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Cancer Incidence and Mortality Among ESRD Patients Receiving Dialysis or Kidney Transplantation: a National Cohort Study in Korea

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Objectives: Patients with end-stage renal disease (ESRD) have a higher-than-normal cancer risk. However, the incidence and mortality of cancers in ESRD patients receiving dialysis or kidney transplantation have been rarely studied for Korean populations.

Methods: We conducted a preliminary methodological study for large-scale data analysis using data from the National Health Insurance Service (NHIS) to identify the incidence and mortality of cancers in ESRD patients receiving dialysis or kidney transplantation. The data from NHIS consisted of a sample cohort (n=100,000,000) representing the whole nation over a period of 10 years. The study population was restricted to individuals starting maintenance dialysis or received kidney transplantation between 2006 and 2014. Control group was age-, gender-, and 1:2 propensity score-matched general population. They were followed from initiation of dialysis until death, discontinuation of dialysis, or the end of 2015. Cox proportional hazard regression models was used to identify the risk factors for cancer in ESRD patients.

Results: Of 1,298 ESRD patients, 245 (18.8%) had been newly diagnosed with cancer [Tab-1]. The incidence of any cancer was higher for certain subgroups: older age, DM, hypertension, and coronary artery disease. Rate of cancer in ESRD patients was 1.54 times higher than in the general population (95% CI 1.299-1.823, p<0.001). Especially, rates of cancer in patients on HD and kidney transplantation were higher than in the general population (HD: 95% CI 1.201-1.753, p=0.0001; kidney transplantation: 95% CI 1.479-3.947, p=0.0004; PD: 95% CI 0.348-1.564, p=0.427). Figure-1 showed the overall survival curves of cancers after newly diagnosed in ESRD patients and the general populations.

Conclusions: These results suggested that the frequency of cancer is higher in ESRD patients than in the Korean general population. Especially, the overall risk of cancer is increased in ESRD patients receiving hemodialysis and patient who received kidney transplantation.

Table1. Demographic Characteristics for ESRD Patients in Korea

	General population	ESRD
Total number of standard sample	2,596	1,298
Treatment modality (n [%])		
Kidney transplantation	-	65 (5.0%)
Mixed group	-	178 (13.7%)
Hemodialysis	-	964 (0.74%)
Peritoneal dialysis	-	91 (7.0%)
Gender		
Male	1,464 (56.4%)	732 (56.4%)
Female	1,132 (43.6%)	566 (43.6%)
Age (mean±SD)	53.05±15.52	56.68±15.67
0-19	46 (1.7%)	23 (1.7%)
20-39	310 (11.9%)	155 (11.9%)
40-49	462 (17.7%)	231 (17.7%)
50-59	568 (21.8%)	284 (21.8%)
60-69	610 (23.4%)	305 (23.4%)
≥70	600 (23.1%)	300 (23.1%)
CCI score		
0	438 (16.8%)	219 (16.8%)
1	276 (10.6%)	138 (10.6%)
2	932 (35.9%)	466 (35.9%)
3	950 (36.5%)	475 (36.5%)
Year of diagnosis		
2006	326 (12.5%)	163 (12.5%)
2007	298 (11.4%)	149 (11.4%)
2008	302 (11.6%)	151 (11.6%)
2009	306 (11.7%)	153 (11.7%)
2010	272 (10.4%)	136 (10.4%)
2011	314 (12.0%)	157 (12.0%)
2012	248 (9.5%)	124 (9.5%)
2013	286 (11.0%)	143 (11.0%)
2014	244 (9.3%)	122 (9.3%)
Baseline comorbidity		
Diabetes mellitus	1,440 (55.46%)	694 (53.4%)
Hypertension	1,167 (44.95%)	987 (76.0%)
Coronary artery disease	290 (11.1%)	207 (15.9%)
Stroke	337 (12.9%)	153 (11.7%)
Mean follow-up (year)	5.34±2.73	4.02±2.68
New cancer patients	399	245
Mean age(±SD) at diagnosis of cancer	61.51±12.34	59.58±14.50
Time to discover cancer (yrs)	3.54±2.55	2.58±2.25

Fig-1. Overall survival curves of cancers after newly diagnosed in end-stage renal disease patients and general populations. (A) General population, (B) Kidney transplantation, (C) Switched modality group, (D) Hemodialysis, (E) Peritoneal dialysis.

