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Evaluating the accuracy and reliability of ChatGPT in breastfeeding counseling: A literature-based assessment

Reyhan Erkaya¹, Sevim Atalar²¹Karadeniz Technical University, Faculty of Health Sciences, Department of Nursing, Trabzon, Türkiye²Kanuni Training and Research Hospital, Director of Health Care Services, Trabzon, Türkiye

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Abstract

In recent years, artificial intelligence (AI) tools such as OpenAI's Generative Pre-trained Transformer (ChatGPT) have enhanced healthcare information access by enabling rapid retrieval of medical knowledge and guidelines. This study aims to evaluate the consistency, accuracy, and clinical relevance of ChatGPT's responses on breastfeeding counseling by comparing them with current literature. The study was designed as a qualitative comparative analysis grounded in a review of current literature. Between October 21 and 23, 2024, one breastfeeding-related question per day was submitted to ChatGPT (free version, GPT-3) via the Google search engine. The questions were selected to reflect the most commonly addressed topics in breastfeeding counseling, as identified through the literature. ChatGPT's responses were directly incorporated into the manuscript and analyzed in comparison with current literature to assess their accuracy, clarity, and sufficiency for use in patient education by healthcare professionals and laypersons. Additionally, a 5-point scoring system was applied to evaluate each response based on five content quality dimensions, such as consistency with literature and the timeliness of evidence. The data sample was limited to responses generated based on ChatGPT's knowledge cutoff of November 30, 2022, to ensure that the content reflected a period unaffected by post-deployment user interactions. The analysis revealed that ChatGPT's responses were generally consistent with existing guidelines and literature. However, a notable limitation was found in the response regarding breast milk storage, which did not reflect an update released on March 26, 2024. This finding illustrates ChatGPT's limitation in reflecting the most recent evidence. While ChatGPT offers accessible and mostly accurate health information, its inability to incorporate updates beyond November 2022 limits its applicability for delivering up-to-date clinical guidance. Therefore, although ChatGPT may serve as a supplementary educational tool, its outputs should be interpreted with caution and used in conjunction with professional medical guidance and the most recent evidence-based resources.

Keywords: ChatGPT, breastfeeding counseling, current data, health education

Introduction

Generative Pre-trained Transformer (ChatGPT) is a natural language processing (NLP) model developed by OpenAI. Following its release in a free, open-access format on November 30, 2022, the tool rapidly gained global popularity. Designed to simulate human-like dialogue across multiple languages including Turkish, it enables real-time interaction with users in a conversational format [1]. Trained on an extensive and diverse textual dataset, ChatGPT continues to evolve through ongoing refinements and updates [2].

Prior to its public release in late November 2022, ChatGPT was trained using a wide range of scientific and non-scientific data sources. This information was processed through a transformer-

based architecture, allowing the model to identify relationships between concepts and generate contextually appropriate language outputs [3]. As a result, ChatGPT can produce coherent and human-like responses in a variety of tasks, including answering questions, defining concepts, and challenging assumptions.

ChatGPT's applications are diverse and span numerous sectors. It plays a supportive role in customer service, software development, marketing, creative writing, and content generation. Its use has been associated with increased productivity and time efficiency across these domains. In the healthcare field, ChatGPT supported systems have shown potential to assist both patients and providers particularly in-patient education, symptom evaluation, and explanation of treatment protocols [4].

CITATION

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Corresponding Author: Reyhan Erkaya, Karadeniz Technical University, Faculty of Health Sciences, Department of Nursing, Trabzon, Türkiye
Email: reyhanozturk30@hotmail.com

Patient education is a fundamental component of quality care, enabling individuals to better understand their health conditions and actively participate in decision-making. In this context, ChatGPT stands out as a tool capable of delivering accessible, personalized information. By responding to patient inquiries based on their symptoms or background, it may facilitate informed treatment decisions. Its ability to recognize patient concerns and provide clear, comprehensible responses distinguishes it within the field of NLP based tools [3-5].

Breastfeeding is widely recognized as the optimal method of infant nutrition, offering substantial short- and long-term health benefits for both mothers and infants. A lack of adequate knowledge about breastfeeding remains one of the leading causes of early introduction of complementary foods. Consequently, providing mothers with accurate and comprehensive breastfeeding information is essential for successful outcomes [6-10]. International health authorities, including the World Health Organization (WHO), the United Nations Children’s Fund (UNICEF), the American Academy of Pediatrics (AAP), and The European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) recommend exclusive breastfeeding for the first six months of life. Beyond individual health benefits, breastfeeding is increasingly regarded as a critical public health strategy [11-15].

Using a qualitative approach grounded in current academic literature, this study aims to critically evaluate the accuracy, reliability, clarity, and applicability of responses provided by the currently available, free-access version of ChatGPT in the context of breastfeeding counseling. Using three evidence-informed questions identified through a comprehensive literature review reflecting the most frequently asked queries by mothers, the analysis assesses how well ChatGPT’s outputs align with current scientific knowledge [6,8-10]. The findings intend to guide healthcare professionals on the potential integration of AI-based tools like ChatGPT into patient education, while also highlighting their present limitations and implications for clinical practice.

Material and Methods

Type of the Study

This study was designed as a comparative analysis grounded in a review of current literature. Between October 21 and 23, 2024, one breastfeeding-related question per day was submitted to ChatGPT (free version, GPT-3) via the Google search engine. The responses were directly incorporated into the manuscript and assessed for their accuracy, clarity, and adequacy in the context of existing literature. The study sample exclusively comprises data generated prior to November 30, 2022, the date when ChatGPT was publicly released for free access by OpenAI. This temporal delimitation was established to ensure that the analysis reflects outputs unaffected by extensive user interactions. This study is best characterized as a literature-based comparative analysis using qualitative and descriptive methods to assess the content quality of ChatGPT's responses in light of current evidence (The flow of the study is illustrated in Figure 1).



Figure 1. ChatGPT breastfeeding counseling study flowchart

Inclusion and Exclusion Criteria

Since this study did not involve human participants and focused solely on textual content generated by artificial intelligence (ChatGPT), traditional clinical inclusion and exclusion criteria were not applicable.

Inclusion Criteria

- Responses generated by ChatGPT (free version, GPT-3) between October 21 and 23, 2024,
- Text-based answers to three frequently asked questions in the field of breastfeeding counseling,
- Content based solely on ChatGPT’s knowledge cutoff prior to November 30, 2022,
- Responses that could be evaluated within the framework of evidence-based medicine and current breastfeeding guidelines.

Exclusion Criteria

- Responses generated outside the date range of October 21–23, 2024,
- Responses not directly related to evidence-based breastfeeding counseling or off-topic content,
- Responses suspected to be influenced by data added to the ChatGPT model after November 30, 2022.

These limitations were implemented to enhance the methodological transparency and reproducibility of the study.

Evaluation Criteria and Scoring Framework

Each ChatGPT response was independently evaluated using a structured scoring framework developed by the author. Five content quality criteria were used for this purpose: (1) consistency with literature, (2) recency of information, (3) evidential support, (4) content completeness, and (5) academic tone. For each criterion, a

score between 0 (very poor) and 5 (excellent) was assigned based on predefined descriptors. The total score for each response ranged from 0 to 25, and are presented in Tables 1 and 2. The purpose of this scoring system was to allow a semi-quantitative comparison among ChatGPT outputs and to increase the transparency and reproducibility of the evaluation process. Although no formal statistical testing was conducted due to the limited data size (n=3), the scores were summarized descriptively (e.g., using means) and visualized to support comparative interpretation. This methodological choice is in line with established principles of qualitative content analysis frequently applied in educational and health informatics research [16,17].

Table 1. Summary of evaluation criteria and corresponding score descriptors

Criterion	Description	Score Range
Consistency with literature	Alignment with current academic guidelines and sources	0-5
Recency of information	Reflects data or guidelines published after 2020	0-5
Evidential support	Inclusion of evidence-based or referenced information	0-5
Content completeness	Covers all major aspects of the question topic	0-5
Academic tone	Scientific, objective, and clear language used	0-5

Table 2. Detailed scoring framework and definitions for ChatGPT response evaluation

	Score	Definition
Consistency with literature	0	Clearly contradicts the literature
	1	Largely inconsistent; key concepts are missing
	2	Partially consistent but with significant gaps
	3	Generally consistent but some critical references are lacking
	4	Largely consistent with current literature
	5	Fully consistent with current literature in all aspects
Recency of information	0	Outdated and obsolete information
	1	Limited to sources older than five years
	2	Lacks new information; mostly outdated
	3	Partially based on the last 5 years
	4	Includes data from post-2019 sources
	5	Actively references post-2022 data
Evidential support	0	No sources; speculative information
	1	Weak or single-source support
	2	Sources present but insufficient or unreliable
	3	Basic sources provided but limited diversity
	4	Supported by multiple reliable sources
	5	Backed by international guidelines and multiple current sources
Content completeness	0	Response is largely incomplete
	1	Key elements of the response are missing
	2	Only surface-level explanation
	3	Basic components present but lacks examples/data
	4	Mostly comprehensive and explanatory
	5	Thorough, multidimensional, and clearly articulated
Academic tone	0	Entirely colloquial; lacks scientific language
	1	Informal tone; few technical terms
	2	Some academic expressions but weak structure
	3	Sufficient academic language present
	4	Academic tone with controlled expression
	5	Fully adheres to academic writing standards and terminology

Ethical Considerations

As ChatGPT is hosted on an open-access platform available to everyone, access rights are open to all, and therefore ethical committee approval is not required. Moreover, ethical considerations regarding the use of artificial intelligence systems in health-related information were taken into account. This study did not involve any personal data, identifying information, human participation, or experimental intervention. The population and sample consist of all data uploaded to the database prior to November 30, 2022, the date when ChatGPT

was made publicly available for free access by OpenAI. Since the responses provided by ChatGPT do not contain any information about individual participants, no privacy or ethical concerns arise.

Results

Between October 21 and 23, 2024, the questions related to Breastfeeding Counseling provided below were posed to ChatGPT, with one question asked each day on the specified dates and are presented in Table 3.

Table 3. ChatGPT questions on breastfeeding counseling

Question number	Date	Question text
Question 1	October 21, 2024	When should breastfeeding be initiated after birth and why? Can you answer this question based on current academic literature?
Question 2	October 22, 2024	What are the storage conditions for expressed breast milk? Can you answer this question based on current academic literature?
Question 3	October 23, 2024	What should be done to increase breast milk production? Can you answer this question based on current academic literature?

The questions directed to ChatGPT and its responses were recorded exactly as received, without any modification, and are presented in Table 4. The responses were evaluated based on five criteria: consistency with literature, recency of information, evidential support, content completeness, and academic tone. Each response was scored on a scale of 0 to 5 using a predefined scoring framework. The findings were analyzed in a semi-quantitative manner based on this structured scoring approach.

Table 4. Assessing the alignment between ChatGPT’s responses and the scientific literature in breastfeeding counseling and health education

ChatGPT answer	Consistency with academic literature	Recency of information	Evidential support	Missing elements	Evaluation summary
October 21, 2024					
Answer 1*	Largely consistent with current literature	Aligned with information prior to 2022	ESPGHAN (2009) WHO (2018) TDHS (2018) AAP (2022) CDC (2022) FIGO (2023)	Although institutional authorities (e.g., WHO, AAP) are mentioned, the publication year and specific references are not provided	Evidence-based, strong response; aligns with 2022 guidelines but lacks most recent updates
October 22, 2024					
Answer 2**	Partially consistent; some durations contradict the literature	Aligned with data prior to 2022	WHO (2018) AAP (2022) CDC (2024)	Incorrect information was provided regarding breast milk storage durations. CDC’s 2024 update not included	Superficial and partially inaccurate; may pose a risk in terms of safe storage recommendations
October 23, 2024					
Answer 3***	In line with general guidelines	Mostly based on 2017-2020 sources	EFSA (2017) WHO (2018) CDC (2022) AAP (2022)	Recent superfood trends and vegan diet considerations not included	Basic information is solid; adding current nutrition trends or special diets would strengthen the response

*Breastfeeding should be initiated within the first 30 minutes to 1 hour after birth. This recommendation is supported by many international health organizations, especially the WHO, UNICEF, and AAP. **1. The Importance of Colostrum:** Colostrum, produced in the first days after birth, contains essential nutrients and antibodies vital for the baby’s health. Colostrum strengthens the baby’s immune system and serves as the first vaccination. **2. Infant Sucking Reflex:** Newborns have a sucking reflex immediately after birth. Initiating breastfeeding in the first hours helps stimulate this reflex. **3. Increase in Milk Production:** Early initiation of breastfeeding is a critical factor in increasing maternal milk production. Breastfeeding stimulates the breast and promotes the secretion of prolactin and oxytocin hormones, which in turn enhances milk production. **4. Mother-Infant Bond:** Early breastfeeding strengthens the emotional bond between mother and baby. This bond plays a critical role in both psychological and emotional development. **5. Mother’s Health:** Early breastfeeding reduces the risk of postpartum hemorrhage and helps the uterus return to its normal size.

Expressed breast milk can retain its nutritional value and continue to benefit the baby if stored under appropriate conditions. Below are the recommended methods for storing breast milk: **1. It is important to wash hands thoroughly with soap and water before expressing milk. Breast pumps, containers, and other equipment must be clean and sterile. **2.** Breast milk should be stored in BPA-free plastic containers or glass bottles specially designed for milk storage. Writing the date on the containers helps track the freshness of the milk. **3.** At room temperature: can be stored for up to 3 hours (up to 25°C); in the refrigerator: can be stored for up to 3 days (0-4°C); in the deep freezer: can be stored for 6-12 months (-18°C or lower). **4.** Frozen breast milk should be thawed slowly in the refrigerator or under warm water. The microwave should not be used as it can unevenly heat the milk and degrade its nutritional value. Once thawed, breast milk should be used within 24 hours when stored in the refrigerator. Milk that has been thawed should never be refrozen.

***Various strategies and methods are recommended to increase breast milk production. According to the academic literature, here are some effective approaches to enhance milk production: **1.** The baby should be breastfed frequently and regularly (every 2-3 hours). The principle of milk production based on demand is related to the frequency of breastfeeding. Increasing the duration of time the baby stays on the breast promotes milk production. **2.** With the correct breastfeeding technique, ensuring that the baby latches onto the breast properly increases milk flow and ensures complete emptying of the breast. Proper emptying of the breast can enhance milk production. **3.** The mother should maintain a balanced diet, ensuring sufficient calorie intake, and consume nutritious foods, with particular attention to protein, vitamin, and mineral intake. Adequate fluid intake supports milk production, and it is recommended to drink at least 8-10 cups of water per day. **4.** Stress can negatively affect milk production. The mother should manage stress through techniques such as yoga and meditation. **5.** Galactagogues, including certain herbal supplements (e.g., fennel, cumin, oats) and some medications, may help increase milk production. However, consultation with a healthcare professional should be sought prior to using such supplements.

The responses provided by ChatGPT were analyzed based on five key criteria: consistency with academic literature, recency of information, evidential support, content completeness, and academic tone. Each response was scored on a 0–5 scale across these dimensions, and the results are presented in Table 5.

The total scores for Question 1, 2, and 3 were 22/25, 16/25, and 18/25 respectively. Question 1 received the highest score overall, particularly excelling in content completeness and consistency with the literature. In contrast, Question 2 was rated the lowest,

mainly due to its outdated information and insufficient evidential support. Question 3, while generally accurate, lacked recent data and source diversity.

On average, the responses received the highest scores in “Content Completeness” (mean=4.0), while “Recency” and “Evidential Support” yielded the lowest average (mean=3.3). These findings indicate that although ChatGPT can generate coherent and well-structured responses, it struggles to incorporate up-to-date references and diverse source citations.

Table 5. Evaluation scores of ChatGPT responses (0–5 scale)

ChatGPT question	Consistency with literature	Recency of information	Evidential support	Content completeness	Academic tone	Total score
ChatGPT question 1	5	4	4	5	4	22
ChatGPT question 2	4	3	3	3	3	16
ChatGPT question 3	4	3	3	4	4	18

A graphical summary of these scores across evaluation criteria and questions is presented in Figure 2, highlighting the relative strengths and limitations of each response.

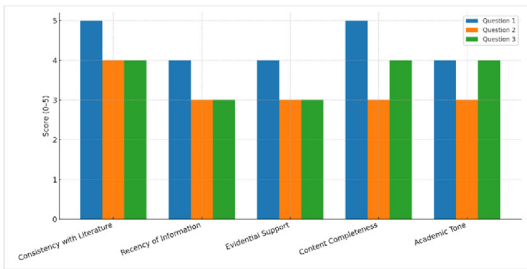


Figure 2. Evaluation scores of ChatGPT responses across five criteria (0–5 scale)

Discussion

ChatGPT was released by OpenAI in a free and open-access format on November 30, 2022. The model has been trained only on data available up to that date. This temporal limitation may restrict the recency and comprehensiveness of its responses, particularly in rapidly evolving fields such as healthcare. The increasing use of large language models like ChatGPT as tools for accessing health-related information has raised the need for academic evaluation of their content accuracy and reliability [18]. Especially in critical areas such as breast milk, breastfeeding counseling, and neonatal care, assessing whether the information provided aligns with scientific sources is essential for ensuring safe use in healthcare services. This study aimed to evaluate the consistency, accuracy, and validity of ChatGPT’s responses in light of current literature.

Qualitative data (e.g., interview transcripts, open-ended questions, ChatGPT responses) are typically analyzed through meaning, themes, and content (Tables 1 and 2). However, categorizing such data and converting them into frequency-based or scored formats facilitates comparison in educational and healthcare research [19,20]. This study went beyond classical qualitative content analysis by evaluating the responses

using a structured scoring system based on five criteria: consistency with literature, recency of information, evidential support, content completeness, and academic tone. This semi-quantitative assessment enabled a comparative analysis of both the qualitative features and objective measurements of the content. Tables and figures present the scores obtained across these five criteria in a comprehensive manner (Tables 3, 4, 5 and Figure 2). This hybrid method contributes to the literature by allowing both content-based and numerical comparisons within the context of AI evaluation in healthcare education.

Within the scope of the three selected questions, the responses generated by ChatGPT were generally found to be consistent with the literature. In particular, the answer regarding the timing of breastfeeding initiation demonstrated high accuracy and completeness. In contrast, responses concerning breast milk storage showed deficiencies in terms of information recency. While the content addressing strategies to increase milk production was relatively comprehensive, the section on herbal supplements (galactagogues) was found to be controversial. These findings are discussed in detail for each question and response below.

1. When Should Breastfeeding Be Initiated and Why?

In the semi-quantitative evaluation, the response to this question received the highest total score (22/25). While full scores were given for “content completeness” and “consistency with the literature,” certain shortcomings were identified in “recency of information,” “evidential support,” and “academic tone.” This indicates that the model is capable of generating a well-structured conceptual framework but remains limited in terms of source citation and regional data integration.

In response to the question “When should breastfeeding be initiated after birth?”, ChatGPT stated, “Breastfeeding should be initiated within the first 30–60 minutes after birth. This recommendation is supported by many international health organizations, especially the WHO, UNICEF, and the AAP.”

This answer is aligned with the recommendations of institutions such as WHO, AAP, and UNICEF; however, it does not cite the original sources. The 2018 Türkiye Demographic and Health Survey (TDHS) reports that 71% of newborns in Türkiye are breastfed within the first hour after birth [13]. According to UNICEF's 2021 data, the global average for early initiation is 48% [14]. A review of the literature shows that numerous guidelines and clinical sources emphasize the importance of initiating breastfeeding within the first 30–60 minutes and recommend exclusive breastfeeding for the first six months. The WHO (2018) implementation guide directly recommends early breastfeeding initiation [12], and the AAP's 2022 policy statement "Breastfeeding and the Use of Human Milk" strongly supports starting within the first hour [21]. CDC publications such as the Breastfeeding Report Card (2022) and mPINC also address early initiation and postpartum care practices [22]. The International Federation of Gynecology and Obstetrics (FIGO) considers breastfeeding a life-saving and protective intervention and recommends initiation during the "golden hour"– the first hour of life [23]. The ESPGHAN in its 2009 and 2022 guidelines on promoting breastfeeding does not specify the timing of initiation but strongly advocates exclusive breastfeeding for six months [15]. The Turkish Ministry of Health organizes training programs for healthcare providers on breastfeeding counseling, publishes guidelines, and develops public health programs. In addition, professional associations such as the Turkish Pediatric Association and the Social Pediatrics Association have issued local guidelines recommending early breastfeeding [24,25]. ChatGPT's response did not refer to Türkiye-specific sources such as the 2018 TDHS, local Ministry of Health initiatives, or guidelines from national associations. It only mentioned international institutions by name without referencing their specific publications or release years. While the content is generally accurate, the response lacked local data and omitted critical concepts such as "baby-friendly hospitals," "skin-to-skin contact," and the "golden hour."

In response to the question "Why should breastfeeding be initiated after birth?", ChatGPT based its answer on five main justifications: the biological importance of colostrum, the sucking reflex, increased milk production, mother–infant bonding, and maternal health benefits.

Regarding colostrum, it stated: "Colostrum, produced in the first days after birth, contains essential nutrients and antibodies vital for the baby's health. Colostrum strengthens the baby's immune system and serves as the first vaccination." This response aligns well with the literature, which describes colostrum produced during the first five days postpartum as rich in lactoferrin, lysozyme, IgA, growth factors, anti-inflammatory cytokines, oligosaccharides, antioxidants, and other immune-supportive components [20].

Concerning the sucking reflex, ChatGPT stated: "Newborns have a sucking reflex immediately after birth. Initiating

breastfeeding in the first hours helps stimulate this reflex." This corresponds with findings that during the first reactive phase (15–30 minutes post-birth), infants are alert, responsive, and their sucking reflex is active. Initiating breastfeeding during this window stimulates sucking and swallowing reflexes, supports milk production, prevents neonatal hypoglycemia, and promotes growth and development [6].

On the topic of milk production, ChatGPT wrote: "Early initiation of breastfeeding is a critical factor in increasing maternal milk production. Breastfeeding stimulates the breast and promotes the secretion of prolactin and oxytocin hormones, which in turn enhances milk production." This is consistent with the literature indicating that mechanical stimulation of the breast activates neural pathways, leading to increased secretion of prolactin and oxytocin, which are essential for milk production [7,26]. Continued and adequate milk supply depends on regular breast emptying, proper latch technique, sufficient maternal rest, and self-efficacy [8].

Regarding mother–infant bonding, the model stated: "Early breastfeeding strengthens the emotional bond between mother and baby. This bond plays a critical role in both psychological and emotional development." Literature supports that fulfilling the newborn's care needs strengthens this bond. Early breastfeeding, along with skin-to-skin and eye contact, increases oxytocin release, enhancing emotional communication and fostering a sense of security. Practices such as kangaroo care, massage, yoga, meditation, and social support also reinforce this process [26,27]. This response is consistent with the scientific literature.

On maternal health, ChatGPT noted: "Early breastfeeding reduces the risk of postpartum hemorrhage and helps the uterus return to its normal size." Early breastfeeding supports uterine contraction, reduces postpartum bleeding, and promotes uterine involution. It also facilitates return to pre-pregnancy weight, acts as a natural contraceptive, reduces the risk of breast and ovarian cancer, improves bone health, and enhances glucose tolerance, thereby reducing the risk of type 2 diabetes. Additionally, endorphin release during breastfeeding enhances maternal psychological well-being and supports confidence [6,28]. ESPGHAN's 2009 guideline provides detailed information on breast milk composition and the benefits of breastfeeding [15], while FIGO highlights the long-term maternal and infant benefits of early initiation [23]. The UNICEF & WHO (2018) "Ten Steps to Successful Breastfeeding" guide outlines the key stages for successful breastfeeding [29]. Compared to these clinical resources, ChatGPT's answers appear to lack depth and do not explicitly reference such guidelines.

2. How Should Expressed Breast Milk Be Stored?

ChatGPT provided a structured and largely accurate summary of essential practices related to the storage of expressed breast milk. The response included information on hand hygiene, the

use of BPA-free containers, and appropriate storage durations at room temperature, in the refrigerator, and in the deep freezer. However, the updated durations provided in the latest CDC (2024) guidelines were not reflected in the answer. In the semi-quantitative evaluation, this response received a total score of 16/25. The lowest scores were assigned for “recency of information” and “evidential support” (3/5 each). These results suggest that although ChatGPT accurately reflects past data, it is insufficient in incorporating newly published guidelines. This finding underscores the necessity for continuous updates to AI-based counseling tools to ensure their clinical reliability.

To the question “How should expressed breast milk be stored?”, ChatGPT answered: “When stored properly, expressed breast milk retains its nutritional value and continues to benefit the baby.” It summarized the storage methods in terms of hygiene principles, container types, storage durations, and thawing conditions. While the explanations about thawing techniques, labeling, and hygiene were generally adequate, the response lacked more detailed information regarding updated guidelines and context-specific risks.

Because breast milk contains many protective factors, it has inherent resistance against infection. However, hands are the primary source of contamination. Since hands can carry microorganisms from the body and the environment, proper hand hygiene is essential [9]. According to the Academy of Breastfeeding Medicine, breast pumps and storage containers should be thoroughly cleaned after each use, washed with hot soapy water, rinsed, and then boiled [10,30]. ChatGPT’s statement that “hands should be thoroughly washed with soap and water before expressing milk, and the pump and containers must be clean and sterile” aligns well with the literature. The most ideal storage material is glass bottles [31]. Plastics containing BPA may damage immunological components during long-term storage [30]. Labeling the containers with the date is necessary to monitor freshness [9]. Its statement, “BPA-free plastic containers or glass bottles should be preferred. Writing the date on the container is important for tracking freshness,” is accurate and up-to-date. Additionally, the inclusion of galenic details (e.g., BPA-free containers, avoidance of microwave use) is a positive aspect of the response.

For storage durations, ChatGPT provided the following: “Breast milk can be stored at room temperature (up to 25°C) for 3 hours; in the refrigerator (0–4°C) for 3 days; and in the deep freezer (–18°C or lower) for 6–12 months.” This response is based on the pre-2022 “3-3-3 rule” (3 hours at room temperature, 3 days in the refrigerator, and 3 months in the freezer). These recommendations align with earlier standards from international and national authorities such as the CDC and the Turkish Ministry of Health. However, as of March 26, 2024, the Turkish Ministry of Health adopted the CDC’s updated guideline, replacing the “3-3-3 rule” with the “4-4-6 rule”: breast milk can now be stored for 4 hours at room temperature,

4 days in the refrigerator, and 6 months in the freezer [32]. ChatGPT’s response does not include this post-2022 update. This omission is a result of the model’s static knowledge base, which only includes data available before November 30, 2022. Thus, while the content may be partially accurate, it is limited in terms of informational recency.

According to the Turkish Ministry of Health, thawed breast milk can be stored in the refrigerator for 24 hours, and any leftover milk should not be reused [9]. Because microwave heating can degrade the immunological properties of breast milk, it should be warmed in a water bath instead [33,34]. ChatGPT’s statement— “Frozen milk should be thawed slowly in the refrigerator or under lukewarm running water. Microwaves should not be used. Thawed milk should be consumed within 24 hours and should not be refrozen” —is consistent with the guidelines and literature. However, although it warns against using a microwave, it could have provided more detailed information about the risks of uneven heating and the degradation of immune components.

3. What Can Be Done to Increase Milk Production?

ChatGPT provided five main recommendations for increasing milk production: frequent and regular breastfeeding, proper breastfeeding technique, balanced nutrition and adequate fluid intake, stress management, and the use of galactagogues. The overall structure of the response is comprehensive, and the first four categories are largely consistent with the academic literature. However, the suggestions regarding galactagogues lack sufficient warnings about the safety of herbal supplements. While the response was positively rated for literature consistency, content completeness, and academic tone, it received lower scores in evidential support and recency. The total score for this response was 18/25.

According to the literature, milk production is demand-driven, directly influenced by the frequency of breastfeeding, and it is recommended to breastfeed 8–12 times within 24 hours during the first two weeks [35,36]. The UNICEF & WHO (2018) guidelines address the promotion of breastfeeding and frequent feeding within the framework of the “Ten Steps to Successful Breastfeeding” [29]. The literature is consistent with ChatGPT’s response: “The baby should be breastfed every 2–3 hours.” Proper breastfeeding technique enhances nipple stimulation and triggers the release of prolactin and oxytocin [6,12]. This aligns with ChatGPT’s statement: “Ensuring the baby latches correctly and that the breast is fully emptied helps increase milk production.”

The average daily milk production is about 800–1000 ml, which increases the mother’s fluid requirements [37]. ChatGPT’s response—“The mother should maintain a balanced diet with adequate calorie intake and drink at least 8–10 cups of water per day”—is aligned with the literature. On stress management, ChatGPT recommended relaxation techniques such as yoga

and meditation. Studies confirm that stress can reduce oxytocin release, hinder milk flow, and highlight the importance of social support [6]. The European Food Safety Authority (EFSA) 2017 guideline includes nutritional recommendations specific to the lactation period for supporting milk production [38].

Regarding galactagogues, ChatGPT stated: “Herbal supplements such as fennel, cumin, and oats, as well as certain medications, may help increase milk production; however, a healthcare provider should be consulted.” However, this explanation is rather superficial. While both herbal and pharmacological options were briefly mentioned, the limited evidence for herbal products and the potential risks of unsupervised use were not adequately emphasized. The efficacy of herbal galactagogues in humans is not well established. Their mechanisms are generally unknown, although most are believed to act by increasing prolactin levels. One of the most commonly used pharmacologic agents is metoclopramide [37,39,40]. Moreover, the response did not address clinically important differences between agents such as metoclopramide and fenugreek, contraindications, placebo effects, or other relevant pharmacological nuances. The scientific safety profile of herbal galactagogues remains unclear. It should be emphasized that “natural” does not always mean “safe,” and such products should only be used under medical supervision. ChatGPT’s limited discussion on this topic contributed to a lower score in evidential support.

In general, ChatGPT’s responses to breastfeeding counseling questions were well-structured, largely accurate, understandable, and based on academic sources. However, due to the temporal limitation of the model’s training data, some responses lacked up-to-date information. Since ChatGPT’s training dataset ends on November 30, 2022, it cannot incorporate updates such as the 2024 breast milk storage guideline. The absence of local guidelines, recent updates, and regional data reduces the contextual depth of its responses. Moreover, ChatGPT cannot dynamically tailor responses to individual circumstances or follow-up questions, which may limit its use in clinical environments. Another issue is that ChatGPT tends to use general statements instead of referencing specific studies, and it does not distinguish between different levels of evidence (e.g., systematic reviews vs. expert opinion), which may mislead users about the strength of the evidence. Despite these limitations, the findings of this study suggest that ChatGPT has potential as a guiding tool in health education. However, to ensure its safe use, complementary measures such as regular updates, reference integration, and expert supervision are essential.

Another contribution of this study is the integration of a semi-quantitative scoring system into qualitative content analysis, providing a multidimensional evaluation model. Nevertheless, this evaluation process carries the risk of subjective interpretation, as it is difficult to entirely eliminate evaluator bias.

Limitations of the Study

ChatGPT was made publicly available in an open-access format by OpenAI on November 30, 2022. Since the model’s knowledge base only includes data prior to this date, it does not cover subsequent scientific updates, guidelines, or publications. This temporal limitation, especially in rapidly evolving fields like healthcare, restricts the recency and comprehensiveness of the responses. Furthermore, the study was limited to three questions within a short time frame. The response generation process of the model was not controlled, and the evaluations were conducted solely by the author. The fact that scoring was performed by a single evaluator (the author) raises the risk of subjective bias and compromises inter-rater reliability. These limitations may affect the generalizability and objectivity of the findings.

Conclusion

ChatGPT has emerged as a transformative tool in healthcare education, with the potential to enhance information dissemination among healthcare professionals, patients, and the general public. By facilitating rapid access to clinical knowledge and current guidelines, it supports the optimization of clinical workflows and reinforces continuing medical education. Furthermore, its capacity to deliver health-related explanations in accessible language contributes meaningfully to patient education and the promotion of health literacy in both clinical and non-clinical contexts.

Despite its promising applications, the integration of ChatGPT into healthcare education requires critical scrutiny, particularly regarding the accuracy, reliability, and currency of its responses. Given that the model’s knowledge base is limited to data available prior to November 30, 2022, it may fail to reflect recent developments, updated clinical protocols, or newly established guidelines. This limitation poses a risk of disseminating outdated or incomplete information, particularly in fast-evolving medical fields.

Healthcare delivery involves complex, high-stakes decision-making processes that necessitate clinical judgment, contextual understanding, and ethical responsibility. Therefore, AI based systems such as ChatGPT should not be viewed as substitutes for professional expertise but rather as complementary tools that can support but not replace human decision-making. Ensuring that AI outputs are interpreted and contextualized by qualified healthcare professionals remains essential for safeguarding patient safety and quality of care.

To maximize the utility of ChatGPT in medical education and patient communication, its implementation must be guided by frameworks that emphasize evidence-based accuracy, transparency, and ethical accountability. Future improvements in AI systems should prioritize real-time data integration, continuous validation against current medical standards, and

alignment with clinical governance structures. In doing so, ChatGPT can serve as a reliable adjunct in healthcare education without compromising clinical integrity.

Conflict of Interests

The authors declare that there is no conflict of interest in the study.

Financial Disclosure

The authors declare that they have received no financial support for the study.

Ethical Approval

This study does not require ethical approval as it utilizes OpenAI's ChatGPT. The population and sample of the study consist of all data uploaded to the database prior to November 30, 2022, the date when ChatGPT was made publicly available for free access by OpenAI. The study does not involve any personal data or identifying information. Since the responses provided by ChatGPT do not contain any information about individual participants, no privacy or ethical concerns arise.

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