Abstract

Background: Vitamin D (VD) took a lot of attention in recent years due to a global interest of VD deficiency related to an increased risk of a variety of human diseases.

Aims: The aim of the study is to understand the effect of vitamin D deficiency on mortality of critically ill patient.

Methodology: Vitamin D is a group of fat soluble vitamins that play a significant role in the regulation of bone metabolism, it also plays a major role in extraskeletal metabolic processes. Vitamin D deficiency is defined by most experts as a 25-hydroxyvitamin D level of less than 20 ng per milliliter (50 nmol per liter). >20 ng/mL is considered sufficient, 11–20 ng/mL is considered insufficient, and ≤10 ng/mL is considered deficient.

Conclusions: Deficiency of VD is very common in both critically ill patients and general population and has been associated with various negative outcomes in critical illness, including sepsis, infection , duration of hospital stay, length of mechanical ventilation , and mortality. There is a probapility that therapeutic VD treatment could help in preventing poor clinical outcomes; furthermore, the actual clinical improvements, dosing, and frequency have yet to be Proved. The level of VD treatment has been controversial and has varied by expert opinion. VD supplementation has been elucidated, to be safe in both critically ill and healthy populations with low reports of toxicity. There is a lot of evidence leading to the need for improving VD status; Furthermore, more interventional trials are needed to define the benefit and safety in the critical care population. Until more questions are answered, definitive recommendations for VD treatment in critical illness cannot be made.

Keywords: Vitamin D, Deficiency and Mortality, Critically Ill Adult, extraskeletal metabolic

Contents

List of Abbreviations

Abbreviation	Meaning
AB	Activated B lymphocytes
AIDS	Immunodeficiency syndrome
AODM	Adult Onset Diabetes Mellitus
APCs	Antigen-presenting cells
ARDS	Acute respiratory distress syndrome
AT	Activated T lymphocytes
BCG-lux	Mycobacterium bovis bacilli Calmette-Guérin-luciferase-*labeled*
BMD	Bone Mineral Density
Bcl-2	B-cell lymphoma 2
CDK	Cyclin-dependent kinase
CD	Cathelicidin
CHD	Coronary Heart Disease
CRP	C-reactive protein
CV	Cardiovascular
COPD	Chronic obstractive pulmonary disease
CYP2R1	VD-25-hydroxylase
CYP24A1	1,25-$(OH)_2$D-24-hydroxylase
CYP27B1	25OHD-1-α-hydroxylase
DIC	Disseminated intravascular coagulation
DM	Diabetes Mellitus
EVLW	extravascular lung water

Abbreviation	Meaning
FEV1	Forced expiratory volume in 1 second
FGF	Fibroblast growth factor
FGF23	Fibroblast growth factor 23
FGFR	Fibroblast growth factor receptors
FVC	Forced vital capacity
HAART	Highly active anti-retroviral treatment
HBP	High Blood Pressure
hCAP	human cathelicidin antimicrobial protein
ICU	Intensive care unit
IFN-γ	Interferon- γ
IGF-1	Insulin-like growth factor 1
IκBα	nuclear factor of kappa light polypeptide gene enhancer in B-cells inhibitor, alpha
IKK	IκB kinase
IL	Interleukin
ILT3	Immunoglobulin-like transcript 3
iNOS	Inducible nitric oxide synthase
IOM	Institute of Medicine
LL-37	Antimicrobial peptides cathelicidin
LPS	Lipopolysaccharide
LOS	Length of hospital stay
LTAC	long-term acute care
MAPK5	MAP kinase 5
MI	myocardial infarction

Abbreviation	Meaning
MMP-9	Matrix metalloproteinasis-9
MrOS	Medical Review Officers
MS	Multiple Sclerosis
MV	Mechanical ventilation
NADPH	Reduced nicotinamide adenine dinucleotide phosphate
NF-kB	nuclear factor κB
NHANES	National Health and Nutrition Examination Survey
NR	Not reported
NR4A2	Nuclear receptor 4A2.
1-OHase	25OHD-1-α-hydroxylase
25-OHD	25-hydroxyvitamin D
1, 25(OH)$_2$D	1, 25 dihydroxyvitamin D
OR	Odds ratio
PAMPs	Pathogen-associated molecular patterns
PG	prostaglandin
PTH	Parathyroid hormone.
RA	Rheumatoid Arthritis
RAAS	Renin–angiotensin–aldosterone system
RCT	Randomised controlled clinical trial.
RDA	Recommended dietary allowances
TB	Tuberculosis
TGFβ	Transforming growth factor β

Abbreviation	Meaning
Th2	T helper cells type 2
TLR2/1	Toll-like receptor 2/1
TLR	Toll-like receptor
TNF	Tumor necrosis factor
TRPV6	Transient receptor potential cation channel, subfamily V, member 6
RANK	The receptor for RANKL on preosteoclasts
RANKL	Receptor activator of nuclear factor kappa-B ligand
RR	Relative risk
UK	United Kingdom
US	United States
URI	Upper Respiratory Tract Infection
UV	Ultraviolet
UVB	Ultraviolet beta
VD	Vitamin D
VDBP	Vitamin D binding protein
VDR	Vitamin D receptor
VDRE	Vitamin D response elements
VDR-RXR	Vitamin D receptor-retinoic acid x-receptor complex
WHI	Women's Health Initiative

List of Tables

List of Figures

Introduction

Aim of the Study

Chapter (1)

Vitamin D

Chapter (2)

Vitamin D Deficiency

Chapter (3)

Actions of Vitamin D and Complication of its Deficiency

Chapter (4)

Vitamin D Deficiency in the Critical Care