Effect of Tele-nursing about life Style Modification on Health Outcomes of Rheumatic Heart Disease Patients during COVID-19 Pandemic

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Abstract

Background: Tele-nursing is considered one of the most important technological events of the late (twentieth) century as the gateway to modern nursing care. The aim of tele-nursing is to improve patient safety, quality of care, and is considered a quick access to nursing care by overcoming the geographical barriers. **Aim:** This study aims to determine effect of tele-nursing about life style modification on health outcomes of rheumatic heart disease patients during COVID-19 pandemic. **Design:** A quasi-experimental research design has been utilized in this study (Two groups study and control). **Setting:** The study was conducted at Sohag University Hospital in Egypt. **Subjects:** Based on the population, 60 patients were chosen as the sample size was divided in to two groups, control (30 patients) and study (30 patients). **Tools**:1) A Self-administered Questionnaire (pre/post-tests), (2 Mini Nutritional Assessment short-form (MNA®-SF) (pre/post-test), (3 The Exercise Adherence Rating Scale (EARS) and (4 Deep venous thrombosis risk assessment tool . **Results:** There were a highly statistically significant differences between both groups regarding knowledge level, pepper nutrition, exercise adherence (P≤ 0.001).There was a positive correlation between body mass index and prevention of deep venous thrombosis among study group patients post- implementing of tele-nursing during COVID-19 (r= .580 at P≤ 0.01). **Conclusion**: it is an effective strategy, telenursing has been proven to give appositive result for improving health outcomes of rheumatic heart disease patients. **Recommendations:** Replication of the study using large probability sampling**.** Enhance telenursing use in nursing practice, and apply telenursing via follow up phone services to improve patient's adherence to a healthy regimen.

Key words: Educational intervention, Tele-nursing, Health Outcomes, rheumatic heart disease, Covide-19

Introduction

It is certainly that, the (21st) century has faced one of its biggest challenges. Outbreaks of coronavirus have killed millions of people; especially, nurses who care for these patients were included. On the other hand, the prevalence of the new coronavirus (COVID-19), which was transmitted by respiratory droplets and direct contact, is much more contagious. So, the primary goal is to minimize the risk of infection transmission between patients and nurses. The World Health Organization (WHO) even, has considered infection control is necessary in patients with confirmed or suspected COVID-19. Therefore, the best option for treatment of infectious diseases is the self-care education. **(Purabdollah & Ghasempour., 2020).**

One lesson from the current COVID-19 pandemic is the need to optimize health care provision outside of traditional settings, and potentially over longer periods of time. An important strategy is the remote patient monitoring (RPM), allowing patients to remain at home, while they transmit health data and receive follow-up services. The COVID-19 pandemic has transformed remote care provision, as health care settings have needed to reduce face-to-face contact to ensure social distancing, and triage care provision to accommodate pandemic-specific responsibilities **(Muller, Berg, Jardim, Johansen & Ormstad., 2021).**

Tele-medicine certainly seems to be a new opportunity in the crisis of COVID-19 Pandemic to reduce these problems, in particular, reducing transmitting infection and costs. **(Purabdollah & Ghasempour., 2020).**

Tele-nursing is considered one of the most important technological events of the late (twentieth) century as the gateway to modern nursing care. The aim of tele-nursing is to improve patient safety, quality of care, and is considered a quick access to nursing care by overcoming the geographical barriers. The use of mobile phones, telephones, SMS and communication technologies are considered part of tele-nursing. As increasing technology growth and also increasing access to nursing services, the use of tele-nursing in patient care seems to be a necessary. Now, with such increasing prevalence of COVID-19, hospitals really are facing a serious challenges due to the shortage of nursing staff and preventive, diagnostic, therapeutic equipment's, especially the lack of adequate bedding relative to the population and also the impossibility of hospitalization of all these patients **(Sakinah & Nurdin., 2021).**

Cardiovascular disease (CVD) is the leading cause of death in the Middle East. CVD can be caused by a combination of socio-economic, behavioral and environmental risk factors, including high blood pressure, unhealthy diet, high cholesterol, diabetes, air pollution, obesity, tobacco use, kidney disease, physical inactivity, harmful use of alcohol and stress. Family history, ethnic background, sex, and age can also affect a person's risk of cardiovascular disease (Jarrah et al., 2018)**; Shimanda et al., 2021).**

Rheumatic heart disease (RHD) is a major cause of cardiovascular morbidity and death in low-income and middle-in-come countries. RHD remains a significant health problem in the developing world, affecting 15.6 million people worldwide. RHD is largely a disease of poverty, of which overcrowding, poor nutrition, poor health-care access and limited health resources are major contributing factors **(WHO., 2020).**

Rheumatic heart disease is the result of an abnormal immune response to the bacteria Streptococcus pyogenes. The disease causes permanent scarring of the heart values, which results in heart failure, stroke and early death. When valvar heart disease is associated with atrial fibrillation (AF) it without doubt carries a risk of multisystem embolization. People with RHD are at risk of ischemic stroke because of blood clots which can form in the heart and subsequently block blood flow to parts of the brain. Some people living with RHD need to take 'blood thinning' medication (anticoagulation) to reduce the risk of stroke **(Rusingiza et al., 2018).**

Venous thromboembolism (VTE) is a major health issue worldwide which includes deep venous thrombosis (DVT) and pulmonary embolism (PE) which considered serious complications of RHD. VTE is the formation of a thrombus in a vein or veins, usually in the lower limbs, and the embolization of a thrombus to the pulmonary arterial system via the inferior vena cava and right heart chambers. According to Centers for Disease Control and Prevention, it is estimated that between 300,000 and 600,000 people suffer from VTE each year, and up to 100,000 people die as a result of it worldwide **(Mohammed, Taha & El- Aziz., 2018).**

Exercise is important for people with RHD because it helps circulation and eases symptoms of venous insufficiency. Walking and exercising may help to improve symptoms as

edema, pain, tachycardia, dyspnea, hypotension, and hypoxemia or chest pain. Currently, physical exercise is considered one of the most effective methods to help prevent RHD and also to promote cardio vascular (CV) health. There are more than 250000 yearly deaths in the United States who are attributed to CV disease which result from lack of physical activity. Exercises have certainly a favorable effect on the lipid metabolism. **(Patel et al., 2017; Streiff et al., 2016).**

Nursing staff play a key role in RHD management and in prevention compilations if well know ledged, skillfully and empowered to change hospital culture. Their increased level of knowledge leads to an improvement in the delivery of patient care. Appropriately trained nurses are skilled in assessing the risk of RHD in their patient and ensuring prophylactic measures are in place. Many nurses have risen to the complex challenges of caring for people during COVID-19 in innovative ways to provide care **(Mohammed, Taha & El- Aziz., 2018).**

Patient education, undoubtedly, is one of the nurses' most important roles. Also it is an essential strategy in the disease controlling process and reducing the disease complications. The needs of these patients include; educational needs toward adherence to drug treatment and side effects, mental counseling, diet, and observance of standards of care, health care and follow-up of disease outcomes certainly helped through tele-nursing. Good nutritional status is so important in RHD health outcomes. Many patients require nutritional intervention to help treat and/or prevent malnutrition which may be a serious risk factor for many diseases. So it is a necessary for RHD patients to be educated and provided with needed health dietary modifications **(Purabdollah & Ghasempour, 2020; Razu et al., 2021).**

Significance of the study:

The rapid increase of coronavirus disease cases, the fear of being infected, the delayed access to the treatments and progressive lockdown measures delayed most elective procedures, outpatient visits, rehabilitation programs and chronic clinical care, with effects on the most vulnerable cardiovascular patients **(Yeo, Wang & Low., 2020)**. The restrictions to contain the infection have caused lifestyle changes in a deleterious direction, with a possible impact on management of the RHD **(Mattioli, Sciomer, Cocchi, Maffei & Gallina., 2020)**. As a result of the indirect consequences of the COVID-19 pandemic on health care system and RHD patient, nurses need to be prepared for a different cardiovascular disease scenario in the future and take advantage of this challenges time implementing the current healthcare modalities with new e-health methods.

Aim of the study

This study aimed to determine the effect of tele-nursing about life style modification on health outcomes of rheumatic heart disease patients during COVID-19 pandemic.

Research Hypothesis: The present study hypothesis that:

1.Patients exposed to tele-nursing are expected to have mean knowledge level, proper nutritional status and exercise adherence scores higher than patients who don't exposed to tele-nursing.

2.Patients exposed to tele-nursing are expected to have the risk for deep venous thrombosis fewer patients who don't exposed to tele-nursing.

Operational Definitions:-

1) Life style modifications for rheumatic heart disease patients.
Small changes can make a big difference, recommendations about diet, exercise and other habits can help alleviate heart failure symptoms, slow your disease's progression and improve your everyday life. In fact, people with mild to moderate heart failure often can lead nearly normal lives as a result. Making some of these lifestyle changes can be easier said than done. But working these changes into your daily routine can make a real difference in your quality of life.

2) Indicators for health outcomes for rheumatic heart disease patients :-

A. Patient's knowledge about rheumatic heart disease and covide-19.

B. Proper nutritional modifications for rheumatic heart disease patients during covid-19.

C. Exercise adherences for rheumatic heart disease patients during covid - 19.

D. Prevention of deep venous thrombosis for rheumatic heart disease during covid - 19.

Subjects and method

Design:

A quasi-experimental research design has been utilized in this study (Two group study and control)

Research Setting:

The study was conducted at Sohag University Hospital which serves all cities and villages of Sohag Governorates., in the internal medicine unit located on the right side, third level of hospital buildings which divided into two wards one of them for male patients and the other for female patients, the unit capacity is 40 patients with 40 beds and about 25 nurses through 3 work shifts. This university hospital was selected because it serves more than 5 million residents

Subjects:

The hospital's patient records for the years of (2019-2021) were revised to find out the number of patients in whom were admitted with rheumatic heart disease in the last year. It was found that the number of patients throughout the year is 250 patients, and accordingly the sample size was calculated. sample size was calculated based on Roasoft calculation program with the assumption of a 50% response rate and 95% confidence interval (CI) and error margin 5%. Therefore, based on the population, 60 patients were chosen as the sample size and were divided in to two groups, control (30 patients) and study (30 patients).

Selection method:

A non-probability convenience sampling technique was used, 60 patients with rheumatic heart disease were recruited according to the inclusion criteria.

Inclusion criteria:

• Adult patients with rheumatic heart disease for a minimum of one year

• Have Android phones.

Exclusion criteria:

Free from any other associated medical diseases as evident from patients charts.

Tools of Data collection:

Four tools were used as follow;

Tool 1- A biosocidemographic & knowledge assessment Questionnaire: (structure on live interview): It was developed by researcher in an Arabic language after reviewing the related literature **(Faadn., et al, 2020; Hoffman., & Sullivan, 2020).** It consists of two parts:

Part I: Personal and clinical data:

It includes the following data; patient's age, sex, marital status, educational level, occupation, residence, longevity of disease, and body mass index (BMI) through patients were asked to report his\her height & weight.

Part II: Patient knowledge about rheumatic heart disease and covide-19:

It was developed by researcher in an Arabic language after reviewing the related literature. Used to assess the patient's knowledge level and cover the following items: knowledge about her/his illness, definition of diseases, symptoms, treatment of diseases, complications, preventions, and investigations normal values. Also, patient knowledge about covid-19 pandemic, definition, causes, sign and symptoms, prevention, complications.

Scoring system: likert scale was used with 3 alternatives categories as:

Always =1   Sometimes =2   Never = 0

less than (60%) were considered having poor knowledge, from (50 to 70%) were considered having satisfactory knowledge and while those who obtained above than (70%) were considered having good knowledge level.

Tool 2- Mini Nutritional Assessment short-form (MNA®-SF)

The Mini Nutritional Assessment is a well-validated tool for assessing malnutrition in adult patients. It consisting of six questions on food intake, weight loss, mobility, psychological stress, or acute disease, the presence of dementia or depression, and body mass index (BMI). The maximum score for this part is equal to 14. A score equal to or higher than 12 indicates normal nutrition, 8 indicate at risk of mal nutrition and 7 or less indicate malnourished. This tool demonstrated good internal consistency (Cronbach's α = 0.87) and test–retest reliability (intra-class correlation coefficient [ICC] = 0.93) **(Kaiser et al, 2009).**

Tool 3- The Exercise Adherence Rating Scale (EARS)

Exercise Adherence Rating Scale (EARS) is a self-report measure developed by a group of United Kingdom researchers. The EARS also demonstrated good internal consistency (Cronbach's α = 0.81) and test–retest reliability (intra-class correlation coefficient [ICC] = 0.97), composed of six items that directly assess adherence behavior. The six items are summed and items with positive phrases are reversely scored; meaning items 1, 4 and 6. The six items are scored using an ordinal answer scale (0 = strongly agree to 4 = totally disagree), with higher scores indicating greater adherence (0 to 24) **(Beinart et al, 2017)**

Tool 4- Deep venous thrombosis risk assessment tool:

The Wells score is the most widely used clinical decision tool developed by (**Modi., et al, 2016**) for the diagnosis of deep vein thrombosis (DVT) as a complication from rheumatic heart disease or any other disease. This tool risk-stratifies patients into 'low', 'intermediate' and 'high' risk categories for DVT, based on a point system. The internal reliability of the original tool was good (Cronbach's alphas = 0.90).

A Wells score is calculated with patients scoring +1 point for each of the below criteria: chronic disease treatment, paralysis, recent plaster immobilization of the legs, recently bedridden for ≥ 3 days, or major surgery within the last 12 weeks requiring general or local anesthetics, localized tenderness, entire leg swelling, calf swelling >3 cm compared with the asymptomatic leg, pitting edema, collateral superficial veins, previously documented DVT. The scoring system for DVT: - 2 to 0: low risk, 1 to 2 points: Moderate risk, 3 to 8 points: high risk. **(Bradburn et al, 2020)**.

Ethical considerations

Prior to recruitment and data collection, a written consent were secured from each subject after being informed about the nature, purpose and benefits of the study. Patients were also informed that participation is voluntary and about their right to withdraw at any time without giving reasons. Confidentiality of any obtained information was ensured through coding of all data. The researchers reassured subjects that the data would be used for only the research purpose.

Pilot study:

A pilot study were carried out on 10% (6 patients) of the total study sample to test the clarity and practicability of the tools and to estimate the needed time to fill in each form. Necessary modifications were done according to the pilot study results. Pilot subjects will later be excluded from the main study sample.

Field work:

• Approval was taken by official letters to director of the hospitals before data collection and after explanation of the study purpose.

• Tools were reviewed by experts in the different fields of nursing and medical specialties.

• The nursing health recommendations Booklet was designed by the researchers based on analysis of the actual patients' needs from pretests (assessment patients' knowledge, nutrition, exercises, and risk for DVT).

Telehealth Nursing Protocol:

• The telehealth nursing protocol consists of sending daily SMS to the subjects of the study group for 90 days. It consists of the list of messages that was sent every day. The SMS are classified into two. SMS health teaching messages were based on health teachings written in the booklet. On the other hand, SMS reminder messages consist of messages and audio recordings, for illiterate patients, which remind the study subjects to perform their physical activity and follow the recommended diet plan given for the day.

• **Data collection were divided into four phases:-**

A.   **Assessment phase:**

• The researchers interview for both control and study groups online for assessment of **personal** data, and then patients were ask his/her knowledge which is prepared in a simple Arabic language as a pretest, and then assess patients' nutrition, exercise adherence, risk for DVT using assessment tools (2, 3, and 4) as a pretest. Questionnaire was taken 15-20 minutes to be filled online. Determined patients' needs were based on answer of each patient in the previous tools. Initial body mass index was online assessed and recorded by asking the patients about his/her weights and height after measurements. (Pre Test Assessment)

B.   **Planning phase:**

Educational nursing recommendations **("Keep it Beating! Booklet")** related to knowledge about rheumatic heart disease, needed proper dietary modifications, needed activity exercise and needed recommendations to prevent DVT occurrence were designed according to predetermined actual patients' needs. The content met patients' needs. The written Arabic recommendations **("Keep it**

Beating! Booklet") consisted of **three sessions as following:**

Session one: Patients' knowledge about rheumatic heart disease and covide-19:

It included: Meaning of rheumatic heart disease, causes, symptoms, high risk people, life style and home care and methods of treatment.

Session two: Patients' knowledge about rheumatic heart disease patients' proper diet include the following: -

Clinical diet needed for rheumatic heart disease patients, Meals numbers -time daily, diet rich with protein source, vitamin D source, vitamin B12 source and laboratory investigations needed to early detect any defect malnutrition in patients.

Session three: Needed exercises and warning signs for patients with rheumatic heart disease to prevent DVT:-

In this part the researchers provide patients knowledge and practice about the importance of exercises for rheumatic heart disease patients. As, exercise is important for people with DVT because it helps circulation and eases symptoms of something called venous insufficiency. That's a condition in which blood doesn't flow well back to your heart. Aerobic activity -- things like walking exercises, leg and feet exercises, hiking, and swimming can also help your lungs work better after a pulmonary embolism and in prevention of DVT occurrence.

Warning signs for DVT include, throbbing or cramping pain in 1 leg (rarely both legs), usually in the calf or thigh, swelling in 1 leg (rarely both legs), warm skin around the painful area, redness or darkened skin around the painful area, swollen veins that are hard or sore when you touch them.

Method of teaching

- WhatsApp group –Shorting messages service (SMS) – Mobile calling and video calling.

Media of teaching:

- WhatsApp messages and audio recordings, online paper Booklet, videos, and Shorting messages service (SMS).

C. Implementing phase:-

After both control and study groups patients' pre assessment with orientation about the content and purpose of the study, only the study group patients were subjected to the Telehealth Nursing Protocol through telephone call and 4 daily SMS and What's App messages, for 90 days regarding nursing health educational intervention for knowledge, needed diet modifications and needed activity exercises to prevent DVT (Deep Vein Thrombosis), and reminders to follow the nursing health recommendations about diet and activity exercises needed for the day. Both the study and control group were administered with a pretest and a posttest questionnaire before and after the implementation of the study, and were underwent a weekly body mass index assessment, and were given a **"Keep it Beating! Booklet"** while control group patients were not exposed to telehealth nursing protocol through on line reading. **(Sakinah & Nurdin, 2021)**

D. Evaluation phase (Post Test assessment): (after 3 months).

After three months the researchers made another interview with the patients of the study and control groups for knowledge, needed proper nutrition modifications and exercise adherence posttest reassessment in the outpatient or inpatient.

Statistical Design:

The obtained data were reviewed, prepared for computer entry, coded, analyzed and tabulated. Descriptive statistics (frequencies, percentage, mean and standard deviation) were done using computer intervention SPSS version 27, Excel 2016, analysis of variance done by using chi-square test P- Value <0.05. Correlation Co-efficient tests to appear the association between scores; a two-tailed p < 0.05 was considered statistically significant.

Results

Table (1): This table showed the socio demographic characteristics and clinical data of the studied groups. More than half of the studied patients in both groups were aged from 31 to 40 years and more than half of them were females. The majority of both control and study groups were married representing (90%, 93.3%) respectively. The higher percent from urban area in both groups (70%, 63.3%) respectively. In relation to the level of education, (40.0%) in the control group and (43.3%) in the study group had secondary school. Concerning patients' occupation, nearly one third of the studied patients were employee representing 33.3% in the control group, and 26.7 % in the study group and about half of them are house wives, and they were matched with regard to smoking, duration of illness and body mass index. Related to monthly income two thirds of both groups had low income and almost all studied patient in both groups had no training course. Also, there was no significant difference between socio demographic and clinical area of both groups.

Tables (2) Illustrated Comparison between study and control Groups regarding the participant's knowledge all over the study phases about rheumatic heart disease. The majority of study and control group had poor knowledge regarding rheumatic heart disease pre the intervention, however the study group showed marked improvement in their knowledge at post and follow-up phases of the intervention in all items of knowledge as showed in the table above with significant difference between both groups with improvement of mean knowledge score of the study group rather than control group all over the study phases.

Table (3): showed the participant's Mini Nutritional Assessment pre, post and follow-up the nursing intervention. Regarding the study group, it was found that33.3 % was at risk of mal nutrition and 46.7 of them were mal nourished in the pre intervention phase. Also marked improvement in nutritional status for the study group. in the other hand this table showed that the great percent of the control

group were at risk of mal nutrition and mal nourished (36.7, 43.3respectly) in the pre implementation phase with no significance difference in the post and follow up phase of the intervention

Table (4): Revealed overall mean scores of the participant's exercise adherence in all phases of the intervention among studied groups; in relation pre intervention phase the mean scores of the study group were 2.4±3.62 of the study group and 2.9±4.28 for the control group. At post intervention there were statistical significant differences only in the study group (the mean score were18.3±6.10) . During follow up, it was improved in the mean scores of the study group19.1±4.80 than the control group7.1±4.82.

Table (5): Presented the participant's risk for DVT pre, post and follow-up the nursing intervention. **In relation to** study group 50.0% of them were at High risk of DVT in the pre intervention phase. While, in the post and follow up phases of the intervention there were marked reduction of patient risk to develop DVT with (40.0, 76.7) respectively. Contrary, (53.3) of the control group are at High risk of

DVT in the pre intervention phase. Also, about half (46.7) in post and half (50.0) of patient in follow up phase of the intervention were at risk of DVT . The results revealed that there was a highly statistically significant difference regarding risk for DVT (p=0.000) between both groups after the intervention.

table 6 illustrated that, there was a highly statistically significant correlation between patients' knowledge, nutritional status and risk of DVT in the study group throughout the study phases. In addition, there was no correlation between patients' knowledge, nutritional status and risk of DVT in the control group throughout the study phases.

Table 7: This table clarifies the Correlation Co-efficient between participant's knowledge and socio demographic data throughout the study phases. Regarding age, there were a statistical significant correlation between Knowledge and participant's age. However, this table showed that, there were a highly statistically significant correlation between patient level of education and body mass index for both group throughout the study phases.

Table (1): Distribution of participants according to socio-demographic and clinical data (N= 60)

Items	Study group (n=30) No (%)	Control group (n=30) No (%)	P. value
Age group (years):			
▪ 18 –	4 (13.3)	3 (10.0)	0.63
▪ 31 –	15 (50.0)	18 (60.0)	
▪ 41 –	9 (30.0)	6 (20.0)	
▪ 51 – 60	2 (6.7)	3 (10.0)	
Mean ± SD	37.54± 6.21	36.32± 5.51	
Gender: Male	14 (46.7)	12 (40.0)	0.26
Female	16 (53.3)	18 (60.0)	
Residence: Rural	9 (30.0)	11 (36.7)	0.51
Urban	21 (70.0)	19 (63.3)	
Marital status:			
▪ Single	1 (3.3)	2 (6.7)	0.20
▪ Married	28 (93.4)	27 (90.0)	
▪ Widowed	1 (3.3)	1 (3.3)	
▪ Divorced	0 (0.0)	0 (0.0)	
Level of education:			
▪ Basic education	9 (30.0)	10 (33.4)	0.35
▪ Secondary	12 (40.0)	13 (43.3)	
▪ High Education	9 (30.0)	7 (23.3)	
Occupation:			
▪ Employee	8 (26.7)	10 (33.3)	0.68
▪ housewives	12 (40.0)	14 (46.7)	
▪ Skilled worker	10 (33.3)	6 (20.0)	
Smoking			
▪ Non-smoker	18 (60.0)	21 (70.0)	0.33
▪ Current smoker	8 (26.7)	7 (23.3)	
▪ Smoking in the past	4 (13.3)	2 (6.7)	
Duration of illness: ▪ >5	8 (26.7)	9 (30.0)	
▪ 5-	15 (50.0)	17 (56.7)	0.36
▪ 10 +	7 (23.3)	4 (13.3)	
Body mass index (BMI)			
▪ Over weight	13 (43.3)	12 (40.0)	0.42
▪ Normal weight	10 (33.4)	9 (30.0)	
▪ Under weight	7 (23.3)	9 (30.0)	
Monthly Income:			
▪ High income (≥ 500$Monthly)	2 (6.7)	3 (10.0)	
▪ Middle income (490 - 300$Monthly)	9 (30.0)	7 (23.3)	0.10
▪ Low income (≤ 290$Monthly)	19 (63.3)	20 (66.7)	
Previous educational program:			
▪ Yes	1 (3.3)	0 (0.0)	0.51

Table (2): percentage distribution of patients according to knowledge assessment in all phases of the study through on line (N= 60).

Participants Knowledge	Study group (n=30)			Control group (n=30)			X² - test	P. value
	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)		
Disease defining							7.21	0.001
▪ Poor	22	5 (16.7)	4 (13.3)	24	21 (70.0)	20 (66.7)		
▪ Satisfactory	(73.3)	5 (16.7)	3 (10.0)	(80.0)	6 (20.0)	6 (20.0)		
▪ Good	6 (20.0)	20 (66.6)	23 (76.7)	5 (16.7)	3 (10.0)	4 (13.3)		
	2 (6.7)			1 (3.3)				
Clinical pictures							13.78	0.000
▪ Poor	20	4 (13.3)	2 (6.7)	22	21 (70.0)	24 (80.0)		
▪ Satisfactory	(66.7)	5 (16.7)	3 (10.0)	(73.4)	5 (16.7)	4 (13.3)		
▪ Good	6 (20.0)	21 (70.0)	25 (83.3)	4 (13.3)	4 (13.3)	2 (6.7)		
	4 (13.3)			4 (13.3)				
Managements							14.21	0.001
▪ Poor	22	5 (16.7)	4 (13.3)	24	21 (70.0)	20 (66.7)		
▪ Satisfactory	(73.4)	5 (16.7)	3 (10.0)	(80.0)	6 (20.0)	6 (20.0)		
▪ Good	6 (20.0)	20 (66.6)	23 (76.7)	5 (16.7)	3 (10.0)	4 (13.3)		
	2 (6.6)			1 (3.3)				
Warning signs							11.41	0.002
▪ Poor	15	6 (20.0)	5 (16.7)	17	18 (60.0)	16 (53.3)		
▪ Satisfactory	(50.0)	5 (16.7)	5 (16.7)	(56.7)	5 (16.7)	9 (30.0)		
▪ Good	8 (27.0)	19 (63.3)	20 (66.6)	7 (23.3)	7 (23.0)	5 (16.7)		
	7 (23.0)			6 (20.0)				
Complication prevention							17.31	0.001
▪ Poor	23	6 (20.0)	3 (10.0)	25	22 (73.3)	24 (80.0)		
▪ Satisfactory	(76.7)	5 (16.7)	6 (20.0)	(83.3)	3 (10.0)	3 (10.0)		
▪ Good	4 (13.3)	19 (63.3)	21 (70.0)	3 (10.0)	5 (16.7)	3 (10.0)		
	3 (10.0)			2 (6.7)				
Lab investigations								
▪ Poor	27	8 (26.7)	6 (20.0)	26	21 (70.0)	22 (73.4)		
▪ Satisfactory	(90.0)	9 (30.0)	5 (16.7)	(86.8)	4 (13.3)	6 (20.0)	15.51	0.003
▪ Good	2 (6.7)	13 (43.3)	19 (63.3)	2 (6.6)	5 (16.7)	2 (6.6)		
	1 (3.3)			2 (6.6)				
Medication adherance							20.34	0.000
▪ Poor	22	7 (23.3)	3 (10.0)	25	23 (76.7)	21 (70.0)		
▪ Satisfactory	(73.3)	9 (30.0)	6 (20.0)	(83.3)	3 (10.0)	6 (20.0)		
▪ Good	5 (16.7)	14 (46.7)	21 (70.0)	3 (10.0)	4 (13.3)	6 (20.0)		
	3 (10.0)			2 (6.7)				
Mean ± SD	5.1±4.52	13.1±5.20	13.5±5.89	4.9±3.38	7.23±4.51	8.1±4.78		

(*) Statistically significant at $p<0.05$ (**)Highly significant at $P < 0.01$

Table (3): The participant's Mini Nutritional Assessment short-form (MNA®-SF) in all phases of the study through on line (N= 60)

Mini Nutritional Assessment	Study group (n=30)			Control group (n=30)			X² - test	P. value
	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)		
▪ Normal nutritional status (12–14 points)	6 (20.0)	19 (63.3)	20 (66.7)	7 (23.0)	9 (30.0)	8 (26.7)	25.43	0.000
▪ Risk of malnutrition (8–11 points)	10 (33.3)	5 (16.7)	6 (20.0)	11 (36.7)	12 (40.0)	10 (33.3)	19.62	0.001
▪ Malnourished (0–7 points)	14 (46.7)	6 (20.0)	4 (13.3)	13 (43.3)	9 (30.0)	12 (40.0	22.65	0.000

 (*) Statistically significant at p<0.05 (**)Highly significant at P < 0.01

Table (4): percentage distribution of patients according to exercise adherence in all phases of the study through on line (N= 60).

Participants Knowledge	Study group (n=30)			Control group (n=30)			X² - test	P. value
	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)		
I do my exercises as often as recommended:							19.69	0.000
▪ Completely Agree	4 (13.3)	8 (26.7)	10 (33.4)	3 (10.0)	4 (13.3)	2 (6.7)		
▪ Agree	3 (10.0)	12 (40.0)	11 (36.6)	3 (10.0)	3 (10.0)	4 (13.3)		
▪ Undecided	1 (3.3)	3 (10.0)	4 (13.3)	5 (16.6)	6 (20.0)	5 (16.7)		
▪ Disagree	10 (33.4)	3 (10.0)	2 (6.7)	10 (33.4)	9 (30.0)	13 (43.3)		
▪ Completely Disagree	12 (40.0)	4 (13.3)	3 (10.0)	9 (30.0)	8 (26.7)	6 (20.0)		
I forget to do my exercises:							20.89	0.001
▪ Completely Agree	11 (36.6)	5 (16.7)	4 (13.3)	12 (40.0)	13 (43.3)	12 (40.0)		
▪ Agree	10 (33.4)	2 (6.7)	2 (6.7)	6 (20.0)	5 (16.7)	5 (16.7)		
▪ Undecided	2 (6.7)	3 (10.0)	4 (13.3)	6 (20.0)	5 (16.7)	7 (23.3)		
▪ Disagree	4 (13.3)	7 (23.3)	12 (40.0)	4 (13.3)	5 (16.7)	3 (10.0)		
▪ Completely Disagree	3 (10.0)	13 (43.3)	8 (26.7)	2 (6.7)	2 (6.6)	3 (10.0)		
I do less exercise than recommended by my health care professional:							23.78	0.000
▪ Completely Agree	12 (40.0)	4 (13.3)	3 (10.0)	10 (33.4)	15 (50.0)	14 (46.7)		
▪ Agree	10 (33.4)	3 (10.0)	2 (6.6)	7 (23.3)	5 (16.6)	7 (23.3)		
▪ Undecided	2 (6.6)	4 (13.3)	3 (10.0)	5 (16.7)	2 (6.7)	4 (13.3)		
▪ Disagree	3 (10.0)	8 (26.7)	11 (36.7)	4 (13.3)	6 (20.0)	3 (10.0)		
▪ Completely Disagree	3 (10.0)	11 (36.7)	11 (36.7)	4 (13.3)	2 (6.7)	2 (6.7)		
I fit my exercises in to my regular routine:							20.40	0.005
▪ Completely Agree	2 (6.7)	9 (30.0)	13 (43.3)	1 (3.3)	3 (10.0)	2 (6.7)		
▪ Agree	2 (6.7)	13 (43.3)	11 (36.7)	2 (6.7)	3 (10.0)	3 (10.0)		
▪ Undecided	4 (13.3)	1 (3.3)	1 (3.3)	7 (23.3)	5 (16.7)	4 (13.3)		
▪ Disagree	12 (40.0)	5 (16.7)	4 (13.4)	8 (26.7)	6 (20.0)	9 (30.0)		
▪ Completely Disagree	10 (33.3)	2 (6.6)	1 (3.3)	12 (40.0)	13 (43.3)	12 (40.0)		
I don't get around to doing my exercises:							18.30	0.003
▪ Completely Agree	15 (50.0)	1 (3.3)	0 (0.0)	17 (56.7)	16 (53.3)	18 (60.0)		
▪ Agree	7 (23.3)	2 (6.7)	1 (3.3)	9 (30.0)	9 (30.0)	55 (16.7)		
▪ Undecided	2 (6.7)	2 (6.7)	1 (3.3)	2 (6.7)	1 (3.3)	3 (10.0)		
▪ Disagree	2 (6.7)	6 (20.0)	10 (33.4)	1 (3.3)	9 (30.0)	2 (6.7)		
▪ Completely Disagree	4 (13.3)	19 (63.3)	18 (60.0)	1 (3.3)	1 (3.3)	2 (6.7)		
I do most, or all, of my exercises:								0.002
▪ Completely Agree	1 (3.3)	14 (46.7)	15 (50.0)	2 (6.7)	3 (10.0)	2 (6.7)		
▪ Agree	3 (10.0)	12 (40.0)	10 (33.3)	1 (3.3)	1 (3.4)	1 (3.3)	19.62	
▪ Undecided	4 (13.3)	1 (3.3)	1 (3.3)	9 (30.0)	7 (23.3)	8 (26.7)		
▪ Disagree	13 (43.3)	2 (6.7)	2 (6.7)	10 (33.4)	12 (40.0)	7 (23.3)		
▪ Completely Disagree	13 (43.3)	1 (3.3)	2 (6.7)	8 (26.7)	7 (23.3)	12 (40.0)		
Mean ± SD	2.4±3.62	18.3±6.10	19.1±4.80	2.9±4.28	5.3±4.71	7.1±4.82		

(*) Statistically significant at p<0.05 (**)Highly significant at P < 0.01

Table (5): The participant's Wells Clinical Prediction Rule for DVT risk in all phases of the study through on line (N= 60).

Wells Clinical Prediction Rule for DVT risk	Study group (n=30)			Control group (n=30)			X² - test	P. value
	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)	Pre No (%)	Immediate Post No (%)	Follow up (post-3 M) No (%)		
▪ High risk (3 to 8 points)	15 (50.0)	8 (26.7)	4 (13.3)	16 (53.3)	14 (46.7)	15 (50.0)	30.78	0.000
▪ Moderate risk (1 to 2 points)	9 (30.0)	10 (33.3)	3 (10.0)	10 (33.3)	11 (36.7)	9 (30.0)	29.78	0.001
▪ Low risk (-2 to 0 points)	6 (20.0)	12 (40.0)	23 (76.7)	4 (13.3)	5 (16.7)	6 (20.0)	36.90	0.000

(**)Highly significant at $P < 0.01$

Table (6): Correlation Co-efficient between participant's Knowledge on nutritional assessment and DVT risk in all phases of the study.

	Participants Knowledge			
Correlations	Study group (n=30)		Control group (n=30)	
	R	P	R	P
Mini Nutritional Assessment				
▪ Normal nutritional status (12–14 points)	0.73	0.00	0.45	0.05
▪ Risk of malnutrition (8–11 points)	0.66	0.02	0.51	0.04
▪ Malnourished (0–7 points)	0.78	0.00	0.42	0.02
Wells Clinical Prediction Rule for DVT risk				
▪ High risk (3 to 8 points)	0.80	0.00	0.37	0. 05
▪ Moderate risk (1 to 2 points)	0.44	0.02	0.54	0. 04
▪ Low risk (-2 to 0 points	0.69	0.01	0.37	0.03

Correlation is (not significant NS at > 0.05 level, significant S at< 0.05, highly significant HS at <0.01)

Table (7): Correlation Co-efficient between Knowledge and socio demographic data throughout the study phases

	Participants Knowledge			
Correlations	Study group (n=30)		Control group (n=30)	
	R	P	R	P
Age group (years):				
▪ 18 –	0.46	0.01	0.39	0.01
▪ 31 –	0.53	0.01	0.49	0.02
▪ 41 –	0.37	0.02	0.36	0.03
▪ 51 – 60	0.28	0.03	0.19	0.04
Level of education:				
▪ Basic education	0.86	0.00	0.75	0.00
▪ Secondary	0.69	0.00	0.65	0.01
▪ High Education	0.63	0.00	0.61	0.02
Body mass index (BMI)				
▪ Over weight	0.90	0.00	0.89	0.00
▪ Normal weight	0.79	0.00	0.80	0.00
▪ Under weight	0.59	0.02	0.69	0.01

(*) Statistically significant at p<0.05 (**) highly significant at $P < 0.01$

Discussion

The coronavirus disease-2019 (COVID-19) crisis has surged worldwide, putting immense stress on the health care services, leading to institutions deferring elective procedures and struggling to triage the emergency care of cardiac patients. This has affected the management of the rheumatic valvular heart disease patients especially, in developing countries, potentially placing these patients at enormous risk for complications like congestive cardiac failure, stroke and death **(Kulkarni & Mahadevappa., 2021)**.

The presence of a rheumatic disease alone may be associated with an increased risk for developing COVID-19 with more adverse outcomes; Patients with rheumatic diseases should be practicing the widely recommended prevention strategies that are focused on mitigating infection risk. This includes adopting practices such as optimal hand hygiene, physical distancing, and wearing a mask in public when adequate physical distancing is not possible. **(Mikuls, Johnson & Kenneth., 2022)**.

Modifications to routine rheumatologic care that minimize risk of exposure to COVID-19 when necessary eg, during periods of increased prevalence and risk include: Optimal use of telehealth nursing. Some rheumatologists and patients have found telehealth to be useful and effective. However, there are some disadvantages to depending upon this approach. While some clinicians have used telehealth to facilitate ongoing care **(Singh, Richards & Chang., 2021)**.

Tele-nursing is the use of technological resources and communication systems is becoming the new approach in encouraging the development of nursing and increasingly used in managing many chronic diseases. Its efficiency has been demonstrated to help countries overcome barriers to healthcare **(Elgaphar & EL-gafar., 2017)**. The purpose of this study was to evaluate the effect of tele-nursing about life style modification on health outcomes of rheumatic heart disease patients during COVID-19 pandemic**.**

Regarding to socio demographic characteristics of the studied patient. The result of the present study illustrated that more than half of the studied patients in both groups of the study their ages ranged from 31 to 40 years and more than half of them were females. Also, The great percent from urban area had secondary school. This finding is in agreement with **Zühlke et al., (2017)** who reported that, the prevalence of RHD is highest in adults aged 25 to 45 years, which reflects late detection and the long-term effects of acute rheumatic fever (ARF) attacks. Also, this result in agreement with **Sayed et al., (2021)** who reported that, most participants (63.5%) were females and the majority had either completed secondary level of education.

Additionally, on the same context **WHO., (2020)** reported that, RHD disproportionately affects girls and women. The risk of developing RHD is up to two times higher for females than males.

While this finding not correspondent with **Asmare , Woldehanna, Hunegnaw, Janssens &Vanrumste., (2021)** who found that, RHD is the most common cardiovascular disease in people aged 25 years and under. Additionally**, Nkoke et al., (2018)** reported that, most of the participants were in the 20 to 29 year old and the majority of the participants had a post-secondary level of education

The result of the present study revealed that, almost all studied patient in both groups had no training course about RHD. This may be related to lack of nursing education regarding such topics in hospital related diminished attention, lack of hospital resources and nurses shortage during COVID-19 pandemic. Additionally, lack of use of online telehealth.

Meanwhile, most studies had found that the level of awareness of rheumatic fever(RF) and RHD is modest **(Almadhi, Alshammri & Altamimi., 2021).** However, recent evidence from Cameroon suggests that, the population lacks knowledge about all aspects of RHD and its treatment **Nkoke et al., (2018)**. Also, this finding was supported by **El Jamal, Abi-Saleh &Isma'eel., (2021)** who stated that,

telehealth care involves the use of information and communication technologies to deliver healthcare at a distance and to support cardiac patient self-management through remote monitoring and personalized feedback.

Related to monthly income two thirds of both groups had low income. This result in agreement with **Watkins et al., (2016)** who reported that, RF and RHD have essentially disappeared from industrialized/high income countries. However, the same cannot be mentioned for developing countries when the predominant risk factor for the disease is poverty, illiteracy and lack of medical awareness.

Regarding to the penitent's knowledge all over the study phase about RHD, it was found that the majority of study and control group had poor knowledge before the telehealth, however the study group showed marked improvement in their knowledge at post and follow-up phases of the protocol of care in all items of knowledge. Additionally, there were a significant difference between both groups with improvement of mean knowledge score of the study group rather than control group all over the study phases.

This finding does not agree with **Hailu, Tsega & Gebregziabher., (2019)** who showed that, Levels of knowledge and awareness on RHD is low. Control and prevention of this deadly disease requires thorough understanding by the general public, health personnel and the patient population. Early diagnosis and adequate treatment of group a streptococcal throat infection is an important initial stage in primary prevention. This will require adequate knowledge of RHD by the general public and health care professional including doctors and nurses.

Socioeconomic and environmental factors such as poor housing, under nutrition, overcrowding and poverty are well-known contributors to the incidence, magnitude and severity of RHD **Watkins et al., (2016)**. In relation to the participant's nutritional assessment all over the study, the results of the present study revealed that about one third of

the study group were at risk of mal nutrition and nearly half of them were mal nourished in the pre telehealth phase with marked improvement in nutritional status in post and follow up phases. in the other hand the great percent of the control group were at risk of malnutrition in the pre implementation phase with no significance difference in the post and follow up phases of the telehealth.

These improvements may be attributed to the effect of telenursing interventions on health outcomes of rheumatic heart disease patients during covid-19 pandemic. Which emphasized more important is the knowledge acquired during the program, which turned out to be the most significant independent predictor of improvements in nutritional assessment scores of the patients.

This finding was supported by **Anderson et al., (2016)** who identified that, although during severe acute respiratory syndrome due to a novel coronavirus global health systems need to focus on treatment and mitigation of COVID-19, the overall impact of non-communicable disease even in this setting needs to be taken into account. Studies and a meta-analysis made clear that cardiovascular metabolic comorbidities made patients more susceptible to suffer COVID-19 and exacerbated the infection. On the other hand, COVID-19 can produce or aggravate heart damage (**Li et al., 2020**).

Concerning the participant's exercise adherence all over the study period among studied groups, illustrated that, there was a statistically significant differences in the mean score of exercise adherence in the post and follow up phases of the intervention. This is not surprising because during lockdown, telemedicine can provide many benefits, so it can be a useful intervention to avoid stress and boost the immune system by applying the exercises recommended (**Ribeiro & Santos., 2020**).

This finding goes in the same line with **Kemps et al., (2020)** who clarified that, since 2019, WHO called non-communicable disease as major health alert, and exercise-based cardiac

prevention and rehabilitation programs were valorized as a precious tool to improve population health

Regarding the participant's risk for deep venous thrombosis (DVT), the current study result clarified that, half of study group were at high risk of DVT in the pre intervention phase. While in the post and follow up phase, there was marked reduction of patient risk to develop DVT. Contrary, more than half of the control group are at high risk of DVT in the pre intervention phase with minimal variation in risk of DVT in the post and follow up phases. Also the results revealed that there was a high statistically significant difference regarding risk for DVT between both groups after the intervention.

These findings was in agreement with **Pradhan, Jha & Nepal., (2018)** who stated that, RHD involving mitral valve causes inflammation and fibrosis with disruption of the atrial architecture. There is increased left atrial pressure that contributes to left atrial dilatation and increased wall stress predisposing to the development of atrial fibrillation leading to left atrial clot and subsequent systemic embolism. RHD with severe mitral stenosis and atrial fibrillation leading to multiple systemic emboli. Early recognition and aggressive management led to a satisfactory outcome in this case.

There was a highly statistically significant correlation between patients' knowledge, nutritional status and risk of DVT in the study group throughout the intervention phases. In addition, there was no correlation between patients' knowledge, nutritional status and risk of DVT in the control group throughout the intervention phases.

These findings were in agreement with **Ramelet et al., (2017)** Who mentioned that, telenursing intervention combined with affective support, health information and assistance in decision making is a new effective management approach for patient with inflammatory rheumatic diseases. This nurse-led telephone intervention has the potential to reduce health problems, whilst increasing patients' and family's satisfaction during the

management of chronic, debilitating rheumatic disease, especially when administered in the newly-diagnosis period.

This finding also correspondent with **Agastiya, Kurianto, Akalili & Wicaksana., (2022**) who stated that, telenursing management of disease-specific symptoms and daily self-monitoring could identify minor or early changes, improve self-management, and prevent complications with appropriately tailored health consultations.

In addition, the current study result clarified that, there were a statistical significant correlation between participant's knowledge about RHD and their age and there were a highly statistically significant correlation between patient level of education and body mass index for both groups throughout the study phases. This may be related to the knowledge the patients' gain due to positive effects of education and their ages on their health outcome parameters. Patients with underlying cardiovascular conditions have a high risk of adverse outcomes, and strategies have to be put in place to prioritize those who require critical cardiac interventions and at the same time reduce the chances of virus infection to them and the health care professionals.

This finding correspondent with **Cimperman, Makovec & Trkman., (2016)** who stated people with RHD accept and are satisfied with daily home monitoring-based telenursing, which means that the telehealth system has strong potential for maintaining the QOL of people with chronic diseases. Furthermore, this result agreement with **Wong et al., (2022)** who found a positive impact on health outcomes has been correlated with telehealth interventions. Where health outcomes, such as metabolic control variable or symptom severity and distress have been improved notably for patients suffering from chronic conditions, such as diabetes, asthma and RHD.

One lesson from the current COVID-19 pandemic is the need to optimize health care provision outside of traditional settings, and potentially over longer periods of time. An important strategy is remote patient monitoring,

allowing RHD patients to remain at home, while they transmit health data and receive follow-up services.

Conclusion:

It is an effective strategy, telenursing has been proven to give appositive result for improving health outcomes of rheumatic heart disease patients.

Recommendations:

• Replication of the study using large probability sampling.

• Enhance telenursing use in nursing practice, and apply telenursing via follow up phone services to improve patient's adherence to a healthy regimen.

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