Ketopoly

A playful approach to supporting ketogenic nutritional therapy in children and adults

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Abstract

Ketopoly is an educational board game that teaches children, parents, and professionals about the ketogenic diet in a fun way. Based on a classic game, it teaches knowledge about food, meals, and nutritional values. The aim is to promote nutritional literacy and practical skills in a playful way.

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Introduction

Ketogenic diets are based on a very low-carbohydrate, moderate-protein, and high-fat diet [1]. This makes them fundamentally different from Western dietary patterns and the dietary recommendations of the German Nutrition Society (*Deutsche Gesellschaft für Ernährung*, DGE), which advocates a balanced intake of all macronutrients with a particular focus on carbohydrates as the main source of energy [2–4].

According to the S1 guideline of the Society for Neuropediatrics, the ketogenic diet is an effective treatment option for drug-resistant epilepsy and the treatment of choice for certain rare congenital metabolic disorders such as glucose transporter 1 (GLUT1) deficiency and pyruvate dehydrogenase (PDH) deficiency [5]. The central metabolic basis of the ketogenic diet, ketosis, is achieved by drastically reducing carbohydrate intake while increasing fat intake. Due to the reduced supply of glucose, which is normally the primary source of energy, the body begins to use ketone bodies – especially β-hydroxybutyrate and acetoacetate – as alternative sources of energy. These are continuously produced in the liver, but only occur in very small amounts in a carbohydrate-rich diet [6]. The ketogenic diet therefore mimics the metabolic state of fasting [4].

However, the long-term implementation of this diet requires discipline. Giving up carbohydrate-rich foods such as bread, pasta, and fruit is difficult for many people [7–9]. A recent review shows that average adherence across all age groups is around 64 to 72%. Factors influencing adherence include age, duration of the diet, potential side effects, and the type of ketogenic diet chosen [7]. In addition, parents and children are often under a great deal of stress, especially after the diagnosis [10]. Nevertheless, consistent adherence is essential for the success of the therapy [11, 12]. Careful planning is also necessary to avoid nutrient deficiencies, which can have serious consequences, especially in children [13–15].

Current studies show that children can internalize content better through playful methods [16, 17]. So far, there are only a few playful approaches to ketogenic nutrition, such as quartet games or nutrition cards, most of which focus on the fat-carbohydrate-protein ratio ("ketogenic ratio") [18, 19]. This is where the game *Ketopoly* comes in. The aim is to provide both children and adults, including professionals and nursing staff, with basic knowledge about the ketogenic diet and, at the same time, to promote a sense of the right food choices in a playful way. The aim is to address several challenges at once and support affected families in their everyday lives – with the goal of making it easier for them to follow the diet.

Methods

At the outset, a comprehensive literature review on the use of ketogenic diets in children and adolescents was conducted in the PubMed database. At the same time, an analysis of the game structure and dynamics of the board game *Monopoly*® was carried out in order to transfer its mechanics to the planned educational game *Ketopoly*. On this basis, the game concept was specifically modified to convey

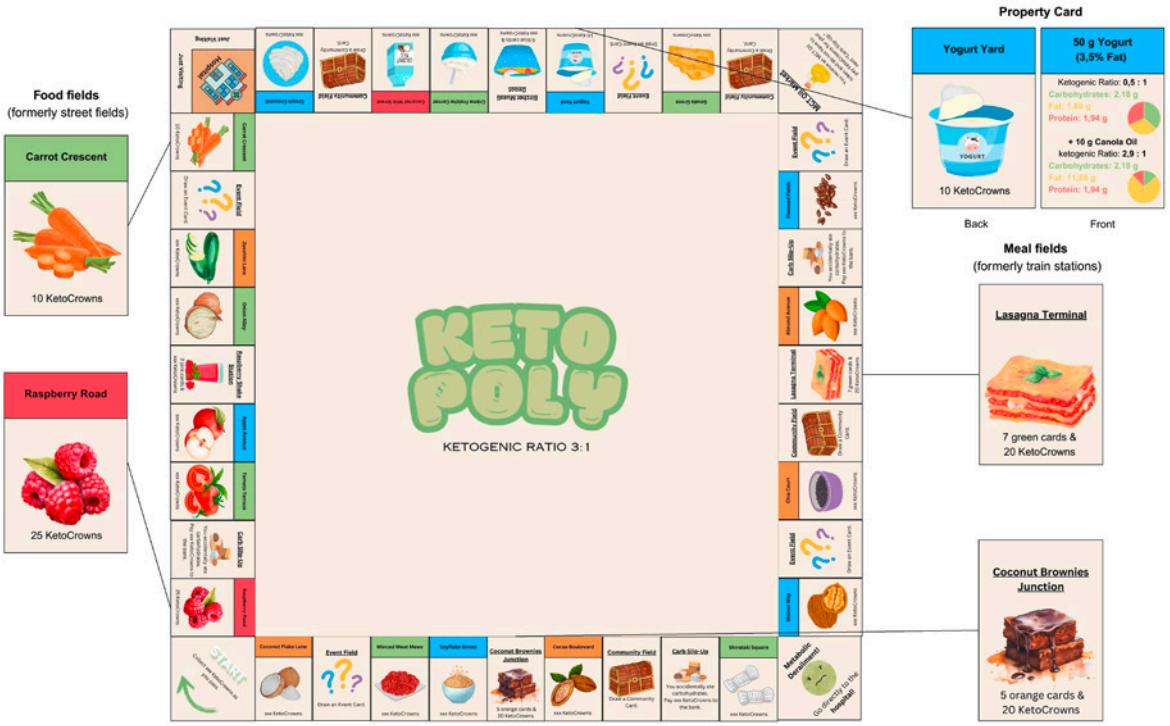

Fig. 1: **Overview of the *Ketopoly* playing field**
food fields (formerly street fields): have been adapted to the principles of a ketogenic diet
meal fields (formerly train stations): foods can be combined to form complete ketogenic meals
property card: contains information on the ketogenic ratio, macronutrient profile, and the amount of fat required to achieve the ketogenic target ratio

the central principles of the ketogenic diet in a playful way. For the nutrition-related development, the nutritional value software Prodi was used to calculate the ketogenic ratios (1:2 and 1:3) for various foods and meals. Based on the nutritional value calculations, two game variants were developed to meet different dietary requirements. The graphic design of the game was created entirely using the design software Canva. Several test runs with six children aged four to twelve were conducted to check the game's applicability and comprehensibility.

Results

The game development was based on the game dynamics of the classic game, whereby the content of the playing field was adapted to the requirements of ketogenic nutritional therapy. Instead of the original street fields, various foods were positioned (◆ Figure 1), which can be purchased during the game with the specially developed game currency – the so-called *KetoCrowns*. The cost of the foods is based on their ketogenic ratio: high-fat foods are cheaper, while foods rich in carbohydrates and protein are more expensive. This playfully conveys the value of individual foods in relation to the ketogenic diet.

When purchasing a food item, players receive a property card (◆ Figure 1) that shows not only the nutritional profile for stan-

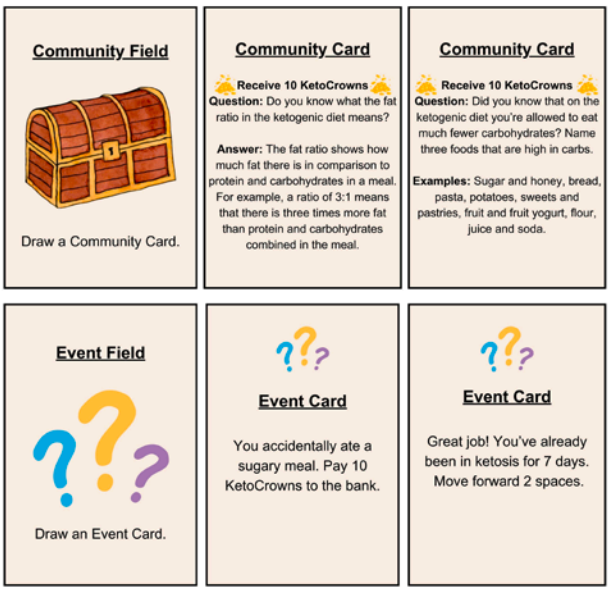

Fig. 2: **Community playing field (top) with sample community cards for playful knowledge transfer and event playing field (bottom) with sample cards containing tasks related to the ketogenic diet**

dard portion sizes but also the amount of fat required to achieve the desired ketogenic ratio. These cards are intended to provide parents, professionals, and caregivers in particular with a deeper understanding of the composition of ketogenic meals. For children, on the other hand, the pricing system creates awareness of which foods should be preferred and which should only be consumed in limited quantities.

In addition, so-called *meal fields* replace the original train stations (◆ Figure 1). Here, food combinations can be put together to form complete meals. The aim of the game is to create as many ketogenic meals as possible – the player with the most meals wins.

The game board also contains numerous *event and community fields*: while the community fields contain quiz-like questions about ketogenic diet, the event spaces require players to complete small, topic-related tasks or missions (◆ Figure 2). Particular emphasis was placed on using age-appropriate, easy-to-understand language. Another playful innovation is the *hospital* (◆ Figure 1), which replaces the original prison: Players who "fall out" of ketosis are transferred there – a symbolic reference to the importance of diet compliance in therapy.

Discussion

The development of *Ketopoly* shows that game-based learning formats can be used to teach complex nutritional medicine content. The combination of a familiar game principle and pedagogically prepared content provides both children and their caregivers with low-threshold access to the topic of the ketogenic diet. Especially in the case of chronic diseases that require consistent adherence to a diet [11, 12], such a format can make a valuable contribution to therapy adherence.

A key concern during development was to present the nutritional basics in a child-friendly, yet technically accurate manner. The game mechanics intuitively convey which foods should be preferred. This addresses both cognitive and emotional levels of learning, which, according to learning theory approaches such as "situated learning" or "gamification", can demonstrably promote learning motivation and knowledge acquisition [20–24].

An interesting aspect lies in the thematic parallel to the original version of the game, which focuses on strategic thinking, planning, and resource management [25–27]. These skills are also crucial for the successful implementation of a ketogenic diet in order to avoid nutrient deficiencies and reliably maintain the individually required ketogenic ratio [15, 28]. *Ketopoly* picks up on this strategic character and playfully conveys the need for a reflective, well-structured approach.

Limitations of the game include its limited reach among very young children or families with language barriers. The integration of culturally diverse food options could also expand the game's reality and appeal to more families. In addition, no long-term evaluation of knowledge transfer or adherence could be carried out during the test phase.

Conclusion

Ketopoly offers a creative and practical approach to teaching children and adults about the ketogenic diet. Through playful engagement with food-related content, it promotes a basic understanding of the principles of this specific form of diet. Future practical tests are needed to evaluate the effectiveness and suitability of the game for everyday use under real conditions and to make targeted optimizations.

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References

1. *Newman JC, Verdin E: β-hydroxybutyrate: much more than a metabolite. Diabetes Res Clin Pract 2014; 106(2): 173–81.*
2. *Deutsche Gesellschaft für Ernährung e. V. (DGE): Referenzwerte. www.dge.de/wissenschaft/referenzwerte/ (last accessed on 21 August 2024).*
3. *Deutsche Gesellschaft für Ernährung e. V. (DGE): Referenzwert Fett, essenzielle Fettsäuren. www.dge.de/wissenschaft/referenzwerte/fett-essenzielle-fettsaeuren/ (last accessed on 28 September 2024).*
4. *Och U, Fischer T, Marquardt Thorsten: Ketogene Diät — eine Herausforderung für Patienten und Fachkräfte. Ernährungs Umschau 2017; 64(8): M444–58.*
5. *Gesellschaft für Neuropädiatrie e. V. (GNP): S1-Leitlinie Ketogene Diäten. https://register.awmf.org/assets/guidelines/022-021l_S1_Ketogene_Diaeten_2022-02.pdf (last accessed on 28 August 2024).*
6. *Dhillon KK, Gupta S: StatPearls: Biochemistry, ketogenesis. Treasure Island (FL) 2024.*
7. *Lopes Neri LdC, Guglielmetti M, Fiorini S, et al.: Adherence to ketogenic dietary therapies in epilepsy: a systematic review of literature. Nutr Res 2024; 126: 67–87.*
8. *Klepper J, Leiendecker B: Die ketogene Diät bei Anfallsleiden – Indikationen und Wirkungen. Aktuel Ernahrungsmed 2004; 29(5): 271–4.*

9. Falsaperla R, Sortino V, Striano P, Kluger G, Ramantani G, Ruggieri M: Is ketogenic diet a 'precision medicine'? Recent developments and future challenges. Eur J Paediatr Neurol 2024; 48: 13–6.
10. Muscara F, Burke K, McCarthy MC, et al.: Parent distress reactions following a serious illness or injury in their child: a protocol paper for the take a Breath Cohort Study. BMC Psychiatry 2015; 15: 153.
11. Barañano KW, Hartman AL: The ketogenic diet: uses in epilepsy and other neurologic illnesses. Curr Treat Options Neurol 2008; 10(6): 410–9.
12. Zarnowska IM: Therapeutic use of the ketogenic diet in refractory epilepsy: what we know and what still needs to be learned. Nutrients 2020; 12(9).
13. Detopoulou P, Papadopoulou SK, Voulgaridou G, et al.: Ketogenic diet and Vitamin D metabolism: a review of evidence. Metabolites 2022; 12(12).
14. Kenig S, Petelin A, Poklar Vatovec T, Mohorko N, Jenko-Pražnikar Z: Assessment of micronutrients in a 12-wk ketogenic diet in obese adults. Nutrition 2019; 67–68: 110522.
15. Meng Y, Sun J, Zhang G: Take the bull by the horns and tackle the potential downsides of the ketogenic diet. Nutrition 2024; 125: 112480.
16. Skene K, O'Farrelly CM, Byrne EM, Kirby N, Stevens EC, Ramchandani PG: Can guidance during play enhance children's learning and development in educational contexts? A systematic review and meta-analysis. Child Dev 2022; 93(4): 1162–80.
17. Rosi A, Brighenti F, Finistrella V, et al.: Giocampus school: a "learning through playing" approach to deliver nutritional education to children. Int J Food Sci Nutr 2016; 67(2): 207–15.
18. Fischer T, Baumeister A, Franzmeier N, Marquardt T: Entwicklung eines aktionsgebundenen Schulungskonzeptes für die ketogene Diät. In: 17. Dreiländertagung – der Deutschen Gesellschaft für Ernährungsmedizin e. V. (DGEM) – der Österreichischen Arbeitsgemeinschaft Klinische Ernährung (AKE) – der Gesellschaft für Klinische Ernährung der Schweiz (GESKES) – Jahrestagung 2018 des BerufsVerbandes Oecotrophologie e. V. (VDOE) – 19. Jahrestagung des Bundesverbandes Deutscher Ernährungsmediziner e. V. (BDEM). Georg Thieme Verlag KG 2018.
19. Baumeister A, Franzmeier N, Koop U, et al.: Erstellung eines innovativen Kochbuches zur ketogenen Diät mit aufklärenden und motivierenden Elementen. In: 17. Dreiländertagung – der Deutschen Gesellschaft für Ernährungsmedizin e. V. (DGEM) – der Österreichischen Arbeitsgemeinschaft Klinische Ernährung (AKE) – der Gesellschaft für Klinische Ernährung der Schweiz (GESKES) – Jahrestagung 2018 des BerufsVerbandes Oecotrophologie e. V. (VDOE) – 19. Jahrestagung des Bundesverbandes Deutscher Ernährungsmediziner e. V. (BDEM). Georg Thieme Verlag KG 2018.
20. Kam AHT, Umar IN: Fostering autonomous motivation: a deeper evaluation of gamified learning. J Comput High Educ 2024; 36(2): 368–88.
21. Kam AH, Umar IN: Would gamification affect high and low achievers differently? A study on the moderating effects of academic achievement level. Educ Inf Technol 2023; 28(7): 8075–95.
22. Thomas NJ, Baral R: Mechanism of gamification: role of flow in the behavioral and emotional pathways of engagement in management education. Int J Manag Educ 2023; 21(1): 100718.
23. Luarn P, Chen C-C, Chiu Y-P: Enhancing intrinsic learning motivation through gamification: a self-determination theory perspective. IJILT 2023; 40(5): 413–24.
24. Denden M, Tlili A, Essalmi F, Jemni M: Students' learning performance in a gamified and self-determined learning environment. In: 2020 International Multi-Conference on: "Organization of Knowledge and Advanced Technologies" (OCTA). IEEE 2020; 1–5.
25. Hirani C, Varin C (eds.): Supporting adult learners through games and interactive teaching: a practical guide. Abindgon, Oxon, New York, NY: Routledge 2023.
26. Kuppinger B, Wust K: Just a game? How continuous time modelling can ameliorate corporate strategy games. WREMSD 2011; 7(4): 422.
27. Lew C, Saville A: Game-based learning: teaching principles of economics and investment finance through Monopoly. Int J Manag Educ 2021; 19(3): 100567.
28. Plogsted S: The ketogenic diet. ICAN: Infant, Child, & Adolescent Nutrition 2010; 2(6): 370–6.