Effect of Web-Based Education on Quality of Life and Anxiety Level among Patients undergoing Hemodialysis during Covid-19 Lockdown

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Abstract

Hemodialysis patients are prone to high stress and anxiety levels related to the acute coronavirus epidemic. **Aim:** To evaluate the effect of web-based education on quality of life and anxiety level among patients undergoing hemodialysis during Covid-19 lockdown. **Methods: Subjects and method**: **Design**: Quasi-experimental research design pre-post-test was utilized to achieve the aim of this study. **Settings**: The study was conducted at Port Said City in Egypt. **Sample**: Purposive samples of 300 patients undergoing hemodialysis were enrolled in this study during the period of the beginning of june 2020 to end of October 2020. **Four tools were used in data collection**: (I): A self-administered questionnaire (pre and post-test format) was used to assess the patient's demographic characteristics, medical history, and patient's knowledge about hemodialysis (pre and post-test format); (II): Corona Disease Anxiety Scale (CDAS); (III): Quality of Life (QoL) scale, and (IV) Patient's satisfaction regarding web-based education. **Results:** The present study revealed that there were highly statistically significant differences between patients' knowledge and their anxiety during COVID-19 pandemic outbreaks pre and post-implementation of the web-based education. Also, Significant improvements in the QoL ($p<0.001$) were revealed after the implementation of web-based education. **Conclusion:** the study concluded that web-based education achieved significant improvements in the patient's knowledge and has a positive effect on improving their quality of life and minimizing anxiety levels during the covid-19 lockdown. **Recommendations:** The Web Based education could be applied and carefully planned for all patients undergoing hemodialysis as a new teaching method for proving health issues. Provision of continuing follow-up education programs are recommended for patients undergoing hemodialysis

Keywords: Anxiety, Covid-19 lockdown, Hemodialysis, Quality of Life, Web-based education

Introduction:

Covid-19 had become a global health issue by the end of 2019. A worldwide lockdown was imposed in response to the pandemic, which had an impact on the people and changed many areas of their lives **(Sharma et al., 2020).** Egypt's lockdown began on March 25th and lasted around three months and patients have been affected by closures, putting their safety and security in danger. Long-term home isolation as a result of lockdown measures to prevent the spread of the COVID-19 epidemic (**World Health Organization, 2021**).

Coronavirus disease 2019 (COVID-19) was detected in China at the end of 2019 and quickly became a pandemic in the world (**Bueno-Notivol et al., 2021**). This disease had various destructive effects on mental health in China and the world. During the initial phase of the COVID-19 outbreak in China, more than half of the respondents rated the psychological impact as moderate to severe, and about one-third reported moderate-to-severe anxiety (**Luo et al., 2020**). It had the highest impact of event Scale-Revised (IES-R), stress, anxiety, and depression scores in some nations. Furthermore, Poland and the Philippines were the two countries with the highest levels of anxiety, depression, and stress (**Wang et al., 2020**). Some studies had reported numerous mental disorders due to the prevalence of COVID-19 disease and the effects of quarantine in the community. In Iran, high levels of anxiety, stress, and fear have been reported (**Castellini et al., 2021**).

According to the World Health Organization (WHO) on April 27, 2020, 109 577 laboratory-confirmed COVID-19 incidents were widely reported in China and 28 673 incidents in 104 other countries. , which included 3809 deaths, 8 Less than half of the patients had underlying diseases such as diabetes, hypertension, and cardiovascular disease **(Malakoutikhah et al., 2021).** In Egypt, from 3 January 2020 to 7:12pm CEST, 22 July 2021, there have been 514,413 confirmed cases of COVID-19 with 24,750 deaths, reported to WHO. As of 16 July 2021, a total of 93,009,661 vaccine doses have been administered (**World Health Organization, 2021**).

COVID-19 disease has a significant effects on chronic patients, including rheumatoid arthritis, systemic lupus erythematous, and renal patients (chronic kidney disease and chronic end-stage failure), which seems to be associated with an increased mortality rate in these patients during coronavirus outbreak (**Alberici et al., 2020).**

End-stage renal disease (ESRD) is a clinical condition in which the kidneys fail to perform metabolic functions and maintain fluid and electrolyte balance in the body, affecting 2% to 3% of the global population. Hemodialysis is currently the most common alternative treatment for these patients **(Dehbashi et al., 2017).**

A high percentage of anxiety is reported in patients with chronic diseases **(Zakeri et al., 2021).** In addition to chronic disease, hemodialysis patients face many stressors, including problems with treatment, dietary and fluid restrictions, weakness, anxiety, and depression **(Shinde & Mane, 2018).**

Anxiety is associated with all psychological factors and increases the rates of other forms of mental disorders in different patients. Anxiety can physiologically affect the functioning of the immune system and predispose a person to any physical or mental illness by reducing body resistance. Unfortunately, the prevalence of anxiety in patients undergoing hemodialysis is currently increasing, which can affect the mental and physical health of these people and also disrupt their course of treatment **(Sadeghifar & Mehrabian, 2016).** Thus, anxiety can weaken the immune system and make a person vulnerable to diseases such as coronavirus as people do not know such a disease well, and they are worried about the future **(Hossini et al., 2021 Zakeri et al., 2021).**

The impact of the coronavirus disease 2019 (COVID-19) pandemic on mental health among the general population becomes more evident as the pandemic is continuing. Previous studies show that symptoms of depression, anxiety, and stress are common reactions to the COVID-19 pandemic. Longitudinal studies report an increase in mental health problems compared to the pre-pandemic era (**Kwong et al., 2020).**

Individuals in the community use information technology mean like social media to raise awareness, educate, and track health-related events in the wake of the COVID-19 lockdown (**Kamel Boulos, 2019).** Social media is defined as websites and programs that enable users to generate and share information or participate in social networking. Social media tools are platforms and communities, such as Facebook, WhatsApp, and Facebook Messenger that allow several people to communicate and interact at the same time **(Barrett & Mac Sweeney, 2019).**

The number of people using social media is continually rising, with over 3.2 billion active users globally. The role of social media varies according to users and non-users, age groups, and demographic populations. Because technological change is linked to linguistic and cultural shift patterns, the role of social media is changing constantly **(Statsita, 2019**). The use of social media in healthcare become more common to improve communication speed, disseminate accurate information, and promote knowledge of support, treatments, and self-care options (**Kamel Boulos, 2019) & (Cherak et al., 2020).**

Teaching is a process used in nursing care and in psychotherapy to help people making their own decisions based on sound information provided by the nurses aimed at improving their understanding of the origins of their problems, underlying factors, and various alternatives to deal with them. The nurse does not propose or advise, but rather offers help if

needed. Teaching is one of the major roles of nurses, and it gains more importance in the nursing care for patients after hemodialysis to help them deal with anxiety **(Lee et al., 2020)**.

Significance of the study:

During the COVID-19 pandemic**,** it was recommended to employ additional preventive methods to the existing measures as routine care for patients undergoing hemodialysis. These guidelines had intended for all patients, not just those diagnosed with SARS-CoV-2. Rules & procedures must be prepared by facilities to assure that the instructions had implemented. Therefore, developing and applying Web-based education hemodialysis patients during the Covid-19 pandemic is very important and beneficial in terms of quality of care **(World Health Organization, 2021**).

One of the effective methods to attain continuing Web Based education is WhatsApp reminder messages. It may help in acquiring adequate knowledge and skills regarding hemodialysis. Because WhatsApp reminder massages depend on repeating and remembering massages for hemodialysis patients through photos, videos, power points to enhance and develop their knowledge, and practice. **Hence, this study aimed to** evaluate the effect of web Based education for patients undergoing hemodialysis on their quality of life and anxiety level during Covid-19 lockdown**.**

Aim of the Study

The study aimed to evaluate the effect of web-based education on quality of life and anxiety level among patients undergoing hemodialysis during Covid-19 lockdown.

Research hypothesis:

H1; web-based education has positive effect on improving quality of life among patients undergoing Hemodialysis during the COVID-19 lockdown

H2; web-based education has positive effect on reducing anxiety level among patients undergoing Hemodialysis during the COVID-19 lockdown

Subjects and Methods:

Research design:

Quasi-experimental research design pre-post-test was utilized to achieve the aim of this study

Settings:

The study was conducted at Port Said City in Egypt

Sample:

A purposive sample of 300 patients undergoing hemodialysis and obtained from Facebook and WhatsApp groups through Google form spreadsheet which is presented in Facebook and WhatsApp groups. The online Google form spreadsheet was opened from the first day of June 2020 to the end of the same month 2020 it was closed which was the determined time collect the sample.

Inclusion criteria: Adult conscious patients aged from 18 years to 60 years old from both sexes, having smartphone and internet access educated patients, free from physical, mental, and chronic disease, free from cognitive disease, and no history of mental illness, patients didn't participate in any previous educational program regarding hemodialysis and willing to participate and communicate in the study.

Exclusion criteria: was patients having a mental disease and refusing to participate in this study.

Data collection tools:

Tools were used to collect the data for the study as the following: Those tools an online Google forms that were sent to the respondents' patients via Facebook and WhatsApp groups.

Tool I: **A self-administered questionnaire** (pre and post-test format) was developed by the researchers after reviewing the related literature and research studies. It included the following three parts:

Part (1): Patient's demographic characteristics: This covered data such as age, sex, education, and residence.

Part (2): Patient's medical history involved duration of f treating with hemodialysis (yr.) hemodialysis sessions number per week, type of vascular access, and sources of information.

Part (3): Patient's knowledge about hemodialysis (pre and post-test

format): It was developed by the researchers after reviewing the related literature and research studies **(Sadeghifar & Mehrabian, 2016; Shinde & Mane, 2018; Lee et al., 2020; Zakeri et al., 2021; Yeter et al., 2021**; **Bonenkamp et al., 2021)**. It included 15 items of closed-ended questions about knowledge related to hemodialysis such as definition, causes, high-risk persons, care pre, during, and after hemodialysis, complications, and what to expect after hemodialysis.

Scoring system for patient's knowledge about hemodialysis:

Each item was scored as two marks for a correct answer, one mark for an incomplete answer, and zero for the wrong answer with a total score of 30 points. Then, these scores were converted to a percentage score. The patient's knowledge was considered satisfactory if the percentage score was 60% or more and unsatisfactory if was less than 60%. The reliability of the tool was confirmed by Cronbach's Alpha test r = 0.84.

Tool II: Coronavirus disease anxiety scale:

The Coronavirus Disease Anxiety Scale (CDAS) was developed by (**Alipour et al, 2020)** to measure coronavirus disease-related anxiety in the Iranian population. CDAS consists of 18 items congaing 2 subscales: psychological and physical symptoms each subscale has 9 items, in a 4-point Likert scale. Items are rated as (0 = never, 1 = sometimes, 2 = often, and 3 = always). Respondents are asked to rate the level of their anxiety related to these two domains.

Scoring system: Total scores range from 0-54, with a higher score reflecting a higher level of anxiety and categorized as no/mild anxiety (0-16), Moderate (17-29), and severe anxiety (30-54).

Tool III: Quality of Life (QoL) scale:

This scale was developed by **Brucker, (2014)**, it consisted of 33 items assessing four QoL domains, economic, psychological, family/social relations, and spiritual. The responses are on 3-point Likert agree/uncertain/disagree.

The scoring system: these were scored 2, 1, and 0 respectively. The scoring was reversed for negative items so that a higher score indicates better QoL. The scores of the items of each domain and the total scale were summed up, divided by the number of items, and converted into percent scores. The QoL was considered high if the score was 60% or higher and low if less than 60%.

Tool IV: Patient's satisfaction regarding web-based education:

This part is used to assess the web-based education characteristics and their effect. It included five statements, was the web-based education content enough, satisfaction with the web-based education did the web-based education improve knowledge, advantages, and disadvantages of the web-based education.

Tool Validity and Reliability:

The content validity of the tools, their clarity, comprehensiveness, appropriateness, and relevance was reviewed by five expert professors; two experts in medical-surgical nursing, one expert in mental health nursing, and two experts' physicians from the medical-surgical department). Modifications were made according to the panel judgment to ensure sentence clarity, comprehensiveness, and content appropriateness.

The reliability of the two scales was assessed in the current study using the internal consistency approach. Both demonstrated high reliability of the knowledge part was confirmed by Cronbach's Alpha test r = 0.84 and with Cronbach alpha coefficients 0.95 for the CDAS scale and 0.93 for the QoL scale.

Pilot study:

This was conducted on 10% of the total sample size (30 patients undergoing hemodialysis) to ensure the applicability of the tool and the time needed to complete it. The patients undergoing hemodialysis who participated in the pilot study were excluded from the main study sample.

Ethical considerations:

An official permission was obtained through an issued letter from the Dean of Faculty of Nursing, Port Said University to

obtain the permission for data collection before conducting the study explaining the aim. An informed consent was taken from all patients participated in the study after explanation of purposes and nature of the study on the first page of the online questionnaire; Instructions for completing the questionnaire, as well as the link and quick response code for the online questionnaire were done. They were given the right to withdraw at any time, or refuse to answer specific question without giving any reason. The researcher assured maintaining anonymity and confidentiality of subject's data.

Procedure:

The actual fieldwork was carried out starting from the first day of June 2020 to the end of the October 2020, it was closed. The study was conducted through preparatory, implementation, and evaluation phases.

Preparatory Phase:

Preparatory phase started from the beginning of June, 2020 to the e beginning of July 2020 (A period of one month). It included developing the structured tools and the education program based on the review of related literature. Represented by using booklets, images, videos, and power point presentations, it was written in a simple Arabic language and supplemented by photos and illustrations.

Implementing Phase:

The implementation phase started from the beginning of July, 2020 to end of October, 2020. The program was implemented in period of four months three times a week including pretest, program implementation, and post-test; the program was carried out over 12 to 15 weeks.

Pre & Post -test: The survey was sent to patients through Facebook and WhatsApp groups during the COVID-19 pandemic via Google drive link: (**https:// docs. google. com/ forms/ dle/ 1FSLPSLsd**). On the first page of the online questionnaire, patients were informed about the study's purpose and expected outcomes, the tools' contents, and how to respond. For post-test; tool II&III was sent again on the WhatsApp groups to re assess the Quality of Life (QoL) scale, and Coronavirus disease anxiety scale. The average time spent on the patient's completion of the online administered questionnaire was approximately 30 minutes.

Intervention: The implementation of the Web-Based Education program was conducted through videos call, posters, recordings, and power point presentation, and group discussions through the WhatsApp groups and Zoom meetings. The patients were divided into groups, each group from (15-20 patients), three sessions per one week for 60-90 minutes followed by post-test survey: First session: Included "Introduction about the aim of the web-based education program& Give knowledge about introduction, causes, risk factors, and management of hemodialysis". second session: Included:" Effect of hemodialysis on patient's anxiety and QOL &Practice relaxation training as a deep breathing exercise and progressive muscle relaxation technique." Third session: Included "Practice relaxation training as meditation &Practice relaxation training as a progressive muscle relaxation technique."

The sessions for the Web-based educational program were:

Session 1: Introduction and orientation:

1. The researcher introduces herself and explains the nature and purpose of the study and the possibility to the patients that the program is very important.
2. Taking oral informed consent of the patients who agreed to participate in the program and setting an agreement on the number of sessions, time, and duration of every session, then specifying the subject of the next session.
3. Orienting the patients about the program (5 sessions, two sessions every week, for 60-90 minutes). Patients must follow the WhatsApp group with confirming the privacy and confidentiality of research information, commitment to session dates and times, avoiding sarcasm about others' opinions, and apply essential activities during every session.
4. The pretest anxiety Scale and quality of life scale were given to them (pre-assessment).

Session 2: Overview of hemodialysis:

At the beginning of the session, the researcher welcomes all patients and thanks them for their participation. Participants were asked to fill out and submit a Google Form that had been prepared online. The Google form link was shared with women via Facebook and WhatsApp groups during the COVID-19 pandemic about meaning, causes, risk factors, and management of hemodialysis.

Session (3): Overview of the effect of hemodialysis on patient's anxiety and QOL**:-**

This session concerned with what is the effect of hemodialysis on the patient's anxiety and QOL. The researcher discusses with the participants how to improve their QOL through:

- Strength your relationship with God and ask him for help
- Develop good behavior through:
- Replace your negative thoughts with positive ones
- Stay away from negative people

Session (4): Relaxation training:

The researcher asked patients to see deep breathing exercises introduced through WhatsApp and Facebook groups. The researcher shows videos and photos that illustrate how to practice deep breathing exercises. The researcher asks patients, to apply deep breathing exercises.

Session (5): Relaxation training:

The researcher asked women to see meditation. The researcher shows videos and photos that illustrated how to practice meditation.

Session (6): Relaxation training:

The researcher asked patients to see progressive muscle relaxation which was introduced through WhatsApp and Facebook groups. The researcher shows videos and photos that illustrate how to practice progressive muscle relaxation. The researcher asks patients, to apply progressive muscle relaxation.

Evaluation phase: Post-test was applied after implementation of the program immediately through link send on WhatsApp groups.

Statistical analysis:

Data entry and analyses were done using the Statistical Package for the Social Sciences (SPSS Version 20.0). Categorical variables were analyzed using the Chi-squared test. To identify the predictors of improvement of the QoL and DASS scores, multiple linear regression analyses were done with the analysis of the variance of the models obtained. The level of statistical significance was considered at $p< 0.05$.

Results:

Table 1 demonstrates that 64% of the studied patients were aged > 40 years old, (66%) of them were male, (58%) of them were in secondary education, and (73%) of them were living in urban areas.

Table 2: illustrates that 25% of the studied patient treated with hemodialysis from ≥4, (86%) of them did hemodialysis sessions three times per week, 13% of the patients believed that the COVID-19 outbreak and lockdown influenced their course of treatment.

Figure 1: demonstrates that the main source of knowledge regarding hemodialysis among the studied patients were nurses and physicians (64% and 43%) respectively.

Table 3: indicates that there were a highly statistical significant differences between pretest and posttest in total score of patients' knowledge regarding hemodialysis after implementation of the web-based education with p value (P <0.001*).

Figure 2**:** shows that almost of patients 93% had an unsatisfactory level of knowledge regarding hemodialysis in the pre- web-based education but in post-web-based education 95% of them had a satisfactory level of knowledge.

Table (4): Shows that majority of the studied patients (72%) had severe anxiety scores and (28%) of them were moderate anxiety and none of them had mild anxiety scores toward covid-19 pre-web-based education compared to (12%) who had severe anxiety score and (39%) of them had moderate anxiety and 49% of them had mild anxiety score towards covid-19 post-web-based education, with a highly statistical significant differences between pretest and posttest in total score of patients' anxiety score after implementation of the web-based education with p value (P <0.001).

Table 5: illustrates that there were a highly statistical significant differences between pretest and posttest at the level of

CDAS scores after implementation of the web-based education with p value (P <0.00٠).

Table 6: Shows that there were highly statistically significant differences in all domains regarding the total quality of life scale after implementation of the web-based education with p value (p<0.001).

Table 7: Shows that 100% of the studied patients reported that the contents were enough, were satisfied with the web-based education, and satisfied that the web-based education improved their knowledge; while 94% of the studied patients reported that the disadvantage of web-based education was internet interruption.

Table (8): Reveals that there were significant positive linear correlations between knowledge- **anxiety** ($r = 0.448$, $p < 0.001$), knowledge- **QoL** ($r = 0.223$, $p < 0.001$), and **anxiety - QoL** ($r = 0.225$, $p < 0.001$).

Table (1): Frequency and percentage distribution of the studied patients regarding their demographic characteristics (n=300)

Demographic characteristics	No	%
Age:		
<40	108	36.0
> 40	192	64.0
Sex		
Female	102	34.0
Male	198	66.0
Education:		
Primary education	48	16.0
Secondary education	174	58.0
High education	78	26.0
Residence:		
Urban	219	73.0
Rural	81	27.0

Table (2): Frequency and percentage distribution of the studied patients regarding their medical history (n=300)

Patient's medical history	No	%
Duration of f treating with hemodialysis (yr.)		
≤1	78	26.0
2	63	21.0
3	84	28.0
≥4	75	25.0
Hemodialysis sessions number per week		
Three	258	86.0
Other	42	14.0
Type of vascular access		
Fistula	189	63.0
Catheter	111	37.0
Effect of COVID on treatment		
Yes	39	13%
No	261	87%

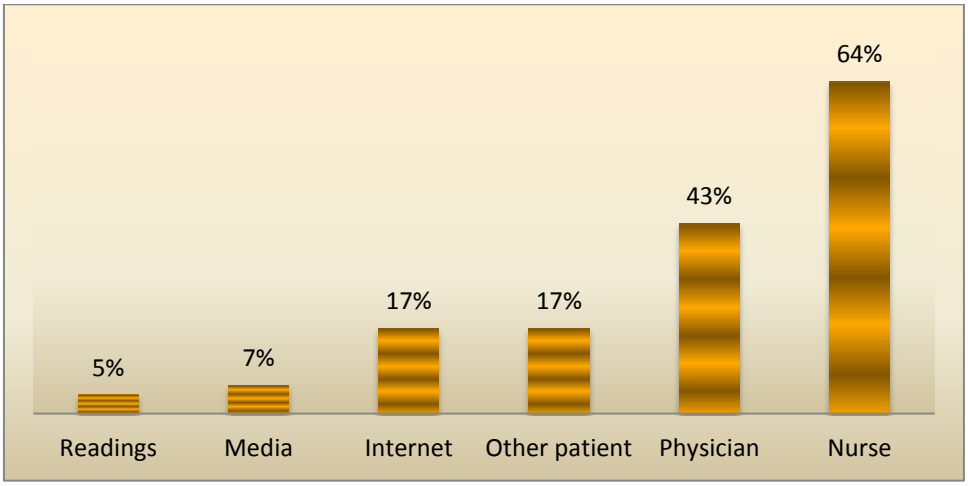

Figure (1): Percentage distribution of the studied patients regarding their source of knowledge about hemodialysis (n=300)

Table (3): Percentage distribution of the studied patient's knowledge about hemodialysis pre and post-web-based education

Patient's knowledge	No =(300)		X^2	P-value
	Pre-web-based education (N/%)	Post-web-based education (N/%)		
Meaning of hemodialysis	75 (25.0)	285(95.0)	137.43	<0.001*
Causes of hemodialysis	108(36.0)	282(94.0)	113.23	<0.001*
High-risk persons of hemodialysis	54 (18.0)	279(93.0)	83.18	<0.001*
Complications of hemodialysis	75 (25.0)	276(92.0)	115.47	<0.001*
Care pre, during, and after hemodialysis	111 (37.0)	258(86.0)	135.45	<0.001*
What to expect after a hemodialysis	105(35.0)	264(88.0)	105.23	<0.001*

**highly Significance at 0.001 levels

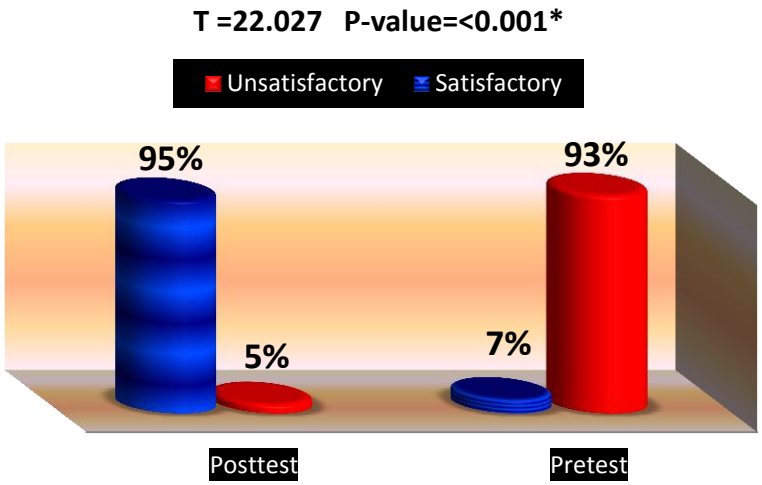

Figure (2): Percentage distribution of the total patient's knowledge level about hemodialysis

Table (4): Comparison between CDAS about anxiety levels towards covid-19 among the studied patients pre and post-web-based education

CDAS anxiety level	Pre web-based education		Post-web-based education		X2	p-value
	No	%	No	%		
- Mild	0	0.0	147	49.0	0.853	0.001*
-Moderate	84	28.0	117	39.0		
-Sever	216	72.0	36	12.0		

**highly Significance at 0.001 levels

Table (5): Comparison between the average means scores of the CDAS among the studied patients pre and post-web-based education

Items	Pre web-based education	Post-web-based education	T-test	p-value
- CDAS average Scores	39.45 ± 12.53	32.653 ± 10.52	18.47	0.000***

***A highly statistically significant difference (P<0.000).

Table (6): Pre-Post- web-based education differences regarding domains and total score of quality of life (QoL) among the studied patients (n=300)

QoL domains	Time				X^2	P-value
	Pre web-based education (n=300)		Post web based education (n=300)			
	No.	%	No.	%		
Economic	105	35.0	255	85.0	26.72	<0.001*
Psychological	78	26.0	111	37.0	5.63	0.032*
Family/social relations	75	25.0	177	59.0	7.43	0.004*
Spiritual	81	27.0	204	68.0	12.62	<0.001*
Total **QoL** score	23.36±4.27		53.53±7.82		21.132	<0.001*

(*) Statistically significant at p<0.05
**highly Significance at <0.001 levels

Table (7): Percentage distribution of the studied patients satisfaction regarding web-based education (N=300).

Web-based education	N0	%
Is the content enough?		
-Yes	300	100.0
-No	0	0.0
Satisfaction with the web-based education		
-Yes	300	100.0
-No	0	0.0
Did web-based education improves knowledge		
-Yes	300	100.0
-No	0	0.0
Advantages of web-based education:		
- Active participation	282	94.0
-Participants can get a chance for live chat.	275	95.0
-Participants can reach it at any place.	279	93.0
-They offer calendar scheduling and invites	288	96.0
-Ease of users to stay in touch with teaching program providers	300	100.0
Disadvantages of web-based education:		
-Internet interruption	282	94.0
-Inability of participants to join a social media teaching program with a large sample	18	6.0

Table (8): The correlation between knowledge, anxiety, and QoL among patients undergoing hemodialysis during Covid-19 Lockdown

Variable	Correlation coefficient	P-value*
Knowledge- **anxiety**	0.448	<0.01
Knowledge- **QoL**	0.223	<0.01
anxiety - **QoL**	0.225	<0.01

*Correlation significant at <0.001levels

Discussion:

The current study hypothesized that patients' knowledge regarding hemodialysis will improve after receiving a web-based education during the COVID-19 lockdown. Additionally, patients undergoing hemodialysis will have to reduce their level of anxiety and improving in their quality of life after receiving a web-based education during the COVID-19 lockdown. Hence, the study aimed to evaluate the effect of web-based education for patients undergoing hemodialysis on their quality of life and anxiety level during the Covid-19 lockdown.

The present findings revealed that two-thirds of patients were male. In comparison with other studies, a study conducted at Tikrit Teaching Hospital by **Saadoon**, **(2017**) **& Abdel-Kader et al., (2019**) about " Frequency of CMV-infection among hemodialysis patients: "found that males accounted for more than two-thirds. Additional support was found by **Kang** et al., **(2017)** who studied "Nutritional status predicts 10-year mortality in patients with end-stage renal disease on hemodialysis" and found that more than half of the sample was male. This is in consistent with **Fatim et al., (2018)** who stated that more than half of patients are from (48 – above yrs.).

It could be explained by the differences in lifestyle between genders (i.e. more males are smoking and drinking alcohol). The poor lifestyle might aggravate renal failure and this result is similar to a study conducted by **Abdel-Kader et al., (2019**) who studied " Individual quality of life in chronic kidney disease: Influence of age and dialysis modality". The study indicated that the number of male patients with end-stage renal disease (ESRD) is higher than those of female patients.

Regarding medical history, the result of the current study showed that the most of the studied patients did hemodialysis sessions three times per week, This result is in the same line with **Parlak & Şahin, (2021)** that shows that almost of patients have three hemodialysis sessions week. Less than a quarter of the patients believed that the COVID-19 outbreak and lockdown influenced their course of treatment. This result is in the same line with **Dehghan et al., (2021) & Fatim et al., (2018)** who found the same result. From the researchers' point of view, this may be the cause of anxiety among patients

The result of the current study indicated that thirteen percent of the patients believed that the COVID-19 outbreak and lockdown influenced their course of treatment. From the researchers' point of view, this may be the cause of anxiety among patients. This result is in the same line **as Fatim et al., (2018)** who studied "Effectiveness of an Education Program on Hemodialysis Patients, Knowledge towards Dietary Regimen" and found the same result.

The result of the current study showed that more than three-fifths of patients and more than two-fifths of them reported that the main source of knowledge regarding hemodialysis among the studied patients were nurses and physicians respectively. From the researchers' point of view, this result reflects that patients had the desire to seek information from health personnel. This result is in contrast with **(Cho et al., 2021)** who stated that Source of COVID-19 information were TV, newspaper, and radio.

Concerning patient**s'** knowledge, the findings of the current study revealed that there was a highly statistically significant difference between patients' knowledge

regarding hemodialysis pre and post-web-based education. From the researchers' point of view, this result reflects the positive effect of web-based education, which meets the studied patients' needs and provides them with sufficient knowledge.

This result agreed with the study by **Fan et al**., (**2020)** about the "KAP theory" and reported that, health behavior change when gaining the right knowledge and adopting the practice**.** Also**,** a recent study by **Rana et al., (2020)** illustrated that sufficient individual knowledge is associated with effective prevention, control of disease, and promotion of a person's health**.** A study by **Ricardo et al., (2018)** supported that; knowledge deficit is associated with poor health and maladaptive disease**.**

This finding is supported by a similar study conducted by **Sousa et al., (2018**) that aimed to identify the effectiveness of a teaching intervention to promote self-care of vascular access. The results of that study showed that teaching intervention significantly improved knowledge about vascular access care.

In another study, **AdibHajbaghery et al., (2019**) evaluated the quality of care of vascular access of patients on hemodialysis in Iran. The results revealed that the knowledge about the quality of care was at a moderate level. Therefore, it indicates the necessity of continuing education programs and developing a standard protocol for vascular access care; also indicated the importance of patient education about self-care of vascular access.

In this study, patients' knowledge regarding complications of hemodialysis and its management increased from one quarter in the pretest to almost all in the posttest. This finding is similar to the study conducted by **Motahedian et al (2019)** assessed the effect of programmed nursing care on hemodialysis complications. The study illustrated that there were significant differences in the knowledge of complications before and after the program.

The present study findings indicated that almost of patients had an unsatisfactory level of knowledge regarding hemodialysis in the pre-web-based education but in post-web-based education, almost all of them had a satisfactory level of knowledge. From the researchers" point of view, it reflected the positive effect of web-based education and illustrated the importance of introducing web-based education about hemodialysis to patients.

The present findings revealed that there were significant differences and reducing was observed between pre and post-web-based education at the level of CDAS scores. These results explained the knowledge deficit that, causes increasing emotional disturbances level and fear of the unknown. These results were consistent with the study done by **Huang and Zhao (2020)** regarding generalized anxiety disorder, sleep quality and depressive symptoms and noticed that anxiety disorder affected depressive symptoms. This success of the web-based education could be attributed to the coping element of this web-based education, which focused on helping patients to select the most suitable coping strategy to be followed to relieve their anxiety.

The findings of the present study displayed that there were highly statistically significant improvements revealed in all domains regarding the total quality of life scale. From the researchers' point of view, the findings reflected acceptance of the set research hypothesis, indicating the effectiveness of the web-based education in alleviating these patients' anxiety, and consequently improving their QoL.

This finding is similar to the study conducted by Thomas et al. (2019) in India that measured the effect of patient counseling on the quality of life of hemodialysis patients and concluded that awareness of patients about medications and dietary requirements through patients counseling was found to be very effective in improving quality of life for hemodialysis patients.

Similarly, these results were consistent with the study done by **Hammad & Eltayeb, (2020)** who studied "Impact of an educational program on knowledge and quality of life among hemodialysis patients in Khartoum state" and concluded that the interventional education program also improved the quality of life after its implementation. Specifically, the results revealed that there was a significant

improvement in all domains of quality of life namely: health and functioning, social and economic, psychological/spiritual, and family domain.

In addition, **Ghadam et al., (2016)** found in their study on "Effect of self-care education by face-to-face method on the quality of life in hemodialysis patients" that the educational program on the QOL improvement of HD patients was assessed after 8 weeks. The results showed a significant improvement in each domain after counseling. Total QOL score improvement post-intervention increased.

Also, **Bahodri et al., (2018)** showed similar results in their study on " The effects of an interventional program based on self-care model on health-related quality of life outcomes in hemodialysis patients" and concluded that educational programs held through counseling patients have a positive effect on HRQOL and could help in providing mental support and understanding of the disease as well as improving the self-esteem of the patients undergoing HD.

The present findings revealed that all of the studied patients reported that the contents were enough and were satisfied with the web-based education and it improved their knowledge. From the researchers' point of view, it indicated the good impact of web-based education regarding hemodialysis.

The findings of the present study revealed that there were significant positive linear correlations between knowledge-anxiety, knowledge-QOL, and anxiety- QOL. From the researchers' point of view, this reflects the importance and effectiveness of web-based education that is commonly associated with improving knowledge and a better understanding among the studied patients that help them learn and acquire good knowledge and apply it. This association is explained by that when the studied patients had sufficient knowledge that can help them decrease their anxiety which reflected on their quality of life.

Conclusion:

Based on the results of the present study, the study findings concluded that the results support the research hypothesis in web based education achieved significant improvements in the patient's knowledge and has a positive effect on improving their quality of life and minimizing anxiety levels during the covid-19 lockdown

Recommendations:

Based on the current study results, the following recommendations are proposed:

- The Web Based education could be applied and carefully planned for all patients undergoing hemodialysis as a new teaching method for proving health issues.
- Provision of continuing follow-up education programs are recommended for patients undergoing hemodialysis.
- Psychological support should be carried out to help patients undergoing hemodialysis to cope and become more resilient regarding hemodialysis**.**
- Replication of the current study with a larger sample of patients undergoing hemodialysis in different settings is required for generalizing the results.

Limitations of the study:

The current study had two limitations**,** first, the inability to interview the studied patients face-to-face. Second, the study online-based questionnaire method was used during the coronavirus pandemic outbreak to avoid infection transmission and during the lockdown. So, there was sampling bias being conducted online and restricted to only educated patients with internet access that did not represent and reflect the whole patients.

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