
ELECTRONIC APPLICATION OF BARTOCAR IN CHRONIC RENAL FAILURE PATIENTS: A LITERATURE REVIEW

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ABSTRACT

Chronic Renal Failure (CRF) is a slow, progressive and irreversible decline in renal function can lead to the inability of the kidneys to dispose of residual waste products and unable to maintain fluid and electrolyte balance. Hemodialysis treatment measures performed on CRF patients in order to survive. Fluid monitoring in CRF patients using telemonitoring (remote monitoring equipment), the application contains fluid control and diet to facilitate patients at home. To find out the nutritional monitoring of Chronic Renal Failure patients using the electronic application of bartocar (nutritional fluid monitoring sheet). In this literature review were use 3 data bases namely proquest, pubmed and google scholar, he last 5 years from 2016-2020. Inclusion criteria: Quantitative, qualitative and mix method research design, have communication tools such as mobile phones/computers, Based via online (smartphones and websites), Chronic renal failure undergoing hemodialysis, Free, the last 5 years 2016-2020. Exclusion criteria: Paid journals, Patients undergoing hemodialysis. From the results of the journal search obtained 35,944 English journals discussed only 10 journals discussed different topics. Electronic bartocar (fluid monitoring sheet) in patients very helpful to facilitate diet, restriction of incoming and outgoing fluids and nutrients. This mHealth app is designed to help with early diagnosis of CRF and self-monitoring. This app can be accessed via online, android 4.0/ios mobile web application and website app. Bartocar serves to help monitoring fluids and nutrients in chronic renal failure patients at home.

Keyword: *Bartocar Chronic Renal Failure, Electronic Application, Nutrients Fluids.*

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INTRODUCTION

Chronic Kidney Failure (CKD) is a slow, progressive and irreversible decline in kidney function that can lead to the inability of the kidneys to get rid of waste products and unable to maintain fluid and electrolyte balance (Bettoni et al., 2017). The results of basic health research in 2013 and 2018 show that the prevalence of chronic kidney failure in Indonesia 15 years based on a doctor's diagnosis in 2013 was 0.2% and there was an increase in 2018 of 0.38%. For the province of Central Java, chronic kidney failure appears to be lower than the national prevalence. In 2015 deaths caused by chronic kidney failure reached 1,243 people (Organization, 2017).

According to the (World Health Organization 2017), reports that those suffering from chronic kidney failure have increased by 50% from the previous year, globally the incidence of chronic kidney failure is more than 500 million people and who have to live life depending on dialysis (hemodialysis) as many as 1.5 million people. The causes of chronic kidney failure according to the United States

Renal Data System (USRDS) in 2014, the first order is diabetes mellitus by 34%, hypertension by 21%, glomerulonephritis by 17%, pyelonephritis by 3.4%, polycystic kidney by 3.4% and others by 21%. Hemodialysis is a kidney replacement therapy using a semi-permeable membrane that functions as a nephron so that it can remove metabolic waste from the body and correct fluid and electrolyte balance disorders in patients with chronic kidney failure (Mailani, 2015).

The development of the times, now chronic kidney failure patients can control fluids and nutrition by using online (websites, mobile phone applications) When the patient undergoes treatment at home electronic bartocar makes it easier to limit fluids and nutrients in the body. Facilitates the control of liquids and food through online (Olivares-Gandy et al., 2019). Make it easier to control nutrients from and control fluids in the hospital by using electronic services bartocar in patients with chronic kidney failure. In addition, it easier for patients to consult with nutritionists about fluids and food diets and facilitates treatment in undergoing remote monitoring in the consultation. On the site there are nutritionists and laboratories by including patient profiles, medical records, and the hospital being treated during hemodialysis. With the remote monitoring tool by using online makes it easier for patients by consulting with doctors and nurses even though the patient is at home (Liu et al., 2017). With telemonitoring (remote monitoring equipment) patients rarely come to the hospital for treatment and only hospitalized to perform hemodialysis, the application there is fluid control and diet to facilitate patients at home.

The purpose of this research is to fluid monitoring in CRF patients using telemonitoring (remote monitoring equipment), the application contains fluid control and diet to facilitate patients at home. To find out the nutritional monitoring of Chronic Renal Failure patients using the electronic application of bartocar (nutritional fluid monitoring sheet).

METHOD

The database in writing this literature review uses 3 databases namely proquest, pubmed and google sholar". Keywords in writing this literature review with online card hemodialysis keywords, acute kidney failure and fluid and nutrition monitoring, the last 5 years from 2016-2020. The search results of the journal were obtained by 35,944 English-language journals. However, as per the title or discussed in the literature review, only 10 other journals covered different topics. Using English keywords and synonyms. In the literature review there are 2 criteria, namely inclusion and exclusion criteria. Inclusion criteria: design used in quantitative, qualitative and mixed methods research, has a mobile/computer communication device, access through the website, patients with chronic kidney failure, hemodialysis, journals that are accessed for free, journals accessed in the last 5 years 2016 -2020. Exclusion criteria: journals with paid access, patients who did not undergo hemodialysis, patients who did not have mobile phones/computers, journals accessed for more than 5 years. For literature review researchers, they use a quality assessment tool from the Joanna Briggs Institute with the following link <https://joannabriggs.org/critical-appraisal-tools>.

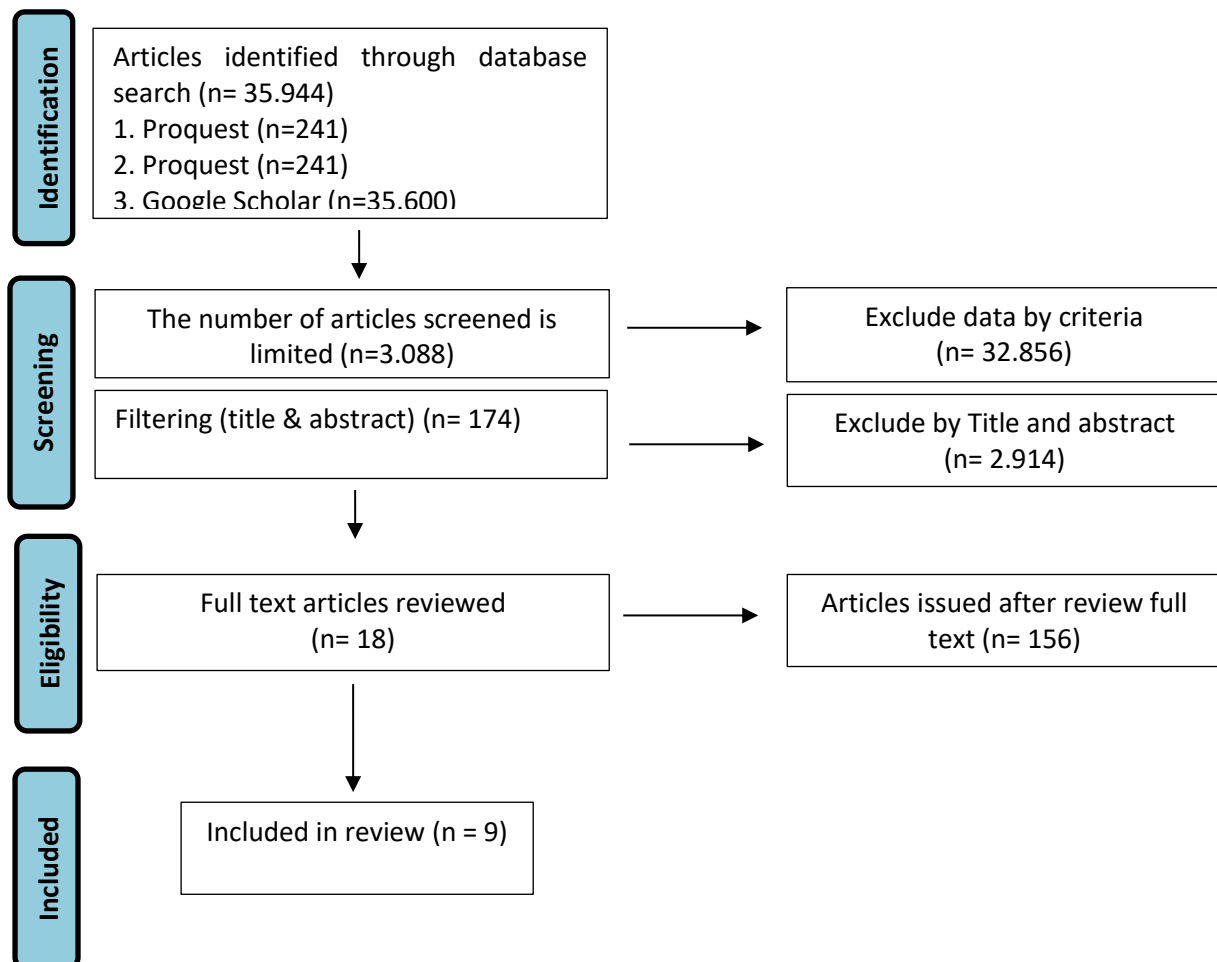


Figure 1. Prisma Flow Chart

RESULTS AND DISCUSSION

The study investigated 35,900 journals. There are three journals in the literature review, of the 35,900 journals need full text journal screening. And after screening the journal in full text produces 10 journals that will be written in the review literature. By using a bartocar (remote fluid monitoring sheet) in patients with chronic kidney failure, it is easier for doctors, care and nutritionists to monitor nutrition, diet and fluid limits both in and out of the body. A complete description of the results of the literature review is explained as follows.

A total of 9 articles were reviewed, discussing monitoring fluid limits in chronic kidney failure patients that can be accessed via smartphone. After reviewing the article, the authors identified that monitoring fluid restriction in chronic kidney failure patients can be accessed via smartphone. Based on the 9 articles analyzed, it produced 6 main themes. The resulting theme represents Mobile for Management of Chronic Kidney Care and End-Stage Kidney Disease: Systematic Search in the App

Store and Evaluation in table 1. Themes are found to have a relationship between one theme and another.

Table 1. Characteristics of the included literature

Name & Year	Title	Metode	Result
(Siddique et al., 2019)	Mobile App for Chronic Kidney Care Management and End-Stage Kidney Disease: Systematic Search on the App Store and Evaluation	Desaign research using Random sampling Characteristics of CKD patient respondents The study was conducted in the United States.	The MARS total score had excellent internal consistency (Cronbach alpha=.90) and a moderate level of interrater reliability (2-way mixed ICC 0.65). Overall, 11 out of the 12 reviewed apps met the minimum acceptable score of 3.0 in MARS rating. The 3 apps with the highest combined scores were My Kidneys, My Health Handbook (MARS=4.68); My Food Coach (MARS=4.48); and National Kidney Foundation Malaysia (MARS=4.20). The study identified 2 general weaknesses in the existing apps: the apps fell short of accommodating advanced interactive features such as providing motivational feedback and promoting family member and caregiver participations in the app utilization.
(Sobrinho et al., 2018)	Design and evaluation of mobile apps to help self-monitor chronic kidney disease in developing countries	Elicited requirements were translated into a native mHealth app targeting the Android platform. Afterward, the Cohen's Kappa coefficient statistics was applied to evaluate the agreement between the app and three nephrologists who analyzed test results collected from 60 medical records. Finally, eight users tested the app and were interviewed	A mHealth app was designed to assist the CKD early diagnosis and self-monitoring considering quality attributes such as safety, effectiveness, and usability. A global Kappa value of 0.7119 showed a substantial degree of agreement between the app and three nephrologists. Results of face-to-face interviews with target users indicated a good user satisfaction. However, the task of CKD self-monitoring proved difficult because most of the users did not fully understand the meaning of specific biomarkers

		about usability and user perceptions.	
(Welch et al., 2013)	Using a Mobile App to Self-Monitor Diet and Fluid Intake among Adults Who Receives Hemodialysis	This study uses Case control. Characteristics of respondents HD patient >3 months, age >18 years, Willing to follow your own diet and fluid restriction The study was conducted at a hospital in the United States. Needing It took a very long time to see results with 6 weeks of intervention.	Results from this pilot study suggest the intervention is feasible and acceptable, although few significant effects on outcomes were found in this small sample. The DIMA has potential to facilitate dietary and fluid self-monitoring but requires additional refinement and further testing
(Chen et al., 2016)	Effect of Journal Dietary Intake Application on Chronic Health Outcomes Stage of Kidney Disease 3B-5	Characteristics of respondents Aged >50 years, Patients are able to use computers, smartphones and the e significant results that is 12 weeks.	Thirteen of 20 participants completed the dietary protein restriction intervention, and their health outcomes were measured according to changes in blood urea nitrogen, serum creatinine, albumin, and glycated hemoglobin compared with those who dropped out. The empirical results support the first hypothesis and show that using the food journaling app can significantly increase the dietary compliance, but the results regarding the second hypothesis were not significant.
(Kosa et al., 2019)	Nutrition Mobile App for CKD Patients: A Review Methodical	The characteristics, user satisfaction with, usability/feasibility, and effectiveness in changing dietary behavior of the mobile application were summarized using descriptive statistics and in a narrative manner	Thirteen full-text studies were included, of which 11 were single center, with a mean sample size of 23. Of the 7 studies that measured usability/feasibility, all found at least some aspects of the application feasible/useful. Of the 5 studies that reported an evaluation of changes in behavior/diet related to self-management, all reported some positive change.

(Olivares-Gandy et al., 2019)	A telemonitoring system for nutritional intake in patients with chronic kidney disease receiving peritoneal dialysis therapy	In this study, we present the analysis, design, and development of a telemonitoring system for the nutritional intake of patients with CKD receiving PD therapy. The proposed system consists of a mobile web application addressed to the nutrition specialist and a native Android application aimed at patients undergoing PD.	Furthermore, the system allows the patient to record the intake data daily, receive updates on diets generated by the nutritionist and communicate with the nutritionist through a consultation module. Finally, we performed a usability assessment of our system based on a laboratory study with two users: a nutritionist and a patient undergoing peritoneal dialysis treatment. Based on the obtained results, our telemonitoring system shows a favorable opinion in terms of usability from the perspectives of the patient and nutritionist.
(Okoyo Opiyo et al., 2020)	Perception of Adherence to Dietary Prescriptions for Adults with Chronic Kidney Disease Hemodialysis: Qualitative Study	This study used Purposive sampling. Characteristics of respondents of patients aged >18 years, CKD patients undergoing HD. The research was conducted in the hemodialysis room.	Most of them make un-informed dietary decisions that lead to consumption of unhealthy foods with negative outcomes such as metabolic waste accumulation in the patients' bodies negating the effects of dialysis and undermining the efforts of healthcare system in management of patients with chronic kidney disease.
(Martínez García et al., 2018)	Telemonitoring system for patients with kidney disease undergoing peritoneal dialysis: Assessment of usability based on case studies	This study used Purposive sampling. Characteristics of respondents of patients aged >50 years and above, CKD patients undergoing HD. The study was conducted in Mexico in a hospital.	Based on the obtained results, the evaluated telemonitoring system holds wide acceptance, satisfaction, and applicability from patients' and doctors' perspectives. It is also noted that the evaluated system considers and satisfies the requirements and suitable parameters that should be monitored in PD treatment according to studies presented in the literature.

(Liu et al., 2017)	Remote Monitoring System for Chronic Patients in Hemodialysis Home: Field Trials of Copresence Enhanced Design	This study used Purposive sampling. Characteristics of respondents of patients aged >18 years, CKD patients, hemodialysis patients. This study was conducted in the hemodialysis room.	Health care professionals were able to prioritize the review of the entries based on the emotional status and also felt assured to see patients' change in mood. There were 989 entries sent with short notes. Entries with negative emotions had a higher percentage of supplementary notes entered compared to the entries with positive and neutral emotions. The qualitative data further showed that the HHD system was able to improve patients' feelings of being connected with their health care professionals and thus enhance their self-care on HHD. The health care professionals felt better assured with patients' status with the use of the system and reported improved productivity and satisfaction with the copresence enhancement mechanism. The survey on the system usability indicated a high level of satisfaction among patients and nurses.
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Discussion

1. Hemodialysis

Hemodialysis is a kidney replacement therapy using a semi-permeable membrane that functions as a nephron so that it can remove metabolic waste from the body and correct fluid and electrolyte balance disorders in patients with chronic kidney failure (Mailani, 2015). According to (Bawazier et al., 2018), hemodialysis is a process of separation/filtering to clean the blood through semipermeability carried out by patients with chronic kidney failure whose kidney function is no longer good/decreased. Patients with chronic renal failure with a total Glomerulus Filtration Rate (GFR) <15 mL/min, using a Creatinine Clearance Test (TKK) <5 mL/min even though there are no symptoms. At TKK/GFR 5 mL/minute, the renal excretory function is minimal, resulting in the accumulation of toxic substances in the blood and has experienced dangerous complications if dialysis is not performed immediately (Jangkup et al., 2015).

The function of hemodialysis in patients with chronic kidney failure is to maintain survival while changing the patient's lifestyle. Chronic kidney failure patients who have undergone hemodialysis are prone to stress related to fluid restriction, dietary compliance, physical limitations, complications, drug side effects and hemodialysis dependence will reduce the patient's quality of life (Mailani, 2015).

2. Bartocar (remote fluid monitoring sheet)

The increasingly advanced development of era 4.0 makes it easier for patients and staff, both doctors, nurses and nutritionists, to create new health plans using online access, such as the bartocar (fluid monitor) specially designed for CKD patients to facilitate diet, nutrition and fluid programs that enter and go out. Some researchers bartocar (fluid monitoring sheet) that,

bartocar (fluid monitoring sheet) is an application designed to help CKD / ESRD patients who are under strict diet and medication control and tend to have limited resources and capacities (Siddique , et al. 2019)

According to research (Sobrinho et al., 2018), that the mHealth app is designed to help early diagnosis of CKD and self-monitoring. According to (Siddique et al., 2019), this application is useful for CKD patients to control diet and fluid restrictions from within the body.

According to (Okoyo Opiyo et al., 2020), this application has many benefits ranging from, ease of implementing a prescribed diet, dietary adherence, a specified dialysis schedule, nutritional information, transition to a new diet, health complications and disease severity. According to (Welch et al., 2013), the Dietary Intake Monitoring (DIMA) application has the potential to facilitate self-monitoring of food and fluids but requires additional refinement and further testing.

According to (Olivares-Gandy, et al. 2019), the mHealth application is designed to help early diagnosis of CKD and self-monitoring. This application can be accessed via online, android 4.0/ios mobile web application (Martínez García et al., 2018). The benefits of bartocar (fluid monitoring sheet) are that it makes it easier for patients to implement diet and dietary adherence, provide nutritional information, know the severity of the disease, reduce complications and hemodialysis as scheduled (Okoyo Opiyo et al., 2020). According to (Olivares-Gandy et al., 2019), telemonitoring systems (remote monitoring) show a favorable opinion in terms of usefulness from the perspective of patients and nutritionists.

To get optimal results mHealth applications by using a telemonitoring system (remote monitoring) takes a very long time. According to research that using the mHealth application to produce significant/expected results takes approximately 6 weeks (Welch, et al. 2016), 12 weeks (Chen, Wu and Chou 2016) and even 5 months per patient (Martínez García et al., 2018). At the time of monitoring the patient's diet and fluid limits, it can be done at home, in the hospital and in the hemodialysis room by using a smartphone/ computer and accessing the mHealth application (Martínez García et al., 2018).

The results using the significant mHealth found in the Dietary Intake Monitoring App (DIMA) have the potential to facilitate self-monitoring of food and fluids but require additional refinement and further to (Welch et al., 2013). According to research (Martínez García et al., 2018), empirical results support the first hypothesis and show that the use of a food journal application can significantly improve dietary adherence, but the results regarding the second hypothesis are not significant. According to a study (Kosa et al., 2019), that the mHealth app was able to evaluate behavioral/dietary changes related to self-management, all of them reported positive changes in CKD patients.

CONCLUSION

Chronic renal failure is a slow, progressive and irreversible decline in kidney function that can lead to the inability to get rid of waste products and unable to maintain fluid and electrolyte balance. Treatment in patients with kidney failure is to perform hemodialysis and kidney transplantation, in order to prolong life. In patients with chronic kidney failure will experience excessive excess production in the body. Increasingly advanced in the era of sophisticated nurses,

doctors and nutritionists make innovations in the form of fluid control of chronic kidney failure patients using online (remote) to make it easier for patients and health workers to control nutrition and diet. By using innovation via online here, the tool used is a bartocar (body fluid monitor). Bartocar here serves to help monitor fluids and nutrition in patients who fail at home, the bartocar can be accessed using the mHealth application which can be operated on Android 4.0 and iOS mobile phones and can be via the website. To obtain optimal results in monitoring fluid and diet of patients with chronic kidney failure using a bartocar (fluid monitoring sheet) it takes a very long time, namely 6 weeks, 12 weeks and even 5 months/patient.

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