



Influenza Vaccination in Adult Patients with Hypertension or Diabetes in South Korea: A Cross-sectional Study

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Introduction

- World Health Organization (WHO) recommended influenza coverage targets of 75% in elderly and at high-risk groups.
- Diabetes status is a high-risk group of developing influenza complications. Patients with hypertension who got an influenza vaccine are reduced risk of death during flu season.

We addressed the coverage rate for influenza vaccination according to hypertension or diabetes status in Korean adults.

Methods

- Data source:** Korea National Health and Nutrition Examination Survey (KNHANES) 2016 to 2018, conducted by the Korean Ministry of Health and Welfare.
- Study Population:** 16,206 out of 24,269 participants who were aged ≥20 years with no missing values in all variables
- Study variables:**
 - Hypertension or diabetes.** Data were collected by health screening. Hypertension was defined as having a systolic blood pressure ≥140mmHg or diastolic blood pressure ≥90mmHg or using antihypertensive medication. Diabetes was defined as having a fasting glucose level of ≥126mg/dL or using anti-hyperglycemic medication.
 - Influenza vaccination status** estimated by the face-to-face question about receiving a flu shot in the last 12 months.
- Main statistical analysis:**
 - Descriptive statistical results about individual characteristics were presented. Categorical variables were compared among the participants using the Chi-square test.
 - Multivariable logistic regression analyses, adjusted for sex, job, education level, family income, marital status, smoking status, alcohol intake, and obesity, to examine the relationships between hypertension or diabetes status and vaccination.

Results

Table 1. Influenza vaccination coverage of study populations

	Influenza Vaccination	Non-Influenza Vaccination	P
Overall	7,027 (43.4)	9,179 (56.6)	
Hypertension			<0.0001
No	3,893 (31.1)	7,068 (68.9)	
Yes	3,134 (51.9)	2,111 (48.1)	
DM			<0.0001
No	5,746 (34.7)	8,408 (65.3)	
Yes	1,281 (55.7)	771 (44.3)	
Age (years)			<0.0001
20-39	1,200 (23.8)	3,210 (75.0)	
40-64	2,456 (30.1)	5,323 (69.9)	
≥65	3,371 (84.1)	646 (15.9)	
Sex			<0.0001
Male	2,788 (31.5)	4,333 (68.5)	
Female	4,239 (42.3)	4,846 (57.7)	
Occupation			<0.0001
No	3,415 (46.9)	2,766 (53.1)	
Yes	3,612 (31.7)	6,413 (68.3)	
Education level			<0.0001
≤Middle school	3,167 (64.5)	1,406 (35.5)	
High school	1,684 (33.8)	2,690 (66.2)	
≥College	2,176 (27.3)	5,083 (72.7)	
Family income			<0.0001
Low	1,952 (56.4)	1,020 (43.6)	
Moderate-low	1,790 (37.9)	2,118 (62.1)	
Moderate-high	1,638 (31.9)	2,881 (68.1)	
High	1,647 (31.6)	3,160 (68.4)	
Marital status			<0.0001
Single	426 (15.3)	2,195 (84.7)	
Married	6,601 (43.2)	6,984 (56.8)	
Smoking status			<0.0001
Never/past	6,207 (40.4)	7,067 (59.6)	
Current	820 (24.0)	2,112 (76.0)	
Drinking status			<0.0001
No	3,814 (45.0)	3,542 (55.0)	
Yes	3,213 (31.3)	5,637 (68.7)	
Obesity			0.09
No	4,467 (36.3)	6,070 (63.7)	
Yes	2,560 (37.9)	3,109 (62.1)	

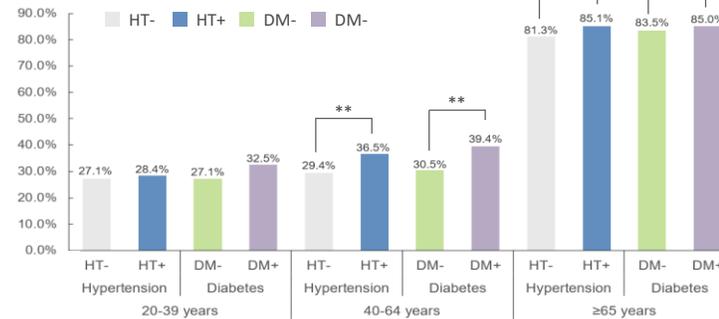


Figure 1. Coverage rates of influenza vaccinations by age groups with and without hypertension or diabetes. *P <0.05, **P <0.0001.

- Among aged ≥65 years, HT group had higher influenza vaccination coverage than non-HT group (P <0.0001), and DM group had higher coverage than non-DM group (P=0.03).
- Adults aged 40-64 years revealed a similar pattern that HT group had higher coverage than non-HT group (P <0.0001), and DM group had higher coverage than non-DM group (P <0.0001).
- From age 20-39 years, there was significantly no difference in coverage between HT group and non-HT group (P=0.97), DM group and non-DM group (P=0.28).

Table 2. Association between influenza vaccination status in age groups and hypertension or diabetes.

	20-39 (Vaccinated)			40-64 (Vaccinated)			≥65 (Vaccinated)		
	N	aOR* (95% CI)	P	N	aOR (95% CI)	P	N	aOR (95% CI)	P
HT	342	0.95 (0.70-1.29)	0.73	2,356	1.14 (0.99-1.31)	0.07	2,548	1.20 (0.99-1.45)	0.06
DM	77	1.23 (0.07-2.17)	0.48	928	1.23 (1.04-1.47)	0.02	1,047	1.17 (0.94-1.46)	0.17

* aOR, adjusted OR.

- Adults aged 40-64 years with diabetes were 1.23 times (P=0.02) more vaccinated than those same aged without diabetes.

Discussion

- Over 80% of the elderly aged ≥65 were vaccinated with or without diseases, so it met WHO recommendation. High vaccination coverage in the elderly may be explained by the National Immunization Program (NIP), which is a Korean policy that administers free influenza vaccination for aged over 65 years.
- An adjusted analysis showed that influenza vaccination coverage differed significantly between diabetic and non-diabetic adults aged 40-64, but patients aged ≥40 were generally more vaccinated than adults without chronic disease. Previous study showed that patients with chronic diseases were likely to be aware of vaccination recommendations because they tended to visit clinics more regularly due to chronic diseases.
- Our study featured a cross-sectional design, it was characterized by understanding the current trend rather than identify causative relationships. We acquired study outcome from self-reported questionnaires, which might have contributed to recall bias.
- However, this study in Korea identified a detailed overview of the latest influenza vaccination status in hypertensive or diabetic patients who are a high-risk group of influenza complications.

Conclusion

- More improving influenza vaccination coverage rates for adults with hypertension and diabetes is encouraged.
- It is necessary to devise strategies to raise coverage in patients with hypertension and diabetes.

Acknowledgement

- This research was supported by Government-wide R&D Fund project for infectious disease research (GFID), Republic of Korea (Grant Number: HG18C0067).