Unit 5. Bala Poshana (Child Nutrition) & Vyadhikshamatva (Immunity) Topic 1, 2

Unit 5 — Bala Poṣaṇa (Child Nutrition) & Vyādhikṣamatva (Immunity)

Topic 1 & 2 — Importance of Āhāra in health and disease; Age-related nutritional needs (incl. micronutrients & vitamins); Nutritional assessment

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1) Classical orientation: why Āhāra is the first medicine

In Kaumarabhritya, **āhāra** (food) is the *primary upastambha* (pillar) sustaining **bala** (strength), **varṇa** (complexion), **medhā** (cognition) and **ojas** (vital essence). The triad of daily pillars is classically stated as:

> **"आहारनिद्राब्रह्मचर्याणि त्रयोपस्तम्भाः ..."** — *Aṣṭāṅgahṛdayam*, **Sūtrasthāna** (Mātrāśītya/Āhāra-vidhi context).
> *(Sense: Food, sleep and regulated conduct are the three sustaining pillars of life.)*

Link to **Vyādhikṣamatva (disease resistance)**: good āhāra nourishes **rasa** and downstream dhātus, culminates in **ojas**, and manifests clinically as fewer infections, better convalescence and growth. Modernly, this aligns with adequate energy–protein–micronutrient intake, optimal breastfeeding and timely, diverse complementary feeding.

PART A — Importance of Āhāra in health and disease

1. **Sustains growth & development**: In infants/children, nutrient deficits quickly present as **growth faltering**, impaired neurodevelopment, anaemia, rickets and recurrent infections.
2. **Builds Vyādhikṣamatva**:
   - **Ayurveda**: Well-digested, doṣa-balancing diet → clear srotas → robust **ojas** → **bala** and **vyādhikṣamatva**.
   - **Modern**: Adequate **protein**, **iron**, **zinc**, **vitamin A**, **vitamin D**, **B12**, **folate**, **essential fatty acids** and **iodine** support innate & adaptive immune function (barrier integrity, antibody production, cytokine balance).
3. **Prevents both ends of malnutrition**:
   - **Deficits** → SAM/MAM, micronutrient deficiencies, infections.
   - **Excess/poor quality** → overweight/obesity, NAFLD, metabolic risk in adolescents.
4. **Therapeutic role**: Diet is the *first-line* in diarrhoea (continued feeds + zinc), anaemia (iron-rich foods + IFA), rickets (calcium + vitamin D), protein-energy malnutrition (bṛṃhaṇa pathya).

PART B — Age-related nutritional needs (Indian context with ICMR-NIN 2020 & WHO)

> **Note:** Values below use **ICMR-NIN 2020** energy and protein recommendations for children; micronutrient priorities are highlighted with practical targets and sources. For detailed planning, consult the full ICMR tables.

1) Energy & protein (daily needs) — remember these anchors

Age group	Energy (kcal/day)	Protein (RDA g/kg/day)*	What this means in practice
0–6 mo (exclusive BF)	~**530**	**1.40** (via breastmilk)	Early initiation; on-demand feeds

Age group	Energy (kcal/day)	Protein (RDA g/kg/day)*	What this means in practice
6–12 mo	~**660**	**1.23**	Start **iron-rich** complementary foods; 2–3 meals + BF
1–3 y	~**1110**	**0.97**	3 meals + 1–2 snacks; increase variety & fats
4–6 y	~**1360**	**0.87**	Family foods; ensure calcium/iron
7–9 y	~**1700**	**0.92**	School tiffin with protein
10–12 y (boys/girls)	**2220 / 2060**	**0.91 / 0.90**	Growth spurt prep; iron focus in girls
13–15 y (boys/girls)	**2860 / 2400**	**0.89 / 0.87**	High appetite; calcium, iron, zinc
16–18 y (boys/girls)	**3320 / 2500**	**0.86 / 0.83**	Peak bone mass window; sports nutrition

*ICMR-NIN 2020; for low-quality cereal-heavy diets, protein needs trend toward **≈1 g/kg/day**.

Meal-building rule (ICMR 2020): improve protein quality with a **3:1:2.5** mix of **cereals : pulses : milk** across the day (rotis + dal + curd/paneer), and include nuts/seeds.

2) Micronutrients & vitamins — what to prioritise by age

Below are **practical priorities** with indicative Indian RDA ranges and sources (drawn from ICMR-NIN 2020 summaries and WHO CF guidance). Use these to justify diet charts in exams.

a) 0–6 months (exclusive breastfeeding)

- Breastmilk suffices for most micronutrients **except vitamin D**; **IAP** recommends **400 IU/day** vitamin D in infancy.
- Maternal diet determines **B-vitamins**, iodine, fatty acid profile; ensure maternal adequacy.

b) 6–23 months (complementary feeding with BF)

- **Iron** (critical): introduce **heme iron** (egg/meat where acceptable) OR **fortified cereals/pulses + vitamin C**; WHO flags iron, zinc, **B12** as commonly limiting at this age.
- **Zinc**: pulses, millets, nuts/seeds, dairy, eggs/meat.
- **Vitamin A**: orange-yellow veg (pumpkin, carrot), mango, dairy; continue national supplementation where applicable.
- **Vitamin D** & **Calcium**: curd/paneer, til & ragi, sunlight prudently; continue vitamin D **400 IU/day** in infancy.
- **Iodine**: use **iodised salt** at household level.

c) 2–5 years (preschool)

- **Calcium** trend **~500–550 mg/day** (ICMR 2020): milk/curd/paneer, ragi/til.
- **Iron**: green leafy veg + pulses + vitamin C; heme sources where acceptable.
- **Essential fats**: add ghee/oils (visible fat within total limits) and nuts/seeds paste.

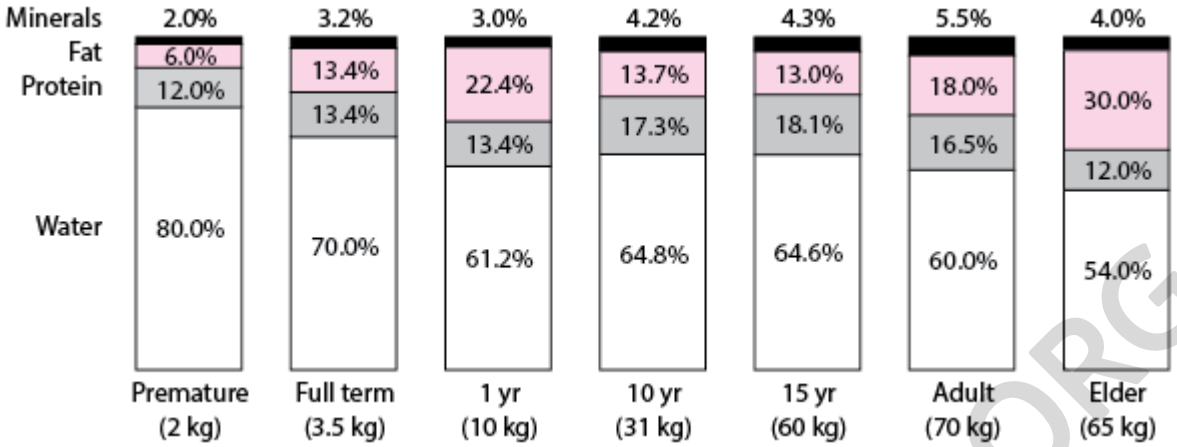
d) 5–9 years (school age)

- **Protein quality** and **zinc** for immunity and growth; tiffin must include **dal/egg/milk/nuts**.
- **Calcium** rises (~650 mg/day by 7–9 y).

e) Adolescents (10–18 years)

- **Iron**: girls need special attention (menarche); integrate weekly IFA where programmatically indicated.
- **Calcium**: climbs to **~850–1050 mg/day** as bone accrual peaks; ensure **milk/curd/paneer**, ragi/til.
- **Vitamin D**: meet **~400–600 IU/day** from diet + sunlight; supplement if deficient.
- **Energy density** for athletes; avoid sugary drinks/ultra-processed snacks.

WHO CF 2023 emphasises *thick* complementary foods, **iron-rich** options from day one of CF, and 2–3 meals at 6–8 mo → 3–4 meals + 1–2 snacks at 9–23 mo (breastfed). Use this language in short notes.



Changes in Body Composition With Growth and Aging
Adapted from Puig M: Body composition and growth. In *Nutrition in Pediatrics*, ed. 2, edited by WA Walker and JB Watkins. Hamilton, Ontario, BC Decker, 1996.

PART C — Practical diet building (India-friendly templates)

- **6–8 mo**: mashed dal-khichri with ghee; mashed egg yolk or paneer; fruit mash (banana/mango) + curd; avoid thin gruels.
- **9–12 mo**: upma with moong-dal powder; idli + sambar; suji halwa with ground peanuts/til.
- **1–3 y**: chapati soaked in dal + sabji; curd rice; veg poha + peanuts; fruit.
- **4–9 y**: roti/dal/sabji + curd; egg/paneer roll; sprouts chaat; fruit.
- **10–18 y**: 3 meals + 1–2 snacks; add **milk (300–600 ml/day)** or curd/paneer portions; **egg/fish/chicken** where acceptable or **dal + nuts** otherwise.

Protein-quality hacks: cereal–pulse pairing (roti-dal, khichri), dairy, soy/tofu, nuts & seeds (powders/pastes in younger children).

PART D — Nutritional assessment (anthropometry + diet + clinical + labs)

1) Anthropometry (how to measure correctly)

- **Length** (<24 mo) on infantometer; **height** (≥24 mo) on stadiometer; **weight** on calibrated scale; **MUAC** (6–59 mo) with standardized tape; **head circumference** (infants).
- Plot on **WHO Growth Standards**; interpret **Z-scores** (number of SD from the median).

Key cut-offs (6–59 months):

- **SAM**: **WHZ < −3 or MUAC < 115 mm** or **bilateral pitting oedema**.
- **MAM**: **WHZ ≥ −3 and < −2** or **MUAC 115–124 mm**.

BMI-for-age (5–19 y) for thinness/overweight; track **velocity** (crossing down ≥2 major centile lines signals growth faltering).

2) Dietary assessment (what to ask)

- **24-hour recall** + **7-day food frequency** (milk, pulses, eggs/flesh foods, fruits/veg; junk/UPFs).
- Texture/portion suitability for age; **meal frequency** vs WHO CF guidance.

- **Household measures**: cups, katoris, spoons; verify oil/ghee use (energy density).
- Feeding behaviours (responsive feeding, distractions, bottle use), appetite, illness days.

3) Clinical signs (quick head-to-toe)

- **Anaemia**: pallor, fatigue, pica, spoon nails.
- **Vitamin A**: night blindness (older child), xerosis/Bitot's spots.
- **Vitamin D/Calcium**: bone pain, delayed motor milestones, wrist/ankle widening, bowing.
- **Zinc**: frequent infections, poor growth, periorificial dermatitis.
- **B-complex**: angular stomatitis, glossitis, dermatitis.
- **Protein–energy**: wasting/oedema, hair changes.

4) Laboratory basics (context-specific)

- **Hb** (anaemia); **ferritin/CRP** where feasible to assess iron status; **25-OH-D** if rickets/low-sunlight risk; **TSH**, **celiac screen** in selective growth faltering; stool (parasitic).
- Always **triangulate** with anthropometry + diet + clinical.

PART E — Immunity (Vyādhikṣamatva) and nutrition: integrate in your answer

- **Ayurvedic construct**: *vyādhikṣamatva* = **vyādhi-bala-virodhitva** (resistance to disease) + **vyādhi-utpāda-pratibandhakattva** (aversion to disease generation); it is **bala/ojas-centric**.
- **Modern mapping**: nutrition drives **barrier integrity (skin/mucosa)**, **microbiome** (HMOs, fibre), **cell-mediated & humoral responses** (iron, zinc, vitamins A/D/B12/folate), and **immunometabolism** (PUFAs). Contemporary reviews explicitly connect **Vyādhikṣamatva–Ojas–Dhātu-poshana** with immunity.

Counselling line (write as is): *"Balanced āhāra that is age-appropriate, diverse and digestible is the daily 'rasāyana' for a child's vyādhikṣamatva."*

PART F — Putting it to practice (quick algorithms)

1) For infants 6–23 months (breastfed)

- Ensure **meal frequency** per WHO (2–3 → 3–4 + 1–2 snacks), **thick consistency**, one **iron-rich** food each day, **vitamin C** with plant iron, regular **milk/curd/paneer**, and **iodised salt**.
- Continue **vitamin D 400 IU/day in infancy**; review need thereafter.

2) For preschool/school age

- **3 meals + 1–2 snacks**; each meal = grain + **protein** (dal/egg/milk/paneer) + veg; one fruit/day.
- **Calcium** to target age-band values (≈500–650 mg/d 1–9 y).

3) For adolescents

- **Breakfast mandatory**; **protein** at each meal; **600–1000 ml/day** milk equivalent or ragi/til alternatives.
- **Menstrual girls**: iron-rich foods + IFA as per program; screen for symptomatic anaemia.

PART G — Case-style examples (write in short answers)

- **Case 1 (9-mo)**: BF + thin rice water 2×/day → WHZ −2.1. *Fix*: move to **thick** khichri with ghee, add **dal powder**, **egg/Paneer** or fortified cereal, fruit; recheck weight in 2 weeks per WHO CF.
- **Case 2 (12-y girl)**: pallor, low diet diversity. *Plan*: diet with **heme/fortified** iron + vitamin C, screen Hb, start IFA if indicated; add **milk/curd** for calcium; outdoor play (vit D).
- **Case 3 (3-y boy)**: MUAC 12.3 cm (MAM), recent diarrhoea. *Plan*: energy-dense foods, pulse-based snacks, **zinc** during diarrhoea; weekly follow-up; red-flag if MUAC drops.

Assessment

Long answer (10 marks)

1. **Explain the role of Āhāra in building Vyādhikṣamatva** in children. Correlate Ayurvedic concepts (rasa→ojas) with modern immunity, then tabulate **age-wise nutrient priorities** and outline a **nutritional assessment protocol** including WHO growth charts and MUAC.

Short essays (5 marks each)

1. **Age-related needs (0–2 y)**: energy, protein, iron, zinc, vit A/D; include WHO CF frequency & consistency.
2. **Adolescent nutrition**: energy, protein quality, **calcium** peak bone mass, **iron** for girls; vitamin D sunlight policy with IAP note.
3. **Nutritional assessment**: steps, cut-offs for SAM/MAM and actions.

Short answers (3 marks each)

- Define **Vyādhikṣamatva** and list **three** dietary determinants.
- Write **two** indicators of adequate complementary feeding at 9–12 months.
- Give **ICMR-NIN 2020** protein RDA (g/kg/d) for **1–3 y** and **7–9 y**.
- State **SAM** criteria (any one suffices).
- Name **four** clinical signs of micronutrient deficiency (any).

MCQs (1 mark each)

1. ICMR-NIN 2020 daily **energy** for a **1–3 y** child is closest to:
   a) 800 kcal b) **1100 kcal** c) 1500 kcal d) 1800 kcal.
2. **SAM** can be diagnosed when MUAC is:
   a) 130 mm b) 125 mm c) **<115 mm** d) 140 mm.
3. **Vitamin D** routine prophylaxis in infancy (IAP) is:
   a) 200 IU/day b) **400 IU/day** c) 800 IU/day d) 1200 IU/day.
4. WHO CF stresses complementary foods must be:
   a) Thin and watery b) **Thick (spoon holds)** c) Given once daily d) Fruit only.
5. For protein quality, ICMR suggests daily mix of cereal:pulse:milk ≈
   a) 5:1:0.5 b) 1:1:1 c) **3:1:2.5** d) 11:1:3.

References

Classical

- **Aṣṭāṅgahṛdayam (Vāgbhaṭa)** — *Sūtrasthāna* (Mātrāśītya / Āhāra-vidhi context): **Tri-upastambha** (āhāra, nidrā, brahmacarya).
- **Kāśyapa Saṃhitā** — sections on *Bāla-poṣaṇa* and *Annapāna/Lehana* (conceptual links between nourishment and bala/ojas).

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- **Caraka Saṃhitā** — *Sūtrasthāna 27* (*Annapānavidhi*): principles of dietetics supportive of infant and child feeding transitions.

Modern / Guidelines

- **ICMR-NIN (2020)**. *Nutrient Requirements for Indians: RDA & EAR — Brief note* (energy & protein by age; protein quality mix).
- **WHO (2023)**. *Guideline for Complementary Feeding of Infants and Young Children 6–23 months* (meal frequency, iron-rich foods, consistency).
- **WHO ELENA / Nutrition Journal**: **SAM/MAM** diagnostic thresholds (WHZ and MUAC).
- **IAP (2021/2022)**. *Vitamin D in Childhood: Revised Guidelines* (400 IU/day in infancy; diet/sunlight thereafter).
- **NIN (2024)**. *Dietary Guidelines for Indians* — child diet charts and practical messaging.
- **NIN/secondary summaries**: Child **calcium** RDAs (≈500 mg in 1–3 y → ≈1050 mg in 16–18 y).

60-second recap

Āhāra is a *pillar* of paediatric health. Use **ICMR-NIN 2020** anchors for **energy/protein**, ensure **iron–zinc–vit A/D–B12** sufficiency by **age**, and apply **WHO** guidance for **complementary feeding**. Assess every child with **anthropometry (Z-scores, MUAC)**, **dietary recall**, **clinical signs** and targeted **labs**. In Ayurvedic language, well-digested, diverse food sustains **rasa → ojas**, and thus **Vyādhikṣamatva**.

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