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Overweight, obesity and intentional weight loss in chronic kidney disease: NHANES 1999-2006

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Abstract

Objective—Obesity and chronic kidney disease (CKD) have emerged as major public health problems. We aimed to examine: a) lifestyle and behavioral factors, b) factors related to pursuing weight loss, and c) weight loss modalities pursued by CKD and non-CKD individuals who are overweight and obese.

Methods—Cross-sectional analysis of 10,971 overweight and obese adult participants in the National Health and Nutrition Examination Surveys conducted between 1999-2006. We examined the differences in lifestyle and behavioral factors between CKD and non-CKD participants and factors associated with pursuing weight loss using survey regression models.

Results—The total daily energy intake of the CKD population was lower than the non-CKD group (1987 kcal/day vs. 2063 kcal/day, $p=0.02$) even after adjusting for relevant covariates. However, the percentage of energy derived from protein was similar between the groups. Sixty-six percent of the CKD population did not meet the minimum recommended leisure time physical activity goals compared to 57% among non-CKD ($p<0.001$). Fifty percent of CKD participants pursued weight loss (vs. 55% of non-CKD individuals, $p=0.01$), but the presence of CKD was not independently associated with the pursuit of weight loss in the multivariate model. Among participants pursuing weight loss, modalities including dietary interventions utilized by CKD and non-CKD participants were similar. Eight percent of CKD participants used medications to promote weight loss.

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Conclusions—Among the overweight and obese population, lifestyle and behavioral factors related to obesity and weight loss are similar between CKD and non-CKD participants. Insufficient data exist on the beneficial effects of intentional weight loss in CKD and these data show that a significant proportion of the CKD population use diets that may have high protein content and medications to promote weight loss that may be harmful. Future clinical trials evaluating the efficacy and optimal modalities to treat obesity in the CKD population are warranted.

Keywords

Chronic kidney disease; diet; physical activity; obesity; weight loss

Background

Obesity rates have increased in the United States and the number of patients with chronic kidney disease (CKD) has increased concomitantly during the same period. The prevalence rate of CKD in the United States is currently approximately 13% (1, 2). Both experimental and population based studies have examined the mechanistic links between obesity and CKD (3-6). After the development of kidney disease, the presence of obesity is associated with increased risk for both progression of kidney disease and all-cause mortality (7). Sedentary lifestyle and higher energy intake have been linked to the increase in obesity rates in the general population (8, 9). It is unclear whether CKD patients have a similar macronutrient dietary intake and physical activity levels compared to individuals without CKD.

Lack of motivation, misperceived weight status and low socioeconomic status are some of the barriers to pursuing weight loss (10). Diagnosis of a chronic medical condition might increase one's interest in pursuing weight loss but the same condition may also be a physical deterrent for pursuing weight loss. Whether patients with chronic medical conditions such as CKD pursue weight loss programs at similar rates compared to the non-CKD population has not been previously examined. A modest intentional amount of weight reduction through lifestyle modification reduces cardiovascular risk factors in the general population (11-13). Commercial weight loss programs are widely available and several billions of dollars are spent on weight loss related products and services every year in the United States. Recommendations for weight loss include both reduced caloric intake and increased physical activity (14). This may not be applicable to the CKD population and the different type of weight loss modalities followed by CKD patients in the community is unknown.

Therefore, the purpose of this study was to examine: a) the lifestyle (dietary composition and physical activity levels) and behavioral factors (desire to weigh less and pursue weight loss) among overweight and obese CKD and non-CKD participants, b) factors related to pursuing weight loss, specifically the presence of CKD, and c) the various weight loss modalities followed by overweight and obese CKD and non-CKD participants among a nationally representative sample of US adults.

Methods

Study population

We examined data from the National Health and Nutrition Examination Survey (NHANES), a nationally representative, complex and multistage probability of the US civilian, non-institutionalized population conducted by the National Center for Health Statistics (Appendix 1). Participants in NHANES were interviewed in their homes and underwent a standardized physical examination in a mobile examination center. Self-reported information on demographics, socioeconomic status, health conditions, health behaviors and routine site of healthcare were obtained during the interview. The National Centers for Health Statistics Ethics Review Board approved the study protocol and each participant provided written informed consent. The four 2-year cycles of the continuous NHANES 1999-2000, 2001-2002, 2003-2004 and 2005-2006 were combined for the purposes of this analysis. Participants who met the following criteria were included: 20 years of age and older who underwent the medical examination component, with BMI ≥ 25 , who were not pregnant, had serum creatinine and albumin/creatinine ratio results, were not on dialysis, had eGFR ≥ 15 ml/min/1.73m², and answered whether they pursued weight loss in the last year were included in these analyses.

Measures

Kidney disease—CKD was defined as the presence of either reduced kidney function (estimated glomerular filtration rate [eGFR] 15-59 ml/min/1.73 m²) and/or elevated albuminuria (urinary albumin-to-creatinine ratios of 30–299 mg/g [microalbuminuria] and ≥ 300 mg/g [macroalbuminuria]). eGFR was calculated according to the Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equations for calibrated creatinine (15). Serum creatinine levels were corrected for the 1999-2000 and 2005-2006 surveys as suggested in the NHANES serum creatinine documentation (16).

Comorbid conditions—Diabetes was defined as self-reported if ever told by a doctor that the participant had “diabetes or borderline diabetes”. Hypercholesterolemia was defined as presence of total cholesterol >200 mg/dl and/or use of cholesterol lowering medications. Self-reported hypertension was defined by the answer “yes” to the question, “Have you ever been told by a doctor or other health professionals that you have hypertension or high BP?”

Anthropometrics—Height and weight measurements were collected by trained health technicians using standardized techniques and equipment. BMI was calculated as weight in kilograms divided by measured height in meters squared and classified as: 25-29.9 kg/m² overweight, and ≥ 30 kg/m² obese (14). Waist circumference was categorized as high risk for men with measured WC >102 cm and women with measured WC >88 cm and low risk otherwise.

Dietary intake details—Participants in 1999-2000 were asked to complete one dietary recall interview while participants in 2001-2006 were asked to complete two 24-h dietary recall interviews (first in-person and second over the telephone 3-10 days later) using the Automated Multiple Pass Method in these surveys (17). All food items and quantities

consumed by each participant from midnight to midnight on the day preceding the interview were recorded. The 24-hour recall included both weekdays and weekends. Data from both 24-hour recalls were averaged to produce an estimate of the grams of carbohydrate, fat, protein, fiber and sodium consumed by the study participants for the 2001-2002, 2003-2004, 2005-2006 surveys, while single day recall was used for 1999-2000.

Dietary awareness—The following dietary awareness questions were asked in the NHANES 2005-2006 survey but not in earlier surveys (1999-2004):

- a. Have you heard of dietary guidelines?
- b. Have you heard of food guide pyramid?

Physical activity—Detailed information about leisure time physical activity (LTPA) over the past 30 days was obtained during the interview at home. Each LTPA was classified to a MET score according to the Compendium of Physical Activities (18). LTPA was categorized into less than minimum goal (<450 MET/min/week), meeting the minimum goal (450 to <750 MET/min/week) and exceeding the goal (>750 MET/min/week).

Perceived weight status and desire to weigh less—The following questions were asked during the interview to assess the perceived weight status, “Do you consider yourself now to be overweight, underweight or about the right weight?” Additional questions were asked during the interview to assess their desire to weigh less, “Would you like to weigh more, less or stay the same”.

Pursuing weight loss and the modalities adopted for weight loss—Participants with a self-reported drop in weight of 10 or more pounds in the prior year were asked if the weight loss was intentional. In addition, the following questions were asked of all participants without such self-reported weight loss to assess whether they pursued weight loss, “During the past 12 months have you tried to lose weight?” Participants who reported pursuing weight loss or intentional weight loss were further asked to report the various means that they adopted to lose weight or to keep from gaining weight. Due to a questionnaire error, participants with intentional weight loss were not asked about ways in which they had tried to lose weight in the 1999-2000 survey. We categorized weight control modalities into the following categories: dietary changes, exercise, diet and exercise, medications and others for 2001-2006.

Statistical analysis

Demographics, comorbidities, diet-related variables, physical activity, and dietary awareness were compared between participants with and without CKD using Rao-Scott Chi-square tests for categorical variables and t-tests for continuous variables. Linear regression analysis was used to assess the association between CKD and dietary calories and percent of calories derived from each nutrient while adjusting for age, gender, African American race, income, diabetes, hypertension, CAD, and BMI. Logistic regression analysis was used to assess the association between CKD and less than minimum LTPA goal while also adjusting for the above-mentioned variables. We tested the interactions between CKD and gender for the

dietary details (total energy, carbohydrate, protein, fat, saturated fat and sodium intake) and physical activity. Wherever applicable, we reported both unadjusted and adjusted results separately.

Logistic regression analyses for pursuing weight loss was performed with CKD as the primary explanatory variable while adjusting for age, gender, race, diabetes, blood pressure, cardiac disease, hypercholesterolemia, BMI, smoking and household income as these were shown to be associated with the pursuit of weight loss in previous studies. For participants who reported pursuing weight loss, we also performed a logistic regression analysis to assess use of each of the weight loss modalities while adjusting for age, gender, African American race, income, diabetes, hypertension, and CAD. Medical examination weights were used for all analyses except those including any diet related variables. For analyses including diet-related variables, diet weights were used. Because diet-related variables for the years 2001-2006 were an average of day 1 and 2 responses the second day diet weights were used for that time period while day 1 diet weights were used for 1999-2000. We repeated all the above analyses by defining CKD as presence of eGFR <60 ml/min/1.73 m² alone.

All analyses were performed using survey procedures with SAS version 9.2 for Unix (SAS Institute, Cary, North Carolina), which account for the sampling design of NHANES and appropriately weight participants in statistical models. Graphs were produced using R version 2.12.2 (The R Foundation for Statistical Computing, Vienna, Austria).

Results

Participant characteristics

Mean age of the CKD population was 60.9(0.5) years with 46.1% males, while 53.5% of non-CKD participants were males with a mean age of 45.4(0.3) years. A higher proportion of the CKD population had diabetes (24% vs. 6%), hypertension (59% vs. 29%), hyperlipidemia (71% vs. 59%) and heart disease (16% vs.4%) in comparison to the non-CKD population (all p-values < 0.001, Table 1). Participants with CKD (n=2,150) had higher waist circumference (107.9 cm vs. 103.6 cm, p<0.001) and a larger percentage had a BMI ≥ 30 kg/m² (55% vs. 47%, p<0.001). CKD participants had a lower household income compared to non-CKD participants, with 27.9% of CKD participants earning <\$20,000 (vs. 15% of non-CKD population) and 16.6% of participants earning \geq \$75,000 (vs. 29.3% of non-CKD population) (Table 1).

Lifestyle factors

Diet—In unadjusted analysis, total daily energy intake was lower for the CKD population compared to the non-CKD group (1886 kcal/day [SE 29.3] vs. 2252 kcal/day [SE 16.3]). This remained significantly lower even after adjusting for age, gender, African American race, income, diabetes, hypertension, CAD and BMI for the CKD group (1987 kcal/day [SE 35.1] vs. 2063 kcal day [SE 22.8], p = 0.02) (Table 2). In adjusted analysis, the CKD population derived a slightly higher percentage of energy from carbohydrate than the non-CKD population (49.1% vs. 48.2%, p=0.05). The CKD population and non-CKD

populations did not differ based on the percentage of energy derived from protein, fat, and saturated fat and the amount of sodium intake. We found no significant interaction between CKD and gender on any of the diet related regression models.

Dietary awareness—CKD participants had lower awareness about dietary guidelines (46.8% vs. 52.9%, $p=0.01$) and the food pyramid (71.2% vs. 80.1%, $p<0.001$) compared to non-CKD participants. When adjusted for relevant confounding variables, CKD participants had significantly lower odds of awareness of dietary guidelines ($p=0.03$) but not for awareness of the food pyramid ($p=0.26$).

Physical activity—In unadjusted analysis, CKD participants were less active than non-CKD participants ($p<0.001$). Overall, 66% of the CKD population did not meet the minimum recommended leisure time physical activity goals (<450 METS/min/week) compared to 57% among non-CKD (Table 3). Eight percent of CKD participants and 9% of non-CKD participants met the minimum LTPA goals. A higher proportion of participants with non-CKD had more than stipulated LTPA goals compared to the CKD population (34% vs. 25%). However, when adjusted for relevant covariates, presence of CKD is not associated with lower physical activity levels (Odds ratio 0.98, 95% CI 0.84, 1.14). We found no significant interaction between CKD and gender on having low physical activity.

Behavioral factors

Proportions of CKD and non-CKD participants who perceived their body weight as underweight, ideal weight and overweight did not differ between CKD and non-CKD participants ($p=0.40$). CKD participants expressed their desire to weigh less at a similar rate compared to non-CKD participants (79.8% vs. 82%, $p=0.06$).

Pursuing weight loss

Of the 10,971 overweight and obese participants, 5,453 reported pursuing weight loss. Among CKD participants, 50% reported pursuing weight loss while 54% of non-CKD participants pursued weight loss ($p=0.01$). When adjusted for demographics, comorbidities and household income, presence of CKD was not associated with pursuit of weight loss (OR 0.97, 95% CI 0.83, 1.14) (Table 4). African Americans, lower income groups and elderly adults had lower odds of pursuing weight loss. Presence of diabetes and obesity, and female gender were associated with increased odds of pursuing a weight loss program (Table 4).

Weight loss modality

In the unadjusted analysis, participants with and without CKD (2001-2006 surveys) had significant differences among the different weight loss modalities that they pursued (Figure 1). When adjusted for age, gender African American race, income, diabetes, HTN, and CAD, CKD participants were not significantly different on any weight loss modality except the use of medications, with CKD participants using fewer medications to promote weight loss.

Sensitivity analyses

We repeated all the above analyses by defining CKD as eGFR <60 ml/min/1.73m² only (n=1106) and the results were qualitatively similar (data not shown).

Discussion

Among a nationally representative sample of US adults, the CKD population were older, had other co-morbid conditions and were obese compared to the population without CKD. CKD participants who are overweight and obese had lower total energy intake than non-CKD participants who are overweight and obese. Physical activity levels of overweight and obese CKD participants were similar to overweight and obese participants without CKD. CKD and non-CKD participants had a similar perception of their body weight and similar proportions of them expressed their desire to weigh less. Over half of CKD and non-CKD participants followed intentional weight loss and a similar proportion of CKD and non-CKD participants chose exercise, diet, or diet and exercise for losing weight.

Among the general population, energy intake has tripled in the past three decades which might have contributed to the three-fold increase in obesity rates in the United States (8). In patients with eGFR <25 ml/min/1.73m², a dietary energy intake of 35 kcal/kg/day for age <60 years and 30-35 kcal/kg/day for age >60 years are recommended (19). National Kidney Foundation – Kidney Disease Quality Outcomes and Initiative guidelines also recommend a 0.6-0.75 kg/g/day of protein intake for patients with GFR <25 ml/min/1.73m². In this analysis, CKD participants had a lower energy intake than non-CKD participants and the energy derived from protein sources was found to be similar between CKD and non-CKD participants suggesting that the protein intake among CKD participants is probably higher than recommended for their level of kidney function (20). This could adversely impact the kidney function and may negate the beneficial effects seen with weight loss in this population. Even though the awareness about dietary guidelines and the food pyramid are low among CKD participants, consistent results were not seen in multivariate analysis and so firm conclusions could not be drawn from these data.

Recent guidelines recommend that an individual should engage in a minimum of 450-750 MET minutes/week activity (21). Two-thirds of CKD participants did not meet the minimum recommended LTPA goals. Using the NHANES III data, Beddhu et al reported that 60% of CKD participants were physically inactive (defined as participants with no leisure time physical activity) or insufficiently active (defined as self-reported leisure time moderate activity [METs ranging from 3 to 6] of five or more times per week or leisure time vigorous activity [METs > 6] three or more times per week) (22). However, the data cannot be directly compared to our results because the definitions used to classify physical activity were different for both studies.

Apart from the higher comorbid disease burden that actually nullified the associations between presence of CKD and lower physical activity levels, such low levels of physical activity may be attributed to the muscle wasting secondary to mitochondrial abnormalities, imbalance between protein synthesis and degradation, and the metabolic acidosis commonly seen in CKD (23, 24). Population-based studies have established an inverse association

between lower levels of physical activity and the development of kidney disease (both albuminuria and lower GFR), and a positive association between physical inactivity and mortality in the CKD population (22, 25-28). These data, along with ours cumulatively suggests a need for testing interventions to improve physical activity among the CKD population.

Misperception of body weight based on the differences between the “measured and perceived” weight category has been reported in the general population (10, 29). Higher self-reported BMI has been directly linked to the pursuit of weight control in previous studies (30, 31). In this analysis, perception of body weight and the desire to weigh less did not differ between CKD and non-CKD groups. Similar to previous reports, this study showed that more participants were pursuing weight loss in the non-CKD population (32, 33). In addition, we also report that 50% of CKD participants were pursuing weight loss. Younger (aged 35-49 years) and older adults (>65 years), African Americans, and participants with lower income were less likely to pursue weight loss while females, diabetics, and overweight and obese participants were more likely to pursue intentional weight loss. Physicians and others who counsel to promote intentional weight loss among non-CKD and CKD participants should consider these factors (34).

Intentional weight loss among the CKD population provides only modest benefits and no adequately powered trial has examined the effects of intentional weight loss on kidney function and cardiovascular risk factors (35-38). Understanding this limitation, the most common practices followed by both CKD and non-CKD participants were dietary interventions. These included eating less food, eating food with less fat and lower calories, skipping meals and joining a weight loss program. However, CKD patients should avoid a high protein diet and it is unclear how many of these participants followed a high protein diet that is harmful to kidney function (20, 39). None of the FDA approved weight loss medications can be safely used in patients with CKD, especially in patients with eGFR <60 ml/min/1.73m² (40). Even though there was no statistically significant difference between CKD and non-CKD participants with respect to the use of medications to promote weight loss, 8% of CKD participants used medications to promote weight loss which is of concern.

A major strength of our study is the inclusion of a nationally representative sample with fair representation of various ethnic/racial groups. However, the study is subject to limitations. These include the cross-sectional study design, the use of single UACR measurement which might lead to misclassification of CKD, especially among participants with early-stage CKD, inclusion of participants with prevalent CKD rather than incident CKD participants, reverse causality, and lack of adjustment for unmeasured confounders. To address some of these limitations, we conducted a sensitivity analysis limited to eGFR <60 ml/min/1.73 m² that showed overall similar results. Also, underreporting of food intake is common in dietary recalls and could potentially influence our study results. The details about physical activity practices and the various weight loss modalities followed were based on self-reported information. This could have been over or under-reported and the validity of these self-reports is not known. However, it stands to reason that these biases would not be systematically different between the CKD and non-CKD population.

In summary, in a nationally representative sample of overweight and obese US adults, the CKD population had a lower energy intake, was equally physically active and expressed a similar interest in pursuing weight loss when compared to the non-CKD participants. Over half of CKD participants pursue weight loss and the weight loss modalities followed by CKD participants are similar to the non-CKD participants. There is a lack of convincing evidence on beneficial effects of intentional weight loss in CKD and the optimal weight loss modality to be followed (especially one that is safe) in this population is unclear. Importantly, significant proportions of the CKD population follow dietary interventions that may have high protein content and this may contribute to a decline in renal function. Therefore, with such high proportions of the CKD population following intentional weight loss, clinical trials are warranted in this area.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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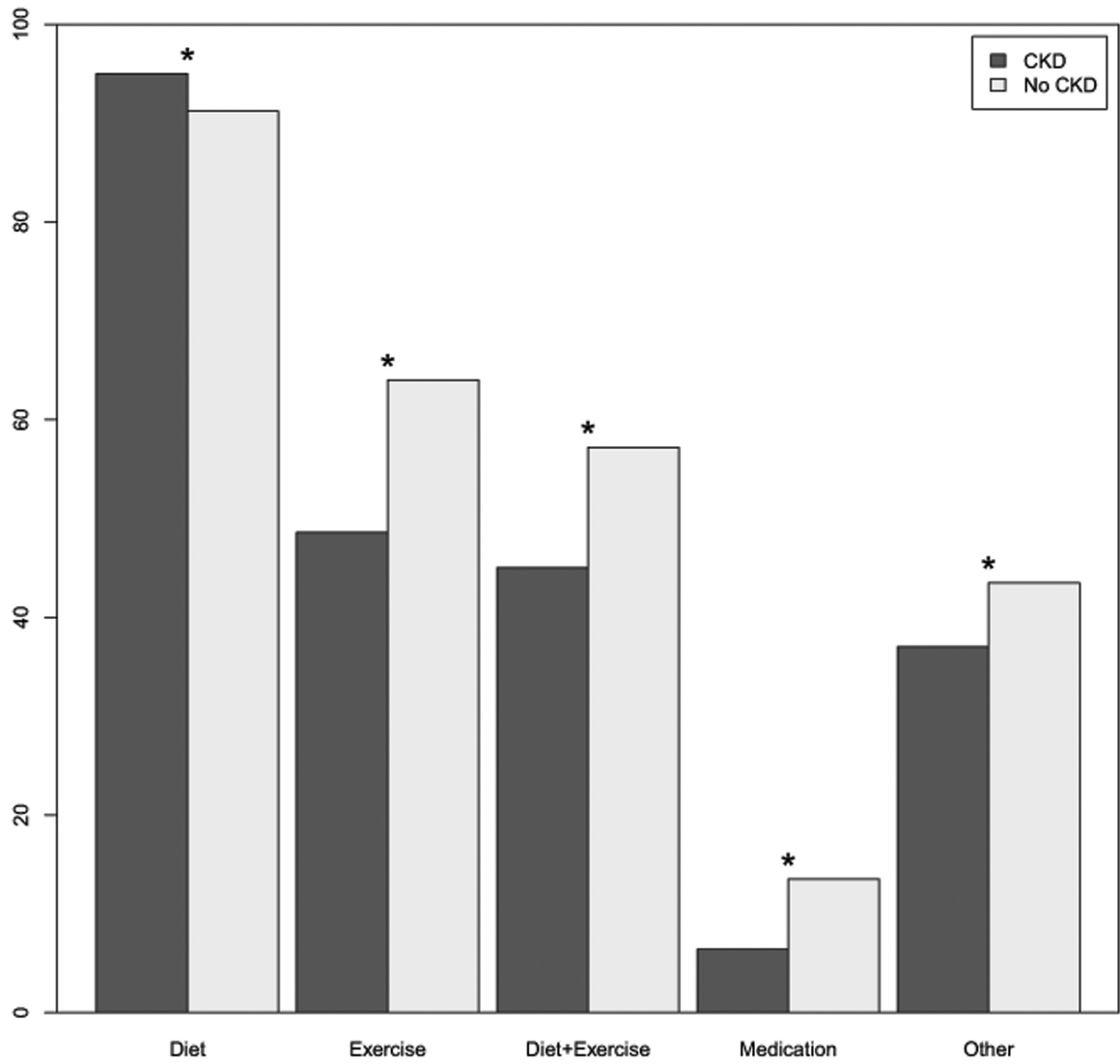


Figure 1. Various weight loss modalities followed by CKD and non-CKD participants who pursued weight loss in NHANES 2001-2006. * indicates significant difference between the groups ($p < 0.05$).

Table 1
Characteristics of overweight and obese CKD and non-CKD participants in NHANES
1999-2006

Variable	CKD (n=2150)	Non-CKD (n=8821)	p-value
Age, years (mean ± SE)	60.9(0.5)	45.4(0.3)	<0.001
Male gender, % (SE)	46.1(1.3)	53.5(0.6)	<0.001
Race, % (SE)			0.07
Non-hispanic White	71.4(1.9)	71.2(1.6)	
Non-hispanic black	12.4(1.3)	11.4(1.0)	
Mexican American	6.4(0.9)	8.3(0.8)	
Other Hispanic	5.6(1.1)	5.5(0.9)	
Other	4.2(0.7)	3.7(0.4)	
Diabetes, % (SE)	24.0(1.2)	6.3(0.3)	<0.001
Hypertension, % (SE)	58.8(1.2)	29.4(0.7)	<0.001
Cardiac disease, % (SE)	16.3(0.9)	4.4(0.3)	<0.001
Hyperlipidemia, % (SE)	70.7(1.3)	58.5(0.8)	<0.001
Smoking, % (SE)	16.0(1.0)	23.1(0.6)	<0.001
Mean BMI	32.2(0.2)	31.1(0.1)	<0.001
BMI, % (SE)			<0.001
25-29.9 kg/m ²	45.1(1.5)	53.3(0.9)	
>30 kg/m ²	54.9(1.5)	46.7(0.9)	
Waist circumference (cm) (mean ± SE)	107.9(0.5)	103.6(0.2)	<0.001
Waist circumference (cm)	84.1(1.0)	69.6(0.8)	<0.001
>102 males >88 female, % (SE)			
Household Income,% (SE)			
< \$ 20,000	27.9(1.7)	15.0(0.6)	<0.001
\$20,000 - \$44,999	35.0(1.5)	29.0(1.1)	
\$45,000 - \$74,999	20.5(1.6)	26.7(0.8)	
\$75,000	16.6(1.5)	29.3(1.2)	
eGFR, ml/min/1.73m ² (mean ± SE)	71.8(0.8)	95.5(0.3)	<0.001
Albuminuria			
UACR (mg/g) (mean ± SE)	163.0(15.3)	7.2(0.1)	<0.001
Microalbuminuria (%)	56.3 (1.3)	0	
Macroalbuminuria (%)	9.3 (0.8)	0	

eGFR: estimated glomerular filtration rate, BMI: body mass index, SE: standard error, *mean, percent and SE are weighted. P-values for continuous variables are from t-test and for categorical variables from Rao-Scott chi-square test

Table 2

Estimated energy intake and dietary composition in overweight and obese CKD and non-CKD participants in NHANES 1999-2006.

	CKD (n=1789)	Non- CKD (n=7393)	P-value*
Total daily energy intake (kcal), mean(SE)	1987 (35.1)	2063 (22.8)	0.018
Carbohydrate (% of energy), mean(SE)	49.1 (0.5)	48.2 (0.4)	0.05
Fat (% of energy), mean(SE)	33.2 (0.4)	33.8 (0.3)	0.10
Protein (% of energy), mean(SE)	15.7 (0.2)	15.9 (0.2)	0.35
Saturated fat (% of energy), mean(SE)	10.7 (0.2)	10.7 (0.1)	0.79
Sodium mg, mean(SE)	3259 (68)	3358 (57)	0.09

* Survey linear regression adjusted for age, gender, race, diabetes, high blood pressure, CAD, household income, BMI. Estimated means are for age 48.

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Table 3
Physical activity levels in CKD and non-CKD participants in NHANES 1999-2006

Leisure time physical activity	CKD	Non-CKD	P-value*
Did not meet minimum goal (<450 METS/min/week)	66.4 (1.4)	56.6 (0.8)	<0.001
Met minimum goal (450-750 METS/min/week)	8.2 (0.7)	9.2 (0.4)	
More than minimum goal (>750 METS/min/week)	25.4 (1.4)	34.3 (0.7)	

* Rao-Scott Chi-square test; When comparison adjusted for age, gender, race, Diabetes, BMI, HTN, CAD, and income there was no significant difference between CKD and no CKD (odds ratio for CKD vs non CKD 0.98 (0.84, 1.14), p=0.77).

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Table 4
Factors associated with pursuing weight loss among participants in NHANES 2001-2006

Variable	Multivariable adjusted odds ratio (95% CI)* N=9543
Age (years)	
35-49 vs. 20-34	0.82 (0.70, 0.96)
50-64 vs. 20-34	0.92 (0.77, 1.09)
65 vs. 20-34	0.53 (0.44, 0.64)
Gender (Female vs. Male)	2.21 (2.02, 2.42)
Race (African Americans vs. Whites)	0.79 (0.70, 0.89)
Presence of Diabetes	1.67 (1.44, 1.93)
SBP (per 5 mm Hg increase)	0.96 (0.94, 0.97)
Presence of cardiac disease	1.07 (0.86, 1.32)
Presence of hypercholesterolemia	0.97 (0.87, 1.09)
Body mass index	
30 kg/m ² vs. 25-29.9 kg/m ²	1.84 (1.67, 2.04)
Smoke Cigarettes	0.68 (0.59, 0.79)
Household income	
< \$20,000 vs. \$75,000	0.53 (0.43, 0.64)
\$20,000- \$44,999 vs. \$75,000	0.65 (0.55, 0.78)
\$45,000 - \$74,999 vs. \$75,000	0.83 (0.69, 0.99)
Presence of chronic kidney disease	0.97 (0.83, 1.14)

* Adjusted for age, gender, race, Diabetes, BMI, HTN, CAD, smoking, hypercholesterolemia and income