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НИТРАТЫ В ПРОДУКТАХ ПИТАНИЯ: НЕГАТИВНОЕ ВОЗДЕЙСТВИЕ НА ОРГАНИЗМ ЧЕЛОВЕКА

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Аннотация

Введение. В данной статье будет представлен всесторонний анализ нитратов в продуктах питания, их влияния на здоровье человека, источников поступления и методов снижения потенциальных рисков. **Цель исследования** – провести анкетирование, получить новые знания по теме, обобщить и расширить представление о свойствах нитратов, опираясь на опрос. **Материал и методы.** В исследовании был использован метод анкетирования. Исследование проведено с 1 по 14 марта 2025 года на базе студентов екатеринбургских вузов: УГМУ, УрФУ, УрГЭУ, РГППУ, УрГАУ. В помощь исследованию был создан онлайн – опрос. Результаты анкетирования обобщены вне зависимости от пола, возраста, этнической принадлежности. Полученные данные были преобразованы в процентном соотношении. **Результаты.** Большинство респондентов имеют базовые знания о нитратах в продуктах питания, считают очень важным такие аспекты, как: безопасность продуктов, методы снижения нитратов и потенциальное влияние на здоровье, систематически изучают информацию о содержании нитратов в различных продуктах. Их беспокоят вопросы возможного негативного воздействия нитратов на организм, а также способы минимизации рисков при употреблении овощей и фруктов. **Выводы.** Необходимо обратить внимание на повышение информированности населения о нитратах, разработать практические рекомендации по снижению их содержания в продуктах питания и провести дополнительные просветительские мероприятия для различных возрастных групп.

Ключевые слова: нитраты, продукты питания, анкетирование, безопасность питания, здоровое питание, методы снижения нитратов, исследование.

NITRATES IN FOOD: NEGATIVE IMPACT ON THE HUMAN BODY

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Abstract

Introduction. This article presents a comprehensive analysis of nitrates in food products, including their impact on human health, sources of intake, and strategies for mitigating potential risks. **The aim of the study** is to conduct a survey, obtain new knowledge on the topic, generalize and expand the understanding of the properties of nitrates, based on the survey. **Material and methods.** The study used the survey method. Data collection was conducted from March 1 to March 14, 2025, on the basis of students of Yekaterinburg universities: USMU, UrFU, USUE, RSPU, and UrGAU. An online survey instrument was created to assist the study. Survey results were summarized regardless of gender, age, or ethnicity. The obtained data were converted into percentage ratios. **Results.** Study findings inform basic knowledge of nitrates in food products, consider aspects such as food safety, methods of reducing nitrates, and potential impacts on health. Systematic study of nitrates in various food products is essential due to concerns about the possible negative impact of nitrates on the body, as well as ways to minimize the risks when consuming vegetables and fruits. **Conclusions.** It is necessary to pay

attention to raising public awareness of nitrates, develop practical recommendations for reducing their content in food products, and conduct additional educational activities for different age groups.

Keywords: Nitrates, food products, questionnaires, food safety, healthy eating, methods of reducing nitrates, research.

INTRODUCTION

Nitrates in food products present a complex scientific challenge with potential implications for human health. Multiple factors contribute to nitrate accumulation, including soil conditions, cultivation methods, fertilizer application, and food processing techniques [4]. Genetic characteristics of plants, environmental factors, and agricultural practices play a substantial role in determining nitrate levels. Research findings suggest that nitrate issues affect approximately 60% of plant products; in certain regions, this figure reaches 80%. Potential adverse impacts of excess nitrates on human health can result in serious metabolic disorders. Studies indicate that 72% of the population expresses concern regarding food safety issues. Therefore, comprehensive study of the nitrate problem, development of methods for reducing nitrate content, and enhanced public awareness of potential risks is of utmost importance. A scientific approach to this issue highlights research relevance [1].

The aim of the study is to gain a better understanding of the properties of nitrates. The intended outcome for using the questionnaire approach is data acquisition, which will enable generalization and expansion of existing understanding. It is projected that this process will contribute to the development of more effective strategies for controlling nitrates in food products.

MATERIAL AND METHODS

A questionnaire methodology informed the study. Data collection spanned from March 1 to March 14, 2025, engaging students from Yekaterinburg universities: USMU, UrFU, USUE, RSPU, and UrGAU. An online survey instrument facilitated the study. The study involved full – time students, aged 18 to 21, studying at the specified universities in Yekaterinburg, who voluntarily provided consent. The survey excluded part – time students, persons under 18 and over 21 years of age, and students from other educational institutions who declined participation. Descriptive statistical methods (quantitative and qualitative indicators) determined the results, with a 95% confidence level. Microsoft Excel 2013 analyzed the results. Results were summarized irrespective of gender, age (within the specified range), and ethnicity. The conversion of the obtained data occurred into a percentage.

RESULTS

The investigation of nitrate awareness among students at Yekaterinburg universities indicated varying awareness levels. A total of 83% of participants, comprising 45% fully aware and 38% partially aware, report knowledge of nitrates. However, 17% of respondents lack any comprehension of nitrates, pointing to the need for intensified educational efforts. Scientific articles (38%) and specialized medical websites (31%) constitute the sources of information cited most frequently, indicating a desire for reliable data. Simultaneously, television (20%) and social networks (11%) also exert influence on the perception of the problem, emphasizing the importance of cultivating a critical approach to information. For products, most participants identified green leafy vegetables (68%) and beets (55%) as the primary sources of nitrates. However, a significant proportion erroneously associated cucumbers (42%) and watermelons (35%) with high nitrate levels, indicating the need for product – specific accurate information. Knowledge of methods for reducing nitrate levels varied. For example, 75% of respondents have awareness of thorough washing, and 62% of heat treatment. In comparison, only 40% are aware of soaking. Importantly, 15% of participants did not indicate any awareness of methods to reduce nitrate load, which suggests that more education is necessary. Concerns about nitrate health effects resulted among most respondents: 48% report significant concern, while 37% report moderate concern. However, 25% report a lack of willingness to change, highlighting the need for development of comprehensive educational arguments for raising awareness of nitrates in food products among student youth.

DISCUSSION

This study of nitrate awareness among Yekaterinburg university students provides valuable insights for public perception assessment and potential risks associated with nitrates. Although a

significant majority of respondents assert awareness of nitrates, comprehension details, information sources, and willingness to change dietary habits, raise concern. While total protection from the harmful effects of nitrates may be unachievable, controlling nitrate amounts and reducing negative impacts remains a reasonable goal. The presence of nitrates in plants results naturally as they source nitrogen. Still, excessive increases prove highly undesirable, becoming toxic to plants. In general, plants convert nitrates into proteins. An absence of harm occurred with bodies in receipt of acceptable nitrate concentrations. However, nitrate conversion results during digestion following ingestion of too many compounds. This process harms organisms. Also, increased nitrates, in addition to a direct threat, reduce the amount of vitamins in foods. As vegetables and fruits reach peak nitrate accumulation during the ripening period, unripe plants demonstrate as the most dangerous [3]. As WHO determined, 5 mg/kg of human body weight comprises a harmless effect, an adult can receive approximately 350 mg without health consequences. Exceeding safe levels then leads to health conditions. Resultant of changed chemical composition in the blood comes a decrease in pressure and liver dysfunction, causing a decline in mental and physical activity [2]. Nitrates facilitate the development of harmful intestinal microflora, which leads to toxin entry in the body that produces poisoning. With prolonged nitrate intake, the amount of iodine declines, which facilitates thyroid diseases. Additionally, nitrates may relate to the occurrence of cancerous tumors [5].

CONCLUSION

This survey of Yekaterinburg university students assesses their information awareness levels and consumer habits pertaining to nitrates within food products. The necessity of nitrogen – containing compounds in food comes as they sustain protein, nucleic acid, ATP, and various hormones. (insulin, adrenaline, glucagon, and thyroxin for examples.) Nitrates can show up in cell amino acids. Through these results, one can determine the nitrogen contents. Also assessed daily consumption and its effects, and its impact on safe or harmful results. For addressing nitrates, a balanced approach results to best action. While key to security and efficiency in agriculture and food production, one should remember to minimize health implications. Key steps to safety involve public education, ecological farming measures, and maintaining appropriate methods for handling and storing.

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