11-1-2009

# Exercise in CKD: Work it Out

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Recommended Citation
Yee J. Exercise in CKD: Work it Out. Advances in Chronic Kidney Disease 2009; 16(6):405-406.

ACKD
Advances in Chronic Kidney Disease
National Kidney Foundation

Vol 16, No 6, November 2009

EDITORIAL

# Exercise in CKD: Work it Out

In this end-of-year issue, Guest Editors Johansen and Painter provide a focused compilation of articles that engages the importance of exercise in CKD patients, particularly those with ESRD. The proportion of ESRD patients older than 65 years continues to grow in all sectors of the world, and this group is particularly vulnerable to weakness and injury. The importance of restoring function to this often frail and disabled population is emphasized in this issue of *Advances in Chronic Kidney Disease*.

The term "frail" is a catchword and connotes a loss of physical function with many implications including reduced cardiorespiratory fitness; disproportionate loss of muscle strength and neuromuscular function; diminished flexibility and balance; and, ultimately, disability. Falls are particularly nettlesome in this population of individuals with boney rarefaction from secondary hyperparathyroidism. Consequently, falls have been metricized as part of many hemodialysis centers' quality improvement programs. Concomitant and compounding of these multiple, accrued physical deficits are the exogenous and endogenous depression that plague ESRD patients and with high prevalence. Depression reduces one's motivation to exercise and provokes greater disability to the point where activities of daily living cannot be fulfilled and the quality of one's life dissipates.

Individuals with CKD are not as aerobically fit as the general population. In fact, on average, they are one third less fit than age- and sex-matched controls. Exercise can mitigate, to a significant extent, the loss of cardiorespiratory exercise tolerance in CKD patients. Again, this is especially true of the ESRD patient. Unfortunately, there is a lesser amount of data in the non–dialysis-dependent CKD population. However, there is often a lack of motivation, inertia, and lack of fitness-based infrastructure that impedes success in this area. Infrastructure is only a partial solution because this collective effort also requires financial and administrative support and an "exercise champion."

Whose lack of motivation is it anyway, and whose inertia? It is therapeutic nihilism to state that the kidney patient is insufficiently driven to improve his/her fitness level. Furthermore, it becomes a fait de accompli that CKD patients will not enhance their exercise tolerance if such an attitude prevails. If health providers do not inquire about patients' exercise capacities, they surely will not improve. In surveys that have explored this issue among nephrologists, one thing stands out: the consideration of motivating ESRD patients to exercise is not a high priority. However, does this lack of consideration stem from a lack of knowledge and rudimentary training in exercise physiology, albeit expertise, or from a lack of our motivation?

The reduction of exercise tolerance worsens as one approaches ESRD and then worsens in ESRD. Even highly functional ESRD patients display poorer levels of physical performance than comparably matched persons with other chronic disorders such as heart failure and chronic obstructive pulmonary disease. Within


1548-5595/09/1606-0001$36.00/0
doi:10.1053/j.ackd.2009.08.007

this perniciously woven fabric of illness are the many CKD patients with heart failure, approximately one third of them, and/or COPD. Cardiologists and pulmonologists have clearly provided leadership and implementation of exercise and rehabilitation regimens for their respective patient cadres, whereas few have done so in the nephrologic realm. Indeed, in several centers of excellence, patients follow a crafted and fun exercise program.

Peridialytic exercise regimens have increased maximal oxygen utilization, decreased functional limitations, and improved sleep patterns of ESRD patients. Most importantly, there is improvement in quality of life. These routines may require in some cases modified exercise equipment, but generally expensive devices are not essential. Exercise is performed on nondialytic days, in the predialysis interval, or during dialysis. Solute clearance may be enhanced by intradialytic exertion, and formal quantitation of this parameter has borne this theory out in, at least, some studies. In addition, concomitant administration of protein and energy supplementation can buffer the catabolic effects of the dialytic procedure itself. This maneuver could assist the efforts of renal nutritionists, especially in the 40% or so of ESRD patients with quantifiable protein energy malnutrition.

Even with successful aging, sarcopenia, the disproportionate loss of lean muscle mass, and an attendant loss of strength will occur. Kidney failure patients develop more sarcopenia than their healthy counterparts, likely in part from the inflammation and elevated cytokine profile intrinsic to advanced CKD. Oxidative stress, hormonal dysregulation of anabolic and catabolic factors, impaired circulation from advanced atherosclerosis, and protein energy wasting contribute to the muscle wasting process. Combating sarcopenia by hormonal manipulation has been relatively ineffective, and nutritional supplementation remains, for most, the obvious solution, but it is not the best one. Exercise is the best solution, and exercise can be optimized by enhanced nutrition.

Programmatic exercise of the anaerobic mitigates the attrition of type II muscle fibers in kidney failure patients and preserves strength. Anaerobic exercise complements aerobic exercise regimens that attenuate oxidative stress, stabilize autonomic function, improve glycemic control, improve lipoprotein profiles, and reduce blood pressure as much as a single antihypertensive agent. Aside from muscle, the entire musculoskeletal system comprised of muscle, the neuroskeleton, endocrine function, vasculature, tendons, joints, ligaments, and bone is dependent on continual, lifelong exercise to maintain integrity. Notably, neither aerobic nor anaerobic exercise is associated with patient endangerment, and the inherent dangers of the dialytic procedure itself outweigh those of exercise performance. In general, formal graded exercise testing is not mandatory before the initiation of self-paced exercise regimens in CKD.

Given the positive benefits of exercise, the time taken to motivate patients will reap dividends for them in terms of functional improvement, reduction of comorbidities and hospitalizations, and enhanced quality of life. Barriers to the development of dynamic, metric-based exercise programs for CKD patients exist and include inertia on the part of health care providers and patients too. Thus, multidisciplinary efforts are the prerequisites for success. It has been 30 years since Painter established the first exercise program for kidney failure patients. It should not take 30 more years to follow her lead. With determination and leadership, we must change the kinetics of exercise in CKD patients may be increased. Yes, we can work it out.

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