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Scientific Trends and Knowledge Gaps in Obesity Management: A Cross-Disciplinary Bibliometric Study of Ketogenic and Fasting Approaches

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Abstract

This bibliometric analysis examines global research trends in obesity management through ketogenic diet and intermittent fasting interventions from 2000 to 2025. Using comprehensive searches of Scopus databases, we analyzed publication patterns, author collaborations, institutional contributions, and thematic evolution in this rapidly expanding field. The analysis revealed exponential growth in research output, with publications increasing from modest volumes in 2001 to over 350 documents by 2023. Mark P. Mattson emerged as the most influential author, demonstrating extensive collaborative networks across interdisciplinary teams. Geographic analysis identified the United States, China, and Europe as dominant contributors, while journals like Frontiers in Nutrition and Nutrients served as primary dissemination platforms. Co-citation analysis revealed nine distinct thematic clusters representing mature research networks spanning metabolic physiology, clinical interventions, and behavioral approaches. Keyword analysis highlighted human-centered research emphasis, with "obesity," "ketogenic diet," and "intermittent fasting" as core terms, alongside emerging concepts like gut microbiota and metabolic flexibility. Both ketogenic diets and intermittent fasting demonstrate significant short-term weight loss and metabolic improvements through enhanced fat oxidation, improved insulin sensitivity, and reduced inflammation. However,

evidence reveals substantial individual variation in responses and limited long-term safety data. Current research gaps include insufficient evaluation of sustainability, potential risks, and effectiveness across diverse populations. The findings indicate that while these interventions represent promising obesity management strategies, future research requires large-scale, long-duration clinical trials integrating personalized medicine approaches. Cross-disciplinary collaboration between nutrition science, endocrinology, and behavioral medicine is essential for developing evidence-based, individualized treatment protocols for sustainable obesity management.

Index Terms: Obesity, Ketogenic diet, Intermittent fasting, Metabolism, Gut microbiota, Insulin sensitivity, Weight loss, Metabolic flexibility, Inflammation, Personalized nutrition.

I. INTRODUCTION

Dietary interventions represent a cornerstone in the modulation of metabolic health, disease prevention, and therapeutic outcomes. Among the various strategies explored, the ketogenic diet (KD) and fasting have emerged as two of the most extensively investigated approaches. Both interventions share the ability to induce a metabolic shift from glucose to fat-derived ketone bodies as the primary energy substrate; however, their mechanisms of action, clinical applications, and physiological consequences are not identical [1], [2].

The ketogenic diet, typically composed of high fat, moderate protein, and very low carbohydrate intake, was originally introduced in the 1920s as a therapeutic option for refractory epilepsy. Since then, KD has been investigated in a wide range of conditions, including obesity, type 2 diabetes, polycystic ovary syndrome, neurological disorders, and cancer [2]–[4]. Mechanistically, KD exerts its effects through the induction of nutritional ketosis, reduction of oxidative stress, modulation of mitochondrial efficiency, regulation of inflammatory pathways, and, in some contexts, epigenetic remodeling [1], [5]. These pleiotropic actions provide a compelling rationale for its clinical and translational research applications.

Fasting, in contrast, encompasses a range of protocols including intermittent short-term fasting (e.g., time-restricted feeding, alternate-day fasting) and prolonged fasting extending beyond 24 hours. Fasting induces metabolic switching characterized by glycogen depletion, mobilization of fatty acids, and increased ketone body

production. Beyond the induction of ketosis, fasting engages additional adaptive responses, such as stimulation of autophagy, enhancement of insulin and leptin sensitivity, activation of AMP-activated protein kinase (AMPK), and inhibition of the mechanistic target of rapamycin (mTOR) signaling pathway [1], [6]. Historically rooted in cultural and religious practices, fasting has been systematically investigated in recent decades for its potential to extend lifespan, improve cardiometabolic health, and augment therapeutic strategies in oncology and neurology [3], [5].

Although KD and fasting converge on the induction of ketone metabolism, accumulating evidence indicates that their molecular and physiological effects are not fully overlapping. Whereas KD sustains ketosis through continuous macronutrient manipulation, fasting relies on periodic nutrient deprivation, eliciting broader metabolic and hormonal adaptations [1], [2]. The growing scientific interest in these dietary interventions is reflected in the rapid expansion of research outputs across disciplines including endocrinology, oncology, neurology, sports science, and women's health [4], [6].

In view of this escalating literature, a bibliometric analysis offers an opportunity to systematically evaluate global research trends, identify influential authors and institutions, and outline emerging thematic focus. Such an analysis is essential to provide a comprehensive overview of the current knowledge landscape on ketogenic diets and fasting, thereby informing future research directions and clinical translation.

II. RATIONALE:

Over the past two decades, scientific research on the ketogenic diet and fasting has expanded at an unprecedented pace, reflecting a growing interest in their therapeutic and preventive potential across multiple disciplines. This expansion has resulted in a heterogeneous body of literature spanning clinical trials, preclinical studies, mechanistic investigations, and translational research in fields as diverse as oncology, neurology, endocrinology, sports medicine, and women's health [3]–[5]. While narrative and systematic reviews have summarized findings within specific domains, they are often limited in scope and do not capture the overall structure, dynamics, and evolution of the research field.

Bibliometric analysis provides a rigorous and quantitative approach to address this gap. By applying bibliometric tools to large-scale publication datasets, it is possible to map patterns of knowledge production, evaluate the influence of key authors, institutions, and journals, and identify emerging research hotspots [1]. Furthermore, bibliometric methods allow

for the visualization of collaborative networks and citation structures, offering insights into how ideas propagate across disciplines and geographical regions.

In the context of ketogenic diet and fasting, bibliometric analysis is particularly timely for several reasons. First, the field is characterized by rapid growth and interdisciplinary diversity, which makes it challenging for researchers and clinicians to remain updated. Second, despite increasing clinical applications, there remain ongoing controversies regarding long-term safety, efficacy, and mechanisms of action [2], [6]. A bibliometric perspective can help delineate where the evidence base is robust and where knowledge gaps persist. Finally, given the rising public and clinical interest in dietary interventions as lifestyle and therapeutic strategies, bibliometric mapping can inform future research priorities, funding strategies, and evidence-based policy development.

Thus, conducting a bibliometric analysis on ketogenic diets and fasting is justified as it provides a comprehensive, evidence-driven overview of the scientific landscape, guiding both researchers and healthcare practitioners in understanding the trajectory, impact, and future directions of this rapidly evolving field.

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III. OBJECTIVES:

1. To analyze global publication trends in research on obesity management through ketogenic diet and intermittent fasting, identifying growth patterns, influential journals, and citation trajectories from 2000 to 2025.
2. To map the intellectual and collaborative structure of the field by examining leading authors, institutions, countries, and co-authorship networks contributing to obesity–diet research.
3. To explore thematic evolution and research hotspots through keyword co-occurrence, bibliographic coupling, and co-citation analyses, highlighting emerging areas of focus within ketogenic and fasting interventions.
4. To identify knowledge gaps and future research directions by synthesizing bibliometric evidence, with emphasis on underexplored dimensions such as long-term clinical outcomes, cross-disciplinary integration, and personalized nutrition strategies for obesity management.

IV. RESEARCH QUESTIONS

1. What are the global publication and citation trends in obesity research related to ketogenic diet and intermittent fasting over the past two decades?
2. Which countries, institutions, and authors have made the most significant contributions, and how are they connected through collaboration networks?
3. What are the dominant thematic clusters and emerging hotspots in the literature on obesity management using ketogenic and fasting approaches?

4. How has the thematic focus of research evolved over time, and what does this reveal about shifting scientific priorities in diet-based obesity management?
5. What critical knowledge gaps remain underexplored, and how can future research integrate cross-disciplinary insights to improve the effectiveness and sustainability of ketogenic and intermittent fasting interventions?

V. MATERIALS AND METHODS

- **Data Sources:** The bibliometric data were retrieved from major scholarly databases: Scopus. These databases were chosen to ensure comprehensive coverage of peer-reviewed literature. Scopus was considered the primary source given its reliability and compatibility with bibliometric analysis tools (e.g., VOSviewer, R-Bibliometrix).
- **Search Strategy:** A structured search was carried out using controlled keywords and Boolean operators. The search focused on three main concepts: obesity, ketogenic diet, and intermittent fasting. To maximize retrieval, related terms and synonyms were incorporated, including *time-restricted eating, time-restricted feeding,* and *low-carbohydrate diet.*

Table 1: Representative Scopus query string

Concepts		Scopus Search Strings
Core Search (Obesity + Keto diet + Intermittent fasting)	TITLE-ABS-KEY	(obesity AND ("ketogenic diet" OR "keto diet") AND ("intermittent fasting" OR "time restricted feeding" OR "time-restricted eating" OR "alternate day fasting" OR "periodic fasting"))

After Refine Search String:

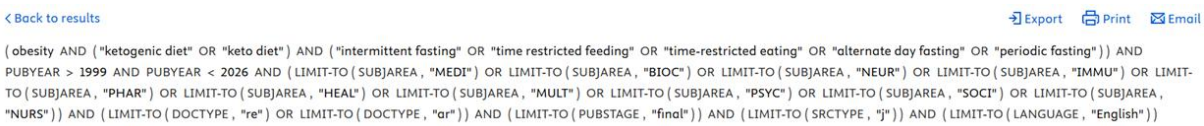

Figure 1: After Refine Search String in Scopus

- **Time Frame:** The search was conducted in September 2025 and limited to the publication period 2000–2025 to capture recent scientific developments in dietary interventions for obesity.
- **Inclusion and Exclusion Criteria:** This study included peer-reviewed journal articles indexed in the Scopus database between 2000 and 2024. Only final publications in English were considered to ensure the quality and consistency of the

data. The search focused on studies exploring obesity in relation to ketogenic diets and fasting practices, including intermittent fasting, time-restricted eating, alternate-day fasting, and periodic fasting. Research falling within relevant subject areas—such as medicine, biochemistry, neuroscience, pharmacology, immunology, psychology, health sciences, and social sciences—was included. Both original research articles and review papers were eligible.

Publications were excluded if they were not written in English, were still in press, or fell outside the defined time frame. Non-journal sources, such as book chapters, editorials, letters, or conference abstracts without complete bibliographic data, were also excluded. Studies unrelated to obesity, or those focusing solely on ketogenic or fasting interventions for other conditions, were omitted to maintain the study's relevance to obesity management.

- **Data Management:** All retrieved records were exported in CSV/Excel format, including full metadata (authors, affiliations, abstracts, keywords, references, and citations). Duplicates were removed manually (Microsoft Excel) and using bibliometric software. The cleaned dataset was imported into VOSviewer, and R-Bibliometrix for quantitative analysis and visualization.

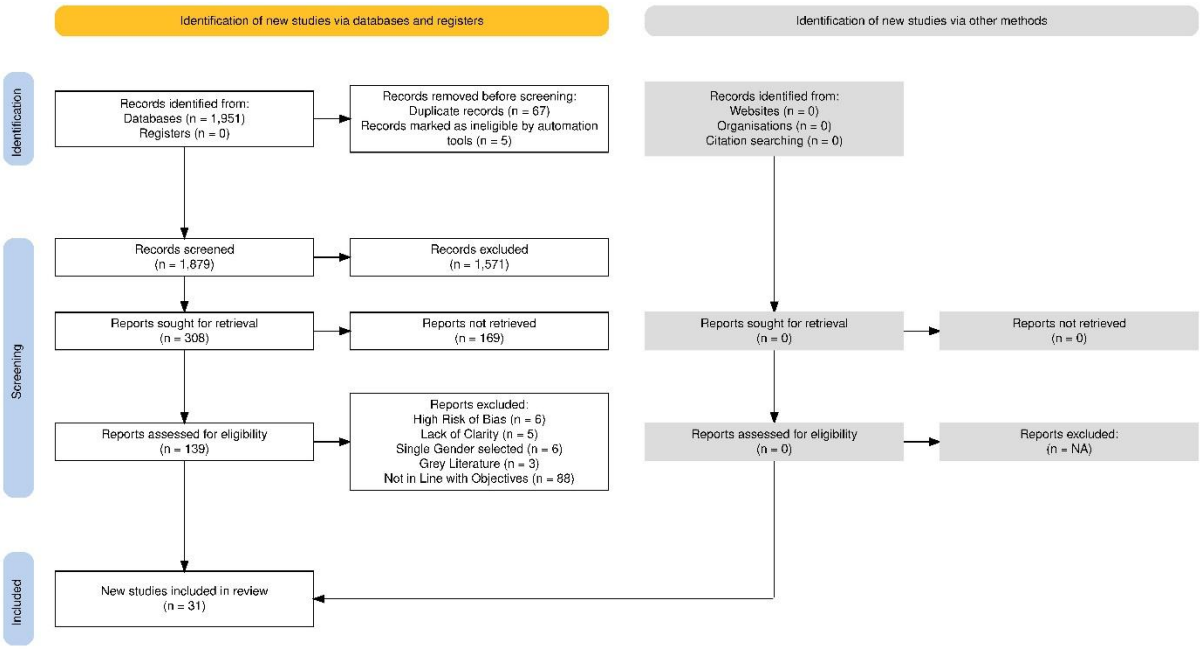

Figure 2: PRISMA flow chart 2020 [7]

- **Key Bibliometric Indicators**

Descriptive and Analytical analysis provide a clear and structured rationale for the bibliometric methodology employed in this study. It justifies the selection of specific metrics by explicitly linking each indicator to its primary purpose and, most importantly, to its specific relevance in mapping the intellectual landscape of this field. By presenting this framework, we ensure the analysis is transparent, replicable, and directly tailored to answer research questions concerning evolution, focus, and gaps in the scientific literature on ketogenic and fasting diets for obesity.

Table 2: Bibliometric analysis structure

Type	Indicator	Purpose	Relevance to Obesity–Ketogenic/Fasting Research
Analytical	Co-authorship Analysis	Examines collaboration networks	Shows interdisciplinary and international research linkages
	Co-citation Analysis	Maps intellectual foundations	Identifies key studies and theoretical bases in ketogenic/fasting approaches
	Co-word Analysis	Reveals thematic clusters and hot topics	Detects emerging themes like gut microbiome, metabolic flexibility, precision nutrition
Descriptive	Annual Publication Output	Tracks research volume and growth trends	Shows whether attention to ketogenic and fasting approaches in obesity is rising or plateauing
	Journals / Sources	Identifies core publishing outlets	Highlights the main platforms (nutrition, medicine, endocrinology) shaping the discourse
	Geographic Distribution	Maps country/institutional contributions	Reveals global vs. regional research focus
	Keyword Frequency	Detects most studied concepts	Captures emphasis on weight loss, insulin resistance, time-restricted feeding, etc.

VI. RESULTS AND DATA VISUALIZATION

i. Analytical Indicators

a. authorship Analysis:

The two visuals present a bibliometric overview of leading researchers working in areas such as fasting, metabolism, and cellular health. The VOSviewer network map illustrates collaboration patterns among authors, where Mark P. Mattson appears as the central node, showing his extensive partnerships and influence within the field. Surrounding clusters represent groups of researchers who often co-author papers together, suggesting shared research interests or institutional ties. The Scopus bar chart supports this observation by ranking Mattson as the most productive author, followed by others like Muscogiuri, Verde, Paoli, and Longo. Collectively, these figures highlight not only the authors' publication volume but also the strength

and structure of their professional networks, which play a crucial role in advancing scientific understanding in this domain.

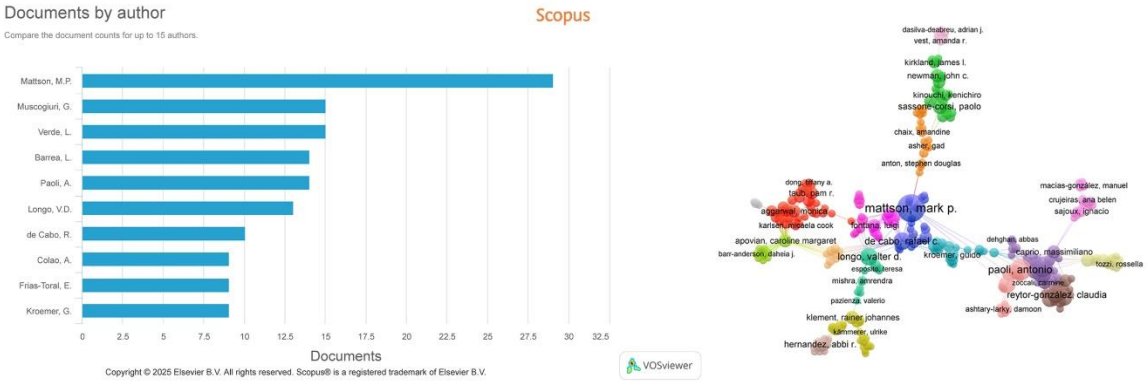

Figure 2: Analytical Indicators of authorship Analysis

b. Co-authorship Analysis

This visualization illustrates the co-authorship network among researchers in fields such as nutrition, metabolism, and fasting studies. Each colored cluster represents a group of authors who frequently collaborate, while the connecting lines show shared publications between them. Mark P. Mattson appears as the most central figure, indicating his extensive research partnerships and leadership within this area. Close collaborators such as Rafael de Cabo, Luigi Fontana, and Valter Longo form tightly linked clusters, suggesting strong interdisciplinary cooperation. Other clusters, including those around Caroline Apovian, Paolo Sassone-Corsi, and Ludovica Verde, highlight distinct but related research communities. Overall, the network reveals how collaboration enhances scientific productivity and connects experts working on complementary aspects of metabolic health and dietary interventions.

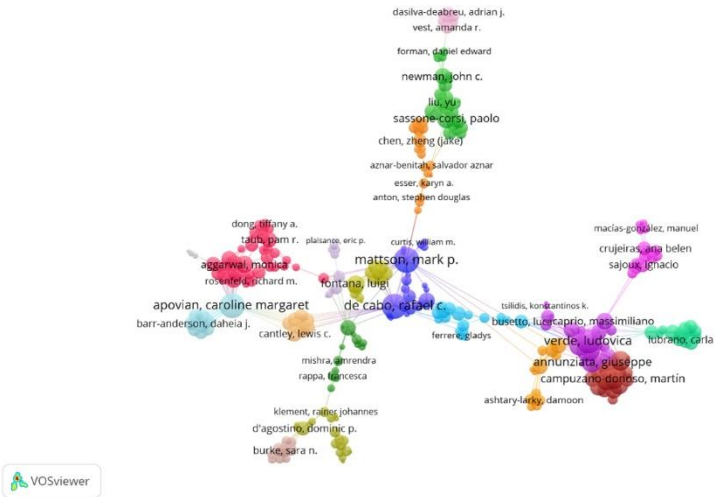

Figure 3: Analytical Indicators of Co-authorship Analysis

c. Co-citation Analysis

The co-citation analysis of obesity management research focusing on ketogenic and fasting interventions reveals a sophisticated intellectual landscape characterized by nine distinct thematic clusters emerging from 87 highly cited authors selected from 8,570 total researchers, demonstrating selective influence patterns within this specialized domain. The network structure exhibits robust connectivity with 946 inter-author links and a cumulative link strength of 3,502, indicating substantial cross-referencing and theoretical convergence among scholars investigating metabolic interventions. These clusters represent diverse yet interconnected research streams encompassing metabolic physiology, nutritional biochemistry, clinical interventions, and behavioral modification approaches, with each cluster constituting a distinct knowledge domain sharing common theoretical frameworks and methodological approaches.

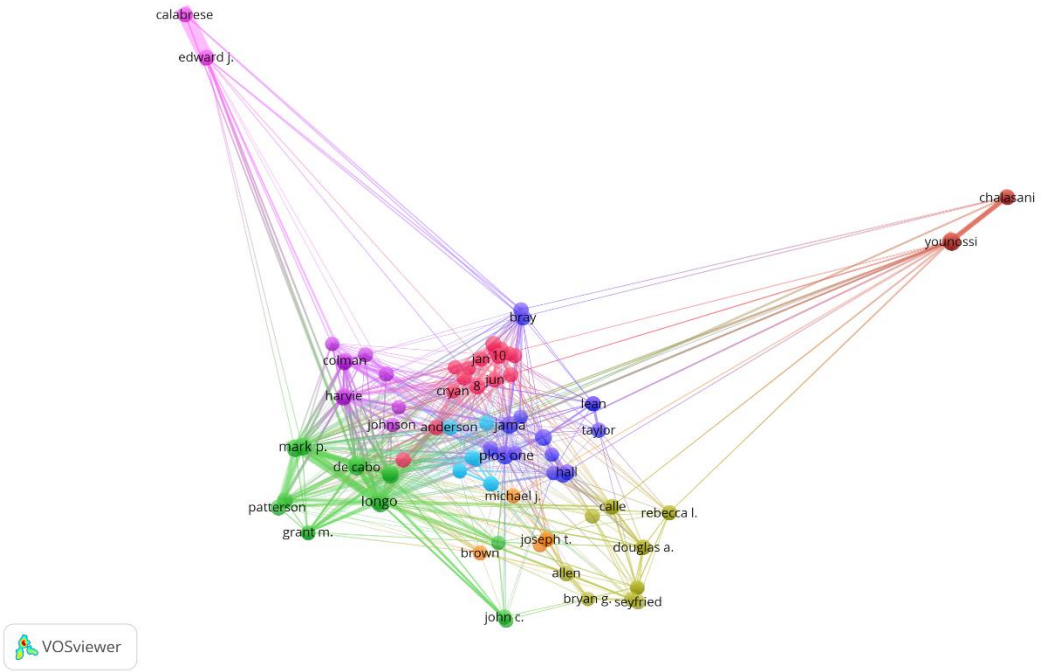

Figure 4: Analytical Indicators of Co-citation Analysis

The high link density and established citation patterns suggest mature research networks with well-developed theoretical foundations supporting ketogenic and fasting methodologies for obesity treatment, while the cross-disciplinary integration between endocrinology, nutrition science, exercise physiology, and clinical medicine indicates the field's evolution beyond isolated disciplinary approaches toward comprehensive, evidence-based weight management

strategies. This bibliometric structure demonstrates both intellectual depth and methodological sophistication characterizing contemporary obesity research, revealing strong inter-cluster connectivity that facilitates knowledge transfer between fundamental metabolic research and practical clinical applications in ketogenic nutrition and time-restricted eating protocols.

d. Co-word Analysis

The lexical distribution demonstrates substantial emphasis on human-centered research approaches, with "human" (1484 occurrences) and "humans" (1129 occurrences) dominating the vocabulary landscape, indicating prioritization of clinical applications over laboratory models. "Review" appears with high frequency (953 occurrences), suggesting comprehensive synthesis approaches characterize contemporary scholarship in metabolic intervention research. The prominence of "obesity" (684 occurrences) and "metabolism" (372 occurrences) establishes the core thematic foundation, while "ketogenic diet" (547 occurrences) represents the primary intervention strategy examined across multiple research domains. Research methodology terminology including "controlled study" (144 occurrences) and "article" (506 occurrences) reflect robust empirical approaches characterizing this field. Gender-based investigation patterns emerge through "male" (432 occurrences) and "female" (457 occurrences) terminology, indicating comprehensive demographic analysis within weight management studies. The appearance of fasting-related terms including "caloric restriction" (131 occurrences), "fasting" (125 occurrences), and "intermittent fasting" (122 occurrences) demonstrates growing research interest in temporal eating patterns as therapeutic interventions. Physiological terminology such as "physiology" (139 occurrences) and "body weight loss" (139 occurrences) emphasizes mechanistic understanding underlying these dietary approaches. This lexical landscape reveals comprehensive, multidisciplinary research examining evidence-based nutritional interventions for obesity management through both ketogenic and fasting methodologies.

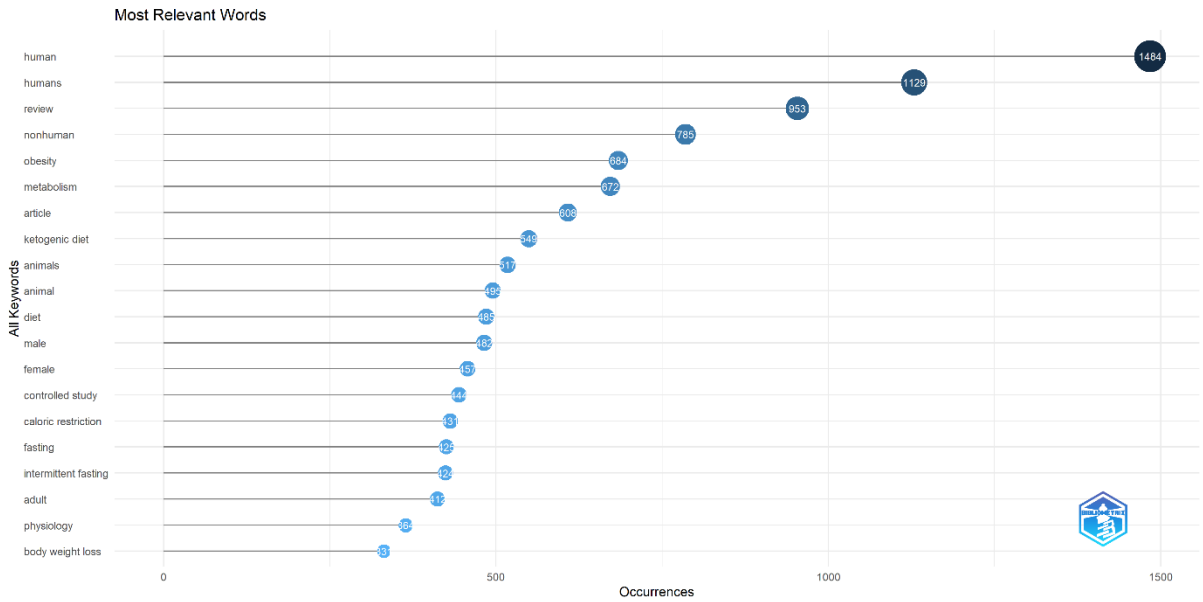

Figure 5: Analytical Indicators of Co-word Analysis

ii. Descriptive Indicators

a. Annual Publication Output

This image illustrates the annual publication output from 2001 to 2023, with data sourced from Scopus. The chart shows a consistent and significant increase in the number of documents over these years, beginning with a modest volume and culminating in a peak exceeding 350 documents by the final year. This upward trend visually represents the growing academic and research interest in the field, which is the central focus of our bibliometric analysis on obesity management.

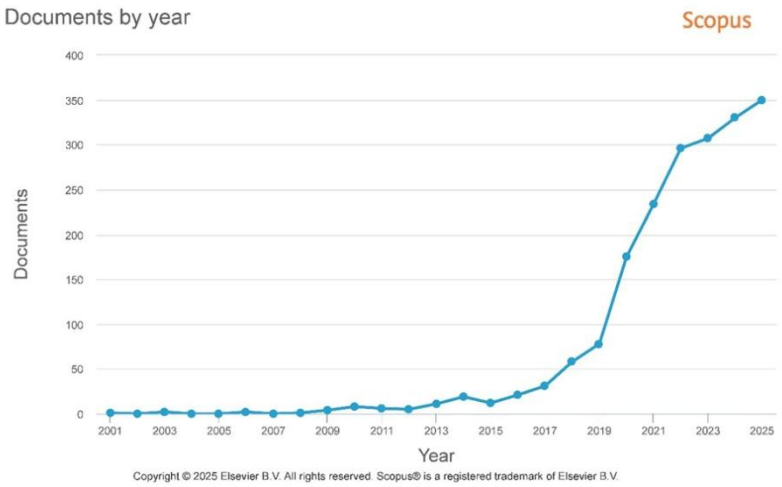

Figure 6: Descriptive Indicators of Annual Publication Output

b. Journals / Sources

This chart presents a longitudinal analysis of publication output from 2010 to 2023 for four key academic journals: Frontiers in Nutrition, Metabolites, Ageing Research Reviews, and Nutrients. The data reveals

distinct temporal trends for each source, illustrating their evolving contribution to literature. Notably, Frontiers in Nutrition and Nutrients demonstrate a marked increase in publications in recent years, suggesting a rising editorial focus on the relevant research themes. This comparative source analysis is instrumental for identifying the primary publication venues and understanding the shifting dissemination patterns within the field of our bibliometric study on ketogenic and fasting interventions for obesity management.

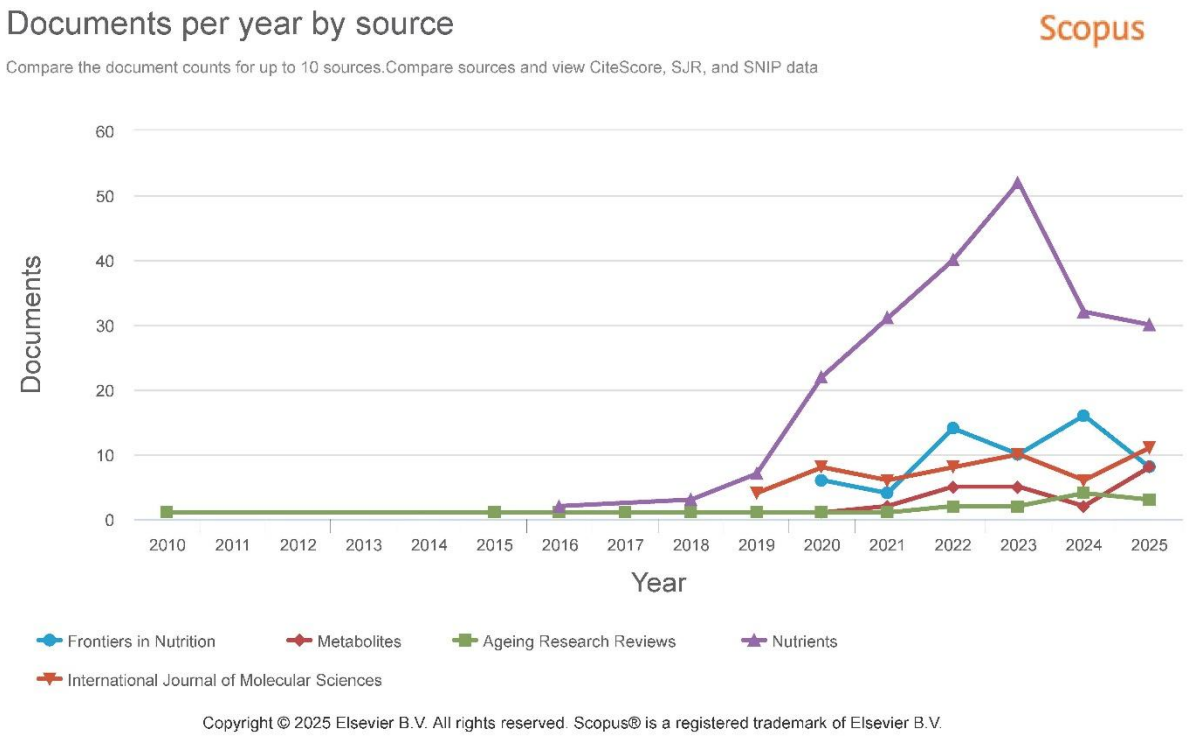

Figure 7: Descriptive Indicators of Source

c. Geographic Distribution

This world map visualization illustrates the global distribution of scientific publications related to our research topic. The data indicates that the United States, China, and several European nations, including Italy, the United Kingdom, and Germany, are the most prolific contributors to this field. This geographic analysis reveals a concentrated research effort within developed Western countries and East Asia, highlighting these regions as primary hubs for scholarly activity on ketogenic and fasting diets for obesity, while also pointing to potential knowledge gaps in other parts of the world.

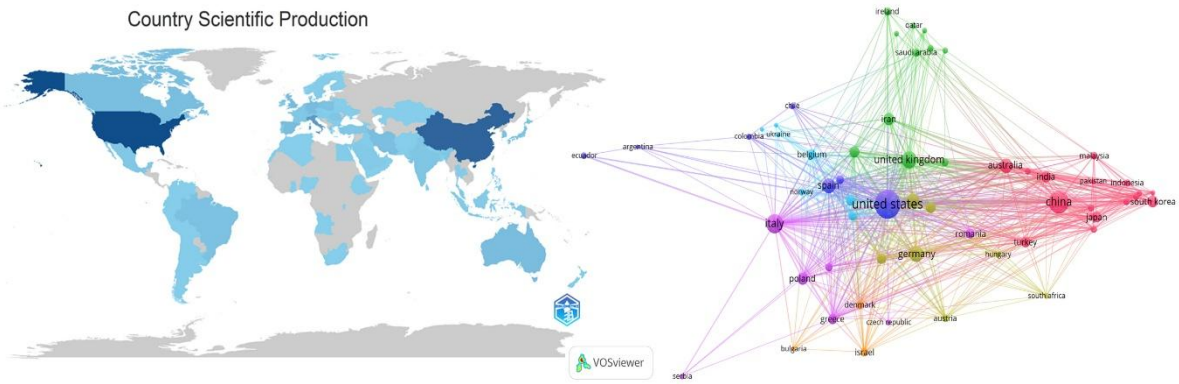

Figure 8: Descriptive Indicators of Geographic Distribution

d. Keyword Frequency

The keyword analysis reveals a dense concentration of core thematic terms central to the research domain. High-frequency words such as "obesity," "ketogenic diet," "intermittent fasting," and "body weight loss" form the foundational pillars of the study, directly reflecting its focus on dietary interventions. The prominence of terms like "metabolism," "fatty acid," and "glucose" underscores a strong emphasis on physiological and metabolic mechanisms. Furthermore, the co-occurrence of keywords like "animal experiments," "randomized controlled trial," and "human" illustrate the cross-disciplinary methodology, bridging preclinical and clinical research. The presence of associated concepts such as "gut microbiota," "inflammation," and "cardiovascular disease" indicates a broader investigative scope into the systemic effects and comorbidities of obesity.

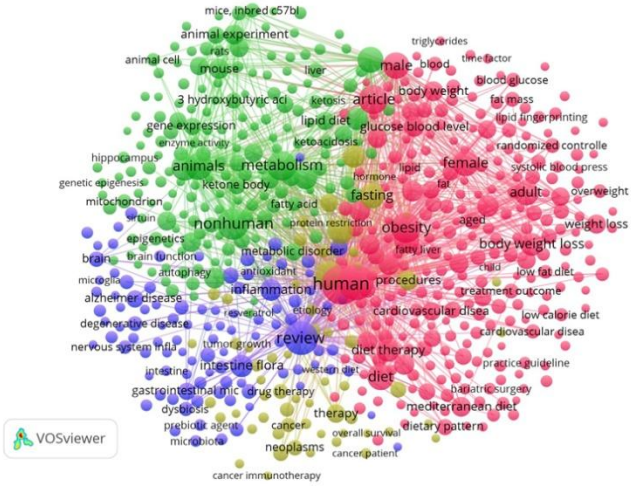

Figure 9: Descriptive Indicators of Keyword Frequency

VII. DISCUSSION

The bibliometric analysis highlights clear research patterns and collaboration networks shaping current obesity management studies. Mark P. Mattson stands out as a central figure, with strong

partnerships linking experts in fasting, metabolism, and cellular health. Co-authorship clusters show how interconnected teams like those led by Longo, de Cabo, and Fontana advance interdisciplinary work across nutrition, physiology, and clinical medicine. Co-citation mapping reveals nine key thematic clusters that bridge metabolic mechanisms, dietary interventions, and behavioral studies, indicating a mature and collaborative research environment. Lexical trends emphasize human-centered, clinically oriented studies with growing interest in ketogenic and fasting approaches. Publication data from 2001 to 2023 show rapid growth in output, with journals like Frontiers in Nutrition and Nutrients driving dissemination. Geographically, the United States, China, and Europe dominate the field, while global keyword patterns underscore metabolic pathways, weight loss, and dietary mechanisms as core scientific priorities.

Research suggests they enhance mitochondrial activity, promote fatty acid oxidation, and support healthier gut microbiota, which together help regulate weight and insulin sensitivity. These approaches also appear to lower endotoxin levels and improve mitochondrial dynamics, contributing to better metabolic health [8]. However, individual responses differ, and not everyone tolerates these interventions equally well. Potential risks, such as altered lipid profiles or hypoglycemia, highlight the need for personalized clinical use [9], [10].

Both ketogenic diets and fasting approaches show promise in managing obesity by elevating ketone bodies such as beta-hydroxybutyrate, which help suppress inflammation linked to insulin resistance. Fasting and ketogenic diets share similar mechanisms that improve insulin sensitivity and lower pro-inflammatory cytokines [11]. Ketogenic diets aid weight loss by curbing appetite, enhancing satiety, and increasing fat metabolism, while intermittent fasting effectively reduces body fat and glucose levels, especially when combined with exercise [12].

Ketogenic diets can reduce body weight, central obesity, and insulin resistance while preserving lean mass, particularly in women with gynecologic cancers [13]. Intermittent fasting supports metabolic health, improving lipid profiles and insulin sensitivity, and may enhance chemotherapy response by altering cancer metabolism. However, it carries risks such as hypoglycemia in diabetics and limited evidence on long-term safety [14]. Both approaches produce meaningful short-term weight loss, but their effects often decline after several months [15].

Recent evidence shows that ketogenic diets (KDs) and intermittent fasting (IF) are

effective strategies for obesity management but raise important questions about safety and long-term outcomes. KDs help reduce body weight and fat mass, improve glucose and lipid metabolism, and enhance satiety, often performing better than traditional low-calorie diets. IF and fasting-mimicking diets show similar benefits, improving insulin sensitivity, blood pressure, and inflammatory markers. However, the impact of these approaches on bone health remains uncertain, with animal studies suggesting possible adverse effects from KDs, while human evidence is still limited. Strategies such as exercise or metformin may help mitigate these risks [16]. Despite promising metabolic results, current studies are often short-term and lack rigorous control. More large-scale, long-duration clinical trials are needed to determine their safety, sustainability, and suitability across populations, particularly for those with comorbid conditions or nutritional vulnerabilities [17]–[19].

The ketogenic diet helps improve insulin sensitivity, supports rapid fat loss, and shows benefits for cardiovascular health, polycystic ovarian syndrome, and nonalcoholic fatty liver disease. Very low-calorie ketogenic diets appear especially effective for short-term weight loss and inflammation reduction, though maintaining results often requires transition to more balanced patterns like the Mediterranean diet [20], [21]. Intermittent fasting, including time-restricted and alternate-day approaches, improves lipid profiles, blood pressure, and markers of oxidative stress. However, its long-term effectiveness for sustained weight control remains uncertain.

KD consistently produces greater weight, BMI, and waist reductions than standard diets, partly through altering gut microbiota and enhancing fat metabolism. IF, while slightly less effective for weight loss, contributes additional benefits for blood pressure and metabolic flexibility [8]. Both approaches improve body composition and cardiovascular markers and show potential in cancer-related metabolic regulation by lowering inflammation and insulin levels. Ketogenic diets appear to enhance therapy responses in cancer models but may carry risks such as dyslipidemia or hepatic steatosis with long-term use. Fasting, meanwhile, may improve treatment tolerance and recovery but requires careful monitoring to avoid dehydration or muscle loss [19], [22].

The findings from recent studies highlight that ketogenic and fasting-based interventions can play a meaningful role in obesity management through several interconnected mechanisms. Low-carbohydrate ketogenic diets (LCKDs) consistently show greater weight reduction compared to low-fat diets, averaging

around 12 kg loss in six months. These diets also improve cardiovascular risk profiles by lowering small, dense LDL particles and increasing HDL levels, particularly when combined with omega-rich nutritional supplements [23]. By limiting carbohydrate intake and reducing insulin spikes, ketogenic diets and intermittent fasting support the carbohydrate–insulin model of obesity, helping reverse insulin resistance and promote fat loss. This approach may also benefit women's health by improving insulin sensitivity and reducing symptoms related to PCOS and menopause, although such diets are not suitable during pregnancy or breastfeeding [24].

In addition to weight management, ketogenic diets and fasting demonstrate benefits for liver health. Both strategies reduce liver fat and inflammation in nonalcoholic fatty liver disease (NAFLD), largely through energy restriction and ketosis-induced fat oxidation [25]. Ketone bodies such as β-hydroxybutyrate have anti-inflammatory properties that may alleviate oxidative stress linked to obesity [18]. However, potential drawbacks include micronutrient deficiencies, gastrointestinal side effects, and uncertain long-term cardiovascular outcomes when high saturated fat intake is present.

Mechanistically, ketogenic diets mimic fasting by inducing physiological ketosis, preserving lean mass, and promoting fat metabolism [3]. Emerging evidence also suggests positive effects on mood, cognition, and metabolic health. While animal studies reveal mixed results regarding sustained weight loss and metabolic stability [6], overall evidence supports ketogenic and intermittent fasting approaches as promising, though not universally risk-free, strategies for managing obesity and related metabolic disorders [26]–[28].

VIII. RESEARCH GAPS AND FUTURE DIRECTIONS

While ketogenic and fasting interventions show consistent benefits for weight loss and metabolic health, several gaps remain. Most studies are short-term, with limited data on long-term safety, adherence, and sustainability. Individual responses to these diets vary widely, and the mechanisms behind these differences are still unclear. There is also insufficient evidence on how these interventions affect specific populations, such as those with chronic diseases, older adults, or women with hormonal conditions. The potential risks, including nutrient deficiencies and lipid imbalances, need more systematic evaluation. Future research should focus on large, controlled clinical trials that integrate metabolic, genetic, and behavioral data. Cross-disciplinary work combining nutrition science, endocrinology, and personalized medicine is essential to

develop tailored strategies. Expanding research in underrepresented regions could also provide a more global understanding of how ketogenic and fasting approaches can be effectively and safely applied in obesity management.

IX. CONCLUSION

The study concludes that ketogenic and fasting-based dietary interventions offer promising strategies for obesity management through mechanisms that enhance fat metabolism, insulin sensitivity, and inflammation control. Both approaches demonstrate significant short-term weight loss and metabolic improvements, though long-term safety and sustainability remain uncertain. Evidence highlights the need for larger, well-controlled trials to evaluate individualized responses, potential side effects, and outcomes across diverse populations. While the ketogenic diet shows strong effects on fat loss and metabolic health, intermittent fasting provides added benefits for cardiovascular function and metabolic flexibility. Overall, these interventions represent valuable but evolving tools in evidence-based obesity management.

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