

# VITAMIN D AND MUSCULOSKELETAL PAIN

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## Introduction

Vitamin D and its effects are receiving an increased focus and vitamin D deficiency is now considered a significant public health issue. Vitamin D has not only been linked to bone formation but also to mortality, diabetes, cardiovascular disease, rheumatoid arthritis, chronic obstructive pulmonary disease, cancer, multiple sclerosis, rickets and muscle disease, renal disease, schizophrenia and depression. There are few population based studies of vitamin D and general musculoskeletal pain, and research in this area continues to increase. The aim of this study was to determine the relationship between low levels of serum vitamin D levels and musculoskeletal pain in a population-based cohort.

## Methods

The North West Adelaide Health Study (NWAHS) is a cohort study located in the north-western suburbs of Adelaide, SA. Three phases of data collection have been conducted, in 2000-2002 (Stage 1), 2004-2006 (Stage 2) and 2008-2010 (Stage 3). In each stage there has been a self-complete questionnaire, clinic assessment and Computer Assisted Telephone Interview (CATI). In Stage 3, participants were asked if they had experienced pain or stiffness in the back, foot, hand, knee, hip and shoulder on most days over the last month. Serum vitamin D was collected during the clinic examinations (n=2413). The vitamin D was initially measured using the Enzyme Immunoassay method and was then changed to an Automated Chemiluminescent assay. Other information collected included demographics and date of clinic visit to determine season.

## Results

Overall, 74% of participants reported having pain in at least one joint. The proportion of participants classified as vitamin D deficient or insufficient is shown in Table 1. Females were significantly more likely to be classified as vitamin D insufficient or deficient (OR 1.61 95% CI 1.23-2.12; p=0.001) and more likely to report pain in at least one joint. There was no significant association between vitamin D level and musculoskeletal pain in at least one area.

Table 1: Proportion within vitamin D level category

Vitamin D	n	% (95% CI)
Deficient (<25nmol/L)	21	0.9 (0.6-1.3)
Insufficient (>=25nmol/L and < 50nmol/L)	528	21.9 (20.3-23.6)
Sufficient (>=50nmol/L)	1864	77.3 (75.5-78.9)
<b>Total</b>	<b>2413</b>	

However, when examined by individual areas, an association with hand and back pain existed (Table 2), which when adjusted for age, sex and season only remained for hand pain.

Table 2: Unadjusted association between vitamin D levels and each pain site

Areas	Odds ratio	p-value
<b>Shoulder</b>		
Sufficient	1.00	
Insufficient	0.99 (0.79-1.24)	0.945
Deficient	0.75 (0.23-2.49)	0.636
<b>Back</b>		
Sufficient	1.00	
Insufficient	1.22 (1.01-1.49)	<b>0.044</b>
Deficient	0.53 (0.21-1.32)	0.172
<b>Hip</b>		
Sufficient	1.00	
Insufficient	1.21 (0.97-1.51)	0.099
Deficient	0.86 (0.29-2.57)	0.785
<b>Knee</b>		
Sufficient	1.00	
Insufficient	0.91 (0.74-1.13)	0.397
Deficient	1.29 (0.49-3.41)	0.606
<b>Foot</b>		
Sufficient	1.00	
Insufficient	1.06 (0.85-1.30)	0.622
Deficient	0.81 (0.30-2.19)	0.680
<b>Hand</b>		
Sufficient	1.00	
Insufficient	1.35 (1.09-1.66)	<b>0.005</b>
Deficient	1.09 (0.39-3.04)	0.874

## Conclusion

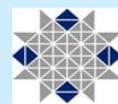
Vitamin D insufficiency/deficiency is relatively common in the population, with more than one fifth of the population classified as insufficient or deficient. There are however, issues with test accuracy bias and imprecision of automated methods which may be a problem at lower ranges. The optimal levels of vitamin D for bone and muscle health are not clear, and while there may be an association between musculoskeletal pain and vitamin D, this association is likely to be weak.



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