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Effect of Telenursing Intervention on Mothers' Care regarding their Children with Juvenile Idiopathic Arthritis

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Abstract
Background: A variety of chronic arthritis types in children are grouped together under the broad name juvenile idiopathic arthritis. **Aim:** This study aimed to evaluate the effect of telenursing intervention on mothers' care regarding their children with juvenile idiopathic arthritis **Design:** A quasi- experimental design was utilized. **Settings:** The study was conducted at Rheumatology Outpatient Clinic in Benha University Hospital and Children's Specialized Hospital at Benha City, Egypt. **Sampling:** Purposive sample was used to carry out this study. The total sample size included 75 mothers having children with juvenile idiopathic arthritis. **Tools of data collection:** One tool was used in this study; an interviewing questionnaire composed of four parts as socio-demographic characteristics of the studied mothers and personal characteristics of studied children, medical history, mothers` knowledge and reported practices regarding care of their children with juvenile idiopathic arthritis. **Results:** 9.4% of studied mothers had good level of knowledge regarding juvenile idiopathic arthritis at pre telenursing intervention which improved to 81.3% of them at post telenursing intervention. 10.7% of studied mothers had adequate level of reported practice at pre telenursing intervention that improved to 86.6% of them had adequate level of reported practice at post telenursing intervention regarding care of their children with juvenile idiopathic arthritis. **Conclusion:** Telenursing intervention was succeeded in increasing knowledge and improving practices of mothers regarding care of their children with juvenile idiopathic arthritis. **Recommendations:** Continuing Telenursing intervention for increasing knowledge, and improving practices of mothers regarding the care of their children with juvenile idiopathic arthritis.

Keywords: Children, Juvenile Idiopathic Arthritis, Mother's Care & Telenursing Intervention

Introduction:
The long-lasting condition known as Juvenile Idiopathic Arthritis (JIA) is defined by ongoing joint inflammation. Pain, swelling, stiffness in the joints, and restricted movement are common symptoms of joint inflammation. In the present instance, "juvenile" refers to the fact that the onset of symptoms typically happens before the age of sixteen and "idiopathic" denotes the fact that the cause of the illness is unknown. Furthermore, JIA is a type of childhood arthritis. JIA impacts on one or more joints for at least six weeks. JIA is a comparatively uncommon illness that affects one or two children of every 1,000 children **(Martini et al., 2022).**

It is estimated that JIA affects 3 million children and young people globally. Between 1.6 and 23 cases of JIA occur for every 100,000 people, whereas the prevalence ranges from 3.8 to 400 per 100,000 (**Al-Mayouf et al., 2021).** JIA is also called "autoimmune", which indicates that the child's immune system is attacking the own body. The exact mechanisms causing JIA are unknown, as is the case with most chronic inflammatory illnesses in humans. Since JIA cannot be inherited, it cannot be passed down from parents to their offspring. However, certain people are predisposed to the disease by certain hereditary variables, and there are even more that are unknown **(Shenoi et al., 2024)**.

The Juvenile Idiopathic Arthritis is diagnosed based on the existence and level of severity of arthritis as well as an accurate rejection of all other diseases through a patient's medical history, physical examination, and laboratory testing. JIA is when arthritis develops before the age of sixteen, all other possible causes have been ruled out and symptoms must persist for longer than six weeks. This six-week interval is designed to permit the exclusion of others. Types of arthritis that are temporary, such those that may develop after certain infections. All types of chronic arthritis with childhood onset and unclear cause are referred to as JIA **(Huang et al., 2024).**

There are various types of JIA and mostly depend on how many joints are impacted. **Systemic JIA;** refers to arthritis as well as possible involvement of several body organs. Fever, rash, and acute organ inflammation are the hallmarks of systemic JIA,

which can occur prior to or concurrently with arthritis (**Zhao et al., 2023) .**

Polyarticular JIA; occurs when five or more joints are affected within the first six months of the illness without a fever. Rheumatoid factor (RF)-based blood tests can differentiate between two kinds of JIA: RF positive and RF negative. **Oligoarticular JIA;** is the most common subtype of JIA, making for about 50% of all cases. It is distinguished by the existence of fewer than five joints implicated in the early stages of the disease, without the appearance of systemic symptoms. It asymmetrically affects big joints, such the ankles and knees **(Ramos et al., 2024).**

Psoriatic arthritis is an inflammatory skin disease characterized by scaling skin patches that are commonly found on the elbows and knees. **Iridocyclitis,** a kind of chronic anterior uveitis, is one of the more frequent and dangerous side effects linked to JIA. About 15% to 20% of JIA children have the disease, which might result in irreversible blindness. Additionally, in developing children with chronic arthritis, growth problems such as leg length disparity and further risks include osteoporosis and osteopenia, permanent joint degeneration, and persistent arthritis that result in considerable disability, functional limits and psychosocial problems involving anxiety and absenteeism from school due to JIA **(Huirache et al., 2024).**

There isn't a particular treatment for JIA. Treatment's objectives are to reduce deformities, limit pain, exhaustion, and stiffness, avoid joint and bone deterioration, enhance mobility, and maintain growth and development. Treating JIA should happen rapidly and effectively to manage systemic problems and support normal physical and psychosocial development. One should not undervalue the significance of supportive measures, such as sufficient diet, calcium, and vitamin D supplements. A multidisciplinary strategy is used to treat JIA, involving psychological therapies, medication therapy, and physical and occupational therapy. Pharmacologic therapy as Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) is the initial line of treatment and may be appropriate to manage mild forms of arthritis **(Peter et al., 2023).**

Joint injections are utilized when a child is experiencing excruciating pain from one or more inflamed joints that are preventing the joint from moving normally. A long-acting corticosteroid formulation was administered to prevent pain, stiffness, muscle contractures, and joint abnormalities, physical therapy and rehabilitation are crucial components of management. Involve suitable exercises and, when necessary, the use of splints to keep joint position in a comfortable position. Orthopedic surgery's primary functions include replacing artificial joints (usually the hips and knees) when articular damage occurs and surgically releasing soft tissues when irreversible contractures occur **(Huang et al., 2024).**

One of the time- and money-saving technological innovations is tele-nursing that can be extremely important to patient care and provide access to home nursing services. A subset of tele-health is tele-nursing, which is the provision of long-distance nursing care using information and communications technologies such as computers, phones, fax systems, computers, internet, and remote monitoring devices. Therefore, real-time audiovisual communication is now widely available to nurses and patients by means of the use of smartphones and tablets **(Abd-Ellatif et al., 2023)**.

Furthermore, tele-nursing is another technique for providing nursing care remotely to enhance efficiency and patient access to healthcare. Using this technology allows rapid access for the nursing care services cost savings and easy access to the most appropriate specialized skills. Overall, the quality of provision of health services to patients increased and provide quick access to better nursing services by removing geographical barriers and can reduce the spread of infections in the event of epidemics. Additionally, the tele-nursing offers remote consultations and training for patients as well as creating email-based submission conditions for training programs for patients and the relatives of the patients **(Abd-Almageed et al., 2022).**

Nurses can conduct tele-nursing sessions from hospitals, clinics, and homes by using technology. With the development of tele-nursing, patients particularly mothers of children with chronic illnesses, who are unable to travel great distances for medical services or consultations, can receive education from a distance. Tele-nursing is generally a productive way to improve childcare and illness management **(Patti & danise, 2019).**

There are numerous drawbacks and obstacles to tele-nursing, such as the absence of in-person interactions between patients and healthcare providers and inability to conduct physical assessments. This constraint may impede precise diagnosis and therapeutic strategies. Furthermore, not every patient has access to the internet or technology needed for tele-nursing where access to care may already be impeded **(Gajarawala & Pelkowski, 2021).**

Nurses can provide remote nursing care including supervision, data collection, remote interventions, and pain control by utilizing creative methods like tele-nursing especially with children with chronic diseases as JIA. The nursing care management plan for children focuses on a number of important areas, including managing symptoms and reducing

inflammation and pain, helping with movement and positioning, and educating and supporting the family and caregivers. Nurses can help mothers of JIA children manage the condition. A crucial component of the treatment regimen's success is the mothers' compliance. Follow-up contributes to the effective management of JIR **(Garner et al., 2021).**

It is important to inform mothers of children affected by JIR disease of the potential problems. Nurses should keep the team informed about the children's condition, in addition to educating mothers about medications, the disease process itself and potential lifestyle modifications, as (physical exercise to emphasize range of motion with minimal joint stress, nutritional guidelines), enhancing body image and self-esteem, psychosocial support, regular follow-up care and medication compliance to manage the disease **(Thatayatikom et al., 2023).**

Significance of the study:

Juvenile idiopathic arthritis is a collection of long-term, diverse illnesses that cause inflammation in the joints in patients under the age of sixteen, with a continuously higher prevalence rate in females. The Middle East and Africa are home to a wide range of ethnic groups, socioeconomic situations, and temperatures that all affect how common JIA is **(Al-Mayouf et al., 2021).** According to the first epidemiological study on JIA in Egypt, there were 3.43 cases of JIA for every 100,000 people living in the Sharkia Governorate. The prevalence was 2.58 per 100,000 for boys and 4.33 per 100,000 for girls **(Abou El-Soud et al., 2013).** 20% of children in Egypt between the ages of two and eighteen years had systemic JIA; 10% had oligoarthritic; 40% had undifferentiated arthritis, 6% had psoriatic arthritis, enthesitis-related arthritis, and RF positive polyarthritis, and 24% had RF negative polyarthritis **(El-Miedany et al., 2018).**

Due to the numerous advantages of telenursing and its capacity to enhance patient education irrespective of time and location constrains and considering the current restriction on mothers` hospital admission. Therefore, the purpose of this study was to evaluate how tele-nursing intervention could improve mothers' practices and knowledge about caring for their children with JIA.

Aim of the study:

The study aimed to evaluate effect of telenursing intervention on mothers' care regarding their children with juvenile idiopathic arthritis through the following objectives:

- Assess mothers' knowledge regarding juvenile idiopathic arthritis and telenursing
- Assess mothers' reported practices regarding the care of their children with juvenile idiopathic arthritis.
- Design, implement and evaluate telenursing intervention for mothers of children with juvenile idiopathic arthritis.

Research hypothesis:

Mothers who received telenursing intervention will be expected to improve their knowledge and reported practices regarding care of their children with juvenile idiopathic arthritis.

Subjects and Method

Research design:

A quasi-experimental design (pre-posttest) was utilized in this study.

Settings:

The study was carried out at Rheumatology Outpatient Clinic at Benha University Hospital and Children's Specialized Hospital at Benha City, Egypt.

Sampling:

Purposive sample was utilized. There were 75 mothers with children suffering from juvenile idiopathic arthritis altogether (30 children at Benha University Hospital and 45 at Children's Specialized Hospital)., were included throughout a six-month period. The following inclusion criteria were used to take mothers and their children:

- Mothers own a smartphone with internet connection and at least secondary level of education.
- Mothers whose children are free of any other illnesses have been diagnosed with juvenile idiopathic arthritis.
- Children aged from 6-14 years old.
- Children and their mothers not previously attended telenursing.
- The willingness of both mothers and their children to participate voluntarily.

Tool of data collection:

Data was gathered using one tool. An interview form: Researchers created it. It has four sections and is designed in plain, easy-to-read Arabic to evaluate the following:

First Part:

A) Socio-demographic characteristics of the studied mothers: It included 8 items closed ended questions about age, educational level, occupation, marital status, residence, and monthly family income, mothers' source of information about juvenile idiopathic arthritis.

B) Personal characteristics of studied children: Consisted of 6 items closed ended questions about age, gender, ranking in family, child educational stage, regular attendance for school day and causes of irregular attendance for school day.

Second Part: Medical history of the studied children consisted of 8 items closed ended questions about period of disease, signs and symptoms appearing on child, the type of joint affected in the child, type of medication, side effect appearance on child from medication, complications appearance on child due to disease, previous hospitalization related to juvenile arthritis and family history.

Third part:

A) It was developed to assess studied mothers' knowledge about idiopathic juvenile arthritis, adopted from **(Klippel etal., 2008)** which included 7 items inform of multiple-choice questions such as meaning, causes and risk factors, signs and symptoms, types, diagnosis, complications, treatment of juvenile idiopathic arthritis.

B) Mothers' knowledge about tele-nursing, which included 5 items inform of multiple-choice questions such as definition, goals, advantages, disadvantages and means of communication used in tele-nursing.

Scoring system for knowledge:

Knowledge score for each answer was given as follows:

2= Complete & correct answer,

1= Incomplete & correct answer

0 = Don't know

The total score ranged from 0 to 24. Those who achieved ≥75% of the total score (≥18), were considered good. While considered average if it is equaled 50-<75% from the total score (12-<18) and considered poor if it is was<50% from the total score (<12) **(Mohamed et al., 2024)**.

Fourth part: Concerned with mothers' reported practices regarding the care of their children with juvenile idiopathic arthritis adopted from (Covert, 2020): It was made up of (10 sections) divided into:

Help reduce joint stiffness: Involved **(5 items)** such as (apply heat to stiff and painful joints for 20 minutes repeating as needed, make sure that hot water bottles and hot compresses are not too hot for your child's skin…. etc).

Pain management for children: Involved **(9 items)** such as do relaxation exercises, as progressive muscle relaxation, guided imagery, and meditative breathing exercises. Make exercise to help relieve pain, do not allow child to overexert himself while exercising, distract child to distract them from the pain as talking to child or reading to them can give them something to focus on, do fun activities with child can also help……etc)

Splinting care: Involved **(4 items)** such as (remember to check splint regularly, combine wearing splint with an active exercise program, splints shouldn't cause red areas and report any problems due to splint immediately…...etc).

Helping child for doing exercise: Involved **(17 items)** such as (set a goal for child to exercise, set a reminder on cell phone or watch to exercise, make the time as fun as possible, choose a place where child will exercise, choose the order in which to do different exercises (hands/wrists first, then knees), do exercises to music, ask other family members to do exercises with you, take photos or even video-tape for exercises…etc).

Encourage child for sleeping routine: Involved **(6 items)** such as (encourage a regular bedtime routine for a good night's sleep, agree on a time to turn off cell phones and/or tablets, warm their bed with a hot water bottle before bed……etc).

Using assistive devices while child doing exercise: Involved **(10 items)** such as (using a cane or crutch on the side opposite the painful knee or hip can help reduce pressure on the joint, use a reached to pick up objects off the floor or to grasp items on top of cabinets, use high chairs or seat cushions to avoid sitting on chairs that are too low and difficult to get in and out of……..etc).

Medication compliance and follow up for child: Involved **(10 items)** such as (keep medication where you can see it, keep a medication chart and make sure that you know when to take each dose, be organized and use pill boxes and keep track of your entire medication for a week, take each dose with food or after a snack or meal to help avoid stomach upset ……etc).

Balanced diet for child: Involved **(7 items)** such as (eat a diet rich in fiber that protects against inflammation, intake protein that is important for growth and development, eat colorful fruits and vegetables …etc).

Adaptation and support for child: Involved **(9 items)** such as (allow child to vent their anger about their JIA, explain that nothing they did caused the disease, encourage child to participate in physical activities, following the recommendations of child's physical therapist…...etc.

Instructions when attending school: Involved **(7 items)** such as (Allow child extra time to get to class, allow child to write, record, or provide answers verbally instead of typing, allow extra time to complete tests or assignments, allow child to get up and move around class…. etc.

Scoring system: Mothers' reported practices were scored using the following: a score of 1 indicated done and a score of 0 indicated not done. A mean score was calculated by adding up all of the item scores and dividing the total by the number of things. Percentage scores were generated from these scores. The total score of reported practices was (84) points. Reported practices was considered adequate if the total score was ≥60% (50 points and more), and

Inadequate if the total score was < 60% (less than 50 points) (**Jones et al., 2024).**

Ethical consideration:

The Faculty of Nursing's Research Ethical Community at Benha University provided written consent with **Code REC.CHN.P41**. The mothers' consent and their involvement were obtained following an explanation of the study's objectives. At any time during the study, they had the option to withdraw and to decline participation. They were also given the assurance that the data would be kept private and utilized exclusively for research. The researcher stressed that there is no obligation to participate in the study.

Reliability of the tool:

The reliability of the data gathering tool was evaluated by test-retest reliability. Using Cronbach Alpha, the study instrument's dependability was evaluated. Reliability for studying mothers' knowledge R=0.88, and for reported practices of studied mothers' R=0.79. This only proves that this tool is an instrument with good reliability.

Validity of the tool:

Five professionals from Faculty of Nursing Benha University who specialize in Community Health Nursing and Pediatric Nursing evaluated the data collection tool content validity. who checked the tool for completeness, relevance, and clarity; any necessary changes were made.

Pilot study:

The pilot study was carried out on (10%) of the sample size studied represented (7) mothers with their children. The purpose of the pilot study was to evaluate the tool's usability, clarity, and feasibility as well as the amount of time required to complete each sheet. The pilot study sample was included in the whole sample because no changes were made.

Field work

In order to gather data, the researchers first received formal permission from the dean of Benha University's Faculty of Nursing and requested cooperation and consent. The directors are notified by the top administrator of Benha University Hospital and Children's Specialized Hospital to carry out the study. The researchers then greeted and conducted interviews with the research participants. The researchers spent one day a week, from 9 am to 12 pm, visiting the study locations. Individualized mother's interviews were conducted, on average 2–4 mothers per week. Mothers who have children with juvenile idiopathic arthritis were interviewed while they were waiting for treatment or examination and accomplish mother care sessions through Zoom application. The present study lasted for six months, from the beginning of January 2024 to the end of June 2024. The telenursing intervention was applied for the study group through four essential phases: Assessment, planning, implementation, and evaluation.

Assessment phase: Throughout this phase, mothers who have children with juvenile idiopathic arthritis were interviewed, permission to participate in the study was asked for, and the study's objectives were described. Then, each group had a separate interview to assess their Scio demographic characteristics, medical history of their children, as well as mothers' knowledge about juvenile idiopathic arthritis and telenursing and reported practices regarding the care of their children with idiopathic juvenile arthritis. The interview lasted 20 to 30 minutes on average for each group. The researcher conducted the pre-test during this phase.

Planning phase: The telenursing intervention was constructed taking into consideration the demands and needs mentioned by the studied mothers during the assessment phase, as well as a review of relevant literature and the educational booklet which was provided in Arabic language and included pictures. The researchers created the timetables for the sessions and the research objectives. The media, various teaching modalities, the number of sessions, and their content were all considered.

Implementation phase: The telenursing intervention implementation was achieved at the previously specified settings. In this phase the researcher implemented the telenursing intervention for the mothers, was provided in six sessions, each lasting 20 to 30 minutes and involving discussion, power point presentations, demonstration and instructional videos. The sample was separated into 10 groups, with 6-8 mothers in each group. Each group received the same sessions. Health education was provided through the Zoom application (tele-health education), through online sessions by sending invitation link through WhatsApp application, explaining how to enter through **the link (https://us05web.zoom.us)** and how to use it. Each session started with a summary of the previous session and objectives of new topics. To clear up any misunderstandings, the researcher conducted telenursing intervention sessions for mothers after obtaining approval for both general and specific goals. They were also notified of the next session's time.

In the first session: The meaning, causes, and risk factors were briefly addressed by the researchers, signs and symptoms, types, diagnosis, complications, treatment of juvenile idiopathic arthritis.

In the second session, the researchers talked about idiopathic juvenile arthritis diagnosis, side effects, and management. Additionally, the **third session** discusses a definition, goals, advantages, and

disadvantages of tele-nursing and the means of communication used in tele-nursing.

In the fourth session, mothers received an explanation about the care of their children with juvenile idiopathic arthritis regarding (Helping reduce joint stiffness, pain management for children and splinting care).

In the fifth session, the researchers covered (Help child for doing exercise, encourage child for sleeping routine and using assistive devices while child doing exercise).

In **the sixth session**, the researchers covered (Medication administration for children, balanced diet for child, adaptation and support for child and instructions when attending school).

Feedback on the previous session was provided at the end of each session to make sure mother understood, and the objectives of new topics were discussed.

Evaluation stage:

Utilizing the same format as the pre-test, the post-test questionnaire was used to compare the mothers' knowledge and reported practices and assess the effectiveness of the intervention.

Statistical analysis:

For the data analysis, SPSS software (version 25) was used. Numerical data were expressed using the mean, SD, and range. Frequency and percentage were utilized for presenting qualitative data. The nominal variables were compared using chi-square tests (X^2). And linear correlation coefficient (r), and matrix correlation to detect the relation between the variables (P value). Significance levels were considered as follows: Highly statistically significant $P < 0.001$** Statistically significant $P < 0.05$* Not significant $P > 0.05$

Results:

Table (1): Distribution of the studied mothers regarding their socio- demographic characteristics (n=75)

Socio- Demographic Characteristics	Studied Mothers	
	No.	**%**
Age (years)		
25 - < 30	5	6.6
30 -<35	20	26.6
35-<40	**37**	**49.4**
-≤40	13	17.4
Mean± SD 36.28 ±4.66 years		
Educational level		
Secondary education	29	38.7
University education	**32**	**42.7**
Postgraduate	14	18.6
Occupation		
Housewife	38	50.7
Employee	23	30.7
Free business	14	18.6
Marital status		
Married	51	68.0
Widow	18	24.0
Divorced	6	8.0
Residence		
Rural	56	74.7
Urban	19	25.3
Monthly family income		
Enough and save	8	10.7
Enough	**58**	**77.3**
Not enough	9	12.0

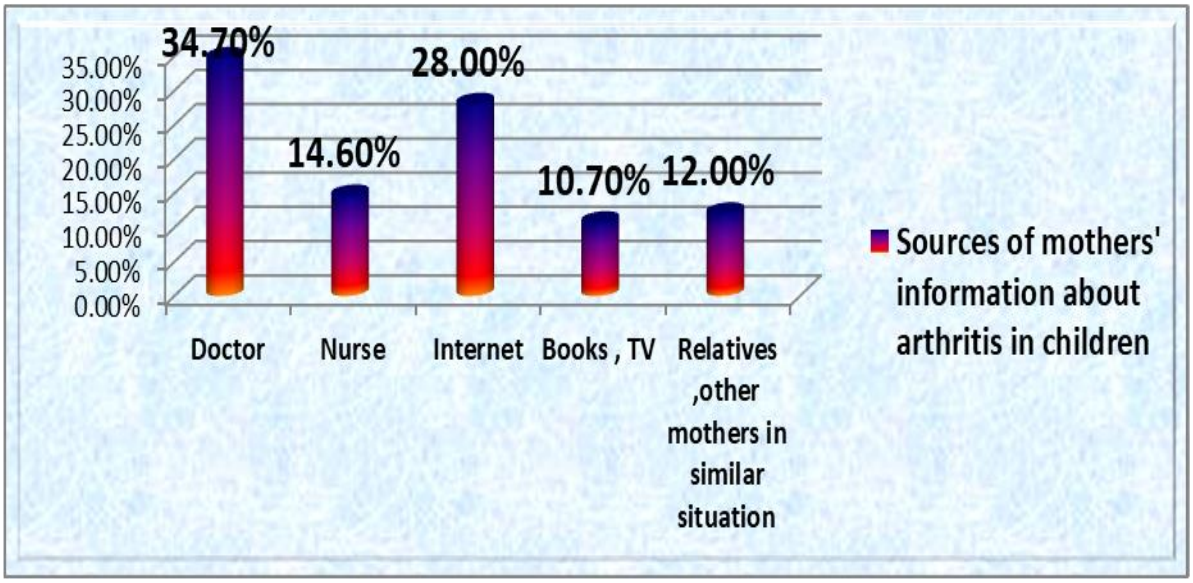

Figure (1): Distribution of the studied mothers regarding their sources of information about juvenile idiopathic arthritis (n=75)

Table (2): Distribution of the studied children regarding their personal characteristics (n=75)

Personal Characteristics	Studied Children	
	No.	%
Age (in years):		
6 < 8 years	7	9.4
8 < 12 years	**36**	**48.0**
12- 14 years	32	42.6
Mean± SD 11.14 ±2.05 years		
Gender		
Female	32	42.7
Male	**43**	**57.3**
Ranking in family		
First	11	14.6
Second	24	32.1
Third	**28**	**37.3**
Others	12	16.0
Child' educational stage		
Primary school	44	**58.6**
Preparatory school	31	41.4
Regular attendance for school day		
Yes	12	16.0
No	**63**	**84.0**
Causes of irregular attendance for school day (63)		
Causes related to disease	57	**90.5**

Table (3): Distribution of the studied children regarding their medical history (n=75)

Medical History	Studied Children	
	No.	%
Period of disease		
<3 years	**48**	**64..0**
≥3 years	27	36.0
Mean± SD 3.0 ± 1.61 years		
Signs and symptoms appearing on child		
Fever+ redness of affected joints+ Joint Pain	43	**57.3**
Joint pain+ swelling and stiffness of affected joints	15	20.0
Fever+ redness of affected joints+ Feeling Tired	7	9.4
Joint pain+ swelling and stiffness of affected joints+ decreased ability to use affected joints	10	13.3
The type of joint affected in the child		
Knee + Hip+ Wrists	15	20.0
Ankle +Hip+ Shoulders	**29**	**38.7**
Ankle+ Shoulders+ Knee	22	29.3
All joint affected	9	12.0
Type of medication for children with juvenile arthritis		
Non-steroidal anti-inflammatory drugs+ Corticosteroid medications	**53**	**70.7**
Disease-modifying anti rheumatic drugs+ Corticosteroid medications	22	29.3
Complications appearance on child from juvenile arthritis		
Permanent joint damage+ Interference with the child's bones and growth	23	30.7
Permanent joint damage+ (inflammation inside the eye)	18	24.0
Chronic (long-term) arthritis and disability (loss of function)	**29**	**38.7**
Inflammation of the membranes surrounding the heart (pericarditis) or lungs	5	6.6
Side effect appearance on child from medication of juvenile arthritis		
Stomach inflammation + Mood changes	**52**	**69.4**
Vomiting	12	16.0
Abnormal growth	11	14.6
Previous hospitalization related to juvenile arthritis		
Yes	**67**	**89.3**
No	8	10.7
Family history		
Yes	**44**	**58.7**
No	31	41.3
Causes not related to disease	6	9.5

Table (4): Distribution of the studied mothers regarding their knowledge about idiopathic juvenile arthritis thorough Tele-nursing intervention phases (n=75).

Knowledge Items of JIA	Pre Tele-nursing Intervention (n =75)						Post Tele-nursing Intervention (n =75)						X^2 FET	P value
	Complete correct Answer		Incomplete correct answer		Don't know		Complete correct answer		Incomplete correct answer		Don't know			
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%		
Meaning	11	14.6	25	33.4	39	**52.0**	60	**80.0**	12	16.0	3	4.0	96.12	0.000**
Causes and risk factors	9	12.0	14	18.7	52	69.3	65	86.6	5	6.7	5	6.7	140.22	0.000**
Signs and symptoms	11	14.6	9	12.0	55	73.4	67	89.3	6	8.0	2	2.7	106.16	0.000**
Types	10	13.3	8	10.7	57	76.0	60	80.0	10	13.3	5	6.7	79.76	0.000**
Diagnosis	5	6.7	12	16.0	58	**77.3**	63	**84.0**	7	9.3	5	6.7	123.20	0.000**
Complications	9	12.0	13	17.4	53	70.6	64	85.3	8	10.7	3	4.0	157.76	0.000**
Treatment	8	10.7	11	14.6	56	74.7	71	94.7	0	0.0	4	5.3	120.85	0.000**

(**) highly statistically significant at (p<0.001)

Table (5): Distribution of the studied mothers regarding their knowledge about tele-nursing thorough Tele-nursing intervention phases (n=75)

Knowledge items Tele-nursing	Pre Tele-nursing intervention (n =75)						Post Tele-nursing Intervention (n =75)						X^2 FET	P value
	Complete correct answer		Incomplete correct answer		Don't know		Complete correct answer		Incomplete correct answer		Don't know			
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%		
Definition	2	2.7	10	13.3	63	84.0	59	**78.7**	12	16.0	4	5.3	157.63	0.000**
Goals	0	0.0	16	21.3	59	78.7	66	88.0	6	8.0	3	4.0	101.65	0.000**
Advantages	2	2.7	7	9.3	66	**88.0**	62	**82.7**	8	10.7	5	6.7	183.32	0.000**
Disadvantages	4	5.3	13	17.3	58	77.3	64	85.3	6	8.0	5	6.7	157.28	0.00**
Means of communication used in tele-nursing	3	4.0	10	13.3	62	82.7	61	81.4	7	9.3	7	9.3	160.12	0.000**

(**) highly statistically significant at (p<0.001)

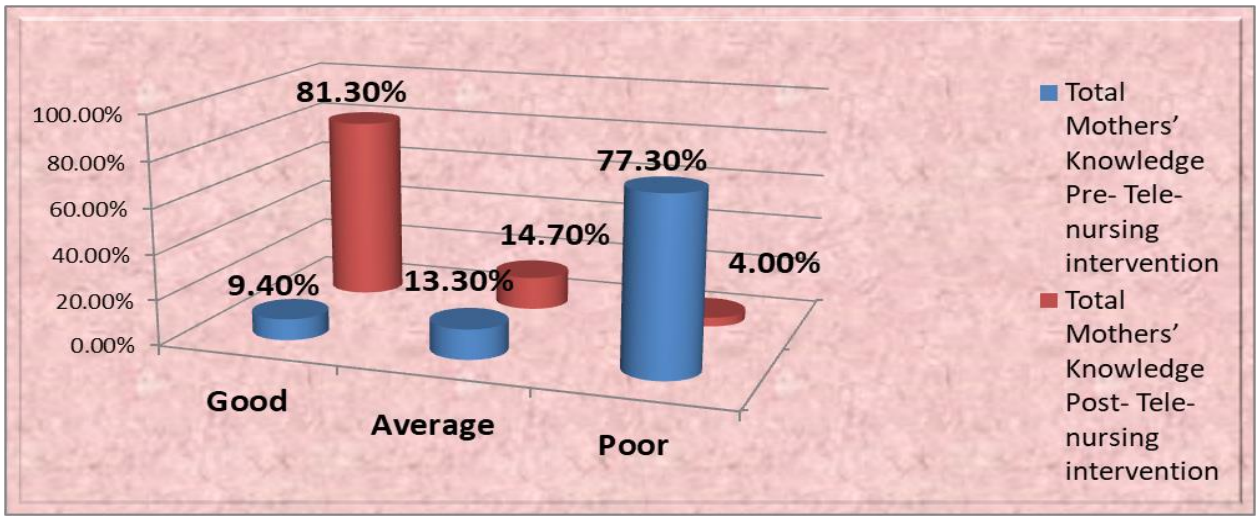

Figure (2): Distribution of total knowledge levels of mothers regarding juvenile idiopathic arthritis thorough Tele-nursing intervention phases (n=75)

Table (6): Distribution of the studied mothers regarding to their reported practices about care of their children with juvenile idiopathic arthritis thorough Tele-nursing intervention phases (n=75)

Items	Pre- Tele-nursing Intervention (n=75)				Post- Tele-nursing Intervention (n=75)				X^2 FEET	p-value
	Adequate		Inadequate		Adequate		Inadequate			
	No.	%	No.	%	No.	%	No.	%		
Help reduce joint stiffness and stiffness for child	9	12.0	66	88.0	67	89.3	8	10.7	89.32	0.000**
Pain management for child	12	16.0	63	84.0	59	78.6	16	21.4	86.92	0.000**
Splinting care	5	6.7	**70**	**93.3**	**61**	**81.3**	14	18.7	115.33	0.000**
Helping child for doing exercise	7	9.3	68	90.7	57	76.0	18	24.0	122.48	0.000**
Encourage child for sleeping routine	12	16.0	63	84.0	62	82.6	13	17.4	90.33	0.000**
Using assistive devices while child doing exercise	14	18.7	61	81.3	68	90.7	7	9.3	78.61	0.000**
Medication compliance and follow up for child	10	13.3	65	86.7	63	84.0	12	16.0	99.85	0.000**
Balance diet for child	7	9.3	68	90.7	69	92.0	6	8.0	111.92	0.000**
Adaptation and support for child	16	21.3	59	78.7	58	77.3	17	22.7	83.85	0.000**
Instructions when attending school	11	14.7	64	85.3	66	88.0	9	12.0	99.33	0.000**

(**) highly statistically significant at (p<0.001)

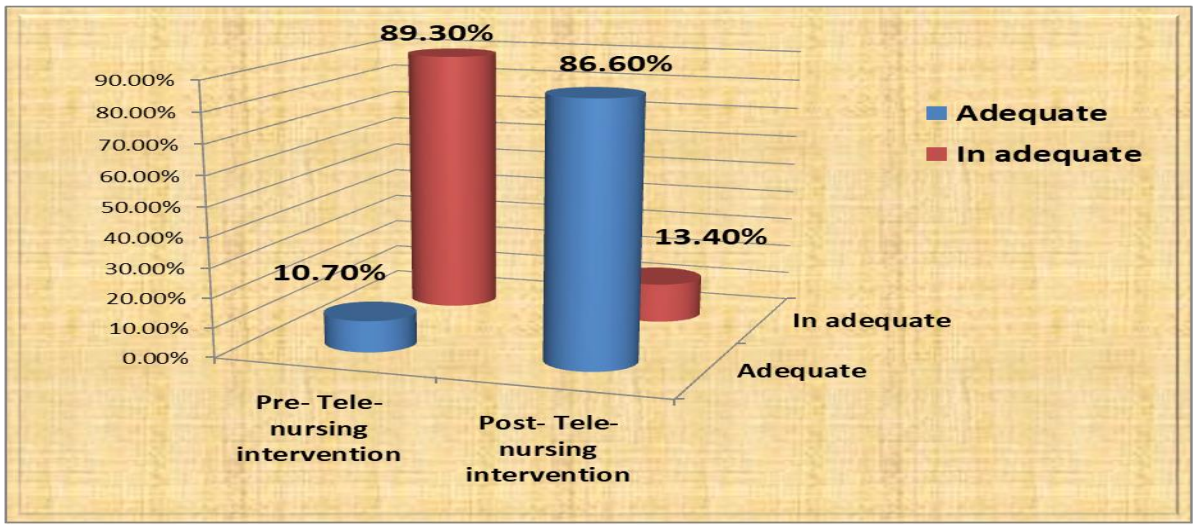

Figure (3): Distribution of total reported practices level of mothers regarding care of their children with juvenile idiopathic arthritis thorough Tele-nursing intervention phases (n=75)

Table (7): Correlation between mothers' total knowledge score and total reported practices score regarding care of their children with juvenile idiopathic arthritis thorough Tele-nursing intervention phases (n=75)

Mothers' Total Reported Practices Score	Mothers' Total Knowledge Score			
	Pre Tele-nursing Intervention		Post Tele-nursing Intervention	
	r	P	r	P
Pre Tele-nursing intervention	0.730	0.000**	0.155	0.000**
Post Tele-nursing intervention	0.136	0.000**	0.726	0.000**

(**) highly statistically significant at (p<0.001)

Table (1): Shows that; 49.4% of studied mothers were in the age group 35- <40 years with mean age was 36.28 ±4.66 years. Regarding educational level, 42.7% of them had university education. 50.7% of the studied mothers were housewife, 74.7% of them were living in rural areas and 68% of them were married. Meanwhile, 77.3% of them had enough monthly family income.

Figure (1): Illustrates that: 34.7% of mothers acquired information about juvenile idiopathic arthritis in children from doctor**.** While 28.0% of them acquired their information from the internet and 10.7% of them acquired their information from books and TV.

Table (2): Clears that, 48% of the studied children were in the age group from 8-<12 years with mean age 11.14 ±2.05 years, 57.3 % of them were males. In relation to the ranking in family, 37.3% of them were the third in family ranking. Moreover, 58.6% of them in the primary school stage of education and 84% of children going to school had irregular attendance to school day and 90.5% of children' irregular attendance to school day related to their disease.

Table (3): Shows that 64.0% of the studied children had the disease since less than three years with mean age 3.0 ± 1.61 years, in relation to signs and symptoms appearing on the child, 57.3% of them had fever, redness of affected joints and joint pain. While 38.7% of them had Ankle, Hip and Shoulders joints that affected due to disease. Regarding to type of medication, 70.7% of them had non-steroidal anti-inflammatory drugs+ corticosteroid medications and 69.4% of them suffered from stomach inflammation and mood changes due to medication side effects and 38.7% of them had chronic (long-term) arthritis and disability (loss of function). Also, 89.3% of them had previous hospitalization related to arthritis and 58.7% of them had family history of juvenile idiopathic arthritis

Table (4): Illustrates that 77.3% of the studied mothers' didn`t know the diagnosis of juvenile idiopathic arthritis at pre-tele-nursing intervention that improved significantly to 84% of them had complete correct answer at post tele-nursing intervention. Moreover, there was a highly statistically significant differences between pre and post tele-nursing intervention related all knowledge items in the table (p <0.000).

Table (5): Indicates that, 5.3% of studied mothers had complete and correct answer regarding disadvantages of tele-nursing at pre telenursing intervention which improved significantly to 85.3%

of them at post telenursing intervention. Moreover, there was a highly statistically significant difference (p <0.000) in favor of post tele-nursing intervention.

Figure (2): Demonstrates that 9.40% of studied mothers had good level of knowledge at pre-tele-nursing intervention that improved significantly to 81.3% of them at post tele-nursing intervention regarding juvenile idiopathic arthritis and telenursing.

Table (6): Shows that 93.3% of the studied mothers had inadequate practice regarding splinting care for their children with idiopathic juvenile arthritis at pre-tele-nursing intervention that improved significantly to 81.3% of them had adequate practices at post telenursing intervention. Moreover, there was a highly statistically significant difference (p <0.000) in favor of post telenursing intervention.

Figure (3): Clarifies that, 89.3% of studied mothers had inadequate level of reported practices at pre telenursing intervention that improved significantly to 86.6% of them had had adequate level of reported practice at post telenursing intervention regarding care of their children with juvenile idiopathic arthritis.

Table (7): Clarifies that there was statistically significant positive correlation between studied mothers' total knowledge and reported practices at pre and post tele-nursing intervention regarding care of their children with juvenile idiopathic arthritis (P <0.000).

Discussion:

Juvenile idiopathic arthritis is a diverse category of chronic arthritis, and the most prevalent chronic rheumatological disorder affecting children under the age of sixteen. JIA is an autoimmune and non-infectious disease, and its etiology is yet unknown. Tele-nursing is a replacement for the personalized approach to nursing care delivery which provides nursing practice and care. It has been widely utilized in healthcare for patients with long-term conditions that require frequent follow-up appointments, such as kids with JIA. Telenursing intervention has a positive effect on children with JIA's health and outcome **(Thatayatikom et al., 2023).**

Regarding the socio- demographic characteristics of the studied mothers, the current study revealed that; less than half of the mothers lied in the age group of 35 to less than 40 years with the mean age was 36.28 ± 4.66 years. Additionally, more than two fifths of the mothers had university education. Also, more than half of them were housewife, less than three quarters of them lived in rural areas and more than two thirds of the mothers were married (table 1). This study supported by **Mulligan et al. (2022),** who reported that the mothers average age was 36.5 years old with the mean age was 6.5 and more than one third 37.7% of the mothers had high education. Also, the majority (85%) of mothers were married.

However, the results of this study disagreed with those of **Pearce et al., (2021),** who reported that all of them aged over 40 years old with the mean age was 5.7, almost two thirds (65%) of the mothers had higher education and more than half (55%) of them were in paid employment. Also, this study finding disagreed with **Mohamed et al., (2024),** who found that more than half (53.3%) of the mothers had secondary education and less than two thirds (61.7%) of them live in urban areas.

Regarding the studied mothers' source of information about juvenile idiopathic arthritis, the present study revealed that, more than one third of them acquired their information about the disease from doctors while more than one quarter of them acquired their information about the disease from the internet (figure 1). From the researcher point of view, this might be due to the mother's belief and expectations that any new information regarding the disease will be communicated directly to them by the child's doctor and doctor is the person who more contact with child through follow up and give her new instructions. This study finding supported by **Wright et al., (2020),** who reported that a majority of parents consider medical professionals as the most reliable source of information about JIA, and they expressed mistrust and anxiety about the veracity of material found online about diseases unless it is verified by a reliable source.

Concerning the children's' personal characteristics, this study showed that, less than half of children's age was between 8 to less than 12 years old with the mean age was 11.14± 2.05; and more than half of them were males. Additionally, less than three fifth of the studied children were in the primary school, majority of them hadn't regular attendance of school day and most of them hadn't regular attendance to school due to causes related to the disease (table 2). This study was in the same line with **Memari et al., (2016),** who found that half of the children under study fell between the age range of 11± 3.5 years and half of them were in primary school.

Also, this study agreed with **Haque et al., (2020)**, who discovered that two thirds (66%) of the of the children in the study were males and more than three quarters (79%) of them had a high rate of absenteeism and most of these children's absences were caused by medical conditions related JIA like fever, hospitalization, medication side effects, and mobility issues.

Regarding to medical history of the children, the current study revealed that; more than three fifths of the children affected with the disease since less than 3 years, more than half of them had fever, redness and joint pain and less than two fifths of the children had affected ankle, hip and shoulder joints due to the

disease. Additionally, more than two thirds of them had non-steroidal anti-inflammatory drugs and corticosteroid medication. Also, more than two thirds of children had stomach inflammation and mood disorders as medication side effects and majority of them had previous hospitalization due to the arthritis (table 3).

This study findings was in the same line with **Currie et al., (2023)**, who found that most of children use non-steroidal anti-inflammatory drugs, approximately three quarters of them suffered from stomach inflammation and mood disorders as fear and anxiety and mostly of the parents visited the hospital once every month for four-hour intravenous infusions.

This study findings disagreed with **Haverman et al., (2024)**, who reported that the majority of children (85%) had juvenile idiopathic arthritis for more than four years, more than three quarters (78%) of them were taking on disease-modifying anti-rheumatic medication, and more than half (57%) of them experienced arthritis in a single joint.

The current study revealed that; there were highly statistically significance improvement regarding all items related to studied mother's knowledge about juvenile idiopathic arthritis pre and post tele-nursing intervention (P = 0.000) (table 4). These findings supported by **Elmagrabi et al., (2018),** who reported that most of mothers (97%) were aware of diagnosis, more than three fifths (63%) of them recognize etiology of disease is considered to be idiopathic and more than two thirds (68%) of them recognize that anti-inflammatory drugs are the main line of treatment. From the researchers point of view, this might be due to the implementation of tele-nursing intervention which helped the mothers to acquire knowledge regarding the disease, giving the mothers opportunity to ask questions and mothers were being more concerned with the disease and looking for the causes, treatment and complications.

Concerning the mothers' knowledge regarding tele-nursing**;** there were highly statistically significance improvement regarding all items related to studied mother's knowledge about tele-nursing pre and post tele-nursing intervention (P=0.000) (table 5). These findings supported by **Ramelet et al., (2017)**, who reported that parents believed that tele-nursing was crucial for offering personalized emotional support and health information on rheumatic illnesses. In addition, these study findings agreed with **Amer et al., (2022)**, who found that parents were aware of how tele-nursing might lower hospital stays and admissions while also saving families funds overall.

Regarding the studied mothers' total knowledge level about juvenile idiopathic arthritis, the current study findings showed that post tele-nursing intervention implementation, majority of the mothers had good total knowledge level while pre-tele-nursing intervention implementation minority of them had good total knowledge level (figure 2). These study findings were in the same line with **Sunthornsup et al., (2022),** who reported that post the intervention, parents in both groups had mean percentages of knowledge scores about the disease which were significantly higher $p < 0.001$. From the researchers' point of view, this might be due to positive effect of the tele-nursing intervention which makes the illness easier to understand.

Also, this study findings supported by **Mohamed et al., (2024)**, who found that the total knowledge score of mothers at post-educational programs is significantly higher than at pre-educational programs, with a statistically significant difference between them. Particularly, the total knowledge score at pre-educational programs was 41.7%, while at post-educational programs it was 73.3%.

The current study revealed that there was highly statistically significance improvement regarding all items related to studied mother's reported practices regarding care of their children with juvenile idiopathic arthritis pre and post tele-nursing intervention (P= 0.000) (table 6). These findings supported by **Rouster-Stevens et al., (2024)**, who found that the majority of the parents (88%) utilized medicine, more than two thirds (67%) of them used heat compresses to relieve their child's painful joints, and more than half (54%) maintained a balanced diet and abstained from foods that exacerbated their child's pain. This might be due to tele-nursing intervention provided mothers with practices guidance tailored to their children

Regarding to total reported practices of the studied mothers**,** the present study revealed that; tenth of them had adequate level of practices pre implementation of tele-nursing intervention, and then this percentage increased to majority of them had adequate level of reported practices post implementation of the intervention (figure 3). This study was supported by **Jones et al., (2024),** who reported that home programs enhanced the majority of the parents' skills and practices as well as their competency in caring their children. From the researcher point of view, this might be due to the effect of tele-nursing intervention that help in improving studied mothers` practices regarding juvenile idiopathic arthritis and assist mothers in understanding the rationale behind each practice and the manner in which to be performed.

The present study revealed that; there was statistically significant positive correlations were found between the studied mothers' total knowledge score and total reported practices score pre and post tele-nursing intervention (P = 0.000) (table 7). From the

researchers' point of view, this might be due to the implementation of the tele-nursing intervention that increased the mothers' knowledge regarding the disease, and this helped them to improve their practices regarding care of their children with juvenile idiopathic arthritis.

Conclusion:

Tele-nursing was successful in improving mothers' practices and raising their level of knowledge about caring for children with idiopathic juvenile arthritis. Minority of mothers studied had good total level of knowledge at pre tele-nursing intervention which improved significantly to majority of them at post tele-nursing intervention. Minority of studied mothers had an adequate level of reported practices at pre-tele-nursing intervention which improved majority of them had adequate level of reported practices at post tele-nursing intervention regarding care of their children with juvenile idiopathic arthritis.

Recommendations:

- Continuing Telenursing intervention for increasing knowledge and improving practices of mothers regarding care of their children with idiopathic juvenile arthritis.
- Regular follow up and checkup for children at Outpatient Clinic.
- Engage child at physical and occupational therapy to help child adapt with disease
- Providing support group for mothers to sharing topics related idiopathic juvenile arthritis for emotional support and practical advices.
- Further researches are needed on large samples among mothers regarding care of their children with idiopathic juvenile arthritis to prevent complication.

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