Prevalence of hypovitaminosis D in postmenopausal women: a systematic review

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SUMMARY

BACKGROUND: Hypovitaminosis D is considered a global public health issue. Knowledge of its true dimensions will allow us to design interventions and plan preventive measures that can have a significant impact on human health.

OBJECTIVES: The aim of this study was to evaluate the prevalence of hypovitaminosis D, defined as a serum 25-hydroxyvitamin D concentration < 30 ng/ml, in postmenopausal women around the world, as well as to identify the potential associated factors.

METHODS: A systematic review was performed in accordance with the Preferred Reporting Items for Systematic Review and Meta-Analyses recommendations. Specific search terms were consulted in Medline, Excerpta Medica, and Latin-American and Caribbean Health Sciences Literature databases, with no restriction for the year or language of publication.

RESULTS: Of 451 studies initially identified, 32 were selected for analysis. Collectively, those 32 studies evaluated 21,236 postmenopausal women, of whom 16,440 (77.4%) had serum 25-hydroxyvitamin D concentrations < 30 ng/ml. The reported prevalence of hypovitaminosis D ranged from 29% (in the United States) to 99.4% (in China). In six of the studies, the prevalence was above 90%.

CONCLUSIONS: If the criterion is the 30 ng/ml cut-off point, the majority of postmenopausal women in the world could be classified as having hypovitaminosis D. Among the studies evaluated, the lowest prevalence reported was nearly 30%. Neither latitude, region of the world, nor laboratory methodology were found to be associated with the prevalence of hypovitaminosis D.

KEYWORDS: Vitamin D deficiency, Vitamin D, Postmenopause, Climacteric, Prevalence

INTRODUCTION

Vitamin D deficiency represents a major public health problem, not only because its prevalence is high (so high that it is considered a true epidemic) but also because of the considerable clinical repercussions1-3. Its importance concerned to calcium homeostasis and bone metabolism are well known, but, following the identification of vitamin D receptors in various cells and organs of the body, including the pancreas, macrophages, endothelium, stomach, epidermis, colon, and placenta4, vitamin D has been shown to have major extra-skeletal (autocrine and paracrine) effects5. Vitamin D treatment has also been associated with reduced rate of falls6, mobility, worsening of muscle function, an increased risk...
METHODS

We conducted a search for cross-sectional studies that estimated the prevalence of hypovitaminosis D in postmenopausal women. We followed the recommendations established in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, selecting studies in which the serum concentrations of 25(OH)D had been determined in postmenopausal women and, although measurements over the 20 ng/mL limit are considered normal by important entities, the 30 ng/ml (75 nmol/L) cut-off point had been used to distinguish between normality and insufficiency or deficiency because this is limit associated with the optimization of intestinal calcium absorption in postmenopausal women. We excluded studies jointly evaluating women of reproductive age and postmenopausal women, studies that did not collect information regarding the menopausal status of the women, cohort studies of women with diseases, and case-control studies. When there was a control group comprising healthy postmenopausal women, data related to those women were included in the review, because the biochemical data from the controls were representative of the general population.

RESULTS

Of a total of 448 articles initially identified, 32 were selected for inclusion in the final analysis (Figure 1). One study was excluded because it presented conflicting results between the prevalence of hypovitaminosis D and the maximum serum concentration of 25(OH)D reported. Most of the studies selected were cross-sectional cohort studies that employed the baseline measures required for inclusion in this review, although a few were case-control studies. When there was a control group comprising healthy postmenopausal women, data related to those women were included in the review, because the biochemical data from the controls were representative of the general population.

To identify eligible studies, we consulted the Medline, Latin-American and Caribbean Health Sciences Literature, and Excerpta Medica databases for entries up to September 2016, using the strategy outlined in Chart 1, without restricting the year of publication or language. The articles were selected through the process described in Figure 1. We also reviewed the publications listed in the bibliographies of the articles selected. The selection, evaluation of the titles, and evaluation of the abstracts of the studies identified in the databases consulted were conducted by two investigators with experience in conducting systematic reviews. The investigators worked independently, strictly adhering to the inclusion and exclusion criteria. To extract data of interest for this review, the investigators then evaluated the remaining articles for information regarding the measurement of serum 25(OH)D concentrations; study locale; participant ages and menopausal status; sample size and selection criteria; and the methods used in the clinical and biochemical analyses. When there was disagreement between the investigators regarding the selection of studies, a third investigator was consulted. The data were compiled into a Microsoft Office Excel spreadsheet. The primary endpoint of interest was the prevalence of hypovitaminosis D, the reference range for serum 25(OH)D concentrations being ≥ 30 ng/ml.

CHART 1 SEARCH STRATEGIES, PER DATABASE

<table>
<thead>
<tr>
<th>Database</th>
<th>Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medline/PubMed</td>
<td>&quot;postmenopause&quot;[All Fields] AND &quot;vitamin d deficiency&quot;[All Fields]</td>
</tr>
<tr>
<td>Latin-American and Caribbean Health Sciences Literature</td>
<td>postmenopause [words] AND vitamin d deficiency [words]</td>
</tr>
<tr>
<td>Excerpta Medica</td>
<td>&quot;vitamin d deficiency&quot; AND &quot;post-menopause&quot; AND &quot;prevalence&quot;</td>
</tr>
</tbody>
</table>

Vitamin D is naturally produced by the skin, and exposure to ultraviolet radiation is a key step in its synthesis. Factors influencing that exposure, such as geographic location, cultural norms, skin color, use of sunscreen, and the modern lifestyle (more time spent indoors), can affect serum concentrations of 25-hydroxyvitamin D (25(OH)D).

Because human life expectancy has increased, many women live longer after menopause, when hypovitaminosis D can become more severe, not only because of the reduction in intestinal absorption due to the aging process but also because of the inherent hypoestrogenism in the postmenopausal period. In combination, these factors increase the risk of loss of bone mass. From the above, it can be deduced that hypovitaminosis D can affect a large part of the population, and knowledge of its true population frequency can contribute to the formulation of public policies involving preventive measures and interventions. Therefore, the objective of this systematic review was to evaluate the prevalence of hypovitaminosis D in postmenopausal women around the world.

PREVALENCE OF HYPOVITAMINOSIS D IN POSTMENOPAUSAL WOMEN: A SYSTEMATIC REVIEW

REV ASSOC MED BRAS 2019; 65(5):691-698
### Table 1. Studies Selected

<table>
<thead>
<tr>
<th>Author and year of publication</th>
<th>Mean age, years</th>
<th>Women</th>
<th>Women with HD</th>
<th>25(OH)D, ng/ml</th>
<th>Latitude</th>
<th>VDS (%)</th>
<th>Locale</th>
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<tr>
<td>El Maataoui et al., 2016 30</td>
<td>59 (8.2)</td>
<td>186</td>
<td>144 (77.4)</td>
<td>20.1</td>
<td>32°N</td>
<td>no</td>
<td>Morocco</td>
</tr>
<tr>
<td>Andreozzi et al., 2015 27</td>
<td>64.4 (8.4)</td>
<td>62</td>
<td>48 (77.4)</td>
<td>ND</td>
<td>41.87°N</td>
<td>no</td>
<td>Italy</td>
</tr>
<tr>
<td>Ailpou et al., 2014 23</td>
<td>ND</td>
<td>140</td>
<td>113 (80.7)</td>
<td>ND</td>
<td>35.7°N</td>
<td>no</td>
<td>Iran</td>
</tr>
<tr>
<td>Godala et al., 2014 26</td>
<td>55.4 (3.5)</td>
<td>36</td>
<td>30 (83.3)</td>
<td>23.52 (13.39–45.87)</td>
<td>51.76°N</td>
<td>no</td>
<td>Poland</td>
</tr>
<tr>
<td>Cheng et al., 2014 47</td>
<td>ND</td>
<td>3345</td>
<td>2727 (81.5)</td>
<td>ND</td>
<td>25–40°N</td>
<td>47.8</td>
<td>USA</td>
</tr>
<tr>
<td>Aloia et al., 2014 18</td>
<td>58.8 (4.9)</td>
<td>76</td>
<td>59 (78.0)</td>
<td>25.2</td>
<td>40.44°N</td>
<td>no</td>
<td>USA</td>
</tr>
<tr>
<td>Gómez-de-Tejada Romero et al., 2014 34</td>
<td>54.8 (11.8)</td>
<td>1221</td>
<td>892 (73.0)</td>
<td>24.3</td>
<td>28.12°N</td>
<td>no</td>
<td>Spain</td>
</tr>
<tr>
<td>Hoon et al., 2014 19</td>
<td>ND</td>
<td>605</td>
<td>509 (84.2)</td>
<td>ND</td>
<td>37.56°N</td>
<td>no</td>
<td>Korea</td>
</tr>
<tr>
<td>Klíšic et al., 2014 35</td>
<td>ND</td>
<td>188</td>
<td>151 (80.3)</td>
<td>ND</td>
<td>42.44°N</td>
<td>ND</td>
<td>Montenegro</td>
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<tr>
<td>Mata-Granados et al., 2013 38</td>
<td>5.4 (6.4)</td>
<td>232</td>
<td>217 (93.7)</td>
<td>17.5</td>
<td>37.5°N</td>
<td>no</td>
<td>Spain</td>
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<tr>
<td>Asadi et al., 2013 28</td>
<td>52.7 (5.0)</td>
<td>110</td>
<td>77 (70.0)</td>
<td>19.28</td>
<td>35.7°N</td>
<td>no</td>
<td>Iran</td>
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<tr>
<td>Casado-Díaz et al., 2013 42</td>
<td>57.4 (12.8)</td>
<td>229</td>
<td>190 (83.0)</td>
<td>21.76</td>
<td>37.8°N</td>
<td>no</td>
<td>Spain</td>
</tr>
<tr>
<td>Hacker-Thompson et al., 2012 36</td>
<td>63.9 (7.8)</td>
<td>122</td>
<td>36 (29.5)</td>
<td>ND</td>
<td>41°N</td>
<td>82.0</td>
<td>USA</td>
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<tr>
<td>Hussein et al., 2012 41**</td>
<td>ND</td>
<td>223</td>
<td>212 (95.0)</td>
<td>ND</td>
<td>21.29°N</td>
<td>ND</td>
<td>Saudi Arabia</td>
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<tr>
<td>El Maghraoui et al., 2012 36</td>
<td>58.8 (8.2)</td>
<td>178</td>
<td>152 (85.3)</td>
<td>15.8 (3.0–49.1)</td>
<td>34°N</td>
<td>no</td>
<td>Morocco</td>
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<tr>
<td>Rudenka et al., 2012 29**</td>
<td>63 (7.8)</td>
<td>205</td>
<td>189 (92.0)</td>
<td>ND</td>
<td>53.9°N</td>
<td>62.1</td>
<td>Belarus</td>
</tr>
<tr>
<td>Baro, 2011 44**</td>
<td>ND</td>
<td>150</td>
<td>119 (79.3)</td>
<td>ND</td>
<td>41.38°N</td>
<td>ND</td>
<td>Spain</td>
</tr>
<tr>
<td>Harinarayan et al., 2011 20</td>
<td>53 (0.2)</td>
<td>136</td>
<td>124 (89.7)</td>
<td>ND</td>
<td>13.40°N</td>
<td>no</td>
<td>India</td>
</tr>
<tr>
<td>Sternberg et al., 2011 39**</td>
<td>61.4</td>
<td>112</td>
<td>65 (57.9)</td>
<td>ND</td>
<td>35°S</td>
<td>ND</td>
<td>Argentina</td>
</tr>
<tr>
<td>Zhao et al., 2011 16</td>
<td>64.1 (9.2)</td>
<td>1724</td>
<td>1714 (99.4)</td>
<td>13.2 (4.0–35.6)</td>
<td>39.54°N</td>
<td>no</td>
<td>China</td>
</tr>
<tr>
<td>Laktasić-Zerjavic et al., 2010 37</td>
<td>61.2 (8.8)</td>
<td>120</td>
<td>111 (92.5)</td>
<td>46.94 (10–110.9)</td>
<td>42–46°</td>
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<td>Croatia</td>
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<tr>
<td>Allali et al., 2009 30</td>
<td>55.9 (6.8)</td>
<td>307</td>
<td>282 (92.0)</td>
<td>17.7</td>
<td>33.97°N</td>
<td>no</td>
<td>Morocco</td>
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<tr>
<td>Bobinac et al., 2009 45**</td>
<td>ND</td>
<td>720</td>
<td>455 (63.3)</td>
<td>27.33</td>
<td>45.32°N</td>
<td>ND</td>
<td>Croatia</td>
</tr>
<tr>
<td>Maddah et al., 2009 40</td>
<td>63.4 (8.7)</td>
<td>646</td>
<td>536 (83.0)</td>
<td>19.99</td>
<td>37.12°N</td>
<td>ND</td>
<td>Iran</td>
</tr>
<tr>
<td>Poiana et al., 2009 46**</td>
<td>58.4</td>
<td>174</td>
<td>144 (82.8)</td>
<td>ND</td>
<td>44.43°N</td>
<td>ND</td>
<td>Romania</td>
</tr>
<tr>
<td>Stewart et al., 2009 22</td>
<td>54.3 (3.3)</td>
<td>242</td>
<td>153 (63.3)</td>
<td>ND</td>
<td>41.8°N and 38.6°N</td>
<td>53.7</td>
<td>USA (Ames, IA and Davis, CA)</td>
</tr>
<tr>
<td>Lee et al., 2009 23</td>
<td>58 (8)</td>
<td>254</td>
<td>112 (44.0)</td>
<td>33.3</td>
<td>37.56°N</td>
<td>35.8</td>
<td>Korea</td>
</tr>
<tr>
<td>Al-Turki et al., 2008 24</td>
<td>56.1 (4.9)</td>
<td>200</td>
<td>110 (55.0)</td>
<td>ND</td>
<td>26.22°N</td>
<td>no</td>
<td>Saudi Arabia</td>
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<tr>
<td>Manicourt et al., 2008 31</td>
<td>65 (8)</td>
<td>85</td>
<td>53 (62.0)</td>
<td>25.6</td>
<td>50.85°N</td>
<td>no</td>
<td>Belgium</td>
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<tr>
<td>Bruyère et al., 2007 25</td>
<td>74.2 (7.1)</td>
<td>8532</td>
<td>6186 (72.7)</td>
<td>24.04</td>
<td>40.46–55.17°N</td>
<td>24</td>
<td>Belgium, France, Spain, Germany, Hungary, Italy, Poland, and the United Kingdom</td>
</tr>
<tr>
<td>Garnero et al., 2007 41</td>
<td>62.2 (8.8)</td>
<td>669</td>
<td>490 (73.2)</td>
<td>ND</td>
<td>45.76°N</td>
<td>ND</td>
<td>France</td>
</tr>
</tbody>
</table>

HD, hypovitaminosis D; VDS, Vitamin D supplementation; ND, no data; *Plus minimum and maximum values, where provided. **Published in poster form.

which the control group was representative of the population of interest. We also included eight poster publications that presented the necessary minimum information (Table 1).

Table 1 shows the information obtained from the selected studies 15-46, the names of the authors and year of publication; the mean ages of the participants; the number of women evaluated; the number
of subjects with serum 25(OH)D concentrations \(< 30 \text{ ng/ml}\); the prevalence of hypovitaminosis D; the mean 25(OH)D concentrations, with minimum and maximum values when available; and the latitude and locale of the study. Collectively, the selected studies evaluated 21,236 women, 16,440 (77.4\%) of whom had serum 25(OH)D concentrations \(< 30 \text{ ng/ml}\). Sample sizes ranged from 36 to 8,532, the prevalence of hypovitaminosis D ranging from 29.5\% (in San Francisco, CA)\textsuperscript{15} to 99.4\% (in Beijing, China)\textsuperscript{12}. The laboratory techniques used were radioimmunoassay, in nine studies\textsuperscript{17-25}; chemiluminescent immunoassay, in six\textsuperscript{26-31}; electrochemiluminescence, in six\textsuperscript{16,32-36}; high-performance liquid chromatography (HPLC), in three\textsuperscript{15,37,38}; ELISA, in two\textsuperscript{39,40}, and competitive protein-binding techniques, in one\textsuperscript{41}. In five studies, the laboratory technique employed was not reported\textsuperscript{42-46}.

In six of the 32 studies, the prevalence of hypovitaminosis D was above 90\%\textsuperscript{16,29,30,38,39,43}. In the study conducted in Beijing\textsuperscript{16}, only 10 of the 1,724 women evaluated had serum concentrations of 25(OH)D above 30 ng/ml. The prevalence of hypovitaminosis D was above 90\% in seven other cities around the world: 95.0\% in Jeddah, Saudi Arabia\textsuperscript{43}; 93.7\% in Junta de Andalucía, Spain\textsuperscript{38}; 92.5\% in Zagreb, Croatia\textsuperscript{39}; 92.0\% in Minsk, Belarus\textsuperscript{29}; and 92.0\% in Rabat, Morocco\textsuperscript{32}. Even at the sites where the prevalence of hypovitaminosis D was lowest, it was relatively high: approximately 30\% in San Francisco, CA\textsuperscript{15}; 44.0\% in South Korea\textsuperscript{23}; and 55.0\% in Saudi Arabia\textsuperscript{24}.

Stratifying the results by continent, we found that the prevalence of hypovitaminosis D in North America, Europe, Africa, the Middle East, and Asia was 78.6\%, 73.6\%, 86.1\%, 81.5\%, and 90.4\%, respectively. The fact that the prevalence was highest in Asia was due to the study conducted in Beijing, which involved 1,724 women, almost all of whom had hypovitaminosis D\textsuperscript{16}. With the search strategy adopted, only one study from South America was selected, a study conducted in Argentina and involving 112 women, in

<table>
<thead>
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<th>Database</th>
<th>n=267</th>
<th>n=173</th>
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<tr>
<td>Embase</td>
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<td>Medline/PubMed</td>
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<td>LILACS</td>
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</table>

PREVALENCE OF HYPOVITAMINOSIS D IN POSTMENOPAUSAL WOMEN: A SYSTEMATIC REVIEW

FIGURE 1

![Flowchart showing the selection process](image-url)
which the estimated prevalence of hypovitaminosis D was 57.9%\textsuperscript{21}.

Multiple studies carried out in a single country presented very different results. In a study conducted in South Korea in 2009 and involving 254 women\textsuperscript{23}, the prevalence of hypovitaminosis D was 44.0%, compared with 84.2% in another, more recent study involving 605 women evaluated in that same country\textsuperscript{19}. In the studies conducted in the United States, the reported prevalence ranged from 29.5\%\textsuperscript{15} to 81.5\%\textsuperscript{17}. In two studies conducted in Saudi Arabia, one in the city of Al Khobar in 2008\textsuperscript{24} and the other in the city of Jeddah in 2012\textsuperscript{43}, the reported prevalence was 55.0\% and 95.0\%, respectively.

Although comparisons were made among latitudes and continents, we identified no factors that could explain the differences observed. The reported prevalence of hypovitaminosis D was high even in populations in which the rate of vitamin D supplementation was near 50\%, although it was lower in the studies in which women receiving vitamin D supplementation were excluded\textsuperscript{24}. We identified no association between the prevalence of hypovitaminosis D and the laboratory techniques employed.

**DISCUSSION**

One of the most important aspects of this review is the fact that, to our knowledge, this is the first study to show the worldwide distribution of the prevalence of hypovitaminosis D according to the laboratory technique employed, specific geographic location, and latitude. Another important aspect was the selection of studies involving healthy postmenopausal women, with the objective of avoiding biases caused by treatments or diseases concerning the serum concentrations of 25(OH)D. We chose to include studies in which a portion of the population was using vitamin D supplementation, as long as the samples were representative of the local population of healthy postmenopausal women.

In this review, we did not find the prevalence of hypovitaminosis D to be associated with geographic location, latitude, use of vitamin D supplementation, or the laboratory technique employed. We identified considerable variation among studies conducted in the same country, in terms of the prevalence of hypovitaminosis D. Between the two studies conducted in South Korea, the one conducted in 2009\textsuperscript{23}, in which the prevalence of hypovitaminosis D was 44.0\%, included women under treatment for osteoporosis or menopause, which could account for the difference in relation to the 2014 study\textsuperscript{19}, which involved only women not receiving such treatment and in which the prevalence was 84.2\%. It is of note that both of those studies were conducted in the city of Seoul. For the 2009 study\textsuperscript{23}, if only the women not receiving vitamin D supplementation (\(n = 91\)) were evaluated, the prevalence would be 56\%. In addition, the women evaluated by those authors were under treatment at a referral center for hormone replacement therapy or osteoporosis. Those treatments could have generated behavioral changes that had a positive influence on serum concentrations of 25(OH)D (engaging in outdoor activities, increased exposure to the sun, and consumption of foods rich in vitamin D). Similarly, in the United States, the prevalence of hypovitaminosis D ranged from as high as 81.5\%, in a multicenter study\textsuperscript{37}, to as low as 29.5\%, in the study conducted in San Francisco\textsuperscript{15}. Those two studies, however, were quite different. The first was an assessment of baseline serum 25(OH)D concentrations measured at the start of the follow-up of the Women’s Health Initiative Observational Study, involving a total of 3,345 postmenopausal women followed at 40 clinical institutions throughout the United States, where approximately 50\% of the participants were receiving vitamin D supplementation. The second study, conducted by Hacker-Thompson et al.\textsuperscript{19}, involved a much smaller sample, comprising 122 participants, 82\% of whom were receiving vitamin D supplementation. In addition, the laboratory technique used in both studies was HPLC, a technique described as being highly sensitive\textsuperscript{14}. In Saudi Arabia, blood samples were collected between January and May 2008 in the study conducted in the city of Al Khobar\textsuperscript{24}, whereas they were collected throughout 2011 in the study conducted in the city of Jeddah\textsuperscript{43}. However, the latter study provided no information on the laboratory technique used.

The countries of Europe were represented in 15 studies, the largest of which involved more than 8,500 postmenopausal women in nine countries\textsuperscript{25}. In that study, serum 25(OH)D concentrations were determined by radioimmunoassay, although all of the laboratory techniques described in this review were used in at least one of the studies conducted in Europe. The prevalence of hypovitaminosis D was the lowest (62.0\%) in Belgium and the highest (92.5\%) in...
The high prevalence in the study conducted in Spain was not explained by geographic location or laboratory technique, and the most sensitive technique, HPLC, was used in that study. Morocco, the only African country represented in this review, accounted for three of the studies evaluated, among which the prevalence ranged from 77.4%, in a study using electrochemiluminescence and collecting samples between November 2008 and October 2009, to 92.0%, in a study using chemiluminescent immunoassay and collecting samples between June and August of an unspecified year. These data did little to explain the difference found, given that the prevalence was higher in the study conducted only during the months of maximum solar radiation in that country. Five of the studies selected had been conducted in the Middle East, three in Iran and two in Saudi Arabia. The lowest and highest values for the prevalence of hypovitaminosis D in the Middle East were both reported in studies conducted in Saudi Arabia.

Researchers working in countries where Islam is the predominant religion often cite cultural and clothing issues as major factors inhibiting the endogenous production of vitamin D. In this review, we found that the mean prevalence of hypovitaminosis D in the Middle East was 78.6%, lower than that found in North America (81.4%), where the culture is very different from that of Muslim countries and the clothing designed for women does not necessarily cover their entire bodies. Therefore, we can't assume that the low serum concentrations of 25(OH)D reported for Muslim countries correlate with the type of clothing used.

Studies about hypovitaminosis D in postmenopausal women brings knowledge about a factor strongly associated with osteoporosis, which is particularly prevalent in this group. The knowledge about other population groups, such as premenopausal women, however, is desirable to allow comparisons that improve the understanding of hypovitaminosis D and its possible triggers.

This review has some limitations. The lack of standardization of the laboratory technique employed in the measurement of serum 25(OH)D concentrations and the different times of year during which the blood samples were collected made it difficult to compare the results across studies. Also, some studies with large sample sizes had to be excluded, some because they evaluated women with diseases such as osteopenia or osteoporosis and others because they did not present serum 25(OH)D concentrations with a cut-off point of 30 ng/ml. Furthermore, in some countries, a large part of the postmenopausal population use vitamin D supplementation, which creates a situation in which the potential vitamin D status of those populations could be masked. Nevertheless, we believe that this review has achieved its primary goals, showing the available information on the prevalence of hypovitaminosis D in postmenopausal women around the world and providing a global perspective on the problem.

CONCLUSION

The analysis of the selected studies revealed that the prevalence of hypovitaminosis D is high among postmenopausal women, affecting a large part of the population, even in the regions where that prevalence is lowest. Given the importance of vitamin D in women's health, further studies are needed in order to determine the actual impact of this finding.

RESUMO

INTRODUÇÃO: A hipovitaminose D é considerada um problema de saúde pública global. O conhecimento de suas verdadeiras dimensões nos permitirá projetar intervenções e planejar medidas preventivas que possam ter um impacto significativo na saúde humana.

OBJETIVO: O objetivo deste estudo foi avaliar a prevalência de hipovitaminose D, definida como concentração sérica de 25-hidroxi vitamina D <30 ng/ml, em mulheres na pós-menopausa em todo o mundo, bem como identificar os potenciais fatores associados.

MÉTODOS: Uma revisão sistemática foi realizada de acordo com as recomendações de itens de Relatórios Preferenciais para Revisão Sistemática e Meta-Análises. Os termos de pesquisa específicos foram consultados nas bases de dados Medline, Excerpta Medica e Literatura Latino-Americana e do Caribe em Ciências da Saúde, sem restrição para o ano ou idioma de publicação.

RESULTADOS: Dos 451 estudos inicialmente identificados, 32 foram selecionados para análise. Coletivamente, esses 32 estudos avaliaram 21.236 mulheres na pós-menopausa, das quais 16.440 (77,4%) apresentavam concentrações séricas de 25-hidroxi vitamina D <30 ng/ml. A prevalência relatada de hipovitaminose D variou de 29% (nos Estados Unidos) a 99,4% (na China). Em seis dos estudos, a prevalência foi superior a 90%.

CONCLUSÕES: Se o critério é o ponto de corte de 30 ng/ml, a maioria das mulheres na pós-menopausa no mundo poderia ser classificada como tendo hipovitaminose D. Entre os estudos avaliados, a menor prevalência relatada foi de quase 30%. Nem latitude, região do mundo, nem metodologia laboratorial foram encontrados para ser associados com a prevalência de hipovitaminose D.

PALAVRAS-CHAVE: Deficiência de vitamina D; Vitamina D; Pós-menopausa; Climatério; Prevalência.
REFERENCES


PREVALENCE OF HYPOVITAMINOSIS D IN POSTMENOPAUSAL WOMEN: A SYSTEMATIC REVIEW


