

GLOBAL RESEARCH LANDSCAPE ON THERMAL STABILITY OF HUMAN MILK BIOACTIVE COMPONENTS: A BIBLIOMETRIC ANALYSIS

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Article Info	ABSTRAK
<p>Article History: Received 16/02/2026. Revised - Accepted 10/03/2026.</p>	<p>ASI merupakan sumber nutrisi optimal bagi bayi karena tidak hanya menyediakan zat gizi esensial, tetapi juga berbagai komponen bioaktif yang berperan dalam mendukung pertumbuhan dan perkembangan bayi. Komponen bioaktif ASI bersifat sensitif terhadap penanganan pasca-pemerahan, khususnya proses termal seperti penyimpanan dan pemanasan. Penelitian ini bertujuan untuk memetakan lanskap penelitian global terkait stabilitas termal komponen bioaktif ASI, mengidentifikasi tren penelitian utama, kontributor terkemuka, kesenjangan pengetahuan, dan memberikan arah bagi penelitian selanjutnya. Analisis bibliometrik dilakukan terhadap publikasi yang terindeks dalam basis data Scopus pada periode 2015–2026. Kata kunci yang digunakan yaitu ASI, stabilitas termal, kualitas mikrobiologis, dan kualitas nutrisi. Dianalisis menggunakan perangkat visualisasi bibliometrik. Penelitian menunjukkan peningkatan signifikan jumlah publikasi dari waktu ke waktu, dengan penelitian yang didominasi oleh negara maju, khususnya Amerika Serikat dan Tiongkok, serta didukung oleh kolaborasi internasional yang luas. Tema penelitian utama berfokus pada pasteurisasi, keamanan pangan, dan kualitas mikrobiologis. Sebaliknya, penelitian mengenai komponen bioaktif non-protein, interaksi antar komponen, serta dampak jangka panjang terhadap kesehatan bayi masih terbatas. Penelitian global mengenai stabilitas termal komponen bioaktif ASI telah berkembang pesat, namun masih terdapat kesenjangan penelitian. Studi ini memberikan gambaran komprehensif perkembangan riset dan menyoroti area prioritas untuk mendukung penyusunan pedoman berbasis bukti serta penelitian di masa mendatang.</p>
<p>Keywords: <i>Thermal stability, breastfeeding, human milk, global research, bibliometric study</i></p>	<p>ABSTRACT <i>Breast milk is an optimal source of nutrition for infants because it not only provides essential nutrients, but also various bioactive components that play a role in supporting infant growth and development. The bioactive components of breast milk are sensitive to post-expression handling, particularly thermal processes such as storage and heating. This study aims to map the global research landscape related to the thermal stability of breast milk bioactive components, identify major research trends, leading contributors, knowledge gaps, and provide direction for further research. A bibliometric analysis was conducted on publications indexed in the Scopus database for the period 2015–2026. The keywords used were breast milk, thermal stability, microbiological quality, and nutritional quality. The analysis was performed using bibliometric visualization tools. The study shows a significant increase in the number of publications over time, with research</i></p>

dominated by developed countries, particularly the United States and China, and supported by extensive international collaboration. The main research themes focus on pasteurization, food safety, and microbiological quality. In contrast, research on non-protein bioactive components, interactions between components, and long-term effects on infant health is still limited. Global research on the thermal stability of breast milk bioactive components has grown rapidly, but there are still research gaps. This study provides a comprehensive overview of research developments and highlights priority areas to support the development of evidence-based guidelines and future research.

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