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The Use and Role of Vitamin D in the Population of Ferizaj during the COVID-19 Pandemic

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Abstract – Vitamins are essential organic substances for the normal functioning of the body, present in various food sources such as plants, animals, and microorganisms. Their intake through food is crucial for maintaining metabolic processes, tissue regeneration, and overall human health (Hart, 2012). Among these vitamins, vitamin D plays a unique role in the immune system and has been shown to be beneficial in combating viral infections.

Purpose – This study aims to evaluate the quantity and reasons for the use of vitamin D in the city of Ferizaj during the COVID-19 pandemic.

Methodology – This is a descriptive study conducted to identify the trends in the use of vitamin D within the population of Ferizaj during the pandemic. Data were collected through a specifically designed questionnaire, which was distributed and completed by citizens in public spaces throughout the city.

Results – The analysis includes data gathered from a broad group of citizens, regardless of age and gender, who consumed vitamin D before or after being infected with COVID-19. The results indicate an increase in the use of vitamin D during the pandemic and personal accounts regarding its impact on healing and recovery post-illness.

Conclusions – The data demonstrate a significant role of vitamin D in enhancing health during the pandemic, supporting the possibility that its use may have contributed to strengthening the population's immunity against viral infections, including COVID-19.

Keywords – Vitamin D, Usage, COVID-19 Pandemic, Public Health, Ferizaj.

I. INTRODUCTION

Vitamins (from Latin "vita" = life) are organic substances found in plants, animals, and microorganisms, which humans primarily obtain through food. Vitamins are essential for maintaining and supporting the metabolic processes of the body (Dewick, 2002).

Vitamin D is a group of secosteroids that are fat-soluble and function as a prohormone in the human body. It is unique because, in addition to being obtained from the diet, it can be synthesized endogenously through the skin's exposure to UVB rays from sunlight. Through natural synthesis in the skin and dietary intake, vitamin D affects serum concentrations, which are crucial for maintaining overall health (Bikle, 2010).

Vitamin D plays a vital role in supporting the immune system, making it a widely used supplement during the COVID-19 pandemic to aid in combating viral infections. Consequently, the use of vitamin D increased significantly among the population of Ferizaj during the pandemic.

The History of the Discovery of Vitamin D

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In the early 20th century, Polish scientist Casimir Funk (1884-1967) was the first to use the term "vitamin" to describe several essential food components necessary for maintaining health. This term derives from the Latin word vita (life) and the biochemical word amine, as the first discovered components contained nitrogen, although not all vitamins contain this element.

In the United Kingdom, Edward Mellanby was concerned about the high incidence of rickets, a condition particularly prevalent in Scotland, which became known as "the English disease." Based on the work of Dr. McCollum, Mellanby suggested that rickets might be linked to a dietary deficiency. He experimented with a vitamin-deficient diet, similar to that consumed by the Scottish population, by feeding dogs kept indoors and away from sunlight. These animals developed symptoms of rickets similar to those in humans, and Mellanby discovered that he could cure this disease with cod liver oil, hypothesizing that vitamin A was responsible for preventing rickets.

Meanwhile, Dr. McCollum, who transferred to Johns Hopkins University, continued his research on vitamin A and its effects. To test his hypothesis, he used a preparation of cod liver oil in which vitamin A had been destroyed. This preparation could no longer prevent vitamin A deficiency (xerophthalmia) but retained the ability to cure rickets. Through this experimentation, McCollum concluded that another factor was responsible for preventing rickets, which he named vitamin D (Semba, 2012).

Sources of Vitamin D

The body obtains the necessary amount of vitamin D primarily through exposure to sunlight, consumption of vitamin D-rich foods, and the use of dietary supplements (Avicenalab.com.mk, 2019). Sunlight exposure remains the main source of vitamin D, while recent studies indicate that around 1 billion people, or 15% of the global population, suffer from a deficiency of this vitamin, often due to insufficient exposure to sunlight. When ultraviolet (UV) rays from the sun hit the skin, they trigger a chemical reaction that produces vitamin D. In summer, approximately 10 minutes of sun exposure is needed to meet daily requirements, while in winter, the exposure time increases to about 2 hours (Nattyralvita.com, 2017).

Individuals with darker skin generate vitamin D more slowly from sunlight because melanin, the protective pigment in the skin, reduces the effect of UV rays. This is why individuals with darker skin are at a higher risk of vitamin D deficiency. Additionally, the process of vitamin D production from sunlight decreases with age, making the elderly more susceptible to this vitamin deficiency (Avicenalab.com.mk, 2019).

Vitamin D2 (Ergocalciferol)

Vitamin D2 (ergocalciferol) is a form of vitamin D that is available in both prescription and over-the-counter forms, depending on its dosage. It is used to treat various conditions related to low levels of vitamin D, including hypoparathyroidism (lack of parathyroid hormone) and rickets, as well as several other medical conditions that cause a decrease in vitamin D (Olivemedical-ks.com, 2018). Ergocalciferol is a dietary supplement that aids in the absorption of calcium and phosphate in the body, essential for bone health and strength. Individuals with parathyroid gland disorders often cannot produce sufficient vitamin D naturally; ergocalciferol serves as a substitute for this vitamin that their body does not produce in adequate amounts (Olivemedical-ks.com, 2018).

Effects of Vitamin D Deficiency:

Hypoparathyroidism (low levels of parathyroid hormone)

Familial hypophosphatemia (a genetic disorder causing low phosphate levels)

Vitamin D-resistant rickets (bone weakening associated with vitamin D deficiency) (Shqip.com, 2017).

Vitamin D3 (Cholecalciferol):

Vitamin D3 (cholecalciferol) is primarily found in animal sources and is produced naturally in the skin in response to sunlight exposure. Cholecalciferol from animal products (derived from cholesterol found in them) is biologically similar to that produced naturally by the sun in the human body. Studies show that vitamin D3 is metabolized in the body approximately 500 times faster than D2 and is considered to be about four times more effective in healthy individuals (Olivemedical-ks.com, 2018).

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Chemical Structure of Vitamin D:

Vitamin D includes a group of fat-soluble secosteroids that help in the absorption of calcium, magnesium, and phosphate in the intestines, supporting various biological functions. In humans, the most important components of this group are vitamin D3 (cholecalciferol) and vitamin D2 (ergocalciferol) (Holick, 1992). The primary natural source of vitamin D is the synthesis of cholecalciferol in the skin's epidermis through exposure to ultraviolet B (UVB) radiation. Vitamin D from diet and supplements is initially inactive and requires two hydroxylation activation steps—first in the liver and then in the kidneys—to be converted into the active form, calcitriol. Since vitamin D is synthesized in the body through exposure to sunlight, it is technically not classified as a vitamin but as a hormone that acts through a nuclear receptor in various organs (Friedmann, 1989).

Vitamin D Deficiency:

In the elderly, vitamin D deficiency often causes muscle weakness, cramps, and bone pain, especially when pressure is applied to the cartilage bone. In advanced cases, this may lead to loss of balance and an increased risk of bone fractures. Observable symptoms usually manifest only in advanced stages; therefore, even in the absence of visible signs, regular measurement of vitamin D levels is recommended for at-risk elderly individuals (Chang & Lee, 2019). Vitamin D deficiency in the elderly can lead to osteomalacia, a condition causing insufficient mineralization of bones and severe skeletal pain. This deficiency is also linked to osteoporosis, significantly increasing the risk of fractures.

Excessive Intake of Vitamin D:

Hypervitaminosis D is a rare but serious condition typically caused by high doses of vitamin D supplements. Elevated levels of vitamin D can lead to increased concentrations of calcium in the blood, which can affect bones, tissues, and other organs. If untreated, this condition can result in hypertension, loss of bone mass, and kidney damage (Martineau et al., 2016).

Causes of Hypervitaminosis D:

Hypervitaminosis D is usually caused by excessive consumption of vitamin D supplements and not by sun exposure. Recently, cases of hypervitaminosis D have increased, primarily due to overdosing on vitamin D tablets.

II. Problem Statement

The chosen topic for this thesis was suggested by my mentor and encompasses a theme that has captured my attention and interest for research. During the COVID-19 pandemic, the importance of vitamin D became prominent, making it a significant subject for study. This vitamin is well-known for its role in strengthening the immune system and helping to prevent various diseases, including viral infections.

For this reason, I have decided to analyze the impact of vitamin D on the health of citizens in Ferizaj during the pandemic. Based on my personal experiences and the knowledge I have gained during my studies, I have created a questionnaire to collect data from the citizens of this city regarding their awareness and use of vitamin D supplements during the pandemic. My aim is to illustrate the benefits of vitamin D, possible side effects, and its importance in the context of COVID-19. In my opinion, the pandemic has contributed to an increase in awareness among citizens about the significance of vitamin D, making them more conscious of its role in supporting overall health. Through this research, I hope to provide a significant contribution to the existing literature and help promote a healthy strategy for the use of vitamin D as a protective tool during health crises.

III. Methodology

o collect data regarding the use of vitamin D during the COVID-19 pandemic among the citizens of Ferizaj, we developed a questionnaire. This data was collected and documented based on the responses given by the participants. The process of data analysis was carried out through qualitative and descriptive methods, providing a detailed overview of the citizens' perceptions and experiences regarding vitamin D.

Sample

The sample for this research includes data collected from the questionnaire, which was designed to reflect the experiences of citizens

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with vitamin D during the pandemic years 2019-2022. The collected data is clear and provides information on the impact of vitamin D on citizens' health, showing how this vitamin has positively or negatively influenced their battle against the COVID-19 virus.

Instrument

As an instrument for gathering the necessary information, we utilized the responses of citizens from the questionnaire regarding the use of vitamin D during the pandemic. Participants accurately shared their experiences, providing a valuable perspective on the impact of vitamin D on their health. In this work, we extracted important data, such as the use of vitamin D before and after the pandemic, as well as their experiences regarding whether vitamin D has helped in fighting or recovering from COVID-19. This methodological approach allows us to analyze in more detail the role of vitamin D during this critical health period.

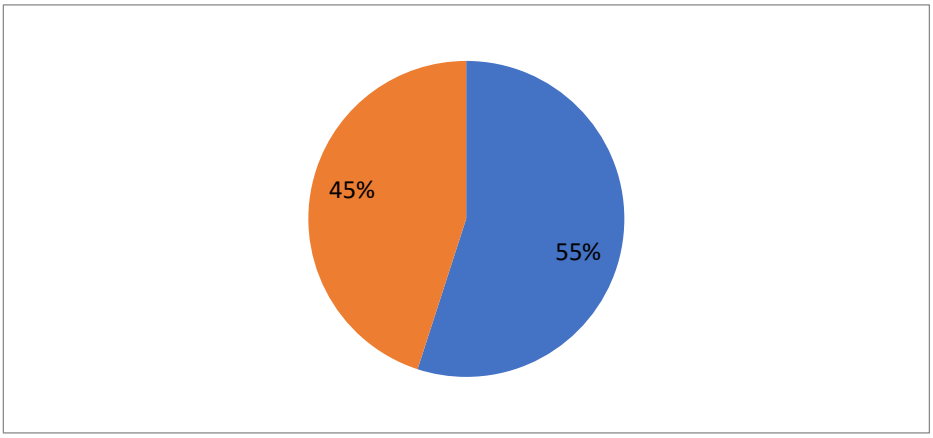
IV. Research Findings

Empirical Presentation of Results

In this section of the research, the results are presented through tables and graphs.

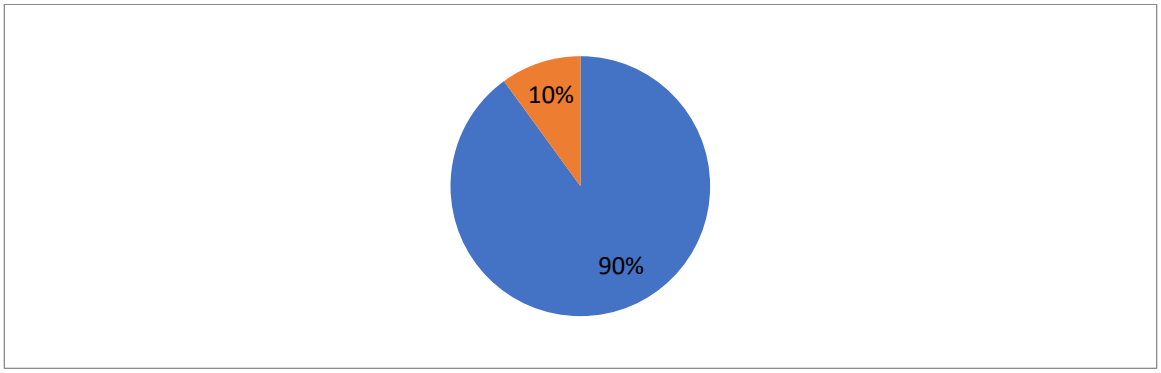
Presentation of Results by Gender

The number of participants in the research was 40 patients, divided by gender, as illustrated in the table below:



Results of Participation in Research by Gender

The analysis of the data collected from the questionnaire I conducted shows that responses were more frequent from males compared to females. Specifically, approximately 45% of the citizens who participated in the research were male, while 55% were female. This gender distribution of participants is an important indicator that may aid in interpreting the data and understanding the different perspectives that arise in the context of vitamin D use during the pandemic. This distinction may have implications for the analysis of the results and the conclusions drawn from this research.



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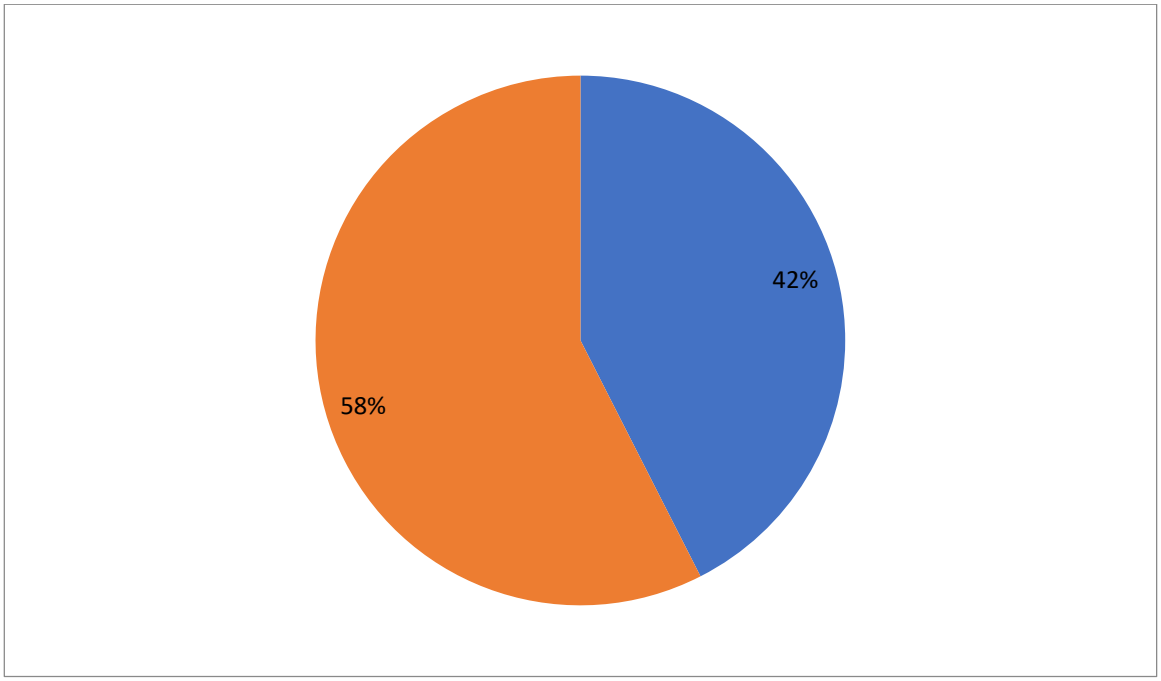
Results of Citizens' Knowledge about Vitamin D

Analyzing the data presented in this table, we observe that the majority of citizens are informed about the importance and role of vitamin D in the body. Approximately 90% of citizens had knowledge of this vitamin, recognizing its positive impact on health, including its assistance in the immune system and prevention of various diseases. Meanwhile, only 10% of citizens lacked sufficient information about vitamin D, indicating a need for greater education and awareness in this area. These results underscore the importance of informative and educational campaigns to enhance citizens' knowledge about this vital vitamin.



Presentation of Vitamin D Consumption: Before or After the Pandemic

In this section, we will examine the changes in vitamin D consumption among the citizens of Ferizaj, dividing the data into two periods: before and after the COVID-19 pandemic.

Before the Pandemic

In the pre-pandemic period, 17 citizens reported that they regularly consumed vitamin D. This indicates that the level of awareness regarding the importance of this vitamin for health was not very high, and many individuals may not have fully understood its role in strengthening the immune system and preventing diseases.

After the Pandemic

Following the outbreak of the pandemic, the number of citizens who began consuming vitamin D increased to 23. This rise of 6 individuals suggests a noticeable increase in awareness and interest in personal health. The change in this indicator shows that the pandemic positively influenced the education of citizens about the importance of vitamin D, motivating them to improve their dietary habits and include vitamin D supplements in their efforts to maintain their health.

Presentation of Forms of Vitamin D Consumption

In this section, we will explore the different ways of consuming vitamin D among the citizens of Ferizaj, categorizing the data into two main forms: in tablet form and through sun exposure.

Consumption in Tablet Form

A significant number of citizens, around 23 individuals, have chosen to take vitamin D in tablet form. This indicates a trend toward the use of supplements, which may be related to the convenience of use and clarity regarding the health benefits these

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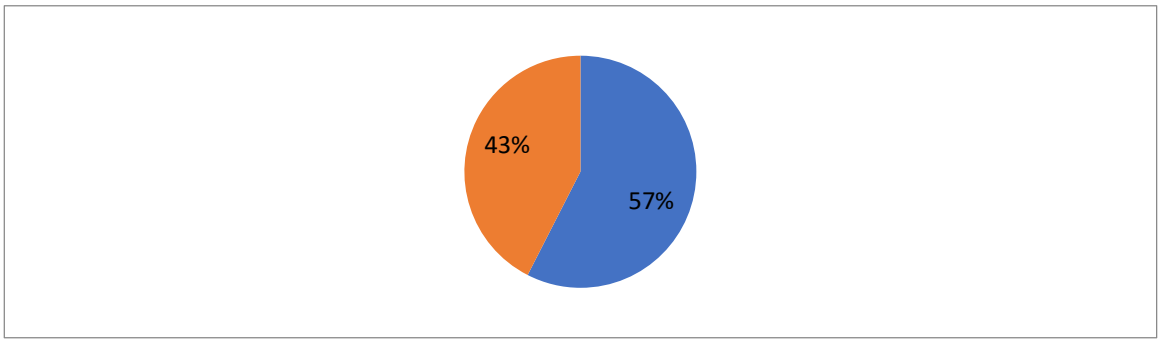
products provide. Tablet consumption offers a safe option for those who may not be exposed to sufficient sunlight due to lifestyle or weather conditions, thus ensuring an adequate level of vitamin D in the body.

Consumption through Sun Exposure

On the other hand, 17 citizens prefer to consume vitamin D through direct exposure to the sun. This is a traditional and natural practice that aids in the production of vitamin D in the body through ultraviolet radiation. However, the lower number of individuals practicing this form suggests that citizens may be more aware of the need to supplement vitamin D through supplements, considering the health risks associated with excessive sun exposure, such as burns and the risk of skin cancer.



According to the analysis of the data presented in this table, a larger number of citizens have chosen to consume vitamin D in tablet form compared to those who are exposed to the sun to obtain this important vitamin. Specifically, 23 citizens, representing about 57% of the total, preferred to take vitamin D in tablet form. This suggests that the majority of individuals consider this method to be a more convenient and safer alternative for meeting their vitamin D needs.

On the other hand, 17 citizens, or about 43% of the total, chose to obtain vitamin D through sun exposure. This natural practice, which helps the body produce vitamin D through ultraviolet radiation, is a traditional and well-known method. However, the low number of individuals using this form may be the result of lifestyle choices, health risks associated with excessive sun exposure, or perhaps a greater awareness of the importance of supplements.

Presentation of Citizens' Age During Vitamin D Consumption

The collected data show the distribution of citizens who have consumed vitamin D according to different age groups, reflecting the diversity of consumers in this aspect.

- Under 20 years: 1 citizen
- 20 to 30 years: 6 citizens
- 30 to 40 years: 11 citizens
- 40 to 50 years: 10 citizens
- 50 to 60 years: 6 citizens
- Over 60 years: 6 citizens

As indicated by this data, the largest group of vitamin D consumers includes individuals aged 30 to 40, with 11 citizens reporting its use. This may suggest that this age group is more aware of the importance of vitamin D for their health.

On the other hand, the low percentage of consumers under 20 years, with only 1 citizen, may indicate that young people might not have sufficient information regarding the need for this vitamin.

Considering this data, it is clear that there is a diversity in vitamin D consumption by age, highlighting the need for more education and awareness about its importance for all age groups.

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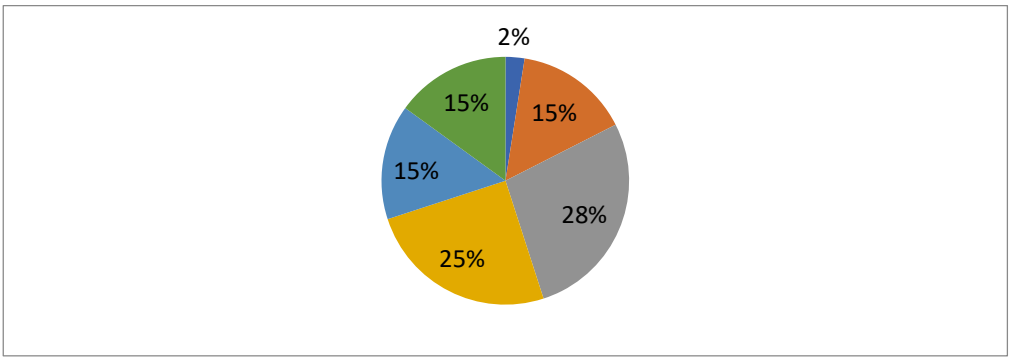


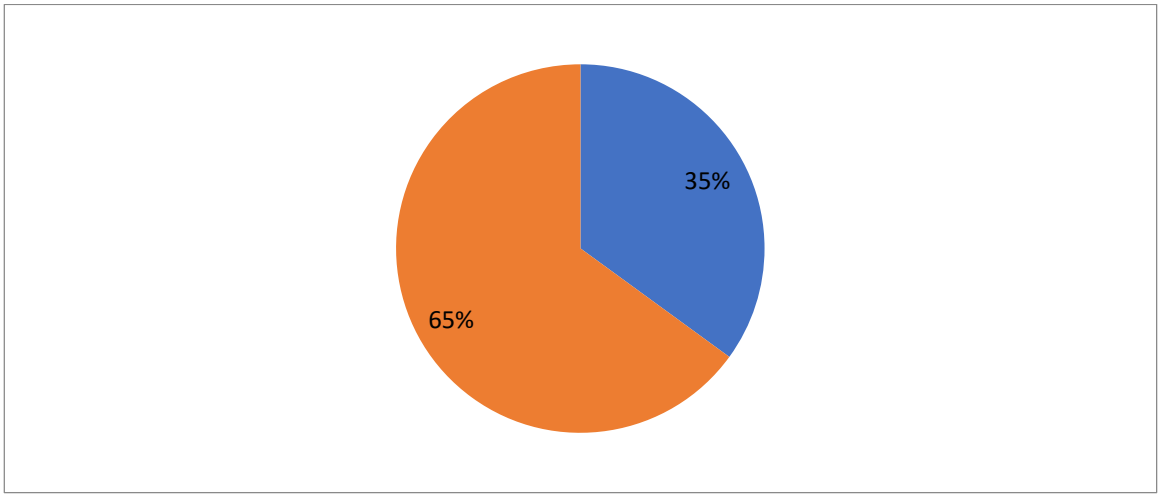
Presentation of Vitamin D Consumption: With Consultation from a Doctor or Pharmacist

The collected data on vitamin D consumption indicate that a significant portion of citizens prefer to take this vitamin after consulting healthcare professionals.

- Consultation with a Pharmacist: 14 citizens
- Consultation with a Doctor: 26 citizens

As shown in this table, the number of citizens who consulted a doctor before consuming vitamin D is significantly higher, with 26 citizens (approximately 65%). This suggests a strong awareness of the importance of professional guidance and the potential for addressing health needs accurately.

On the other hand, only 14 citizens (approximately 35%) have taken vitamin D after consulting with a pharmacist, indicating that while pharmacists play an important role in providing information about supplements, the majority of citizens prefer to seek guidance from doctors to ensure they are following an appropriate and safe treatment.



Results of Vitamin D Consumption: With Consultation from Doctors or Pharmacists

This table clearly illustrates how citizens of Ferizaj consume vitamin D and highlights an important perception of the role of health professionals in the supplementation process.

From the results, we observe that a dominant majority of citizens (65%) prefer to consult with a doctor before using vitamin D. This trend indicates a high level of awareness regarding the importance of professional guidance, suggesting that citizens recognize the need for a more thorough assessment of their health status before starting supplementation. This also reflects that doctors are often

perceived as a more reliable source of critical health information, contributing to the provision of appropriate and effective treatment.

On the other hand, 35% of citizens who have consulted with a pharmacist indicates that the role of pharmacists in providing information about supplements is also valuable, although not as dominant as that of doctors. This suggests that pharmacists play an important role in educating patients and offering support for vitamin D intake, particularly in the context of everyday treatments.

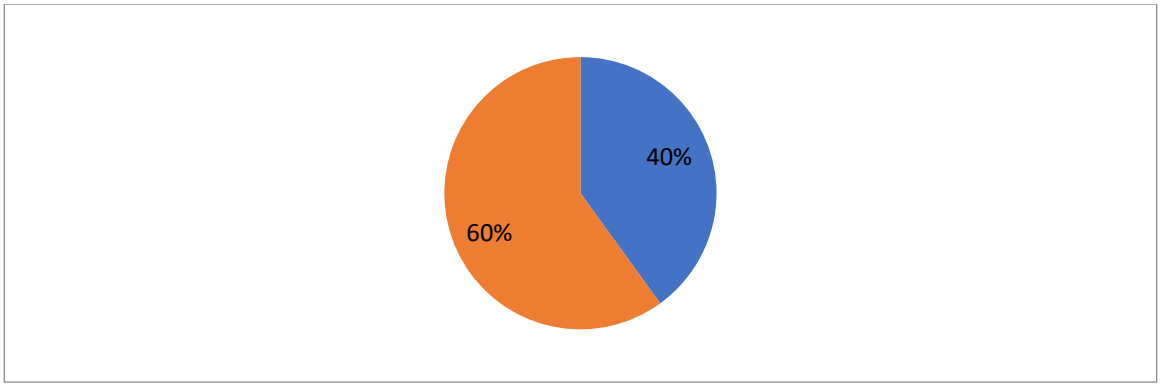
In summary, these results suggest that improving collaboration between doctors, pharmacists, and citizens could be essential for optimizing vitamin D consumption and ensuring a more holistic approach to public health. While the role of the doctor is clear and dominant, it is also important to encourage engagement with pharmacists as valuable sources of information and advice.

Awareness of Citizens About Vitamin D Before COVID-19

This table shows the level of awareness of citizens regarding vitamin D prior to the outbreak of the COVID-19 pandemic. According to the data, 16 citizens (approximately 40%) confirmed that they had knowledge about the importance and benefits of vitamin D, while 24 citizens (around 60%) did not have sufficient information about this essential vitamin.

These results illustrate a noticeable lack of knowledge regarding vitamin D, which is known for its role in strengthening the immune system and improving overall health. The lack of information about this vitamin before the pandemic suggests a need for educational and informational campaigns to help raise citizens' awareness about its importance, especially in the context of infectious diseases.

The limited knowledge about vitamin D before COVID-19 may have contributed to health concerns that intensified during the pandemic, indicating that education and information are crucial for better support of public health. This situation provides an opportunity to enhance awareness and educate citizens about the importance of vitamins and minerals in maintaining health, including the benefits of vitamin D as an important factor for immune support.



The Role of Vitamin D in the Fight Against COVID-19

This table presents citizens' perceptions regarding the impact of vitamin D in combating COVID-19. According to the data, 31 citizens (approximately 77%) believe that vitamin D has helped improve their health during the pandemic, while 9 citizens (around 23%) do not share this view.

These results suggest a high awareness of the potential role of vitamin D in strengthening the immune system and supporting the body during infections like COVID-19. The strong belief in the benefits of vitamin D among citizens indicates an increased awareness of its importance during challenging health periods. This may have influenced how they managed their health during the pandemic, including the incorporation of more vitamin D-rich food sources or the use of supplements.

However, it is important to emphasize that while many citizens have knowledge and confidence in the benefits of vitamin D, accurate information supported by scientific research is essential to understand its role in combating COVID-19. This situation highlights the need for educational campaigns and further research to help citizens make informed choices about their health, including the use of vitamin D as an important part of an overall health protection strategy.

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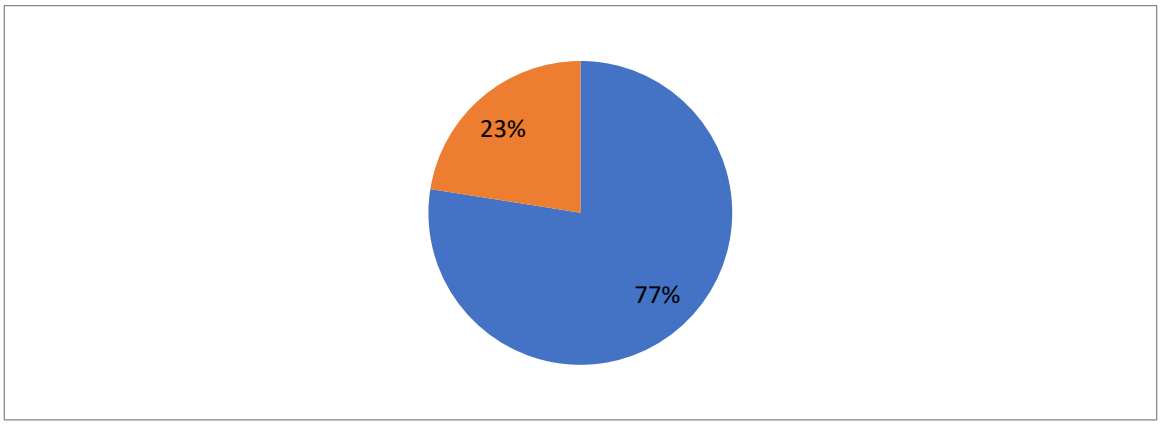

Results of Vitamin D's Role in the Fight Against COVID-19

This table presents the responses of citizens from Ferizaj regarding the role of vitamin D during the pandemic. It reflects individuals' perceptions and experiences concerning the potential role of vitamin D in strengthening the immune system and supporting the fight against COVID-19.

The figures show that a significant majority, approximately 77% of citizens, believe that vitamin D has contributed to the improvement of their immunity and has played a positive role in the process of fighting and recovering from COVID-19. This indicates a high level of awareness regarding the importance of vitamin D and suggests that citizens are informed about its health benefits.

On the other hand, 23% of citizens who expressed that they did not feel this impact offer an important perspective, indicating that not everyone has experienced the same effect or has different health conditions that assist in coping with infections. This suggests the need for further education and research regarding vitamin D and its effects, to better understand individual variations in responses to this supplement.

Presentation of Benefits Observed by Citizens for Vitamin D

This table illustrates citizens' perceptions regarding the benefits of vitamin D, showing that the majority of them have noticed positive effects from its consumption. Approximately 97% of citizens, which constitutes a large number, have confirmed that they have felt benefits from vitamin D, expressing their belief in its importance for overall health.

Only 3% of citizens have not reported any benefits, indicating a broad consensus on the positive role of vitamin D. This situation suggests that citizens are aware of the importance of this vitamin and its impact on strengthening immunity and improving well-being.

The observed benefits may be linked to increased energy, enhanced resilience, and help in protecting against illnesses. This also suggests that education about the role of vitamin D and its benefits may have contributed to raising awareness and usage among citizens.

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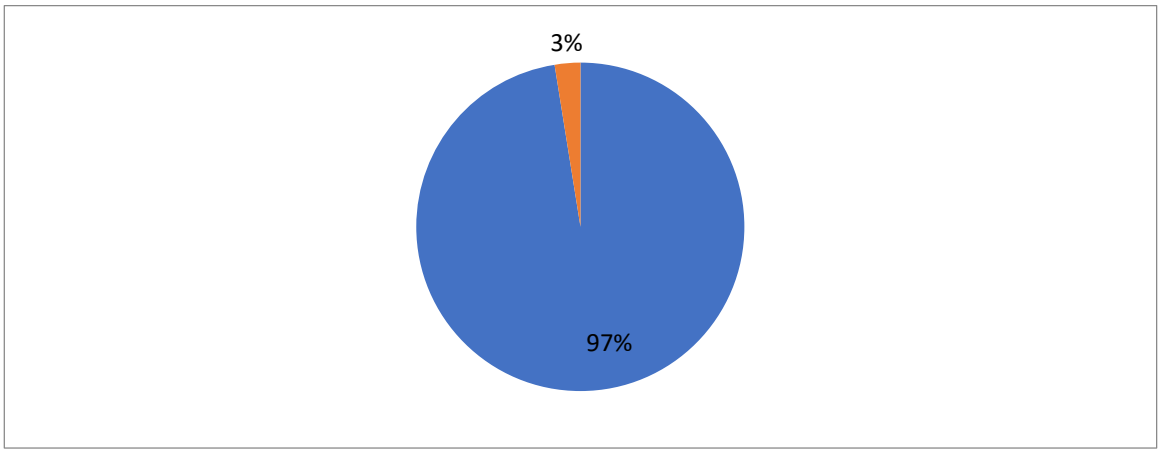

V. Conclusions And Recommendations

Based on the review of relevant literature and the analysis of responses from the citizens of Ferizaj, this research presents the following recommendations:

Increase in Vitamin D Consumption Post-Pandemic**:**The research indicates that the use of vitamin D has significantly increased following the outbreak of the COVID-19 pandemic. This trend suggests that citizens have begun to recognize the importance of this vitamin in supporting the immune system and as a protection against diseases.

Consultation with Healthcare Professionals:The results show that the majority of citizens prefer to consult with a doctor before starting vitamin D consumption. This implies a high level of trust in healthcare professionals and the importance of accurate guidance for the use of vitamin supplements.

Consumer Age Group**:**The age group that consumes vitamin D the most is between 30 and 40 years. This may be related to the fact that individuals in this age group often face health issues, including bone pain, and are more likely to seek solutions to address them.

Form of Consumption**:**Data indicates that citizens prefer to consume vitamin D in tablet form, suggesting that this is the easiest and most accepted method for them. It is important for manufacturers to provide various forms to make supplementation more accessible to all population groups.

Male Dominance in Consumption**:**Another interesting finding is that the majority of vitamin D consumers were male. This may have several implications, including the need for more informational campaigns to encourage women to use this vitamin to improve their health.

Reasons for Consumption**:**Bone and back pain were the main reasons for the use of vitamin D. This indicates a need for more education regarding the benefits of vitamin D for overall health, including its role in preventing other diseases and supporting bone health.

Additional Recommendations:

Education and Awareness**:**It is suggested to create ongoing campaigns to raise awareness about the importance of vitamin D and its impact on health. This will help reach a wider audience and encourage its proper use.

Health Policy**:**Health institutions should include vitamin D in their recommendations for disease prevention and in meeting the needs of the population, especially during pandemic periods or when specific health conditions are present.

Public Health Monitoring**:**A monitoring system should be established to assess vitamin D levels in the population and identify specific groups at risk of deficiency, providing strategies for support and assistance.

Research Recommendations

This research presents several important recommendations for the use and consumption of vitamin D, aimed at raising awareness and ensuring optimal health for individuals. These recommendations are as follows:

Assessment of Vitamin D Needs:It is essential to avoid taking vitamin D without conducting appropriate tests. This will help determine the current levels of vitamin D in the body and ensure that supplementation is necessary and accurate, thereby avoiding the risks of excess or deficiency.

Consumption of Vitamin D by Children:Young children should receive vitamin D throughout the year, up to the age of 4 years. This is important for proper bone development and immune system function, contributing to the prevention of various diseases and supporting healthy growth.

Recommendations for Adults and Children Over 4 Years Old**:**All adults and children over the age of 4 are recommended to take vitamin D supplements during the winter months, from October to April. This is a period when sun exposure is lower, and levels of vitamin D in the body may decrease significantly. Supplementation will help maintain healthy levels of this vitamin.

Consumption of Foods Rich in Vitamin D:It is recommended that individuals consume food containing vitamin D at least once a week. This will help meet dietary needs and contribute to overall health support, particularly in improving bone strength and immune system function.

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