

Prevalence and Awareness of Vitamin D Deficiency and Its Impact on Bone Health in Karachi: A Survey Study

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ABSTRACT

Introduction

Calcium and vitamin D are crucial for maintaining bone health. Deficiencies in these nutrients can lead to weakened bones and the development of diseases like osteoporosis. Osteoporosis is a silent disease characterized by bone loss, often associated with aging and estrogen deficiency. It can lead to immobilizing fractures. Exposure to cadmium has also been linked to the occurrence of osteoporosis. Rational sun exposure and the use of supplements are necessary to fulfill the body's vitamin D requirements.

Objective

The primary goal of our study was to determine the frequency of vitamin D deficiency in females and males and to raise awareness about vitamin D deficiency diseases.

Methodology

Our survey consisted of 15 multiple-choice questions in simple English. Data was collected using Google forms and manual methods from females, males, children, and elderly people in Karachi, Pakistan, during March-April 2018 to assess their vitamin D and calcium levels.

Results

The survey results were categorized into seven key areas. The first category showed that 56.3% of participants spent more than 2-4 hours outdoors. The second category revealed that 50.2% of people exposed only their hands and face to sunlight. The third category indicated that 124 out of 215 people suffered from joint and bone pain. The fourth category showed that 63.7% of people experienced muscle pain. The fifth category revealed that 58.9% of people had not undergone a vitamin D test. The sixth category showed that 52.6% of people were taking vitamin D supplements. The seventh category indicated that 50.9% of people were taking calcium supplements without having a vitamin D test.

Conclusion

According to our survey, we found that a very small number of people had tested their vitamin D and calcium levels. We concluded that most people (56.3%) spent more than 2-4 hours outdoors, but only 50.2% exposed their hands and face to the sun. This lack of adequate sun exposure led to vitamin D deficiency, which in turn caused calcium deficiency and resulted in joint, bone, and muscle pain in 57.7% and 63.7% of participants, respectively. Many people were unaware of the importance of vitamin D and the need for testing.

INTRODUCTION:

Introduction

Vitamin D deficiency is a widespread concern across various parts of the world, particularly in regions like Pakistan and South Asia, where ample sunlight exposure would be expected to mitigate such deficiencies⁽¹⁾. However, the prevalence of vitamin D deficiency remains high in these areas, especially among elderly individuals and women. The main reasons for this deficiency are multifaceted. A diet poor in essential vitamins and nutrients necessary for proper health is a significant contributing factor. Exposure to sunlight is the vital source for vitamin D, and one would expect South Asian countries to be free from vitamin D deficiency due to sufficient sunlight^(2,3). Regrettably, there is a high risk of vitamin D deficiency in these countries due to low calcium intake, lack of vitamin-rich diets, and the most important factor of all: people being more restricted to their houses instead of engaging in outdoor activities. The normal level of vitamin D is 30ng/ml⁽⁴⁾. The skin contains 7-dehydrocholesterol, which transforms into cholecalciferol, also known as vitamin D₃, upon exposure to sunlight. However, despite the abundance of sunlight, vitamin D deficiency remains a significant concern in Pakistan and South Asia. Vitamin D deficiency has been linked to a succession of many diseases, including osteoporosis, osteoporotic fractures associated with hyperthyroidism, osteomalacia, and rickets^(4,5). These conditions can have severe consequences on an individual's health and quality of life, making it crucial to address the underlying causes of vitamin D deficiency in these regions^(6,7,8).

Methodology

Sampling and Participants

The survey was conducted in various areas of Karachi, Pakistan, to ensure a diverse representation of the population. Participants from different age groups, including both married and unmarried individuals, were included in the study. A total of 430 residents of Karachi were surveyed to gather insights into their knowledge of vitamin D deficiency and its effects.

Survey Design

The survey questionnaire was designed to assess participants' awareness of vitamin D deficiency and its implications. It consisted of a series of questions aimed at gauging the level of understanding among respondents regarding this health issue. The questionnaire was structured to gather quantitative data on participants' knowledge and perceptions related to vitamin D deficiency.

Data Collection

The survey was distributed using a combination of online and offline methods. Participants were reached through Google Forms, allowing for convenient and widespread access to the

survey. Additionally, manual distribution methods were employed to ensure coverage across different demographics and areas within Karachi. This multi-faceted approach aimed to maximize participation and capture a broad spectrum of responses from the target population.

Analysis

Upon completion of data collection, the responses were compiled and analyzed to identify trends, patterns, and insights regarding participants' awareness of vitamin D deficiency. Quantitative analysis techniques were applied to interpret the survey data and draw meaningful conclusions about the level of knowledge and understanding within the surveyed population.

Results

The survey results were categorized into seven key areas to provide a comprehensive understanding of the participants' knowledge and experiences related to vitamin D deficiency. The findings are presented in the following sections:

Time Spent Outdoors in Day time

The survey results revealed that a significant portion of the participants spent limited time outdoors. Specifically, 17.7% of respondents spent less than 1 hour outside, while 26% spent between 1-2 hours. However, a majority of participants (56.3%) reported spending more than 2-4 hours outdoors (Table 1).

Table 1: Time spent Outdoor in Day time

<u>Time</u>	<u>n</u>	<u>%</u>
Less than 1 hour	76	17.7%
Between 1-2 hours	112	26%
More than 2-4 hours	242	56.3%

Percentage of Body Parts Exposed to Sunlight

The survey also examined the percentage of body parts exposed to sunlight by the participants. The results showed that 50.2% of respondents exposed only their hands and face to sunlight, while 27.4% exposed their hands, face, and arms. A smaller percentage (20%) reported exposing their hands, face, arms, and legs to the sun (Table 2).

Table 2: Body Part Exposed to light

<u>Body Part Exposed to light</u>	<u>n</u>	<u>%</u>
Hands and face (5%)	216	50.2 %
Hands arm and face (10%)	118	27.4%
Hands, arm, face and legs (20%)	86	20%
Other part	10	2.3%

Prevalence of Joint and Bone Pain

One of the key indicators of vitamin D deficiency is joint and bone pain. The survey findings revealed that 124 out of the 215 participants (57.7%) suffered from this condition (Table 3).

Table 3: Prevalence of Joint and Bone Pain

<u>Joints & bone pain</u>	<u>n</u>	<u>%</u>
Yes	248	57.7%
No	182	42.3%

Muscle Pain and Fatigue

Muscle pain and feelings of low energy are also associated with vitamin D deficiency. The survey results showed that 63.7% of respondents experienced muscle pain and fatigue, while 36.3% did not report these symptoms (Table 4).

Table 4: Prevalence of Muscle Pain

<u>Muscle pain</u>	<u>n</u>	<u>%</u>
Yes	274	63.7%
No	156	36.3%

Vitamin D Testing

To assess the level of awareness and proactivity in addressing vitamin D deficiency, the survey asked participants about their history of vitamin D testing. The results indicated that 41.1% of respondents had undergone a vitamin D test, while 58.9% had not (Table 5).

Table 5: Prevalence of Vitamin D Test

<u>Vitamin D test</u>	<u>n</u>	<u>%</u>
Yes	176	41.1%
No	252	58.9%

Vitamin D Supplementation

The survey also inquired about the use of vitamin D supplements among participants. The findings showed that 52.6% of respondents were taking vitamin D supplements, while 47.4% were not (Table 6).

Table 6: Frequency of use of Vitamins Supplements

<u>Supplements of vitamin D</u>	<u>No. of people out of 215 people</u>	<u>Percentage</u>
Yes	226	52.6%
No	204	47.4%

Calcium Supplementation

Calcium is essential for maintaining bone health and is often recommended in conjunction with vitamin D supplementation. The survey results revealed that 50.9% of participants were taking calcium supplements, while 49.1% were not (Table 7). These detailed results provide valuable insights into the awareness, prevalence, and management of vitamin D deficiency among the surveyed population in Karachi, Pakistan. The findings highlight the need for increased education and access to vitamin D testing and supplementation to address this widespread health concern.

Table 7: Frequency of use of Calcium Supplements

<u>Supplements of Calcium</u>	<u>No. of people out of 215 people</u>	<u>Percentage</u>
Yes	218	50.9 %
No	210	49.1%

Discussion

The findings of our study provide valuable insights into the prevalence and awareness of vitamin D deficiency among the population in Karachi, Pakistan. The survey results highlight several key points that warrant further discussion and consideration. One of the most significant findings is that a majority of the participants (56.3%) spent more than 2-4 hours

outdoors, yet only 50.2% of them exposed their hands and face to sunlight. This suggests that despite spending a considerable amount of time outside, many individuals are not receiving adequate sun exposure, which is the primary natural source of vitamin D. As a result, 57.7% of the participants reported experiencing joint and bone pain, while 63.7% suffered from muscle pain and feelings of low energy. These symptoms are commonly associated with vitamin D deficiency and can lead to more severe health complications if left untreated^(9,10). The survey also revealed that females are particularly susceptible to vitamin D deficiency. This can be attributed to several factors, including spending more time indoors, covering their bodies when going out, and hormonal changes associated with menopause. Vitamin D deficiency in females can lead to a higher risk of osteoporosis and other bone-related diseases⁽¹¹⁾. Another concerning finding is the lack of awareness and proactivity in addressing vitamin D deficiency. The survey results showed that 58.9% of participants had never undergone a vitamin D test, indicating a significant knowledge gap regarding the importance of testing and monitoring vitamin D levels. Furthermore, some healthcare professionals may be engaging in suboptimal practices by prescribing vitamin D and calcium supplements without first conducting a proper assessment through testing⁽¹²⁾. The high percentage of participants taking vitamin D (52.6%) and calcium (50.9%) supplements without prior testing raises concerns about the potential for over-supplementation or inappropriate dosing⁽¹³⁾. While supplements can be beneficial in addressing deficiencies, they should be prescribed based on individual needs and under the guidance of healthcare professionals⁽¹⁴⁾. In light of these findings, it is crucial to implement strategies that promote awareness, education, and access to vitamin D testing and supplementation when necessary. Healthcare providers should prioritize educating patients about the importance of sun exposure, a balanced diet rich in vitamin D-containing foods, and the potential risks associated with vitamin D deficiency^(15,16). Regular screening and appropriate supplementation, if required, can help prevent the development of more severe health complications. Moreover, public health initiatives should target specific populations, such as females and the elderly, who are at a higher risk of vitamin D deficiency^(17,18). These initiatives should focus on raising awareness, providing accessible testing options, and encouraging lifestyle modifications to optimize vitamin D levels. In conclusion, the findings of this study underscore the need for a multifaceted approach to address vitamin D deficiency in Karachi, Pakistan⁽¹⁹⁾. By increasing awareness, promoting regular testing, and providing appropriate supplementation when necessary, healthcare professionals and public health authorities can work together to mitigate the negative health consequences associated with vitamin D deficiency and improve overall well-being in the community⁽²⁰⁾.

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