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PARENT'S PERCEPTION OF MOBILE HEALTH TECHNOLOGY UTILIZE IN HOME CARE-GIVEN TO THEIR CHILDREN WITH CANCER

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Abstract

Background: Mobile health technologies support home care for children with cancer. Parents' perceptions influence their effective use in pediatric cancer care. **Aim:** to assess parent's perception of mobile health technology utilize in home care-given to their children with cancer. **Design:** A descriptive research design was utilized. **Sample:** A purposive sample of 418parents and children's cancer who agreed to participate in the study was utilized. **Setting:** The study was conducted at National Cancer Institute affiliated to Cairo University**. Tools:** Data were collected using three tools. 1st: parents and cancer children interviewing questionnaire, 2nd: Parents 'knowledge toward care given by using mobile health technology-interviewing questionnaire, and 3rd: Parents attitude regarding mobile health technology. **Results:** the mean age of parents whose studied was (mean age 33.10 SD 3.82), and the mean age of studied children with cancer was. (Mean age 10.76 SD3.72). The total mean knowledge score of parents was 26.6±4.7and ,total mean attitude score of parents was 49.3±8.1. there is a significant strong direct positive correlation between knowledge and attitude of studied parents regarding mobile health technology (r=0.61, p=0.00).. **Conclusion:** The parents of children with cancer had moderate to good levels of total knowledge and a total attitude toward mobile health technology, The parents' attitudes are significantly influenced by education level (p=0.01), where higher education was correlated with more positive attitudes toward mobile health technology. **Recommendations:** improve knowledge and attitude of parents toward mobile health technology utilization to their cancer children.

Keywords: Parents' Perception; Mobile Health, Home Care Caregivers; Children with Cancer.

INTRODUCTION

Mobile health technologies have emerged as vital tools in pediatric oncology care, offering parents resources to manage complex care-giving tasks. These include symptom tracking, medication reminders, and real-time communication with healthcare providers. Studies highlight that these features significantly alleviate the burden on caregivers, enabling more efficient home care management (Micah et al., 2024). Parents are central to providing home-based care for children with cancer, often managing multiple responsibilities. Mobile apps designed for pediatric oncology simplify these tasks by providing structured guidance and educational materials. Research shows that caregivers

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benefit from having easily accessible, evidence-based information tailored to their child's needs (Dina et al., 2023).

Mobile health technologies, such as mobile apps and wearable devices, are increasingly being used to address the complex needs of both pediatric cancer patients and their caregivers. For parents, these tools offer more than just convenience; they provide critical support in managing their child's symptoms, ensuring adherence to treatment regimens, and responding to emergencies. However, for mobile health technologies to be effective, they must be tailored to the unique needs and preferences of parents, accounting for their emotional burdens, caregiving responsibilities, and the need for timely, relevant information (Micah et al, 2024).

Parents report positive experiences with mobile health tools, citing improved organization, better communication with care teams, and reduced care-giving stress. These tools enable caregivers to track progress and monitor symptoms, which contributes to timely interventions and improved patient outcomes. Despite their potential, barriers such as technological literacy, privacy concerns, and financial constraints limit the adoption of mobile health tools. Studies emphasize that apps must address these concerns to achieve broader acceptance among caregivers, especially those in under-served communities (Aapro et al., 2020).

Care-giving for a child with cancer is emotionally demanding. Mobile health technologies offer features such as caregiver support forums, relaxation exercises, and access to mental health resources, which help parents manage stress and anxiety more effectively. Parents value apps that are user-friendly and customizable to their specific needs. Features like AI-driven alerts and personalized dashboards enhance engagement, making these tools more relevant to diverse caregiving scenarios. Usability remains a critical factor in determining parents' willingness to adopt these technologies (Dina et al., 2023).

Significance of the study

Childhood cancer is a major challenge and a crisis for any family, but knowing there is hope can make the challenge easier to endure. Childhood cancer has a worldwide incidence of more than 175,000 per year, with an estimated 96,000 deaths annually. In the United States in 2012, approximately 12,060 children under the age of 15 were expected to be diagnosed, and 1,340 children were expected to die from cancer. In Sweden, around 300 children are diagnosed annually, and three out of four are estimated to become long-term survivors (Frederiksen et al., 2022). In Egypt, as in many Arab countries, the true cancer incidence is unknown due to the absence of a national registry. The National Cancer Institute estimates that about 8,500 children in Egypt are diagnosed each year, and WHO estimated in 2004 that over 70 percent of children diagnosed in the North African region, including Egypt, are expected to die annually. The reasons for this high mortality have not been thoroughly investigated, partly due to underreporting and lack of cohesive data (Hasan et al., 2020; Sisk, Anies, Burrous & Dubois, 2020).

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A study done by Kristin et al., (2021) showed that all eligible caregivers consented to participate and completed the survey. Of the 40 caregivers who enrolled in the study, most used a mobile phone (n=34, 85%) and expressed high acceptability in using these devices to communicate with a health care provider regarding treatment support (n=39, 98%), receiving laboratory results (n=37, 93%), receiving reminders for upcoming appointments (n=38, 95%), and receiving educational information on cancer (n=35, 88%). Although only 9% (3/34) of mobile phone owners owned phones with smartphone capabilities, about 74% (25/34) self-reported they could view and read SMS text messages.

Mobile health technology has appeared as a trans formative tool in addressing the multifaceted challenges of childhood cancer care. Through smartphone applications, wearable devices, and telemedicine platforms, mobile health facilitates better communication between families and healthcare providers, ensuring timely access to critical information and support. it enables caregivers to monitor symptoms, manage treatment schedules, and access educational resources, which can reduce stress and improve the quality of care at home. Furthermore, mobile health tools provide opportunities for psychological support through virtual counseling and peer support groups, addressing emotional and social needs that are often overlooked (Panjwani, 2024).

Parents' knowledge about children cancer using mobile health is crucial for the effective management of childhood cancer. mobile health in caring for children with cancer refers to the use of mobile devices and technologies to support medical and public health practice. The parents of children with cancer have varying levels of knowledge about mobile health tools. While some parents are well-informed about the benefits of mobile health , such as remote monitoring and tale-consultations, others may lack awareness or understanding of these technologies. Educational initiatives and support from healthcare providers can significantly enhance parents' knowledge, enabling them to better utilize mobile health tools in their child's cancer care. (Panjwani, 2024)

Parents' attitudes towards mobile health used in caring of children with cancer disease vary among parents. Many parents express positive attitudes, recognizing the convenience and accessibility that mobile health offers. Tele-medicine, for instance, allows parents to consult with healthcare providers without the need for frequent hospital visits, reducing travel time and costs. However, some parents may have concerns about the reliability and security of mobile health tools, particularly regarding the confidentiality of their child's health information. Addressing these concerns through transparent communication and robust data protection measures can help build trust and foster more positive attitudes towards mobile health (Mohamed, Yousef & Ayed, 2022).

Aim of the study

The aim of the study was to assess Parent’s Perception of Mobile Health Technology Utilize in Home Care-Given to their Children with Cancer.

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Research question

What is Parent's Perception of Mobile Health Technology Utilize in Home Care-Given to their Children with Cancer?

SUBJECTS AND METHOD

Research Design

A descriptive research design was used in this study.

Study Setting

The study was conducted in the National Cancer Institute (NCI)- affiliated to Cairo university was. The institute provides services for all Egyptian population**.**

Sampling technique

A purposive sample of 363 parents and children's cancer were recruited.

Inclusion criteria:

1) Parents of cancer children (school age children) (the person who give direct child care).

2) Parents can read and write

3) Parents regardless of their age and social condition.

4) Able to communicate

5) Having smart phone

Sample size

Sample size was estimated using NQuery statistical package, version 7.0, Los Angeles, CA.

$$n = N/(1+N(e)2$$

Total population 6300

Sample size 363

Data Collection Tools:

Three tools for data collection utilized to conduct the present study included the following:

The First Tool (Parents and Cancer Children Interviewing Questionnaire): This tool consisted of two parts and contained 15 questions:

1st Part: Demographic characteristics of the studied parents included eight questions started from 1 to 8 as age, gender, level of education, marital status, occupation, residence and monthly income.

2nd Part: Demographic characteristics & medical data of the studied children included seven questions started from 9 to 15 as gender, age, child's order among family

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members, level of education, diagnosis of disease, duration of the disease, and staging of cancer and past chronic disease.

The Second Tool (Parents 'knowledge toward care given by using mobile health technology-interviewing questionnaire): this tool consists of two parts and included 19 questions concerning benefits and drawbacks of mobile health technology.

1st part : benefits of mobile health technology included 10 questions started from 1 to 10 as (monitor my child's medication adherence, improve communication with healthcare providers, monitor my child's nutrition, provide valuable health information for child, manage effectively my child's health conditions , provide reminders for necessary medical appointments., facilitate access to information resources about my child's health, data tracking can improve treatment outcomes, note my child's symptoms in a timely manner, offer support networks for parents of children facing health issues.

2nd part : drawbacks of mobile health technology included 9 questions started from 11 to 19 such as inaccurate data entry when using mobile technology may lead to misdiagnoses, relying on mobile delay asking consulting a doctor, using mobile might introduce errors of health information, only be used in emergencies, depend on availability and quality of the internet impact the connectivity and efficiency of mobile in healthcare, the large number of available applications lead to overwhelming, mobile costs can be a barrier for families, by using mobile lead to difficult in selecting reliable information, mobile reduced the number of necessary visits to the doctor.).

Scoring system for parents' knowledge for each question, the question were binary measures and the responses were entered as Yes or No. The right answer was scored two point and those wrong were scored one point. The total score ranged from 1 to 38 points. These scores were summed-up and converted into percent score and categorized into two levels as: -

- Satisfactory: if the percent of total score was 70-100%
- Unsatisfactory: if the percent of total score was less than 70%

The Third tool (Parents attitude regarding mobile health technology), it was designed by research investigator and adapted based on CassidyR (2021) and it will be used to assess parents' attitude regarding mobile health technology. This tool was consisted of four parts and includes 25 questions.

1st Part: Potential benefits of using mobile health technology was included five questions started from 1 to 5 such as (mobile helps better organize medication, mobile improves ability to monitor nutrition, mobile provides valuable information for dealing with the side effects as a result of treatment, mobile increases communication with healthcare team, mobile organized child care).

2nd Part: concerns and limitations was included five questions started from 6 to 10 such as (the accuracy of data generated by mobile health programs is a concern, the security and privacy of health data in mobile are concerns, technical issues make me hesitant to

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rely on mobile health technology, interpreting mobile health data and advice is difficult, mobile technology may replace doctor consultations.).

3rd Part: availability of using mobile health technology was included five questions started from 11 to 15 such as (Mobile health programs are easy to use, Support from Mobile health specialists is sufficient when problems arise, I have access to required mobile health technology, Mobile health information meets child specific needs, Feeling comfortable adding mobile health apps to child care.).

4th Part: general attitude regarding using mobile health technology was included 10 question started from 12 to 25 (mobile technology organize child healthcare, i recommend mobile health programs to other parents of children with cancer, mobile health technology will be key in future home cancer care, the current mobile health programs for child care are satisfactory, mobile has improved home care quality, mobile health use has improved healthcare, using mobile health is unclear, mobile health programs are easy to use, mobile makes healthcare more accessible and responsive, mobile is a reliable supplement to traditional healthcare).

Scoring system: for parents' attitude for each question, the responses were entered as agree (3 points), neutral (2points) and disagree(1point). The sum total attitude scores equal 75 points. converted into percent score and categorized into three levels as: -

- Positive attitude: - 70% and more than.
- Neutral attitude: - 35% to less than 70%
- Negative attitude: - less than 35%

Validity: Three experts' professors in the field of community health nursing (five professors of pediatric oncology and one professor in statistical oncology in addition to ethical committee in NCI), Cairo University, evaluated the produced tool's content validity; no changes were made.

Pilot Study: Prior to the main data collection, a pilot test of the data collection tools was conducted with a small sample of parents to identify any issues with the clarity or relevance of the questions. Feedback was used to refine the tools as necessary.

Ethical considerations: Approval was obtained from both the Research Ethics Committee at Faculty of Nursing-Cairo University and Research Ethics Committee at National Cancer Institute hospital. The investigator obtained approval from parents and inform the Parents about the purpose and nature of the study and emphasize that participation in this study is voluntary; each subject has the right to withdraw from the study when he wants.

Written informed consent was obtained from each participant. Anonymity and confidentiality were assured through coding the data. Subjects were assured that this data will not be reused in another research without their permission, and the data collected was used in the purpose for this research only. There is no harm will be felt on the participants in this study.

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Procedure

The data collection for the study was conducted in a systematic and ethical manner to ensure the reliability and validity of the findings. The following steps outline the procedures that will be followed:

- Ethical Approval: Prior to beginning of data collection, ethical approval was obtained from the Research Ethics Committee at the Faculty of Nursing, Cairo University, and the Research Ethics Committee at the National Cancer Institute (NCI). This was ensured that the study adheres to ethical standards and protects the rights of participants.
- Informed Consent: Before data collection, the purpose and nature of the study was explained to potential participants. Written informed consent was obtained from each parent who agrees to participate. Participants were informed that their participation were voluntary and that they could be withdrawal from the study at any time without any consequences.
- Data Collection Process: The research investigator conducted face-to-face interviews with participants in the outpatient clinics. Each interview was lasted approximately 20-30 minutes, during which the investigator administered the questionnaires and record responses. Data collection was conducted every Saturday and Thursday each week over a period of three months, with approximately 15 cases collected per day. These two days were specifically chosen because they have a higher number of cases.
- The investigator tracked the following steps during the data collection sessions: Administration of Questionnaires: The research investigator administered the questionnaires through face-to-face interviews. This approach allows for explanation of questions and ensures accurate responses. Recording Responses: Responses was recorded directly onto the questionnaires. For the knowledge and attitude assessments, the investigator guided parents through the questions, ensuring they understand each item. Use of Technology: If applicable, mobile health applications may be demonstrated to parents during the session to enhance their understanding of the technology being assessed.
- Data Management was performed by the investigator, all collected data was coded to ensure anonymity and confidentiality. Data was stored securely in a password-protected and electronic format.
- Pilot Testing: Prior to the main data collection, a pilot test of the data collection tools was conducted with a small sample of parents to identify any issues with the clarity or relevance of the questions. Feedback was used to refine the tools as necessary.
- Follow-Up and debriefing After the data collection session, parents will be thanked for their participation. A brief debriefing was provided, allowing parents to ask any questions about the study or the data collection process. Feedback Mechanism: Participants was informed that they can contact the investigator for any follow-up questions or concerns regarding the study.

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Statistical analysis:

Upon completion of data collection, the data was scored, tabulated, analyzed by computer using the "statistical package for the social science"(SPSS) program version 26. A descriptive statistic was utilized as frequency, mean, and standard deviation and chi square to analyze data pertinent to the study. Level of significance will be set at $P = 0.05$. P Value is the degree of significance.

RESULTS

Table (1): Percentage distribution of studied parents of their children with cancer about demographic data (n=366)

Personal characteristics	No.	%
Age		
Less than 20 years	2	.5
20 to <25 years	5	1.4
25 to <30 years	72	19.7
30 to <35 years	161	44
>35	126	34.4
Gender		
Male	97	26.5
female	269	73.5
Education		
Can read and write	92	25.1
Basic education	107	29.2
Secondary education	146	39.9
University education	21	5.7
Marital status		
Widow	22	6
Divorced	53	14.5
married	291	79.5
Job		
Housewife/unemployed	223	60.9
Employee	13	3.6
Free work	130	35.5
Residence		
Rural	105	28.7
Urban	55	15
suburb	206	56.3
Income		
Sufficient	141	38.5
Insufficient	215	58.7
Adequate and savings	10	2.7

Table 1 shows that 44% of studied parents aged 30-<35 years and 73.5% of them were females, while 39.9% of them had secondary education and 79.5% were married. Also 60.9% were housewives or unemployed and 56.3% lived in suburb places while 58.7% had insufficient income.

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Table (2): Percentage distribution of studied children with cancer about demographic data of studied children (n=366)

Personal characteristics	No.	%
Gender		
Male	258	70.5
Female	108	29.5
Age		
5-<10	187	51.1
10-<15	119	32.5
18	60	16.4
Rank		
First	213	58.2
Second	94	25.7
Third	47	12.8
Fourth or more	12	3.3
Education		
Nursery	2	.5
Primary	60	16.4
Preparatory	276	75.4
Secondary	28	7.7
Diagnosis		
Leukemia	173	47.3
Osteosarcoma	38	10.4
Lymphoma	29	7.9
melanoma& sarcoma	126	34.4
Duration of disease		
Less than 1 year	217	59.2
1 year or more	149	40.8

Table 2 shows that 70.5% of studied children were males, and 51.1% of them aged 5-<10 years while 58.2% of them were the first child. Also 75.4% of them had primary education and 47.3% had Leukemia while 59.2% of them had the disease for less than 1 year.

Table (3): Percentage distribution of knowledge of studied parents regarding Advantages of mobile health technology (n=366)

Knowledge items	Yes		No	
		%		%
1. Monitor my child's medication adherence	110	30.1	256	69.9
2. Improve communication with healthcare providers	106	29	260	71
3. Monitor my child's nutrition	110	30.1	256	69.9
4. Provide valuable health information for child	110	30.1	256	69.9
5. Manage effectively my child's health Conditions	103	28.1	263	71.9
6. Provide reminders for necessary medical appointments.	62	16.9	304	83.1
7. Facilitate access to information resources about my child's health.	109	29.8	257	70.2
8. Data tracking can improve treatment outcomes.	112	30.6	254	69.4
9. Note me my child's symptoms in a timely Manner	107	29.2	259	70.8
10. Offer support networks for parents of children facing health issues.	106	29	260	71.0

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Table 3 revealed that only 30.1% of parents said yes that monitor my child's medication adherence and 29% said yes that improve communication with healthcare providers and 30.1% said yes that monitor my child's nutrition while 30.1% said yes that provide valuable health information for child. and 28.1% said yes that Manage effectively my child's health conditions while 16.9% said yes that provide reminders for necessary medical appointments and 29.8% said yes that facilitate access to information resources about my child's health while 30.6% said yes that data tracking can improve treatment outcomes and 29.2% said yes that note me my child's symptoms in a timely Manner while 29% said yes that offer support networks for parents of children facing health issues.

Table (4): Percentage distribution of knowledge of studied parents regarding disadvantage of mobile health technology con, (n=366)

Knowledge items	yes		no	
	No.	%	No.	%
11. Inaccurate data entry when using mobile technology may lead to misdiagnoses.	301	82.2	65	17.8
12. Relying on mobile delay asking consulting a doctor.	80	21.9	286	78.1
13. Using mobile might introduce errors of health information.	302	82.5	64	17.5
14. Only be used in emergencies	83	22.7	283	77.3
15. Depend on availability and quality of the internet impact the connectivity and efficiency of mobile in healthcare.	280	76.5	86	23.5
16. The large number of available applications lead to overwhelming.	211	57.7	155	42.3
17. Mobile costs can be a barrier for families	285	77.9	81	22.1
18. By using mobile lead to difficult in selecting reliable information.	206	56.3	160	43.7
19. Mobile reduced the number of necessary visits to the doctor.	30	8.2	336	91.8

Table 4 revealed that only 82.2% of parents said yes that inaccurate data entry when using mobile technology may lead to misdiagnoses while 21.9% said yes that relying on mobile delay asking consulting a doctor and 82.5% said yes that using mobile might introduce errors of health information while 22.7% said yes that only be used in emergencies.

Also 76.5% said yes that Depend on availability and quality of the internet impact the connectivity and efficiency of mobile in healthcare and 57.7% said yes that large number of available applications lead to overwhelming while 77.9% said yes that mobile costs can be a barrier for families and 56.3% said yes that by using mobile lead to difficult in selecting reliable information. Also 8.2% said yes mobile reduced the number of necessary visits to the doctor

Figure 1 shows that 75.1% of studied parents have unsatisfactory knowledge regarding health technology on mobile phones while only 24.9% have satisfactory knowledge.

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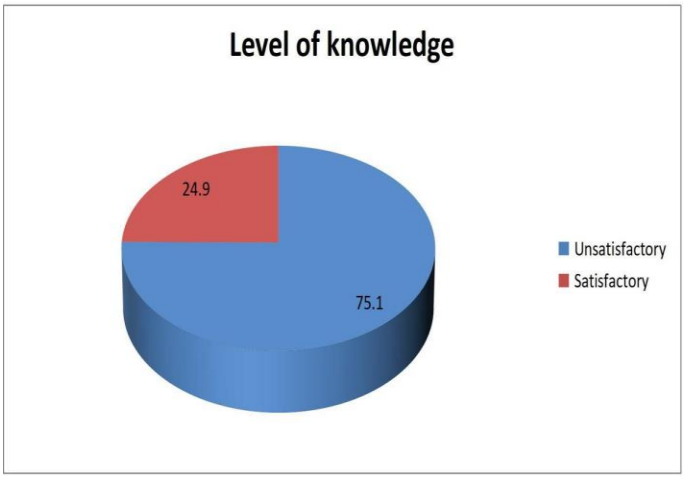

Figure (1): Level of knowledge of studied parents

Table 5 shows that 6.6% of parents agreed that mobile helps better organize medication and 15.8% agreed that mobile improves ability to monitor nutrition while only 15.6% agreed that Mobile provides valuable information for dealing with the side effects as a result of treatment.Also 7.4% agreed that mobile increases communication with healthcare team and 10.7% agreed that mobile organized child care.

Table (5): Percentage distribution of attitude of studied parents regarding Potential benefits of using health technology on mobile phones (n=366)

Attitude items	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
1. Mobile helps better organize medication.	24	6.6	49	13.4	293	80.1
2. mobile improves ability to monitor nutrition.	58	15.8	52	14.2	256	69.9
3. Mobile provides valuable information for dealing with the side effects as a result of treatment.	57	15.6	52	14.2	257	70.2
4. Mobile increases communication with healthcare team.	27	7.4	85	23.2	254	69.4
5. Mobile organized child care.	39	10.7	75	20.5	252	68.9

Table (6): Percentage distribution of attitude of studied parents regarding Concerns and limitations cont, (n=366)

Attitude items	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
6. The accuracy of data generated by mobile health programs is a concern.	271	74	79	21.6	16	4.4
7. The security and privacy of health data in mobile are concerns.	278	76	79	21.6	9	2.5
8. Technical issues make me hesitant to rely on mobile Health technology	319	87.2	30	8.2	17	4.6
9. Interpreting mobile health data and advice is difficult .	251	68.6	57	15.6	58	15.8
10. Mobile technology may replace doctor consultations.	123	33.6	65	17.8	178	48.6

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Table 6 shows that 74% of parents agreed that the accuracy of data generated by mobile health programs is a concern and 76% agreed that the security and privacy of health data in mobile are concerns while 87.2% agreed that technical issues make me hesitant to rely on mobile health technology and 68.6% agreed that interpreting mobile health data and advice is difficult.Also 33.6% agreed that mobile technology may replace doctor consultations.

Table (7): Percentage distribution of attitude of studied parents regarding easy of use and accessibility cont, (n=366)

Attitude items	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
11. Mobile health programs are easy to use	47	12.8	213	58.2	106	29
12. Support from Mobile health specialists is sufficient when problems arise.	34	9.3	212	57.9	120	32.8
13. I have access to required mobile health technology.	217	59.3	49	13.4	100	27.3
14. Mobile health information meets child specific needs.	58	15.8	206	56.3	102	27.9
15. Feeling comfortable adding mobile health apps to child care.	50	13.7	189	51.6	127	34.7

Table 7 shows that 12.8 % of parents agreed that mobile health programs are easy to use and 9.3% agreed that support from mobile health specialists is sufficient when problems arise while 59.3% were agreed that they have access to required mobile health technology and 15.8% agreed that mobile health information meets child specific needs.Also 13.7% agreed that they feeling comfortable adding mobile health apps to child care.

Table (8): Percentage distribution of attitude of studied parents regarding general Attitude cont, (n=366)

Attitude items	Agree		Neutral		Disagree	
	No.	%	No.	%	No.	%
16. Mobile technology organize child healthcare.	53	14.5	228	62.3	85	23.2
17. I recommend mobile health programs to other parents of children with cancer.	58	15.8	282	77.0	26	7.1
18. Mobile health technology will be key in future home cancer care.	59	16.1	284	77.6	23	6.3
19. The current mobile health programs for child care are satisfactory.	23	6.3	244	66.7	99	27
20. Mobile has improved home care quality.	21	5.7	253	69.1	92	25.1
21. Mobile health use has improved healthcare.	25	6.8	303	82.8	38	10.4
22. Using Mobile health is unclear.	262	71.6	34	9.3	70	19.1
23. Mobile health programs are easy to use.	58	15.8	218	59.6	90	24.6
24. Mobile makes healthcare more accessible and responsive	54	14.8	278	76.0	34	9.3
25. Mobile is a reliable supplement to traditional healthcare	55	15	219	59.8	92	25.1

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Table 8 shows that 14.5% of parents agreed that mobile technology organize child healthcare and 15.8% agreed that they recommend mobile health programs to other parents of children with cancer. Also 16.1% agreed that mobile health technology will be key in future home cancer care. While 6.3% agreed that The current mobile health programs for child care are satisfactory.. Also 5.7% of parents agreed that Mobile has improved home care quality and 6.8% agreed that mobile health use has improved healthcare while 71.6% agreed that using mobile health is unclear and 15.8% agreed that mobile health programs are easy to use. Also 14.8% agreed that mobile makes healthcare more accessible and responsive and 15% agreed that mobile is a reliable supplement to traditional healthcare.

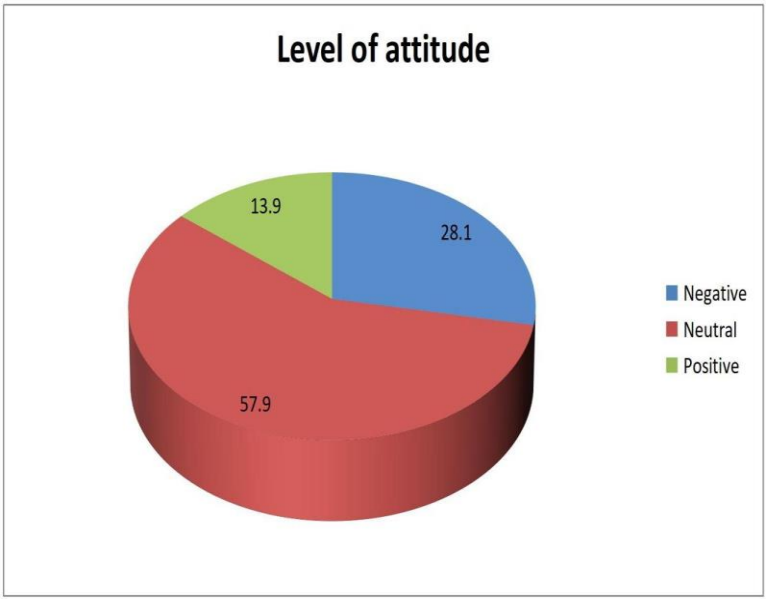

Figure (2): Level of attitude of studied parents

Figure 2 shows that 57.9% of studied parents have neutral attitude towards health technology on mobile phones while 28.1% have negative attitude.

Table (9):Relationship between Personal characteristics of studied parents and their knowledge

Personal characteristics	knowledge		p
	mean	sd	
Age			
Less than 20 years	25.00	1.41	
20 to <25 years	23.80	0.45	
25 to <30 years	27.08	4.97	0.62
30 to <35 years	26.65	4.86	
>35	26.63	4.66	
Gender			
Male	26.57	4.50	
Female	26.72	4.87	0.7
Education			

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literate	26.27	4.39	
basic education	26.53	4.67	
secondary education	26.88	5.00	
university education	27.90	5.23	0.49
Marital status			
Widow	27.05	4.64	0.23
Divorced	26.62	4.70	
Married	26.62	4.79	
Job			
Housewife/unemployed	26.82	4.95	
Employee	27.69	5.65	0.49
Free work	26.35	4.36	
Residence			
Rural	26.10	4.35	0.31
Urban	26.76	4.90	
suburb	26.96	4.93	
Income			
Sufficient	26.48	4.73	0.26
Insufficient	26.91	4.83	
Adequate and savings	24.60	3.47	

Table 9 revealed that the highest mean score of knowledge 27.08 was for age group 25 to <30 years old with p=0.62 while for female 26.72 with p=.7 , and for university education (27.90) with p=0.49 also for married status 27.05 with p=0.23 ,and for employee 27.69 with p=0.49,while for residence in rural 26.10 with p=0.31 and for sufficient income 26.48 with p-0.26.

Table (10): Relationship between Personal characteristics of studied parents and their attitude

Personal characteristics	attitude		p
	mean	sd	
Age			
Less than 20 years	44.50	7.78	
20 to <25 years old	43.40	8.02	
25 to <30 years old	50.03	7.33	0.4
30 to <35 years old	49.20	8.06	
>35	49.44	8.39	
Gender			
Male	49.62	8.53	0.69
Female	49.24	7.87	
Education			
literate	48.28	7.57	
basic education	48.60	7.44	
secondary education	49.90	8.59	
university education	53.86	7.62	0.01*
Marital status			
Widow	51.18	6.08	0.03*
Divorced	47.25	8.18	
Married	49.51	8.08	

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Job			
Housewife/unemployed	49.12	8.04	
Employee	54.46	7.71	0.06
Free work	49.22	7.96	
Residence			
Rural	47.97	7.85	
Urban	49.93	9.14	
Suburb	49.88	7.77	0.11
Income			
Sufficient	48.64	8.33	
Insufficient	49.91	7.87	0.22
Adequate and savings	47.00	6.63	

*significant at p-value<0.05

Table 10 revealed that there is a significant relation between parents' attitude and their education and also marital status. The highest mean score of attitude 50.03 was for age group 25 to <30 years with p=0.4 while for male 49.62 with p=.69 and for university education 53.86 with p=0.01, while for widow 51.18 with p=.03 and for employee 54.46 with p=0.06, and for insufficient income 49.91 with p=0.22.

Table (11): Correlation between knowledge and attitude of studied parents regarding mobile health technology (n=366)

Scores	**Attitude**	
	R	P
Knowledge	0.61	**0.00***

*Significant at p-value<0.05

Table 11 shows that there is a significant strong direct positive correlation between knowledge and attitude of studied parents regarding **mobile health technology(r=0.61, p=0.00).**

DISCUSSION

The study findings indicated that more than three quarters of parents were females among caregivers. This finding was in contrast with (Ahmed et al., 2025) in Egypt, (n=179) which about Satisfaction level of family caregivers of children with cancer towards home care. who reported that, (53.00%) of the family caregivers were mothers.From researcher point of view, this finding reflected persistent gender patterns in family care giving responsibilities, particularly in the framework of childhood illness.

The study findings indicated that more than one third of parents of children with cancer had secondary education.This finding was in contrast with (Chaghazardi, Janatolmakan, Rezaeian & Khatony, 2022) In Iran (n= 270) which about "Care burden and associated factors in caregivers of children with cancer". The study stated that, (19.9%) of caregivers had secondary level of education.From researcher point of view, this finding indicated that a moderate educational level among the study population. Educational accomplishment served as a critical determinant of health knowledge, which directly

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influences the ability to grasp, appraise, and apply health information delivered through digital platforms.

The study findings indicated that more than two thirds of the children with cancer were males, while only around one third were female. The study finding in agreement with (Zaky et al., 2024) in Egypt, Pattern of Childhood Cancers in Minia Govern-orate. Who reported that 51 (53.1%) were males and 45 (46.9%) were females, with a mean age of 9.08±4.97 years.From researcher point of view, The gender difference is consistent with findings from international cancer registries, which often report a higher incidence of cancer among boys compared to girls.This consistency across studies may reflect biological factors, such as genetic or hormonal differences, that predispose males to certain childhood cancers.

Additionally, sociocultural factors and healthcare-seeking behaviors in Egypt might contribute to earlier diagnosis or higher reporting of cancer cases among male children. Therefore, the observed gender distribution warrants further investigation to clarify the underlying biological, environmental, and social determinants influencing childhood cancer patterns in Egypt.

The study finding showed that around one third of parents of children with cancer recognized mobile health role in monitoring their child's medication adherence, and providing valuable health information. This result in line with (Lee et al., 2024) in the University of California, Irvine (UCI) in the United States (Irvine, California), (n=43) which about Mobile Apps for Children's Health and Well-being: Design Features and Future Opportunities, who reported that (32%) of parents had ambiguity in the expected roles of m Health profits and the intended age groups.Researcher point of view, This suggested that there was a gap in awareness about how mobile heath can support daily care-giving tasks, which is critical for children with chronic conditions like cancer.

The study finding showed that around one third of parents of children with cancer recognized mobile heath role in nutrition. The study finding in contrast with (Vázquez-Paz, et al., 2022) in Mexico which about “Parents’ mobile health App for promoting healthy eating behaviors in children: Feasibility, acceptability, and pilot study”. The study mentioned that (60%) of parents affirmed that PersuHabit mobile health application promote the children intake of fruits and vegetables (FVs) and reduce the intake of ultra-processed foods (UPF) in children.

Researcher point of view, This discrepancy may reflect differences in population characteristics, cultural context, or familiarity with digital interventions. These findings highlight a potential gap in awareness and engagement with mobile health nutrition tools among parents of pediatric cancer patients and suggest the need for tailored strategies to increase acceptance and utilization in clinical populations with specialized nutritional needs. The study results highlighted that the around three quarters of parents of children with cancer agreed that the accuracy of data generated by mobile health programs is a concern. The study finding in line with (Stuijt et al., 2025).

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Remote Patient Monitoring Using Mobile Health Technology in Cancer Care and Research: Patients' Views and Preferences among 13 patients with cancer in Netherlands. This highlighted that 80% of patients had not acquainted with the use of digital monitoring devices or wearable, Also, in agreement with (Alhammad et al., 2024), In UK, (n= 33). Patients' perspectives on the data confidentiality, privacy, and security of mobile health apps. It found that more than half (54%) patients and caregivers frequently cite data accuracy as a major barrier to trusting mobile health apps, especially in complex conditions like pediatric cancer.From investigator point of view,The agreement among the three studies shows that data accuracy is a major concern for both parents and patients using mobile health tools. Limited familiarity with digital devices and doubts about reliability reduce trust in these technologies, highlighting the need for clear data validation and user guidance to improve confidence and adoption.

Also, the study results highlighted that the majority parents of children with cancer agreed that the security and privacy of health data in mobile are concerns. The study finding in line with (Olsen et al., 2025), in Australia, (n=117,905 participants). Worldwide willingness to share health data high but privacy, consent and transparency paramount, a meta-analysis. Which (70%) users of health apps expressed concerns about data breaches and illegal access to sensitive medical details and misused. From investigator's point of view both studies indicate that parents and users of health apps are highly concerned about data privacy and security, including fears of breaches, unauthorized access, and misuse of sensitive information, emphasizing the need for robust protections, transparent data handling, and clear consent processes to increase trust and adoption of mobile health technologies. The study findings highlighted that there was a significant strong direct positive correlation between knowledge and attitude regarding mobile health technology among parents of children with cancer specifically, ($r = 0.61$, $p < 0.05$). It demonstrated that as parental knowledge about mobile health tools rises, their attitudes toward using these technologies become more satisfactory and favorable. This strong statistical relationship emphasized the critical role of education and information access in shaping caregiver receptivity to digital health innovations during pediatric oncology care.

The study result is in agreement with (Delemere & Maguire, 2021). Technology usage, eHealth literacy and attitude towards connected health in caregivers of pediatric cancer included 85 caregivers participated in the study in Ireland. The study findings indicated a significant strong positive correlation between knowledge and attitude regarding mobile health technology among parents of children with cancer, with a correlation coefficient of ($r = 0.58$, $p < 0.05$). This suggests that higher parental knowledge about mobile health is associated with a more positive attitude towards using technology for managing their child's health. And in line with (Heydari et al.,2022). Predictors of Perceived Family Sense of Coherence in Parents of Children with Cancer among 125 parents of children with cancer in Iran. The study reported a moderate positive correlation between parental knowledge of cancer care and their overall family sense of coherence, with ($r = 0.55$, $p < 0.05$). Supporting the idea that knowledge positively influences parental attitudes and coping abilities.

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CONCLUSION

The parents of children with cancer had moderate to good levels of total knowledge and a total attitude toward mobile health technology. However, there was a clear weakness in practical awareness and acceptance of mobile health technology specific benefits. This pattern showed that although total scores seem moderately high, parents' responses are led by hesitation and fear, with limited confidence about the usefulness of mobile health in daily regular pediatric cancer care. The parents' attitudes are significantly influenced by education level ($p=0.01$), where higher education was correlated with more positive attitudes toward mobile health technology. there were No significant relationships between parents' knowledge and their demographic characteristics. Importantly, there was a strong, statistically significant positive correlation between knowledge and attitude ($r=0.61$, $p<0.05$), signifying that refining parents' knowledge is expected to improve their acceptance and willingness to use mobile health technology.

RECOMMENDATION

In the light of the findings of the present study, the following recommendations were concluded:

- Improve knowledge and attitude of parents toward mobile health technology utilization to their cancer children
- Increase training on using smart phone among parents have children with chronic disease regardless educational level.
- Replication of the present study to compare the study results with other studies that assessed the parent's perception of home care-given to their cancer children.
- The Researchers should explore how increased exposure to mobile health tools over time affects knowledge and attitudes and assess the impact of mobile health use on clinical outcomes, treatment adherence and children quality of life. Creating focus groups and interviews to identify the specific fears and motivations of parents regarding mobile health approval.

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