25 OH VITAMIN D LEVELS OF PATIENTS LIVING IN ISPARTA, TURKEY

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Abstract
Aim: Vitamin D levels influence the risk of fracture, rickets, osteomalacia, and osteoporosis. Vitamin D protects the body against muscle weakness, helps regulate the heartbeat, strengthens the immune system and thyroid function, and is necessary for normal blood clotting. Vitamin D increases calcium absorption from the digestive tract, helps the accumulation of calcium in the bones and also accelerates the active transport of calcium. Humans obtain vitamin D from exposure to sunlight and from diet. Material and Method: The patients admitted to Suleyman Demirel University Faculty of Medicine Research and Application Hospital during a one-year period were examined to determine 25 OH vitamin D levels. 12,920 male and female patients were included in the study. Statistical analysis was performed with SPSS. Results: There was a significant difference between 25 OH vitamin D levels of patients in the winter season and the spring and summer seasons (<0.05). 25 OH vitamin D levels of men were significantly higher than those of women (<0.05). 25 OH vitamin D levels were low in 72.48% of all patients (<20 ng/ml). The ratio of 25 OH vitamin D levels less than 10 ng/ml was found in 40.92% of the patients. Discussion: When assessing 25 OH vitamin D levels, the season of the year and sex of the patients should be taken into consideration.

Keywords
25 OH Vitamin D Deficiency; Human

Özet
Amaç: D vitamini seviyeleri, kırık, raşitizm, osteomalazi ve osteoporoz riskini etkiler. D vitamini vücudun kas zayıflığına karşı korur; Kalp atışını düzenlemeye yardımcı olur, bağışıklık sistemi, tiroid işlevini güçlendirir ve normal kan pıhtılaşması için gerekli olur. D vitamini, sindirim sistemindeki kalsiyum emiliminin artırır ve kemiklerde kalsiyum birkirimine yardımcı olur. D vitamini, kalsiyum emiliminin artırır ve aktiv kalsiyum taşımmasını hızlandırır. İnsanlar, güneş ışığına maruz kaldıklarında ve diyet ile D vitamini alırlar.

Gereç ve Yöntem: Bir yıl boyunca Süleyman Demirel Üniversitesi Tıp Fakültesi Araştırma ve Uygulama Hastanesine başvuran hastalardan 12920 erkek ve kadın hasta çalışına alındı ve ölçülen 25 OH vitamin D seviyeleri araştırıldı. İstatistiksel analiz SPSS ile yapıldı. Bulgular: Kış mevsiminde ve yaz mevsiminde hastaların 25 OH vitamin D düzeyleri arasında anlamlı fark vardı (<0.05). Erkeklerin D vitamini düzeyleri kadınlardan daha yüksekti (<0.05). 25 OH vitamin D düzeyleri, tüm hastaların % 72.48’inde (<20 ng / ml) düşük bulunmuştur. 25 OH vitamin D seviyelerinin oranı 10 ng / ml’den az olan oran ise % 40.92 bulundu. Tartışma: 25 OH vitamin D seviyesinin değerlendirilmesinde mevsim ve hastaların cinsiyetleri dikkate alınmalıdır.

Anahtar Kelimeler
25 OH Vitamin D Eksikliği; İnsan
Introduction

D vitamins play an important role in the bone metabolism and calcium and phosphorus regulation of the human body. Vitamin D levels influence the risk of fractures, rickets, osteomalacia, and osteoporosis. Vitamin D protects the body against muscle weakness. It helps regulate the heartbeat, strengthens the immune system and the thyroid function, and is necessary for normal blood clotting. Vitamin D increases calcium absorption from the digestive tract, helps the accumulation of calcium in the bones, and accelerates the active transport of calcium. Humans obtain vitamin D from exposure to sunlight and from their diet [1, 2]. Vitamin D deficiency has become a more common problem due to low sunlight intake due to indoor area life, clothing style, use of high-factor cream to prevent harmful effects of the sun, and seasonal changes [3]. Despite there being a lot of research on the lack of vitamin D and seasonal distribution in the literature, there had been no research done in the province of Isparta. This study will investigate the incidence and seasonal distribution of vitamin D deficiency in patients admitted to the SDU Medical Faculty Hospital in Isparta within a one-year period. In this study, a possible relationship between vitamin D deficiency and seasonal distribution was shown in these patients and the groundwork for new studies and research on this topic was prepared.

Material and Method

The present study was conducted upon the approval of Suleyman Demirel University, Medical Faculty, Head of Clinical Research Ethical Committee. During a one-year period, patients were evaluated for 25 OH vitamin D levels. 12,920 patients were included in the study, 4,019 males and 8,901 females. The SPSS package program was used for the statistical analysis. The significance limit was accepted as p <0.05.

Results

There was a significant difference in 25 OH vitamin D levels between patients in the winter season when compared with the spring and summer seasons (<0.05). The 25 OH vitamin D levels of men were significantly higher than the levels of the women (<0.05). 25 OH vitamin D levels were found low in 72.48% of all patients (<20 ng/ml). The ratio of 25 OH vitamin D levels was less than 10 ng/ml in 40.92% of the patients. All results are shown in Table 1-5.

| Sex | Vitamin D Groups | Low | Normal | High | Total |
|-----|------------------|-----|--------|------|-------|
| Male | Count % | 2721 | 1258 | 40 | 4019 |
|   | within sex | 67.7% | 31.3% | 1.0% | 100% |
| Female | Count % | 6643 | 2158 | 100 | 8901 |
|   | within sex | 74.6% | 24.2% | 1.1% | 100% |
| Total | Count % | 9364 | 3416 | 140 | 12920 |
|   | within sex | 72.5% | 26.4% | 1.1% | 100% |

Table 1. Sex * Vitamin D Groups Cross Tabulation

| Sex | Vitamin D Groups | Low | Normal | High | Total |
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| Male | Count % | 2721 | 1258 | 40 | 4019 |
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| Total | Count % | 9364 | 3416 | 140 | 12920 |
|   | within sex | 72.5% | 26.4% | 1.1% | 100% |

Table 1. Sex * Vitamin D Groups Cross Tabulation

| Seasons | Vitamin D Groups | Low | Normal | High | Total |
|---------|------------------|-----|--------|------|-------|
| Winter | Count | 3056 | 1053 | 36 | 4145 |
|   | % within season | 73.7% | 25.4% | 0.9% | 100.0% |
| Spring | Count | 2741 | 865 | 31 | 3637 |
|   | % within season | 75.4% | 23.8% | 0.9% | 100.0% |
| Summer | Count | 1552 | 729 | 31 | 2312 |
|   | % within season | 67.1% | 31.5% | 1.3% | 100.0% |
| Autumn | Count | 2015 | 769 | 42 | 2826 |
|   | % within season | 71.3% | 27.2% | 1.5% | 100.0% |
| Total | Count | 9364 | 3416 | 140 | 12920 |
|   | % within season | 72.5% | 26.4% | 1.1% | 100.0% |

Table 2. Seasons * Vitamin D Levels Groups Cross Tabulation

| Sex | N | Mean | Std. Deviation | Std. Error | Lower Bound | Upper Bound | Mini mum | Maximum | Anova p |
|-----|---|------|----------------|------------|-------------|-------------|----------|---------|--------|
| Male | 4019 | 17.7325 | 12.67428 | 0.14241 | 15.4431 | 19.0217 | 0.001* |
| Female | 8901 | 15.4431 | 13.43579 | 0.14241 | 13.3431 | 17.5431 | 0.001* |

* The mean difference is significant at the 0.05 level.

Table 3. Comparison of Sex and Vitamin D Levels

| Seasons | N | Mean | Std. Deviation | Std. Error | Lower Bound | Upper Bound | Mini mum | Maximum | Anova p |
|---------|---|------|----------------|------------|-------------|-------------|----------|---------|--------|
| Winter | 3056 | 16.1344 | 13.38538 | 0.21154 | 14.9088 | 17.3600 | 0.001* |
| Spring | 2741 | 17.4557 | 13.51777 | 0.28113 | 16.9044 | 18.0070 | 0.001* |
| Summer | 2312 | 18.1922 | 13.35182 | 0.25116 | 16.6997 | 19.6847 | 0.001* |
| Autumn | 2826 | 16.1922 | 13.35182 | 0.25116 | 15.6997 | 16.6847 | 0.001* |
| Total | 9364 | 16.1552 | 13.24560 | 0.2300 | 15.7268 | 16.5837 | 0.001* |

* The mean difference is significant at the 0.05 level.

Table 4. Comparison of Season and Vitamin D Levels Descriptives Vitamin D

| Seasons | N | Mean | Std. Deviation | Std. Error | Lower Bound | Upper Bound | Mini mum | Maximum | Anova p |
|---------|---|------|----------------|------------|-------------|-------------|----------|---------|--------|
| Winter | 3056 | 16.1344 | 13.38538 | 0.21154 | 14.9088 | 17.3600 | 0.001* |
| Spring | 2741 | 17.4557 | 13.51777 | 0.28113 | 16.9044 | 18.0070 | 0.001* |
| Summer | 2312 | 18.1922 | 13.35182 | 0.25116 | 16.6997 | 19.6847 | 0.001* |
| Autumn | 2826 | 16.1922 | 13.35182 | 0.25116 | 15.6997 | 16.6847 | 0.001* |
| Total | 9364 | 16.1552 | 13.24560 | 0.2300 | 15.7268 | 16.5837 | 0.001* |

* The mean difference is significant at the 0.05 level.

Table 5. Season and Vitamin D Levels Comparison Post Hoc Tests

| (I) season | (J) season | Mean Difference (I-J) | Std. Error | Sig. | 95% Confidence Interval |
|------------|------------|-----------------------|------------|------|-------------------------|
| Winter     | Spring     | .86866*                | .33171     | .009 | .2185                   | 1.5189 |
| Summer     | Winter     | 1.26344*               | .37096     | .001 | .5363                   | 1.9906 |
| Spring     | Autumn     | -2.13210*              | .35185     | .000 | -2.8218                 | -1.4424 |
| Autumn     | Winter     | -1.26344*              | .37096     | .001 | -1.9906                 | -1.5363 |

* The mean difference is significant at the 0.05 level.

Table 2. Seasons * Vitamin D Levels Groups Cross Tabulation

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Discussion

Vitamin D is one of the most important hormones for growth, development, and healthy skeletal structure throughout life. Plants and animals exposed to sunlight have the ability to synthesize vitamin D. Vitamin D is synthesized directly under the influence of sunlight [3, 4]. When assessing 25 OH vitamin D levels, the season of the year and the sex of patients should be taken into consideration. Vitamin D levels may also differ according to the measurement method. It is necessary to compare levels with measurements made by a similar method [5]. In studies similar to ours, the regional differences are an important factor in the incidence of vitamin D deficiency [6]. Today, vitamin D deficiency is accepted as a worldwide epidemic [7]. The demand for 25-OH D testing, and thus the cost of testing, is increasing all over the world yearly [8]. For this reason, the diagnosis of vitamin D deficiency should be made correctly. A condition that seems to be a limitation of our research is that patients who are included in the study are not aware of whether they have taken vitamin D supplementation. However, the expected low level of 25-OH D levels in all patients suggests that most patients do not receive vitamin D supplementation. The number of patients in our research is adequate and in accord with the majority of similar investigations [6, 9]. As a result of this study, when assessing 25 OH vitamin D levels, the season of the year and the sex of the patients should be taken into consideration.

Ethical Issues: The present study was conducted upon the approval of Süleyman Demirel University, Medical Faculty, Head of Clinical Research Ethical Committee.

Remarks: The present study was submitted as a poster during the XXIV International Symposium on Morphological Sciences (ISMS) held in Istanbul, Turkey, September 2-6, 2015. An abstract of the poster was published in a special issue of Anatomy Journal in 2015.

Competing interests

The authors declare that they have no competing interests.

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