Amiodarone, sunlight avoidance and vitamin D deficiency

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Abstract

This short report looks at the incidence of vitamin D deficiency, which is an important problem in patients who take amiodarone and also in those who avoid sunlight exposure.

Key words: vitamin D, amiodarone.

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Introduction

Amiodarone is the most widely prescribed anti-arrhythmic agent worldwide. It accounts for around 35% of anti-arrhythmic prescriptions in Europe with 990,700 prescriptions being dispensed during 2004 in the UK, at a cost of £7,121,500.[1] Among its side effects are photosensitive skin reactions. It is recommended that patients who take amiodarone shield from sunlight and use a high factor sunblock.

In the UK, the average adult diet contains little vitamin D. Dietary surveys indicate that vitamin D intake is consistently below the government's RDA (recommended dietary allowance) and low-fat diets restrict vitamin D intake further. We are, therefore, reliant on photosynthesis in the skin as our major source of vitamin D. It is estimated that sunlight exposure accounts for 90–100% of our vitamin D.[2] Photosynthesis is curtailed by inadequate ultraviolet B penetration and the skin's photosynthetic ability. Ageing skin has reduced levels of 7-dehydrocholesterol leading to a four-fold reduction in vitamin D production from the age of 20 to 70 years.[2] Skin pigmentation can produce a 50-times reduction in its ability to photosynthesise. Factor 8 sunblock has been shown to reduce vitamin D production by 97.5%.[2]

Until recently, vitamin D deficiency was thought to be an uncommon problem, confined to Asian communities and those with malabsorption. In the past decade it has been established that the majority of people with vitamin D deficiency have normal routine bone biochemistry tests (calcium, phosphate, alkaline phosphatase) and vitamin D deficiency/insufficiency has been redefined: serum levels that were previously thought to be adequate are now regarded as inadequate (hypovitaminosis D). Population screening has revealed surprisingly high levels of asymptomatic vitamin D deficiency in the general population – 36% of male and 47% of female community dwelling adults aged 71 to 76 years were shown to be deficient. Even higher rates were found in certain high-risk populations, such as the institutionalised elderly where 80–100% are deficient. In hospitalised patients (mean age 62 years) in Boston, US, hypovitaminosis D was found in 57%.[3,4] Some 36% of medical personnel (aged 18–29 years) were also found to be vitamin D deficient at the end of winter in Boston.

Vitamin D deficiency has a well-established relationship with metabolic bone disease and myopathy but it has also been associated with hypertension, impaired immunity, susceptibility to autoimmune disease and malignancy, by its action on cell maturation.

We hypothesised that people who take amiodarone and avoid sunlight exposure were at increased risk of vitamin D deficiency.

Methods

We performed a descriptive study of vitamin D status in patients receiving regular prescriptions for amiodarone. This was performed in a primary care setting with six local practices representing a range of social diversity but more than 90% of patients were Caucasian.

Patients taking amiodarone who were over 20 years old and not taking vitamin supplements (n=136; 76 male; age 38–97 years, mean 76 years) were approached. Eighty-four patients (52 male; age 38–92 years, mean 68 years) agreed to provide a serum sample for analysis and fill in a questionnaire relating to sunlight exposure, medication, concurrent illnesses, falls and fracture rates. The samples were taken from July to September when vitamin D levels would be expected to peak.

We received 57 completed sets of data. After data analysis we approached those who declined to provide a serum sample with the questionnaire to assess potential bias with those consenting to join the trial. We received 25 further completed questionnaires for comparison.

We used serum calcidiol levels above 50 nmol/L to represent vitamin D sufficiency, although some argue that a threshold of 100 nmol/lL is appropriate.

Results

The results are summarised in table 1. We found that 49% of our

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Table 1. Questionnaire results for completed data sets

	Completed data sets
Years of amiodarone use (mean)	4.9
Patients reporting sunlight avoidance	57%
Sunblock use	39%
Multivitamin use	10%
Cod liver oil use	26%
Reported liver disease	0%
Reported renal disease	0%
Fallers	51%
Recurrent fallers	19%
Reported fractures	48%
Mean reported episodes of daylight exposure of > 5 mins/week	18.4

population were deficient in vitamin D (ranging from unrecordable – 83 nmol/L, mean 47.9, standard deviation 15.6) with three (5%) having a severe deficiency (calcidiol < 30 nmol/L), of whom two (3%) had unrecordable levels of calcidiol. If we used the threshold of 100 nmol/L, then 100% would have been deficient.

We demonstrated no correlation between vitamin D level and total dose or years of amiodarone use, reported sunblock use or sunlight avoidance. We did not identify a relationship with other medication use or concurrent medical illness, particularly renal and liver disease.

Interestingly, we had a high rate of self-reported fractures and falls although we did not identify any significant association with years of amiodarone use or vitamin D level in our study. This may reflect predisposition to arrhythmia-related falls or the concurrent use of other cardiac medication with side effects such as hypotension.

We identified no significant bias from questionnaire data in patients who declined venesection.

Discussion

We found a high prevalence of vitamin D deficiency in people who take amiodarone. This is higher than previous studies on similar-aged, community-dwelling populations, suggesting that people who take amiodarone are at increased risk of vitamin D deficiency. Unfortunately our sample size was small so we were unable to ascertain whether this was due to amiodarone use and self-reported sunlight avoidance or other health-related factors.

In view of the growing evidence for the widespread deleterious effects of vitamin D deficiency (including high blood pressure) and the extensive use of amiodarone, we would ask physicians who prescribe it to be aware of the high prevalence of vitamin D deficiency and consider evaluation of serum levels of calcidiol and replacement with oral or parenteral preparations.

Key messages

- Vitamin D deficiency has negative effects beyond metabolic bone disease
- Vitamin D deficiency is common in people who take amiodarone

Funding

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Conflict of interest

None declared.

References

1. Department of Health website. Pharmacies and Prescriptions. Available at: http://www.dh.gov.uk/publicationsandstatistics/statistics/statisticalworkareas/statisticalhealthcare/statisticalhealthcarearticle Accessed: 18.04.05
2. Holick MF. Vitamin D: A millennium perspective. *J Cell Biochem* 2003; **88**:296-307.
3. Allain TJ, Dhesi J. Hypovitaminosis D in older adults. *Gerontol* 2003;**49**: 273-8.
4. Pfeifer M, Begerow B, Minne HW. Vitamin D and muscle function. *Osteoporosis Int* 2002;**13**:187-94.
5. Tangpricha V, Pearce EN, Chen TC *et al*. Vitamin D insufficiency among free-living healthy young adults. *Am J Med* 2002;**112**:659-62.