RDW	Specific test
Iron deficiency	Low	Low	Low	High	Ferritin , iron , TIBC
Megaloblastic	Low	High	High	High	B12, folate level
Thalassemia minor , intermedia	Low	High	Low	normal	Hb electrophoresis HPLC
Haemolytic anemia	Low	Low	Low	High	Retic Count High

Mentzer index: Mean corpuscular volume (MCV, in fL) divided by the red blood cell count (RBC, in Millions per microLiter) is less than 13, thalassemia is said to be more likely. If the result is greater than 13, then iron-deficiency anemia is said to be more likely

IRON PREPARATIONS

Oral

- Ferrous (Fe^{2+}) salts (sulfate, fumarate , gluconate , succinate, aspartate , etc.)
- Ferric (Fe^{3+}) salts are also available (Ferric hydroxide polymaltose complex, Iron polysaccharide, etc.)

- Ferrous – Better absorbed
- Iron combinations (with vitamins, minerals, amino acids, etc.) marketed, but should be considered- irrational due to lower iron content.

Parenteral (Parenteral forms contain organically complexed salts of unionized iron)

- Iron dextran
- Iron-sucrose complex
- Iron sodium gluconate complex

Table.1. Effective elemental iron content of various iron preparations.

Name of iron salt	Mg of salt / 5ml in the preparation	Elemental iron	Effective elemental iron /5ml#	% absorbed*
FS (excicated)	100	20%	30	10%
Ferrous fumarate	100	33%	33	10%
IPC	**	25-40%	50	10%
Colloidal	100	50%	50	
Carbonyl	50	100%	50	7.3-11.7%
Ferrous ascorbate	180	16.6%	30	30-40%
Na-feredetate	231	14.3%	33	25%
Ferrous bis glycinate	150	20%	30	30-40%

* Percentage of iron absorbed varies depending on iron status of patient.

\# Elemental iron content of different brands may vary.

** mg of salt may be variable in different preparations.

Source: Sudhir vinod sane .Newer iron preparations: advantages and limitations. Indian J Pract Pediatr 2011;13 (1) :69.

Summary of advantages and limitations of various iron preparations

Iron salt	Affected by dietary inhibitors	Teeth staining	GIT side effects	Toxic potential	Available in syrup	Brands
Ferrous sulphate	Yes	Yes	Yes	Yes	Public sector only	Only tablets Govtsector&
Fer ammonium citrate/ferrous fumarate	Yes	Yes	Less	Yes	Yes	Haemup Dexorange /Hemsi
IPC	No	No	No	No	Yes	Trifer,ferrium Orofer
Colloidal	Yes	Yes	Yes	Yes	Yes	Tonoferon
Ferrous ascorbate	Less	Yes	Less	Yes	Yes	Feris,fermax Feronia XT
Na-Feredetate	No	No	Less	No	Yes	Irex, Lexifer, vegefer
Ferrous bis glycinate	Less	Less	Less	Less	Yes	Ferose,Globac

PARENTERAL IRON PREPARATION

- Sensitivity test with small test dose before administration - to avoid risk of hypersensitivity reactions

Indications

- Severe deficiency with chronic bleeding
- Intolerance to oral iron
- Malabsorption or inflammatory bowel disease
- On erythropoietin therapy (to meet the increased needs of induced erythropoiesis)

TREATMENT OF IDA

Depletion correction

*3-6 mg /kg day of elemental iron in 2 or 3 doses

*½ hr before or 1-2 hr after feeding for 3 months

Replenishing iron stores : 6 months

SUPPLEMENTATION OF IRON

AGE	Elemental iron	FROM -TO	Remarks
Full term (1)	1 mg/kg/day	4-6 months	Iron rich foods also fill the gap
Preterm	2-4 mg/kg/day	2 weeks-1 yr	
1-3 yrs	7 mg /day		Iron rich foods also fill the gap
4- 8 yrs	10 mg/day		
9-13 yrs	8 mg/day (2)		
Adolescent children	20 mg /day	weekly	

COMMON ADVERSE EFFECTS - ORAL IRON

- Nausea
- Epigastric discomfort
- Abdominal cramps
- Constipation/diarrhea
- Discolouration of teeth
- Oral iron leads to black stools – No clinical significance in itself / may obscure diagnosis of continued gastrointestinal blood loss

HOW TO MAXIMISE COMPLIANCE?

- Take iron with food (1)
- Vit.C can negate the effect of food (2)
- If not liked ,change to a different iron preparation
- Start with half the recommended dose and gradually increase to the full dose ,
- Stool softener can alleviate constipation(3)

PRACTICE TIPS

Factors increasing iron bioavailability	Factors reducing bioavailability
Breastmilk (50%)	Formula 4-6 %(1)
Heme dietary sources (fish, poultry, meat)30%	Non-heme (vegetable) sources 10 %
Vit .c enhances Iron absorption (2)	calcium reduces. Tannates (teas), bran foods rich in phosphates, phytates (plant fiber) in seeds and grains (3)

Adolescents- supervised weekly IFA supplementation (100 mg elemental iron and 500 mcg folic acid) throughout the calendar year, i.e., 52 weeks each year

BEWARE !!

- 34% of haematinic formulations only rational
- Available rational preparations are effective in varied time interval
- No good study on iron in the Indian setting either individually or in comparison
- Select based on cost-effectiveness of available drop preparations; but there is no advantage between them
- Ferrous salt based products are cheaper but not available in private sector
- Heme based product banned. Colloidal iron literature is scanty
- Sodium feredate – Better bioavailable even with food

REQUIREMENT OF VITAMINS

No	Vitamin	Required daily allowance
1.	Vit A	1500 IU/day(500 ug)
2.	Vit C	40 mg/day
3.	Vit D	400 IU/day(10ug)
4.	Vit E	5-15 IU/day(5-15 mg)
5	B1(Thiamine)	0.5-1.5 mg/day
6.	B2(Riboflavin)	0.5-1.5 mg/day
7.	B6(Pyridoxine)	0.5-1.5 mg/day
8.	B3(niacin)	5-15 mg/day
9.	B11(Folic acid)	50-150 ug/day
10.	B12(Cyanocobalamine)	0.5-1.5 ucg/day

From Nutrition and child Development by Dr.KE Elizabeth Paras publishing page 84

EVIDENCE FOR ZINC- AVAILABLE DATA

- Micronutrients including zinc and vitamins are essential for growth in children(1)
- Zinc supplementation is associated with substantial reductions in the rates of diarrhea and pneumonia(2)
- Supplementation of chelated zinc plus multivitamins for 6 months significantly increased the height gain in Thai school children(3)
- 68% reduction in mortality in small-for-gestational-age term infants that were supplemented with zinc from 1 to 9 mo of age(4)

VITAMINS FROM FOOD OR SUPPLEMENTS?

- Diet high in fiber & low in fat - Best way to meet daily nutritional needs.

- Follow "food pyramid" - Meets RDA (Recommended Dietary Allowances) for vitamins and nutrients.

- Food provides calories & energy - required for daily activities ;Vitamin supplements do not provide energy or calories.

VITAMIN SUPPLEMENTATION - NEED ?

- No rule of thumb for micronutrient supplementation
- Thriving term babies: No supplementation
- Preterm & SGA babies: Lowest to low micronutrient
- Cows milk; due to high phosphate - Ca deficiency
- Lack of GYOR vegetables - Vit.A & Vit.C deficiency
- Lack of NV food - B12 & zinc deficiency(1)
- Individual deficiencies -Vit.A, Vit.D, Vit.B12, folic acid
- Mineral & micro nutrients- Iron ,Zinc, calcium Iodine

1.From “Nutrition and child development 3 rd edition by Dr. KE Elizabeth Paras publishers

TABLE I RECOMMENDATIONS FOR VITAMIN D AND CALCIUM DEFICIENCY – PREVENTION AND TREATMENT

	Vitamin D				*Calcium*		
Age	*Prevention*	**Tolerable upper limit*	*Treatment*	*Treatment with large dose (oral route preferred)*	*Prevention*	**Tolerable upper limit*	*Treatment*
Premature neonates	400 IU/day	1000 IU/day	1000 IU/day	NA	Intake of 150 to 220 mg/kg per day	1000 mg/day	Maximum of 175–200 mg/kg/day
Neonates	400 IU/day	1000 IU/day	2000 IU/day[$]	NA	200 mg/day	1000 mg/day	500 mg/day
1-12 months	400 IU/day	1000-1500 IU/day	2000 IU/day[$]	60000 IU wkly for 6 weeks (over 3 mo of age)	250-500 mg/day	1000-1500 mg/day	500 mg/day
1-18 years	600 IU/day	3000 IU day till 9 years, 4000 IU/day from 9-18 years	3000/-6000 IU/day[$]	60000 IU wkly for 6 weeks	600-800 mg/day	2500 mg/day till 8 years and 3000 mg/day for 9-18 years	600-800 mg/day
At-risk groups	400-1000 IU/day	as per age group	as per age group	as per age group	as per age group	as per age group	as per age group

*[$]For a minimum of 3 months; after treatment, daily maintenance doses need to be given; *Tolerable Upper Limit - the maximum level of total chronic daily intake of a nutrient (from all sources) judged to be unlikely to pose a risk of adverse health effects to humans.*

Prevention and Treatment of Vitamin D and Calcium Deficiency in Children and Adolescents: Indian Academy of Pediatrics (IAP) Guidelines; Indian pediatr 2017;54(7):567 – 573.

Multivitamin mineral(MVM) supplementation?

- Despite a balanced and overall healthy diet, micronutrient gaps may occur from time to time . An MVM can help to improve the nutrient supply

- MVM are safe for long-term use (more than 10 years) as documented in a recent clinical trial (1)

- MVMs are safe at physiological doses (100%) in the short and the long term, whereas AEs may occur if single vitamins at high doses are consumed. (2)

Comparision of multivitamin preparations CIMS

brand	vitA IU	vitC Mg	vitD 3 IU	vit E Iu	B1 mg	B2 mg	B3 mg	B5 mg	B6 mg	B12 mcg	Folic A mcg
zincovit	1250	-	100	2.5	0.75	0.75	7.5	1.25	0.5	0.5	-
Vita L	1250	-	100	2.5	2.5	0.75	7.5	1.2	-	3.75	150
Pedic	100	20	200	2.5	1	1	---	----	1	1	
A to Z	1800	20	200	5							
Kidicare+	1350	30	100	3						1.5	
Rudimin	1600	-	200	5	1	1				0.5	50mg
StaminaZ	1250	-	100	2.5	0.75					0.5	
Rejumin	1000		400	5		1.2					
Alamin	3250	40	200	-	1	1	-	--	--	0.15	1mcg

PRACTICE TIPS

- Vitamin supplements are safe to take . Follow the recommended dosages on the label
- Fat-soluble vitamins - more likely to be toxic if taken in excess, as they are stored in the body, where as water-soluble are excreted
- Administer vitamins with a snack or meal to avoid stomach irritation

  Presence of carbohydrates and proteins stimulate digestive enzymes -allow better absorption of nutrients for the supplements.

THANK YOU