



Health Sciences and related fields

**Published:** 2026-02-28

## Articles

### **The effect of coping strategies on flourishing with self-compassion as a mediator in teachers with functional dyspepsia**

Rusdah Parinduri, Suryani Hardjo, Salamiah Sari Dewi  
1607-1617



### **The effect of ramadan fasting in maintaining blood sugar and cholesterol stability in diabetes mellitus patients 2**

Oksita Asri Widyayanti, Fida Dyah Puspasari  
1713-1719



### **Development of a natural eosinophil stain based on cordyline fruticosa leaves extract and selenicereus monacanthus (dragon fruit peel extracts) for hematology diagnostic applications**

Annisa Nur Hasanah, Yane Liswanti, Meti Kusmiati, Aliya Fitria Salsabila, Linda Prihartini  
1730-1738



## **The potential of trigona honey as a hemoglobin booster and immunomodulator in pregnant women with iron deficiency anemia**

Ricca Afrida, Winda Nurmayani, Susilia Idyawati, Hawari Jannati, Raudatul Jannah  
1529-1535

 PDF

## **Public knowledge about smoking as a triggering factor for oral cavity cancer**

Arief Siddik Taufan, Shelly Lelyana, Dicha Yuliadewi, Leonardo Jaya Setiadi Tanumiharja  
1500-1508

 PDF

## **Late-pregnancy anxiety as a distinct multidimensional construct: Psychometric evidence from a community-based sample**

Nurul Jannah, Gunavathy Selvarajh  
1562-1570

 PDF

## **Analysis of the effect of hospital management information system implementation on clinical decision-making at PKU Muhammadiyah Purbalingga hospital**

Sony Andik Pratama, Nining Handayani, Yen Efawati  
1586-1596

 PDF

## **Analysis of psychological and academic factors related to anxiety about entering the workforce among final semester students Payung Negeri Aceh Darussalam Health Sciences Institute 2025**

Rahmiati Tagore Putri, Saipullah Saipullah  
1636-1644

 PDF

## **Health and social burdens of TB-HIV co-infection in Indonesian risk populations**

Nur Indah Chairunnisa, Dwi Sarwani Sri Rejeki, Siwi Pramatama Mars Wijayanti  
1685-1695



## **The influence of spiritual well-being on burnout in kindergarten teachers with self-efficacy as a mediating variable**

Rifatun Nihaya Rambe, Hasanuddin Hasanuddin, Suryani Hardjo  
1769-1779



## **Determinants of obesity risk factors in pre-seniors and seniors in Central Java: 2023 survey analysis**

Yayuk Fathonah, Titik Kuntari, Yaltafit Abror Jeem, Nur Aisyah Jamil  
1519-1528



## **Analysis of hospital costs and insurance reimbursement systems for pneumonia patients: A literature review**

Nopriyan Pujokusuma, Muhammad Syamsu Hidayat, Rochana Ruliyandari  
1536-1548



## **Pharmacy technician knowledge and behavior regarding high alert drugs**

Muhajri Agusfina, Renatalia Fika, Mevy Trisna, Desy Kurniaty, Zulfisa Zulfisa  
1758-1768



## **Artificial intelligence in cardiac nursing practice: A systematic review of applications, challenges, and patient outcomes**

Nova Listya Wahananingtyas, Rachmad Aprilio, Risnadhia Risnadhia, Marista Fiana, Fevi Padhila, Sabrina Rahmatillah Azhar  
1618-1626



## **Implementation of the qanun no smoking area regulation at SMP Negeri 32 Takengon**

Satria Budi, Donal Nababan, Frida Lina Tarigan, Kesaktian Manurung, Mido Ester J. Sitorus

1655-1665

 PDF

## **Descriptive study of pregnant women's knowledge level about high-risk pregnancy**

Cucun Setya Ferdina, Elisa Christiana, Zainab Zainab, Ernia Haris Himawati

1704-1712

 PDF

## **Emotional intelligence and caring behavior among nurses at Dr. M. Djamil General Hospital Padang**

Dorisnita Dorisnita, Hartati Hartati, Melia Nuriyansyah

1509-1518

 PDF

## **Fissure tongue condition in a patient with down syndrome: A case report**

Leonardo Jaya Setiadi Tanumiharja, Anna Nur Azizah, Edria Benita Tampubolon, Patoni Patoni, Marvin Jaya Setiadi Tanumiharja

1495-1499

 PDF

## **Development of a web-based poedji rochjati score information system for early detection of high-risk pregnancy**

Humaediah Lestari, Pahrul Irfan, Baiq Nova Aprilia Azamti

1729-1737

 PDF

## **Literature review of the cytotoxic activity of faloak (*sterculia quaddrifida r.br*) against t47d and mcf-7 breast cancer cells and its active compounds**

Rumaldus Seran, Wiwin Herdwiani, Titik Sunarni

1597-1606

 PDF

## **The relationship between diabetes mellitus (DM) risk factors and random blood sugar levels (RBSL) in managerial and non-managerial positions in the**

## Local government of Bener Meriah Regency

Hajjah Hajjah, Fahmi Ichwansyah, Meutia Zahara, Basri Aramico, Asnawi Abdullah  
1645-1654

 PDF

## A systematic literature review of meaning-oriented resilience as a coping process for pregnancy anxiety and maternal well-being

Nurul Jannah, Nisa Rachmah Nur Anganthi, Sri Lestari, Lisnawati Ruhaena  
1739-1750

 PDF

## The effect of social support on the self-efficacy of parents of children with autism through the mediation of emotional intelligence

Aini Shafra Anwar, Salamiah Sari Dewi, Suaidah Lubis  
1751-1757

 PDF

## Modern traditional games improve early childhood social-emotional skill: A systematic review

Wulan Anugrah P.S, Dian Ramawati  
1549-1561

 PDF

## Analgesic effectiveness test of kitolod leaf ethanol extract (isotoma longiflora l.) against male white mice (mus musculus)

Inda Dwi Yanti, Angga Bayu Budiyanto, Lukman Hardia  
1674-1684

 PDF

## Woolwich massage and back rolling are effective in increasing breast milk production in mothers with post-cesarean section indications of premature rupture of membranes (prom) in hospitals

Alfanira Alfanira, Suryani Hartati, Meiliyani Meiliyani  
1579-1585

 PDF

## **Serum 25-hydroxyvitamin D is associated with body fat percentage and skeletal muscle mass in adults: A cross-sectional study**

Meutia Atika Faradilla, Deasyka Yastani, Yohana Yohana, Karina Shasri Anastasya, Nabila Maudy Salma

1627-1635



## **The effect of giving pumpkin pudding (curcubita moschata) on sleep quality postpartum**

Sandy Nurlaela Rachman, Lina Mardianti, Ilvika Mei Alkafili

1666-1673



## **Effectiveness of health services through the mobile-JKN application for the elderly: A case study at the Gunung Tua BPJS health office, North Sumatra**

Hikmah Siregar, Annio Indah Lestari Nasution, Waizul Qarni

1696-1703



## **Preliminary study of blood pressure and arterial stiffness monitoring using the niva device (non-invasive vascular analyzer)**

Reformia Avianningsih, Patonah Hasimun, Garnadi Jafar, Al-fira Putriyanti, Hasballah Zakaria

1486-1494



## **Routine hematological profile in tuberculosis patients undergoing treatment at Bakunase Community Health Center, Kupang City**

Yoan Novicadlitha, Ni Made Susilawati, Jevenich BN Runumeha

1720-1728



## **Understanding barriers and enablers of tuberculosis prevention in high-risk boarding school settings**

Bella Wiranti, Arih Diyaning Intiasari, Dwi Sarwani Sri Rejeki

1571-1578



 Editorial Team

 Peer Review Process

 Reviewer

 Focus & Scope

 Author Guidelines

 Online Submission

 Publication Ethics

 Copyright Notice

 Policy of Screening for Plagiarism

 Indexing

 Journal Fee

 Statistics View

ISSN

p-ISSN: 2086-7689 | E-ISSN: 2721-9453

TEMPLATE



# SERTIFIKAT

Direktorat Jendral Pendidikan Tinggi, Riset dan Teknologi  
Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi Republik Indonesia



Kutipan dari Keputusan Direktorat Jendral Pendidikan Tinggi, Riset, dan Teknologi  
Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi Republik Indonesia

Nomor: 152/E/KPT/2023

Peringkat Akreditasi Jurnal Ilmiah Periode II Tahun 2023

Nama Jurnal Ilmiah:

**Science Midwifery**

E-ISSN: 27219453

Institute Of Computer Science

Ditetapkan Sebagai Jurnal Ilmiah:

**TERAKREDITASI PERINGKAT 3**

Akreditasi Berlaku selama 5 (lima) Tahun, yaitu:  
Volume 11 Nomor 1 Tahun 2023 sampai Volume 15 Nomor 6 Tahun 2027  
Jakarta, 25 September 2023

Plt. Direktur Jendral Pendidikan Tinggi, Riset, dan Teknologi



Prof. Ir. Nizam, M.Sc., DIC, Ph.D., IPU, ASEAN Eng  
NIP. 196107061987101001



## Current Issue

ATOM 1.0

RSS 2.0

RSS 1.0

## Science Midwifery

### Institute of Computer Science (IOCS)

Alamat: Perumahan Romeby Lestari Blok C,  
No C14 Deliserdang, Sumatera Utara,  
Indonesia

email : [jmidwifery@iocspublisher.org](mailto:jmidwifery@iocspublisher.org)

081381251442

081360000241

081360000891



Science Midwifery

## Policies and Regulations Link

- [Abstracting/Indexing](#)
- [Advertising Policy](#)
- [Author's Rights and Obligations](#)
- [Corrections, Retractions & Expressions of Concern](#)
- [Editorial & Peer Review Process](#)
- [Editorial Policies](#)
- [Data Sharing Solicy](#)
- [For Controbutors Fee](#)
- [Informed Consent policy](#)
- [License Information](#)
- [Peer Review Policy](#)



STAT COUNTER

[View My Stats](#)

is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License \(CC BY-NC 4.0\)](#).

- [Manuscript Preparation Guidelines](#)
- [Privacy Policy](#)
- [Publishing Ethics](#)
- [Publishing with Iocspublisher: step-by-step](#)
- [Policy of Screening for Plagiarism](#)
- [Policies on Conflict of Interest, Human and Animal rights, and Informed Consent](#)
- [Self-Archiving Policies](#)
- [Statement of Informed Consent](#)

Platform &  
workflow by  
**OJS / PKP**



# Science Midwifery

Published By:  
Institute of Computer Science (IOCS)

## Editor in Chief

- Dr. dr. D. K. Keliat, Spa, ([Scopus Profil](#)), Medan, Universitas Sumatera Utara, Inedonesia

## Associate Editors

- Dr. Leila Mohammadinia, Ph.D., MS, BS, ([Scopus Profil](#)) School of Management and Information Sciences, Shiraz University of Medical Sciences, Shiraz, Iran
- Dr. Malakeh Zuhdi Malak, Ph.D., ([Scopus Profil](#)) Associate Professor in Community Health Nursing, Al-Zaytoonah University of Jordan, Amman
- Dr. Satyanarayan Labani, ([Scopus Profil](#)) National Institute of Cancer Prevention & Research, Noida, India
- Joko Gunawan, S.Kep.Ns MN, Ph.D., ([Scopus Profil](#)) Chulalongkrong University, Thailand,
- Prof. Aytac GUDER, PhD., ([Scopus Profil](#)) Department Of Medical Services and Techniques, Vocational High School of Health, Giresun University, Turkey
- Prof. Eileen Savage, ([Scopus Profil](#)) School of Nursing and Midwifery, University College Cork, Ireland
- Prof. Francesco Carelli, FD, MD, MSc., ([Scopus Profil](#)) Professor at University of Milan, Rome and Bari for Undergraduate Students and Specializing Doctors and Masters, Italy
- Prof. Magda Moawad Mohamad Mohsen, PhD., ([Scopus Profil](#)) Professor of Community Health Nursing, Faculty of Nursing, Menoufia University, Egypt
- Prof. Urmila Bhardwaj, ([Scopus Profil](#)) Principal, Rufaida College of Nursing, Jamia Hamdard, New Delhi
- Prof. Yau Sui Yu, PhD., ([Scopus Profil](#)) Associate Professor, School of Nursing and Health Studies, Open University of Hong Kong, Hong Kong
- Prof. Denise Fassett, BHS.RN.MN.PhD, ([Scopus Profil](#)) Faculty Of Health, Departement Nursing and Midfiwifery, University of Tasmania, Australia
- Prof. John Christian Fox, MD, RDMS, FAIUM, ([Scopus Profil](#)) School Of Medicine, University Of California, Irvine, US
- dr.Leo Simanjuntak, SpOG, ([Scopus Profil](#)), Medan, Universitas Sumatera Utara, Inedonesia
- Prof Dr H Aslim Sihotang, SPM-KVR, ([Scopus Profil](#)), Medan, Universitas Sumatera Utara, Inedonesia
- Naety, SST., M.Keb, ([Google Scholar Profil](#)) Medan, Universitas Darma Agung, Indonesia
- Efi Satriana Silalahi, SST, MKM, ([Google Scholar Profil](#)), STIKE Mitra Sejati, Medan, Indonesia

- Ns. Sumandar, S.Kep, M.Kes, ([Google Scholar Profil](#)) STIKes Al-Insyirah Pekanbaru, Riau, Indonesia
- Riny Apriani S.Kep., Ns., M.Kep., ([Google Scholar Profil](#)) STIKES Binalita Sudama Medan, Sumatera Utara, Indonesia

#### Copy Editor

- Ade Setiawan Sembiring, ([Scopus Profil](#)), Agency for Meteorology Climatology and Geophysics, Jakarta, Indonesia
- Suprianto Panjairan, ([Scopus Profil](#)), Institute of Computer Science (IOCS), Sumatera Utara Indonesia
- Fitriani, Riski Muhamad, ([Scopus Profil](#)), Institute of Computer Science (IOCS), Sumatera Utara Indonesia
- Aditiya Pakpahan, ([Scopus Profil](#)), Institute of Computer Science (IOCS), Sumatera Utara Indonesia
- Firta Pandjaitan, ([Google Scholar Profil](#)) IARN Copyeditor, Indonesia
- Sonya Pasaribu, ([Google Scholar Profi](#)) IARN Copyeditor, Indonesia

#### Technical Support

- Hengki Tamando, Institute of Computer Science (IOCS), Sumatera Utara Indonesia



 [Editorial Team](#)

 [Peer Review Process](#)

 [Reviewer](#)

 [Focus & Scope](#)

 [Author Guidelines](#)

 [Online Submission](#)

 [Publication Ethics](#)

 [Copyright Notice](#)

 [Policy of Screening for Plagiarism](#)

⌚ Indexing

⌚ Journal Fee

📊 Statistics View

ISSN

p-ISSN: 2086-7689 | E-ISSN: 2721-9453

TEMPLATE



**SERTIFIKAT**

Direktorat Jendral Pendidikan Tinggi, Riset dan Teknologi  
Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi Republik Indonesia



Kutipan dari Keputusan Direktorat Jendral Pendidikan Tinggi, Riset, dan Teknologi  
Kementerian Pendidikan, Kebudayaan, Riset dan Teknologi Republik Indonesia

Nomor: 152/E/KPT/2023  
Peringkat Akreditasi Jurnal Ilmiah Periode II Tahun 2023  
Nama Jurnal Ilmiah:  
**Science Midwifery**

E-ISSN: 27219453  
Institute Of Computer Science  
Ditetapkan Sebagai Jurnal Ilmiah:

**TERAKREDITASI PERINGKAT 3**

Akreditasi Berlaku selama 5 (lima) Tahun, yaitu:  
Volume 11 Nomor 1 Tahun 2023 sampai Volume 15 Nomor 6 Tahun 2027  
Jakarta, 25 September 2023  
Plt. Direktur Jendral Pendidikan Tinggi, Riset, dan Teknologi



Prof. Ir. Nizam, M.Sc., DIC, Ph.D., IPU, ASEAN Eng  
NIP. 196107061987101001

Current Issue

ATOM 1.0

RSS 2.0

## Science Midwifery

### Institute of Computer Science (IOCS)

Alamat: Perumahan Romeby Lestari Blok C,  
No C14 Deliserdang, Sumatera Utara,  
Indonesia

email : [jmidwifery@iocspublisher.org](mailto:jmidwifery@iocspublisher.org)

081381251442

081360000241

081360000891



### Science Midwifery

is licensed under a [Creative Commons Attribution-NonCommercial 4.0 International License \(CC BY-NC 4.0\)](#).

## Policies and Regulations Link

- [Abstracting/Indexing](#)
- [Advertising Policy](#)
- [Author's Rights and Obligations](#)
- [Corrections, Retractions & Expressions of Concern](#)
- [Editorial & Peer Review Process](#)
- [Editorial Policies](#)
- [Data Sharing Solicy](#)
- [For Controbutors Fee](#)
- [Informed Consent policy](#)
- [License Information](#)
- [Peer Review Policy](#)
- [Manuscript Preparation Guidelines](#)
- [Privacy Policy](#)
- [Publishing Ethics](#)
- [Publishing with Iocspublisher: step-by-step](#)
- [Policy of Screening for Plagiarism](#)
- [Policies on Conflict of Interest, Human and Animal rights, and Informed Consent](#)
- [Self-Archiving Policies](#)
- [Statement of Informed Consent](#)



STAT COUNTER

[View](#)

[My](#)

[Stats](#)

Platform &  
workflow by  
**OJS / PKP**

# Serum 25-hydroxyvitamin D is associated with body fat percentage and skeletal muscle mass in adults: A cross-sectional study

Meutia Atika Faradilla<sup>1</sup>, Deasyka Yastani<sup>2</sup>, Yohana<sup>3</sup>, Karina Shasri Anastasya<sup>4</sup>, Nabila Maudy Salma<sup>5</sup>

<sup>1,2,3</sup>Department of Biochemistry, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

<sup>4</sup>Department of Nutritional, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

<sup>5</sup>Department of Anatomy, Faculty of Medicine, Universitas Trisakti, Jakarta, Indonesia

## ARTICLE INFO

### Article history:

Received Jan 8, 2026

Revised Jan 23, 2026

Accepted Feb 5, 2026

### Keywords:

Body Composition

Body Fat

Muscle Mass

Musculoskeletal Health

Vitamin D

## ABSTRACT

**Background:** Vitamin D is widely recognized for its role in bone and musculoskeletal health, yet accumulating evidence suggests it may also influence body composition through regulatory effects on adipose and skeletal muscle tissues. This study aimed to evaluate the association between serum vitamin D status and body composition parameters in adults. **Methods:** A cross-sectional study was conducted in 77 adults. Serum 25-hydroxyvitamin D [25(OH)D] concentrations were measured using an enzyme-linked immunosorbent assay (ELISA), while body composition (percent body fat and skeletal muscle mass) was assessed using bioelectrical impedance analysis (BIA). Participants were categorized based on vitamin D status, and group comparisons as well as Pearson correlation analyses were performed. **Results:** The mean age of participants was  $35.8 \pm 9.6$  years, and 40.2% were men. The prevalence of vitamin D deficiency ( $<20$  ng/mL) was 36%, while 68% of participants had suboptimal vitamin D levels (deficiency or insufficiency). Individuals with vitamin D deficiency showed significantly higher body fat percentage and lower skeletal muscle mass compared with the non-deficient group ( $p < 0.05$ ). Serum 25(OH)D was moderately inversely correlated with body fat percentage ( $r = -0.41$ ,  $p = 0.018$ ) and positively correlated with skeletal muscle mass ( $r = 0.29$ ,  $p = 0.012$ ). **Conclusion:** Lower vitamin D status was associated with increased adiposity and reduced skeletal muscle mass in adults. These findings highlight the potential importance of maintaining adequate vitamin D levels as part of strategies supporting healthier body composition. Longitudinal and interventional studies are needed to clarify causality and clinical implications.

This is an open access article under the [CC BY-NC](https://creativecommons.org/licenses/by-nc/4.0/) license.



### Corresponding Author:

Meutia Atika Faradilla,

Department of Biochemistry,

Universitas Trisakti,

Jl. Kyai Tapa No.260 Kampus B, Tomang, Kec. Grogol petamburan, Kota Jakarta Barat, Daerah Khusus

Ibukota Jakarta, 11440, Indonesia

Email: [meutia.atika@trisakti.ac.id](mailto:meutia.atika@trisakti.ac.id)

## INTRODUCTION

Vitamin D deficiency represents a significant public health problem (up to 1 billion people worldwide are estimated to be affected) and the burden of disease is high, also in developing countries where rickets still occurs (Marti et al., 2024). In addition to its traditional function of calcium/phosphate metabolism and skeletal health, vitamin D has emerged as a multifaceted steroid hormone with constructive actions in distant organs such as adipocyte or muscle. This broader biological impact is justified by the fact that vitamin D receptor (VDR) signaling exists in non-skeletal tissues; suggesting a possibility that a similar, endocrine-like action mechanism may underlie metabolic and body composition regulation induced by vitamin D (Park & Han, 2021). The “vitamin D paradox” is due to a combination of indoor lifestyles, reduced UVB exposure during peak sunlight hours, air pollution and sun-avoidance behaviour (Siddiquee et al., 2021). Even though there may be abundant sunshine in much tropical country; circulating 25-hydroxyvitamin D [25(OH)D] levels are still low throughout much of the tropics. Similarly, the worldwide prevalence rates of overweight and obesity that have risen globally have increased attention on nutritional biomarkers potentially implicated in adiposity and lean tissue physiology (Bennour et al., 2022).

A consistent observation across epidemiological studies is the inverse association between serum 25(OH)D levels and adiposity-related outcomes, including higher body fat percentage and greater central fat accumulation among individuals with low vitamin D status (Lu & Cao, 2023). Mechanistic explanations for this relationship include adipose sequestration of fat-soluble vitamin D and volumetric dilution across a larger body mass, which may lower measurable circulating 25(OH)D concentrations in individuals with excess adiposity (Szymczak-Pajor et al., 2022). Moreover, obesity has been proposed not only as a correlate but potentially a causal contributor to vitamin D deficiency through combined physiological and behavioral pathways (Angelino et al., n.d.). While the vitamin D–adiposity relationship is widely reported, evidence linking vitamin D status to skeletal muscle parameters remains less consistent, particularly among working-age adults (Angelino et al., n.d.; Bennour et al., 2022). Skeletal muscle is a major metabolic organ responsible for glucose disposal and energy expenditure, and vitamin D signaling has been implicated in muscle cell differentiation, calcium handling, and mitochondrial bioenergetics (Angelino et al., n.d.). Experimental and translational studies suggest that VDR activity may directly influence mitochondrial function in skeletal muscle, providing biological plausibility for associations between vitamin D status and muscle-related phenotypes (Salles et al., 2022). Nevertheless, population findings differ across studies, potentially due to variations in measurement approaches, confounding by physical activity and adiposity, and the frequent use of broad lean mass estimates rather than muscle-specific indicators (Angelino et al., n.d.; Bennour et al., 2022).

Given the concurrent high prevalence of hypovitaminosis D and suboptimal body composition profiles, clarifying the relationship between vitamin D status and fat-muscle distribution in adults remains clinically and public health relevant (Zhang & Li, 2024). Notably, data from working age adults in Southeast Asia, where sunlight exposure is abundant yet vitamin D inadequacy persists, remain underrepresented in the current literature on vitamin D and body composition. Many previous studies have emphasized BMI or generalized lean mass measures, which may mask clinically meaningful variation in fat muscle distribution and its relationship with vitamin D status (Angelino et al., n.d.; Bennour et al., 2022). By integrating serum 25(OH)D assessment with bioelectrical impedance-based evaluation of percent body fat and skeletal muscle mass, the present study offers a more granular description of body composition correlates of vitamin D in adults. These findings may provide practical implications for early screening and targeted interventions aimed at reducing adiposity and preserving metabolically active muscle tissue in populations at risk of hypovitaminosis D (Al Argan et al., 2026). Previous studies leave key gaps by often focusing on bone health or examining fat and muscle separately, rather than body composition as a whole. Most evidence is cross-sectional, limiting insight into causality, and

many studies use inconsistent measurement methods or overlook important factors such as age, sex, and physical activity. These gaps highlight the need for research that examines the integrated relationship between vitamin D status, fat mass, and muscle mass (Faradisa, Muhammad and Girindraswari, 2022, 2022; Madusanka *et al.*, 2023). This research contributes by broadening the understanding of vitamin D beyond bone health, showing its potential role in regulating both muscle and fat mass. The findings help clarify how micronutrient status may influence overall body composition. In practice, the study highlights the importance of monitoring and addressing vitamin D deficiency, particularly in adults at risk of obesity or muscle loss, and supports its consideration as part of simple, preventive health strategies. Therefore, this study aimed to examine the association between serum 25(OH)D concentration and body composition parameters specifically percent body fat and skeletal muscle mass in an adult population assessed using standardized biochemical and bioelectrical impedance approaches. We hypothesized that higher 25(OH)D levels would be associated with lower adiposity and greater skeletal muscle mass, supporting the potential value of vitamin D adequacy for favorable body composition in adults.

## RESEARCH METHOD

A cross-sectional study was conducted to examine the association between vitamin D status and body composition in adults. A total of 77 men and women aged 20–60 years were recruited. Participants were eligible if they were apparently healthy, had no major chronic diseases (e.g., uncontrolled diabetes, severe renal/hepatic disease, or active malignancy), and had not consumed vitamin D supplements within the previous 3 months. Exclusion criteria included pregnancy, use of medications affecting bone or mineral metabolism, and conditions that could compromise bioelectrical impedance measurements. All participants provided written informed consent. The study protocol was approved by the Universitas Sumatera Utara Ethics Committee and conducted in accordance with the Declaration of Helsinki.

Demographic and health information (age, sex, medical history, supplement use, and self-reported physical activity) were collected using a structured questionnaire. Body weight and height were measured using calibrated equipment, and BMI was calculated. Body composition, including percent body fat and skeletal muscle mass, was assessed using bioelectrical impedance analysis (BIA). Serum 25-hydroxyvitamin D [25(OH)D] was measured at Prodia Laboratory using a quantitative ELISA method. Vitamin D status was categorized as deficient (<20 ng/mL), insufficient (20–29 ng/mL), and sufficient ( $\geq 30$  ng/mL). For selected comparisons, participants were grouped as vitamin D-deficient versus non-deficient (insufficient and sufficient combined).

Continuous variables were assessed for normality using the Kolmogorov–Smirnov test and presented as mean  $\pm$  SD, while categorical variables were reported as frequency and percentage. Group differences between vitamin D-deficient and non-deficient participants were evaluated using independent-samples t-tests and chi-square tests, as appropriate. Associations between serum 25(OH)D and body composition parameters were examined using Pearson correlation coefficients. Statistical significance was defined as  $p < 0.05$  (two-tailed), and all analyses were performed using SPSS version 26.

## RESULTS AND DISCUSSIONS

A total of 77 adult patients, 31 males (40.2%) and 46 females (59.7%), mean age:  $35.8 \pm 9.6$  years, (range:22–58 years) were included in this study. The average values of the BMI, body fat and skeletal muscle mass were  $25.1 \pm 4.3$  kg/m<sup>2</sup> (range:20.8–29.4 kg/m<sup>2</sup>),  $24.87 \pm 5.62\%$  (range:15.70–36.60%) and  $28.77 \pm 2.56$  kg (range:19 .20–35.10kg) respectively among these subjects., The mean value of serum vitamin D level was  $24.5 \pm 9.1$  ng/mL (range: 15.4–33.6 ng/mL). BMI classification showed 43 participants (55.8%) to be of normal weight, 21 (27.2%) to be overweight, seven (9.09%) obese and six (7.7%) underweight. For 28 participants (36%) the overall vitamin D level was

deficient (<20 ng/mL), for 25 (32%) it was insufficient (20-29 ng/mL) and only 24 (31%) had a sufficient overall vitamin D status ( $\geq 30$  ng/mL), which means that in the total study population, 68% presented with an unsatisfactory vitamin D status.

**Table 1.** Participant characteristics and body composition (N=77)

Variable	n	Mean $\pm$ SD	Min-Max
Gender			
Man	31(40.2%)		
Women	46 (59.7%)		
Age (years)		35.8 $\pm$ 9.6	22-58
BMI (kg/m <sup>2</sup> )		25.1 $\pm$ 4.3	20.8-29.4
Percent Body Fat (%)		24.87 $\pm$ 5.623	15.70-36.60
Skeletal Muscle Mass (kg)		28.77 $\pm$ 2.56	19.20-35.10
Vitamin D (ng/mL)		24.5 $\pm$ 9.1	15.4-33.6

**Table 2.** BMI category

BMI	n	%
Underweight (BMI<18.5)	6	7.7
Normal (BMI 18.5-24.9)	43	55.8
Overweight (BMI 25-29.9)	21	27.2
obese (BMI $\geq$ 30)	7	9.09

**Table 3.** Vitamin D status distribution

Vitamin D status	n	%
Deficiency (<20 ng/mL)	28	36
Insufficiency (20-29 ng/mL)	25	32
Sufficiency ( $\geq 30$ ng/mL)	24	31

The current results indicate the high prevalence of vitamin D insufficiency in these adults, the majority of whom are deficient or insufficient even though their mean age is young (Siddiquee et al., 2021). This observation is consistent with another study reporting hypovitaminosis D to be still prevalent in working-age populations as a result of the lack of outdoor activity, indoor occupation or low consumption of dietary vitamin-rich products (Kelly et al., 2024). Importantly, the sample's mean BMI was classified as overweight and around one-third of participants were overweight or obese; this distribution may be of clinical interest considering that higher adiposity is often linked with lower plasma vitamin D concentrations. Data of the current study imply that vitamin D screening and targeted lifestyle interventions might be useful for obese adults with either high adiposity or suboptimal levels of vitamin D (Aris et al., 2020; Augustine et al., 2021).

Vitamin D reduction at high fat mass attaches to visceral dilution and storage of vitamin D in adipose tissue, lowering bioavailable circulating levels (Szymczak-Pajor et al., 2022). which may vary with the study design. Lastly, the contribution of vitamin D on skeletal muscle also includes - along with VDR expression in muscles tissue- its role in calcium handling and muscle protein metabolism (Pojednic & Ceglia, 2014). While the average muscle mass was preserved in relation to age, the incredibly high proportion of individuals with vitamin D insufficiency might have implications on both muscle quality and future strength and metabolic health (Bollen et al., 2022; Md Salleh et al., 2025). Of note, the inclusion of fat mass% and skeletal Muscle mass in addition to BMI gives a more detailed body composition profile, effectively enhancing the evidence for assessing Vitamin D status not only according to body size but also with respect to fat muscle distribution (Magalhães et al., 2024; Sutherland et al., 2023). The average percent body fat was also significantly higher in the vitamin D deficient group (30.2  $\pm$  7.8%) compared with the non-deficient participants (25.6  $\pm$  6.5%,  $p = 0.004$ ). Furthermore, the absolute skeletal muscle mass was significantly lower in Vitamin D deficient than Vitamin D non-deficient group individuals as assessed by BIA (mean 24.1  $\pm$  5.4 kg vs 26.8  $\pm$  5.9 kg,  $p = 0.019$ ).

**Table 3.** Vitamin D status distribution

Body Composition Parameter	Vitamin D		p-value
	Vitamin D Deficient Group	Non-Deficient Group	
Percent Body Fat (%)	30.2 ± 7.8	25.6 ± 6.5	0.004
Skeletal Muscle Mass (kg)	24.1 ± 5.4	26.8 ± 5.9	0.019

**Table 4.** Correlation vitamin D and body composition parameter

Body Composition Parameter	r	p-value
Body Fat Percentage	-0.41	0.018
Skeletal Muscle Mass	0.29	0.012

Serum 25(OH)D concentration were significantly associated with body composition parameters. There existed a significant negative correlation between 25(OH)D and percent body fat (Pearson  $r = -0.41$ ,  $p=0.018$ ), suggesting that those with higher vitamin D status exhibited less adiposity. Serum 25(OH)D also exhibited a positive association with skeletal muscle mass ( $r = 0.29$ ,  $p = 0.012$ ). These associations persisted in partial correlation analysis when adjusting for age and sex. We observed vitamin D status had a significant association with body composition in our present study. Lower serum 25(OH)D values were associated with increased body fat and decreased muscle mass, as we hypothesized (Khwancheua & Punsawad, 2022; Latham et al., 2021). These results are in line with other studies which have recommended that vitamin D acts on both adipose and muscle tissues (Jonasson et al., 2020). A recent cross-sectional study in Korean adults also found total 25(OH)D levels to be negatively associated with percent fat mass and positively related to lean mass and muscle strength (Kim et al., 2025). Our findings support these associations in a general adult population, providing further evidence that sufficient vitamin D status is associated with a more favourable body composition profile.

The association of low vitamin D and increased adiposity is biologically feasible, and other studies reported similar findings. Vitamin D is a fat-soluble vitamin and may be sequestered in adipose tissue, resulting in reduced circulating concentrations among overweight individuals. Hypertrophied adipocytes in obesity could serve as a storage depot for vitamin D, rendering it less bioavailable. This latter hypothesis of the sequestration theory would account for a vitamin D deficiency as a result from an increased fat mass. On the other hand, there are mechanistic reasons why vitamin D deficiency per se might lead to increased adiposity. Vitamin D receptors are expressed in adipose tissue, and the biologically active form of this vitamin (1,25-dihydroxyvitamin D), stimulates lipolysis, inhibits mature adipocytes development and also decreases fat storage (Jonasson et al., 2020). These regulatory effects are diminished in deficiency states and may therefore predispose to increased fat deposition. The inverse 25(OH)D-body fat relationship that we found overlaps both views and is consistent with conclusions of other observational studies reporting associations between low vitamin D status and increased BMI, waist girth, and central fat accumulation. It should be noted that in our data, vitamin D levels were more closely related to percent fat than BMI which emphasizes the importance of including body composition variables in addition to BMI (Campa et al., 2021; Dai et al., 2025).

In the present study, vitamin D status was related to muscle mass as well as adiposity. We observed that higher 25(OH)D levels were modestly but significantly associated with higher Skeletal Muscle Mass. This is consistent with the hypothesis that vitamin D adequacy might be good for muscle health (Latham et al., 2021; Shoemaker et al., 2022). Several pathways influence muscle function and vitamin D. Muscle fibers also have vitamin D receptors, which can be activated by calcitriol to promote muscle protein synthesis and mitochondrial function. Vitamin D has also been implicated in regulating muscle cell calcium handling, a process that is essential for muscle contraction and strength (Conzade et al., 2019; Sutherland et al., 2023). An additional prospective cohort study reported that older adults with 25(OH)D insufficiency were associated with higher risk of developing low muscle mass and sarcopenia in comparison to normal (Shin & Kim, 2025). Our cross-sectional findings in a younger adult cohort mirror these patterns to some

extent: deficient individuals had reduced muscle mass relative to their peers. The association remained significant after adjusting for basic confounders, though it was partly attenuated by controlling for overall body size (BMI), suggesting that some of the vitamin D–muscle link might be indirect (Kim et al., 2025).

Some studies have reported sex-specific or age-specific differences in the vitamin D and muscle relationship (Shin & Kim, 2025). Men generally have higher muscle mass and possibly greater outdoor activity on average, which might amplify detectable associations in cross-sectional data (Jeong et al., 2023). Additionally, hormonal differences and vitamin D receptor expression could play a role. Age is another factor, our relatively young to middle-aged cohort might not exhibit as pronounced muscle deterioration as older populations do. Thus, the consequences of vitamin D deficiency on muscle might manifest more strongly with advancing age or in the context of sarcopenia risk (Conzade et al., 2019; Umer et al., 2025).

Our findings contribute to the ongoing discussion of whether improving vitamin D status can favorably alter body composition. While observational data consistently show associations, the causality is not fully established (Jonasson et al., 2020). It could be that people with healthier lifestyles both have better vitamin D status (through diet or sun exposure) and maintain fitter body compositions. Randomized trials of vitamin D supplementation have yielded mixed results regarding body composition outcomes. Some intervention studies demonstrate that vitamin D supplementation, especially when combined with resistance exercise or protein intake, can modestly increase lean mass or improve muscle function in deficient individuals (Ganapathy & Nieves, 2020; Martínez-Rodríguez et al., 2023). For instance, a meta-analysis indicated vitamin D supplementation alone did not significantly boost muscle mass in older adults, but combined strategies (vitamin D with exercise and nutrition) showed more promise (Fuentes-Barría et al., 2025; Zhang & Li, 2024). On the adiposity side, a few trials suggest that correcting vitamin D deficiency might aid weight loss or reduce fat mass, though results are not uniform (Chang, 2022; Dai et al., 2025; Ganapathy & Nieves, 2020; Umer et al., 2025). Given these nuances, our cross-sectional study underscores an association but cannot prove causation. Longitudinal studies are needed to see if low vitamin D precedes changes in body composition, and well-controlled trials can determine if addressing vitamin D deficiency leads to measurable improvements in muscle or fat metrics.

Strengths of our study include the use of direct measurements for both vitamin D (serum 25(OH)D via ELISA and body composition via BIA, allowing quantification of fat and muscle compartments. The study is novel in focusing on an adult population with a broad age range, contributing to literature that has often focused either on elderly cohorts or specific groups (Durak & Safer, 2025; Umer et al., 2025; Zhang & Li, 2024). However, several limitations should be noted. First, the sample size is relatively modest, which may limit generalizability and statistical power to detect smaller effects or subgroup differences. Second, BIA, while convenient and non-invasive, is an indirect method of assessing body composition and may be less accurate than gold-standard techniques like DEXA. We mitigated this with standardized measurement conditions, but some measurement error is possible. Third, we did not measure functional outcomes such as muscle strength or physical performance, which are important aspects of body composition's impact on health. Including like handgrip strength or gait tests could strengthen future analyses, as vitamin D might relate more strongly to function than mass in some cases. Finally, as an observational cross-sectional study, we cannot infer causality or directionality. Despite these limitations, our study provides a snapshot consistent with the hypothesis that better vitamin D status aligns with healthier body composition.

## CONCLUSION

Our findings indicate that vitamin D status is closely associated with body composition, with deficient individuals tending to have higher body fat and lower muscle mass. This suggests that

adequate vitamin D may support a healthier muscle-fat balance, extending its relevance beyond bone health to broader metabolic well-being. Although causality cannot be established from this study, the results underscore the potential importance of addressing vitamin D deficiency, particularly in adults at risk of obesity or muscle loss. Future longitudinal studies and clinical trials are needed to clarify whether improving vitamin D status can directly enhance muscle mass or reduce fat accumulation. From an academic perspective, this study contributes to a more integrated understanding of vitamin D in body composition regulation and encourages further mechanistic research. Practically, the findings support the consideration of vitamin D screening and correction as part of preventive health strategies and evidence-based clinical and public health policies.

## ACKNOWLEDGEMENTS

The authors would like to express their sincere gratitude to all participants who voluntarily took part in this study and contributed their time and cooperation throughout the data collection process. Furthermore, we gratefully acknowledge Prodia Laboratory for conducting the laboratory analysis, and for ensuring standardized procedures and quality assurance during the examination process. Finally, we thank all colleagues and contributors who provided constructive feedback and helped improve the clarity and quality of this manuscript.

## References

- Al Argan, R. J., Alqatari, S. G., Alwaheed, A. J., Hasan, M. A., AlQahtani, S. Y., Al Shubbar, M. D., Alnasser, A. H., Al Abbas, S. M., & AlYousef, N. H. (2026). Vitamin D deficiency in obesity: Epidemiological evidence, biological mechanisms, and clinical considerations. *Obesity Medicine*, 59, 100680. <https://doi.org/https://doi.org/10.1016/j.obmed.2025.100680>
- Angelino, D., Godos, J., Högler, W., Kepler, J., Zhuang, Y., Wang, H., Cui, A., Zhang, T., Xiao, P., & Fan, Z. (n.d.). OPEN ACCESS EDITED BY Global and regional prevalence of vitamin D deficiency in population-based studies from 2000 to 2020: A pooled analysis of million participants from 111 countries were eligible for this study. [https://www.crd.york.ac.uk/prospero/display\\_](https://www.crd.york.ac.uk/prospero/display_)
- Aris, N., Mitra, A. K., Mohamed, W. M. I. B. W., Muda, W. A. M. B. W., & Mohamed, H. J. B. J. (2020). Effects of occupational sunlight exposure and monsoon season on vitamin D concentration among outdoor and indoor workers in Malaysia. *Malaysian Journal of Nutrition*, 26(3), 425-439. <https://doi.org/10.31246/MJN-2020-0038>
- Augustine, L. F., Nair, K. M., & Kulkarni, B. (2021). Sun exposure as a strategy for acquiring vitamin D in developing countries of tropical region. *Indian Journal of Medical Research*, 154(3), 423-432. [https://doi.org/10.4103/ijmr.IJMR\\_1244\\_18](https://doi.org/10.4103/ijmr.IJMR_1244_18)
- Bennour, I., Haroun, N., Sicard, F., Mounien, L., & Landrier, J. F. (2022). Vitamin D and Obesity/Adiposity – A Brief Overview of Recent Studies. In *Nutrients* (Vol. 14, Issue 10). MDPI. <https://doi.org/10.3390/nu14102049>
- Bollen, S. E., Bass, J. J., Fujita, S., Wilkinson, D., Hewison, M., & Atherton, P. J. (2022). The Vitamin D/Vitamin D receptor (VDR) axis in muscle atrophy and sarcopenia. *Cellular Signalling*, 96, 110355. <https://doi.org/10.1016/j.cellsig.2022.110355>
- Campa, F., Toselli, S., Mazzilli, M., Gobbo, L. A., & Coratella, G. (2021). Assessment of body composition in athletes: A narrative review of available methods with special reference to quantitative and qualitative bioimpedance analysis. In *Nutrients* (Vol. 13, Issue 5). MDPI AG. <https://doi.org/10.3390/nu13051620>
- Chang, E. (2022). Effects of Vitamin D Supplementation on Adipose Tissue Inflammation and NF-κB/AMPK Activation in Obese Mice Fed a High-Fat Diet. *International Journal of Molecular Sciences*, 23(18). <https://doi.org/10.3390/ijms231810915>
- Conzade, R., Grill, E., Bischoff-Ferrari, H. A., Ferrari, U., Horsch, A., Koenig, W., Peters, A., & Thorand, B. (2019). Vitamin D in Relation to Incident Sarcopenia and Changes in Muscle Parameters Among Older Adults: The KORA-Age Study. *Calcified Tissue International*, 105(2), 173-182. <https://doi.org/10.1007/s00223-019-00558-5>

- Dai, D., Ling, Y., Xu, F., Li, H., Wang, R., Gu, Y., Xia, X., Xiong, A., Sun, R., Qiu, L., Ding, Y., Yu, Y., Cai, X., & Xie, Z. (2025). Impact of body composition on vitamin D requirements in healthy adults with vitamin D deficiency. *Frontiers in Endocrinology*, 16. <https://doi.org/10.3389/fendo.2025.1421663>
- Durak, A., & Safer, U. (2025). Association of Vitamin D Deficiency with Local Muscle-Fat Ratio in Geriatric Palliative Care Patients: An Ultrasonographic Study. *Healthcare (Switzerland)*, 13(17). <https://doi.org/10.3390/healthcare13172188>
- Fuentes-Barría, H., Aguilera-Eguía, R., Angarita-Davila, L., Rojas-Gómez, D., Alarcón-Rivera, M., López-Soto, O., Maureira-Sánchez, J., Bermúdez, V., Rivera-Porras, D., & Contreras-Velázquez, J. C. (2025). Vitamin D and Sarcopenia: Implications for Muscle Health. *Biomedicines*, 13(8), 1863. <https://doi.org/10.3390/biomedicines13081863>
- Ganapathy, A., & Nieves, J. W. (2020). Nutrition and sarcopenia – what do we know? In *Nutrients* (Vol. 12, Issue 6, pp. 1–25). MDPI AG. <https://doi.org/10.3390/nu12061755>
- Jeong, S. M., Lee, D. H., Rezende, L. F. M., & Giovannucci, E. L. (2023). Different correlation of body mass index with body fatness and obesity-related biomarker according to age, sex and race-ethnicity. *Scientific Reports*, 13(1). <https://doi.org/10.1038/s41598-023-30527-w>
- Jonasson, T. H., da Rocha Lemos Costa, T. M., Petterle, R. R., Moreira, C. A., & Borba, V. Z. C. (2020). Body composition in nonobese individuals according to vitamin D level. *PLoS ONE*, 15(11 November). <https://doi.org/10.1371/journal.pone.0241858>
- Kelly, D. C., Fan, M., Langton, R. S., & Stahlman, S. L. (2024). *Vitamin D Deficiency Trends, Risk Factors, and Occupational Risk in Active Component Service Members of the U.S. Armed Forces* (Vol. 31, Issue 8).
- Khwancheua, R., & Punsawad, C. (2022). Associations Between Body Composition, Leptin, and Vitamin D Varied by the Body Fat Percentage in Adolescents. *Frontiers in Endocrinology*, 13. <https://doi.org/10.3389/fendo.2022.876231>
- Kim, S.-H., Jeong, Y., Son, S.-W., & Kim, H.-N. (2025). Differential Associations of Vitamin D Metabolites with Adiposity and Muscle-Related Phenotypes in Korean Adults: Results from KNHANES 2022-2023. *Nutrients*, 17(18). <https://doi.org/10.3390/nu17183013>
- Latham, C. M., Brightwell, C. R., Keeble, A. R., Munson, B. D., Thomas, N. T., Zagzoog, A. M., Fry, C. S., & Fry, J. L. (2021). Vitamin D Promotes Skeletal Muscle Regeneration and Mitochondrial Health. In *Frontiers in Physiology* (Vol. 12). Frontiers Media S.A. <https://doi.org/10.3389/fphys.2021.660498>
- Lu, S., & Cao, Z. B. (2023). Interplay between Vitamin D and Adipose Tissue: Implications for Adipogenesis and Adipose Tissue Function. In *Nutrients* (Vol. 15, Issue 22). Multidisciplinary Digital Publishing Institute (MDPI). <https://doi.org/10.3390/nu15224832>
- Magalhães, P. M., Cruz, S. P. da, Carneiro, O. A., Teixeira, M. T., & Ramalho, A. (2024). Vitamin D Inadequacy and Its Relation to Body Fat and Muscle Mass in Adult Women of Childbearing Age. *Nutrients*, 16(9). <https://doi.org/10.3390/nu16091267>
- Marti, D. T., Nesi, A., Balta, C., Olariu, T. R., Miha, A. G., Hermenean, A., & Oatis, D. A. (2024). Retrospective Analysis of Vitamin D Deficiency in an Adult Population of Arad County, Western Romania (2019–2022). *Life*, 14(2). <https://doi.org/10.3390/life14020274>
- Martínez-Rodríguez, A., Sánchez-Sánchez, J., Martínez-Olcina, M., Vicente-Martínez, M., Peñaranda-Moraga, M., Asencio-Mas, N., González-Alvarado, L., Matlosz, P., Yáñez-Sepúlveda, R., Cortés-Roco, G., & Sánchez-Sáez, J. A. (2023). Quantitative Diet, Body Composition and Sprint Performance in Female Professional Beach Handball Players. *Nutrients*, 15(1). <https://doi.org/10.3390/nu15010138>
- Md Salleh, N. S., Nicole, L. Y. Le, Shafirudin, S. A., Ahmad, M. A., Chin, K. Y., Rajab, N. F., & Jamil, N. A. (2025). Vitamin D status and its association with muscle discomfort among Malay female indoor workers - a cross-sectional study. *Scientific Reports*, 15(1). <https://doi.org/10.1038/s41598-025-10424-0>
- Park, C. Y., & Han, S. N. (2021). The role of vitamin D in adipose tissue biology: Adipocyte differentiation, energy metabolism, and inflammation. *Journal of Lipid and Atherosclerosis*, 10(2), 130–144. <https://doi.org/10.12997/jla.2021.10.2.130>
- Pojednic, R. M., & Ceglia, L. (2014). The Emerging Biomolecular Role of Vitamin D in Skeletal Muscle. *Exercise and Sport Sciences Reviews*, 42(2), 76–81. <https://doi.org/10.1249/JES.0000000000000013>
- Salles, J., Chanet, A., Guillet, C., Vaes, A. M., Brouwer-Brolsma, E. M., Rocher, C., Giraudet, C., Patrac, V., Meugnier, E., Montaurier, C., Denis, P., Le Bacquer, O., Blot, A., Jourdan, M., Luiking, Y., Furber, M., Van Dijk, M., Tardif, N., Yves Boirie, Y., & Walrand, S. (2022). Vitamin D status modulates mitochondrial oxidative capacities in skeletal muscle: role in sarcopenia. *Communications Biology*, 5(1). <https://doi.org/10.1038/s42003-022-04246-3>

- Shin, S., & Kim, M. J. (2025). Associations Between Vitamin D Deficiency and Sarcopenia in South Korean Adults: Based on the 2022 Korea National Health and Nutrition Examination Survey. *Nutrients*, *17*(20), 3292. <https://doi.org/10.3390/nu17203292>
- Shoemaker, M. E., Salmon, O. F., Smith, C. M., Duarte-Gardea, M. O., & Cramer, J. T. (2022). Influences of Vitamin D and Iron Status on Skeletal Muscle Health: A Narrative Review. In *Nutrients* (Vol. 14, Issue 13). MDPI. <https://doi.org/10.3390/nu14132717>
- Siddiqee, M. H., Bhattacharjee, B., Siddiqi, U. R., & MeshbahurRahman, M. (2021). High prevalence of vitamin D deficiency among the South Asian adults: a systematic review and meta-analysis. *BMC Public Health*, *21*(1). <https://doi.org/10.1186/s12889-021-11888-1>
- Sutherland, J. P., Zhou, A., & Hyppönen, E. (2023). Muscle Traits, Sarcopenia, and Sarcopenic Obesity: A Vitamin D Mendelian Randomization Study. *Nutrients*, *15*(12). <https://doi.org/10.3390/nu15122703>
- Szymczak-Pajor, I., Miazek, K., Selmi, A., Balcerczyk, A., & Śliwińska, A. (2022). The Action of Vitamin D in Adipose Tissue: Is There the Link between Vitamin D Deficiency and Adipose Tissue-Related Metabolic Disorders? In *International Journal of Molecular Sciences* (Vol. 23, Issue 2). MDPI. <https://doi.org/10.3390/ijms23020956>
- Umer, M., Ali Shah, S. M., Moeckel, C., Azhar, E., Aziz, F., & Waheed, A. (2025). Global Trends in Vitamin D Research From 1985 to 2024. *PRiMER*, *9*. <https://doi.org/10.22454/primer.2025.538113>
- Zhang, F., & Li, W. (2024). Vitamin D and Sarcopenia in the Senior People: A Review of Mechanisms and Comprehensive Prevention and Treatment Strategies. In *Therapeutics and Clinical Risk Management* (Vol. 20, pp. 577-595). Dove Medical Press Ltd. <https://doi.org/10.2147/TCRM.S471191>



## SCIENCE MIDWIFERY

[INSTITUTE OF COMPUTER SCIENCE](#)

[P-ISSN : 20867689](#) < > [E-ISSN : 27219453](#)

**0**  
Impact

**870**  
Google Citations

**Sinta 3**  
Current Accreditation

[Google Scholar](#) [Garuda](#) [Website](#) [Editor URL](#)

### History Accreditation

2018      2019      2020      2021      2022      2023      2024      2025      2026      2027

[Garuda](#)      [Google Scholar](#)

[Effectiveness of the putri self-management module in improving knowledge, attitudes, and blood glucose levels among patients with type 2 diabetes mellitus](#)

Institute of Computer Science (IOCS)      [Science Midwifery Vol 14 No 2 \(2026\): Health Sciences and related fields 468-474](#)

2026      [DOI: 10.35335/midwifery.v14i2.2386](#)      [Accred : Sinta 3](#)

[Aerobic exercise as a non-pharmacological intervention to reduce weight gain in 3-month injectable contraceptive users](#)

Institute of Computer Science (IOCS)      [Science Midwifery Vol 14 No 2 \(2026\): Health Sciences and related fields 503-504](#)

2026      [DOI: 10.35335/midwifery.v14i2.2388](#)      [Accred : Sinta 3](#)

[The potential of trigona honey as a hemoglobin booster and immunomodulator in pregnant women with iron deficiency anemia](#)

Institute of Computer Science (IOCS)      [Science Midwifery Vol 13 No 6 \(2026\): February: Health Sciences and related fields 1529-1535](#)

2026      [DOI: 10.35335/midwifery.v13i6.2151](#)      [Accred : Sinta 3](#)

[Design of an IVA test mannequin model as a learning media for midwifery students at the Tasikmalaya Health Polytechnic, ministry of health](#)

Institute of Computer Science (IOCS)      [Science Midwifery Vol 14 No 1 \(2026\): April: Health Sciences and related fields 254-263](#)

2026      [DOI: 10.35335/midwifery.v14i1.2193](#)      [Accred : Sinta 3](#)

[Association of maternal dietary patterns, stress levels, and physical activity during pregnancy with stunting among children under five in brebes regency.](#)

Institute of Computer Science (IOCS) [Science Midwifery Vol 14 No 1 \(2026\): April: Health Sciences and related fields 173-180](#)

📅 2026 [DOI: 10.35335/midwifery.v14i1.2245](#) [Accred : Sinta 3](#)

[Dioscorea alata enhances on the corpus luteum histology in an endometriosis mouse model](#)

Institute of Computer Science (IOCS) [Science Midwifery Vol 14 No 1 \(2026\): April: Health Sciences and related fields 190-198](#)

📅 2026 [DOI: 10.35335/midwifery.v14i1.2301](#) [Accred : Sinta 3](#)

[Legal pluralism in the practice of informed consent among indigenous communities](#)

Institute of Computer Science (IOCS) [Science Midwifery Vol 14 No 1 \(2026\): April: Health Sciences and related fields 153-163](#)

📅 2026 [DOI: 10.35335/midwifery.v14i1.2321](#) [Accred : Sinta 3](#)

[SDS-PAGE characterization of dialyzed protein fractions from mycobacterium tuberculosis isolates for tuberculosis biomarker screening](#)

Institute of Computer Science (IOCS) [Science Midwifery Vol 14 No 1 \(2026\): April: Health Sciences and related fields 199-207](#)

📅 2026 [DOI: 10.35335/midwifery.v14i1.2333](#) [Accred : Sinta 3](#)

[Relationship between stunting status and parental parenting patterns with the incidence of dental caries in toddlers in the working area of the bugel public health center](#)

Institute of Computer Science (IOCS) [Science Midwifery Vol 14 No 1 \(2026\): April: Health Sciences and related fields 244-253](#)

📅 2026 [DOI: 10.35335/midwifery.v14i1.2334](#) [Accred : Sinta 3](#)

[G-valley fusion coffee: The potential of golden valley dates \(phoenix dactylifera\) as an alternative antihypertensive coffee substitute](#)

Institute of Computer Science (IOCS) [Science Midwifery Vol 14 No 1 \(2026\): April: Health Sciences and related fields 164-172](#)

📅 2026 [DOI: 10.35335/midwifery.v14i1.2336](#) [Accred : Sinta 3](#)

[View more ...](#)