Practice Management in Diabetes and CKD

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Disclosures

Dr. Paula Milas Sochacki, EdD, MPH, RDN, LDN

- Assistant Professor/Didactic Program in Dietetics Director at Benedictine University

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Learning Objectives

- Objective 1: To provide insight on current updates relating to practice management of Diabetes among patients with CKD.

- Objective 2: : To review the updated KDOQI Clinical Practice Dietary Intake Guidelines (Energy and Protein) for Diabetes and CKD.

- Objective 3: To gain a better understanding related to Glycated Albumin vs. HbA1C in the evaluation of glycemic control in patients with Diabetes and CKD.

Prevalence of Diabetes[1,2]

- Globally, the levels of diabetes among population groups is estimated to increase from 415 million (8.8%) in 2015 to 642 (10.4%) in 2040[1]
    - Of this the largest increases are expected to occur in the urban population of low to middle-income countries.
- Type 2 diabetes accounts for more than 90% of people with diabetes.
- By 2040 worldwide prevalence is estimated to be 477.9 million people affected in urban areas and 163.9 million in non-urban areas.

Prevalence of Diabetes[1,2]

- It is estimated that the prevalence of diabetes in low to middle-income countries is due to:
  - Economic development and rapid urbanization
  - Increased caloric intake
  - Adoption of a sedentary lifestyle

- The increased growth of the elderly population globally is thought to be related to the increased prevalence of diabetes.

Prevalence of CKD in Patients with Diabetes[1,2]

- Approximately 10% of deaths in people with Type 2 Diabetes are attributed to kidney failure.

- In the United States between 2013-2016 approximately 36% of patients with diabetes developed diabetes-related kidney disease.
    - This resulted in persistent albuminuria, a reduced estimated glomerular filtration rate, or both.

- Prevalence of CKD in urban areas was 37.2% and 24.3-25.3% in less urbanized communities or regional areas.

Who is at Increased Risk[1,2]

- The risk of diabetes-related CKD is much higher in Asian countries rather than Western countries.
- There is an increased risk of developing kidney complications among diabetic patients in developing countries rather than in developed countries.
- People with diabetes living in low to middle-income countries are at an increased risk for developing kidney problems.

Risk Factors

- Patients with type 2 diabetes with CKD were more likely to have diabetes related complications such as:
    - Heart disease
    - Cerebrovascular disease
    - Diabetic retinopathy
    - Albuminuria

- Managing diabetes in the elderly population is difficult due to the high rate of comorbid conditions also associated with a greater risk of developing CKD.

Using Evidence Based Guidelines

- Academy of Nutrition and Dietetics (EBG) in 2010
- KDOQI Clinical Practice Guidelines Update in 2019
- Current Collaboration Exists between AND and KDOQI (NKF) on Guideline Development
  - Multi-disciplinary and Multi-organizational
  - Working Groups reviewed literature and Public Draft Guidelines Update 2019 will be reviewed throughout this presentation.

Target Population of Audience

- Adults aged 18 and older
- Clinical and Outpatient Settings
- CKD any stage 1-5 and transplant
- Article review range 1985-December 2016
- Peer reviewed journals

Energy Requirements

- 3.0.1 In adults with **CKD 1-5 and post-transplant (OPINION) who are metabolically stable,** it is recommended to prescribe an energy intake of 25-35 kcals/kg IBW/day based on age, gender, level of physical activity, body composition, weight status goals, CKD stage, and concurrent illness or presence of inflammation to maintain normal nutritional status.[3-5]

Supportive Evidence: Energy Requirements

Energy metabolism may be impaired in patients with CKD, so maintaining adequate energy intake is needed to prevent protein-energy wasting.

- 10 controlled trials in pre-dialysis and 3 studies in MHD patients evaluated energy intake. Findings showed that intake range from 30-35kcal/kg/d helped maintain neutral nitrogen balance and nutritional status.[3-5]

Supportive Evidence: Energy Requirements

- It is important to remember that many other factors may influence energy expenditure such as age, sex, fat-free mass. Additional factors including hyperparathyroidism, hyperglycemia and chronic inflammation should be considered into the overall energy prescription. [3-5]

- Variability exists in the recommendation based on stage of CKD and modality treatment (dialysis vs. transplantation).[3-5]

Protein Recommendations

3.1.1 Protein Restriction Non-Dialysis

In adults with **CKD 3-5 who are metabolically stable,** it is recommended a protein restriction with or without keto-acid analogs, to reduce risk for ESRD/death and improve QOL.[3-6]

- A low protein diet, providing 0.55-0.60g/dietary protein/kg ideal body weight[3-6], OR
- A very-low density protein diet providing 0.28-0.43 g dietary protein/kg ideal body weight/day with additional keto-acid analogs to meet protein requirements (0.55 to 0.60g/kg body weight/day)[3-6]
- ***Protein restriction should be supervised by a RDN or equivalent in collaboration with a physician.

Supporting Evidence: Protein Recommendation

3.1.1 Protein Restriction Non-Dialysis

- It is well known that adults in Western countries consume excess protein above optimal daily needs. [3-6]

- Metabolic balances in healthy adults and CKD patients have shown that given a healthy energy intake (~>30kcal/kg/d) the protein intake level can safely be decreased to (0.55/0.6g protein/kg/d).[3-6]

Supporting Evidence: Protein Recommendation

3.1.1 Protein Restriction Non-Dialysis

- A further reduction in protein can be achieved with the addition of pills of keto-acid analogs to ensure a sufficient balance of the EAAs which are present in animal proteins.[3-6]

- Findings from 13 RCT of pts with CKD and protein (0.55-0.6g protein/kg/d) showed an improvement in QOL and reduction in ESRD related death.[3-6]

Protein Recommendations

3.1.2 In adults **with CKD on maintenance hemodialysis and PD who are metabolically stable,** it is recommended to prescribe a dietary protein intake of 1.0-1.2g/kg ideal body weight/day to maintain a stable nutritional status (OPINION)[3-7]

Supporting Evidence: Protein Recommendation

3.1.2 Protein recommendations for CKD patients on maintenance HD and PD

- A need exists for specialized renal dietitians who can effectively and safely implement appropriate protein diets.[3-7]
- Findings from 3 RCTs on dietary protein recommendations in MHD.[3-7]
  - Protein intake ranged from 0.9-1.2g/kg BW/day while maintaining good nutritional status.
  - A protein intake of 1.2g/kg/day ensures neutral or positive nitrogen balance in most metabolically stable MHD patients.
- Focus on dietary interventions to improve symptoms when chronic dialysis is not a treatment.[3-7]

Dietary Protein Intake and Diabetes

3.1.3 In adults **with CKD 3-5 and who have diabetes,** it is reasonable to prescribe a dietary protein intake of 0.8-0.9g/kg ideal body weight per day to maintain a stable nutritional status and optimize glycemic control (OPINION).[3, 7-9]

3.1.4 In adults with **CKD on MHD and PD and who have diabetes**, it is reasonable to prescribe a dietary protein intake of 1.0-1.2g/kg ideal body weight per day to maintain a stable nutritional status. For patients at risk of hyper and/or hypoglycemia higher levels of protein intake may need to be considered to maintain glycemic control (OPINION).[3,7-9]

Dietary Protein Intake and Diabetes

- Nutrition and Pharmacological Interventions work together in the management of patients with Diabetic Kidney Disease.[3,7-9]

- Goal is to achieve optimal glycemic control while maintaining adequate protein and energy intake for ideal nutritional status.[3,7-9]

- An extensive review of the literature on patients with DKD indicated that dietary protein intake of (0.8g/kg body weight/day) was advised for DKD not on dialysis and dietary protein intake (>1.2g/kg body weight/day) was advised for DKD patients on dialysis.[4-9]

Dietary Patterns in CKD

- **3.3.1** In adults with **CKD 1-5 (non-dialysis) and post-transplant**, with or without dyslipidemia it is reasonable to suggest that prescribing a Mediterranean Diet may improve lipid profiles.[3,10-11]

- Dietary patterns, including the Mediterranean diet have been the subject of interest in nutritional epidemiology. A whole-diet approach considers the synergistic effects of nutrients and the cumulative effects on health and diease.[3, 10-11]

Dietary Patterns in CKD

- CKD presents many challenges for nutrition management, including increased risk of death and CVD impact upon affected persons. A need exists for additional research to explore the impacts of diets such as the Mediterranean diet on this population group.[3,10-11]

Glycated Albumin vs. HbA1c in Evaluation of Patients with Diabetes and CKD

- Glycated Albumin has been more recently identified as a test that can be used to measure long term glycemic control of diabetics, similar to HbA1c which is used to measure similar results.[12-15]
- In patients without glucose regulation related issues, such as chronic kidney disease and diabetes mellitus, glycated albumin and HbA1c exhibit a positive correlation.[12-15]
- More research needs to be done in regards to its efficacy, specifically if it is a more efficient measure than HbA1C results in patients.[12-15]

Glycated Albumin vs. HbA1c in Evaluation of Patients with Diabetes and CKD

- A cross-sectional study was done to examine the relationship between glycated proteins and fasting glucose in patients with chronic kidney disease.[12-16]
- The study found that people with CKD had higher HbA1C levels, which is an indicator of a possible issue with diabetes or prediabetes.[12-16]
- Additional findings showed that association was not necessarily the same with glycated albumin. In patients with CKD, the HbA1c and glycated albumin do not always react normally, or as expected, as they would in patients without an issue that affects their glycemic control.[12-16]

Glycated Albumin vs. HbA1c in Evaluation of Patients with Diabetes and CKD

- A retrospective cross-sectional study. 234 participants with type II diabetes mellitus was examined and had their oxidative stress levels measured.[12-16]
- This study looked into the relationship between HbA1c, 1,5-Anhydro-D-Glucitol, and Glycated Albumin in regards to oxidative stress; which is common for those with type II diabetes mellitus experiencing vascular issues commonly seen in patients with CKD.[12-16]
- Key findings showed that glycated albumin showed one of the strongest correlations with oxidative stress in patients with optimal and poorly controlled T2DM, respectively. [12-16]

Glycated Albumin vs. HbA1c in Evaluation of Patients with Diabetes and CKD

- A cross-sectional study evaluated the usage of both glycated albumin and HbA1c to measure their efficacy, as well as the similarities and differences, between their results when it comes to the measure of long-term glycemic control.[12-16]
- Findings showed that glycated albumin showed lower levels of uncontrolled or poorly controlled blood levels than the HbA1C measure.[12-16]
- Key conclusions identified that both tests should be utilized when completing blood work for diabetic patients.[12-16]

Glycated Albumin vs. HbA1c in Evaluation of Patients with Diabetes and CKD

- HbA1c Targets:
  - Treat to ~7.0 % to prevent or delay progression of micro-vascular complications of DM, including DKD.[3,12-16]
  - Lowering A1C levels to <7.0% is not recommended for those with DM who are at risk for hypoglycemia, including those treated with insulin or sulfonylureas and/or those who have advanced CKD. [3,12-16]
  - Target >7.0% for individuals with clinically significant comorbidities or limited life expectancy and risk of hypoglycemia. [3,12-16]

Glycated Albumin vs. HbA1c in Evaluation of Patients with Diabetes and CKD

- The utility of HbA1c as a measure in CKD remains questioned due to CKD-related anemia and shortened red blood cell life.[3,12-16]
- However, HbA1c remains the best clinical marker of long-term glycemic control, along with patient self-monitoring of BG in patients with diabetes and CKD.[3,12-16]
- Additional research is needed to further explore these evaluative measures within this population group.[3-12-16]

Resources

- National Kidney Foundation: www.kidney.org
- American Association of Kidney Patients: www.aakp.org
- National Institute of Diabetes and Digestive and Kidney Disease: www.niddk.nih.gov
  - National Kidney Disease Education Program (NKDEP)
- Academy of Nutrition and Dietetics: www.eatrightpro.org
  - National Kidney Diet (partnership of AND Renal Practice Group & NKF Council on Renal Nutrition)
  - New Dish Up a Dialysis Friendly Meal and a Kidney Friendly Meal
  - Professional Resources and Guides

☺ Thank You ☺

Additional Questions???

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Complete list of references available by request.

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