Effect of Tele-nursing on Burden and Coping Strategies among Family Caregivers of Confirmed COVID- 19 Patients

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ABSTRACT

Background: Coronavirus or COVID-19 disease is not only disrupt patients' lives, but they also affect their family caregivers. **Aim** of the study was to evaluate the effect of tele-nursing on burden and coping strategies among family caregivers of confirmed COVID-19 patients. **Methods: Research design** in this study: A Quasi- experimental research design was used to conduct the current study. **Setting:** The study was carried out at family health center of Mastay village followed Quesna district, Menoufia governorate. **Subjects:** A convenient sample of 90 family caregivers of patients with confirmed COVID-19 were taken and divided randomly into study group and control group. **Tools**: The tools of this study used were (1) An interviewing questionnaire included four parts; I- Sociodemographic data and medical history for patients and their family caregivers. (2)- COVID-19 knowledge questionnaire (3) Zarit Burden Interview Scale. (4) Coping Inventory for stressful situation scale. **Results:** The study revealed that 41.4% of the studied family caregivers were among age group 41-50 years old, 53.3% main family caregivers were female, 64.4% of them were married. After application of tele-nursing intervention, there was statistical significance improvement in the total mean score of knowledge about COVID-19 among study group than the control group at ($p < 0.001$). Also, there were a statistical significance differences among both group on total score of burden at ($p < 0.001$). Finally, there were highly statistical significance differences among two group on the total score of coping strategies at ($p < 0.001$). **Conclusions:** Using of tele-nursing was effective in decreasing burden, improving knowledge about COVID-19 disease and improving coping strategies among family caregivers of patients with confirmed COVID - 19 .**Recommendation:** Continuous providing of knowledge and skills about family caregivers' burden and effective coping strategies in the crisis of COVID-19 should be a part of the nursing care.

Keywords: Burden, Coping strategies, Family caregivers, Tele- nursing

Introduction

Corona viruses (COVID-19) pandemic generated a public health crisis of international concern with high transmission probability. The disease ' s clinical signs and symptoms ranged from mild to severe conditions and even death which generating many consequences on patients, their families caregivers and societies as a whole. A large number of cases with COVID-19 and also with many deaths are reported from different countries across the world **(Boulos& Geraghty,2020: Hoseinpour Dehkordi, Alizadeh, Derakhshan, Babazadeh, & Jahandideh, 2020).**

The latest statistics about COVID-19 disease indicated that there are more than 150 million cases with confirmed COVID-19, which lead to over 3 million deaths globally and the number of cases are higher in the United States, India and Brazil than other countries. **(WHO, 2021).** In Egypt, the first case was appearing in February 2020. On 21st July 2021, the Ministry of Health and Population reported that a total of 283,862 were confirmed cases, and 225,869 were recovered and discharged from isolation and quarantine hospitals, but about 16,465 death cases occur in the country from 28 Governorates **(Worldometer, 2021)**.

Coronaviruses (COVID-19) disease has no specific cure. So, treatment is limited to a symptomatic and supportive therapy provided to the patients. Patients who have severe COVID-19 are hospitalized while mild or

moderate patients who haven't chronic conditions can isolated at home and receive care provided by home-based informal caregivers **(WHO, 2021; Chen, Shu, Chen, Hua, Li, 2020)**.

Informal caregivers refers to the family members, or close relatives who provide care voluntarily to the patients with COVID-19 at home. The responsibilities of home caregivers vary from assisting the patients in performing activities of daily life and managing treatment-related disease. Also, they are communicating, educating, and empowering patients to take the care of themselves. The complexity of the care provided by family caregivers has increased, as they implement complex nursing, medical tasks and coordinate care **(Schulz, 2016; Reinhard, Heather, Carol, Kathleen, & Jean, 2019).**

Many studies have indicated that family caregivers' quality of life is affected during patient's treatment course. When any one is infected with COVID-19, all surrounding persons as family members, spouse, friends are also affected. They be afraid of disease and its effects, feelings of helplessness, anxiety, sadness, grieving reactions, financial worries, fear about the future psychological stress in the interpersonal relationships, in addition fear of death from disease. The process of shifting care provision from hospital to home inflicts a care burden to the family **(WHO, 2020).**

Family caregivers are subjected to many burdens due to patient care. This burden is defined as objective and subjective negative consequences, such as psychological stress, physical health problems, social, financial problems, and family relationships breakdown. Desperate relationships and feelings caused by caregiver pressure **(Maguire & Maguire, 2020)**

Family Caregivers without social support can feel anxiety and conflict in the care giving process and experience higher level of burden and distress. Support is required to enable family caregivers to continue their role, without physical, social and emotional burden. This support can be achieved through the use of effective coping strategies which play an important role in reducing the caregiver's distress **(Dixe et al,2019: Sayed, Deyab, & Hussien, 2020).**

Coping strategies are the cognitive and behavioral efforts of the individuals to analyze and overcome the problems and challenges. Coping strategies have been classified into three main categories: problem-focused and emotion-focused and positive appraisal coping (Alnazly,2016). Problem-focused coping aimed to change situation and take control on the source of stress through implementing potential solutions to reduce effects of the stressors. Emotion-based coping involves the emotional response to the stressors and receives support from others. On the other hand, positive appraisal coping refers to thinking about problem to be considered as benign, valuable, or beneficial. It depends on cognitive changes to confront the stressful situation **(Mahmoud, Khanjani, Bayat , 2016).** Using of coping strategies with family caregivers can provide information for designing interventions which help them decreasing burden and adapt to the problems caused by living with confirmed COVID-19 patients **(Monteiro, Santos, Kimura, Baptist, Dourado, et al., 2018).**

Nurses can help caregivers reduce uncertainty and improve coping through using of tele- nursing. Tele-nursing involved all kinds of the nursing care and services which provided from distance and comprises a wide range of communication technologies such as phone, email, internet to overcome time ,distance difficulties and offer better nursing care **(Forouzi, 2017).**

The nurse can use Telephone Follow-Up method effectively with family caregivers to know the caregivers needs, assist them to meet their demands, explain the factors that lead to caregiver burden and help them in anticipating the effects of caregiver position. Nurses can educate family members how to accept and provide treatment safely, determining training requirements, disseminating knowledge and facilitating usage of coping strategies **(Miller, 2019).** Follow-up of the family caregivers by phone may be a useful way that not only assist the caregivers but also allows the nurse to continue providing education and psychological support to the family caregivers **(Faezeh & Mohammad, 2019).**

Tele-nursing is an effective tool for delivering remotely nursing care remotely to improve the efficiency and accessibility to the healthcare by the family caregivers. A Tele-nursing call is important for the nurses who are participating in the healthcare continuum. Nurses can use Tele-nursing for providing all

the processes of nursing care including assessment, planning, implementation, and evaluation of the results of nursing care . Also, the nurses can provide psychological support, knowledge ,teaching skills and effective coping strategies for family caregivers of patients with COVID-19 **(Patti & Denise 2019).**

Significant of the study:

In Egypt, Coronavirus is an infectious pandemic disease, which changes occur every day as virus outbreaks, spreading rapidly and an increasing death rate. So that, nurses should understand the possible negative effects of COVID-19 on family caregivers such as decreased in coping and adaptation, and an increased in family stress levels. The nurse should focus on providing interventions that aimed at decreasing the family caregiver's burden, improving their role, providing family support and facilitating the use of coping mechanism **(Fitzmaurice, 2017).** As a result of preventing spread of infection, The majority of patients with COVID-19 and their family caregivers are often unable to attend hospital or clinics and receiving care at home. So, Face-to-face learning were transformed to virtual remote learning to protect the nurses and family caregivers from the pandemic. Therefore the present study was focused on providing those family caregivers with information, determine needs, burden and enhance coping mechanisms via telephone **(Abd Elgaphar &Abd EL-Gafar, 2017).** Tele-nursing become a new approach which promotes providing care and facilitate healthy behavior among family caregivers of patients with confirmed COVID-19 through increasing their awareness about the disease, treatment, providing care and preventing spread of infection.

For this reason, the present study was conducted because limited studies and interventions were done on using Tele-nursing on caregivers of patients with COVID -19 in Egypt and in the world.

Aim of work

The aim of the current study was to evaluate the effect of tele-nursing on burden and coping strategies among family caregivers of confirmed COVID- 19 patients. The aim of the study could be achieved through the following objectives:

- Assess knowledge of family caregivers regarding COVID-19 disease.
- Determine level of burden among family caregivers of patients with confirmed Covid- 19.
- Assess effect of tele- nursing on burden and coping strategies among family caregivers of patients with confirmed Covid- 19.

Research hypothesis

- Family caregivers who received tele-nursing intervention would have increased knowledge about covid-19 disease than control group.
- Family caregivers who received tele-nursing intervention would have fewer burden corresponding to control group..
- Coping strategies of family caregivers of patients with covid-19 who received tele-nursing intervention would be improved than control group.

Operational definition

Family caregivers: are relatives, friends, or neighbors who provide assistance related to an underlying physical disabilities for at-home care delivery and assist in performing the activities of daily living who have no formal training to provide services and unpaid

Burden : is the stress that is perceived by caregivers as a result of t home care situation. It include physical, social , and psychological burden.

Coping strategies: are strategies that is used in reducing burden and unpleasant emotions. It include problem- oriented, emotion- oriented and positive appraisal coping.

Tele-nursing: it is operationally defined as the use of tele-communications technology to provide nursing intervention at a distance through calling to decrease burden and enhance coping strategies of family care givers.

Methodology

Study Design:

A Quasi experimental design was utilized to conduct the present study.

Study Setting

A multistage random selection method was used in this study which included:

- ✓ First stage included random selection of Quesna district from the nine districts in Menoufia Governorate.
- ✓ Second stage included random selection of Mastay village from Quesna district.

- ✓ Third stage, the sample was randomly selected based on registered cases with confirmed COVID 19 from health unit files of the village.

Subjects

- A purposive sample of 90 family caregivers of patients with confirmed COVID-19 who were registered as confirmed COVID-19 by a specialist physician through the result of Chest CT scan or their positive PCR. Also, they received standard medical treatment and their cases were followed up by the family health center. Patients with mild & moderate symptoms received care from family's caregivers at their home.

Sample size:

A total of (90) family caregivers were selected according to the following formula:

$$n' = \frac{n}{1 + \frac{z^2 \times \hat{p}(1-\hat{p})}{\varepsilon^2 N}}$$

n = Z2p (1-p)/d2, Where z = level of confidence as stated by the standard normal distribution (for a level of confidence of 95%, z = 1.96). p = estimated proportion of population that have the characteristic (when unknown we use p = 0.5), d = (d is considered 0.05).

Family caregivers are taken in this study according to the following:

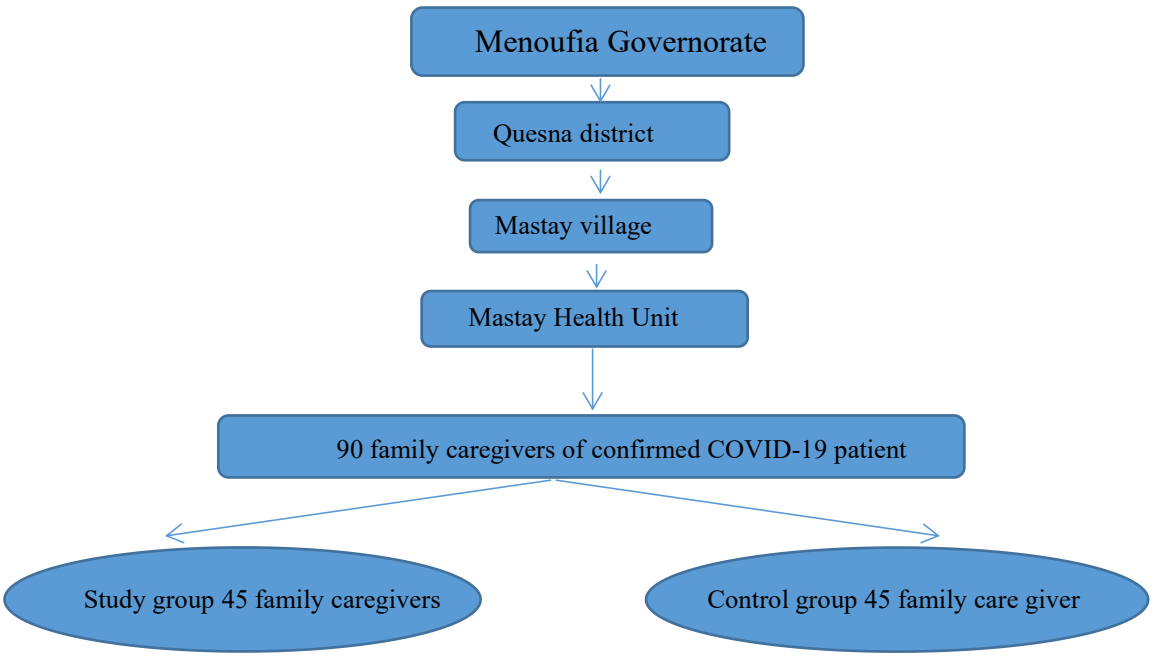
Inclusion criteria:

- Caregivers were in close contact relationship, living with the patients who have confirmed COVID-19
- Caregivers who had network platforms and willing to participate in the present study.

Exclusion criteria:

- Caregivers who live away from the patients who have confirmed COVID-19
- Caregivers who had not network platforms

Sampling technique:



- Family caregivers were divided randomly by taken odds numbers as study group which consisted of 45 family caregivers and even numbers as control group which included 45 family caregivers.

Tools used for data Collection

An online questionnaire was developed by the researchers after reviewing of current literature. It consists of four parts to achieve the aim of the study

Instrument I: It is developed by the researchers and included two parts:

Part I- Socio-demographic data: it is developed by the researchers to assess demographic data for the patients with covid-19, family caregivers and their medical data. This part included the following:

I- Demographic data for patient: It included age, sex, level of education, marital status and occupation

II- Demographic data for family caregivers: It included age, sex, marital status, level of education, occupation, relationship with the patient, family income and total family members.

III- Medical history for the patient as duration of COVID-19, presence of chronic disease as diabetes, hypertension, liver disease,……., pervious infection with Covid-19, expected source of having infection, acuteness of the infection, and another person in the family have Covid-19. Also, it included medical history for caregivers as history of chronic disease and its regular treatments.

Part II- COVID-19 knowledge questionnaire: This part was developed by the researchers to assess knowledge of study family caregivers. This part included ten questions regarding clinical presentations, mode of transmission, high risk group, treatment and preventive measures. Correct answers take one, incorrect answers and don't know take zero. The total knowledge scores of the studied participants regarding COVID-19 were ten and classified into three categories as follows:

Level of knowledge	%
-Satisfactory knowledge	>50 % of the total score (from 5 to10 questions).
-Un satisfactory knowledge	≤ 50% of the total score (from 1- 5 questions).

Instrument II: Zarit Burden Interview (ZBI) Scale: This scale was developed by Zarit et al. (1998) in order to measure caregiving burden and to assess perceived caregiving burden in clinical and research settings. It also measures physical, psychological, social, and economic impacts of caregiving. This scale included twenty-two items and was modified by **Amer (2015)** who added seven items about physical burden, and psychological burden in order to be appropriate for the Egyptian culture. As a result, the modified ZBI scale consisted of 29 items that included three main parts: physical burden (refers to a measure of the physical effects of caregiving), it consisted of four questions. social burden (refers to the impact of caregiving on both interpersonal and social relationships within family and working),it consisted of ten questions. Psychological burden (refers to evaluation of caregivers feeling of anxiety, shame, depression, and embarrassment with respect to the patient), it included fifteen questions.

The ZBI items were scored using three-point Likert scale: 0 = "never", 1 = "sometimes", 2 = " always". So, the total ZBI score ranges from 0 to 58 points which refer to the total amount of burden of care experienced by caregivers which classified into mild burden ranged from 0-19, moderate burden ranged from more than 19 to less than 38, and severe or greater burden ranged from 38-58.

Instrument III: Coping Inventory for Stressful Situations (CISS) Scale: This scale was developed by **Endler and Parker (1998)** in order to measure the frequency of coping mechanism used by caregivers, evaluate types of coping strategies that used in stressful situations, and describe the cognitive styles and behavioral resources used in response to a specific stressor. This scale is self-reported and consisted of forty-eight items and modified by the researchers by removing four questions to be suitable for Egyptian culture. The scale assessed three coping patterns:

- Pattern I: Problem-oriented coping, refers to the purposeful efforts made by caregivers to solve and/or restructure the problem to

improve the situation as understanding the medical condition through communication with other caregivers and consultation with the medical staff. This strategy included nine questions.

- Pattern II: Emotion-oriented coping, refers to self-oriented reactions including emotional responses of caregiver's social support, psychological stability, self-esteem and caregiver's efforts to have a sense of well-being. This strategy composed of nineteen questions.
- Pattern III: Positive- appraisal coping, refers to the understanding of the problem as benign, valuable, or beneficial which includes the activities and cognitive changes to confront the problem as maintaining the family integration, their cooperation and positive view of the situation. It also focused on the family caregiver's view on life and to the patient's illness. This strategy composed of sixteen questions.
- If the CISS items were scored using three-point Likert scale:0 = "never", 1 = "sometimes", 2 = " always". The total CISS score ranges from 0 to 88 points which refer to the total amount of coping strategies experienced by caregivers which classified into mild coping ranged from 0-29, moderate coping ranged from more than 29 to less than 58, and higher coping ranged from58-88.

Procedure:

-A written administrative approval:

Ethical committee approval was gained to perform the present study. An official letters was taken from the dean of the Faculty of Nursing, Menoufia University to Mastay Family Health Center manager in order to obtain his agreement on taking data collection and perform the study after providing an explanation of study purpose.

Ethical considerations and the human rights:

The study was conducted with careful attention to the ethical standards of the research and rights of caregivers. They were assured that all information would be confidential and only used for the research to assure the confidentiality of the participants. Also, the participants had the right to withdraw from the study at any time and can refuse to participate in the study. The submission of the answered form was considered as consent to participate in the study.

Validity:

The content validity of the instruments (I,II,III, and V) was tested by a jury of four experts in the field of nursing (Two assistant professor of Psychiatric Health Nursing and two assistant professor of Community Health Nursing) to ascertain accuracy and completeness. Suggestions were incorporated into the instrument and the needed modifications were completed.

Reliability

- Reliability of instrument I was done by the researchers for testing internal consistency of the instrument. This done through administration of the instrument to some family caregivers under the similar conditions and then re-administered to the same caregivers after 2 weeks and compares the results(Test-retest Reliability). The instruments was in which R= 94.6.
- Reliability of the instrument II of Zarit Burden Interviewing questionnaire was done by using Cronbach's co-efficiency Alpha (a=.0.97) to determine to what extent the items were related to each other. The internal consistency of all questionnaire items (r =0.02-0.98) was tested using Pearson correlation co-efficiency.
- Regarding instrument III of Coping Inventory for Stressful Situations, Internal consistency of this questionnaire is high (Cronbach's alpha = 0.85) and Pearson correlation co-efficiency was used to test the internal consistency of the subscale of the questionnaire (r =0.80- 0.93).

Pilot study:

Before the collection of data, a pilot study was done on nine caregivers to investigate applicability, simplicity and viability of online questionnaire, and to determine the needed time to complete it. The pilot sample were excluded from the total study sample to confirm the strength of the results. Based on the pilot study results, online questions were

modified prior to data collection.

Data collection

Data collection extended from 15 January to 28 February 2021.The data was collected from the Mastay Family Health Center followed Quesena district at Menoufia governorate.

At the start of present study, family caregivers were divided randomly into two groups (45 caregivers as study group and 45caregivers as control group). Intervention of this study included three phases (preparatory phase, implementation phase, and evaluation phase).

Preparatory phase

The necessary permission needed to enter the selected research setting and start the present study was obtained. As a result of COVID-19 disease, there was nonattendance of the family caregivers in the selected family health center. In order to access them, the researchers obtained a permission from the Family Health Center manager to take the telephone number of each patient's caregiver from their registered files. After contacting with the family, the researchers introduced themselves to initiate a line of communication then, explained the purpose of the study and obtained their oral consent to participate in this study.

- A caregiver who accepted to participate entered in the study. Telephone number which included Whats App was taken from each family caregiver. During the intervention period, the researchers contacted with family caregivers through phone calls.
- Each caregiver in both groups was asked to fill the online self-reported questionnaire, using google form for pretest by the link was distributed by the researchers to all caregivers at the same time. , via calls on Whats App (video and audio calls). It took about 20-30 minutes

Implementation phase

In the implementation phase , the following was done:

First: The intervention composed of virtual conversation using software that included video and audio call via WhatsApp Every day, one call was done, and the duration of each call took about twenty –thirty minutes. Audio or video call was determined by the caregiver.

Second: A copy of online family's caregiver Support Intervention educational brochure that was prepared by the researchers after appraising evidence based research and comprehensive literature was sent to the study group via a link through WhatsApp. It was implemented in this study, for the caregivers of patients with COVID 19 included in the study group to support them in acquiring and maintaining the caregiver's role. Family's caregiver support intervention consisted of online training courses that divided into fourth meetings during which the caregivers receive information on different aspects of the disease and they are instructed on the management of physical, social and psychological burden.in addition, coping mechanism to overcome burden. This intervention was provided within one week. The study group which divided into 5 groups (9 family care givers/ group) according to their suitable time for meeting .

- Each meeting is divided into two parts: a part of frontal lesson of about 15 minutes and the other part of about10 minutes to have a time for asking questions and sharing experiences.
- The first two meetings were provided in two days and dedicated to the disease description and the related preventive measures of the disease. the caregivers are informed on the natural course of the disease.
- The third meeting were provided in two days and focused on answering of caregivers' questions related to patient's condition, the treatment process, provided illustration and training of the caregivers on preventive measures particularly at the level of home care management. Daily contact time was set with the family caregivers.

- The fourth meeting, which were provided in two - three days for continuous follow- up , and the researchers provided information about problem- solving skills, decision making skills and also stress management approaches to improve the coping with disease, reduce the stress in caregivers and enhance their spiritual dimension. After providing the intervention, the questionnaire was filled within 24 hours after finishing the intervention in by caregivers of both groups to evaluate effectiveness of proposed intervention.
- At the same time of intervention, the researchers sent a copy of a booklet on health literacy for chronic disease which developed by staff of faculty of nursing, menoufia university which revised by Agency for Service Development and Environmental Affairs via control group on whatsapp. This booklet used as a support for control group during the time of intervention.

Evaluation phase

One month later after the intervention, each caregiver in both groups was asked to fill the same online questionnaire for posttest by the same link using his ID number to evaluate the effectiveness of the family's caregiver Support Intervention teaching brochure on the caregivers' burden and coping strategies in the study group . It took about 20-30 minutes. Then, a copy of online family's caregiver Support Intervention educational brochure are sent via a link through WhatsApp to the caregivers included in the control group.

Statistical Analysis

The collected data were organized, entered and analyzed using (Statistical Pack-age for Social Science (SPSS)software version 25. Qualitative data were presented in the form of frequency distribution tables, numbers and percentage. Quantitative data such as total score knowledge, burden of care , its components as physical, social & psychological burden, coping mechanism and its components were analyzed using mean ($\bar{X}$) & standard deviation (SD). Also, It was evaluated using the student t-test in order to compare between two means in both the study group and control group. Correlation between the variables was estimated using Pearson's correlation coefficient (r).Graphics were done using Excel program. Level of significance was fixed at p value < .05 for all significant tests.

Results

Table 1 represents demographic characteristics of patients with confirmed COVID- 19.It illustrates that, 34.4% of the studied patients were among age group 30-40 years, 55.6% were female, 52.2% had diploma education followed by 22.2 % of them had highly education, and 72.2% were married. Regarding occupation, 54.4% of the studied patients were employee and 45.6% of them were not employed.

Table 2 represents demographic characteristics of studied family caregivers. It illustrated that,41.4% of the studied family caregivers were among age group41-50 years old, 53.3% were female,64.4% of them were married. Also, it showed that 52.2% of studied family care givers were highly educated,53.3% were employee, 60% had family member>4, and 63.3% of the studied caregivers' incomes were not enough. Regarding relationship to the patient, 48.9% of family caregivers were spouse.

Table (3) represents distribution of medical history of the studied family caregiver's and the patients with confirmed COVID- 19 (study and control groups).Regarding medical history of family caregivers, It illustrated that, 75.6% of the study group and 71.1% of control group not have chronic disease but24.4% of the study group and 28.9% of the control group had chronic disease while 54.5% of the study group and 53.8% of control group not have regular treatment for their chronic disease.

Regarding medical history of studied patients, it presented that 88.9% of the study group & 91,1% of control group had duration of disease≥ one month, 77.8% and 73.3% of study and control group respectively not have chronic disease, while 84.4% of study group and 88.9% of control group not have pervious infection with Covid-19.

Also, it illustrated that 44.4% and 46.4% respectively had infection with disease at work, 80.0% of the study group and 75.5 of control group had moderate signs &symptoms of disease, 77.8% and 82.2% respectively not have another person in the family infected with Covid-19, 88.9% and 84.4% respectively of study and control group received care at home.

Figure 1 illustrated that, the total mean knowledge score pre tele-nursing intervention was 4.93 in the study group that improved to 7.35 post tele-nursing intervention in the study group. While in the control group, total mean score pre- intervention was 4.71 that increase slightly to 4.97 post intervention. This indicated that there was a statistically significant differences at the post test knowledge about COVID-19 among both group (P<0.05).

Table (4) shows effect of tele- nursing pre- posttest on studied family caregivers' types and total score of burden. It illustrated that, after tele-nursing intervention, there was decreasing in mean score of the types of burden in the study group whether physical burden (3.64±1.5) , social burden (10.22±2.80) and psychological burden (17.60±5.84) than in control group as physical burden (4.88±2.16), social burden (13.24±3.29), and psychological burden (21.11±5.13). Also, a highly statistical significance difference was occurred among the study group than in control group on pre-posttest tele-nursing intervention regarding total score of burden(p <0.001).

Figure 2 represents that the more than half of family caregivers in both group had sever feeling of burden (55.5% and 60% in the study and control group respectively) pre tele-nursing intervention which decreased to 28.9% in the study group after one month of intervention compared to control group (55.5%).

Figure (3) represents that the more than half of family caregivers in both group had mild coping (77.8% and 82.2% in both study and control group respectively) pre intervention. After intervention, the study group had high level of coping (64.4%)compared to the control group (11.1%)..

Table (5) represents tele- nursing intervention effect (pre- posttest) on types and total score of coping among studied family caregivers. It illustrated that, there was improvement in posttest of problem- oriented coping in study group (13.80±4.40) than control group (6.80±4.53), Emotional-oriented coping in the study group (27.00±9.75) than control group (15.64±8.41). In addition, there was improvement in posttest of Positive - appraisal coping in study group (23.64±7.85) than control group (12.53±6.54). Also, A highly statistical significance difference was found among the study group than in the control group on pre- posttest tele-nursing intervention regarding total score of coping (p <0.001).

Table (6) represents Correlation between knowledge of the study family caregivers and level of burden and coping mechanism (pretest & posttest). After receiving knowledge about COVID-19,there is decreasing in level of burden to -0.246 while level of coping increasing to 0.541 at posttest intervention.

Table (1): Distribution of demographic characteristics of the patients with confirmed COVID- 19 (study group and control group) (n=90).

Demographic data	The study sample (n=90)					
	Study group (n=45)		Control group (n=45)		Total (n=90)	
	n	%	n	%	n	%
▪Age (years):						
20- 29	15	33.3	13	28.9	28	31.1
30- 39	16	35.6	15	33.3	31	34.4
40- 49	6	13.3	5	11.1	11	12.2
50-59	3	6.7	4	8.9	7	7.8
60- 64	5	11.1	8	17.8	13	14.4
	Mean± SD 39.60±14.56					
▪Sex:						
Males	19	42.2	21	46.7	40	44.4
Females	26	57.8	24	53.3	50	55.6
▪Educational level:						
Illiterate	5	11.1	2	4.4	7	7.8
Basic education	8	13.3	8	17.8	16	17.8
Diplom	20	44.5	27	18.7	47	52.2
Highly education	12	26.7	8	60.0	20	22.2
▪Marital status:						
Single	14	31.1	11	24.4	25	27. 8
Married	31	68.9	34	75.6	65	72.2
▪ Occupation:						
Employee	25	55.6	24	53.3	49	54.4
Not employed	20	44.4	21	46.7	41	45.6

Table (2): Distribution of demographic characteristics of the studied family caregivers (study group and control group) (n=90).

Demographic characteristics	The study sample (n=90)					
	Study group (n=45)		Control group (n=45)		Total (n=90)	
	n	%	n	%	n	%
▪Age (years):						
≤ 30	9	20.0	11	24.5	20	22.2
31-40	13	28.9	15	33.3	28	31.1
41- 50	20	44.4	17	37.8	37	41.1
> 50	3	6.7	2	4.4	5	5.6
Mean± SD (37.75±8.42)						
▪Sex:						
Males	22	48.9	20	44.4	42	46.7
Females	23	51.1	25	55.6	48	53.3
▪Marital status:						
Single	15	33.3	17	37.8	32	35.6
Married	30	66.7	28	62.2	58	64.4
▪Educational level:						
Illiterate	5	11.1	3	6.7	8	8.9
Basic	16	35.6	19	42.2	35	38.9
Diplom	24	53.3	23	51.1	47	52.2
Highly education						
▪ Occupation:						
Employee	23	51.1	25	55.6	48	53.3
Not employed	22	48.9	20	44.4	42	46.7

Demographic characteristics	The study sample (n=90)					
	Study group (n=45)		Control group (n=45)		Total (n=90)	
	n	%	n	%	n	%
▪ Relationship to the patient:						
Spouse	23	51.1	21	46.7	44	48.9
Parents	12	26.7	10	22.2	22	24.4
Son	3	6.7	4	8.9	7	7.8
daughter	7	15.5	10	22.2	17	18.9
▪ Family members						
≤4	17	37.8	19	42.2	36	40.0
>4	28	62.2	26	57.8	54	60.0
▪ Income						
Not enough	27	33.3	30	66.6	57	63.3
Enough	15	60.0	12	26.7	27	30.0
More than enough	3	6.7	3	6.7	6	6.7

Table (3): Distribution of medical history of the studied family caregiver's and the patient with confirmed COVID- 19 (study and control groups) (n=90).

Medical history	The study sample (n=90)			
	Study group (n=45)		Control group (n=45)	
	n	%	n	%
Family caregiver's medical history				
History of chronic disease				
Yes	11	24.4	13	28.9
No	34	75.6	32	71.1
If yes , have regular treatment for chronic disease				
Yes	5	45.5	6	46.2
No	6	54.5	7	53.8
Patient's medical history				
▪ Duration of disease:				
< one month	5	11.1	4	8.9
≥ one month	40	88.9	41	91.1
▪Presence of chronic disease:				
Yes	10	22.2	12	26.7
No	35	77.8	33	73.3
▪Pervious infection with Covid-19:				
Yes	7	15.0	5	11.1
No	38	84.4	40	88.9
▪Expected source of having infection:				
Home	8	17.8	6	13.3
Work	20	44.4	21	46.7
Other	17	37.8	18	40.0
▪ Acuteness of the infection:				
Mild	4	8.9	4	8.9
Moderate	36	80.0	34	75.5
Sever	5	11.1	7	15.6
▪ If there another person in the family have Covid-19				
Yes	10	22.2	8	17.8
No	35	77.8	37	82.2
▪ Receiving treatment at				
Home	40	88.9	38	84.4
Hospital	5	11.1	7	15.6

Figure (1): Effect of Tele- nursing intervention pre- posttest on the total mean scores of knowledge of the study family care givers (study and control groups) about COVID- 19 (n=90).

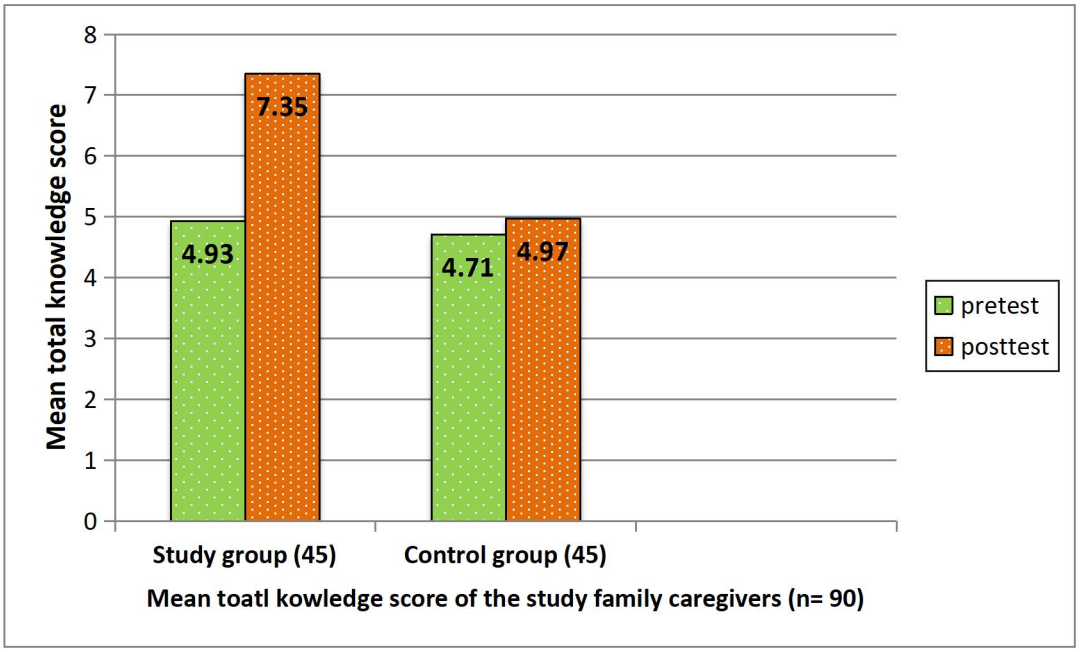


Table (4): Effect of Tele-nursing intervention pre- posttest on studied family caregivers' types and total score of burden (study and control groups) (n=90).

Types of burden	The study family caregivers (n=90)		t-test	P
	Study group (n=45)	Control group (n=45)		
	Mean± SD	Mean± SD		
Physical burden				
Pretest	5.62±1.8	5.33±1.95	0.729	0.468
Post test	3.64±1.5	4.88±2.16	3.162	0.002*
Social Burden				
Pretest	13.53±3.63	13.57±3.05	0.036	0.950
Post test	10.22±2.80	13.24±3.29	4.96	0.000*
Psychological burden				
Pretest	21.97±5.77	22.28±4.57	0.284	0.777
Post test	17.60±5.84	21.11±5.13	3.025	0.003*
Total score				
Pretest	38.73±8.76	40.64±7.56	1.10	0.271
Post test	30.57±9.34	38.51±8.42	4.22	0.000*

Figure (2): Effect of tele-nursing intervention pre- posttest on the level of burden among studied caregivers (study group and control groups) (n=90).

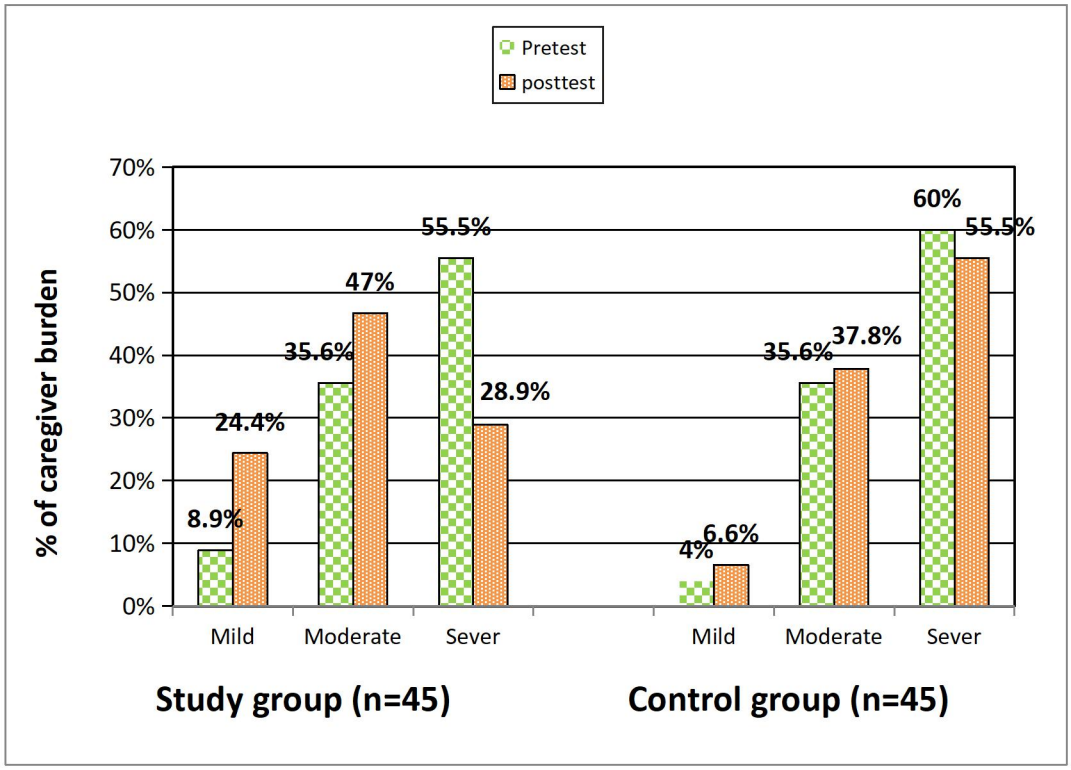


Figure (3): Effect of Tele-nursing intervention pre- posttest on the level of coping strategies among studied family caregivers (study and control groups) (n=90).

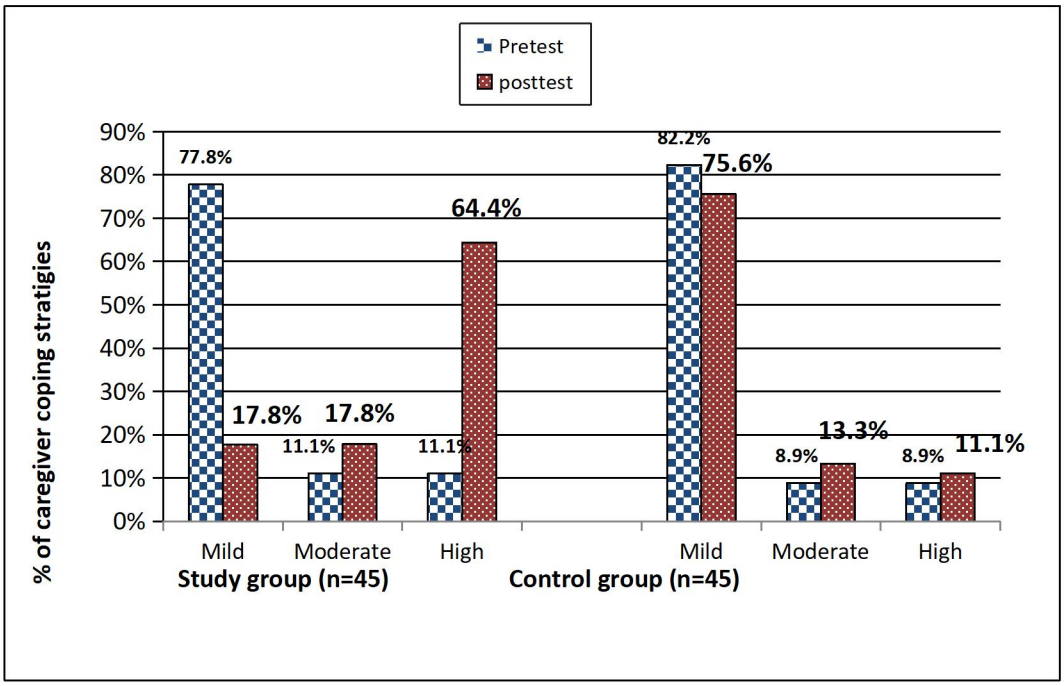


Table (5): Effect of Tele-nursing intervention pre- posttest on types and total score of coping among studied family caregivers (study and control groups) (n=90).

Types of coping	The study family caregivers (n=90)		t-test	P
	Study group (n=45)	Control group (n=45)		
	Mean± SD	Mean± SD		
-Problem- oriented coping				
Pretest	6.57±4.41	6.31±4.14	0.295	0.769
Post test	13.80±4.40	6.80±4.53	7.428	0.000*
Emotional- oriented coping				
Pretest	14.73±7.61	14.60± 7.49	0.084	0.933
Post test	27.00±9.75	15.64±8.41	5.914	0.000*
Positive - appraisal coping				
Pretest	12.37±6.66	11.93±6.37	0.323	0.747
Post test	23.64±7.85	12.53±6.54	7.290	0.000*
Total score				
Pretest	33.68±18.36	64.44±21.35	0.222	0.825
Post test	32.84±17.71	34.97±19.51	6.890	0.000*

Table (6): Correlation between knowledge of the study family caregivers and level of burden and coping mechanism (pretest & posttest)(n=90)

level of burden & coping	Knowledge about Covid -19 (n=90)			
	Pre test (n=90)		posttest (n=90)	
	r	P	r	P
▪ level of burden	0.051	0.634	- 0.246	0.01*
▪ level of coping	0.120	0.261	0.541	0.000*

*** Significant (p<0.05)**

Discussion

Corona virus disease or Covid-19 is an epidemic health problem. Patients with Covid-19 are in particular need of care and support to prevent complication followed from infection. These patients may be received care at home or hospital by the family caregivers that places a great physical, psychological and social burden. So, an appropriate nursing interventions using tele-nursing are essential to improve knowledge of caregivers, decrease their burden and improve coping pattern **(Chagas, 2020).** .

Regarding the demographic data of patients with confirmed COVID- 19.The present study indicated that mean and SD of the studied patients were 39.60±14.56, more than half of the patients were female , one fifth of them had highly education, nearly three quarters of patients were married, and nearly one half of the studied patients were employee. This findings was similar with a study done by **Kord, et al (2021)** . They reported that mean and SD of the patients' age was42.15±6.643, more than half of the sample were women and three quarters of the patients were married. No difference in the results could due to that the pandemic disease can affect any one and at any time.

Concerning of demographic characteristics of the studied family caregivers. The present study reported that mean and SD of the studied family caregivers were 37.75±8.42, more than one half of sample were female, nearly two third of them were married, more than one half of studied family care givers were highly educated ,employee, and

had family member >4. In addition, more than half of the studied caregivers' incomes were not enough. Regarding relationship to the patient, it showed that nearly one half of family caregivers were spouse. These results was in congruent with the study was done by **Shariati et al (2021).** They reported that family members, mean age and standard deviation were 39.93±10.91. Most of the family caregivers were married, highly educated, most of the studied caregivers were male, while female is the most caregivers in control group. In addition, one third of caregivers were spouse but no significant difference was observed between two group in the terms of occupation and family size. In addition, nearly one half of the sample, s income were not enough. These similarity in findings could be due to increasing the cost of treatment of the patient with COVID-19 as cost of chest x-ray, cost of medication and also, increasing the number of family member and the cost of living.

Regarding the effect of tele- nursing intervention pre- posttest on knowledge of family caregivers about COVID-19 disease. The current study revealed that, more than two thirds of studied caregivers have unsatisfactory knowledge at pretest which changed to that the majority of the study group had satisfactory knowledge than in the control group after one month of intervention. This finding is congruent with study done by **El Mezayen &Elkazeh, 2020**. They indicated that the majority of the studied sample had good knowledge about COVID-19 after intervention than pre intervention. This agreement in finding that the studied sample were interested to know more knowledge about COVID-19 disease to prevent infection or adverse effect of disease. Also, it may be due to that majority of the studied family caregiver were educated that facilitate their understanding of knowledge.

In relation to effect of tele-nursing on the total mean scores of knowledge of the study family care givers about COVID-19. The current study reported that there were a statistically significant improvement at the post test knowledge about COVID-19 among study group than control group after application of tele-nursing intervention (P<0.05). This findings agreed with the study by **Bohan (2020).** He reported that there was a statistical significant improvement in total score of knowledge after intervention than pre intervention. This similarity could prove that the use of the educational and the distance caregiving interventions was effective & very practical measure to improve satisfaction of families during crisisof COVID-19.

Regarding effectiveness of tele-nursing intervention on studied family caregivers' types and total score of feeling of burden. The current study reported that, after application of tele- nursing intervention, there were a statistical significant decreasing in total score of different types of burden especially psychological burden mong study group than control group at pre- posttest with p <0.001. These findings were consistent with the study that was done by **Shariati et al (2021)** and the study that was done by **Annarumma, Vitale,Sessa, & Tedesco (2020)**. They reported that after the intervention application, the mean scores of physical , emotional and social burden in the intervention group decreased than in the control group and there was a statistically significant difference which indicates the effectiveness of the tele-nursing intervention in reducing caregivers stress. This consistency could prove that, presence of burden especially psychological burden among family caregivers might be related to increasing number of family members and lack of income. So, the telephone communication method are effective in reducing all types of burden among family care givers especially psychological burden during COVID-19 pandemic.

Regarding the effect of tele-nursing intervention pre- posttest on the level of burden among studied caregivers, The present study revealed that the level of burden due to care of COVID-19 patients by using Zarit Burden Interviewing (ZBI) Scale is significantly high pre nursing intervention in all types of burden (physical, social and psychological burden) which more than half of family caregivers in both group had sever feeling of burden which decreased to less than one third in the study group after one month of intervention compared to control group. These finding was in congruent with a studies were done by **Imani et al. (2015) & Jiloha,(2020)**. They reported that the family caregivers stress score

pre-intervention indicated severe family stress but family stress was decreased after application of the intervention. Also, this findings was consistent with the study was done by **Cravello, et al (2021).** They reported that the caregiving burden was higher before than after intervention among family caregiver. This agreement could prove that the web-based communication method between the health care providers and the family are very efficient in reducing the stress among patients and family caregivers. .

In the other hand, the result is not supported by the study was done by **Lifen, et al (2019).** Who reported that most study group were suffering from different burden after intervention although they received social support. These inconsistency could prove that intervention used in the present study was effective in reducing caregiver burden than the intervention used in the other study or might be differences in disease itself used in both studies.

Regarding effectiveness of tele-nursing intervention on pre- posttest on studied family caregivers' types, total score of coping strategies and level of coping. The current study reported that, after application of tele-nursing intervention, the study group had high coping strategies whether problem- oriented coping, emotional- oriented coping and positive – appraisal coping than the control group. Also, there were a statistical significant improvement among study group than control group at pre- posttest regarding different types of coping especially emotional- oriented coping and total score of feeling of burden ($p < 0.001$). These findings was congruent with study was done by **Mariani et al (2020)**. They reported that after family support intervention, coping styles were improved in the studied family member and there was a statistically significant differences and positive correlation between family support intervention and coping style. From the researchers' point of view, application of different coping strategies using tele-nursing especially emotional oriented coping were effective in enhancing family caregiving of COVID-19 patient or most of the family caregiver were educated that facilitate their positive reaction and enhanced their using of coping mechanism.

Regarding effectiveness of tele- nursing on pre- posttest on studied family caregivers level of coping. The present study indicated that more than half of family caregivers in both group had mild coping pre tele- nursing intervention. After intervention, more than half of the study group experiencing high level of coping compared to the control group. This result was in agree with the study was done by **Cravello et al ,2021**. They reported that after application of life support intervention, the coping mechanism were used by three quarter of the family caregivers. From the researcher point of view, reflecting the success of tele-nursing and its positive effect on improving coping mechanism among study group.

In the other hand, the result was incongruent with the study was done by **Azar et al, 2021**. They reported that two third of family caregivers in study group experiencing mild coping and moderate coping pre and post intervention. This disagreement could be due to that difference in type of disease as the present study on infectious disease. While the other study on chronic disease which made family caregivers took more time to adapt with disease and reduce its burden than in COVID-19 disease.

The current study reported that a statistical significance negative correlation between studied caregivers' knowledge and their level of burden at post-intervention ($p < 0.05$) than pre- intervention. Also, it indicated that, there was highly statistical positive correlation between studied caregivers' knowledge and their level of coping mechanism ($p < 0.001$) at post- intervention than pre- intervention. These findings agreed with a study was done by **Menati, et al (2020).** They reported that there was negative relationship between care burden and coping strategies in the study sample especially after receiving intervention at $p < 0.0001$. This agreement could prove that tele nursing had a positive effect and efficiency in improving caregivers' knowledge about disease that lead to reducing burden and enhancing their usage of coping strategies.

Limitation of the Study

- It is difficult to obtain complete data about COVID-19 patients as some patients not registered in health units.
- Lack of researches done on the role of family caregivers during crisis of COVID-19 in Egypt.

Conclusion

In the light of study results, it can be concluded that the application of tele-nursing intervention for one month which emphasized on increasing the study group knowledge about COVID-19 disease and treatment process were very effective in reducing physical, social and psychological burden among family caregivers. Additionally, this intervention was effective in improving coping strategies among the study group than the control group.

Recommendations

The following recommendations are proposed:

1- Continuous providing of knowledge and skills about family caregivers' burden and effective coping strategies in the crisis of COVID-19 should be a part of the nursing care.

3- Effective communication strategy should be used by ministry of health to increase use of tele-nursing in providing care in the current crisis to prevent spread of infection and provide psychological support for caregivers.

4- Further studies are required to expand understanding of the importance of using tele-nursing in decreasing burden and improving coping among family caregivers during COVID-19 pandemic.

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