

**ASSESSMENT OF VITAMIN D STATUS AMONG  
SEPTIC CHILDREN ADMITTED TO PICU AND ITS  
EFFECT ON THE CLINICAL OUTCOME**

*Thesis*

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## List of Contents

Title	Page
▪ List of Abbreviations.....	I
▪ List of Tables.....	V
▪ List of Figures.....	IX
▪ Introduction.....	1
▪ Aim of the Work.....	3
▪ Review of Literature	
- Chapter (1): Vitamin D.....	4
- Chapter (2): Pediatric Sepsis .....	51
▪ Patients and Methods.....	75
▪ Results .....	85
▪ Discussion.....	112
▪ Summary.....	126
▪ Conclusion .....	130
▪ Recommendations .....	131
▪ References.....	133
▪ Arabic Summary.....	--

## List of Abbreviations

<b>°C</b> .....	Celsius degree
<b>1,25-(OH)<sub>2</sub> vit D</b> ...	1,25- Dihydroxyvitamin D.
<b>1,25D</b> .....	1,25-dihydroxyvitamin D
<b>24-OHase</b> .....	25-hydroxyvitamin D-24-hydroxylase
<b>25-(OH) vit D</b> .....	25- Hydroxyvitamin D
<b>25D</b> .....	25-hydroxyvitamin D
<b>5a</b> .....	C5aR Complement fragment 5a receptor
<b>7-DHC</b> .....	7- Dehydrocholesterol
<b>AB</b> .....	B-lymphocytes
<b>AI</b> .....	Adequate intake
<b>AMPs</b> .....	Antimicrobial peptides
<b>ANOVA</b> .....	Analysis of variance
<b>AODM</b> .....	Adult onset diabetes mellitus
<b>ARDS</b> .....	Acute respiratory distress syndrome
<b>AT</b> .....	T-lymphocytes
<b>ATP</b> .....	Adenosine triphosphate
<b>BP</b> .....	blood pressure
<b>BS</b> .....	blood sugar
<b>C5a</b> .....	Complement fragment
<b>Ca</b> .....	Calcium
<b>CaSR</b> .....	Calcium-sensing receptor
<b>CD</b> .....	Crohn disease
<b>CHD</b> .....	Coronary heart disease
<b>CNS</b> .....	Central nervous system
<b>CRP</b> .....	C-reactive protein
<b>D</b> .....	Vitamin D deficient ptients

## List of Abbreviations

<b>DBP</b> .....	Vitamin D binding protein
<b>EFSA</b> .....	European Food Safety Authority
<b>FEV1</b> .....	Forced expiratory volume in 1 second
<b>GCS</b> .....	Glasgow Coma Score
<b>HAART</b> .....	Highly active antiretroviral therapy
<b>HBp</b> .....	High blood pressure
<b>Hr</b> .....	Hour
<b>I</b> .....	Vitamin D insufficient patients
<b>ICU</b> .....	Intensive care unit
<b>IL</b> .....	Interleukin
<b>IO</b> .....	Intraosseous
<b>IOM</b> .....	Institute of Medicine
<b>IU</b> .....	International Unit
<b>IV</b> .....	Intravenous
<b>LBD</b> .....	Ligand binding domain
<b>LPS</b> .....	Lipopolysaccharide
<b>MARRS</b> .....	Membrane-associated rapid response steroid binding protein
<b>min</b> .....	minute
<b>MRSA</b> .....	Methicillin-resistant    staphylococcus aureus
<b>MS</b> .....	Multiple sclerosis
<b>N</b> .....	Number
<b>NA</b> .....	NO abnormality
<b>NF-κB</b> .....	Nuclear factor kappa-light-chain- enhancer of activated B cells
<b>NICU</b> .....	Neonatal intensive care unit
<b>NO</b> .....	Nitric oxide

## List of Abbreviations

<b>NOS</b>	.....	Nitric oxide synthase	
<b>PAMP</b>	.....	Pathogen-associated	molecular
		pattern	
<b>PCR</b>	.....	Polymerase chain reaction	
<b>PELOD</b>	.....	pediatric logistic organ dysfunction	
<b>PICU</b>	.....	Paediatric intensive care unit	
<b>PMNs</b>	.....	Polymorphonuclear cells	
<b>Previt</b>	.....	Previtamin	
<b>PRISM</b>	.....	Pediatric risk of mortality	
<b>PRR</b>	.....	pathogen-recognition receptors	
<b>PTH</b>	.....	Parathyroid hormone	
<b>RA</b>	.....	Rheumatoid arthritis	
<b>RDA</b>	.....	Recommended daily allowances	
<b>RhoA</b>	.....	Ras homolog gene family member A	
<b>ROS</b>	.....	reactive oxygen species	
<b>RXR</b>	.....	Retinoid X receptor	
<b>S</b>	.....	Vitamin D sufficient ptients	
<b>SA-HRP</b>	.....	Streptavidin-HRP	
<b>SBP</b>	.....	Systolic blood pressure	
<b>ScvO2</b>	.....	Central venous oxygen saturation	
<b>SD</b>	.....	Standard deviation	
<b>SE</b>	.....	Standard error	
<b>Secs</b>	.....	Seconds	
<b>SIRS</b>	.....	Systemic inflammatory response	
		syndrome	
<b>SNP</b>	.....	Single nucleotide polymorphism	
<b>SOFA</b>	.....	Sequential [Sepsis-related] Organ	
		Failure Assessment	

## List of Abbreviations

<b>SOFA</b>	.....	Sequential Organ Failure Assessment
<b>TB</b>	.....	Mycobacterium tuberculosis
<b>Th</b>	.....	T helper cell
<b>TLR</b>	.....	Toll-like receptor
<b>TLRs</b>	.....	Toll-like receptors
<b>TNF<math>\alpha</math></b>	.....	Tumor necrosis factor alpha
<b>UL</b>	.....	Tolerable upper intake level
<b>URI</b>	.....	Urinary tract infection
<b>USA</b>	.....	United States of America
<b>VDD</b>	.....	Vitamin D deficiency
<b>VDR</b>	.....	Vitamin D receptor
<b>VDREs</b>	.....	Vitamin D response elements
<b>Vit</b>	.....	Vitamin

## List of Tables

Table No.	Title	Page
<b>Review of Literature tables</b>		
<b>Table (1):</b>	Different forms, nomenclature and sources of vitamin D .....	7
<b>Table (2):</b>	Vitamin D-rich foods .....	11
<b>Table (3):</b>	The recommended daily allowances of Vitamin D.....	22
<b>Table (4):</b>	The Tolerable upper intake level of Vitamin D .....	23
<b>Table (5):</b>	Health Canada recommendation for dietary allowances and tolerable upper intake levels for vitamin D .....	23
<b>Table (6):</b>	EFSA recommendation for Adequate Intake and Tolerable upper limit for vitamin D .....	24
<b>Table (7):</b>	Basic science studies of vitamin D and the innate immune response .....	39
<b>Table (8):</b>	Strategies to Prevent and Treat Vitamin D deficiency in children.....	48
<b>Table (9):</b>	Symptoms of hypervitaminosis D .....	49
<b>Table (10):</b>	Definitions for pediatric sepsis .....	53
<b>Table (11):</b>	Age-specific vital signs and laboratory variables.....	54
<b>Table (12):</b>	Definitions for organs dysfunction for children .....	54

## List of Tables (Continued)

Table No.	Title	Page
<b>Table (13):</b>	Epidemiology of pediatric sepsis in multicenter studies in developed countries since 2003 .....	56
<b>Table (14):</b>	Risk factors for sepsis .....	58
<b>Table (15):</b>	Definition for pediatric sepsis .....	76
<b>Table (16):</b>	Age-specific vital signs and laboratory variables.....	77
<b>Table (17):</b>	Definitions for organs dysfunction for children .....	78
<b>Table (18):</b>	Variables of PIM 2 score .....	79
<b>Table (19):</b>	Modified Sequential [Sepsis-related] Organ Failure Assessment (SOFA) score .....	82
<b>Results tables</b>		
<b>Table (1):</b>	Sex distribution among studied patients.....	85
<b>Table (2):</b>	Age and measurements of studied patients.....	86
<b>Table (3):</b>	Number of systems affected of studied patients at the 1st day of admission .....	86
<b>Table (4):</b>	Initial severity scores and serum vitamin D level of studied patients at the 1st day of admission.....	86

## List of Tables (Continued)

Table No.	Title	Page
<b>Table (5):</b>	Clinical outcome of studied patients ....	87
<b>Table (6):</b>	Vitamin D status in relation to age .....	89
<b>Table (7):</b>	Vitamin D status in relation to sex .....	89
<b>Table (8):</b>	Vitamin D status in relation to feeding pattern .....	90
<b>Table (9):</b>	Vitamin D status in relation to onset of weaning .....	91
<b>Table (10):</b>	Vitamin D status in relation to vitamin D supplementation .....	91
<b>Table (11):</b>	Vitamin D status in relation to weight for height percentiles .....	92
<b>Table (12):</b>	Vitamin D status in relation to order of birth .....	94
<b>Table (13):</b>	Vitamin D status in relation to daycare center attendance and sun exposure .....	95
<b>Table (14):</b>	Clinical signs of rickets and motor delay compared to vitamin D status ....	96
<b>Table (15):</b>	Vitamin D status in relation to vital signs within 1st hour of admission .....	98
<b>Table (16):</b>	PIM2 score (predicted mortality rate) and SOFA score in the 1st hour after admission in different studied groups .....	99

## List of Tables (Continued)

Table No.	Title	Page
<b>Table (17):</b>	Number of systems affected on presentation in different studied groups .....	101
<b>Table (18):</b>	Vitamin D status in relation to serum total Ca level.....	102
<b>Table (19):</b>	Vitamin D status in relation to serum CRP level .....	103
<b>Table (20):</b>	Vitamin D status in relation positive blood culture.....	104
<b>Table (21):</b>	Vitamin D status in relation to need for mechanical ventilation and catecholamines .....	105
<b>Table (22):</b>	Vitamin D status in relation to duration of mechanical ventilation and catecholamines.....	106
<b>Table (23):</b>	Vitamin D status in relation to progression to septic shock .....	107
<b>Table (24):</b>	Vitamin D status in relation to duration of PICU stay .....	108
<b>Table (25):</b>	SOFA score in different study groups .....	109
<b>Table (26):</b>	Change in SOFA score from day 1 to day 4.....	110
<b>Table (27):</b>	Change in SOFA score from day 1 to day 7.....	110
<b>Table (28):</b>	Mortality in different study groups .....	111

## List of Figures

Figure No.	Title	Page
<b>Review of Literature figures</b>		
<b>Fig. (1):</b>	The Chemical Structure of 25(OH)D (Calcidiol) .....	8
<b>Fig. (2):</b>	The Chemical Structure of 1,25(OH)2D(calcitriol).....	8
<b>Fig. (3):</b>	Relationship between hours of sunshine and serum 25OHD .....	9
<b>Fig. (4):</b>	Seasonal fluctuation of serum 25OHD according to frequency of sun exposure .....	10
<b>Fig. (5):</b>	Metabolic activation of vitamin D3 to its hormonal form, 1,25(OH)2D3 .....	15
<b>Fig. (6):</b>	Vitamin D metabolism during pregnancy and lactation .....	17
<b>Fig. (7):</b>	Functional domains of the vitamin D receptor (VDR).....	19
<b>Fig. (8):</b>	Vitamin D intakes recommended by the Institute of Medicine and the Endocrine Practice Guidelines Committee .....	25
<b>Fig. (9):</b>	Role of 1,25(OH)2D3 in calcium homeostasis .....	26
<b>Fig. (10):</b>	Contribution of vitamin D to good health .....	28
<b>Fig. (11):</b>	Metabolism of 25-hydroxyvitamin D [25(OH)D] to 1,25 dihydroxyvitamin D[1,25(OH)2D] for nonskeletal functions.....	29

## List of Figures (Continued)

Figure No.	Title	Page
<b>Fig. (12):</b>	Regulation of immune function by 1,25(OH) <sub>2</sub> D.....	41
<b>Fig. (13):</b>	Reported incidence of vitamin D deficiency defined as a 25-hydroxyvitamin D (25[OH]D) level below 20 ng/mL around the globe in pregnant women and the general population.....	44
<b>Fig. (14):</b>	Schematic representation of the major causes of vitamin D deficiency and potential health consequences.....	48
<b>Fig. (15):</b>	Algorithm for septic shock identification.....	71
<b>Fig. (16):</b>	Algorithm for septic shock management.....	73
<b>Results figures</b>		
<b>Fig. (1):</b>	Sex distribution among studied patients.....	85
<b>Fig. (2):</b>	Vitamin D status among studied patients.....	88
<b>Fig. (3):</b>	Vitamin D status in relation to feeding pattern.....	90
<b>Fig. (4):</b>	Vitamin D status in relation to vitamin D supplementation .....	92
<b>Fig. (5):</b>	Vitamin D status in relation to weight for height percentiles.....	93

## List of Figures (Continued)

Figure No.	Title	Page
<b>Fig. (6):</b>	Vitamin D status in relation to order of birth.....	95
<b>Fig. (7):</b>	Vitamin D status in relation to daycare center attendance and sun exposure .....	96
<b>Fig. (8):</b>	Vitamin D status in relation to clinical signs of rickets and motor delay .....	97
<b>Fig. (9):</b>	Vitamin D status in relation to temperature .....	99
<b>Fig. (10):</b>	Vitamin D status in relation to PIM2 % (predicted mortality rate) in the 1st hour after admission .....	100
<b>Fig. (11):</b>	Vitamin D status in relation to SOFA score in the 1st hour after admission .....	100
<b>Fig. (12):</b>	Number of systems affected on presentation in different studied groups .....	101
<b>Fig. (13):</b>	Vitamin D status in relation to serum total Ca level.....	102
<b>Fig. (14):</b>	Vitamin D status in relation to serum CRP level .....	103
<b>Fig. (15):</b>	Vitamin D status in relation to positive blood culture .....	104
<b>Fig. (16):</b>	Vitamin D status in relation to need for mechanical ventilation and catecholamines .....	105

## **List of Figures (Continued)**

<b>Figure No.</b>	<b>Title</b>	<b>Page</b>
<b>Fig. (17):</b>	Vitamin D status in relation to duration of mechanical ventilation and catecholamine .....	106
<b>Fig. (18):</b>	Vitamin D status in relation to septic shock .....	107
<b>Fig. (19):</b>	Vitamin D status in relation to duration of PICU stay .....	108
<b>Fig. (20):</b>	SOFA score in different study groups .....	109
<b>Fig. (21):</b>	Mortality in different study groups .....	111

## ABSTRACT

**Background:** Vitamin D deficiency is thought to negatively impact the cardiovascular, respiratory and immune systems directly through cellular vitamin D receptors.

**Aim:** To determine the incidence of vitamin D deficiency among septic critically ill children admitted to pediatric intensive care unit (PICU), Children's Hospital, Ain Shams University and the influence of vitamin D status on clinical outcome.

**Patients and method:** Prospective observational study on 52 critically ill children who were diagnosed with sepsis and admitted to pediatric ICU, Children's Hospital, Ain Shams University in the time period from July 2017 till January 2019. The patients aged 1 month - 18 years and they were subjected to detailed clinical history and examination. The patients were divided according to vitamin D status which was obtained as close as possible to diagnosis of sepsis using ELIZA. Studied groups were compared regarding demographic data, risk factors of vitamin D deficiency, severity of illness at admission and clinical outcome during PICU stay.

**Results:** The frequency of vitamin D deficiency (67.3 %) among septic children admitted to PICU while 11.5 % of patients were vitamin D insufficient. The mean of serum vitamin D (25OHD) among patients was ( $18.6 \pm 20.6$  ng/ml). Vitamin D deficiency was highly significant associated with low serum calcium level and high serum CRP level. There was a poor clinical outcome among vitamin D deficient patients but with no significant difference compared to vitamin D sufficient patients regarding need for mechanical ventilation, use of catecholamines, progression to septic shock, length of PICU stay and mortality.

**Conclusion:** Vitamin D deficiency should be considered as a risk factor for pediatric sepsis. However, it does not affect the clinical outcome.

**Keywords:** Vitamin D, Pediatric sepsis, PICU.