\* Risk factors or causes of frailty among CKD patients.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | | | Effect (descriptions) | | | | | | Prevalence | Frailty Assessment | Sample Size | CKD Pattern | Reference |
| Biological | | |  | | | | | |  |  |  |  |  |
|  | Cardiovascular | | Heart Failure | | | | | | 30% vs 12% | Fried Phenotypes | 336 | CKD stages 1-4 | 3 |
| Angina | | | | | | 34% vs. 22% | Fried Phenotypes | 336 | CKD stages 1-4 | 3 |
|  | Cerebrovascular | | Cerebrovascular Disease Prevalence (%) | | | | | | 26.4 vs. 12.0 | Fried Phenotypes | 324 | ESRD | 5 |
|  | Neurological | | Brain Wave | | | | | | F vs. NF | Simple FRAIL scale (SFS) | 46 | ESRD, under chronic dialysis | 6 |
|  | | | Global DAR | | | 283 ± 679 vs. 2971 ± 4859 |
|  | | | DARs (left frontal) | | | 135 ± 250 vs. 3073 ± 4702 |
|  | | | DAR (left TO) | | | 197 ± 318 vs. 3708 ± 6398 |
|  | | | DAR (central) | | | 55 ± 96 vs. 1773 ± 3262 |
|  | | | DAR (right TO) | | | 187 ± 261 vs. 4400 ± 7763 |
|  | | | Global DTABR | | | 191 ± 469 vs. 1781 ± 2793 |
|  | | | DTABR (left frontal) | | | 86 ± 158 vs. 1680 ± 2388 |
|  | | | DTABR (left TO) | | | 130 ± 210 vs. 1884 ± 2828 |
|  | | | DTABR (central) | | | 39 ± 65 vs. 1132 ± 1957 |
|  | | | DTABR (right TO) | | | 126 ± 178 vs. 2960 ± 5271 |
|  | Cognitive | | Mini-Mental State Examination (MMSE) | | | | | |  | Edmonton Frail Scale (EFS) | 137 | Elderly, ≥65y/o | 7 |
|  | Spearman’s correlation coefficient of EFS scores with gross MMSE scores | | | | | -0.607 (p<0.01) |
| Executive Function | | | | | | F vs. NF at cohort entry |  |  |  |  |
|  | Trail Making Tests A (TMTA) scores | | | | | +12.08 | Fried Phenotypes | 324 | ESRD | 5 |
|  | Trail Making Tests B (TMTB) scores | | | | | +33.15 | Fried Phenotypes | 324 | ESRD | 5 |
|  | Microbiota | | Gut Microbiota Composition | | | | | |  | Fried Phenotype score | 64 (and 15 control subjects) | Stage 3b-4, eGFR 15-45ml/min | 10 |
|  | Malnutrition-Inflammation-Score (MIS) | | | | | 7.6 vs. 3.9 |
|  |  | | | | Abundance of unclassified Mogibacteriaceae and Oscillospira | Directly proportional to MIS |
|  |  | | | | Abundance of Akkermansia, Ruminococcus, and Eubacterium | Inversely proportional to MIS |
|  | Bacterial Abundance of some genera (Mogibacteriacee, Coriobacteriacee, Eggerthella, Erwinia, Coprobacillus, Anaerotruncus, etc) | | | | | ↑ |
| Immunological | | Mycophenolate mofetil (MMF) dose reduction (MDR) | | | | | | F vs. NF | Fried Phenotypes | 525 | CKD stage 5T | 9 |
|  | 1 year since KT (%) | | | | | 44 vs 40 |
|  | 2 years since KT (%) | | | | | 54 vs. 45 |
|  | 3 years since KT (%) | | | | | 67 vs. 51 |
| Viral infection | | | | | | F vs. NF |  |  |  |  |
|  | | | | HCV (n=37) | | 36 vs. 1 | Fried Phenotypes | 205 | CKD stage 5D (hemodialysis) | 1 |
|  | Functional Status | | Disability | | | | | | F vs. NF | Fried Phenotypes | 336 | CKD stages 1-4 | 3 |
|  | At least one disability in activities of daily Living (ADLs) | | | | | 15% vs. 5% |
|  | At least one disability in instrumental activities of daily living (IADLs) | | | | | 60% vs. 28% |
|  | At least one disability in mobility tasks | | | | | 40% vs. 18% |
|  | Endocrinologic/ Metabolic | | Diabetes | | | | | | F vs. NF |  |  |  |  |
|  | | | | Prevalence | | 64% vs. 49% | Fried Phenotypes | 336 | CKD stages 1-4 | 3 |
| Obesity | | | | | | F vs. NF |  |  |  |  |
|  | Prevalence | | | | | 64% vs. 50% | Fried Phenotypes | 336 | CKD stages 1-4 | 3 |
|  | Prevalence | | | | | 51.8% vs. 23.9% | Fried Phenotypes | 324 | ESRD | 5 |
|  | BMI based on dry weight | | | | | 31.5 vs. 27.6 |
| Body Composition | | Appendicular skeletal muscle mass index (ASMI) | | | | | | 6.8 vs. 7.7 | Edmonton Frail Scale (EFS) | 41 | CKD stage 1-5 | 11 |
| Low lean body mass (i.e. sarcopenia) (in frail vs. nonfrail) | | | | | | 57.1% vs .14.7% |
|  | Laboratory Data | | eGFR (mL/min/1.72m^2) | | | | | | 18 vs. 50 | Edmonton Frail Scale (EFS) | 41 | CKD stage 1-5 | 11 |
|  | eGFRcys <30 | | | | | Frailty prevalence 2.8 | Fried Phenotypes | 336 | CKD stages 1-4 | 3\* |
| eGFRcys 30-44 | | | | | Frailty prevalence 2.1 |
| eGFRcys >60 | | | | | Referent |
| Albumin (g/L) | | | | | | 38 vs. 41 | Edmonton Frail Scale (EFS) | 41 | CKD stage 1-5 | 11 |
| Calcium (mmol/L) | | | | | | 2.24 vs. 2.36 |
| Creatinine (umol/L) | | | | | | 299 vs. 115 |
|  | Miscellaneous | | Dialysis clearance rate | | | | | | ↑ | Simple FRAIL scale (SFS) | 46 | ESRD, under chronic dialysis | 6 |
| Psychological | | |  | | | | | |  |  |  |  |  |
|  | Mood | | Mood Change | | | | | | Negative change | Edmonton Frail Scale (EFS) | N/A | CKD stage 5D (hemodialysis) | 13 |
|  | Mental Health | |  | | | | | |  |  |  |  |  |
|  |  | Anxiety | Hospital Anxiety and Depression Scale (HADS) | | | | | | Women:↑in global, psychological, social frailty  Men:↑in Physical frailty | N/A | 97 | ESRD, under online-haemodiafiltration (OL-HDF) | 14 |
|  |  | Depression | Hospital Anxiety and Depression Scale (HADS) | | | | | | Men↑in global, psychological, physical frailty | N/A | 97 | ESRD, under online-haemodiafiltration (OL-HDF) | 14 |
| Incidence (%) (Self-reported Major Depression Inventory) | | | | | | 83 vs. 6 | Edmonton Frail Scale (EFS) | 41 | CKD stage 1-5 | 11 |
|  |  | |  | | | | | |  |  |  |  |  |
|  | | | | | |  |  |  |  |  |
|  | Mental Function | | Post-KT delirium | | | | | | 9.0% vs. 3.9% | Fried Phenotypes | 893 | CKD stage 5T | 15 |
| Sociological | | |  | | | | | |  |  |  |  |  |
|  | Isolation | |  | | | | | |  |  |  |  |  |
|  | Interaction | | Interaction with family | | | | | | Good |  |  |  | 16 |
| Quality of Life | | | HRQoL | | | | | |  |  |  |  |  |
|  | SF-36 | | | | |  |  |  |  |  |
|  |  | Scores in physical functioning, blood pressure, role physical, and physical component summary domains | | | | ↓ | Edmonton Frail Scale (EFS) | 41 | CKD stage 1-5 | 11 |
| Falls (times) | | | | | | 115 vs. 12 | Fried Frailty Phenotypes | 205 | CKD stage 5D (hemodialysis) | 1 |
| Independence | | | Functional Independence Measure (FIM) | | | | | |  | Edmonton Frail Scale (EFS) | 137 | Elderly, ≥65y/o | 7 |
| Spearman’s correlation coefficient | | | | | Frailty diagnosis with global FIM | -0.703 (p<0.001) |
| Frailty diagnosis with motor FIM | -0.714 (p<0.001) |
| Frailty diagnosis with cognitive FIM | -0.575 (p<0.001) |
| EFS scores with gross FIM | -0.53 (p<0.01) |
| Health-care utilization | | | Hospitalization | | | | | |  |  |  |  |  |
|  | Cumulative number of inpatient health-care visits | | | | | ↑ | Edmonton Frail Scale (EFS) | 41 | CKD stage 1-5 | 11 |
|  | Cumulative number of emergency health-care visits | | | | |
|  | Cumulative number of total health-care visits | | | | |
|  | >3 times (n=141) | | | | | 127 vs. 14 | Fried Frailty Phenotypes | 205 | CKD stage 5D (hemodialysis) | 1 |
|  | 1-2 times (n=64) | | | | | 40 vs. 24 |

Bibliography

1. YadlaM, JohnJ, MummadiM. A study of clinical assessment of frailty in patients on maintenance hemodialysis supported by cashless government scheme. *Saudi J Kidney Dis Transplant*. 2017. doi:10.4103/1319-2442.198102

2. MuradK, KitzmanDW. Frailty and multiple comorbidities in the elderly patient with heart failure: implications for management. *Heart Fail Rev*. 2012;17(4-5):581-588. doi:10.1007/s10741-011-9258-y

3. RoshanravanB, KhatriM, Robinson-CohenC, et al. A prospective study of frailty in nephrology-referred patients with CKD. *Am J Kidney Dis*. 2012;60(6):912-921. doi:10.1053/j.ajkd.2012.05.017

4. JohansenKL, ChertowGM, JinC, KutnerNG. Significance of frailty among dialysis patients. *J Am Soc Nephrol*. 2007;18(11):2960-2967. doi:10.1681/ASN.2007020221

5. McAdams-DemarcoMA, TanJ, SalterML, et al. Frailty and cognitive function in incident hemodialysis patients. *Clin J Am Soc Nephrol*. 2015;10(12):2181-2189. doi:10.2215/CJN.01960215

6. ChaoC-T, LaiH-J, TsaiH-B, YangS-Y, HuangJ-W. Frail phenotype is associated with distinct quantitative electroencephalographic findings among end-stage renal disease patients: an observational study. *BMC Geriatr*. 2017;17(1):277. doi:10.1186/s12877-017-0673-3

7. Fabrício-WehbeSCC, SchiavetoFV, VendrusculoTRP, HaasVJ, DantasRAS, RodriguesRAP. Cross-cultural adaptation and validity of the “Edmonton Frail Scale - EFS” in a Brazilian elderly sample. *Rev Lat Am Enfermagem*. 2009;17(6):1043-1049. doi:10.1590/S0104-11692009000600018

8. JohansenKL, DalrympleLS, DelgadoC, et al. Factors Associated with Frailty and Its Trajectory among Patients on Hemodialysis. *Clin J Am Soc Nephrol*. 2017;12(7):1100-1108. doi:10.2215/CJN.12131116

9. McAdams-DemarcoMA, LawA, TanJ, et al. Frailty, mycophenolate reduction, and graft loss in kidney transplant recipients. *Transplantation*. 2015;99(4):805-810. doi:10.1097/TP.0000000000000444

10. MargiottaE, CaldiroliL, VettorettiS, et al. SuO004GUT MICROBIOTA COMPOSITION AND FRAILTY IN ELDERLY PATIENTS WITH CHRONIC KIDNEY DISEASE. *Nephrol Dial Transplant*. 2018;33(suppl\_1):i618-i618. doi:10.1093/ndt/gfy104.SuO004

11. Adame PerezSI, SeniorPA, FieldCJ, JindalK, MagerDR. Frailty, Health-Related Quality of Life, Cognition, Depression, Vitamin D and Health-Care Utilization in an Ambulatory Adult Population with Type 1 or Type 2 Diabetes Mellitus and Chronic Kidney Disease: A Cross-Sectional Analysis. *Can J Diabetes*. June2018. doi:10.1016/j.jcjd.2018.06.001

12. ChiangJM, KaysenGA, SegalM, ChertowGM, DelgadoC, JohansenKL. Low testosterone is associated with frailty, muscle wasting and physical dysfunction among men receiving hemodialysis: a longitudinal analysis. *Nephrol Dial Transplant*. 2018. doi:10.1093/ndt/gfy252

13. DeSouza OrlandiF, GesualdoGD. Assessment of the frailty level of elderly people with chronic kidney disease undergoing hemodialysis. *ACTA Paul Enferm*. 2014;27(1):29-34. doi:10.1590/1982-0194201400007

14. SalesC, TavaresR, AmadoL, et al. SP651ANXIETY AND DEPRESSION IN END STAGE RENAL DISEASE PATIENTS AND ITS ASSOCIATION WITH CLINICAL AND LABORATORIAL DATA. *Nephrol Dial Transplant*. 2017;32(suppl\_3):iii355-iii355. doi:10.1093/ndt/gfx154.SP651

15. HaugenCE, MountfordA, WarsameF, et al. Incidence, Risk Factors, and Sequelae of Post-kidney Transplant Delirium. *J Am Soc Nephrol*. 2018;29(6):1752-1759. doi:10.1681/ASN.2018010064

16. MoffattH, MoorhouseP, MalleryL, LandryD, TennankoreK. Using the Frailty Assessment for Care Planning Tool (FACT) to screen elderly chronic kidney disease patients for frailty: the nurse experience. *Clin Interv Aging*. 2018;13:843.

17. LeeSJ, SonH, ShinSK. Influence of frailty on health-related quality of life in pre-dialysis patients with chronic kidney disease in Korea: a cross-sectional study. *Heal Qual Life Outcomes*. 2015;13:70. doi:10.1186/s12955-015-0270-0

18. McAdams-DeMarcoMA, OlorundareIO, YingH, et al. Frailty and Postkidney Transplant Health-Related Quality of Life. *Transplantation*. 2018;102(2):291-299. doi:10.1097/TP.0000000000001943