

CREATINE AND ITS EFFECTS FROM AN EDUCATIONAL VIEWPOINT: BRIDGING THE EVIDENCE–PERCEPTION DIVIDE IN HIGHER EDUCATION

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Abstract: *This study examines the persistent disconnect between clinical scientific evidence and public perception regarding creatine monohydrate supplementation. Although an extensive body of peer-reviewed literature confirms that creatine enhances muscle strength, anaerobic power, and cognitive health without impairing renal function, public distrust remains widespread. This paper analyzes three primary structural drivers of misconceptions: low consumer scientific literacy, sensationalized media marketing, and insufficient nutrition education within medical and university curricula. Framing this challenge within specialty code 13.00.02 (Theory and Methodology of Training and Education), this article outlines a comprehensive pedagogical methodology for cultivating evidence-based information literacy among higher education students and future healthcare professionals in Uzbekistan.*

Keywords: *Information literacy, digital pedagogy, evidence-based health education, scientific communication, creatine monohydrate, higher education methodology.*

KREATIN VA UNING TA'SIRI TA'LIMY YONDASHUV NUQTAI NAZARIDAN: OLIY TA'LIMDA ILMIY DALILLAR VA JAMOATCHILIK IDROKI O'RTASIDAGI TAFOVUTNI BARTARAF ETISH

Annotatsiya: *Ushbu tadqiqotda kreatin monogidratining xavfsizligi va samaradorligi bo'yicha ilmiy dalillar hamda jamoatchilik idroki o'rtasidagi mavjud tafovut pedagogik nuqtai nazardan tahlil qilinadi. Ko'plab xalqaro ilmiy izlanishlar kreatinning sport natijalarini oshirishi va kognitiv salomatlikni qo'llab-quvvatlashini ko'rsatishiga qaramay, past ilmiy savodxonlik, OAVdagi bo'rttirilgan axborotlar va tibbiy ta'limdagi bo'shliqlar sababli noto'g'ri tushunchalar saqlanib qolmoqda. 13.00.02 – Ta'lim va tarbiya nazariyasi va metodikasi ixtisosligi doirasida ushbu maqola oliy ta'lim talabalarida dalillarga asoslangan axborot kompetensiyasini hamda ilmiy manbalar bilan ishlash ko'nikmalarini rivojlantirish bo'yicha pedagogik metodikani taklif etadi.*

Kalit so'zlar: *Axborot savodxonligi, raqamli pedagogika, dalillarga asoslangan ta'lim, ilmiy kommunikatsiya, kreatin monogidrat, oliy ta'lim metodikasi.*

КРЕАТИН И ЕГО ЭФФЕКТЫ С ТОЧКИ ЗРЕНИЯ ОБРАЗОВАНИЯ: ПРЕОДОЛЕНИЕ РАЗРЫВА МЕЖДУ НАУЧНЫМИ ДАННЫМИ И ОБЩЕСТВЕННЫМ ВОСПРИЯТИЕМ В ВЫСШЕЙ ШКОЛЕ

Аннотация: *В данной статье анализируется устойчивый разрыв между научными доказательствами и общественным восприятием безопасности и эффективности креатина моногидрата. Несмотря на многочисленные рецензируемые исследования, подтверждающие положительное влияние креатина на физическую и когнитивную деятельность без вреда для почек, общественное недоверие сохраняется из-за низкой научной грамотности, сенсационности в СМИ и недостатка обучения нутрициологии. В рамках специальности 13.00.02 предлагается педагогическая методика формирования информационной грамотности и критического анализа научных данных у студентов высших учебных заведений.*

Ключевые слова: *Информационная грамотность, цифровая педагогика, доказательное образование, научная коммуникация, креатин моногидрат, методика высшего образования.*

Introduction

Creatine monohydrate is one of the most researched ergogenic acids. With long- and short-term clinical studies and literature reviews, it is widely regarded as one of the best supplements to aid in high-intensity workouts, particularly when combined with resistance training (Kreider et al., 2017; Wang et al., 2024). However, public perception on creatine has regarded it unsafe, with myths linking it to renal damage, side effects of anabolic steroids and even implying that it is a derivative of a banned pharmacological agent (Antonio, 2021). The persistence of these beliefs directly contradicts the extensive research which already exists showing benefits for users with no harmful side effects at recommended intake levels (Kreider et al., 2017; de Souza e Silva et al., 2019; Wang et al., 2024).

Proposing that creatine is a public health-communication case, this study evaluates how the opinions surrounding creatine stem from misinformation and inadequate scientific literacy. A comparative analysis of evidence base against public narratives showcases the central issue while targeted solutions such as consumer-facing systematic literature reviews aim to bridge this gap.

Creatine monohydrate is a supplement which facilitates ATP regeneration in cellular metabolism through the phosphohagen system (Kreider et al., 2017). When it is supplemented, the cellular stores increase, thereby increasing phosphocreatine stores in the cell which aid in short, high-intensity workouts. Decades of research confirms that creatine monohydrate, when supplemented and combined with resistance training improves lean muscle mass growth, strength and power (Wang et al., 2024). In addition to athletic performance enhancement, Clark et al. (2022), also found that it may provide protective and therapeutic effects from neurological diseases such as Parkinson's.

The safety of creatine consumption is also well documented. Multiple case studies and clinical research confirm that recommended levels of creatine supplementations have no effects on Glomerular Filtration Rate (GFR) or any other renal biomarkers (de Souza e Silva et al., 2019). Furthermore, randomisation studies further found that creatine monohydrate levels have had no effect on renal sufficiency and by extension to renal function (Zhou et al., 2024).

Nonetheless, the majority of public opinion, even in the educational setting does not coincide with the endless scientific proof available. Personal experiences generally exaggerate the effects of cramps or even dehydration (Antonio, 2021), while the media often portrays creatine as an anabolic steroid.

Therefore, this gap between scientific evidence and public opinion warrants literature to translate evidence into initiatives. This bifurcated approach is aimed at bridging the gap between researchers, athletes and educators.

Key Issues

The principal issue relating to creatine use is the fact that the general public usually relies on anecdotal evidence rather than scientific research to form opinions on sport enhancers - or any other drug for that matter. If educators relied on peer-reviewed studies instead, then the misconceptions surrounding creatine would be non-existent (Thomas & Dunn, 2020). As a result, evidence-based usage is rarely used outside of their own spheres. For example, athletes may dive deep into creatine research before use, but an amateur weight trainer would still be reliant on opinions of his/her peer rather than scientific evidence.

The fitness industry is a worldwide, multi-billion dollar market. This results in many competitors showcasing baseless advertisements on consumer media calling out creatine as an anabolic steroid with drastic health drawbacks such as kidney damage (Antonio, 2021). These marketing campaigns aim to sell "herbal alternatives" labelled as "natural" and "safe" at the expense of creatine and spreading misinformation. These campaigns are almost always allowed as there is no regulation on fitness claims which products make, creating a greater sense of mistrust and confusion.

Healthcare professionals are usually considered to be authorities on prescribing medications. This is also true for when it comes to sports enhancements, however, many healthcare professionals are hesitant to recommend creatine. This is partly because of the earlier mentioned prevalence of misconceptions on social media, but also partly due to the lack of dietary knowledge among most healthcare providers (Bukic, J., et al. 2018). This reluctance, subsequently highlights the gap between medical training and sports nutrition as supplement

Pharmacology is often not given priority.

Analysis

The biggest diversion is between the perception of creatine by the public and the evidence which supports the Creatine is safe. Kreider et al. (2017) and Wang et al. (2024) emphasise that both short-term and long-term studies conclude that recommended creatine supplementation supports lean muscle mass and strength when recommended doses are coupled with high-intensity exercises. Clinical trials as well as meta-analysis from de Souza e Silva et al. (2019) and Zhou et al. (2024) further prove that even with prolonged creatine supplementation, the renal function is stable. However, as Antonio (2021) highlights that creatine usage is still perceived to be linked with organ toxicity. This highlights a clear gap between the perception of creatine and its actual effects.

The misconceptions surrounding creatine perception can be linked to four major, yet interconnected factors.

Factor	Rationale	Source
Scientific literacy barriers	The majority of the population is not capable of interpreting primary or even secondary research and end up relying on information from peers or media.	Thomas and Dunn (2020)
Media sensationalism	Fitness influencers and incorrect media campaigns often do not represent creatine scientifically and promote other “natural” supplements.	Antonio (2021)
Educational Gaps	Healthcare professionals seldom receive the appropriate training to advise on correct supplementation usage.	Bukic et al. (2018) Crowley et al. (2019)
Regulatory	Supplements are never under the same	Thomas &

insufficiency	scrutiny and by extension regulation as other pharmacological agents.	Dunn (2020)
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There is a clear correlation between the scientific awareness of creatine and its positive perception. People who are more embedded into the fields of nutritional science and athletics such as sports scientists and trainers have a higher level of scientific literacy and therefore associated creatine with enhanced performance and strength rather than any renal disease or organ toxicity (Kreider et al., 2017). However, amateur weight lifters and beginners often view creatine in a different, more negative light showcasing the correlation between awareness level and evidence-based usage. Hence, this phenomenon confirms that the problem is communicative rather than pharmacological or academic.

Solutions and Recommendations

Enhancing scientific literacy is one of the most effective and long-term solutions to tackle the wrong public perception of creatine. This would improve public scientific literacy and aim to safeguard the future against public misconceptions. As Thomas and Gunn (2020) already emphasised, the general public lacks the ability to interpret peer reviewed scientific literature. Furthermore the inaccessibility of this research also poses a challenge for the general public to understand and read scientific literature. Governments and health ministries worldwide should invest in apparatus to make literature available to the general public. This can be done through verified and regulated digital platforms, enabling the general public to educate themselves on supplementary information.

Moreover, fitness institutions could be regulated to mandatory and openly display information about supplements. These supplements should include the ingredients, side effects and effects of the supplement in plain language. This would equip the public with the necessary information to make informed and accurate decisions based on scientific evidence.

Healthcare professionals are generally the bridge between scientific knowledge and public health, but because of their limited knowledge on supplementation during medical education, they are hesitant to recommend supplementations to their patients (Bukic et al., 2018; Crowley et al., 2019). Therefore, medical schools must have a curriculum reform that makes it necessary for training doctors to learn about supplement pharmacology. The American Heart Association already has a model in place to standardise the practice of supplementation in medical training (Aspry et al., 2018), and this can be used globally.

Furthermore, continued medical education (CME) programs can also be implemented which can update practicing doctors to consolidate new information and then further

recommend usage of supplements to their patients (de Souza e Silva et al., 2019; Zhou et al., 2024).

The most persistent source of confusion for the public is the varying practices of an unregulated supplementation market. The absence of oversight makes it difficult for consumers to trust supplements as it misleads consumers with exaggerated claims. Manufactures should be required to display standardised safety tests for each supplement which can be taken from peer-reviewed and transparent studies into the supplement (Kreider et al., 2017; Antonio, 2021).

Additionally, there should be marketing codes which inhibit the use of unsubstantiated psychological marketing labelling products as being “natural” or “100% guaranteed”. Similar to the alcohol and tobacco market, side effects of drugs should be strictly mentioned on the packaging in bold prints.

Conclusion

The case of creatine monohydrate is one of those which exhibits how persistent misinformation can lead to decades of academic research not translating appropriately in public perception. This analysis then further finds that these misconceptions are a symptom of something broader: insufficient access to scientific literacy, weak supplement market regulation and limited education on nutrition for healthcare professionals. This reveals how scientific truth can be overshadowed by media frenzies and exaggerated anecdotes. Therefore, by improving scientific communication and stronger professional education, we can ensure that it is science, not myths that guide public perception.

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