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# Patients Undergoing Dialysis - focus on nutrition

A literature review

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Degree Programme in Nursing

Nurse (AMK)

Bachelor's Thesis

18.4.2017

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Appendix 1. Table of articles used

Author(s) Title Number of Pages Date	Riikka Castrén Patients Undergoing Dialysis - focus on nutrition - A literature review. 21 pages, 1 Appendix 18 April 2017
Degree	Bachelor of Health
Degree Programme	Degree Programme in Nursing
Specialisation option	Nursing
Instructor(s)	Liisa Montin, senior lecturer, PhD, RN
<p>The purpose of this thesis is to describe appropriate nutrition for dialysis patients. The aim is to utilize this knowledge in clinical nursing when developing patient education. The thesis's focus is on problems related to the nutrition of dialysis patients and on methods that patients use in managing the renal diet.</p> <p>Thirteen research articles were analyzed for this literature review. The articles were acquired through the CINAHL and MEDLINE databases (n=11) and two research articles were acquired through manual search (n=2).</p> <p>Two main themes in the reviewed articles are problems related to the renal diet and methods used in managing the renal diet. According to the literature, early dietary advice is beneficial, and results in better adherence and improved patient outcomes. The articles emphasize that nurses play a major role in providing ongoing nutritional education to renal patients; therefore, nurses need factual information about the renal diet in order to provide the patient with good care. This is accomplished with continuing nursing education. Appropriate methods of protein nutrition spark controversy in the renal community and more studies are needed in the future. Overhydration in dialysis patients is best detected by measuring body mass composition. By contrast, use of BMI to determine interdialytic weight gain is often inaccurate because patients can be over-hydrated despite low interdialytic weight gain. Methods used for managing the renal diet include a combination of cognitive and behavioral methods, either proactively to avoid lapses or as compensatory methods. Self-management is common practice among dialysis patients. The highest levels of self-management and diet adherence are among women; the lowest levels are among men, young and people working full-time jobs. Main factors influencing the level of self-management are patients' knowledge, self-efficacy, depression and the availability of social support.</p> <p>Further studies need to be conducted on the mechanisms through which dietary restrictions may influence patient outcomes. Nurses' roles in providing nutritional information should be supported with ongoing education for nurses.</p>	
Keywords	nutrition, dialysis, renal diet, chronic kidney failure

<p>Tekijät Otsikko</p> <p>Sivunmäärä Aika</p>	<p>Riikka Castrén Dialyysihoidossa käyvien potilaiden ravitsemus. Kirjallisuuskatsaus 21 sivua, 1 liite 18 April 2017</p>
<p>Tutkinto</p>	<p>Bachelor of Health</p>
<p>Koulutusohjelma</p>	<p>Degree Programme in Nursing</p>
<p>Suuntautumisvaihtoehto</p>	<p>Nursing</p>
<p>Ohjaaja(t)</p>	<p>Liisa Montin, TtT, lehtori</p>
<p>Tämän opinnäytetyön tarkoituksena on ollut kuvata dialyysipotilaan ruokavalioon liittyviä kysymyksiä. Tavoitteena on käyttää tätä tietoa kliinisessä hoitotyössä potilaan ohjauksen kehittämiseksi. Opinnäytetyön painopiste on ollut dialyysipotilaan ruokavalioon liittyvissä ongelmissa, sekä menetelmissä joita dialyysipotilaat käyttävät ruokavalion ylläpidossa ja toteutuksessa.</p> <p>Yhteensä 13 tutkimusartikkelia valittiin analysoitavaksi. MEDLINE ja CINAHL tietokannoista löydettiin yksitoista artikkelia (n=11) ja manuaalisella haulla (n=2). Tutkimuksen tulokset esitetään kirjallisuuskatsauksena.</p> <p>Tässä kirjallisuuskatsauksessa käytettyjen artikkeleiden keskeisenä teemana on dialyysipotilaan ruokavalioon liittyvät ongelmat sekä menetelmät joita dialyysipotilaat käyttävät ruokavalion ylläpitoon ja toteutukseen. Kirjallisuudessa tulee esille aikaisen ruokavalio-ohjauksen tarve, sekä hyödyt, jotka jatkuvat läpi koko dialyysipotilaan hoitopolun ajan. Hoitajien rooli potilaiden ohjauksessa on tärkeää ja jatkuvaa, ja heidän tietonsa tulisi olla ajantasaista. Proteiinien merkityksestä munuaispotilaan ruokavaliossa ollaan vielä epävarmoja ja lisätutkimuksia kaivataan. Nestekertymien arvioimiseen dialyysihoitojen välillä on käytettävä kehonkoostumusmittausta, koska painoindeksi ei ole tarpeeksi tarkka mittari nestekertymien arvioimiseen. Potilaalla voi olla liiallista nestekertymää vaikka painoindeksissä ei olisi näkyvää muutosta. Dialyysipotilaat käyttävät moninaisia menetelmiä ruokavalion ylläpitoon ja toteutukseen, joista yleisimmät ovat yhdistelmä kognitiivisia ja käyttäytymisen kontrolloinnin menetelmiä. Itsesäätely on myös yleistä. Miehet, nuoret ja täysipäiväisesti työssäkäyvät kokevat itsesäätelyn ja ruokavalion noudattamisen ongelmallisena. Itsesäätelyyn vaikuttavat tekijät ovat potilaan tietoperusta, minäpystyvyys, masennus sekä sosiaalisen tuen saatavuus.</p> <p>Lisätutkimuksia ruokavalion vaikutuksesta potilaaseen olisi tarpeen, jotta sen vaikutus potilaan kokonaisvaltaiseen terveyteen ymmärrettäisiin paremmin. Hoitajien tietotaitoa dialyysipotilaan ruokavalio-ohjauksessa pitäisi tukea säännöllisillä lisäkoulutuksilla.</p>	
<p>Avainsanat</p>	<p>ruokavalio, dialyysi, munuaisten vajaatoimintaa sairastan ruokavalio, munuaisten vajaatoiminta</p>

## 1 Introduction

Chronic kidney disease, defined as prolonged abnormal kidney function, is common, existing in about 11% of the population in Europe and the United States, and often occurs jointly with other health conditions such as diabetes and cardiovascular disease. Chronic kidney disease impairs the proper functioning of the kidneys that is necessary for waste material elimination from digested food and from the body. As kidney function declines due to chronic kidney disease, a person's diet must be altered to maximize remaining kidney function.

Restriction of dietary protein, sodium, phosphate, potassium and fluid help the kidneys function more efficiently. Early-stage dietary management is focused on restricting sodium intake, because excess sodium in the diet can cause kidney disease to progress more quickly, due to sodium's effect on blood pressure (rather than as a direct effect on the kidneys). (Sachs- Svetkey- Vollmer 2001; Scottish Intercollegiate Guidelines Network 2008.) Meanwhile, dietary protein restriction is not required in the early stage of the disease, and could even result in a decline in the patient's nutritional status and overall fitness, but can be implemented in later stages of the disease. Nutritional status typically deteriorates as the disease progresses and kidney function declines. (Scottish Intercollegiate Guidelines Network 2008.)

Dietary restrictions also prevent health conditions such as hyperkalemia and hyperphosphatemia, which are common in patients with chronic kidney disease. Weight management along with increased physical activity are key factors in maintaining quality of life through early stages of the disease (National Institute for Health and Care Excellence 2008).

Dialysis treatment is usually necessary at a stage where the kidney function has declined to a level where elimination of waste products has become insufficient and toxic levels of waste products start building up in the blood (National Institute for Health and Care Excellence 2008).

Hemodialysis is a process where the patient's blood is passed through a dialysis venous catheter, via a dialysis fluid solution in a hemodialysis machine, to be filtered externally,

then returned to the patient (Berman & Snyder 2012). Most patients receive dialysis treatment 3-4 times a week and each treatment session lasts 3-5 hours (Munuais-ja maksaliitto 2013).

Hemodialysis can be lifesaving and prolongs life expectancy, but is highly taxing on a patient's overall fitness. Many patients undergoing regular hemodialysis treatments suffer from protein energy wasting, which causes the patients to lose 1 to 3 kilos of lean body mass per year. Losing lean body mass leads to reduction of overall well-being and activity, which is associated with worsening nutritional status, which leads to increased hospitalizations and mortality among patients undergoing regular hemodialysis treatments (Brandon- Kistler- Fitschen- Ikizler- Wilund 2015).

This thesis addresses the nutritional recommendations for and management of the renal diet, which is the diet that patients should follow when suffering from chronic kidney disease ("CKD") and undergoing dialysis. The focus in this thesis is to look at nutritional questions related to the renal diet as well as gain insight on methods used by dialysis patients in the management of the renal diet.

## **2 Patient's symptoms and reasons for dialysis**

### **2.1 Dialysis treatment explained**

Dialysis is a process that uses a man-made membrane to filter out toxins, waste products, and excess fluid from the blood when kidney function is impaired. Dialysis treatment also balances the body's calcium, phosphorus and potassium levels. Dialysis treatment extends life expectancy significantly, but it alone is not enough to manage advanced CKD, so it is used in conjunction with dietary restrictions and medication to slow down the progression of CKD. (Munuais-ja maksaliitto 2013.)

Removal of excess fluid through dialysis is also known as ultrafiltration. The level of ultrafiltration is dependent on the patient's fluid load. Fluid load is determined by weighing the patient before dialysis treatment to determine a post-dialysis target weight. Ideally, the weight gain between dialysis treatments is a maximum of 2 kilograms (Munuais-ja maksaliitto 2013).

Dialysis is the most widely utilized treatment for end-stage CKD. However, it requires extensive modifications and restrictions to a patient's lifestyle and often interferes with daily activities.(Pessoa & Linhares 2015.) Long-term compliance with dietary restrictions, medications and treatment schedules can cause stress to hemodialysis patients. Further, hemodialysis is a time- and energy-consuming treatment, which can potentially cause social isolation, dependency on others, financial stress and strained family relationships (Seah- Tan- Srinivas- Wu - Griva 2013).

## 2.2 Chronic kidney disease symptoms

Symptoms of CKD are often non-specific and go undetected until severe damage to kidneys has occurred. Patients affected by CKD report experiencing the following symptoms: lack of energy, pruritus, drowsiness, dyspnea, edema, pain, dry mouth, muscle cramps, lack of appetite, sleep disturbance, constipation, dry skin and poor concentration. (Murtagh et al. 2007.)

## 2.3 Causes of chronic kidney disease and other reasons for needing dialysis

CKD is a long-term health condition brought on by damage to both kidneys, which is usually irreversible, and which can be triggered by several causes. The most common causes are diabetes mellitus, hypertension, smoking, cardiovascular disease, advanced age, chronic use of non-steroidal anti-inflammatory drugs, and obesity. A lower socioeconomic status also tends to correlate with CKD. Among these causes, two of the most common are diabetes mellitus and hypertension. Diabetes mellitus is becoming more common in the general population due to increasing obesity. (Scottish Intercollegiate Guidelines Network 2008.)

In addition to the causes listed above, a common genetic form of CKD that requires regular dialysis treatments is polycystic kidney disease. (Munuais- ja maksaliitto 2013.)

In addition to CKD, two other reasons a patient may need dialysis are glomerulonephritis and interstitial nephritis. The glomeruli are parts of the kidney that filter excess fluid and waste products from urine and glomerulonephritis is an inflammation of the glomeruli that is treated with dialysis. Interstitial nephritis is a swelling between the kidney tubules,

which causes the kidneys to function less efficiently, and can be acute or chronic. Interstitial nephritis may also be treated with dialysis. (Munuais-ja maksaliitto 2013.)

## 2.4 Renal diet overview

The main goal of the renal diet is to manage the levels of circulating waste products and minerals, between dialysis treatments. To achieve this, patients undergoing dialysis treatment are instructed to limit their intake of vegetables, fruits, legumes, nuts, whole grains and dairy, because these foods contain high amounts of potassium and phosphate, which can cause excess strain to already-failing kidneys. Further, fluid intake is generally restricted in order to control interdialytic weight gain. (Biruet- Jeong- Barnes- Wilund 2016.)

However, this diet is complicated to manage and can cause various problems. Prohibition of various foods can lead to monotony of diet and malnutrition. Moreover, loss of appetite is common in dialysis patients and contributes to undernutrition. Psychosocial factors such as solitude, depression and inability to cook meals may also cause undernutrition among dialysis. Furthermore, limiting consumption of many everyday foods makes it difficult for patients to adequately satisfy their energy and protein needs. (Pasticci- Fantuzzi- Pegoraro-McCann- Bedogni 2012.)

Tracking patient's nutritional status is necessary to identify possible problems early during hemodialysis treatment. Regular blood tests to check on albumin, phosphorus, acidosis, and C-reactive protein are part of a patient's treatment plan. Patients are always weighed before each dialysis treatment to determine how much fluid can be removed safely. BMI is calculated monthly and creatinine is checked from a blood sample monthly as well. Patients meet with a licensed nutritionist once or twice a year. (Munuais-ja maksaliitto 2013.)

### **Fluid and salt**

Healthy kidneys can regulate fluid balance by excreting excess water and salt from the body. But patients with CKD are unable to adequately regulate their fluid balance, due to their kidney failure. Because any excess fluid retention in the body causes hypertension, shortness of breath and nausea, patients on hemodialysis are put on fluid restrictions. To determine how much fluid can be safely consumed per day, a patient's



urine output is measured. The daily fluid allowance is usually the amount of urine output per day plus 500-750 ml of fluid depending on kidney function. As a result of their kidney disease and the resulting fluid restriction, many patients on hemodialysis urinate very little or not at all. (Munuais-ja maksaliitto 2013.)

Sodium intake is also restricted for patients on a renal diet. Sodium intake can increase thirst for patients on a renal diet, because sodium affects receptors located in the brain called osmoreceptors, which regulate the feeling of thirst (Munuais-ja maksaliitto 2013). Excessive thirst makes it difficult to adhere to the fluid restrictions discussed above. (Biruet et al. 2016.)

Current recommendation of salt for patients on hemodialysis is less than 5 grams a day or 2000mg of sodium (Munuais-ja maksaliitto 2013).

## **Protein**

Kidney disease is associated with impaired protein metabolism. Therefore, protein consumption is often restricted. Only 1.2g/kg/day of protein is typically recommended for dialysis patients. About 50% of the protein should come from sources that are of high biological value such as chicken, fish, eggs or cottage cheese. (Pasticci et al. 2012; Munuais-ja maksaliitto 2013.)

However, the use of a protein-restricted diet in patients with advanced CKD receiving dialysis treatments has been controversial because a dietary regimen with low protein intake is thought to result in malnutrition and may decrease survival rate. On the other hand, in some studies, low protein intake has been shown to be beneficial for patients with end-stage kidney disease, which in return directly relates to higher survival rates. (Gonzalez-Parra- Gracia-Iguacel- Egidio- Ortiz 2012.)

Dialysis treatment stimulates net protein catabolism. Many factors affect protein catabolism such as loss of amino acids and glucose during dialysis treatment. The lost amino acids and glucose need to be replaced with dietary protein. Patients on dialysis should carefully monitor the amount of protein they consume because excess intake of protein can cause strain on the kidneys. Regular blood tests for albumin serum levels are necessary for all dialysis patients. Albumin is a protein found in animal sources such

as milk, eggs and meat. Lowered serum albumin is associated with higher mortality rate among patients receiving dialysis treatments. (Munuais-ja maksaliitto 2013.)

### **Phosphorus**

Patients with CKD gradually lose the ability to remove excess phosphorus from their blood. This can result in renal osteodystrophy, which happens when impaired kidneys fail to maintain calcium and phosphorus levels in the blood causing damage to veins, arteries, lungs and soft tissues of the body. Renal osteodystrophy affects nearly all people receiving dialysis treatment. (Munuais-ja maksaliitto 2013.)

Phosphorous restrictions are used to prevent and slow down the progression of renal osteodystrophy. Dialysis patients should limit their daily phosphorus intake to 800-1000mg. The amount is adjusted according to patient's weight and gender. (Munuais-ja maksaliitto 2013.) Many foods that contain high amounts of phosphorus also contain high amounts of protein, so many scientific societies recommend lowered protein intake in order to reduce the amount of phosphorus consumed. One gram of protein has about 15mg of phosphorus and about 30% to 70% of it is absorbed in the intestine. (Gonzales-Parra et al. 2012.)

### **Potassium**

Healthy kidneys are able to maintain normal potassium levels by excreting excess potassium through urine. But people with CKD have impaired kidney function, which causes accumulation of potassium in their blood and increases the risk of hyperkalemia. Hyperkalemia causes abnormal heart rhythms which increases the risk of sudden death. (Munuais-ja maksaliitto 2013.)

In CKD patients, hemodialysis treatment is not enough to control potassium levels and dietary restriction on potassium consumption is always necessary. The average daily limit for potassium intake for a hemodialysis patient is 2000-2500mg. (Munuais-ja maksaliitto 2013.)

### **3 Purpose, aim and study questions**

The purpose of this thesis is to describe the appropriate nutrition for patients undergoing dialysis treatments. The aim is to utilize this knowledge in clinical nursing when developing patient education.

Study questions:

1. What are the problems in nutrition of dialysis patients?
2. What type of methods dialysis patients use to manage the renal diet?

### **4 Methods**

#### **4.1 Data collection method**

Data for this thesis was collected by literature review. A literature review is an objective assessment of evidence or research that attempts to answer study questions. Literature review demonstrates what has been already researched and known about the study subject in question and may reveal aspects of the subject not already answered in the research and which may benefit from further investigation. (LoBiondo-Wood & Haber 2014: 30.) At the beginning of the literature review process, a research question is formulated to provide a focal point to guide the literature review. Only original publications of published research are used in this thesis. Using original publications as a source eliminates possible distortion or misinterpretation of original work, which may happen when information is collected from secondary sources. (Parahoo 2006: 122.)

#### **4.2 Data collection**

Recent, relevant and credible information are the building blocks of a high quality literature review. (Parahoo 2006: 126.) The databases used for data collection were CINAHL and Ovid Medline and a manual search was done using references of reliable articles. Appropriate search words for the search, such as dialysis, nutrition, diet and nursing, were chosen after a background research on the topic was conducted in order

to become familiarized with the topic. Pediatric research articles were excluded from the search.

In this literature review, the search was restricted to articles published between years 2008 and 2017 in the CINAHL database and for years 2012 and 2017 in the MEDLINE Ovid database because the author wanted to focus the thesis on the most current research developments in the topic. Only articles available in English language were used. Articles used in this thesis were chosen by reading the title and then the abstract to see if they were fit to be included in the literature review. After that, relevant articles were reviewed and a decision was made about the inclusion or exclusion of the article in the final review.

Database searches are presented in Table 1. A total of 13 articles were chosen for the literature review.

Table 1. Database searches from different databases

Database	Search terms	Limits	Hits	Chosen by title & abstract	Final
CINAHL 27.1.2017	dialysis OR hemodialysis OR AND nutrition OR diet AND nursing	English language 2008-2017	69	29	9
MEDLINE 29.1.2017	dialysis OR hemodialysis OR AND nutrition OR diet OR AND nursing	English language 2012-2017	78	18	2
Manual search					2
Total			149		13

### 4.3 Data analysis

Inductive data analysis is a qualitative method. (Elo & Kyngäs 2008: 109.) Inductive content analysis is a technique to organize information according to concepts and categories. The concepts and categories are then analyzed by open coding, categorizing and abstracting. Open coding refers to a process where the reader takes notes and creates headings while reading through text. After reading the text, the produced notes and headings are constructed into categories to aid with coding and further clustering into sub-categories. (Elo & Kyngäs 2008: 111.)

Articles used in this literature review were read multiple times during the process. Notes and headings were created during the reading process and grouped into categories that shared common patterns and themes. After that the data was divided according to the study questions, and further categorized in to sub-groups; general problems, protein, hydration, and factors and methods of self-management.

## 5 Results

Firstly, this thesis answers a study question: `What are the problems in nutrition of dialysis patients?` The other study question was, `What type of methods do dialysis patients use to manage the renal diet?`

### 5.1 Problems in nutrition

The mechanisms through which dietary restrictions may influence patient outcomes are complex and further studies needs to be conducted. (Cianciaruso- Pota- Bellizzi 2009: 1059; Taylor et al. 2011:21.) It is still under investigation whether achievement of clinical and metabolic goals set by many nutritional guidelines for dialysis patients in fact help extend the life expectancy of dialysis patients, and help preserve remaining kidney function. (Cianciaruso et al. 2009: 1059.)

Nearly all patients newly diagnosed with CKD would like to receive dietary advice. It is widely believed in the health care community that renal specific dietary changes are not

needed at an early stage. Despite of this, many patients would like to receive reassurance from medical professionals that their diet is not causing further kidney damage. Many renal patients do not receive adequate dietary guidance in the early stages of kidney disease. (Sutton- Hollingdale- Hart 2008:147.)

Renal dieticians are generally recognized as the most valid and trustworthy source of dietary knowledge by CKD patients, followed by renal specialist doctors and nurses (Sutton et al. 2008:149). However, nurses play an important role in recognizing under nutrition in patients undergoing dialysis treatments. Screening tools can aid nurses to distinguish dialysis patients who are nutritionally at risk and in need of dietician's consultation. Use of such screening tools are especially useful in non-hospital or community dialysis centers which are mostly nurse-run. (Bennett et al. 2012: 727.)

Nurses are at utmost importance in providing ongoing education and encouragement for patients receiving dialysis about nutrition. Nurses' support is especially useful for those experiencing difficulties in fluid and dietary adherence. (Barnett-Yoong- Pinikahana- Si-Yen 2007: 305.) Completion of monthly nutritional screening for patients receiving regular dialysis treatments is useful in identifying issues and changes in nutritional status of patients. (Bennett et al. 2012: 727.)

### 5.1.2 Low protein diet

Recommendation of low protein diet in patients receiving hemodialysis treatment sparks controversy in the health care field. (Cianciaruso et al. 2009: 1057; Taylor et al. 2008: 20; Jeloka et al. 2013.) The two most relevant clinical markers of good nutritional status are body weight and urinary creatinine level, as they reflect changes in caloric intake and lean body mass. Both remained stable in study participants who kept a low protein diet (0.95g/kg/d) for 32 months. Patients following a low protein diet have a small risk of developing alterations in nutritional status. Furthermore, low protein diet does not lead to protein wasting and does not negatively affect mortality rate. (Cianciaruso et al. 2009: 1057.)

However, another study observed that a moderate intake of protein from a source low in phosphorus, specifically egg whites, improved serum albumin levels in majority of test subjects, indicating increased nutritional status and lowered risk of mortality. When

patients used egg whites in place of other animal sources of protein in their diet, the patients' serum phosphorus level decreased significantly during a six week trial and serum albumin levels increased, indicating an improved nutritional status. Egg whites are high in protein and low in phosphorus, with a phosphorus-to-protein ratio of less than 2mg/g. Favouring foods with low phosphorus to protein ratio are a smart choice for dialysis patients. Furthermore, egg whites were also considered to be palatable by test subjects, as well as easy to digest without any adverse effects reported, which improves adherence to dietary regimen. (Taylor et al. 2011: 18-21.)

Oral protein supplements are often recommended for dialysis patients by medical professionals. Protein digestion and absorption is impaired in CKD and dialysis patients. However, high protein oral supplements are poorly tolerated by majority of dialysis patients. Use of high protein oral supplements come with many side effects, including severe gastrointestinal distress such as vomiting and bloating in many patients. Because of this, there is a notable decline in protein and calorie consumption resulting in decreased nutritional status. Parenteral protein supplementation should be seen as a noteworthy alternative in managing malnutrition in dialysis patients. (Jeloka, Dharmatti-Jamdade- Pandit 2013: 2-4.)

### 5.1.3 Over-hydration

There is a significant correspondence between over-hydration and 2-year mortality rate. (Mathew et al. 2014: 69.) Over-hydration correlates with higher mortality rate among dialysis patients. Patients' hydration state can be used as a predictor of mortality. Additionally, a patient can be over-hydrated despite of a low interdialytic weight gain, and the use of BMI as a way to measure over hydration may not be optimal. (Wizemann, et al. 2009: 1579.) Using body mass composition as a tool for detecting over-hydration is more effective compared to clinically measured dry weight. (Mathew et al. 2014: 71.)

## 5.2 Methods to manage renal diet

Patients with end stage renal failure on maintenance dialysis need to comply with dietary and fluid regimes. Failure to follow the regimes has a major impact on morbidity, survival and occurrence of complications. Improving patient's self-management levels directly

affects patient outcomes and reduces mortality among patients receiving dialysis treatments. (Barnett et al. 2007: 305.) Thirst and food cravings are ingrained into the lives of dialysis patients and many patients employ a range of methods to manage the renal diet. (Yu- Ng- Nandakumar- Griva 2014: 220.)

### 5.2.1 Self-management

Self-management of renal disease involves management of symptoms through diet and exercise, psychological well-being as well as communication with medical providers such as nurses and doctors (Li- Jiang- Lin 2012: 213-215).

Food cravings and thirst are a common issue for dialysis patients (Yu et al. 2014: 220 ; Hollingdale & Sutton 2008: 139.) Patients use a combination of different strategies to manage the renal diet. Most commonly patients utilize thought suppression, psychological devaluation and a range of behavioural methods to manage cravings and thirst. (Yu et al. 2016: 220.)

To manage thirst, use of ice cubes, small sips and sour flavoured candy were common among dialysis patients. Avoidance strategies were also used, such as refraining of consumption of spicy foods and limiting time spent outdoors when the weather is hot and could cause increased feeling of thirst. Avoidance of restaurants and dinner parties were also reported. As avoidance may not be feasible sometimes, patients used so called purposeful yet controlled lapses. This method of control allows the patients to indulge in their cravings in small quantities while showing restraint. (Yu et al. 2016: 222-224.)

Many patients struggle with the idea of following the renal diet instructions because they conflict with their previously learned idea of healthy diet, and often cease to adopt a self-defined diet that they perceive to be reasonable healthy. (Hollingdale & Sutton 2008: 140.)

Self-monitoring is a method used by many patients. Careful measurement of fluid intake, weighing oneself many times a day were typical behaviors among patients undergoing regular dialysis treatments. In case of excessive intake of fluid or certain food, compensatory methods were often utilized. Restricting subsequent food intake and using exercise to rid excess fluid via perspiration were listed as the most common



compensatory methods. (Yu et al. 2016: 223-224.) Patients often adjust their diet according to the gravity of their symptoms and general well-being (Hollingdale & Sutton 2008: 139).

Overall, patients use a combination of cognitive and behavioural methods either in a proactive manner to avoid lapses or as compensatory methods. Many of these strategies used by dialysis patients are similar to methods used by patients with other common chronic diseases. Some of the methods, for example, paced and controlled giving in, self-perception and consumption of thirst relieving substitutes, are special to CKD and dialysis patients (Yu et al. 2016: 220-224.)

### 5.2.2 Factors influencing self-management

Improving patients' level of self-management is an effective way of reducing complications, mortality and improve quality of life. Main factors influencing the level of self-management are patients' knowledge, self-efficacy, depression and the availability of social support. (Li et al. 2012: 211-215.) Perceptions of benefits related to restriction are identified as factors that affect the level of adherence. An increase in perceived benefits shows higher adherence levels among patients (Chang & Than 2014: 38).

Many adherence issues are caused by lack of motivation and confusion. Confusion is further fuelled by conflicting dietary advice for the control of other co-morbidities. Many patients believe that the issue with confusion could be solved with individualized dietary advice from health care professionals. (Hollingdale & Sutton 2008: 139.)

The lowest levels of adherence were among young, male, single and working patients. These categories of patients should receive additional nutritional education and support to improve adherence to nutritional guidelines. Nurses should focus on offering support, identifying barriers to adherence and planning interventions together with patients and their families to overcome issues with diet adherence. (Chang and Than 2015: 37-38.)

The importance of nurses' role in providing ongoing support and guidance for patients receiving hemodialysis treatment on nutritional matters is recognized in many studies. (Chang and Than al. 2014: 38 ; Barnett et al. 2007: 305 ; Bennett et al. 2012: 727; Albayrak-Cosar and Cinar-Palyuz 2015: 181.) Use of assessment scales in identifying patients' knowledge, behaviors and attitudes can be used by nurses in order to identify

barriers and problems that hinder the patients' health. (Albayrak-Cosar and Cinar-Palyuz 2015: 181.)

When patients are given firm and straightforward information about the consequences of not following the renal diet guidelines, adherence is greatly improved and a change in patient's way of thinking and attitudes is observed, resulting in overall improvement of patient outcomes. (Hollingdale & Sutton 2008: 139.)

Patients who successfully control food and fluid intake, experience a sense of accomplishment and positive emotions. Positive emotions and self-pride seems to reinforce patients' willingness to adhere to dietary restrictions. (Yu et al. 2014: 220.)

## **6 Discussion**

### **6.1 Discussion of the results**

After analyzing literature on nutrition among patients undergoing dialysis treatments obtained from CINAHL and MEDLINE databases, along with some additional manual research, the literature was categorized into two main categories: 1. problems related to dialysis nutrition; and 2. the methods used by dialysis patients to manage the renal diet.

Review of the literature collected for study question number one, regarding problems related to dialysis nutrition, revealed that a significant source of patients' difficulty in following a proper renal diet may result from their having been inadequately educated early in the renal treatment about the consequences of not following the renal diet guidelines. When patients are given firm and straightforward information about the consequences of not following a proper renal diet, adherence is greatly improved, resulting in overall improvement of patient outcomes through self-management. This suggests that CKD patients could benefit from additional nutritional education, especially immediately after diagnosis and during the course of care by renal nurses. Early dietary education is shown to improve later outcomes (Sutton et al. 2008, Li et al. 2012). Multiple studies highlight the fact that, because nurses are at the forefront of patient care, they play a key role in providing nutritional education to patients, as well as identifying issues such as adherence problems. This demonstrates the importance of providing continuing

education to nurses so they can continue being patient advocates. (Barnett et al. 2007; Bennett et al. 2013; Chang & Than 2015.)

Another theme that became apparent through the literature review was the existence of an ongoing debate, likely requiring additional research, about the appropriate level of protein in the renal diet. Inadequate protein intake is believed by some researchers to potentially cause protein-energy wasting, which negatively affects the patient's health. (Taylor et al. 2011.) On the other hand, too much protein may lead to hyperphosphatemia, because high-protein foods are often high in phosphate as well. Further, some studies question whether lowering protein intake actually leads to significant protein-energy wasting. One long-term study showed that a low-protein diet does not cause protein-energy wasting or changes in biochemical markers of nutritional status. (Cianciaruso et al. 2009.)

When patients are unable to ingest sufficient protein through their regular food consumption, they may seek to supplement their protein intake through the use of oral protein supplements. However, oral protein supplements can be hard on dialysis patients' digestion and can cause unwanted side effects like nausea. Jeloka et al. hypothesize that parenteral protein supplementation may provide adequate protein supplementation without the unwanted side-effects of oral protein supplements, but they note that further studies are needed to confirm the hypothesis. (Jeloka et al. 2013.)

For patients who wish to avoid oral protein supplements or parenteral protein supplementation, egg whites seem to be a good choice of protein because of their low phosphate-to-protein ratio. Study results indicate an enhanced albumin level, indicating raised nutritional status. Further, egg whites seem to be easily digested by patients receiving hemodialysis treatment who frequently suffer from gastrointestinal discomfort. (Taylor et al. 2011.)

Over-hydration in dialysis patients can cause a plethora of symptoms, from hypertension to cough due to fluid build-up in the lungs, but patients can also be asymptomatic despite fluid overload. Many times, it is difficult to determine the correct amount of fluid accumulation that can be safely removed during dialysis treatment without causing a negative impact on a patient's health. The main concern is hypotension caused by removal of too much fluid, which is a common cause of

mortality among dialysis patients. Clinically-measured weight is not accurate enough to determine the true hydration state of a patient. Body-composition measuring devices offer a much more accurate measurement of patients' hydration level. (Wizemann et al. 2009; Mathew et al. 2014.) Use of body-composition measuring devices is not standard practice in most dialysis units, although the benefits and superior accuracy for determining hydration state are recognized. More research evidence on the topic could make body-composition measuring standard practice in all dialysis units in the future.

Study question number two focused on the methods used by dialysis patients to manage the renal diet. Advanced CKD requires a patient to follow and adhere to multiple restrictions on diet and fluid consumption. Yu et al. (2016) and Hollingdale & Sutton (2008) discuss the methods used by patients to manage the renal diet. Many patients use behavioral methods, psychological devaluation and thought suppression to banish cravings and feelings of thirst. Yu et al. (2016) notes that some patients take pride in being able to control cravings and food intake, giving them a sense of self-accomplishment. Nurses can reinforce patients' feelings of self-accomplishment by giving positive feedback on patients' efforts to follow the renal diet, as well as offer advice on how to solve problems related to managing the diet. Positive feedback is also shown to increase adherence levels. (Yu et al. 2016)

Studies suggest that different groups in the population have varying success rates in following prescribed renal diet restrictions. For example, the categories of patients with the lowest adherence to prescribed sodium restrictions tend to be those who are male, young, unmarried and/or employed full time (Chang & Than 2015). Although Chang & Than (2015) focused their study on investigating sodium restriction adherence, the results of the study can most likely be applied to cover other common dietary limitations present in the renal diet. Indeed, Li et al. (2014) discovered similar findings in their study, and point out that, according to their results, women undergoing hemodialysis showed the highest levels of self-management. As mentioned before, understanding the reasons and common demographics for considerable levels of non-adherence among dialysis patients can help nurses better identify the needs of patients (Chang & Than 2015).

## 6.2 Ethical considerations

When writing a literature review, attention honesty, integrity and accurate use of references is imperial. Overall, all ethical misconduct is to be avoided. (Finnish Advisory Board on Research Integrity 2014.) Ethical misconduct was avoided in this work by paying attention to honesty and integrity, and giving credit to original authors by correctly referencing all sources used in this thesis. Attention was applied to presenting and evaluating the research results to avoid falsification or distortion of the original research. This literature review was written in an unbiased way to retain objectivity. Additionally, a program called Turnitin was used multiple times to check for traces of plagiarism.

## 6.3 Validity of the thesis

Validity is defined by the quality of research being used to support the argument being made. (Lo Biondo & Harber 2006: 338.) Matters that affect the trustworthiness of a research are the method, timing and location of the data collection, as well as whom collected and analysed the collected data. Also, the data collection should be done in a reliable manner, and clearly and comprehensively presented. Interpretation of a written text always involves the possibility of misunderstanding or distortion of the original text because the readers' interpretation of the text is affected by his own beliefs and experiences. (Roberts- Priest-Traynor 2006:41.)

After being familiarized by the chosen topic with extensive background research, search terms for the database search were decided upon. Reliable and well know databases, CINAHL and Medline Ovid were used for the data collection. Only academic research articles were selected to be used in this literature review. Manual search was implemented using references of reliable articles resulting in the inclusion of two other research articles. Altogether, thirteen research articles were used. The author of this thesis aimed to achieve objectivity when analyzing the data by actively excluding personal views and beliefs in order to avoid distortion of the research results.

## 7 Conclusion

Chronic kidney disease is becoming more common in populations around the world. The mechanisms through which diet may influence renal patients are complex and still under

investigation. The renal diet is one of the most difficult diets to teach and implement because it contradicts many of the recommendations for a regular healthy diet and adherence requires significant effort from patients. Further research is imperial in determining the most effective dietary parameters that maximize positive patient outcomes in every demographic group of patients receiving regular dialysis treatments. Customized dietary advice and individualized nutritional parameters may be at key role in improving patients' lives.

Nurses are at the forefront of patient care and play an important part in influencing patient outcomes through their skills in patient assessment and education, so nurses can play a significant role in encouraging and facilitating a patient's adherence to a proper renal diet.

Further research is needed, especially since CKD is becoming more prevalent in populations, and patients expect factual, individualized and precise information about managing their diet while undergoing dialysis treatments. This literature review offers nurses insight to common problems and struggles related to the renal diet, as well as knowledge about patients' self-management methods to manage the renal diet. Nurses can use this knowledge in everyday clinical practice to improve the health of their patients undergoing dialysis.

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Table of Articles used

Author(s), year and country where the study was conducted	Purpose	Participants (sample size)	Data collection and analysis	Main results
Albayrak Cosar & Cinar Pakyuz, 2016, Turkey	To identify knowledge, behaviors and attitudes of hemodialysis patients about fluid control. Study aims to develop a valid and reliable measurement instrument.	276	Face to face interviews, patient files, questionnaire	The scale is a reliable way to measure knowledge, behaviors and attitudes of hemodialysis patients about fluid restrictions. Use of assessment scales in identifying patients' knowledge, behaviors and attitudes can be used by nurses in order to identify barriers and problems that hinder the patients' health. Nurses play an important role in providing patients with ongoing nutritional guidance.
Barnett et al., 2008, Malaysia	To describe renal patients having difficulty in adhering to diet restrictions and especially fluid restriction.	26	Two-month long study with 26 sessions of data collection (weight, blood pressure and nutrition advice given) Analysed using descriptive statistics	Nurses play an important role in providing ongoing education and encouragement to patients. This is especially important for patients with adherence issues.

Bennett et al., 2012, Australia	To determine whether a nurse-completed dialysis nutritional screening tool improves referral rates for nutritional support and compare nutrition sensitive biochemical indices, rates and patient centered quality of life outcomes between referred and non-referred dialysis patients.	81	Monthly screening for six consecutive months using a validated instrument	Nurse completed nutritional screening can lead to appropriate dietetic referrals for nutritional support by nutritional expert clinicians. Nurses play an important role in detecting malnutrition and problems with diet.
Cianciaruso et al., 2009, Italy	To investigate whether low-protein-diet as opposed to moderate-protein-diet improve the long-term survival of patients with CKD or induce protein-caloric malnutrition.	423	Follow-up data from a randomized controlled trial. Analyzed statistically	Low protein diet does not lead to protein energy wasting or decline in nutritional status. Mortality rate was unaffected.
Chang & Than, 2015, Malaysia	To measure adherence levels with dietary restrictions of patients with end stage renal disease receiving hemodialysis.	212	Structured interview questionnaires	Majority of participants reported having moderate to high levels of adherence to dietary guidelines. Perceptions of benefits related to restriction are identified as factors that affect the level of adherence. An increase in perceived benefits shows higher adherence levels in patients Nurses should focus on offering support, identifying barriers to adherence and planning interventions together with patients and their families to overcome issues with diet adherence.

Hollingdale & Sutton, 2008, UK	To explore how the role of diet in renal disease is conceptualized by patients in terms of relevance, importance and ease of adoption in order to inform the development of effective dietary change strategies for the renal patient population.	20	2 homogenous focus groups	Early dietetic intervention would be welcomed by renal patients. Individualized dietary advice is needed. Many patients use self-monitoring as method to manage the renal diet. Many patients struggle with the idea of following the renal diet instructions because they conflict with their previously learned idea of healthy diet, and often cease to adopt a self-defined diet that they perceive to be reasonable healthy. Patients want individualized dietary advice.
Jeloka et al., 2013, India	To study the effect of oral protein supplements on hemodialysis patients	50	Comparative study, test subjects divided in to 2 groups	Many participants withdrew because of intolerance to the oral protein supplement, therefore oral supplements are poorly tolerated. Parenteral nutrition should be considered and needs further studies.
Li et al., 2014, China	To examine self-management levels of patients undergoing hemodialysis treatments	198	5 questionnaires, data analyzed with descriptive and inferential statistics using	Hemodialysis patients show low levels of self-management capability. Reasons for this are gaps in patient's knowledge, self-efficacy, availability of social support and depression. Self-management of renal disease involves management of symptoms through diet and exercise, psychological well-being as well as communication with medical providers such as nurses and doctors.
Mathew et al., 2014, India	To look how baseline nutritional parameters and body composition parameters affect mortality among maintenance and CAPD patients in 24-month study.	99	Longitudinal study from 3 dialysis centers. Clinical, biochemical, nutritional and body composition measurements	Overhydration and BMI are important predictors of mortality in dialysis patients. Overhydration correlates with high mortality level. Body composition measuring is a better way to measure hydration level of patients.

			taken at baseline and at 2 years	
Sutton et al. 2008, UK	To explore knowledge and beliefs of CKD patients about renal dietary advice	100	Questionnaire	Patients need earlier dietary advice because it improves later patient outcomes. Individualized advice is called for by patients. Nurses are in key role for providing nutritional guidance.
Taylor et al., 2011, USA	To show egg whites are a good option for protein intake without adding too much phosphorus in to diet	13	A pilot study	High dietary protein intake is associated with greater survival in hemodialysis patients. Many high protein foods increase dietary phosphorus burden which is proven to cause higher mortality rate. Egg whites provide high amount of protein with a low dose of phosphorus. A drop-in serum potassium in study participants was observed.
Wizemann et al., 2009	To investigate is overhydration increases mortality risk in hemodialysis patients	269	Measurement with a body composition monitor along with other clinical data. Data was collected from 3 different dialysis centers, one time collection Analyzed with chi square test	Hydration state is an important and independent predictor of mortality in chronic HD patients.
Yu et al., 2016, China	To describe common problems related to diet experienced by dialysis patients. Food cravings and thirst common in hemodialysis patients. Exploring their management	32	Semi structured interviews were analysed thematically	Patients feel frustrated when coping with cravings and thirst. Cognitive and behavioural methods are employed when coping with food cravings. Self-monitoring and avoidance also a strategy to maintain the renal diet. Thirst and cravings are common problems.

	strategies in patients on hemodialysis			
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