ATHLETICS
FEDERATION OF INDIA

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Reliance
Foundation Hospital
And Research Centre

RESPECT FOR LIFE

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NUTRITION FOR TRACK & FIELD ATHLETES

MIHIRA A R KHOPKAR

National Swimmer, Synchronized Swimmer

B Sc. Dietetics, M Sc. Sports Nutrition

Lead Sports Nutritionist, Sir H.N. Reliance Foundation Hospital

OUTLINE

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- I. Track & Field Nutrition: The Basics
  - Macronutrients
    - Carbohydrates
    - Proteins
    - Fats
  - Fluid Needs
  - Pre-During-Post Training Guideline
  - Key Micronutrients
    - Minerals
    - Vitamins
  - Super Foods
- II. Nutrition for Juniors
  - Growth spurts & Nutrition Requirements
- III. A glimpse into Periodized Nutrition
  - Definition
  - Framework
  - Key Objectives & Goals
  - Example of a Periodized Diet Plan
- IV. Summary

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"A PROPER DIET CANNOT MAKE AN AVERAGE ATHLETE ELITE BUT A POOR DIET CAN MAKE AN ELITE ATHLETE AVERAGE"

COSTILL 1983

Rationale- Nutrition

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NUTRIENTS

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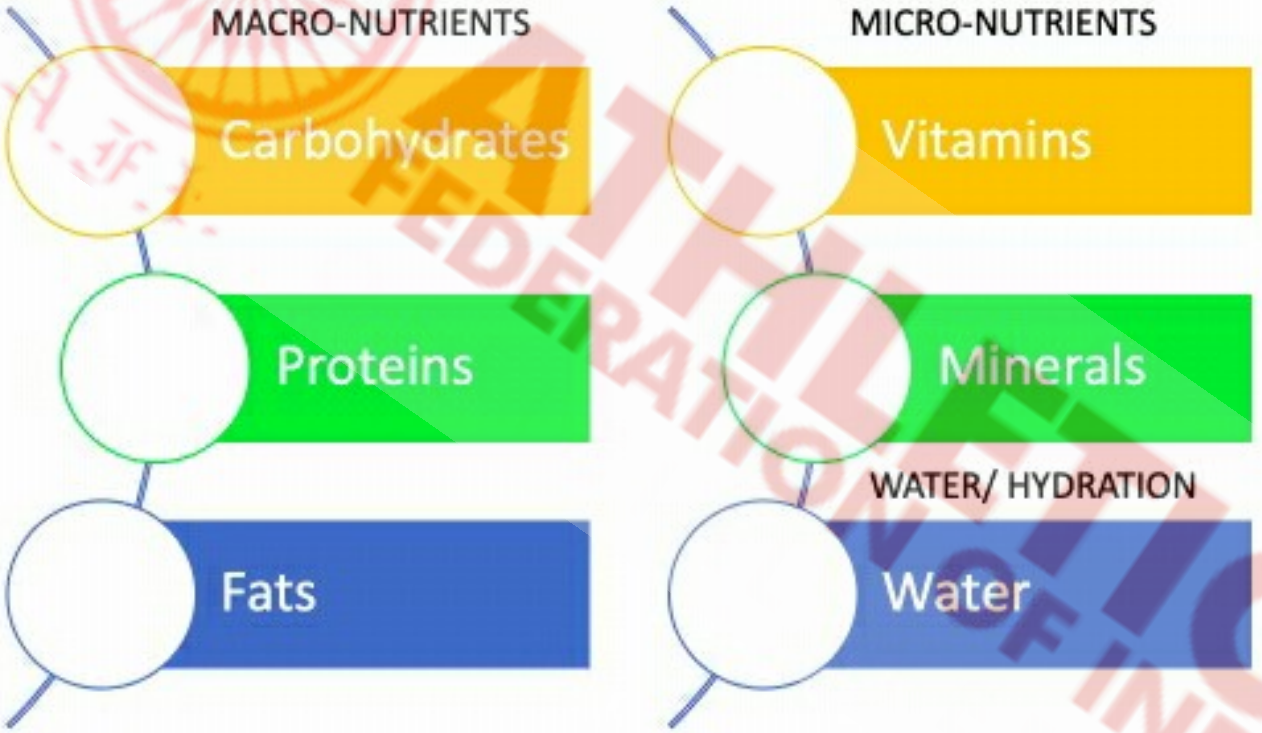

ENERGY SUBTRATES

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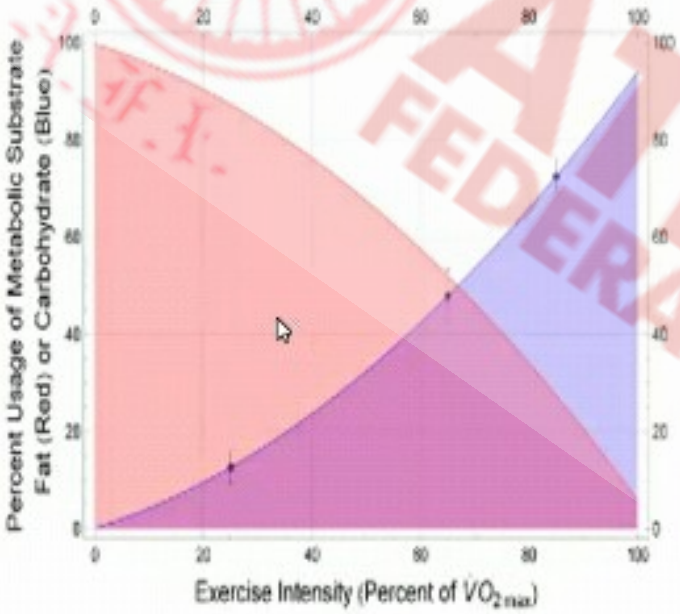

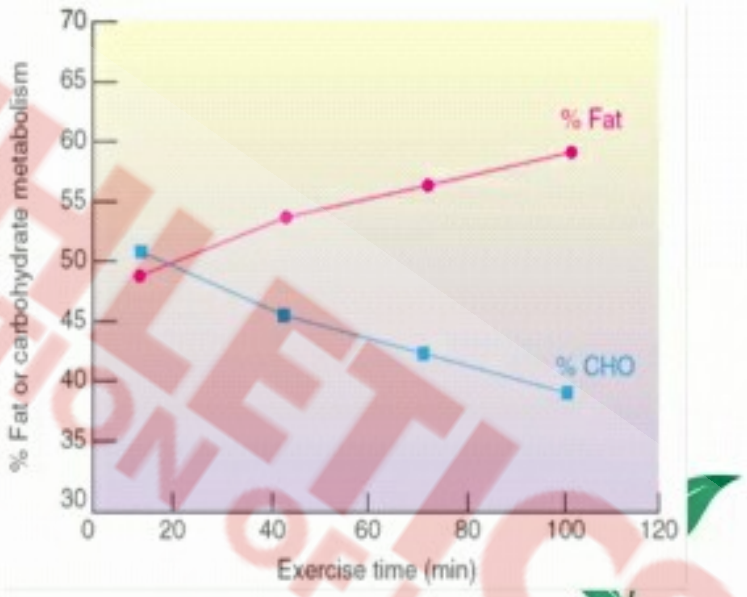

Rapoport B, 2010

SNAPSHOT: CARBOHYDRATES

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KEY FUNCTIONS	STORES	TYPES
• Short lived-fuel • Need to replenish/re-fuel • Protein sparing action • Fuel for brain & RBC's • 1g= 4 kcal	• Circulating form: Blood Glucose • Storage form: Glycogen [Muscles (350-500g), Liver (90-100g)]	• Complex : Slow absorbing carbohydrates • Simple: Fast absorbing carbohydrates

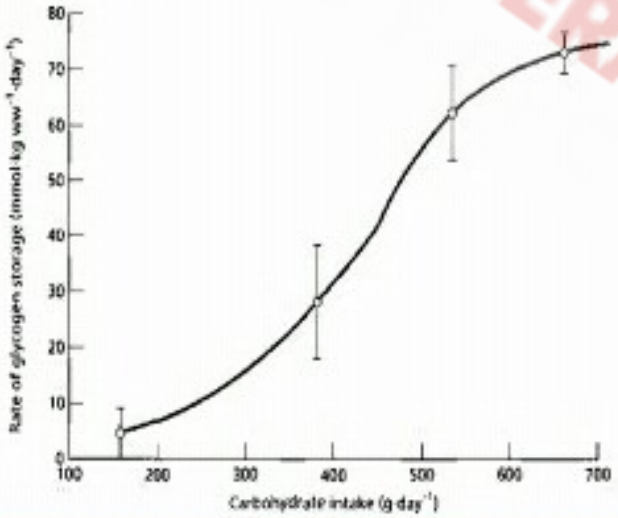

Fig. 29.3 The rate of glycogen resynthesis in the muscle after exercise is closely related to the carbohydrate content of the diet. For complete and effective recovery of the muscle glycogen stores, a high carbohydrate diet should be eaten.

Shephard RJ, Astrand PO, Endurance in Sport, Vol II of Encyclopedia of Sports Medicine; An IOC Commission publication, 2000

CARBOHYDRATE SOURCES

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Rate of absorption	Food Sources
Slow- moderate rate of absorption	Millets (Ragi, Bajra, Jowar)
	Quinoa
	Pulses/Lentils
	Fruits (Apple, Pear, Berries, Peaches, Plums)
	Milk (Dairy), Soy milk
	Most vegetables
	Wheat, Brown rice, Pasta, Dalia, Oats
	Fruits (Oranges, Grapes, Pine-apple, Mango), Dry fruits (Dates)
	Sweet-potato
	Honey
Fast absorbing	Breakfast cereals like cornflakes, White Rice, Naan/Kulcha (Maida)
	Bread (while/brown)
	Potatoes
	Fruits (Bananas, Chickoos, Watermelon)
	Glucose, Sugar

1. https://www.health.harvard.edu/diseases-and-conditions/glycemic-index-and-glycemic-load-for-100-foods
2. *Shephard RJ, Astrand PO, Endurance in Sport, Vol II of Encyclopedia of Sports Medicine; An IOC Commission publication, 2000*
3. *Longvah T et al. Indian Foods Composition Table, National Institute of Nutrition, 2017*

SNAPSHOT: PROTEINS

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KEY FUNCTIONS	FORMS	TYPES
• Muscle-Protein synthesis (along with CHO) • Repair, Recovery • Synthesis of hormones, anti-bodies, transport proteins etc. • Can act as fuel source • 1g= 4 Kcal	• Circulating form: Blood (amino acids)	• Complete proteins (Containing all essential amino acids in right amounts & proportions) • Incomplete proteins (Missing one/more essential amino acids or insufficient quantities)

PROTEIN SOURCES

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Estimated Absorption from slow to fast	Food Source
	Beef
	Pork
	Goat
	Mutton
	Poultry
	Fish
	Casein
	Paneer
	Cheese
	Nuts
	Pulses/ Lentils/ Quinoa
	Milk/ Curd
	Soy milk (with sugar)
	Eggs
	Egg whites
	Vegan Protein Supplement
	Whey Protein Supplement

1. *Longvah T et al. Indian Foods Composition Table, National Institute of Nutrition, 2017*

SNAPSHOT: FATS

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KEY FUNCTIONS

- Reservoir of energy
- Thermo-regulation
- Protection of organs
- Cholesterol: Steroid hormone synthesis
- 1g= 9 Kcal

STORES

- Circulating form: Blood fatty acids
- Storage form: Muscles (Triglycerides), Adipose tissues (Triglycerides)

Coyle E. Fat metabolism during exercise. GSSI

FATS SOURCES

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Types of Fats	Food Sources
Saturated	Butter, Ghee, Dairy, Red-Meat
Unsaturated (Mono)	Olive Oil, canola oil, Avocadoes
	Nuts & Seeds
Unsaturated (Poly) Omega-3	Fish (Mackerel, Indian Salmon, Norwegian salmon, Tuna)
	Flax seeds, Chia seeds, walnuts
Unsaturated (Poly) Omgea-6	Vegetable oils (sunflower, safflower etc.)
Medium-chain triglycerides (MCTs)	Coconut oil
Trans Fats	Vanaspati, fried items repeatedly fried in the same oil
Cholesterol	Eggs, Red-Meat

Good for you! **Use-moderately** **Avoid**

1. *Longvah T et al. Indian Foods Composition Table, National Institute of Nutrition, 2017*

Macronutrient Requirements

Discipline	Carbohydrate ($g.kg^{-1}.day^{-1}$)	Protein ($g.kg^{-1}.day^{-1}$)	Fat (%/ $g.kg^{-1}.day^{-1}$)
Sprints	3-6	1.6-2.2	20-30%
Mid-Distance	7-10	1.5-1.7	
Long-Distance	Up to 12	1.6-1.8	Fat adaptation?
Jumps	3-6	1.5-1.8	1-1.2
Throws*	3-6	1.5-2.2	0.8-1.5
Combined Events	5-8	1.5-2	1-1.5

*higher body mass

Slater et al. 2019, Stellingwerff 2019, Costa et al. 2019, Sygo et al. 2019

Fluid Needs

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≥ 2% Dehydration → Poor motor co-ordination → Poor Performance

PRACTICAL HYDRATION STRATEGIES

- Weight, Urine colour, Thirst
- Personalize Fluid Requirements
- Drink as you would compete

Casa et al, 2019

Nutrient Timing

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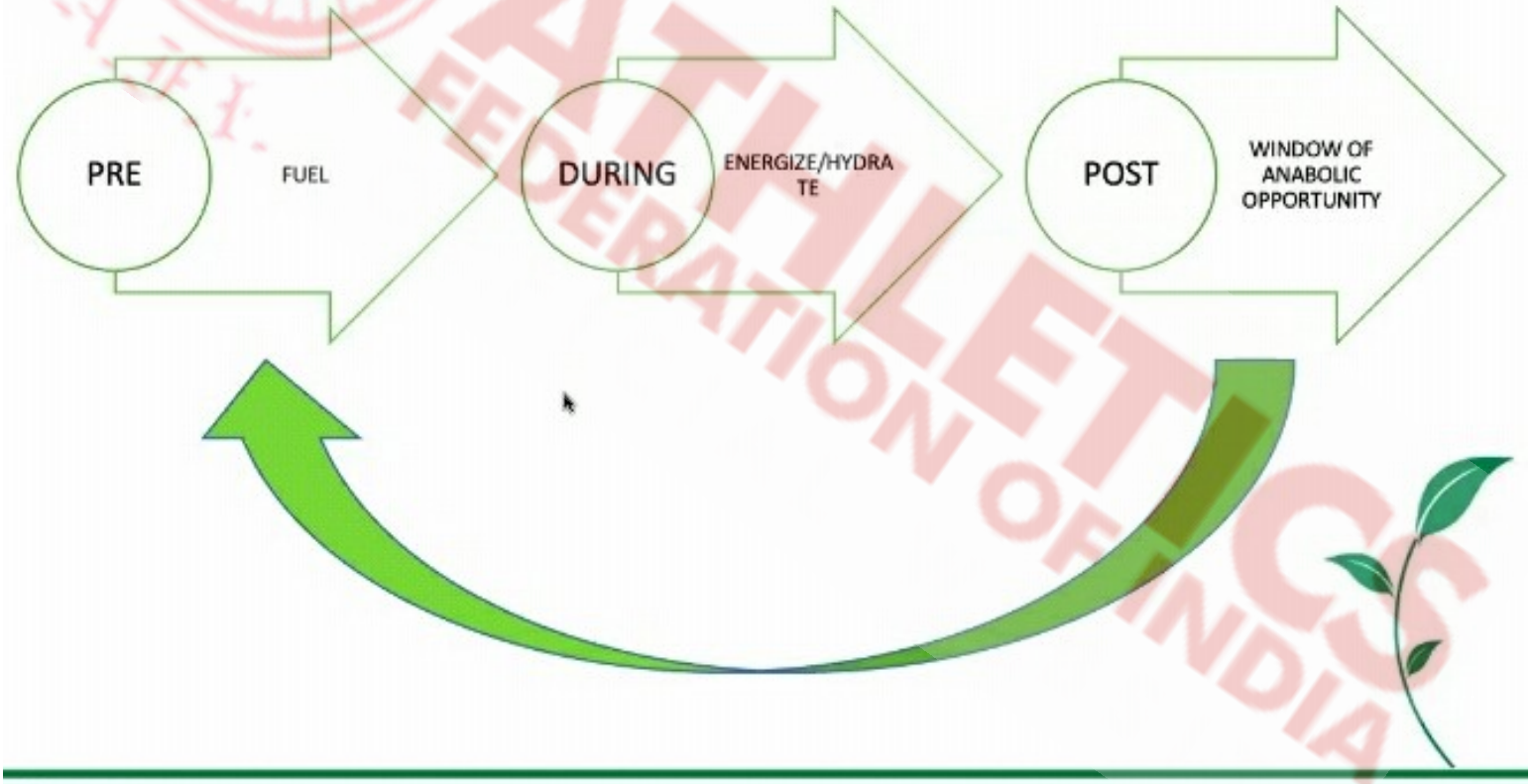

Nutrient Timing: General Guideline

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30-45 min Pre-Morning Training Session

- Fruits like Bananas, Oranges, Apples, Dry Fruits like Dates, Figs, Raisins OR 1 200g cup oats porridge/ragi porridge/muesli and milk/curd

During Morning Training Session

- Sports Drink/Lime water/Electrolyte drink (Customize the quantity based on requirements)/ Can add 1-2 dates/figs/1 small banana in between.

Immediately Post Morning Training Session

- 200ml fresh fruit juice/ 1 banana/chickoo/3-4 pineapple rings/1 300ml bowl melons/ handful of mix dry fruits + 1 whole egg + 2-3 egg whites/1/2-1 scoop of whey protein/300ml milk

Breakfast

- Combination of Eggs, Sausages, Salamis + 1-2 slice of toast/porridge/1-2 portions of breakfast + 1 cup pulse/sprouts (Specific requirements may vary)

KEY MINERALS

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Iron

- Key function: Hb-O2 carrying capacity
- Ideal Dose: At least 21mg/day
- Eggs, liver of chicken, pork, beef
- Rajgeera/Amaranth, chana, soybean, dates, halim seeds, white til

Calcium

- Key Function: Bone Health, muscle contraction
- Ideal Dose: 1000mg/day
- Eggs, milk, paneer, til, leafy vegetables, amaranth/rajgeera, ragi/nachni

Electrolytes

- During Training: 20 mmol/L sodium; 4 mmol/L potassium
- Na rich Foods: Table salt, Dairy, 1 cup leafy veggies
- K rich Foods: Most fruits, vegetables, Coconut water, Grains & Meat products

KEY VITAMINS

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A, C, E	D	B12
• Function: Immuno-nutrition, Anti-oxidant Protection • Amla/Gooseberry, Oranges, Drumsticks, Yellow/Orange & Dark colored fruits and vegetables, Olive oil, Mix nuts and seeds	• Key Function: Bone health, prevention of injuries • Dose: 1000 IU/ day to maintain normal vit D status • Specific Sources: Sunlight! And a few others: salmon, fatty fish, egg yolks	• Function: Repair, RBC Formation • Dose: At least 2.4mcg • Specific sources: All meat items coupled with probiotics such as curd, buttermilk for enhanced absorption

SUPER FOODS FOR ATHLETIC PERFORMANCE

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1 small beetroot= 120mg Nitrates
Consume: 2-4h Pre-Training

Bromelain is known to reduce ex induced muscle damage & inflammation
Consume: Post-Training

2 small fresh raw/25g amlas = 100mg Vitamin C
Consume: Immediately Post-Training

250-300ml tart cherry juice rich on phytochemicals to enhance recovery
Consume: Post-Training

SUPER FOODS FOR ATHLETIC PERFORMANCE

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1 cup coffee=100-150mg Caffeine
Consume: 30-60 min Pre-Training

Pinch of turmeric:- Rich on anti-inflammatory curcumin
Consume: Post-Training/ In Milk before-bedtime

250ml pomegranate juice:- Rich on anti-oxidant polyphenols
Consume: Post-Training

Others include:
Spinach
Cinnamon
Garlic
Black pepper
Ginger
Sabza seeds

Table 5 Performance Supplements and Sports Foods That May Achieve a Marginal Performance Gain in Athletics Events as Part of a Customized and Periodized Training and Nutrition Plan

Event	Caffeine	Creatine	Nitrate	Beta-alanine	Bicarbonate	Sports foods
100/200 m + 100/110 m hurdles, 4 × 100 m relay	✓	✓				Sports drinks • Can be used to achieve hydration and fuel strategies around longer/high-quality training sessions and longer races Electrolyte supplements • Can be used to achieve (re)hydration goals by replacing electrolytes lost in sweat Sports gels/confectionery • Can be used to achieve fueling strategies during longer training sessions/races Protein supplements • Can provide a convenient source of quickly digested, high-quality protein when it is impractical to eat food Liquid meals • Can provide a convenient source of carbohydrate, protein, and nutrients when it is impractical to eat food
400 m + 400 m hurdles 4 × 400 m relay	✓	✓		✓	✓	
800 m	✓	✓	✓	✓	✓	
1,500 m + 3,000 m steeplechase	✓		✓	✓	✓	
3,000 m steeplechase	✓		✓	✓	✓	
5,000/10,000 m, cross-country	✓		✓			
20/50 km race walk Half marathon/marathon	✓		✓			
Mountain/ultrarunning	✓		✓			
Jumps (long, high, triple, and pole vault)	✓	✓				
Throws (discus, hammer, javelin, and shot put)	✓	✓				
Heptathlon and decathlon	✓	✓	✓	✓	✓	

Note. Readers are referred to Burke et al. (2019), Costa et al. (2019), Slater et al. (2019), Stellingwerff et al. (2019a), Sygo et al. (2019).

RATIONALE:
NUTRITION FOR JUNIOR ATHLETES

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- Young athletes of the same chronological age could be at extreme ends for ranges of maturity
- Demands of sport are super-imposed on normal growth and maturation
- Increased prevalence of injury during adolescent growth spurt

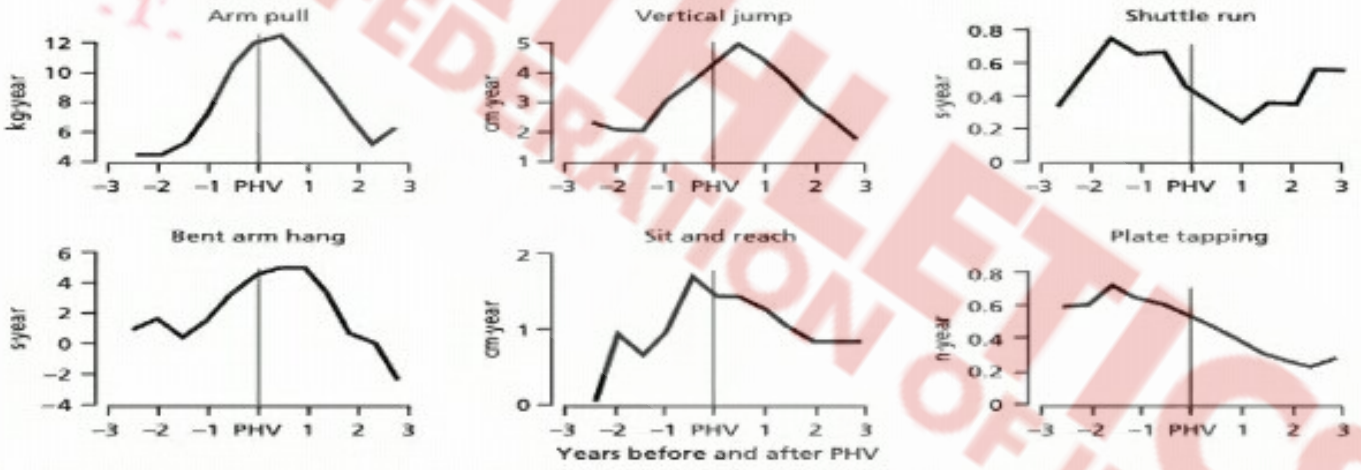

Fig. 1.1 Median velocities of several tests of strength and motor performance aligned on peak height velocity (PHV) in the Leuven Growth Study of Belgian Boys. Velocities for the performance items are plotted as years before and after PHV. Drawn from data reported by Beunen *et al.* (1988).

Beunen G, Malina R. Chapter 1: Growth & Biologic Maturation: Relevance to Athletic Performance
Rejeb A, et. Al, 2019

NUTRITION & JUNIOR ATHLETES

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- Increased requirements of the following:-
  - Energy (Kcal)
  - Protein
  - Calcium
  - Iron
  - B- Vitamins
- Imperative to inculcate healthy eating practices in order to avoid over-supplementation during young ages.

Growth spurts:
1. Linear: (5-9.5cm/year in pubertal male athletes & 5-8.3 cm/year in pubertal female athletes)
2. Peak weight velocity: (3Kg/year to gains of 9Kg/year during puberty)

Soliman A, Sanctis V, Elalaily R, 2014

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PERIODIZED NUTRITION