Marked vitamin D deficiency in patients with diabetes in the UK

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pretreatment levels after approximately 1.5 years. Puberty is usually associated with deterioration in glycaemic control, but age was not a significant determinant of the changes seen. Differences in glycaemic control and the pattern observed between centres that cover areas with a similar socio-economic background suggest that the approach of the local diabetes team is of great importance. It is of note that the number of patients in some contributing units was relatively small.

Few studies have investigated the longer-term effects of insulin pump use in young people. The initial improvements in HbA1c described are generally modest, with some groups also reporting a return to baseline HbA1c values [3]. No study to date has used a robust method of modelling repeated measurements and hence their estimates of effectiveness may be subject to bias [4].

The limitations of our study include the retrospective nature of the data collected and that we only measured HbA1c, which, it can be argued, is only part of what continuous subcutaneous insulin infusion has to offer. Other potential benefits include an improved quality of life and a reduction in hypoglycaemia. It is of note that the patients in this study had a broad range of HbA1c values at baseline and National Institute of Health and Clinical Excellence (NICE) guidelines may not have been rigorously adhered to.

These data underline the need for well-designed, prospective, randomized trials of continuous subcutaneous insulin infusion therapy in children, so that the true impact and cost-effectiveness can be determined.

**Competing interests**

Nothing to declare.

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**References**


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**Marked vitamin D deficiency in patients with diabetes in the UK: ethnic and seasonal differences and an association with dyslipidaemia**


At least 1 billion people worldwide have vitamin D deficiency [1]. Whilst levels of 25-hydroxyvitamin D [25(OH)D] ≥ 30 ng/ml are considered optimal for bone health [2], the levels in diabetes and cardiovascular disease, which have also been linked to vitamin D deficiency, are not established [3].

We assessed the 25(OH)D status in a cross-sectional study of 563 unselected subjects with diabetes and 44 subjects without diabetes to establish the prevalence of vitamin D deficiency and its association with ethnicity, season, lipids and cardiovascular disease.

Ethical approval was not required as the data were extracted retrospectively and did not extend beyond the standard clinical practice of a biannual diabetes clinic review. All participants were aged ≥ 18 years old and attended clinics at the Central Manchester Foundation Trust, Manchester, UK, from August 2009 to July 2010. Subjects with chronic kidney disease stages 4 and 5, granulomatous diseases and malabsorption syndromes were excluded.

Clinical demographic data were analysed from medical records and a medical record database (Diamond database; Hicom, Woking, UK). Serum for 25(OH)D was stored at −20 °C and assayed using an automated platform (Immuno-Diagnostic Systems Ltd, Bolden, UK) based on chemiluminescence technology.

Data were assessed for normality and appropriate statistical analyses were employed using Statsdirect (Statsdirect Ltd, Altrincham, UK). A *P*-value of < 0.05 was considered to be statistically significant and was maintained in multiple comparison tests. All values are presented as mean ± standard deviation (sd).

The mean serum 25(OH)D concentration was 15.7 ± 9.1 ng/ml in subjects with diabetes and 21.3 ± 14.6 ng/ml in subjects without diabetes, although the latter cohort was significantly smaller. The two cohorts were matched for age (59.7 ± 13.3 vs. 58.1 ± 15.6 years) and ethnicity (39 vs. 61% white European).
Table 1: Characteristics by categories of 25(OH)D in 563 unselected subjects with diabetes

<table>
<thead>
<tr>
<th>Serum 25(OH)D</th>
<th>Category 1</th>
<th>Category 2</th>
<th>Category 3</th>
<th>Category 4</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>25(OH)D status</td>
<td>&lt; 10 ng/ml</td>
<td>10 to &lt; 20 ng/ml</td>
<td>20 to &lt; 30 ng/ml</td>
<td>≥ 30 ng/ml</td>
<td>—</td>
</tr>
<tr>
<td>n (%)</td>
<td>179 (32)</td>
<td>233 (41)</td>
<td>99 (18)</td>
<td>52 (9)</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>Men (%)</td>
<td>53</td>
<td>57</td>
<td>48</td>
<td>48</td>
<td>NS</td>
</tr>
<tr>
<td>Type 2 diabetes (%)</td>
<td>85</td>
<td>75</td>
<td>69</td>
<td>52</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>% free of cardiovascular events</td>
<td>79</td>
<td>80</td>
<td>77</td>
<td>84</td>
<td>NS</td>
</tr>
<tr>
<td>Age (years)</td>
<td>58.8 ± 13.7</td>
<td>59.6 ± 13.5</td>
<td>61.0 ± 12.4</td>
<td>60.2 ± 13.0</td>
<td>NS</td>
</tr>
<tr>
<td>Duration of diabetes (years)</td>
<td>15.4 ± 9.4</td>
<td>17.9 ± 11.9</td>
<td>19.1 ± 11.1</td>
<td>22.3 ± 15.1</td>
<td>0.03</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>31.2 ± 6.5</td>
<td>30.5 ± 6.4</td>
<td>31.5 ± 7.0</td>
<td>29.1 ± 6.4</td>
<td>NS</td>
</tr>
<tr>
<td>Systolic blood pressure (mmHg)</td>
<td>129 ± 17</td>
<td>129 ± 16</td>
<td>133 ± 18</td>
<td>131 ± 17</td>
<td>NS</td>
</tr>
<tr>
<td>Diastolic blood pressure (mmHg)</td>
<td>69 ± 10</td>
<td>70 ± 9</td>
<td>69 ± 9</td>
<td>71 ± 11</td>
<td>NS</td>
</tr>
<tr>
<td>HbA1c (mmol/mol) (%)</td>
<td>69 ± 24</td>
<td>68 ± 20</td>
<td>66 ± 17</td>
<td>73 ± 21</td>
<td>NS</td>
</tr>
<tr>
<td>Total cholesterol (mmol/l)</td>
<td>4.2 ± 1.3</td>
<td>4.1 ± 1.2</td>
<td>4.2 ± 0.9</td>
<td>4.5 ± 1.6</td>
<td>NS</td>
</tr>
<tr>
<td>HDL cholesterol (mmol/l)</td>
<td>1.3 ± 0.7</td>
<td>1.3 ± 0.4</td>
<td>1.4 ± 0.5</td>
<td>1.6 ± 0.6</td>
<td>0.003</td>
</tr>
<tr>
<td>Triglycerides (mmol/l)</td>
<td>2.2 ± 2.8</td>
<td>1.7 ± 1.5</td>
<td>1.5 ± 0.9</td>
<td>1.6 ± 1.3</td>
<td>0.04</td>
</tr>
</tbody>
</table>

Data are presented as mean ± sd unless specified as %.
25(OH)D, 25-hydroxyvitamin D; NS, not significant.

Subjects were divided into four categories of 25(OH)D levels (Table 1). Our data confirm widespread vitamin D deficiency among people with diabetes in the UK; 511 (91%) subjects had vitamin D insufficiency (< 30 ng/ml), with severe (< 10 ng/ml) deficiency in 179 (32%) individuals, and in over half (54%) of South Asian/Middle Eastern subjects. Despite deficiency in vitamin D there were no significant alterations in either alkaline phosphatase (ALP) or corrected calcium. These data argue against guidance suggesting that we only test those with vitamin D deficiency among people with diabetes in the UK. Whether vitamin D there were no significant alterations in either alkaline phosphatase (ALP) or corrected calcium. These data argue against guidance suggesting that we only test those with vitamin D deficiency, providing a potential mechanistic link between vitamin D and cardiovascular disease [4]. However, randomized placebo controlled trials are underway (http://www.vitalsudy.org/) of vitamin D supplementation assessing cardiovascular outcomes as primary endpoints; the results are eagerly awaited.

Competing interests
Nothing to declare.

References

