

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

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Abstract

As the entry point to contemporary nursing care, tele-nursing is regarded as one of the most significant technological developments of the late (twentieth) century. By removing geographic obstacles, tele-nursing aims to increase patient safety, care quality, and is regarded as a quick access to nursing care. **Aim:** The study aims to determine the effect of tele-nursing about life style modification on health outcomes of patients with rheumatic heart disease during COVID-19 pandemic. **Design:** This study employed a quasi-experimental research design. (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 statistically highly significant differences between both groups regarding knowledge level, proper nutrition, exercise adherence with ($P \leq 0.001$). 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 with ($r = .580$ at $P \leq 0.01$). **Conclusion:** it is an effective strategy; telenursing has been proven to give positive result for improving health outcomes of patients with rheumatic heart disease. **Recommendations:** Replication of the study using large probability sampling. Enhance telenursing use in nursing practice and Use telenursing via follow-up phone services to improve patient adherence to a healthy regimen.

Key words: Tele-nursing, Health Outcomes, rheumatic heart disease, Covid-19.

Introduction

It is certainly that, the (21st) century has faced one of its biggest challenges. Outbreaks of coronavirus have killed millions of people; Particularly included were nurses who provide care for those patients. However, the novel coronavirus (COVID-19), which was spread through respiratory droplets and direct contact, is significantly more contagious due to its ubiquity. Therefore, reducing the chance of infection transfer between patients and nurses is the main objective. Even the World Health Organization (WHO) has acknowledged the importance of infection control in COVID-19-infected patients. Therefore, the best option for avoiding and managing infectious diseases is the self-care education. (Purabdollah & Ghasempour., 2020).

The current COVID-19 pandemic implicates the need to optimize health care provision outside of the formal contexts, and possibly 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 delivery, as health care settings needed to reduce face-to-face contact to maintain social distance, and triage care delivery to accommodate pandemic-specific responsibilities. (Muller, Berg, Jardim, Johansen & Ormstad., 2021). With the COVID-19 Pandemic in full swing, telemedicine appears to be a novel approach to addressing these issues, particularly in terms of reducing costs and infection transmission. (Purabdollah & Ghasempour, 2020).

Tele-nursing is considered one of the foremost imperative innovative occasions of the late (twentieth) century as the portal to cutting edge nursing care. The point of tele-nursing is to move forward quiet security, quality of care, and is considered a fast get to nursing care by overcoming the geological boundaries. The utilize of versatile phones, phones, SMS and communication innovations are considered portion of tele-nursing. As increasing innovation development additionally expanding get to nursing administrations, the utilize of tele-nursing in persistent care appears to be vital. Presently, with such expanding predominance of COVID-19, clinics truly are confronting a genuine challenge due to the deficiency of nursing staff and preventive, symptomatic, helpful equipment's, particularly the need of satisfactory bedding in connection to the number of tainted populace and the difficulty of hospitalization for all such gather of patients. (**Sakinah & Nurdin., 2021**).

In the Middle East, cardiovascular disease (CVD) is the leading cause of death. CVD may be caused by a combination of socioeconomic, behavioural, and environmental risk factors, such as high blood pressure, poor diet, high cholesterol, diabetes, environmental pollution, obesity, smoking use, kidney disease, lack of physical activity, harmful alcohol use, and stress. A person's risk of cardiovascular disease may also be affected by family history, ethnic origin, gender, and age. (**Jarrah et al., 2018; Shimanda et al., 2021**).

Rheumatic heart disease (RHD) is a major cause of cardiovascular morbidity and death among low-income and middle-income countries. RHD remains a critical wellbeing issue within the creating world, influencing 15.6 million individuals around the world. RHD is to a great extent a infection of destitution, of which packing, destitute nourishment, destitute health-care get to and constrained wellbeing assets are a major contributing variables. (**WHO, 2020**).

Rheumatic heart disease is the result of an abnormal immune response of the body to *Streptococcus pyogenic* bacteria. The disease causes permanent scarring of the heart valves, which results in heart failure, stroke, and early death. When vulvar heart disease is related

with atrial fibrillation (AF), it without question carries a chance of multisystem embolization. People with RHD are at risk of ischemic stroke because of blood clots which could 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 cardiovascular (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 can play an important role in RHD management and prevention if they are well informed, skilled, and encouraged to change hospital tradition. Their increased knowledge results in an improvement in patient care delivery. Appropriately trained nurses are capable of assessing the risk of RHD in their patients and implementing prophylactic measures. During COVID-19, many nurses rose to the complex challenges of providing care for people in novel ways (**Mohammed, Taha & El- Aziz., 2018**).

Patient education, undoubtedly, is one of the nurses' most important roles. Also, it is an fundamental procedure within the infection controlling prepare and reducing the malady complications. Desires of these patients incorporate instructive needs toward adherence to the endorsed treatment drugs and its side impacts, mental counseling, eat less, recognition of the guidelines of care given, wellbeing care and follow-up of illness results certainly all made a difference 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 the needed health dietary modifications (Purabdollah & Ghasempour, 2020; Razu et al., 2021).

Significance of the study:

The quick increment of coronavirus illness cases, the fear of being tainted, the postponed get to to the medications and dynamic lockdown measures postponed most elective strategies, outpatient visits, recovery programs and incessant clinical care, all impacts on the foremost helpless patients with cardiovascular maladies (Yeo, Wang & Moo., 2020). The limitations to contain the disease have caused way of life changes in a harmful heading, with a conceivable effect on administration 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 ought to be arranged for a distinctive cardiovascular malady situation within the future and take advantage of this challenges time actualizing the current healthcare modalities with unused e-health strategies.

Aim of the study

This study aimed to determine the effect of tele-nursing about lifestyle modification on health outcomes of patients with rheumatic heart disease 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 expose to tele-nursing.

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

Operational Definitions: -

1) Lifestyle modifications for rheumatic heart disease patients.

Small changes can make a big difference; recommendations for diet, exercise, and other habits can help relieve heart failure symptoms, slow disease progression, and improve patient quality of life. People with mild to moderate heart failure can often live nearly normal lives as a result. Some of these lifestyle changes can be more difficult to implement than others. However, incorporating these changes into patients' daily routines could make a significant difference in their quality of life.

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

- A. Patient's knowledge about rheumatic heart disease and Covid-19.
- B. Proper nutritional modifications for patients with rheumatic heart disease during Covid-19.
- C. Exercise adherences for patient with rheumatic heart disease during Covid - 19.
- D. Prevention of deep venous thrombosis for patient with rheumatic heart disease during covid - 19.

Subjects and method

Design:

A quasi-experimental research design was 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 the 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 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 biosociodemographic & 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 Covid-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, preventive measures, and investigations normal values. Also, patient knowledge about Covid-19 pandemic, definition, causes, sign and symptoms, preventive measures, and 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 tool of mini nutritional assessment is considered a well-validated tool to assess adult patients for malnutrition. It is composed of six questions on food intake, weight loss, psychological stress, mobility, or acute disease, the presence of dementia or depression, and body mass index (BMI). The most extreme score for this portion is rise to 14. A score rise to or higher than 12 shows normal nutrition, 8 indicate at risk of malnutrition and 7 or less indicate malnourished. This tool demonstrated good internal consistency (Cronbach's $\alpha = 0.87$) and test-retest reliability (intra-class correlation coefficient [ICC] = 0.93) (Kaiser et al, 2009).

Tool 3- The Exercise Adherence Rating Scale (EARS)

The tool of exercise adherence rating scale (EARS) may be a self-report measure which is developed by a group of United Kingdom researchers. The EARS also demonstrated good internal consistency (Cronbach's $\alpha = 0.81$) and test-retest reliability (intra-class correlation coefficient [ICC] = 0.97), composed of six things that straight forwardly assess adherence behavior. The six things are summed and things with positive expressions are reversely scored; meaning things 1, 4 and 6. The six things 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 for clinical decision the 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).

Validity of content

A panel of five nursing and medical experts, including a professor of community health nursing, a professor of geriatric nursing, two lecturers of Medical Surgical Nursing, and a professor of heart disease, reviewed the instruments and designed the booklet for clarity, comprehensiveness, understanding, applicability, and ease of administration. Minor changes were required.

Reliability of Content

It was determined by the Alpha Cronbach test, which is used to assess internal consistency (reliability of the used tool or instrument). The tool's reliability scores are greater than 0.87, indicating that the tool's internal consistency is high.

Ethical considerations

Prior to recruitment and data collection, each subject provided written consent after being notified about the nature, objective, and the study's benefits. Patients were also reminded that their participation was entirely voluntary and that they had the right to pull out at any time without explanation. All data was coded to ensure the confidentiality of any obtained information. The researchers assured the subjects that the data would only be used for research purposes.

Pilot study:

A pilot study was conducted on 10% (6 patients) in accordance to the study's total sample (60 patients) to assess the clarity and practicability of the tools as well as to approximate the time required to complete each form. According to the findings of the pilot study, necessary changes were made. Pilot subjects will be omitted from the main study sample later on.

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 entails sending daily SMS to study group subjects for 90 days. It is a list of messages that were sent each day. SMS are divided into two types. The SMS health teaching messages were based on the booklet's health teachings. SMS reminder messages, on the other hand, consist of messages and audio recordings for illiterate patients that remind study subjects to perform their physical activity and follow the recommended diet plan for the day.

Data collections 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 Covid-19:

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

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

Clinical diet needed for rheumatic heart disease patients, Meals numbers and 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 with the knowledge and practice about the importance of exercises for patients with rheumatic heart disease. 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 the heart. Aerobic activity - things like walking exercises, leg and feet exercises, hiking, and swimming can moreover offer assistance your lungs work way better after a pneumonic embolism and in prevention of DVT occurrence.

Warning signs for DVT include, throbbing or cramping pain in one leg (rarely in both legs), usually in the calf or thigh, swelling in one leg (rarely in 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' perform the pre assessment, an orientation about the content and purpose of the study were done, only the study group patients were subjected to the Telehealth Nursing Protocol through telephone call and 4 SMS daily and What's App messages, for 90 days regarding nursing health educational intervention for the needed knowledge, diet modifications and activity exercises to prevent DVT (Deep Vein Thrombosis), and reminders them 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 also given a “**Keep it Beating! Booklet**” while control group patients were not exposed to the telehealth nursing protocol through online 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 the needed: knowledge, proper nutrition modifications and exercise adherence. The reassessment (posttest) done in the outpatient or inpatient according to follow-up area of the patients.

Statistical Design:

The collected information was reviewed, formatted for computer entry, coded, analysed, and catalogued. Descriptive statistical analysis (frequency, percentage, mean, and standard deviation) were computed using the computer intervention SPSS version 27, Excel 2016, and the variance analysis was performed using the chi-square test with a P-value of 0.05. Correlation Coefficient tests were used to determine the relationship 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 old 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 housewives, 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 both groups regarding socio demographic characteristics and clinical data.

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, also, with improvement of mean knowledge score of the study group rather than the 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 that 33.3 % was at risk of malnutrition and 46.7 % of them were mal nourished in the pre intervention phase. Also marked improvement in nutritional status for the study group. Also, this table showed that the great percent of the control group were at risk of malnutrition and mal nourished (36.7, 43.3respectly) in the pre implementation phase with no significance difference between both groups in the post and follow up phase after 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 statistically significant differences only between the study group mean score were equal (18.3 ± 6.10). During follow up, the mean scores of the study group was improved to 19.1 ± 4.80 more than the control group which was 7.1 ± 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 with ($p=0.000$) between both groups after the intervention.

Table (6): This table 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 clarified the Correlation Coefficient between participant's knowledge and socio demographic data throughout the study phases. Regarding age, there were a statistically 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)	Control group (n=30)	P. value
	No (%)	No (%)	
Age group (years):			0.63
▪ 18 –	4 (13.3)	3 (10.0)	
▪ 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:			0.20
▪ Single	1 (3.3)	2 (6.7)	
▪ Married	28 (93.4)	27 (90.0)	
▪ Widowed	1 (3.3)	1 (3.3)	
▪ Divorced	0 (0.0)	0 (0.0)	
Level of education:			0.35
▪ Basic education	9 (30.0)	10 (33.4)	
▪ Secondary	12 (40.0)	13 (43.3)	
▪ High Education	9 (30.0)	7 (23.3)	
Occupation:			0.68
▪ Employee	8 (26.7)	10 (33.3)	
▪ housewives	12 (40.0)	14 (46.7)	
▪ Skilled worker	10 (33.3)	6 (20.0)	
Smoking			0.33
▪ Non-smoker	18 (60.0)	21 (70.0)	
▪ 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)	0.36
▪ 5-	15 (50.0)	17 (56.7)	
▪ 10 +	7 (23.3)	4 (13.3)	
• Body mass index (BMI)			0.42
• Overweight	13 (43.3)	12 (40.0)	
• Normal weight	10 (33.4)	9 (30.0)	
• Under weight	7 (23.3)	9 (30.0)	
• Patient Monthly Income:			0.10
• High income (≥ 500 \$Monthly)	2 (6.7)	3 (10.0)	
• Middle income (490 -300\$ Monthly)	9 (30.0)	7 (23.3)	
• Low income (≤ 290 \$Monthly)	19 (63.3)	20 (66.7)	
Previous educational program:			0.51
▪ Yes	1 (3.3)	0 (0.0)	

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)			X ² - 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								
▪ Poor	22 (73.3)	5 (16.7)	4 (13.3)	24 (80.0)	21 (70.0)	20 (66.7)	7.21	0.001
▪ Satisfactory	6 (20.0)	5 (16.7)	3 (10.0)	5 (16.7)	6 (20.0)	6 (20.0)		
▪ Good	2 (6.7)	20 (66.6)	23 (76.7)	1 (3.3)	3 (10.0)	4 (13.3)		
Clinical pictures								
▪ Poor	20 (66.7)	4 (13.3)	2 (6.7)	22 (73.4)	21 (70.0)	24 (80.0)	13.78	0.000
▪ Satisfactory	6 (20.0)	5 (16.7)	3 (10.0)	4 (13.3)	5 (16.7)	4 (13.3)		
▪ Good	4 (13.3)	21 (70.0)	25 (83.3)	4 (13.3)	4 (13.3)	2 (6.7)		
Managements								
▪ Poor	22 (73.4)	5 (16.7)	4 (13.3)	24 (80.0)	21 (70.0)	20 (66.7)	14.21	0.001
▪ Satisfactory	6 (20.0)	5 (16.7)	3 (10.0)	5 (16.7)	6 (20.0)	6 (20.0)		
▪ Good	2 (6.6)	20 (66.6)	23 (76.7)	1 (3.3)	3 (10.0)	4 (13.3)		
Warning signs								
▪ Poor	15 (50.0)	6 (20.0)	5 (16.7)	17 (56.7)	18 (60.0)	16 (53.3)	11.41	0.002
▪ Satisfactory	8 (27.0)	5 (16.7)	5 (16.7)	7 (23.3)	5 (16.7)	9 (30.0)		
▪ Good	7 (23.0)	19 (63.3)	20 (66.6)	6 (20.0)	7 (23.0)	5 (16.7)		
Complication prevention								
▪ Poor	23 (76.7)	6 (20.0)	3 (10.0)	25 (83.3)	22 (73.3)	24 (80.0)	17.31	0.001
▪ Satisfactory	4 (13.3)	5 (16.7)	6 (20.0)	3 (10.0)	3 (10.0)	3 (10.0)		
▪ Good	3 (10.0)	19 (63.3)	21 (70.0)	2 (6.7)	5 (16.7)	3 (10.0)		
Lab investigations								
▪ Poor	27 (90.0)	8 (26.7)	6 (20.0)	26 (86.8)	21 (70.0)	22 (73.4)	15.51	0.003
▪ Satisfactory	2 (6.7)	9 (30.0)	5 (16.7)	2 (6.6)	4 (13.3)	6 (20.0)		
▪ Good	1 (3.3)	13 (43.3)	19 (63.3)	2 (6.6)	5 (16.7)	2 (6.6)		
Medication adherence								
▪ Poor	22 (73.3)	7 (23.3)	3 (10.0)	25 (83.3)	23 (76.7)	21 (70.0)	20.34	0.000
▪ Satisfactory	5 (16.7)	9 (30.0)	6 (20.0)	3 (10.0)	3 (10.0)	6 (20.0)		
▪ Good	3 (10.0)	14 (46.7)	21 (70.0)	2 (6.7)	4 (13.3)	6 (20.0)		
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 online (N= 60)

Mini Nutritional Assessment	Study group (n=30)			Control group (n=30)			X ² - 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 online (N= 60).

Participants Knowledge	Study group (n=30)			Control group (n=30)			X ² - 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 prescribed:								
▪ Completely Agree	4 (13.3)	8 (26.7)	10 (33.4)	3 (10.0)	4 (13.3)	2 (6.7)	19.69	0.000
▪ 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:								
▪ Completely Agree	11 (36.6)	5 (16.7)	4 (13.3)	12 (40.0)	13 (43.3)	12 (40.0)	20.89	0.001
▪ 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:								
▪ Completely Agree	12 (40.0)	4 (13.3)	3 (10.0)	10 (33.4)	15 (50.0)	14 (46.7)	23.78	0.000
▪ 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:								
▪ Completely Agree	2 (6.7)	9 (30.0)	13 (43.3)	1 (3.3)	3 (10.0)	2 (6.7)	20.40	0.005
▪ 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:								
▪ Completely Agree	15 (50.0)	1 (3.3)	0 (0.0)	17 (56.7)	12 (40.0)	18 (60.0)	18.30	0.003
▪ Agree	7 (23.3)	2 (6.7)	1 (3.3)	9 (30.0)	8 (26.7)	5 (16.6)		
▪ Undecided	2 (6.7)	2 (6.7)	1 (3.3)	2 (6.7)	2 (6.7)	3 (10.0)		
▪ Disagree	2 (6.7)	6 (20.0)	10 (33.4)	1 (3.3)	7 (23.3)	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:								
▪ Completely Agree	1 (3.4)	14 (46.7)	15 (50.0)	2 (6.7)	3 (10.0)	2 (6.7)	19.62	0.002
▪ Agree	3 (10.0)	12 (40.0)	10 (33.3)	1 (3.3)	1 (3.4)	1 (3.3)		
▪ Undecided	3 (10.0)	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 (33.3)	12 (40.0)	7 (23.3)		
▪ Completely Disagree	10 (33.3)	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 online (N= 60).

Wells Clinical Prediction Rule for DVT risk	Study group (n=30)			Control group (n=30)			X ² -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 (13.4)	5 (16.6)	6 (20.0)	36.90	0.000

(**) Highly significant at P < 0.01

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

Correlations	Participants Knowledge			
	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

Correlations	Participants Knowledge			
	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 crisis has exploded globally, putting enormous strain on health-care services, causing institutions to postpone elective procedures and struggle to

triage emergency cardiac care. This had an impact on the management of patients with rheumatic valvular heart disease, particularly in developing countries, potentially putting these patients at a high risk of complications such as

congestive cardiac failure, stroke, and death (**Kulkarni & Mahadevappa., 2021**).

The presence of a rheumatic disease alone may be associated with an increased risk of developing COVID-19 with worse outcomes; patients with rheumatic diseases should follow widely recommended infection-prevention strategies. Adopting practices such as optimal hand hygiene, physical distancing, and wearing a mask in public when adequate physical distancing is not possible are all part of this. (**Mikuls, Johnson & Kenneth., 2022**).

Modifications to routine rheumatologic care that reduce the risk of COVID-19 exposure when necessary, such as during periods of increased prevalence and risk, include the best use of telehealth nursing. Telehealth has proven to be beneficial and effective for some rheumatologists and patients. However, there are some drawbacks to relying on this approach. While some clinicians have used telehealth to improve continuity of care, (**Singh, Richards & Chang., 2021**).

Tele-nursing is the application of technological resources and communication systems in nursing. It is becoming the new approach to encouraging nursing development and is increasingly being used in the management of many chronic diseases. Its effectiveness has been demonstrated in assisting countries in overcoming healthcare barriers. (**Elgaphar & EL-gafar., 2017**). The purpose of this study was to evaluate the effect of tele-nursing about lifestyle modification on health outcomes of patients with rheumatic heart disease during COVID-19 pandemic.

In terms of the studied patient's sociodemographic characteristics. The current study found that more than half of the patients studied in both groups ranged in age from 31 to 40 years old, with more than half of them being females. In addition, the majority of urban residents had completed secondary school. This finding is consistent with the findings of **Zühlke et al. (2017)**, who reported that the prevalence of RHD is highest in adults aged 25 to 45 years old, owing to late detection and the long-term effects of acute rheumatic fever (ARF) attacks. This result also agrees with **Sayed et al., (2021)**, who reported that the majority of participants (63.5%) were females and the majority completed

secondary school. Furthermore, the **WHO (2020)** reported that RHD disproportionately affects girls and women. Females are up to two times more likely than males to develop RHD.

While this finding contradicts the findings of **Asmare, Woldehanna, Hunegnaw, Janssens, and Vanrumste., (2021)**, who discovered that RHD is the most common cardiovascular disease in people aged 25 and under. Furthermore, **Nkoke et al. (2018)** reported that the majority of the participants were between the ages of 20 and 29 and had a post-secondary level of education.

The current study found that almost all of the patients in both groups had no RHD training. This could be due to a lack of nursing education on such topics in hospitals, as well as a lack of hospital resources and a nurse shortage during the COVID-19 pandemic. In addition, there is a lack of use of online telehealth.

Meanwhile, most studies have found that most people are unaware of rheumatic fever (RF) and RHD (**Almadhi, Alshammri & Altamimi., 2021**). Recent evidence from Cameroon, however, suggests that the population is unaware of 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 entails the use of information and communication technologies to provide healthcare at a distance and to assist cardiac patients in self-management through remote monitoring and personalised 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, In industrialized/high-income countries, RF and RHD have essentially vanished. However, the same cannot be said for developing countries, where poverty, illiteracy, and a lack of medical awareness are major risk factors for the disease.

Regarding to the patient'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, RHD awareness and knowledge are low. Controlling and preventing this deadly disease necessitates a thorough understanding of the general public, medical personnel, and patient population. The early detection and treatment of streptococcal throat infection is a critical first step in primary prevention. This will necessitate adequate RHD knowledge among the general public as well as health care professionals such as doctors and nurses.

Poor housing, malnutrition, overcrowding, and poverty are well-known socioeconomic and environmental factors that contribute 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 malnutrition and nearly half of them were malnourished in the pre telehealth phase with marked improvement in nutritional status in post and follow up phases. In the other hand 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 among patients with rheumatic heart disease 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 among the patients.

This finding was supported by **Anderson et al., (2016)** who identified that, Despite the fact that during severe acute respiratory syndrome caused by a novel coronavirus, global health systems must focus on COVID-19 treatment and mitigation, as the overall impact of non-communicable disease must be considered even in this setting. Cardiovascular metabolic comorbidities made patients more vulnerable to COVID-19 and exacerbated the infection, according to studies and a meta-analysis.

COVID-19, on the other hand, has the potential to cause 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, The World Health Organization declared non-communicable disease a major public health concern, and exercise-based cardiac prevention and rehabilitation programmes were lauded as a valuable tool for improving 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 were in agreement with **Pradhan, Jha & Nepal., (2018)** who stated that, RHD involving the mitral valve causes inflammation and fibrosis, as well as disruption of the atrial architecture. There is increased left atrial pressure, which contributes to left atrial dilatation and increased wall stress, predisposing to the development of atrial fibrillation, which leads to a left atrial clot and subsequent systemic embolism. RHD with severe mitral stenosis and atrial fibrillation, resulting in multiple systemic emboli. Early detection and aggressive management resulted in 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 among the control group throughout the intervention phases.

These findings agreed with **Ramelet et al., (2017)** who mentioned that Telenursing intervention combined with affective support, health information, and decision-making assistance as a new effective management strategy for patients with inflammatory rheumatic diseases. This nurse-led telephone intervention has the potential to reduce health problems while increasing patient and family satisfaction during the management of chronic, debilitating rheumatic disease, particularly in the early stages of diagnosis.

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.

Furthermore, the current study found a statistically significant correlation between participant knowledge of RHD and age, as well as a highly statistically significant correlation between patient level of education and body mass index among both groups throughout the study phases. This could be related to the patients' increased knowledge as a result of the positive effects of education and their ages on their health outcome parameters. Patients with underlying cardiovascular conditions are at a high risk of adverse outcomes, and strategies must be implemented to prioritise those who require critical cardiac interventions while also reducing the chances of virus infection in them and health care professionals.

This finding correspondent with **Cimperman, Makovec & Trkman., (2016)** who stated that People with RHD accept and are satisfied with daily home monitoring-based telenursing, implying that the telehealth system has a high potential for maintaining the QOL of people with chronic diseases. Furthermore, this result agrees with **Wong et al., (2022)** who found Telehealth interventions have been shown to have a positive impact on health outcomes. Whereas, health outcomes such as metabolic control

variable or symptom severity and distress have significantly improved for patients suffering from chronic conditions such as diabetes, asthma, and RHD.

One key message from the current COVID-19 pandemic is the need to optimise health care provision outside of traditional settings, and potentially over longer time periods. Remote patient monitoring is an important strategy that allows patients with RHD to stay at home while transmitting health data and receiving follow-up services. **Conclusion:** telenursing is an effective health care strategy as it has been proven to give a positive result for improving health outcomes among patients with rheumatic heart disease.

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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