



Original Article

Characteristics of human immunodeficiency virus infections among the elderly in Taiwan: A nationwide study

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Abstract

Background: Information regarding human immunodeficiency virus (HIV) infections and acquired immunodeficiency syndrome (AIDS) in the elderly of Taiwan is limited. This study looked into the aforementioned issues.

Methods: Data from the National HIV/AIDS Registry, relating to individuals diagnosed in 2007, were analyzed.

Results: Among 1,975 HIV-infected individuals diagnosed in 2007, the elderly group (age ≥ 50 years) consisted of 153 subjects and the younger (control) group (age 15–39 years) consisted of 1,458 individuals. Some markers, such as primarily males/local Taiwanese, being unemployed, one third of subjects infected by means of intravenous drug use, and primarily diagnosed in hospitals, were similar between the two groups. The elderly group had more married, divorced, and separated individuals, and widows/widowers than the younger group. The causes of death differed insignificantly between the two groups. The younger group had more variety than the elderly group in distribution of occupations. Fewer prison-diagnosed HIV, high ratio of individuals developing AIDS, heterosexuals, high mortality, and unsupported marital status were significant markers of elderly HIV-infected subjects.

Conclusion: In Taiwan, elderly HIV infections have reflected the aforementioned characteristics. Some specific issues concerning elderly HIV infections, such as heterosexual predominance, high mortality and fewer men who have sex with men, are similar with reports from other countries. These characteristics can guide possible directions of social and health care interventions.

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1. Introduction

Human immunodeficiency virus (HIV) infections, including acquired immunodeficiency syndrome (AIDS), have been reported in Taiwan since 1984. The annual incidence of newly diagnosed HIV cases has increased gradually, with the trend increasing since 2003.¹

With an aging society and advances in anti-HIV regimens, HIV infections in the elderly (age ≥ 50 years) are being paid more attention. The major considerations are that HIV infections in the elderly could reflect a delayed diagnosis, an accelerating immunocompromised status, and complicated comorbidities, resulting in limited therapeutic effects in this group.^{2,3}

The rapidly rising proportion of the aged population in Taiwan is astonishing. Since 1993, the Taiwanese population has been defined as an aging society according to the World Health Organization.⁴ There has been an increase in the number of elderly subjects with HIV infections in Taiwan. In

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1997, 47 local Taiwanese subjects aged ≥ 50 years were newly reported as having HIV infections, whereas in 2007, up to 152 cases were newly reported (see Fig. 1).⁵ Information regarding HIV infections in the elderly in Taiwan is limited, and the aim of this study was to understand the characteristics of these patients.

2. Methods

2.1. Data source

Data from the National HIV/AIDS Registry, concerning subjects with HIV infections who were newly diagnosed and registered in 2007, were reviewed. The National HIV/AIDS Registry was established in 1984 and is maintained by the Taiwan Centers for Disease Control, Department of Health, Executive Yuan, Republic of China. The definition of HIV infections, detection methods, and procedures of reporting and registering, are documented.¹ Demographic data pertaining to subjects, HIV-infecting risk factors, survival status, AIDS-defining diseases, and related death were recorded and analyzed. The definitions of AIDS and AIDS-defining diseases are according to the 1993 American Centers for Disease Control and Prevention revised criteria.⁶

2.2. Subjects and parameters

Subjects were categorized into two groups: (i) the elderly group, subjects aged ≥ 50 years; (ii) the younger (control)

group, aged 15–39 years. Individuals aged <15 years or 40–49 years of age were excluded from the study to significantly separate the two groups. The subjects' age was calculated by 2007 minus their birth year (AD). Each subject's survival status was recorded until December 16, 2008, when the latest death of subjects occurred. In terms of HIV-infecting risk factors, homosexual exposures were defined as men who had sexual experiences with men (MSM), and bisexual exposures as men who had sexual experiences with both men and women. Heterosexual exposures were defined as men who had sexual experiences with women, and vice versa. In terms of marital status, "separation" was defined as subjects who were married but did not have sex or live together with their spouse. In terms of causes of death, "AIDS-related conditions (ARC)" were defined as chronic symptomatic HIV infections or combined opportunistic infections. "Severe illness, not related to ARC" was defined as those individuals who had developed AIDS but their fatal illnesses were not associated with ARC (such as bacterial pneumonia or sepsis). "Severe illness, not related to HIV infections" was defined as those subjects who did not develop AIDS and whose fatal illnesses were not associated with HIV infections.

2.3. Statistical analyses

Data are expressed as mean \pm standard deviation. SPSS software (SPSS version 17.0; SPSS Inc., Chicago, IL, USA) was used for statistical analyses. The independent *t* test, χ^2 test, Fisher exact test, and trend χ^2 test were used to calculate

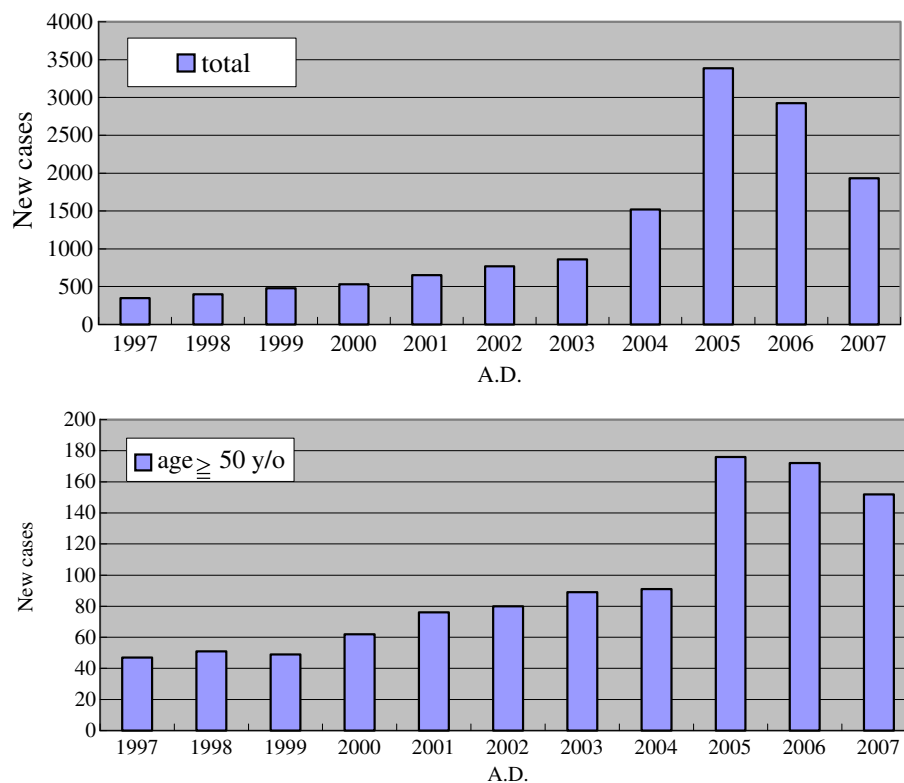


Fig. 1. The trend of HIV infections in local Taiwanese residents, 1997–2007 (edited from governmental published data, <http://www.cdc.gov.tw/public/Attachment/932315393071.xls>).

statistical significance. A p value less than 0.05 was considered statistically significant (two-tailed tests). This study was authorized by the Taiwan Centers for Disease Control, Department of Health, Republic of China (Taiwan). All the data in this study were anonymous and compatible with the regulations of research ethics.

3. Results

In 2007, a total of 1,975 HIV-infected consecutive subjects, including 534 individuals who developed AIDS, were newly diagnosed in Taiwan. The elderly group (age ≥ 50 years) consisted of 153 subjects and the younger group (age 15–39 years) consisted of 1,458 individuals. Three subjects aged <15 years and 361 aged 40–49 years were excluded.

The demographic characteristics of the two groups are listed in Table 1. Both groups comprised predominantly males/local Taiwanese and there was no significant difference between the two groups. The elderly group had a significantly higher ratio of individuals who developed AIDS and poorer survival than the younger group.

The comparisons of characteristics between the two groups are listed in Table 2. Data concerning HIV-infecting risk factors demonstrated that the elderly group had fewer homosexual exposures (MSM) and more heterosexual exposures than the younger group. The elderly group had fewer individuals who had been diagnosed in prisons than the younger group. The elderly group had more married, divorced and separated individuals, and more widows/widowers than the younger group. The distributions of HIV-infecting risk factors, diagnosing facilities, and marital status differed significantly between both groups (all $p < 0.05$).

The distributions of subjects' occupations are listed in Table 3. "Jobless" accounted predominantly in both elderly and younger groups (45.1% and 31.3% respectively). Some young adult-specific items, such as military soldiers and students, were absent in the elderly group. In contrast to the younger group, the elderly group had less variety of occupations ($p < 0.001$).

Of those subjects who died, five were diagnosed with HIV infections after death, including one in elderly and four in control subjects. The causes of death did not differ significantly between the two groups (see Table 4).

Table 1
The demographic characteristics of the selected subjects with HIV infections in 2007

Parameters	Elderly group ($n = 153$)	Younger group ($n = 1,458$)	p
Mean age (yr \pm SD)	57.3 \pm 6.6	29.2 \pm 5.4	
Sex (male/female)	132/21	1,315/143	0.158
Nationality (local Taiwanese/foreigners)	152/1	1,423/35	0.248
Individuals who developed AIDS (yes/no)	75/78	340/1,118	<0.001
Survival status (alive/died/departure)	123/29/1	1,384/53/21	<0.001

AIDS = acquired immunodeficiency syndrome; SD = standard deviation.

Table 2

The comparison of HIV-infecting risk factors, diagnosing facilities, and marital status for subjects with HIV infections

Parameters	Elderly group (%)	Younger group (%)	p
HIV-infecting risk factors			
Homosexual exposure (MSM)	8 (5.2)	580 (39.8)	<0.001
Blood product transfusion	2 (1.3)	0 (0)	
Heterosexual exposure	76 (49.7)	300 (20.6)	
Intravenous drug use	50 (32.7)	476 (32.6)	
Bisexual exposure (MSMW)	11 (7.1)	88 (6.0)	
Others	3 (2.0)	5 (0.4)	
Unclear	3 (2.0)	9 (0.6)	
Diagnosing facilities			
Hospitals, registered on DOH	94 (61.4)	781 (53.6)	0.012
Military draftees' health checkup	0 (0)	23 (1.6)	
Blood donation centers	4 (2.6)	56 (3.8)	
Prisons	19 (12.4)	302 (20.7)	
Other facilities	36 (23.6)	296 (20.3)	
Marital status			
Married	70 (45.8)	131 (9.0)	<0.001
Separated	8 (5.2)	12 (0.8)	
Unmarried	34 (22.2)	1,201 (82.5)	
Divorced	27 (17.6)	107 (7.3)	
Widow or widower	13 (8.5)	2 (0.1)	
Unclear	1 (0.7)	4 (0.3)	
Total	153 (100)	1,458 (100)	

DOH = Department of Health; HIV = human immunodeficiency virus; MSM = men who had sexual experiences with men; MSMW = men who had sexual experiences with both men and women.

4. Discussion

The emergence of HIV infections in the elderly has received attention worldwide. It is reported that approximately 2.8 million individuals with HIV infections are aged 50 years or over throughout the world. Improvements in HIV diagnosis

Table 3
List of subjects' occupations^a

Occupations	Elderly group (%)	Younger group (%)
Laborers	19 (12.4)	154 (10.6)
Unclear	2 (1.3)	8 (0.5)
Governmental employees	0 (0)	11 (0.8)
Others	23 (15.0)	199 (13.6)
Sex workers	0 (0)	8 (0.5)
Service industry	20 (13.1)	294 (20.2)
Military soldiers	0 (0)	41 (2.8)
Housekeepers	2 (1.3)	12 (0.8)
Business	13 (8.5)	78 (5.3)
Professional/scientific experts	0 (0)	63 (4.3)
Jobless	69 (45.1)	456 (31.3)
Farmers	3 (2.0)	4 (0.3)
Transport service	2 (1.3)	15 (1.0)
Fishermen	0 (0)	4 (0.3)
Students	0 (0)	111 (7.6)
Total	153 (100)	1,458 (100)

^a By trend χ^2 test, $p < 0.001$.

Table 4
The cause of mortality in 82 subjects with HIV infections^a

Cause of death	Elderly group (%)	Younger group (%)
ARC	7 (24.1)	11 (20.8)
Severe illness, not related to ARC (subjects with AIDS)	8 (27.6)	14 (26.4)
Severe illness, not related to HIV infections (subjects without AIDS)	4 (13.8)	4 (7.5)
Suicides	0 (0)	6 (11.3)
Accidents	1 (3.4)	8 (15.1)
Unclear	9 (31.1)	10 (18.9)
Total	29 (100)	53 (100)

^a By trend χ^2 test, $p = 0.264$.

AIDS = acquired immunodeficiency syndrome; ARC = AIDS-related conditions; HIV = human immunodeficiency virus.

and prolongation of life by highly active antiretroviral therapy have contributed to an increasing number of elderly HIV-infected cases.⁷ In the United States, elderly HIV-infected patients accounted for 25% of all HIV-infected individuals in 2005, and is predicted to reach 50% by 2015.^{8,9} In addition to the aforementioned characteristics,^{2,3} it is reported that older people have more misconceptions about HIV than young adults, which could contribute to the risk of HIV infections.^{10,11}

In Taiwan, elderly patients accounted for 7.7% of all HIV-infected individuals newly diagnosed in 2007. The elderly HIV-infected patients of Taiwan had some similar characteristics as the younger patients, such as predominance of males/local Taiwanese, and approximately one third of subjects who acquired their infection through injection drug use (IDU). In the mid 1990s, local researchers had predicted the shifting trend of HIV-infecting risks from hemophiliacs to IDU.¹² An American study reported that IDU and sexual exposure were the major risk factors for HIV infections in the elderly,¹³ and the role of IDU in such subjects warrants further research.

In contrast to younger patients, the elderly HIV-infected patients of Taiwan had a worse survival rate and heterosexual predominance. These results are similar to those reported from Spain.¹⁴ The high ratio of individuals who developed AIDS also explained the underlying delayed diagnosis and poor survival rate in the elderly HIV-infected patients. In this study, the proportion of females was higher in the elderly group than in the controls, which was similar to a previous study from Brazil,¹⁵ but the difference did not reach statistical significance (13.7% vs. 9.8%, $p = 0.158$).

Heterosexual predominance in elderly HIV-infected individuals has been reported in other studies, with the exception of a report from southern America.¹⁶ Social and cultural issues could affect the distribution of gender or sexual preferences in a particular study. In highly-endemic areas, being a care-provider to young HIV-infected families was a risk factor for acquiring HIV infections in the elderly.¹⁷ Further related studies are required in Taiwan.

Contamination of blood products was not a cause of HIV infections in the younger group, and was responsible for only

two cases in the elderly group. This reflects advances in pre-transfusion prevention and anti-HIV screening. The HIV-diagnosing facilities reflected the characteristics of subjects' age distribution, such as military draftees' health checkups and prisons.

The marital status of HIV-infected subjects reflected psychosocial issues. In Taiwan, elderly HIV-infected patients were predominantly married, divorced, separated, or were widows/widowers. In contrast, younger patients were predominantly unmarried. At present, social and health care interventions primarily focus on young adult HIV-infected patients and relevant risky facilities such as prisons, institutes, and saunas. This phenomenon was also noted in previous local epidemiological studies.^{18–20} The significance of divorced, separated, and widow/widower statuses in elderly HIV-infected subjects could imply a lack of family resources and support for these individuals, and increase the risk of unsafe sexual exposure. Improved quality of life is associated with social support for HIV-infected patients,²¹ and social and health care interventions for elderly HIV-infected patients should be addressed more comprehensively.

The HIV-infected subjects' occupations reflected some issues. The predominance of "jobless" in both groups reflected the low/lower socio-economic status in most of the HIV-infected patients, and the jobless-related dilemma is more apparent in the elderly group. These patients need more socio-economic intervention or support. The role of sex workers was also interesting in our results. All of the eight sex workers were female and in the younger group. We suppose that some biases may cause this phenomenon. Sex workers may hint at their identification when registering in the HIV/AIDS registry, such as "service industry" or "others". Absence of patients aged 40–49 years may exclude underlying sex workers. The border of different occupations may be unclear when actually registering. The improvement of data set quality should be an issue for further studies.

In this study, the causes of death also reflected age-related characteristics, although statistical significance was not achieved. However, the age-specific distribution of "successful suicides" did not represent actual suicide ideations, which are thought to correlate with elderly HIV infections.²² Studies concerning psychological issues of elderly HIV infections in Taiwan are indicated. The distribution of major severe illnesses, including ARC and non-ARC illnesses, was similar in both groups. However, elderly HIV-infected patients were more likely than young adults to die from severe illnesses before developing AIDS (13.8% vs. 7.5%). This reflects that the underlying roles of comorbidities were common in the elderly HIV-infected cases,^{23,24} and the trends and comorbidities of HIV infections in the elderly in Taiwan need further research.

In terms of the aforementioned characteristics of elderly HIV-infected subjects, fewer MSM and heterosexual predominance are compatible with reports from other countries. A high mortality and an increased number of unsupported marital status reflect that additional care and modifying the policies of social/health care interventions are indicated.

This study was limited by the range of parameters investigated and the limited authorization for the research to be carried out. Retrospective analysis is also limiting; a lack of detailed data pertaining to parameters such as items listed as “unclear” or “other”, causes of death, prescribed medicines, and various serum/blood cell markers limited the scope of the study and prevented further investigations. The subjects’ survival status did not exclude confounding factors of the aging process. However, this study represents an initial investigation into the characteristics of elderly HIV-infected patients of Taiwan using the nationwide database. Future national studies concerning this group are expected.

In conclusion, HIV infections of the elderly Taiwanese population are similar to those afflicting younger patients in some characteristics. Those individuals affected are primarily males, local Taiwanese and jobless. Approximately one third of subjects are infected by means of IDU. Most individuals were diagnosed after attending hospital. Specific issues concerning elderly HIV infections in Taiwan, such as heterosexual predominance, high mortality, and fewer MSM, are similar with reports from other countries. The elderly had less variety than younger group in occupations. High mortality, high ratio of individuals who developed AIDS, and unsupported marital status serve as markers of elderly HIV-infected patients, and guide possible directions of social and health care interventions. Such infections will be an important issue in the future of Taiwan.

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