Vitamins And Iron Preparations

- **Vitamin toxicity**
- **The consumption of vitamins (and minerals) has increased in the past several years due to our interest in good health, nutrition and preventive medicine.**
- **Vitamins can be purchased without a prescription in non-pharmacy outlets in dosage strengths that often require a prescription when purchased from pharmacy outlets.**

- **Megadosing**

- **A vitamin megadose is defined as a dose that is ten or more times the RDA. Most people who use megadoses report that they personally feel better when these large doses are consumed.**

- **Toxic manifestations of vitamin over ingestion are more commonly seen with the fat-soluble vitamins A and D.**

- **The water-soluble B complex and vitamin C are eliminated in the urine when taken in overdose. generally cannot be considered to be life-threatening.**

- **Vitamin A Toxicity**

- **Vitamin A toxicity can occur from either the topical or oral form of Vitamin A. Each has its own set of adverse effects. Oral vitamin A toxicity can be acute or chronic. In acute toxicity, ingestion occurs because of the ingestion of a large amount of vitamin A over a short period of time. In chronic toxicity, intake is over a longer duration. The most common adverse effect of topical retinoids is skin irritation, notably erythema and peeling. The most severe adverse effect of systemic retinoids is teratogenicity.**

- **Vitamin A Toxicity**
- **Acute toxicity is reported in:**
- **· adults after oral ingestion of 1,000,000 IU**
- **· children after oral ingestion of 300,000 IU**
- **Chronic toxicity usually develops after ingestion of 10 times the RDA. RDA of Vitamin A in the different age groups**
- **Adults & Children > 4 yrs 5,000 IU, Children < 4yrs 2,500 IU, Infants (0-12 mths) 1,500 IU**

- **Clinical Features**
- **Acute ingestion: Headache, vomiting, blurred vision, irritability and other effects associated with increased intracranial pressure**
- **Chronic ingestion: Vomiting, anorexia, fatigue, irritability, diplopia, headache, bone pain, alopecia, skin lesions, increased intracranial pressure mimicking brain tumor and papilloedema. laboratory findings include**

1-elevated liver function tests,

2-prolonged PT,

3-hypercalcaemia,

4-elevated erythrocyte sedimentation rate and periosteal calcification on X-ray.

- **Management of Toxicity**
- **Withholding all vitamin A supplementation.**
- **Treat vitamin-A induced elevated intracranial pressure (if it occurs) with mannitol, dexamethasone and hyperventilation.**

- **Vitamin D**
- **Toxicity Limited data is available for toxicity due to single overdose; one report suggests that 100 times RDA is necessary to produce acute hypercalcemia.**
- **Chronic ingestion in excess of 2,000 IU/day in children and of 75,000 IU/day in adults may produce toxicity.**

- **Clinical Features: Anorexia, lassitude, nausea, vomiting, diarrhoea, polyuria, nocturia, albuminuria, polydipsia, sweating, headache, vertigo, hypertension, renal failure and high cholesterol level. Hypercalcaemia, cardiac arrhythmia, myocardial infarction, polyneuropathy, extreme depression, confusion and fatigue, normocytic/normochromic anemia may be seen with chronically high ingestion.**

- **Management of Toxicity**
- • **Withhold all Vitamin D supplements.**
- • **Treat hypercalcemia :**
- **- initiate low calcium diet,**
- **- administer ascorbic acid to lower urine pH thereby enhancing calcium excretion,**
- **- administer IV furosemide to enhance calcium excretion by forced diuresis,**
- **- replace lost fluids, sodium and potassium by IV infusions,**
- **- severe hypercalcaemia not responding to other therapies has been treated with sodium EDTA or mithramycin**
- **- Cholestyramine may be effective in lowering serum calcium**

- **Vitamin E**
- Toxicity following a massive dose has been ingested.
- **Clinical Features**
- • GI disturbances, headache and fatigue, abnormalities of prothrombin and bleeding times have been noted.
- **Management of Toxicity**
- • Discontinuance of megadose therapy is indicated.
- **Laboratory Tests :** PT

- **Vitamin B6 (Pyridoxine)**
- Neuropathy has been most commonly reported after chronic oral ingestion of 200-6000 mg/day for several months or years.
- **Clinical Features**
- Sensory neuropathies characterized by burning pains and paraesthesias, often associated with ataxia or clumsiness; seizure
- **Management of Toxicity**
- • Discontinuation of Vitamin B6 leads to resolution of symptoms. Total recovery can take months.
- **Laboratory Tests :** Serum pyridoxine level (above 20ng/mL), neurological testing.

- **Vitamin B3 (Niacin)**
- • Acute ingestion of more than 100mg may cause dermal flushing.
- **Clinical Features**
- • Cutaneous flushing, pruritus, wheezing. Chronic large doses lead to hepatotoxicity.
- **Management of Toxicity**
- • Symptomatic treatment of sensitivity reactions with oral or intramuscular diphenhydramine.

- **Vitamin C**
- Toxicity of water-soluble vitamin C is rare. In a single case, a man given an IV dose of 45g suffered from acute renal failure and death. Nephropathy has occurred with chronic ingestion of >4g/day and acute IV administration of 1.5g.
- **Clinical Features**
- • Diarrhoea with amounts up to 10g or more daily.
- **Management of Toxicity**
- • Treatment of effects of diarrhoea eg. dehydration.

- **Iron Preparations**

- Ingestion of 20-60mg/kg of elemental iron is potentially toxic. Fatalities have occurred following pediatric ingestions of 1200 to 4500 mg of elemental iron. The lowest reported lethal dose in an adult is 2g of elemental iron with delayed deferoxamine treatment. Normal serum values range from 50 to 175µg/dL, peak levels of < 350µg/dL are not considered toxic; toxic serum iron level is > 500µg/dL.

- **Clinical Features**

- GI system: Nausea, vomiting, diarrhoea and haemorrhagic necrosis
- CVS system: Tachycardia, hypotension, circulatory collapse and cardiac failure
- Respiratory: Pulmonary oedema Metabolic Acidosis, hyperglycaemia Hepatic Necrosis
- Genitourinary: Renal failure Neurologic Lethargy, restlessness or confusion, convulsions and coma may occur in later phases

- Phase I (0.5-2hrs) includes vomiting, hematemesis, abdominal pain, diarrhea, lethargy, shock, acidosis and coagulopathy. Necrosis to the GI tract occurs from direct effect of iron on GI mucosa.
- Phase II (after Phase I) includes a period of apparent recovery and may give a false sense of security. Observe closely.
- Phase III (2-24 hours after Phase I) includes profound shock, severe acidosis, cyanosis, fever, worsening of GI hemorrhage, severe lethargy, coagulation defects, renal insufficiency secondary to poor perfusion.
- Phase IV (2 to 4 days) includes possible hepatotoxicity.
- Phase V (days to weeks) includes GI scarring and strictures.

- **Management of Toxicity**
- • Maintain airway and circulation.
- • Treat shock with IV crystalloid fluids and replace blood if needed. If unresponsive, administer dopamine or norepinephrine.
- • Correct electrolyte balance.
- • Perform gastric lavage for patient with recent ingestion of 20mg/kg or more OR symptomatic patient.

- • IV Deferoxamine is indicated if :
- - patient is symptomatic and a serum iron cannot be readily obtained;
- - peak serum iron exceeds 350-500µg/dL.
- - The recommended dose is continuous IV infusion of up to 15mg/kg /hr with the maximum daily dose up to 80mg/kg. The total duration of therapy has not been established, however, the generally accepted recommendations include continuation of deferoxamine until : Serum iron falls to <100µg/dL or Patient is asymptomatic.

- **Contraindications**
- - Known sensitivity to desferrioxamine
- - Use in pregnancy only with cases of serious intoxication
- - Use with caution in patients with renal impairment
- **Adverse Reactions**
- - Hypotension, anaphylactoid reaction (from rapid IV administration).
- - Pain, sterile abscess, induration at injection site, with IM injection

THANK YOU