Effect of Asynchronous Mobile Health Nursing Intervention on Medications Adherence and Quality of Life among Patients with Psoriasis

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Abstract

Telehealth refers to the usage of any electronic materials in the form of voice, images, documents, etc. **The aim:** to examine the effect of asynchronous mobile health nursing intervention on medications adherence and quality of life among patients with psoriasis. **Design:** A quasi-experimental research design. **Subjects**: A purposive sample including 60 patients who were admitted to the dermatology outpatient clinics, were divided randomly into the study and control group of 30 patients in each. **Setting**: This research was conducted at a university hospital dermatology clinic. **Instruments of the study:** (I): Structured interview questionnaire. (II): Modified 12-Item Medication Adherence Scale. (III): Dermatology Life Quality Index. **Results:** The mean of knowledge score, adherence level was increased, and improve quality of life index increased significantly throughout the phases of the intervention among study group subjects with statistically significant differences existed between them. **Conclusion:** Using (mobile health) in education about psoriasis and its management significantly improving total knowledge score, medications adherence improved the quality of life. **Recommendations:** designing different mobile patient engagement applications to provide a simple way for follow-up, and education. Replication of the study using a large number of subjects, and longer follow-up time to permit a chance for results generalization.

Keywords: Mobile Health Nursing, Medications Adherence, Quality of Life, Psoriasis

Introduction:

Psoriasis is a non-communicable chronic, painful, disfiguring, and debilitating illness that has a significant negative effect on the quality of life of patients. It can strike at any age, but it is most common in people between the ages of 50 and 69 **(WHO, 2020)**. It is an immune-mediated inflammatory skin disease with a complicated etiology that includes a complex interaction of environmental and genetic risk factors as the disease's initiating event **(Singh et al., 2019)**.

A wide range of unrelated *local factors* may cause psoriasis for example skin damage, scratching, systemic factors such as infections; especially streptococcus and HIV, as well as psychological stress as lithium agents, blockers, interferon, non-steroidal anti-inflammatory drugs, etc. Minimal or widespread scaly erythema or plaque is the most common clinical coetaneous manifestation of psoriasis. Psoriasis, on the other hand, goes far beyond skin involvement and faces various problems including co-morbidities **(Yan et al., 2020)**.

Psoriasis patients are likely to receive a variety of therapies over time. Owing to the difficulty of the regimens and the disappointing outcomes obtained with topical therapies, psoriasis therapies have traditionally been correlated with low levels of patient adherence. Adherence is a multifarious human behavior controlled by various independent components. Generally, it is simply described why adherence in those psoriatic patients is poor because it is due to the relapsing nature of the disease and the use of many different treatment agents which, are usually not applied properly **(Yelamos et al., 2015)**.

95% of patients who suffer from skin problems were noticed for the first time in a dermatology clinic as a result of non-adherence to their topical treatment therapy. Psoriatic patients are not an exception and they also suffer from poor compliance to their treatments **(Storm et al., 2008)**. So developing new approaches to enhance adherence and

compliance for those patients is important to attain better-quality outcomes, avoid flares, manage psoriasis-related comorbidities, and improve the overall quality of life for those patients. Therefore, understanding the reasons for non-adherence is a critical component to putting these techniques into action **(Yelamos et al., 2015)**.

Living with psoriasis can be difficult for people, not just in terms of physical and emotional symptoms, but also in terms of overall happiness. Those patients have an increased risk of lifestyle-related concurrent conditions, according to recent researches on different chronic diseases as hypertension, obesity, diabetes, and cardiovascular disease reported that to become an efficient and constructive self-manager, a certain level of expertise and technical skills may be needed **(Larsen et al., 2014)**.

Dermatology nurses in outpatient serve a consult closely with physicians and educate psoriasis patients on how to use medications. Therefore, nurses are a significant healthcare resource for psoriasis patients, and they play a vital role in providing care and assisting patients with chronic diseases in improving adherence in patients with long-term illnesses. They are knowledgeable about professional standards and are respectful of them to provide healthy, high quality, and ethical care **(Svendsen et al., 2020)**.

Around the world, electronic (E.) health services have grown and had great importance for clinical healthcare systems. It states the health services that are boosted through electronic devices, the internet, and technology **(Kwan et al., 2020)**. Moreover, "E. health, which is a combined use of electronic information and communication technology (ICTs) in the health sector, has a higher possibility for optimizations and savings in the majority of health care systems worldwide. E. health technology can provide care and management by exchanging data among health care team members or patients; so nurses are increasingly implementing new technology to meet ever-increasing regulatory standards for patient care and safety" **(Tebeje and Klein, 2021)**.

Tele-health is a component of E. health, includes telemedicine, and mobile health (mobile health using text messages, videos, and calls). Mobile health includes using mobile apps technology and communication system to implement health care activities, analyze health information, and enhance overall patient outcomes. Tele-health reinforces the consultations using a patient-centered approach at any location and increases their access to medical assistance and guidance. Thus, it acts as a link between the health care members and self-care, manages health care activities, shares medical data, analyzes health information, and enhances the overall patient experience, such as their outcomes **(Tebeje and Klein, 2021)**.

Core skills in electronic nursing intervention tend to be critical for achieving long-term health-related behavioral improvement and making better decisions. A created telephone-based individualized E.nursing intervention that included an extended follow-up with personalized care. The program's main emphasis is on daily psoriasis care and desired behavioral changes. This intervention would have major clinical benefits; enhance disease awareness, medication adherence, improve self-management, and enhance behavioral lifestyle changes **(Larsen et al., 2014)**.

Among the strategies that may benefit the psoriatic patients are the importance of attending visits in the health care setting and it should be worried to all patients. For those who live away from the clinic or for those who are always busy and/or having troubles in transportation, utilizing a phone (teledermatology) can be used to decrease the required face-to-face visits, while still providing effective monitoring for patients. By using mobile health, patients who favor lessening the time for visiting the clinic find that are desirable to other treatments, such as phototherapy, which requires multiple clinic visits per week during the initiation phase. Electronic communications can also be used to inform patients about follow-up office visits for another testing **(Aldredge and Young, 2016)**. So this study aimed to examine the effect of asynchronous m. health nursing intervention on medications adherence and quality of life among patients with psoriasis.

Significance of study:

According to statistics of the National psoriasis foundation; 125 million people have psoriasis worldwide it is considered approximately 2 to 3% of the total population. Moreover, around 36% of these patients have a family history of psoriasis, and much genetic susceptibility has been discovered (**National Psoriasis Foundation, 2020**). World Health Organization identifies the crucial necessity to track multifaceted efforts to increase awareness regarding psoriasis and to fight stigmatization suffered by psoriatic patients. The prevalence rate of psoriasis was reported in Egypt is around 3% (**U.S. National Library of Medicine, 2019**).

Such a study can be used to promote the adherence of medication in a wide range of psoriatic patients. In addition, the current study provides an opportunity for nurses to provide asynchronous mobile health nursing intervention for such patient populations having psoriasis, especially during the covid-19 pandemic, aiming to prevent infection from patients to nurses and vice versa.

Operational definition:

The independent variable is the mobile health nursing intervention, while the dependent variable is the medication adherence and quality of life among patients with psoriasis.

Mobile health nursing intervention is represented as the electronic telephone-based nursing educational intervention regarding medications adherence and behavioral lifestyle practices of patients with psoriasis such as lifestyle modification as smoking cessation, weight loss, modifying activities of daily living, and taking into consideration the aggravating and relieving factors of psoriasis attack.

Medications adherence are operationally defined as data collected by the researchers using designated instruments to detect measurable changes in patients' knowledge and their compliance to the prescribed medications and lifestyle behavioral changes that may result from a designated mobile health nursing educational intervention.

Aim of the study:

The present study aimed to examine the effect of asynchronous mobile health nursing intervention on medications adherence and quality of life among patients with psoriasis.

Research hypotheses:

The following research hypotheses were formulated to accomplish the study's aim:

1. Patients who follow mobile health nursing intervention (study group) will have a higher total knowledge score than patients who don`t (control group).

2. Patients who follow mobile health nursing intervention (study group) will exhibit higher medications adherence scores than patients who don`t (control group).

3. Patients who follow mobile health nursing intervention (study group) will exhibit significant improvement in quality index scores than patients who don`t (control group).

Subjects and Methods

Research design: Use a quasi-experimental research design to accomplish the purpose of the study.

Setting: The present study was conducted at university hospital dermatology clinics, Menoufia Governorate, Egypt.

Sample: A purposive sample of 60 patients who visit the dermatology clinics in the university hospital who were granted to participate in the study and fulfilled the inclusion criteria. The study subjects were allocated randomly equally into two groups (30 patients for each group).

- **Study group (I):** receive the mobile health nursing intervention program along with the usual routine of care.

- **Control group (II)**: Follow the usual routine hospital care only.

Sampling: the study sample was statistically calculated based on the statistics of the National psoriasis foundation[11] who mentioned that about 2 to 3% of the total population suffers from psoriasis. The

intended sample size was determined to be 60 patients by using the subsequent equation with confidence power equal to 95%.

$$n \geq \frac{N Z_{1-\alpha/2}^2 \, p(1-p)}{d^2(N-1) + Z_{1-\alpha/2}^2 \, p(1-p)}$$

Where:

n: Sample size

N: Total population (260)

$Z_{1-\alpha/2}$ = standard normal variation (at 5% type 1 error (P<0.05) it is 1.96) p = Expected proportion of psoriasis (0.02)

d = Absolute error or precision (0.05).

Inclusion criteria:

1. Adult patients aged 18 years or above of both genders.

2. Patients should have access to a mobile phone throughout the study and be able to follow the instructions.

Exclusion criteria:

1. Patients have significant cognitive impairment or intellectual disabilities

Instruments:

The researchers were used three instruments to collect the data and achieve the aim of the study as follows:

The instrument I: Structured interview questionnaire:

It was constructed by the researchers to collect baseline bio-sociodemographic data and knowledge. It covers the following three parts:

- **Part one: Sociodemographic data:** It was comprised of items related to age, sex, occupation, education, and marital status, etc...
- **Part two: Medical data:** It was composed of data concerning medical data such as patients' complaints of smoking, and previous comorbidities, etc...

Part three: Psoriasis knowledge Questionnaire (PKQ):

The PKQ, which is a simple index, was established in the Norwegian dermatology context and it's having 49 statements about psoriasis (its etiology, characteristics, prevalence, development, and treatments). There are three response options for each statement: There are two responses to each statement are "valid," "uncertain," or "invalid." A total score was done by calculating the number of correct responses with a possible range of 0–49 **(Wahl et al., 2013)**.

Scoring system: Three responses were derived for each question as follows:-

- A score of three was given to the correct and complete answer

- A score of two was given to the partially correct answer and

- A score of one was given to incorrect answers.

The responses were recorded, and then the total knowledge score was calculated and put within the range from 0 to 49 as a maximum score and categorized into:

- A given score of < 50% denoted poor or unsatisfactory knowledge

- A given score between 50-70% indicated accepted results while

- A given score of >70% denoted satisfactory results. The reliability of Cronbach's alpha for the 49 items index was 0.84.

Instrument II: Modified 12-Item Medication Adherence Scale:

It was developed by **Ueno et al., (2018)**. It is used to assess a patient's medication adherence level to prescribed medications. It consists of 12 items and having four categories, each category containing three items. The first was to measure the level of medication adherence, the second to measure patients to health care team collaboration, the third was to measure ability and preparedness to access disease information, while the fourth category was to measure acceptance to take treatment and how taking treatment fits patients' lifestyles.

Scoring system: A five-point Likert scale rated from one to five in which one denoted never to five indicated always. Scores for each subscale were summed then the total score for

medication adherence was calculated by adding all 12 items. Scores were reversed for item no. 3 and 12. The maximum score is 60 points, such that higher scores indicated higher medication adherence. Levels of medication adherence are divided into:

- Low adherence 0-20

- Moderate adherence 20-40

- Full adherence 40-60

Reliability: The reliability of the questionnaire tested and was demonstrated to be 0.78 for the 12-item scale while the four subscales were 0.74, 0.81, 0.67, and 0.45. The 12-item scale is used to support more effective medication self-management, as it provides a convenient way to assess the medication-taking behavior of chronic disease patients. Therefore it is expected to improve patients' quality of life and outcomes through better adherence to medication regimes (**Ueno et al., 2018**).

Instrument III: Dermatology Life Quality Index (DLQI):

The Dermatology Life Quality Index (DLQI) it was adopted by **Finlay and Khan (1994)** is designed for use in adults and aimed to measure how much skin problem has affected life over the last week. It consists of 10 items these items are scored on a four-point scale (very much=3, a lot=2, a little=1, not at all, or not relevant=0). The DLQI is calculated by counting the response of each item resulting in 30 as a maximum and 0 as a minimum. A higher score means a negative effect on the quality of life. The total score of the scale was calculated after summing the results and categorized as the following:

- A score of 0 -1 noted no effect at all on the patient's life

- A score of 2-5 noted a small effect on the patient's life

- A score of 6-10 noted a moderate effect on the patient's life

- A score of 11 to 20 noted a large effect on a patient's life

- While a score of 21-30 noted a very large effect on a patient's life

Reliability:

the reliability of the index was calculated as Cronbach's alpha was 0.92 for the whole questionnaire. Based on these results the questionnaire was a credible, reliable, and valid tool for measuring the quality of life for psoriasis patients (**Aghamolaei and Ghanbarnejad, 2015**).

Methods:

- **Formal approval:** Officially agreement was obtained from the director and the head nurse of the dermatology clinics followed the explanation of the study's aim.

- **Instruments development:** After reviewing the literature extensively, the first two parts of instrument I were developed by the researchers while part three of the instrument I was adopted from the Norwegian dermatology context as mentioned by **Wahl et al., (2013)**. Instrument II was developed by **Ueno et al., (2018)** while instrument III was developed **Finlay and Khan (1994)**.

- **Validity:** The validity of the instruments were tested by a board of five experts specialized in medical surgical nursing and dermatology specialist to establish completeness and relevance.

- **Reliability:** The reliability was tested using a test-retest method to ascertain the relevance and consistency of the instruments. The reliability of the structured questionnaire (part one and two) was r= 0.78. While the reliability for part three of instrument I (Psoriasis knowledge Questionnaire), and instrument II was r = 0.84. Therefore; the 12-item scale total reliability was 0.78 while for the four subscales were 0.74, 0.81, 0.67, and 0.45 respectively. Moreover, the reliability of instrument III was 0.92.

- **Pilot study:** Before data collection, a pilot study was conducted on six patients (10%) to test the clarity, objectivity, feasibility, and applicability of the instruments. In addition, to ascertain any administrating problems to the instruments and calculate the needed time for data collection then

the necessary modifications were done based on results.

Ethical consideration

The Ethical Committee for scientific research review in the faculty of nursing approved this study. Official permission was obtained from the hospital manager, and head nurse of dermatology clinics.

- Written consent to participate in the study was got from all participants after an explanation of the study's aim, and they were assured that the data would be confidential and will be used only to achieve the aim of the current study. The nature of all instruments will not cause any physical or emotional harm to participants. Furthermore, the researchers highlighted that participation is completely voluntary and the secrecy of the subjects was assured through coding all data and put all papers in a closed cabinet. Also inform the subjects that, the refusal of participation in the study would not affect their care.

Data collection:

- Data were collected from day one of December 2020 to the end of April 2021.

- Data were collected over nearly 5 months.

- The selected subjects were divided randomly into two equal groups, **the study group (I)**: receive them. health nursing intervention program along with the usual routine of care. While **the control group (II)**: Follows the usual routine hospital care only.

- Each subject who decided to participate in the study and who fulfilled the inclusions criteria were interviewed individually by the researchers and assessed baseline data for bio-sociodemographic characteristics and their knowledge level, adherence level, and quality of life by using the study instruments I, II, and III respectively at the university hospital dermatology clinic. Around 20-25 minutes were taken for completing questionnaires for each participant.

- The researchers were developed guide pictures and materials aimed to improve

the study subjects' knowledge and practice regarding self-care and medication adherence based on the baseline obtained data.

- Guide materials used in this study included videos, pictures, oral and written instructions through video calls, SMS, and Whatsapp messages.

- After baseline data collection, six daily sessions were performed; each session takes about 10 to 20 minutes through mobile video calls then SMS and Whatsapp messages were used to assist in enforcing the knowledge and improve performance and understanding for the study group subjects. The video calls were performed each day between 6.00 and 8.00 PM as preferred by all study group subjects.

✓ **First session:** the researchers provided each subject of the study group with knowledge about psoriasis (definition, risk factors, clinical manifestations, and diagnostic methods) then allowed the patients to ask for clarification for any unclear information.

✓ **Second session:** At the beginning of the session, the researchers refreshed the previously learned knowledge then provide patients of the study group with information about psoriasis management, severity, and its complications. Then the researchers revise and reinforce the information according to the participant's needs.

✓ **Third session:** At the beginning of this session, the researcher refreshed the previously learned knowledge then provides information about the importance of medication adherence and its effect on the patients' health and quality of life. At the end of the session, the researchers carried revision and reinforcement according to the participant's needs. Also, the researchers corrected the wrong information and answered questions.

✓ **Fourth session** (theoretical & practical session): This session emphasized on demonstration of the previously learned knowledge and self-care activities and

medication adherence benefits. During this session, reinforcement was carried according to the subject's needs.

- ✓ **Fifth session:** At the beginning of this session, the researcher refreshed and reinforced the previously learned knowledge then provides subjects with information about diet (allowed and forbidden foods), smoking (complications and importance of quitting smoking), medications, and asked to carry the lifestyle modifications to enhance the psoriasis management process and assist in decreasing the excerptions of its symptoms.

- ✓ **Sixth session:** This session emphasized on demonstration of all previously learned knowledge about psoriasis, its management, medications, and the importance of lifestyle modifications to improve symptoms and quality of life. At the end of the session, the researchers carried revision and reinforcement according to the participant's needs. Also, the researchers demonstrate the knowledge and correct the wrong information.

- Daily SMS and Whatsapp messages were sent to remind patients about medication timing.

- All participants were assessed for their knowledge, adherence level, and quality of life by using part three of instrument I, instrument II, and III respectively two times; the first time after one month of intervention and the other after three months of intervention for both study and control groups.

- A comparison between both study and control groups was done to examine the effect of asynchronous M. health nursing intervention on medications adherence and quality of life among patients with psoriasis.

Statistical Analysis

The collected data were tabulated and analyzed using version 22 of the SPSS software package. For quantitative for comparison between means of two groups of parametric data of independent samples. Significance was adopted at p< 0.05 for

interpretation of results of tests of significance **(Dawson and Trapp, 2001)**.

Results

Table (1) illustrated that; about two-thirds of both study and control groups' age was ranged from 40 to 60 years old (63.4% and 70%) respectively. While around half of the studied group subjects were female. Regarding marital status; the majority of both groups were married. Moreover, the results showed the majority of both studied group subjects suffered from this disease from a period ranging from 5 to 15 years ago and they didn't have any family history for this disease. All subjects of both studied groups were suffered from different levels of pain.

Figure (1) illustrated that there were 33.3 % of the study group subjects complained of skin irritation and the presence of crusts in addition to 36.7% add the presence of skin dryness and itching compared to 20 % and 40 % of control group subjects respectively. Also, around one-third of the control group suffered from skin problems in addition to joint swelling compared to one-fifth of study group subjects.

Table (2) revealed that there were statistically significant differences existed between study and control group subjects regarding their knowledge scores after one month and three months of intervention at P-value > 0.0001 respectively.

Table (3) noted that there was an increase in the medication adherence mean scores among study group subjects after one and three months of intervention compared to control group subjects with statistically significant differences at P-value > 0.0001.

Table (4) this table revealed that the mean of quality index scores was improved among study group subjects when compared to control group scores with a statistically significant difference at P-value > 0.0001.

Table (5) shows that there was a positive correlation between total adherence scores and total patients quality index scores among the study group of patients with psoriasis, with a highly significant statistical difference after one month and after 3 months of intervention, (r= 0.699 at p= 0.0001, r= 0.636 at p= 0.0001).

Table (1): Distribution of subjects of both groups regarding their bio-sociodemographic characteristics (N= 60)

Clinical and medical data	Study group N= 30		Control group N= 30	
	No.	**%**	**No.**	**%**
Age				
• 20<30	8	26.6	6	20
• 30<40	3	10	3	10
• 40<50	19	63.4	12	40
• 50≤60	0	0	9	30
Gender				
• Male	12	40	14	46.7
• Female	18	60	16	53.3
Education				
• Illiterate	4	13.4	0	0
• Primary	3	10	3	10
• Secondary	10	33.3	18	60
• High education	13	43.3	9	30
Marital state				
• Single	3	10	5	16.7
• Married	27	90	25	83.3
Place of residence				
• Rural	30	100	30	100
Occupation				
• Work	20	66.7	21	70
• don't work	10	33.3	9	30
Duration of the disease				
• 5< 10 years	14	46.7	15	50
• 10< 15 years	10	33.3	15	50
• More than 15 years	6	20	0	0
Family history				
• Yes	0	0	3	10
• No	30	100	27	90
Presence of pain				
• No	5	16.7	3	10
• Mild	1	3.3	0	0
• Moderate	12	40	9	30
• Severe	9	30	18	60
• Worst	3	10	0	0
X^2 for pain in between groups P-value	7.92 0.09			

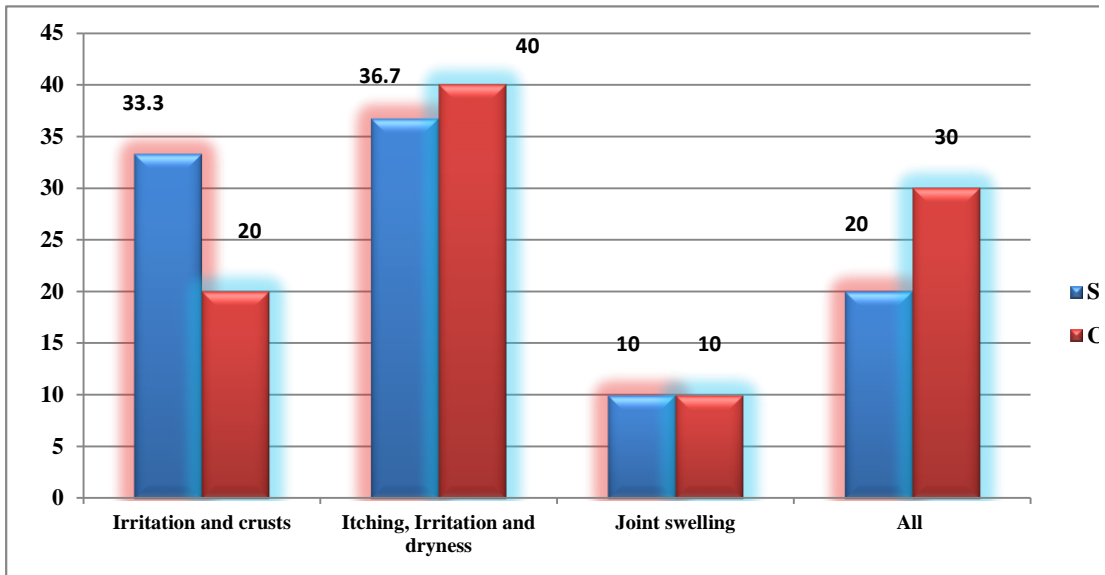*(*) Statistically significant at P < 0.05*

Figure (1): The main complaint about both study and control groups

Table (2): Distribution of knowledge scores for both study and control groups (N=60)

Patients Knowledge	Study group N= 30		Control group N= 30		Test	P-value
	No.	%	No.	%		
Pre-intervention Patients' Knowledge						
• Unsatisfactory	30	100	30	100	---	---
• Accepted	0	0	0	0		
• Good	0	0	0	0		
$X^2 \pm$ SD	**50.77± 1.94**		**50.03± 0.96**		**8.34**	**0.069**
After one month Patients' Knowledge						
• Unsatisfactory	7	23.3	30	100	60	0.0001*
• Accepted	20	66.7	0	0	0	
• Good	3	10	0	0	0	
$X^2 \pm$ SD	**96.03± 2.15**		**52.50± 1.92**		**82.4**	**0.0001***
After three months Patients' Knowledge						
• Unsatisfactory	0	0	30	100	60	0.0001*
• Accepted	21	70	0	0	0	
• Good	9	30	0	0	0	
$X^2 \pm$ SD	**101.40±4.62**		**53.93± 2.51**		**49.40**	**0.0001***

(*) Statistically significant at P < 0.05

Table (3): The mean scores of patient medication adherence among study and control groups

Adherence	Study group N= 30		Control group N= 30		Test	P-value
	No.	%	No.	%		
Pre-intervention Patients' adherence					2.85	0.09
• Low adherence	18	60	24	80		
• Moderate adherence	12	40	6	20		
• Full adherence	0	0	0	0		
$X^2 \pm$ SD	**31.37±4.12**		**30.30± 0.91**		**1.38**	**0.17**
After one month Patients' adherence					24.0	0.0001*
• Low adherence	0	0	12	40		
• Moderate adherence	12	40	18	60		
• Full adherence	18	60	0	0		
$X^2 \pm$ SD	**44.43± 2.59**		**30.90± 0.84**		**27.1**	**0.0001***
After three months Patients' adherence					60.0	0.0001*
• Low adherence	0	0	8	26.6		
• Moderate adherence	5	16.7	22	73.3		
• Full adherence	25	83.3	0	0		
$X^2 \pm$ SD	**48.50±3.99**		**31.00± 1.01**		**23.23**	**0.0001***

(*) Statistically significant at P < 0.05

Table (4): Distribution of the Patients Quality Index for both study and control groups

Quality Index Items	Study group N= 30		Control group N= 30		Test	P-value
	No.	%	No.	%		
Pre-intervention					----	----
• No effect at all on the patient's life	0	0	0	0		
• Small effect on patient's life	0	0	0	0		
• Moderate effect on patient's life	0	0	0	0		
• Large effect on patient's life	0	0	0	0		
• Very large effect on patient's life	30	100	30	100		
$X^2 \pm$ SD	**29.80±0.40**		**28.40± 0.40**		**11.92**	**0.0001***
After one month					40.0	0.0001*
• No effect at all on the patient's life	0	0	0	0		
• Small effect on patient's life	0	0	0	0		
• Moderate effect on patient's life	0	0	0	0		
• Large effect on patient's life	24		0	0		
• Very large effect on patient's life	6		30	100		
$X^2 \pm$ SD	**19.70±5.49**		**24.6-± 2.54**		**4.43**	**0.0001***
After three months					51.0	0.0001*
• No effect at all on the patient's life	0		0	0		
• Small effect on patient's life	0		0	0		
• Moderate effect on patient's life	27		0	0		
• Large effect on patient's life	3		9			
• Very large effect on patient's life	0		21			
$X^2 \pm$ SD	**7.87±2.52**		**22.10± 2.51**		**21.88**	**0.0001***

(*) Statistically significant at P < 0.05

Table (5): Correlation between total scores of adherence and total quality index scores of the study group pre and post-intervention

Total adherence scores at different times of assessment	Correlation of total scores among the study group quality index	
	r	**P value**
Pre intervention	0.290	0.069
After one month of intervention	0.699	0.0001[*]
After three months of intervention	0.636	0.0001[*]

r=Correlation Coefficient
 (*) Statistically significant at P < 0.05

Discussion:

Due to the daily life inconvenience caused by psoriasis, it producing for psoriatic patients some difficulties in living with psoriasis. Understanding the pathogenesis of psoriasis can increase the patient's sense of control, and paying attention to the aggravating factors can increase the patient's adherence to therapy and enhance positive lifestyle behaviors (**Nagarajan and Thappa, 2020**).

Mobile devices have rushed in popularity in latest years, creating plentiful options for their use in health care as mobile health (M. Health) tools. One of the advantages of M. health is that it can asynchronously provide information. The incorporation of asynchronous M. health into daily health care services might consequently help to enhance the efficiency of these services for patients with different chronic diseases such as psoriasis. The benefits have been reviewed in various medical conditions, such as diabetes and asthma, with promising results (**Seppen et al., 2020**). So the current study aimed to examine the effect of asynchronous M. Health nursing intervention on medications adherence and quality of life among patients with psoriasis.

Regarding the sociodemographic data of the studied subjects revealed that about two-thirds of both study and control groups were range between 40 to 60 years old while more than half of those participants were female. Moreover, the majority of the current study participants have secondary and high education. These results were supported by **Trettel et al. (2017), Mabuchi et al. (2012), and Wahl et al. (2013)** who reported that the majority of their study participants were assigned to the age group 35:64. **Santos-Moreno et al (2021)** added that about half of the sample in their study were women and had

a mean age of 58.7 years. While **Soliman (2020)** mentioned that the most of patients were university-educated in his study which studying the disease severity and quality of life among Arabic psoriatic patients.

The present study revealed that the study participants were mainly complained of itching, irritation, and dryness of the skin in addition to the presence of crusts, as itch is a common complaint among patients with psoriasis. Similar findings were reported by **Nagarajan and Thappa (2020) and Valenzuela (2011)** who mentioned that pruritus is the most frequent symptom was reported by their study subjects. In the current results, psoriatic arthritis was assessed in terms of joint swelling and pain. It was reported that a minority of the study and control group subjects and the majority were experienced moderate to severe pain. These results were higher than that reported by **Nagarajan and Thappa (2020) and Valenzuela (2011)**. This discrepancy may be related to the communities differences between both studies and also may be the result of differences in the disease duration in both studies participants than the present study participants as the disease duration of the majority of the previously mentioned studies was more than 10 years, on the contrary, that nearly half of the current study cases have a disease duration ranging from 5 to less than 10 years and may have less experience than those in other studies.

Regarding the patients' knowledge; many research findings indicate the urged importance of psoriatic patients education about their condition, as the present study illustrated that the mean of knowledge score was increased significantly after one month and three months of the intervention among study group subjects and statistically significant differences existed between study and control groups regarding

their knowledge scores after one month and three months of intervention. These results were in the same line with **Nagarajan and Thappa (2018)** who study the "effect of an educational and psychological intervention on knowledge and quality of life among patients with psoriasis" and reported an increase in the mean of the knowledge scores among the experimental group subjects to post the implementation of an educational intervention than pre-intervention of their study.

Balato et al. (2013) added that education and demonstration by nurses can be effective in decrease psoriatic patients' symptoms severity. Moreover, the research examined pre and post-education knowledge of psoriatic patients regarding psoriasis in the context of climate therapy. These results revealed significant improvement of the knowledge score immediately and after 3 months of the intervention when compared with pre-education knowledge scores of study subjects (**Wahl et al., 2013**). On the other hand, **Hawkins et al. (2017)** argued that; although their study identified improved patient education as a potential outcome of these applications they found that a large percentage of the apps were marketed as diagnostic tools, with limited or complete lack of verified oversight from actual dermatologists. There is no current system in place for ensuring that these apps are developed through the appropriate scientific channels

The present study cleared that, concerning the medication adherence level of subjects; the adherence mean scores were increased among study group subjects after one and three months of intervention compared to subjects of the control group. These results were consistent with **Balato et al. (2013)** who examine the effect of the use of mobile phone-based interventions to improve adherence among patients with psoriasis. These authors mentioned that the intervention group exhibits an improvement of adherence to therapy in the time of the control group subjects remained stable. Also there added that the use of electronic health (E-health) solutions to improve the adherence of psoriasis patients has been mobile text reminders are effective in improving adherence to prescribed medication. Moreover, improving adherence can occur

when patients report their symptoms weekly to a website **Alinia et al. (2017)**; or use a support application on a smartphone (app) **(Svendsen et al., 2018; Svendsen et al., 2018)**.

Pouls et al., (2021) in their systemic review research to identify different interventions especially using mobile calls, SMS text messaging, or mobile apps. A majority of all interactive interventions had a statistically significant effect on medication adherence and added that; their results supported the hypothesis that interactive e-health interventions can improve medication adherence and improve patients' involvement moreover that are most promising and should be considered for implementation in practice.

Concerning the quality index of subjects, the current results revealed that the mean of quality index scores was improved among study group subjects when compared to control group scores. Different previous studies have the same results; so Armstrong et al., **(2019)** reported that telemedicine intervention declined the DLQI score more than the usual care group after 12 months of follow-up by mean difference −0.45 (95% confidence interval= −1.29 to 0.38). Moreover, **Oostveen et al. (2014)** and **Balato et al. (2013)** indicated that patients allocated to regular daycare and telemedicine intervention had more reduction in the DLQI (dermatology life quality index) score about the regular daycare group. Moreover, conflicting data were reported by **Chambers et al. (2012)** who demonstrated that both the online and the in-office groups decreased significantly the DLQI score in their study. Also, **Dahy et al. (2020)** reported the need for further studies to assess the pros and cons of the telemedicine approach in psoriasis management.

The current study found that there was a positive correlation between total adherence scores and total patients quality index scores among the study group of patients with psoriasis. These findings were supported by the results of the study carried by **Augustin et al. (2011)** titled "Adherence in the Treatment of Psoriasis: A Systematic Review" that recognizes that a better understanding of the determinants of adherence can improve the outcomes of psoriasis treatment and lead to

higher patient satisfaction and quality of life scores.

Conclusion:

Based on the results of the current study, it was concluded that Use of a mobile app (mobile health) in education about psoriasis to engage patients in their health care, can have a significant impact on patients' knowledge, medication adherence, and quality of life among patients with psoriasis.

Recommendations:

Based on the study's results, the subsequent recommendations are made:

1. Designing different mobile patient engagement applications have motivational and visual user interfaces to provide a simplifier way for follow-up and education. Therefore, it can aid in nurse-patient communications, is easy to use, and contributed to an improvement in the overall quality of life outcomes for patients with psoriasis.

2. Replication of the study on a large number of subjects from a wide geographical area to allow more results generalization.

3. Replications of the study with longer follow-up time to allow for a greater understanding of the effect of E. health on medications adherence and quality of life and to permit a chance for generalization of the results.

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