SEASONAL VARIATION IN SERUM 25 HYDROXYVITAMIN D AMONG CHILDREN AGED 3 TO 6 YEARS IN SURKHANDARYA REGION UZBEKISTAN

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Protocol abstract

Annotatsiya. Surxondaryo viloyatida yashovchi 3–6 yoshli bolalarda D vitamini statusining mavsumiy o‘zgarishlarini baholash uchun prospektiv kuzatuv tadqiqoti taklif etiladi. Bir xil bolalarda zardobdagi 25-gidroksivitamin D [25(OH)D] to‘rt mavsumda o‘lchanadi. Qo‘shimchalar qabul qilish, ovqatlanish, ochiq havoda bo‘lish va antropometrik ko‘rsatkichlar hisobga olinadi. Takroriy o‘lchovlar chiziqli aralash effektli model bilan tahlil qilinadi. Tadqiqot mavsumiy farqlarning kattaligi va ular bilan bog‘liq omillarni aniqlashga qaratilgan; natijalar hali olinmagan.

Kalit so‘zlar: D vitamini; 25-gidroksivitamin D; maktabgacha yosh; mavsumiylik; prospektiv kuzatuv; Surxondaryo.

Аннотация. Предлагается проспективное наблюдательное исследование сезонных изменений статуса витамина D у детей 3–6 лет, проживающих в Сурхандарьинской области. У одних и тех же детей концентрация сывороточного 25-гидроксивитамина D [25(OH)D] будет измеряться в четыре сезона. Будут учитываться прием добавок, питание, пребывание на открытом воздухе и антропометрические показатели.

Повторные измерения планируется анализировать с помощью линейной модели со смешанными эффектами. Исследование направлено на оценку величины сезонных различий и связанных с ними факторов; фактические результаты еще не получены.

Ключевые слова: витамин D; 25-гидроксивитамин D; дошкольный возраст; сезонность; проспективное наблюдение; Сурхандарья.

Abstract. A prospective observational study is proposed to assess seasonal vitamin D status in children aged 3–6 years residing in Surkhandarya, Uzbekistan. Serum 25-hydroxyvitamin D [25(OH)D] will be measured in the same children across four seasons. Supplementation, diet, outdoor activity and anthropometry will be recorded. Repeated measurements will be analysed using a linear mixed-effects model. The study aims to quantify seasonal differences and associated factors; no empirical results are yet available.

Keywords: vitamin D; 25-hydroxyvitamin D; preschool children; seasonality; prospective cohort; Surkhandarya.

Scientific rationale. This component addresses seasonal vitamin D status rather than somatic morbidity. The distinction between environmental sunlight and personal exposure is central: outdoor timing, shade, clothing and behaviour may modify the relationship between a sunny climate and serum 25(OH)D. A repeated-measures design reduces confounding by stable differences between children, although age-related changes and changes in supplementation still require consideration. Contemporary guidance does not establish a universal 25(OH)D target for prevention of non-skeletal disease [1, 2].

Objective. To quantify within-child seasonal variation in serum 25(OH)D and explore its associations with supplementation, diet, outdoor activity and anthropometric characteristics.

Methods. A prospective observational cohort is proposed, enrolling children aged 3–6 years at baseline who have resided in Surkhandarya for at least 12 months. The same children will be assessed in four prespecified seasonal windows over one annual cycle, provisionally February, May, August and November. Recruitment will cover urban and rural settings. Conditions substantially affecting vitamin D metabolism, including chronic kidney or liver disease and malabsorption, will be excluded; relevant medications will be documented. Routine supplementation will not be withheld.

Total serum 25(OH)D will be measured using the same assay platform with documented calibration and internal and external quality control. Each visit will record supplement dose and adherence, vitamin D and calcium intake, outdoor time and time of day, clothing and sun-protection practices, recent illness, and height and weight. Local meteorological data will characterize seasonal solar availability; these data will not be treated as direct measurements of personal ultraviolet exposure.

The primary outcome will be within-child variation in continuous 25(OH)D concentration across the four visits, analysed using a linear mixed-effects model with a child-specific random intercept. Prespecified contrasts and adjusted associations will be reported with 95% confidence intervals. Secondary descriptive categories will follow the skeletal-health consensus: deficiency <30 nmol/L, insufficiency 30–50 nmol/L and sufficiency >50 nmol/L [3]. These categories will not imply thresholds for non-skeletal disease. Sample size will be calculated before recruitment from the prespecified primary contrast, plausible within-child variability, 80% power, two-sided α=0.05 and

anticipated attrition. Missing-data assumptions and sensitivity analyses will be prespecified.

Sampling and quality assurance. The proposed cohort will include children from selected urban and rural recruitment sites. Residence, eligibility and parental consent will be verified before enrolment. The sampling frame, recruitment procedure and participation rate will be documented so that representativeness can be assessed. Visit windows and acceptable deviations will be fixed before recruitment; exact sampling dates will be retained. The primary seasonal contrast will be February versus August, with all four visits contributing to the overall seasonal model.

Analytical considerations. Sample handling, storage, assay platform, units and laboratory quality-control procedures will be standardised and recorded. Dietary and outdoor-exposure questions will refer to a defined recent period and be repeated at each visit. Serum 25(OH)D will be analysed primarily as a continuous measurement. The consensus categories correspond to <12 ng/mL, 12–20 ng/mL and >20 ng/mL, respectively, using 1 ng/mL = 2.5 nmol/L. These are skeletal-health descriptors rather than universal targets for disease prevention [1, 3].

Limitations and practical relevance. Changes in supplementation following clinically significant findings may influence later measurements and will be examined in sensitivity analyses. Selective participation, loss to follow-up and caregiver recall may affect estimates. Measurements over one annual cycle cannot establish consistency across years. The anticipated contribution is a regional estimate of seasonal variation, rather than an immediate recommendation for universal testing or altered supplementation doses.

Expected contribution. The study will estimate the magnitude and uncertainty of seasonal variation and identify potentially modifiable correlates.

Neither a seasonal decline nor a protective effect of sunlight is assumed. Observational associations will not establish causation or justify population-wide screening.

Ethics. Ethics committee approval and written parental consent will be obtained before enrolment. Clinically significant findings will prompt assessment and care; any subsequent treatment will be recorded for analysis.

REFERENCES

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