



# FOCUS ON RESEARCH

## ORKNEY COMPLEX DISEASE STUDY: NORTHERN ISLES VITAMIN D STUDY – PREVALENCE AND IMPACT OF HYPOVITAMINOSIS D IN A HIGH RISK POPULATION

### Researchers

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### Aim

The primary aims were to measure plasma 25(OH)-vitamin D levels (hereafter vitamin D) in 2300 individuals from the Northern Isles of Scotland, and to thus compare the prevalence of optimal, adequate and deficient vitamin D to those in a recent Mainland Scottish study (SOCCS). Secondary aims were to investigate the relationship of vitamin D levels with disease risk factors and end points and to establish a study which will allow follow up to investigate how vitamin D levels influence the risk of developing disease (new or incident cases of disease).

### Project Outline/Methodology

Both forms of vitamin D (D2 and D3) were measured in the plasma of 2306 volunteers in the Orkney Complex Disease Study (ORCADES) and Northern Isles Multiple Sclerosis study (NIMS) (aged 16-100 years). Mean levels of vitamin D and the prevalence of deficiency were compared by month to data from SOCCS. In both studies, vitamin D categories were defined as deficient, high risk of deficiency, adequate and optimal. Where appropriate, measures were seasonally adjusted, to allow comparison as if all bloods were drawn in May (May-adjustment). Age-, sex- and May-adjusted vitamin D was compared to a number of disease risk factors and end points using statistical models. Participants are flagged for long-term follow up using NHS routine data, establishing a resource for the future investigation of incident disease.

### Key Results

A high proportion of ORCADES subjects were either deficient in vitamin D (34%) or at high risk of deficiency (31%), but this varied dramatically by season. 51% were deficient in December but only 9% in August while conversely optimal levels were found for 13% in January and 44% in August. There is a remarkable similarity in the seasonality of vitamin D in the Northern Isles and Mainland Scotland. Mean levels are not significantly different overall or for any month and the proportion deficient is also comparable, except for a tendency to higher proportions with deficiency in Mainland Scotland than Orkney in June and July. For all months apart from January, the proportion of severely deficient

individuals is higher in Mainland Scotland than Orkney (e.g. March 22% vs 12%, August 4% vs 2%). Vitamin D levels declined with age but there were no sex differences. Vitamin D intake from food and supplements was significantly associated with crude and May-adjusted plasma vitamin D. When vitamin D intake is accounted for, May-adjusted vitamin D levels were significantly associated with outdoor occupation. Age-, sex- and May-adjusted vitamin D was not associated with lipid levels, blood pressure, measures of atherosclerosis, osteoporosis, hypertension, diabetes and its risk factors but prevalence of vitamin D deficiency was statistically significantly higher among people with Multiple Sclerosis (MS).

### Conclusions

The prevalences of optimal, adequate and deficient plasma vitamin D in the Northern Isles were not different to those in Mainland Scotland, while severe deficiency is rarer, despite the higher latitude. This is potentially due to "outdoor lifestyle", as subjects with outdoor occupations had higher levels than others. Vitamin D deficiency was significantly associated with MS case status but not with any of the other disease risk factors and end points tested.

### What does this study add to the field?

We show that plasma vitamin D levels do not vary by latitude in Scotland and that other factors such as diet and outdoor lifestyle are more important. However, MS patients in the Northern Isles have significantly lower vitamin D than people without MS.

### Implications for Practice or Policy

This study confirms that vitamin D deficiency is widespread in the Northern Isles of Scotland, particularly among MS patients. If deficiency is shown to be causally involved in any condition, consideration should be given to increasing the recommended dietary intake or supplementation.

### Where to next?

Measure individual ultraviolet exposure to further investigate relationship of plasma vitamin D to lifestyle factors such as occupation, physical activity and time spent outdoors.

### Further details from:

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