

COVID 19 Outbreak and Care Givers' Management Approach of their Children who undergoing Hemodialysis

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Abstract

Background: COVID-19 is an acute pulmonary infection caused by a coronavirus and characterized by several clinical characteristics ranging from asymptomatic to respiratory failure that required special care. **Aim:** Evaluate the impact management approach for caregivers regarding prevention and control strategies of COVID19 for their children undergoing hemodialysis. **Study Design:** Quasi-experimental design was used. Setting: The study was conducted at pediatrics dialysis units at Mansoura University Children's Hospital. **Subjects:** A convenient sample of (34) children undergoing hemodialysis therapy & their caregivers who accompanied them. **Tools:** *three tools* used in this study; **Tool (I):** Include three parts: Socio-demographic characteristics of the studied children, Clinical information of the studied children undergoing hemodialysis, and Sociodemographic characteristics of children's caregivers. **Tool (II):** included two parts; Knowledge of caregivers related to hemodialysis, knowledge of caregivers related to COVID19, and Preventive and control strategies of Covid19 used by caregivers for their children undergoing hemodialysis therapy. **Tool (III):** Strategies and precautions followed by caregivers related to hemodialysis therapy and preventive and control strategies of Covid19 used by caregivers for their children undergoing hemodialysis therapy. **Results:** The results revealed that there was a statistically significant effect on caregiver's knowledge regarding hemodialysis, COVID-19. In addition to there was a statistically significant difference in the application of COVID19 prevention precautions followed by caregivers for their children undergoing hemodialysis through the program phases with $P < 0.001$. **Conclusion:** a significant improvement of caregiver's knowledge regarding the hemodialysis, COVID-19 post & follow up implementation phases compared with the pre-implementation phase. In addition to there was also a significant improvement in the application of preventive and control strategies of Covid19 followed by studied caregivers for their children who undergoing hemodialysis after the program application. **Recommendation:** Infectious disease guidelines of the COVID-19 epidemic should be conducted by healthcare staff in pediatric dialysis centers in order to reduce the transmission of infection among children with chronic renal failure.

Keywords: COVID 19, Management, care givers, children, hemodialysis.

Introduction:

The recent literature reported that the COVID-19 pandemic affects all age group, but then its appearance is changed in children from adults Although

COVID-19 is less common in children or may exist with mild symptoms, adults with a suppressed immune system because of chronic disorder such as renal failure and cancer are at increased risk of distress from the disturbing

subsequences of the virus (**Saroha & Moulik, 2020**).

Children with chronic disorders have a high mortality rate because of transmission of the COVID 19 pandemic that affected health disorders such as, diabetes, cardiovascular, cancer, and renal disease which compromised the immunity system. This is particularly essential as pneumonia is the significant leading cause of death in children worldwide. They may have an increased possibility of exposure as a result of the required continuing clinical care, including laboratory monitoring and dialysis (**Sun et al., 2020**).

Coronavirus 2019 pandemic (COVID-19) is a greatly infectious disease produced by the severe acute respiratory syndrome affected those who undergoing immune suppression therapy conditions such as chronic renal failure. The researchers label the clinical disease course of COVID-19, pediatric patients with chronic renal failure who undergoing hemodialysis and chronic immunosuppression as well as the measures to decrease transmission among hemodialysis patients and staff (**Rawson et al., 2021**).

Livingston & Bucher 2020 reported that mortality rates among 10% and 30% approximately, the imperfect experience with patients with ESRD undergoing hemodialysis suggests the children might consume additional mild progression. Fewer studies reported that the COVID-19 mortality rate in adults with ESRD undergoing hemodialysis ranges from <5% to 16% (**Ma et al., 2020**). These inconsistent epidemiologic statistics, lengthways with the characteristically mild course of COVID-19 in pediatric patients, have directed to uncertainty concerning the

predictable sequence and strictness of COVID-19 in pediatric patients with kidney disease on dialysis and/or chronic immunosuppression (**Covid et al., 2020**).

Dialysis in children is presumed to be substantial on caregivers has given their requirement to assume dual responsibilities of parental and therapeutic management of their child's chronic illness. At the time of their child's ESKD analysis and beginning of dialysis management, caregivers stated experiencing concentrated exercise and training. They labeled requiring to chief a novel therapeutic linguistic, technical skills, and compound daily practices for lasting illness supervision while concurrently treatment anxieties around their child's well-being unpredictability and prediction and chance and dangers of transplant and preserving their routine function as a caregiver to their child (**Wightman et al., 2019**).

The management of children with end stages renal disease (ESRD) is extremely particular and frequently ill implicit by non-pediatric providers and ability/organization managers. Important alterations among adult and pediatric dialysis units are emphasized. Expectations and responsibilities of the supporters of the interdisciplinary dialysis team are delineated as they apply to precisely to the maintenance of pediatric dialysis patients. Bodily and staffing needs of the dialysis capability are studied, over concentrating on exclusive requirements and challenges confronted via the pediatric dialysis management team members (**Chand et al., 2017**).

Pediatric nurses in dialysis centers should consume an elementary considerate of childhood consequence and development of certain

neurocognitive disorders and physical handicaps therefore that interventions and explanations can be supported in a non-threatening progression a suitable method. Assumed that the greatest children are attended by a maternal or another caregiver who may continue with the child through dialysis therapy, the necessity to encompass the caregiver in descriptions around maintenance exercises and measures also improve nursing accountabilities and responsibilities (Saroaha & Moulik, 2020).

A quality of life (QoL) assessment is an instructed patient-reported consequence tool in children dialysis. This is principally unwieldy in children with ESRD as compared with adults because of calculation requirements to contain the caregivers and their children. The dialysis unit requests to consume an arrangement in residence to confidentially and comprehensively evaluate both gatherings. For the reason that procedures, hospitalizations, measures, and therapeutic calls, school absenteeism, and movement limitations are common procedures, children with ESRD take inferior health-related QoL marks associated with healthy children (Mariani et al., 2016).

Significance of the study:

It is well known that chronic medical disorders children are more possible to progress severe disease and infection is the second most common death cause among children who undergoing hemodialysis. Dialysis children with primary lung disorder and with medications immunosuppression are the greatest threat for complication of infection. (Chaturvedi & DeBaun, 2016; Hockenberry & Wilson, 2018)

Children with renal failure and undergoing hemodialysis are at risk for contracting COVID19 infection among pediatric chronic dialysis patients as a following ; compromised immune system; close proximity to other patients during treatment in a confined HD unit; frequent contact with healthcare workers, who may be asymptomatic but infected while caring for a variety of other patients; a need for the presence of parents or other relatives during the treatment, which increases the risk of cluster infection (Wu & McGoogan, 2020).

The care of children who received hemodialysis is critical to lessen the complication of life-long therapy accompanying the ESRD, to improve consequences during hemodialysis, and to improve their quality of life and to enhance their social productivity. Subsequently these children required a complex and specialized curative and participation of a parent or adult caregiver in all aspects of the child's hemodialysis therapy (Chand et al., 2017). So that the study conducted to evaluate the impact of management approach for caregivers of children undergoing hemodialysis regarding prevention and control strategies of covid19.

The aim of the study

Evaluate the impact of the management approach for caregivers of children undergoing hemodialysis regarding prevention and control strategies of covid19.

Assess knowledge of caregivers' regarding hemodialysis & COVID 19 pre- intervention.

Assess prevention & control strategies of COVID19 followed by care givers for their children undergoing hemodialysis pre intervention.

Plan and implement the management approach for caregivers of children undergoing hemodialysis regarding prevention and control strategies of COVID19

Evaluate the impact of the management approach for caregivers of their children undergoing hemodialysis regarding prevention and control strategies of covid19.

The hypothesis of the study:

Care givers ' knowledge and reported practice related to control strategies and prevention of covid19 improved after the management approach for their children who undergoing hemodialysis.

Material and Methods Study Design:

A quasi-experimental research design was used in this study.

Setting:

The study was conducted at pediatrics dialysis units at Mansoura University Children's Hospital,

Subjects:

A convenient sample of (34) children undergoing hemodialysis therapy & their caregivers who accompanied them. The subjects were picked up and then followed up using social communication platforms (Zoom & What's App) in order to receive the management approach. The study was

conducted through six months from the beginning of August 2020 to the beginning of March 2021 according to the following criteria:

Inclusion criteria:

Caregivers either; father, mother, or any family member who can read and write & can use technological applications of social communication skills through mobile, lab top, computer, or any social media for communications regardless of their age.

Children Children undergoing hemodialysis therapy regardless of their age or gender.

Exclusion criteria:

Children with any chronic diseases were excluded from the study (such as heart disease or diabetes mellitus).

Data collection tools:

Questionnaire sheet applied to the studied caregivers of children undergoing hemodialysis through electronic form applied via e-mail, what's-App & zoom application to caregivers which consisted of three tools as following:

Tool I: Questionnaire sheet developed by the researchers and composed of three parts: Part (1): Socio-demographic characteristics of the studied children which included: Age in years, gender, educational level, and birth order.

Part (2): Clinical information related to the studied children undergoing hemodialysis which included: family history of renal failure, previous hospitalization, previous exposure to COVID 19, previous exposure of any

family member for infected with COVID 19, duration of beginning of hemodialysis, number of a weekly HD session, duration of HD, types of vascular access, number of vascular access & Vascular access complication.

Part (3): Socio-demographic characteristics of children' caregivers such as age in years, residence, current occupation, and Level of education.

Tool II: Assessment questionnaire sheet regarding knowledge of caregivers related to hemodialysis & COVID-19, developed by researchers after reviewing the literature. The questionnaire composed of two parts as follows:

Part (1): Knowledge of caregivers related to hemodialysis:

Composed of ten sub-items such as the definition of hemodialysis, an indication of hemodialysis, how is hemodialysis done through, the precautions that must be taken to protect the arterial junction (fistula), the signs and symptoms associated with hemodialysis that may appear on the children, the diet regimen should these children follow, foods and drinks should avoid, the risks that may occur if the types of foods are not adhered to, and Complications from excessive fluid and salt intake.

Part (2): Knowledge of caregivers related to COVID 19:

Composed of six sub-items such as the definition of coronavirus, the risk of developing the disease, precautions to prevent infection, modes of transmission, the signs & symptoms, and the investigations should be done to confirm the disease.

❖ **Scoring system:**

The Scoring system for knowledge was as follows; the correct answer was given the score of "ONE" and the wrong answer was given the score of "ZERO". Based upon the scoring system utilized, the knowledge level was categorized as follows: satisfactory level is $\geq 60\%$ and the unsatisfactory level was $< 60\%$.

Tool III: Assessment questionnaire sheet of Strategies Control and precautions followed by care givers regarding hemodialysis therapy & COVID19. It composed of two parts as follows:

Part (1): Strategies and precautions followed by caregivers related hemodialysis therapy:

It was developed by EL Ghadban, 2014 & Saadoon M.M. (2016) then modified by researchers which included Strategies & Precautions was taken before starting a hemodialysis session, Strategies & Precautions were taken after the dialysis session, Strategies & precautions for Caring for the Vistula.

Part (2): Preventive and control strategies of Covid19 used by caregivers for their children undergoing hemodialysis therapy:

It was developed by Shen, et al, 2020, it included: Home environment management, pediatric management, hand hygiene, protective equipment, and disinfection of drainage fluid, limiting accompanying persons, and remote medical care & online medical consultation for home.

❖ **Scoring system:**

The Scoring system for the preventive and control strategies of Covid19 used by caregivers had two responses, 'done' response was given the

score of "ONE" and the 'not done' response was given the score of "ZERO". Based upon the scoring system utilized, the performance level was categorized as follows: adequate level is $\geq 60\%$ and the inadequate level was $<60\%$.

Field of study.

Once permission was granted from responsible and authoritative parties at the pediatrics dialysis department at Mansoura University Children's Hospital, data collection initiated and contacted each potential caregivers of children undergoing hemodialysis during two days every week (Monday, and Thursday) through electronic form applied via e-mail, what's-App & zoom application. The study was conducted from the beginning of October 2020 to the beginning of March 2021 (6 months) through the following phases:

Preparatory phase:

This phase involves literature reviewing related to a research problem, and theoretical knowledge of its various aspects of the study, using textbooks, evidence-based articles, periodicals, and magazines in order to collect the tools of this study. As well, the researchers collected all data related to caregivers & children undergoing hemodialysis from the pediatrics dialysis department at Mansoura University

Children's Hospital involving children & their care givers' socio-demographic characteristics, children' health information, and they collected also care givers' telephone numbers, email address, mutual communication by the what-up application then send for them the zoom application link in order to implement the study program. This phase

conducted from the beginning of August 2020 to October 2020.

Pre- test phase:

This phase was established in November 2020 and extends to December 2020 through an electronic Pretest assessment of caregivers' knowledge related to COVID-19& hemodialysis. Prevention and control strategies of COVID19 followed by care givers regarding hemodialysis therapy also assessed through the pretest phase.

Implementation phase:

This phase was applied via Zoom application lectures that divided into eight sessions through two days per week (Monday & Thursday) from January 2021 to February 2021. It was dependent on a literature review regarding the management approach for caregivers of children undergoing hemodialysis regarding prevention and control strategies of covid19 for their children undergoing hemodialysis. Lectures included Pictures, videos, Simulation demonstrations, and handouts developed in a suitable manner which was sent to children's caregivers through what's application. An instructional booklet to present data for them were developed and sent to them by email & what's App.

Session (1)

The 1st training session involved the knowledge related to the definition of hemodialysis, the indication of hemodialysis, how is hemodialysis done, the precautions that must be taken to protect the arterial junction (fistula), the signs and symptoms associated with hemodialysis that may appear on the

children, the diet regimen should these children follow, foods and drinks should you avoid, the risks that may occur if the types of foods are not adhered to, and Complications from excessive fluid and salt intake.

Session (2)

The 2nd training session involved knowledge of caregivers related to COVID19 which composed of six sub-items such as the definition of coronavirus, the risk of developing the disease, precautions to prevent infection, modes of transmission, the signs & symptoms, and the investigations that should be done to confirm the disease.

Session (3)

The 3rd training session included Strategies & Precautions before starting a hemodialysis therapy (Follow Measuring body weight, don't eat directly before the session, wearing clothes according to hospitalization unit Washing hands and the Vistula care with soap and water, then Al-betadine/ Alcohol& follow blood pressure treatment if any according to the doctor's instructions).

Session (4)

The 4th session involved Strategies & Precautions after hemodialysis therapy (Wait until making sure that the fistula acupuncture sites are closed and put the spare parts on them, ensure children that sitting for a short period to keep the body balanced, take into account to follow the measurement of vital observations, follow bodyweight measurement& Giving treatment according to the doctor's instructions).

Session (5)

The 5th training session involved caring for the Vistula through illustrated videos& demonstration by the researcher the following steps; hand washes, well Place the arm in a horizontal position so that we can feel the pulse, use fingertips to feel the pulse, evaluate the occurrence of signs of any type of infection In the place of the Vistula, such as feeling pain - swelling - redness - high temperature, wash the place of the Vistula with soap and water and leave it dry, taking the cotton and sheets and dipping in the disinfectant then cleansing the exit of the section, with a circular movement, then discarded, and repeat 3 times, and purify the place of the fastening is also and every time we use new cotton.

Session (6)

The 6th training session involved Preventive and control strategies of Covid19 for children undergoing hemodialysis (Home environment management; Air out the room in which hemodialysis is being conducted by opening windows and doors as deemed feasible at least twice a day for 30 min each time, when connecting the PD catheter to the dialysis tubing to conduct an exchange, it is necessary to close the window and/or any air conditioner vents to avoid convective airflow, the floor of the PD treatment room should be swept and cleaned before the PD treatment is conducted once daily, followed by ultraviolet of the room's air, if ultraviolet equipment is available at home, the floor of the PD treatment room should be swept and cleaned before the PD treatment is conducted once daily, followed by ultraviolet disinfection, if ultraviolet equipment is available at home, the ultraviolet disinfection period should be no less than 30 min each time& the ultraviolet lamp should be kept clean and wiped with 75% alcohol once a week,

Before and after each manual PD exchange. Pediatric management; Both children and caregivers try to stay home and avoid crowded places if going out, they should wear a mask and avoid touching surfaces unnecessarily, body temperature monitoring, the patients and their caregivers should undergo body temperature screening, as well as screening for respiratory symptoms, the screening should be conducted outside the dialysis center, if one is found to have a fever and/or respiratory symptoms in association with, a history of epidemic exposure, he/she should be referred to a designated fever clinic or another specified location in the hospital for evaluation, Personal protective equipment the HD patient should wear a disposable general medical mask or surgical mask when undergoing HD& Use of an N95 mask is not recommended for HD patients since it could result in hypoxemia).

Session (7)

The 7th training session involved also preventive and control strategies of the COVID19 for children undergoing hemodialysis (Hand hygiene; Patients and care providers should wash hands in accordance with the seven-step washing method, hand hygiene should be performed after using the restroom and before meals& upon returning home. Protective equipment; the care provider/operator should wear a general medical mask and cap, and the child should wear a general medical mask, the mask should cover the nose and mouth, and the cap should cover the hair. Limiting accompanying persons; one patient should be accompanied by only one fixed caregiver, who needs to wait in the waiting area wearing a disposable general medical mask or a surgical mask, the accompanying caregiver should remain in the waiting area throughout the

dialysis session and should only be allowed to enter into the dialysis area in special situations when approved by dialysis staff& If the accompanying person is substituted by another person, the contact history of the new individual should be acquired in detail).

Session (8)

The 8th training session involved also preventive and control strategies of the COVID19 for children undergoing hemodialysis (Remote medical care & online medical consultation for home; Communicating with each patient and their families by telephone or Internet is recommended, any signs of illness experienced by the HD patient or his/her family member should be reported to the dialysis program promptly, it is also recommended that, if available, a remote management system with remote connectivity should be used to facilitate effective monitoring of home PD, and as a means to provide timely feedback and improve treatment compliance and efficacy, if the family member of the child has a history of epidemic exposure, he/she should be isolated from the child immediately, it is highly recommended that the patient should limit any time at the hospital other than the exact time required for dialysis, & if the patient is found to have fever and/or respiratory symptoms with a history of epidemic exposure, he/she should be referred immediately to a designated fever clinic or other hospital specified location for evaluation. At the end of this session, the researcher conducted a revision & answer about caregivers' questions.

Post-Test phase:

The Posttest stage was done after the implementation phase immediately. This phase begun from the ending

February 2021 to the ending March 2021 depend on the post-test assessment.

Follow up phase:

Follow up stage was done after three months flow the implementation phase.

Content validity:

The previously mentioned tools were revised by seven experts in, pediatrics and community health nursing experts. Based on the experts' opinions, and the modification was made.

Pilot study:

A pilot study was conducted on 10% of the study sample to obtain data regarding clarity of the questionnaire, and time needed for completing. The children' caregivers shared in the pilot study were not included in the study sample.

Reliability assessment:

The tool of data collection questionnaire was checked for reliability on 10% of the study sample.

Alpha Cronbach showed that all items are significantly differed and have a correlation coefficient ($r=0.87$). On the other hand, the alpha for the performance checklist was ($r=0.85$).

Ethical consideration:

Permission to carry out the study was taken from the administrative authorities. The researchers confirm that participation is voluntary, the anonymity and confidentiality were assured. A

consent was taken from children' care givers. As well as, Researchers were confirmed on research data confidentiality.

Statistical analysis:

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). All continuous data were normally distributed and were expressed in mean \pm standard deviation (SD). Categorical data were expressed in number and percentage. The comparisons were determined using ANOVA test for more than two variables with continuous data. Chi-square test was used for comparison of variables with categorical data. Statistical significance was set at $p<0.05$.

Results

Table (1): Illustrates frequency distribution of the socio-demographic characteristics of the studied children undergoing hemodialysis. It indicated that the mean age of studied children was 14.3 \pm 2.8 years, more than two-thirds of them (64.7%) were males, they were distributed over the primary, preparatory and secondary schools (35.3%, 32.4%, and 32.4%) respectively. Concerning birth order, 44, 1% of studied children ranked as the first, 44.1% were the second, while only 11.8% of ranked as the third child.

Table (2): Shows frequency distribution of the Clinical information related to the studied children who undergoing hemodialysis. It illustrated that 38.2% of studied children had a family history of renal failure, less than three-quarters of them (70.6%) were previously hospitalized, also 41.2% of them were exposed to COVID-19 and a

similar proportion (41.2%) had a family member exposed to it. Regarding dialysis, slightly less than half (47.1%) began dialysis before 2-3 years, while 20.6% began before more than 3 years. Half (50%) of studied children had the only fistula and the other half had both fistula and venous catheter. The most-reported Vascular access complications were pain, thrombosis, edema & bleeding (20.6%, 17.6%, 17.6%, 14.7%, 11.8) respectively.

Table (3): Indicates frequency distribution of the sociodemographic characteristics of the children's caregivers who undergoing hemodialysis. It clarified that 85.3% of caregivers were mothers, while only 14.7% were fathers. The mean age of caregivers was 29.3 ± 5.2 years, more than half of them (55.9%) were living in urban areas, also 70.6% of them were working and 61.8% of them had only secondary education.

Table (4): Illustrates comparison of the caregivers' knowledge related to hemodialysis and COVID-19. It illustrated that there were statistically significant differences in caregiver's knowledge regarding the hemodialysis through program implementation phases ($P < 0.001$). As nearly one-fifth (20.6%) of studied caregivers had satisfactory knowledge pre-intervention compared to 76.5% & 64.7% in post-intervention and follow-up phases respectively. Concerning caregiver's knowledge regarding the COVID-19, there were also statistically significant differences in caregiver's knowledge regarding COVID-19 through program implementation phases ($P < 0.001$). As 17.6% of caregivers had satisfactory knowledge regarding COVID-19 pre-intervention compared to 67.6% post-intervention and 52.9% in the follow-up phase. This means that the

program has a statistically significant effect on caregiver's knowledge regarding hemodialysis, COVID-19, and total knowledge ($P < 0.001$).

Table (5): Shows a comparison of the strategies and precautions followed by caregivers for their children who undergoing hemodialysis. It clarified that demonstrated that there were statistically significant differences in the application of strategies and precautions followed by caregivers for their children undergoing hemodialysis through the program phases ($P < 0.001$). As slightly more than one-fifth (20.6%) were practicing these strategies and precautions adequately pre-intervention compared to 85.3% post-intervention and 67.6% during the follow-up phase.

Table (6): Illustrates Comparison of the preventive and control strategies of Covid19 used by caregivers for their children undergoing hemodialysis. It indicated that there was a statistically significant difference in total caregivers' application of prevention and control strategies of COVID19 for their children who were undergoing hemodialysis ($P < 0.001$). As, more than one quarter (29.4%) of them applied them adequately pre-intervention compared to 88.2% post-intervention and 79.4% in the follow-up phase. Concerning home environment management and using of protective equipment, 14.7% of caregivers managed their home environment adequately pre-intervention, while 85.3% managed it adequately post-intervention and 67.4% in follow-up. Additionally, less than one quarter (23.5%) of caregivers were using protective equipment adequately pre-intervention compared to 85.3% & 61.8% in post-intervention and follow-up phases respectively.

Table (1): Frequency distribution of socio demographic characteristics of the studied children who undergoing hemodialysis (n=34).

| Socio demographic characteristics | N | % |
|-----------------------------------|----|-----------|
| Age (years) | | |
| <10 | 5 | 14.7 |
| 10 – 15 | 19 | 55.9 |
| >15 | 10 | 29.4 |
| Mean ±SD | | 14.3 ±2.8 |
| Gender | | |
| Female | 12 | 35.3 |
| Male | 22 | 64.7 |
| Educational level | | |
| Primary school | 12 | 35.3 |
| Preparatory school | 11 | 32.4 |
| Secondary school | 11 | 32.4 |
| Birth order | | |
| First | 15 | 44.1 |
| Second | 15 | 44.1 |
| Third | 4 | 11.8 |

Table (2): Frequency distribution of the Clinical information related to the studied children who undergoing hemodialysis (n=34).

| Clinical information | N | % |
|---|----|------|
| Family history of renal failure | 13 | 38.2 |
| Previous hospitalization | 24 | 70.6 |
| Previous exposure to COVID-19 | 14 | 41.2 |
| Previous exposure any family member for infected with COVID-19 | 14 | 41.2 |
| Duration of Beginning of hemodialysis (years) | | |
| 1 – 2 | 11 | 32.4 |
| 2 – 3 | 16 | 47.1 |
| >3 | 7 | 20.6 |
| Types of vascular access | | |
| Fistula | 17 | 50.0 |
| Fistula and venous catheter | 17 | 50.0 |
| Number of vascular access | | |
| One time | 16 | 47.1 |
| Two times | 18 | 52.9 |
| Vascular access complication | | |
| Edema | 5 | 14.7 |
| Thrombosis | 6 | 17.6 |
| Pain | 7 | 20.6 |
| Absent pulse | 6 | 17.6 |
| Bleeding | 4 | 11.8 |

Table (3): Frequency distribution of the sociodemographic characteristics of the children 'caregivers who undergoing hemodialysis (n=34).

| Sociodemographic of the caregivers | | N | % |
|---|------------|-----------|------|
| Care giver provider for the studied children | | | |
| Father | | 5 | 14.7 |
| Mother | | 29 | 85.3 |
| Age (years) | | | |
| <25 | | 3 | 8.8 |
| 26 – 30 | | 12 | 35.3 |
| 31 – 35 | | 11 | 32.4 |
| 36 – 40 | | 8 | 23.5 |
| Mean | ±SD | 29.3 ±5.2 | |
| Residence | | | |
| Rural | | 15 | 44.1 |
| Urban | | 19 | 55.9 |
| Occupation status | | | |
| Not working | | 10 | 29.4 |
| Working | | 24 | 70.6 |
| Educational level | | | |
| Secondary | | 21 | 61.8 |
| Higher | | 13 | 38.2 |

Table (4): Comparison of the caregivers' knowledge related to hemodialysis and COVID-19 (n=34).

| The caregivers' knowledge | Preintervention | | Post=intervention | | Follow up | | Chi square test | |
|---|-----------------|------|-------------------|------|-----------|------|-----------------|--------|
| | N | % | n | % | n | % | X ² | P |
| Caregiver knowledge regarding the hemodialysis | | | | | | | | |
| Unsatisfactory | 27 | 79.4 | 8 | 23.5 | 12 | 35.3 | 23.754 | <0.001 |
| Satisfactory | 7 | 20.6 | 26 | 76.5 | 22 | 64.7 | | |
| Caregiver knowledge regarding the COVID-19 | | | | | | | | |
| Unsatisfactory | 28 | 82.4 | 11 | 32.4 | 16 | 47.1 | 18.072 | <0.001 |
| Satisfactory | 6 | 17.6 | 23 | 67.6 | 18 | 52.9 | | |
| Caregiver total knowledge | | | | | | | | |
| Unsatisfactory | 27 | 79.4 | 9 | 26.5 | 14 | 41.2 | 20.322 | <0.001 |
| Satisfactory | 7 | 20.6 | 25 | 73.5 | 20 | 58.8 | | |

* F value, ANOVA test

Table (5): Comparison of the strategies and precautions followed by care givers for their children who are undergoing hemodialysis. (N=34).

| Strategies and precautions | Preintervention | | Post=intervention | | Follow up | | Chi square test | |
|---|-----------------|------|-------------------|------|-----------|------|-----------------|--------|
| | N | % | N | % | N | % | X ² | P |
| Strategies and precautions before starting a hemodialysis dialysis session | | | | | | | | |
| Inadequate | 23 | 67.6 | 3 | 8.8 | 10 | 29.4 | 26.530 | <0.001 |
| Adequate | 11 | 32.4 | 31 | 91.2 | 24 | 70.6 | | |
| Strategies and precautions after starting a hemodialysis dialysis session | | | | | | | | |
| Inadequate | 24 | 70.6 | 5 | 14.7 | 11 | 32.4 | 23.279 | <0.001 |
| Adequate | 10 | 29.4 | 29 | 85.3 | 23 | 67.6 | | |
| Mean ±SD | 2.0 ±0.8 | | 4.0 ±1.4 | | 3.3 ±1.3 | | 25.699* | <0.001 |
| Strategies and precautions regarding Caring of the Vistula | | | | | | | | |
| Inadequate | 24 | 70.6 | 7 | 20.6 | 13 | 38.2 | 17.826 | <0.001 |
| Adequate | 10 | 29.4 | 27 | 79.4 | 21 | 61.8 | | |
| Total strategies and precautions followed by care givers for their children undergoing hemodialysis. | | | | | | | | |
| Inadequate | 27 | 79.4 | 5 | 14.7 | 11 | 32.4 | 31.199 | <0.001 |
| Adequate | 7 | 20.6 | 29 | 85.3 | 23 | 67.6 | | |

* F value, ANOVA test

Table (6): Comparison of the preventive and control strategies of Covid19 used by care givers for their children undergoing hemodialysis. (N=34).

| preventive and control strategies of Covid19 | Preintervention | | Post=intervention | | Follow up | | Chi square test | |
|---|-----------------|------|-------------------|------|-----------|------|-----------------|--------|
| | N | % | N | % | n | % | X ² | P |
| Home environment management | | | | | | | | |
| Inadequate | 29 | 85.3 | 5 | 14.7 | 12 | 35.3 | 36.191 | <0.001 |
| Adequate | 5 | 14.7 | 29 | 85.3 | 22 | 64.7 | | |
| Pediatric management | | | | | | | | |
| Inadequate | 25 | 73.5 | 2 | 5.9 | 5 | 14.7 | 42.713 | <0.001 |
| Adequate | 9 | 26.5 | 32 | 94.1 | 29 | 85.3 | | |
| Hand hygiene | | | | | | | | |
| Inadequate | 21 | 61.8 | 1 | 2.9 | 2 | 5.9 | 41.519 | <0.001 |
| Adequate | 13 | 38.2 | 33 | 97.1 | 32 | 94.1 | | |
| Protective equipment | | | | | | | | |
| Inadequate | 26 | 76.5 | 5 | 14.7 | 13 | 38.2 | 26.939 | <0.001 |
| Adequate | 8 | 23.5 | 29 | 85.3 | 21 | 61.8 | | |
| Disinfection of drainage fluid | | | | | | | | |
| Inadequate | 24 | 70.6 | 10 | 29.4 | 16 | 47.1 | 11.612 | 0.003 |
| Adequate | 10 | 29.4 | 24 | 70.6 | 18 | 52.9 | | |
| Limiting accompanying persons | | | | | | | | |
| Inadequate | 16 | 47.1 | 2 | 5.9 | 5 | 14.7 | 18.300 | <0.001 |
| Adequate | 18 | 52.9 | 32 | 94.1 | 29 | 85.3 | | |
| Remote medical care and online medical consultation for home | | | | | | | | |
| Inadequate | 27 | 79.4 | 2 | 5.9 | 5 | 14.7 | 49.324 | <0.001 |
| Adequate | 7 | 20.6 | 32 | 94.1 | 29 | 85.3 | | |
| Total score of preventive and control strategies of Covid19 used by care givers for their children who undergoing hemodialysis | | | | | | | | |
| Inadequate | 24 | 70.6 | 4 | 11.8 | 7 | 20.6 | 30.361 | <0.001 |
| Adequate | 10 | 29.4 | 30 | 88.2 | 27 | 79.4 | | |

* F value, ANOVA test

Discussion

COVID-19 consumes quickly transmission not solitary in China nevertheless through the worldwide. Pediatrics with renal failure (chronic kidney disease (CKD) stage 5) is a major danger for coronavirus. A set of references for the control and promotion of the severe acute respiratory syndrome coronavirus and COVID-19 in children undergoing hemodialysis homes and centers in peritoneal dialysis (PD) settings have been anticipated. The references are constructed on the epidemiological geographies of the COVID19 disease, vulnerability features, and control and approaches. These references will be reorganized as novel statistics regarding COVID-19 becomes accessible (*Shen et al., 2020*).

Dialysis in children is invented to stay weighty on caregiver presumed their inevitability to assume dual responsibilities of therapeutic supervision of their chronic disorders and caregiver (*Wightman et al., 2019*). The COVID-19 pandemic compact the obtainability of beneficial therapeutic visits and resources, construction PD basis shortages, and inflexible to consume blood investigations the main suffering of transplantation individuals and dialysis, congruently; children aged 18 years old and younger grief from COVID 19 virus slender to take a reputable estimation, nevertheless comorbidities children, such as cardiovascular disorder, hypertension, and renal failure because of their destruction of the immune system, hospitalization and great prevalence of nourishing insufficiency devour advanced COVID-19 mortality rate (*World Health Organization, 2019*). So

that this study aimed to evaluate the impact of the management approach for caregivers regarding prevention and control strategies of COVID19 for their children undergoing hemodialysis.

The result of the current study revealed that the mean age of children undergoing hemodialysis therapy was 14.3 ± 2.8 years. The study sample included 34 children with ages ranging between 10 and 15 years, the majority are males and the first children in the family. This result was similar to the result of a study conducted by *Park et al., 2020* that revealed that the majority of studied children are males, a total of 49 patients (28 boys, 21 girls) on maintenance hemodialysis were assessed during the study period, and the median age of the subjects was 13.0 years. Additionally, the results were different from a study conducted by El Nagar et al., 2020 who found in their study showed that more than half of children were females; this result was also similar with Awaji, et al., 2019 and in agreement with *El-Karmalawy, et al., 2015*.

As regards, clinical information, slightly less than half of the studied children have a positive family history of renal failure. On contrary, *Kilis – Pstrusinska, et al., 2013* who found in their study that the majority of the children undergoing dialysis therapy had a negative family renal history. The current study was supported by *Gupta, 2011* who stated that Al port syndrome, polycystic kidney, and several other hereditary disorders result in renal failure in childhood. Also, these results were different from a study conducted by El Nagar et al., 2020 who found that more than one-half of children had a negative family history of CKD. And also in accordance by *Awaji et al., 2019 and El-*

Karmalawy, 2015 who reported in their study that 68% had no family history.

The majority of them have the previous hospitalization, meanwhile, slightly less than half of the children in the present study and their family members had previous exposure or infected with COVID-19. Conversely, the situation was inconsistent with **Zhao et al., 2020** (Fudan University, Shanghai (Shanghai center) Wuhan Children's Hospital of Tongji Medical College) who showed that no confirmed or suspected cases had been reported from 220 respondents at the time of their survey. Also, the five centers included in the study had not received any report of confirmed or suspected COVID-19 cases from their patients. In our study interpretation of this was particularly evident regarding the reason might be that most of our children had no a greater chance of staying at home. They are perceived as being vulnerable to infection, and measures such as avoiding visits to places with dense populations, wearing face masks outside, and washing hands. Meanwhile, health care staff were not had adequate awareness of the potential spread in hemodialysis centers and adaptation of protection in hemodialysis centers may also prevent the virus from spreading among children on in-center hemodialysis (**Shen et al., 2020**). Also, this result disagreed with **Eibensteiner et al., 2020** who found no cases of confirmed COVID-19 in children with dialysis in his study. Certainly, the incidence of the COVID-19 among children with kidney failure might be hyper estimated in our study due to selection bias and self-report bias.

Meanwhile, the finding of this study clarified that slightly less than half of the children in the present study began hemodialysis before 2-3 years.

According to types of vascular access of studied children, the present study findings revealed that one-half of the children in the study sample were having the only fistula and the other half have both fistula and venous catheter. In congruence **Rania, 2021** who stated that children have fistula and venous catheter. The International Pediatric Fistula First.

The current study revealed that the majority of the studied caregivers are mothers. This study Similarly to a study conducted by **Wightman et al., 2019** who revealed that the majority of their studied children's caregivers were mothers, and also the highest percentage of the studied caregivers lived in urban areas. In relation to children caregivers' occupation, the finding of this study revealed that the majority of studied children caregivers were working and less than of them not working. The mothers were given up their jobs because of burdens, difficulties, and challenges faced due to frequent hemodialysis therapy sessions per week and the mothers necessary must be associated with them during hospitalization, hemodialysis therapy sessions, and frequent follow up.

This finding supported by **Lerret et al., 2014** who stated that parenting roles and strategies were impacted by the demands of dialysis as well as the duty to meet the needs of others in the family that trying to maintain a sense of normalcy and routine despite the awareness that the struggle to maintain normalcy reflects the fact that life with a child on dialysis is not normal. This finding was also consistent with **Medway et al., 2015** who clarified that the impact of the dramatic financial costs of dialysis treatment may be universal regardless of the health care system. According to the mother's educational level, less than one-half of the studied children's caregivers have a high

educational level. This result was in on contrary with a study conducted by, *Wightman et al., 2019* who revealed that the majority of studied children have a high level of education that was an observable improvement in the level of the studied caregiver's knowledge post and follow up program compared with their poor knowledge level preprogram intervention.

As regard knowledge of the studied caregivers regards hemodialysis, the study also revealed that there was a statistically significant difference pre, post, and follow-up phases of the program implementation. It was rationalized that the present study attempted to improve children's caregiver's knowledge about precaution and strategies followed by them for their children who are under hemodialysis. The pretest finding of the present study showed that the majority of them demonstrated generally deficient knowledge before the intervention. These findings were consistent with a study conducted by *El Nagar et al., 2020* who clarified that the level of mothers' knowledge about CKD and its management, confirmed that there was statistically significant progress in the level of mothers' knowledge about disease management, dialysis process, home management including nutrition, blood pressure and weight monitoring after implementation of the family-centered empowerment intervention program. Similarly, *Minooei, et al., 2016* who reported that the family-centered empowerment model resulted in the development of information and understanding of the disease, a decrease in school absence and nonemergency admission, and a general increase in children's performance in school and their communities.

In addition, this result supported by *Abd El- Magid 2010* who stated that there was a statistically significant difference regarding the compliance of the studied subject for management plan in relation to their knowledge about renal failure in the first, second and third visit. This result also is in accordance with *Bellou and Geroianni, 2013* who stated that many families have inadequate knowledge concerning the provision of effective care to their children with chronic renal failure and they found that the parent needs knowledge concerning the progress of patient's condition, treatment and general care provided for their children.

Concerning caregiver's knowledge about strategies and precautions regarding the care of the fistula, the result of the current study revealed that there was a statistically significant difference between preintervention and post-intervention also follow-up program intervention. It is explained in the light of the implementation of the program change awareness and attitude of the studied caregivers positively and accordingly influence on strategies and precaution regarding the care of the fistula, this result Strategies are emerging to counter acceleration of the COVID-19 pandemic in the face of shortages of resources and personal protective equipment. Concerns about the transmission of SARS-CoV-2 to HCP are also emerging more frequently. These might be even more relevant in the pediatric setting, as infected children appear to suffer fewer complications than do their adult HCP (*Shen et al., 2020*)

As regarding preventive and control strategies of Covid19 used by caregivers for their children undergoing hemodialysis, the result of this study clarified that there was a statistically significant difference pre, post, and

follow-up program intervention. The present study findings demonstrated generally deficient knowledge before the intervention. This was most evident in the knowledge of home environment management, hand hygiene, disinfection of drainage fluid, and remote medical care, and online medical consultation for the home. This could be due to the young age of most of the children so that most of them were unable to assimilate such information. Such knowledge is important for renal disease children in order to be cautious about possible treatment side effects such as the transmission of infectious agents or the infection with COVID-19. The significant improvements in all areas of knowledge regarding prevention and control strategies of Covid19 due to the instructions provided by their caregivers for their children after training program implementation. This indicates that the program was effective in achieving its objective concerning knowledge improvement.

These findings were consistent by *Carmassi et al., 2020* who stated that there was a significant improvement in knowledge 19 after application of educational program regarding preventive measures of COVID, and the effect of the program was further confirmed by the multivariate analysis, which identified the study intervention as the most influential predictor of the change in the knowledge score. The success of the program is certainly attributed to its content, which was based on identified unmet needs, as well as its procedures that followed the rules of participatory adult learning. The result was also supported by *Baloran, 2020* who showed that the studied subject possessed sufficient knowledge, high-risk perceptions, and non-medical prevention measures were perceived as highly effective. In addition to the current

finding was agreed with study investigated the knowledge, attitudes, and practices of the Saudi public, toward COVID-19, during the pandemic that conducted by *Al-Hanawi et al., 2020* who added that there was improvement when has taken unprecedented and stringent preventive and precautionary measures against COVID-19 to control its spread, safeguard citizens and ensure their well-being.

Conclusion

In the light of the present study, the findings concluded that there was a significant improvement of caregiver's knowledge regarding the hemodialysis, COVID-19 post & follow up implementation phases compared with the pre-implementation phase. In addition to there was also a significant improvement in the application of preventive and control strategies of Covid19 followed by studied care givers for their children who undergoing hemodialysis after the program application.

Recommendations:

Infectious disease guidelines of the COVID-19 epidemic should be conducted by healthcare staff in pediatric dialysis centers in order to reduce the transmission of infection among children with chronic renal failure.

Environmental infection control procedures should be implemented in both health care and home settings for children who undergoing hemodialysis & Products approved by the Environmental Protection Agency (EPA) for emerging viral pathogens should be used in order to help to reduce the spread of COVID-19.

Researches should be manipulated the coping strategies for care givers' experiences, worries, difficulties, and challenges during the COVID19 Pandemic because of COVID-19 outbreak had physical, mental, logistical, and financial effects on families have children with chronic disorders.

Limitation of the study

The researcher faced more difficulties in order to connect the participants via an electronic form at the beginning of the study, resulting in the participants providing more objective answers when compared to a face-to-face interview.

Many child' caregivers refused involvement in the study because they were not used social application media for communication. So that the researcher omitted them from the study.

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COVID-19 Outbreak and Management Approach for Families with Children on Long-Term Kidney Replacement Therapy. Copyright © 2020 by the American Society of Nephrology, www.cjasn.org Vol 15 September, 2020.