

## Diet-Based Interventions and Vitamin-D Deficiency

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Sun radiation penetrates skin-layers called the epidermis, while there's a chemical called 7-hydrocholesterol. This chemical is absorbed through ultraviolet light to produce the pre-vitamin-D molecule. Warm skin converts pre-vitamin D3 to vitamin D3, which moves from the skin, pushed out into the capillary system and, eventually, into the blood system, where it can then be activated and used. Air and sun exposure is needed to give students adequate doses of vitamin D (600 IU daily dose according to the Consensus Report of the Institute of Medicine), needed to maintain bones to prevent *rickets* and *tuberculosis* (during early childhood), *scoliosis*, *kyphosis* and *lordosis* (during later childhood and adolescence), *osteomalacia* (during adulthood) and *osteoporosis* (during old age) — a guarded-graduated approach (guarded means strict overexposure surveillance for possible harmful effects and graduated means systematic exposure increase to condition body to increased doses) should build up tolerance to sun-exposure, resistance to common colds as well as produce a melanin layer on skin, which protects the students from getting skin cancer, at the same time acclimatizing child to heat effects. During initial exposure, the students should cover their exposed body-parts by an appropriate SPF sunscreen. The importance of skin exposure of primary-school students to the morning (for the morning-shift schools) or the later-afternoon (for the afternoon-shift schools) sun cannot be over-emphasised. A mirror exercise is to be done by the parents, whereby they should allow younger children to play in the sun stripped to waist, wearing only shorts/miniskirts in the later afternoon or the morning (depending on the school-shift). These dressing practices would, also, give the body an opportunity to breathe. Many instances of vitamin-D deficiency are found in the Asian countries, in particular, Pakistan. In a recent UK study, 13 out of 14 found cases of vitamin-D deficiency were found in the Asian children. Adverse effects may include backache, chronic fatigue, muscular and joint pain as well as progressively weakening eyesight. In younger children, it may lead to chronic flu, delayed teething and hardening of the skull-bone. In addition, deficiency of this vitamin may cause Alzheimer's disease, autoimmune diseases, cancer, infectious diseases and kidney stones. Supplementation via intra-muscular injection, tablets or syrups is not recommended, as these measures may cause severe vitamin-D toxicity in case the vitamin fails to absorb in the body. The most natural, the cheapest and the safest way is to expose students' skins to sunshine, at those times when sun rays are inclined and coming from a denser layer of atmosphere, so that intensity is reduced and harmful rays are cut down by absorption or removal from the main beam. Starting with a 10-minute exposure, initially and gradually, increasing to 20 and later to 30 minutes, accompanied with 2-3-hour, fresh-air exposure in the shade, with the students minimally dressed, exposing hair, hands, arms, shoulders, backbone and back-skin from external auditory meatus to waistline, legs from mid-thighs to feet. During this period, engage students in light floor activities, involving drawing, singing, scribbling, playing jigsaw puzzles or board games or a structured activity, like story reading by teacher. During an outdoor activity, the teacher should sit facing the sun and the students must have their backs towards the sun to protect their eyes. Vitamin-D deficiency prevents calcium to be, properly, absorbed from diet and contribute towards strengthening the bones and preventing scoliosis, gaining height through tissue synthesis and maintaining optimal weight.

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