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OBESITY AND IRON DEFICIENCY AMONG ADOLESCENTS: DOES IRON SUPPLEMENTATION HELP?

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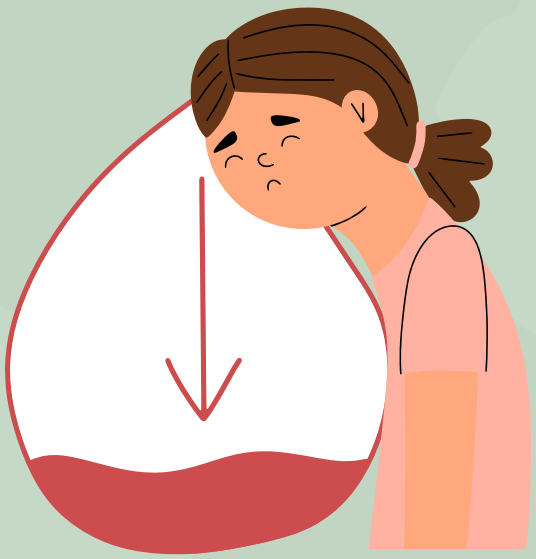
CLINICAL DATA ON OBESITY-RELATED IRON DEFICIENCY—ADOLESCENCE

- Lower concentrations of serum iron with increasing BMI have been observed several decades ago [1,2]

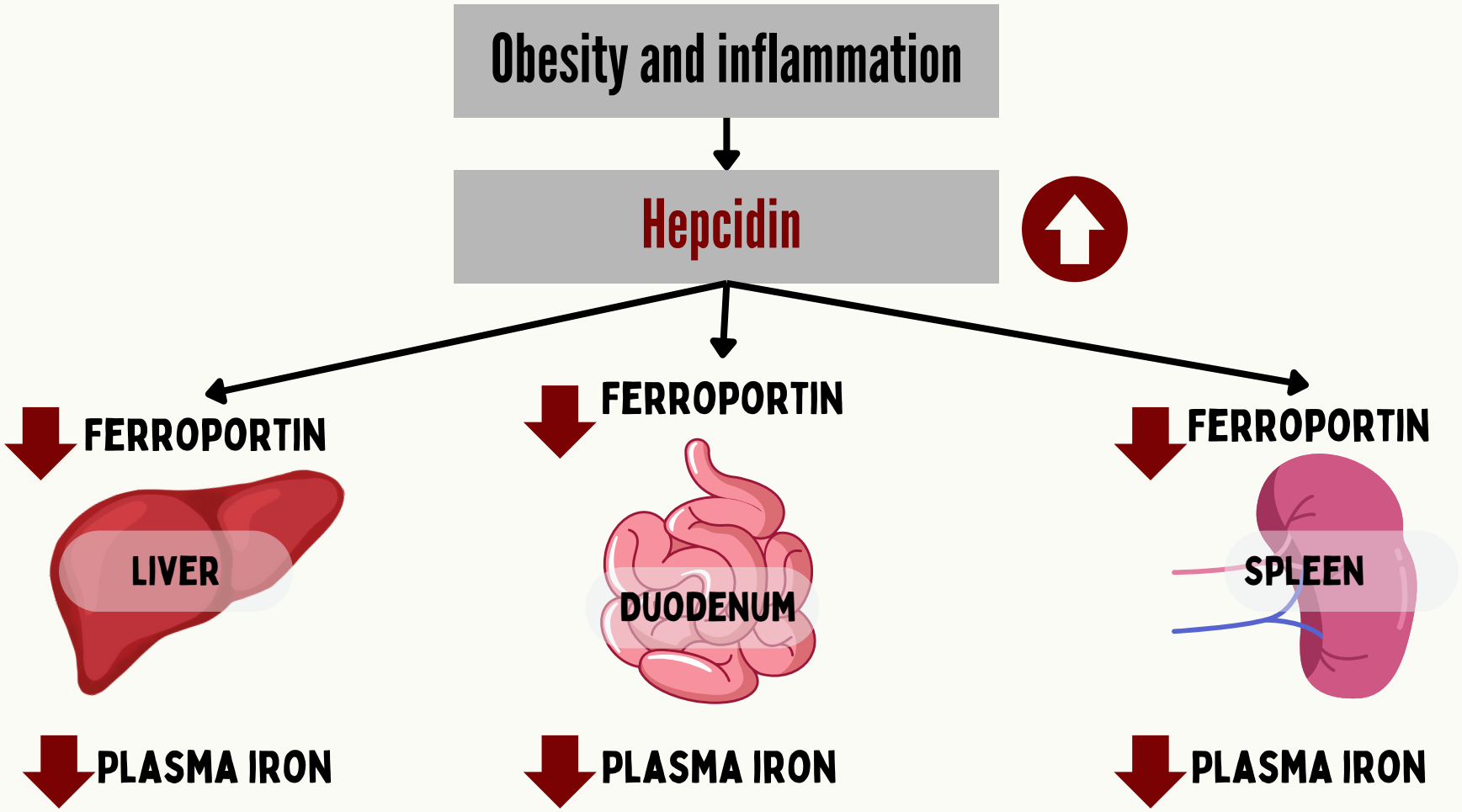


- The risk for iron deficiency (ID) has been reported to be twice as high in overweight adolescents compared to normal-weight adolescents not only in high-income countries (e.g. Greece [3], US [4], and Israel population [5]) but also in low and middle-income countries (e.g. Iran [6] and China [7]).

- Additionally, obese children exhibit restricted iron absorption from the duodenum in comparison to those with a normal weight [8].
- On the other hand, a study in mainly lean or mildly overweight adolescents, without severely obese subjects, found a link between higher serum ferritin and transferrin saturation and increasing BMI quartiles [9].

HOW THIS PHENOMENON COULD HAPPEN?

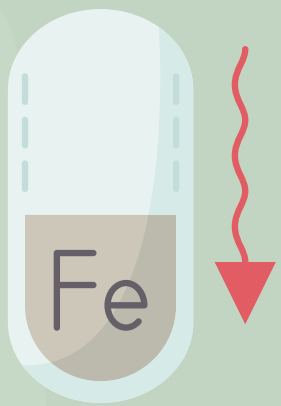
OBESITY LEADS TO IRON DEFICIENCY



- Obesity-related inflammation triggers excess hepcidin production.
- Excess hepcidin may interfere with intracellular iron absorption and excretion, through downregulation of ferroportin expression (in the liver, duodenum, and spleen).
- As we know that ferroportin serves as the exclusive passageway for transporting iron from organs to blood vessels.
- This condition can lead to reduced levels of iron in the plasma, which negatively impacts the production of red blood cells and can cause anemia [10].

IS IRON SUPPLEMENTATION EFFICIENT?

- A study in South African overweight and obese children showed that BMI for age z-score (BAZ) before iron supplementation intervention was associated with a 0.09 mg/kg reduction in body iron after 8 months of supplementation [11].
- Higher BAZ predicted higher transferrin receptor (TfR) (ß=0.232, P<0.001) at the endpoint, and increased the odds ratio (OR) for remaining ID at the endpoint in both the iron and placebo groups (iron: OR 2.31, 95% CI: 1.13, 4.73; placebo: OR 1.78, 95% CI: 1.09, 2.91) [11].



- Despite similar dietary iron intakes, the prevalence of ID was significantly higher in obese women (OR 1.92, 95% CI: 1.23, 3.01) and children (OR 3.96, 95% CI: 134, 11.67) compared with normal-weight subjects [12].

Correlations between parameters of insulin resistance, serum lipids and intestinal iron absorption evaluated with the AUC of ^{58}Fe.

Intestinal iron absorption versus:	Correlation coefficient	*p* (Spearman test)
Body Mass Index (kg/m^2)	−0.36	0.01
Waist circumference (cm)	−0.29	0.04
Blood pressure (mmHg)		
Systolic	−0.10	0.49
usCRP (mg/l)	−0.52	<0.001

Iron absorption was lower in overweight people (40.5 ± 29.4 ug/l/h) than in normal weight people (102.5 ± 113.5 ug/l/h). BMI and waist circumference was negatively correlated with Intestinal iron absorption (*left table*) due to hepcidin upregulation [13] .

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