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NUTRITIONAL COMPOSITION AND SAFETY OF STREET VENDED FOODS IN KHARTOUM STATE, SUDAN

Dr. Awatif Yousif Mohamed Elamin [1], Dr. Amira Gafar Mohamed Osman [2]
Dr. Nada Mohamed Osman [3], Dr. ElGazafey Basheer Haj Ahmed [4]
Dr. Kamal Elbssir Mohammed Ali [5], Dr. Eltayeb Idris Almahi [6]

[1]Dallang University, Faculty of Medicine and Health Sciences
[2]Alzaiem Alazhari University, Faculty of Applied Medical Sciences
[3]Alzaiem Alazhari University, Faculty of Public Health
[4]East Kordofan University, Faculty of Medicine and Health Sciences
[5]Alzaiem Alazhari University, Faculty of Public Health
[6]Community Medicine Dep. University of Delta Technologies and Sciences.

ABSTRACT

Background: Street vended foods are widely consumed in Sudan, yet their nutritional composition and safety are poorly documented. This study evaluated the proximate composition and microbiological safety of selected street foods in Khartoum State.

Methods: Between 2016 and 2018, samples of meat products, fried snacks, and fruit juices were collected from vendors in Khartoum, Khartoum North, and Omdurman. Nutritional analysis included protein, fat, carbohydrate, ash, fiber, and energy content. Microbiological analysis assessed total plate counts, coliforms, yeasts, and molds. Safety was evaluated against Codex Alimentarius and WHO standards.

Results: Meat products contained the highest protein (19.2%) and energy (245 kcal/100g), but also high fat (21.5%). Fried snacks had elevated carbohydrate (56.8%) and fat (27.3%). Fruit juices contained low protein (1.4%) but were rich in carbohydrates (12.6%). Microbiological tests revealed contamination exceeding standards in 61% of fried snacks and 74% of fruit juices. Common contaminants included coliforms and yeasts. Overall, nutritional quality was acceptable but safety standards were frequently breached.

Conclusion: Street foods in Khartoum provide affordable nutrition but pose microbiological safety risks. Regular monitoring, vendor training, and consumer awareness are essential to maximize nutritional benefits while minimizing health hazards.

الملخص (Arabic Abstract)

الخلفية: تُستهلك الأطعمة المباعة في الشوارع على نطاق واسع في السودان، إلا أن تركيبتها الغذائية وسلامتها لم توثق جيداً. هدفت هذه الدراسة إلى تقييم التركيب الغذائي والسلامة الميكروبية لبعض الأطعمة المباعة في ولاية الخرطوم.

المنهجية: خلال الفترة من 2016 إلى 2018، جُمعت عينات من منتجات اللحوم، والوجبات المقلية، والعصائر من بائعين في الخرطوم والخرطوم بحري وأم درمان. شمل التحليل الغذائي قياس البروتين، الدهون، الكربوهيدرات، الرماد، الألياف، والطاقة. أما التحليل الميكروبيولوجي فشمل العد الكلي للبكتيريا، العد القولوني، وعد الخمائر والعفن. تمت مقارنة النتائج بالمعايير الدولية (Codex, WHO).

النتائج: احتوت منتجات اللحوم على أعلى نسبة بروتين (19.2%) وطاقة 245) كيلو كالوري100/غ(، لكنها كانت مرتفعة الدهون .(21.5%) احتوت الوجبات المقلية على نسبة عالية من الكربوهيدرات (56.8%) والدهون .(27.3%) احتوت العصائر على بروتين منخفض (1.4%) لكنها غنية بالكربوهيدرات .(12.6%) كشفت الفحوص الميكروبية عن تلوث يتجاوز الحدود المسموح بها في 61% من الوجبات المقلية و74% من العصائر. أكثر الملوثات شيوعاً كانت القولونيات والخمائر. بشكل عام، كانت الجودة الغذائية مقبولة، لكن معايير السلامة لم تتحقق في كثير من العينات.

الاستنتاج: توفر الأطعمة المباعة في شوارع الخرطوم تغذية ميسورة الكلفة لكنها تشكل مخاطر ميكروبية. يُعد الرصد المنتظم، وتدريب البائعين، وتوعية المستهلكين أموراً أساسية لتعظيم الفوائد الغذائية وتقليل المخاطر الصحية.

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1. INTRODUCTION AND LITERATURE REVIEW

Street foods are an important source of affordable nutrition in urban Sudan. However, their safety and nutritional adequacy remain a concern. Proximate composition provides information on macronutrients, while microbiological safety determines consumer health risks. Few studies in Sudan have comprehensively assessed both nutritional composition and microbial safety of street foods. This study evaluates the nutritional and safety status of commonly vended foods in Khartoum State.

Recent research (2018–2024) shows that street foods provide significant macronutrients but often exceed fat and carbohydrate recommendations. In Nigeria, fried snacks were found to be energy-dense but nutritionally imbalanced. Studies in Ethiopia and Kenya highlighted microbiological risks, particularly in fruit juices. Reviews from Asia reported similar findings with contamination by coliforms and fungi. Balancing nutritional value and safety remains a global challenge.

3. MATERIALS AND METHODS

Study design: Cross-sectional analysis (2016–2018) of major street foods in Khartoum State.
Sample collection: 150 samples (50 meat products, 50 fried snacks, 50 fruit juices).

Nutritional analysis: Proximate composition was determined using AOAC methods. Parameters included protein, fat, carbohydrate, ash, fiber, and energy.

Microbiological safety: Total plate count, coliforms, yeasts, and molds were analyzed. Results were compared with Codex Alimentarius and WHO standards.

Data analysis: Means and standard deviations calculated for nutrients; contamination frequencies expressed as percentages.

4. RESULTS

Nutritional composition and safety results are summarized below.

Table 1. Proximate composition of selected street foods in Khartoum State.

Food Type	Protein (%)	Fat (%)	Carbohydrate (%)	Ash (%)	Fiber (%)	Energy (kcal/100g)
Meat products	19.2	21.5	2.3	4.1	0.8	245
Fried snacks	7.5	27.3	56.8	3.6	2.1	390
Fruit juices	1.4	0.9	12.6	0.4	0.6	70

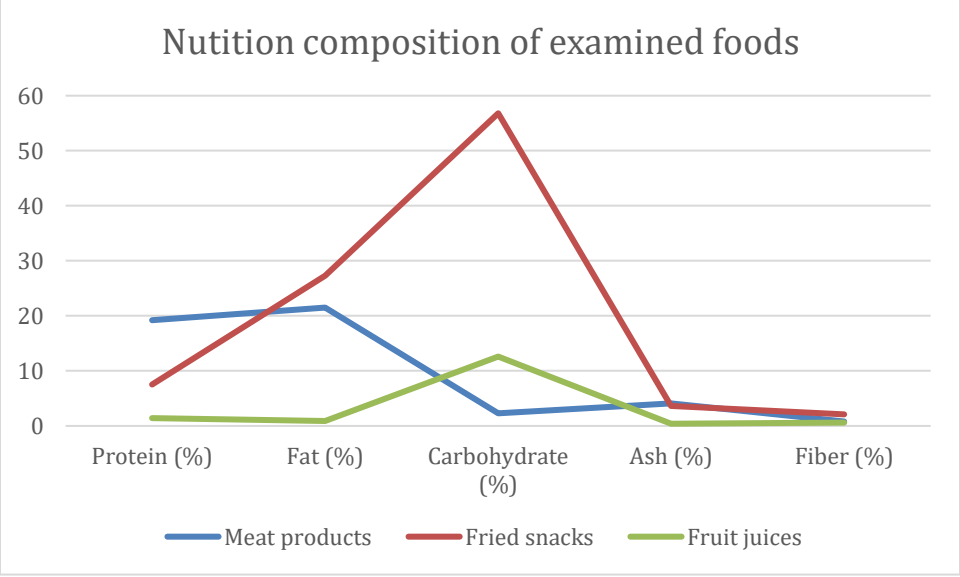


Figure 1. Proximate Nutrition composition of selected street foods.

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Table 2. Microbiological safety of selected street foods in Khartoum State.

Food Type	Samples Exceeding Standards (%)	Main Contaminants	Implication
Meat products	42	Coliforms, S. aureus	Unsafe if undercooked
Fried snacks	61	Coliforms, yeasts	High risk from poor oil hygiene
Fruit juices	74	Coliforms, yeasts, molds	Unsafe for consumption

5. DISCUSSION

The proximate composition results show that meat products are valuable protein sources but contain high fat. Fried snacks provide excess energy from carbohydrates and fat, similar to findings in Nigeria and India. Fruit juices are poor in protein but contribute simple sugars. Microbiological safety is a major concern, particularly for juices where contamination exceeded Codex standards in over 70% of samples. These findings align with studies from Ethiopia, Kenya, Nigeria, and Ghana (2018–2024), which reported similar microbial hazards. The balance between nutritional benefits and safety risks underscores the need for integrated food safety strategies in Sudan. FAO and WHO guidelines emphasize strengthening informal food systems through simple hygiene measures, which could reduce contamination without jeopardizing livelihoods.

6. CONCLUSION

Street foods in Khartoum provide essential nutrients, particularly proteins and carbohydrates, but often fail to meet safety standards. Meat products and fried snacks contribute energy and macronutrients but may increase fat-related health risks. Fruit juices pose the highest microbiological risks. Ensuring safe street food consumption requires balancing nutritional adequacy with safety monitoring.

7. RECOMMENDATIONS

- Promote nutrition-sensitive street food policies.
- Train vendors in hygienic preparation and safe storage of food.
- Regular microbiological monitoring of high-risk foods (juices, snacks).
- Educate consumers on safe consumption practices.
- Encourage diversification of street food options to improve nutrient intake.

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