

Pathology of HIV Seropositive: Forensic Autopsy Study in a Tertiary Care Hospital, Bangkok, Thailand

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Objective: To retrospectively study the pathology of HIV seropositive in forensic autopsies.

Material and Method: Three hundred thirty five HIV seropositive cases, selected from 7,387 forensic postmortem inquests by law, were studied in Ramathibodi hospital between 2000 and 2010. The study topics were sex, age, cause of death, manner of death, and pathological features. Autopsies were done in 67 cases. The pathological features were classified into five groups, (a) HIV disease with infectious and parasitic diseases, (b) HIV disease with malignant neoplasms, (c) HIV disease with other specified diseases, (d) HIV disease with other conditions, and (e) HIV disease with unspecified pathology.

Results: The average prevalence of HIV seropositive cases was 4.5%. The peak was 10.0% in 2001 and gradually decreased until 1.8% in 2010. The ratio of male:female was 4:1. The most manner of death was natural death (83.6%). In unnatural death cases, the most frequently method was suicide by hanging. The prevalence of HIV group (a) to group (e) were 56.7%, 6.0%, 3.0%, 17.9%, and 16.4%, respectively. Pulmonary tuberculosis is the most common found in group (a) with frequency of 28.4%. Kaposi's sarcoma of skin, coronary atherosclerosis, and fatty change of liver were frequently observed in HIV group (b) to group (d), respectively. The pathology showed multiple pathological features in each group, i.e., group (a) pulmonary tuberculosis, pneumonia, disseminated fungal infection, brain abscess, and meningitis, group (b) Kaposi's sarcoma of skin and acute lymphoblastic leukemia, group (c) coronary atherosclerosis, chronic pyelonephritis, gastritis, and cirrhosis of the liver, and group (d) cardiomegaly, fatty change of liver, pulmonary edema, and splenomegaly.

Conclusion: HIV disease causes pathology of various organs. The severities vary from severe to asymptomatic disease. Five pathological patterns of HIV were established in this study that showed interesting topics, i.e., pulmonary tuberculosis was the most frequent and occurred (28.4%) in HIV disease with infectious and parasitic diseases while Kaposi's sarcoma of skin frequently occurred in HIV disease with malignant neoplasms. The decreasing rate of HIV transmitted infection in forensic postmortem may reflect the success of using antiretroviral drug treatment in the National AIDS program during the ten-year period of this study.

Keyword: Human immunodeficiency virus, Pathology of HIV/AIDS, Forensic autopsy, AIDS

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Acquired immune deficiency syndrome (AIDS) is a disease caused by human immunodeficiency virus (HIV) since late 1970s. The first case in Thailand occurred in 1984⁽¹⁾. HIV is a global epidemic transmitted by sexual contact, blood transfusion, mother-to-child transmission, and drug injection. Diagnosis is made by blood examination for anti-HIV that is positive within three to six months after exposure. It takes time, a few months to many years, before it reaches the AIDS phase⁽²⁾. Estimated number

of people living with HIV/AIDS in Thailand was 530,000 and estimated number of AIDS-related deaths was 28,000 people in 2009⁽³⁾. Diseases that characterize AIDS in HIV-infected people include opportunistic infections by viruses (*cytomegalovirus*, herpes simplex), bacteria (*mycobacterium tuberculosis*, gram-negative rods), fungi (*pneumocystis jiroveci*, *cryptococcus neoformans*), protozoa (*toxoplasma gondii*), opportunistic tumors such as Kaposi's sarcoma, and direct effects of HIV (HIV giant cell encephalitis and HIV enteropathy)⁽⁴⁾. In the authors' experience, a number of forensic postmortem examination cases were found with positive anti-HIV. The autopsies were done to search for the cause and manner of death. These cases showed many interesting pathological features. In the present study, pathology

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of HIV seropositive cases were analyzed using retrospective data from division of forensic medicine at Ramathibodi Hospital.

Material and Method

Between 2000 and 2010, 7,387 bodies from the central Bangkok area that were sent for forensic postmortem inquest, per section 148 of the criminal procedure code to the division of forensic medicine at Ramathibodi Hospital were studied. Prior to the autopsy, every case had to be checked for anti-HIV by standard method. Those methods were gel particle agglutination, micoparticle enzyme immunoassay, or chemiluminescence immunoassay at the Department of Pathology at Ramathibodi Hospital. There were 335 HIV seropositive cases. After reviewing the autopsy reports, 67 cases of HIV seropositive that had autopsy were included in the present study. The manners of death and causes of death of each case were indicated by the physicians using the data from autopsy, external examination, scene investigation, and clinical history. The prevalence of HIV disease in various variations was calculated. The associations between HIV seropositive cases and various risk factors such as sex, age, and manner of death were tested by Chi-square test. P-value less than 0.05 was considered to be statistical significance. HIV seropositive cases that were autopsied were classified into five groups that were (a) HIV disease with infectious and parasitic diseases, (b) HIV disease with malignant neoplasms, (c) HIV disease with other specified diseases, (d) HIV disease with other conditions, and (e) HIV disease with

unspecified pathology. The pathological features in each type were checked.

This document has been reviewed and approved by the committee on human rights related to research involving human subjects, faculty of medicine, Ramathibodi Hospital, Mahidol University (MURA2011/475).

Results

There were 335 (4.5%) HIV seropositive cases in forensic postmortem examinations during a period of 11 years. Most of them were Thai. Only seven cases were foreigners. The prevalence of HIV seropositive cases in each year varied from 9 to 60 cases or 1.8 to 10.0%. The peak was 10.0% in 2001 and gradually decreased until 1.8% in 2010 (Fig. 1). There were 268 males and 67 females. The ratios of male and female in each year varied from 2.5:1 to 8:1. The average male:female ratio was 4:1. The prevalence of HIV seropositive cases in male was more than female with $p < 0.01$ (5.0% in male vs. 3.3% in female).

The youngest age was three months and the oldest age was 87 years. The mean age was 37.9 years. The autopsies were more frequent in age of 31 to 40 years and 41 to 50 years with frequency of 10.1% and 8.4%, respectively. There was statistical significance in both age groups when compared with age groups of less than 30 years with $p < 0.001$. It was noticed that 10 children had positive anti-HIV between 2000 and 2004. After that no child had positive anti-HIV.

Fifty-five cases (16.4%) of HIV seropositive died from unnatural manner. Those were suicide,

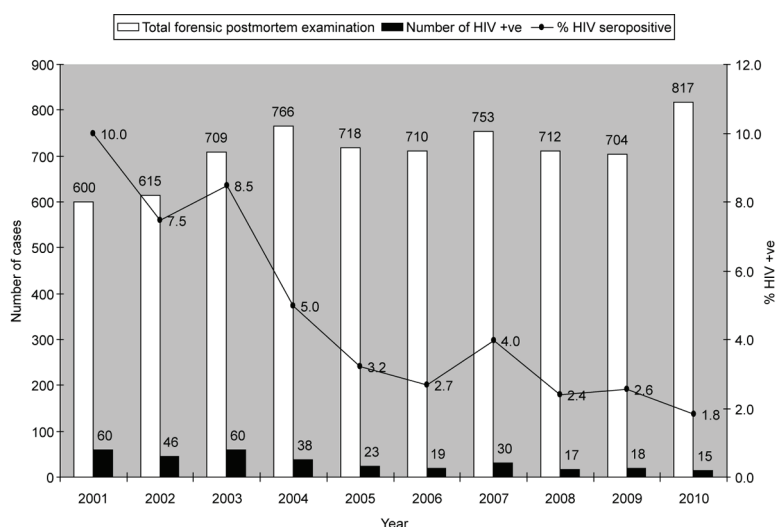


Fig. 1 Prevalence of HIV seropositive in forensic autopsies at Ramathibodi hospital during year 2001-2010

Table 1. Manner of death in HIV seropositive forensic postmortem examination

Manner of death	Number (n = 335)	% of HIV +ve
Natural death (died from disease)	280	83.6
Unnatural death	55	16.4
Unnatural death	Number (n = 55)	% of unnatural death
Suicide	24	43.6
Homicide	7	12.7
Accident	11	20.0
Undetermined	13	23.7

homicide, accident, and undetermined with frequency of 43.6%, 12.7%, 20.0%, and 23.7%, respectively (Table 1). Hanging and traffic injuries were commonly found in unnatural death with frequency of 34.5% and 16.4% of unnatural death, respectively. The remaining 280 cases (83.6%) died from diseases (natural death).

The prevalence and pathological features in each HIV classification are shown in Table 2. In group (a), the infectious microorganisms found included bacteria (*mycobacterium tuberculosis*, non-typhi *salmonella*, *streptococcus pneumoniae*, *klebsiella pneumoniae*, and *escherichia coli*), fungi (*cryptococcus neoformans* and *histoplasma capsulatum*), protozoa (*toxoplasma gondii*), and virus. Pulmonary tuberculosis was the most common pathological feature (19 out of 67 cases or 28.4%). It was noticed that the prevalence of pulmonary tuberculosis in HIV seropositive was high in age group of 21 to 30 years and 31 to 40 years with frequency of 26.7% and 46.6%, respectively (Table 3). In contrast with HIV seronegative, the frequencies of pulmonary tuberculosis were low in the same age groups, 4.6% and 7.0%, respectively. The occurrence of pulmonary tuberculosis in HIV seropositive was significantly higher in younger age group than HIV seronegative with $p < 0.05$ in age group of 21 to 30 years and $p < 0.001$ in age group of 31 to 40 years. The pathological features of group (a) revealed pulmonary tuberculosis, pneumonia, disseminated cryptococcosis, brain abscess, disseminated histoplasmosis, *salmonella* (non-typhi) septicemia, *streptococcus pneumoniae* septicemia, *klebsiella pneumoniae* septicemia, *escherichia coli* septicemia, acute bacterial meningitis, subacute bacterial endocarditis, toxoplasmosis, fungal infection of fingernails, viral meningitis, multiple microabscesses in lungs, kidneys, spleen, liver, and adrenal gland. Three cases had two infectious agents (*mycobacterium tuberculosis* with *salmonella* in

one case, with *cryptococcus* in one case and with toxoplasma in one case). Most HIV seropositive cases had more than one pathological feature mentioned above.

Pathological features of group (b) revealed Kaposi's sarcoma of the skin, acute lymphoblastic leukemia and squamous cell carcinoma of the posterior pharynx whereas coronary atherosclerosis, chronic pyelonephritis, gastritis, and cirrhosis of the liver were found in group (c). In addition, group (d) revealed fatty change of liver, pulmonary edema, splenomegaly, petechial hemorrhage in cerebral white matter, atrophy of the brain, acute splenitis, gastritis, chronic pleuritis, cardiomegaly, and glomerulosclerosis. Finally, group (e) showed unspecified pathology.

In children, there were seven males and three females with ages of three months to seven years. Four, one, and five cases were classified in the HIV group (a), (b), and (e), respectively. For group (a) in children, one had septicemia with three microorganisms (*streptococcus pneumoniae*, *klebsiella pneumoniae*, and *escherichia coli*), the other three had bronchopneumonia. For group (b) in children, acute lymphoblastic leukemia was identified from postmortem blood smear and clinical history.

Discussion

HIV/AIDS is a worldwide epidemic⁽⁴⁾. From Central Intelligence Agency World Factbook, the three highest prevalence of HIV found in Swaziland, Botswana, and Lesotho with more than 20% of the population infected. Recently, the prevalence of HIV in Asia, *i.e.*, Cambodia, Burma, Vietnam, Malaysia, India, Laos, Indonesia, Philippines, China, Hong Kong, Japan, South Korea, and Pakistan was less than 1% except Thailand where the prevalence of HIV was 1.4%⁽⁵⁾. Many programs for prevention and treatment of HIV/AIDS run by both government and non-government were established in Thailand. The

Table 2. Pathological features in HIV seropositive forensic autopsies (n = 67)*

Group of HIV	Pathological features	No. of case (%)
a) HIV disease with infectious and parasitic diseases (56.7%)	a1 Pulmonary tuberculosis	19 (28.4)
	a2 Pneumonia, interstitial	8 (11.9)
	a3 Cryptococcosis, disseminated	3 (4.5)
	a4 Brain abscess	2 (3.0)
	a5 Viral meningitis	1 (1.5)
	a6 Acute bacterial meningitis	1 (1.5)
	a7 Subacute bacterial endocarditis	1 (1.5)
	a8 Salmonella (non-typhi) septicemia	1 (1.5)
	a9 Streptococcus pneumoniae septicemia	1 (1.5)
	a10 Klebsiella pneumoniae septicemia	1 (1.5)
	a11 Escherichia coli septicemia	1 (1.5)
	a12 Histoplasmosis, disseminated	1 (1.5)
	a13 Fungal infection of fingernails	1 (1.5)
	a14 Toxoplasmosis	1 (1.5)
	a15 Multiple microabscesses in lungs, kidneys, etc.	1 (1.5)
b) HIV disease with malignant neoplasms (6.0%)	b1 Kaposi's sarcoma of the skin	2 (3.0)
	b2 Acute lymphoblastic leukemia	1 (1.5)
	b3 Squamous cell carcinoma of the posterior pharynx	1 (1.5)
c) HIV disease with other specified diseases (3.0%)	c1 Coronary atherosclerosis	2 (3.0)
	c2 Gastritis	1 (1.5)
	c3 Cirrhosis of the liver	1 (1.5)
	c4 Chronic pyelonephritis	1 (1.5)
d) HIV disease with other conditions (17.9%)	d1 Fatty change of liver	5 (7.5)
	d2 Pulmonary edema	3 (4.5)
	d3 Splenomegaly	3 (4.5)
	d4 Atrophy of the brain	2 (3.0)
	d5 Petechial hemorrhage in cerebral white matter	2 (3.0)
	d6 Cardiomegaly	1 (1.5)
	d7 Acute splenitis	1 (1.5)
	d8 Chronic pleuritis	1 (1.5)
	d9 Glomerulosclerosis	1 (1.5)
e) HIV disease with unspecified pathology (16.4%)	-	11 (16.4)

* Some cases found more than one pathological features

prevalence of HIV/AIDS in Thailand had fallen from 3.4% in 1992 to 1% in 2009^(6,7). In Thailand, more than 150,000 cases have been treated with antiretroviral drugs under support of the national AIDS program (NAP)^(7,8) resulted in continuously reducing in prevalence of HIV infection. Male has out-numbered female and 31 to 50 years is the most prevalent age-

groups found in both HIV/AIDS diagnoses and in deaths following AIDS in many countries^(9,10). Similar findings were also observed in the present study that male was more than female and age of 31 to 50 years was more frequently observed than other age groups. In addition, the decreasing number of overall HIV seropositive cases especially in childhood in the present

Table 3. Comparison of age in pulmonary TB with HIV seropositive and HIV seronegative forensic autopsies

	Pulmonary TB in HIV -ve (n = 43) n (%)	Pulmonary TB in HIV +ve (n = 15) n (%)	p-value
21-30 yr	2 (4.6)	4 (26.7)	<0.05
31-40 yr	3 (7.0)	7 (46.6)	<0.001
41-50 yr	11 (25.6)	2 (13.3)	
51-60 yr	13 (30.2)	1 (6.7)	
61-70 yr	6 (14.0)	0	
71-80 yr	4 (9.3)	0	
> 80 yr	3 (7.0)	0	
Unknown	1 (2.3)	1 (6.7)	
Average	55.5 yr	35.4 yr	

* Number of pulmonary tuberculosis with HIV seronegative autopsies from year 2008-2010

study will support the success of the prevention and treatment programs for HIV/AIDS in Thailand. Many people living with HIV and AIDS diagnosis committed suicide^(11,12). A high suicide rate, 24 cases, was observed in 55 unnatural deaths with positive anti-HIV in the present study (24/55 cases or 43.6%).

Postmortem pathological features of HIV were established in this study that summarized as follows, *i.e.*, group (a) revealed pulmonary tuberculosis, pneumonia, disseminated fungal infection (cryptococcosis and histoplasmosis), septicemia, meningitis, endocarditis, brain abscess, and multiple microabscesses in several organs; group (b) revealed Kaposi's sarcoma of the skin, acute lymphoblastic leukemia and squamous cell carcinoma of the pharynx; group (c) revealed coronary atherosclerosis, chronic pyelonephritis, gastritis and cirrhosis of the liver; and group (d) revealed fatty change of liver, pulmonary edema, splenomegaly, petechial hemorrhage in cerebral white matter, atrophy of the brain, acute splenitis, chronic pleuritis, cardiomegaly and glomerulosclerosis. These observations were similar to those reported by other investigators^(7,8,13-21).

Conclusion

HIV disease causes pathology of various organs. The severities vary from severe to asymptomatic disease. Five pathological patterns were established in this study, *i.e.*, pulmonary tuberculosis, disseminated cryptococcosis, disseminated histoplasmosis, toxoplasmosis and pneumonia in group (a); Kaposi's sarcoma of the skin, acute lymphoblastic leukemia and squamous cell carcinoma of the pharynx in group (b); coronary atherosclerosis in group (c); and fatty change

of liver, pulmonary edema and splenomegaly in group (d). Group (e) still has unknown pathology.

Potential conflicts of interest

None.

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พยาธิสภาพของการติดเชื้อโรคเอดส์: ศึกษาจากการชันสูตรศพคดีจากโรงพยาบาลตติยภูมิแห่งหนึ่งในกรุงเทพฯ ประเทศไทย

วิชาญ เปี้ยวนิม, กาญจนา สุจิระชาโต, สมิทธิ ศรีสนธิ, จิตตา อุดหนุน

วัตถุประสงค์: เพื่อศึกษาพยาธิสภาพของการติดเชื้อโรคเอดส์จากการชันสูตรศพคดี

วัสดุและวิธีการ: ได้ศึกษาเชิงพรรณนาย้อนหลังจากรายงานการชันสูตรศพคดีจำนวน 7,387 ราย ที่หน่วยนิติเวช ภาควิชาพยาธิวิทยา คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี ระหว่างปี พ.ศ. 2543 ถึง พ.ศ. 2553 ที่ตรวจพบการติดเชื้อโรคเอดส์จำนวน 335 ราย โดยจำแนกความสัมพันธ์ของการติดเชื้อโรคเอดส์กับเพศ, อายุ, สาเหตุการตาย, พฤติการณ์การตาย และพยาธิสภาพที่ตรวจพบ โดยได้จัดกลุ่มจำแนกตามพยาธิสภาพเป็น 5 กลุ่ม ดังนี้ (1) พบร่วมกับโรคติดเชื้อต่างๆ (2) พบร่วมกับโรคมะเร็ง (3) พบร่วมกับโรคอื่นๆ (4) พบร่วมกับภาวะอื่นๆ (5) ไม่พบพยาธิสภาพเฉพาะใดๆ

ผลการศึกษา: จากการวิเคราะห์ผลชันสูตรศพคดีที่หน่วยนิติเวช ภาควิชาพยาธิวิทยา คณะแพทยศาสตร์โรงพยาบาลรามาธิบดี ระหว่างปี พ.ศ. 2543 ถึง พ.ศ. 2553 จำนวน 7,387 ราย พบว่ามีผู้เสียชีวิตที่ตรวจเลือดพบ anti-HIV 335 ราย คิดเป็นร้อยละ 4.5 โดยพบสถิติสูงสุดในปี พ.ศ. 2544 ร้อยละ 10 แล้วย่อยๆ ลดลงเหลือร้อยละ 1.8 ในปี พ.ศ. 2553 ในจำนวนนี้เป็นผู้ชาย 268 ราย และผู้หญิง 67 ราย อัตราส่วน ชาย:หญิง = 4:1 อายุระหว่าง 3 เดือน ถึง 87 ปี อายุเฉลี่ย 37.9 ปี พบว่าเป็นเด็กที่มีอายุน้อยกว่า 10 ปี ในปี พ.ศ. 2543 ถึง พ.ศ. 2547 จำนวน 10 ราย พฤติการณ์การตายส่วนใหญ่เป็นแบบธรรมชาติคือเสียชีวิตจากโรค เสียชีวิตโดยผิดธรรมชาติ จำนวน 55 ราย (ร้อยละ 16.4) ได้แก่ การฆ่าตัวตาย, อุบัติเหตุ, ถูกทำร้าย วิธีฆ่าตัวตายที่พบบ่อยคือ แขนงคอก ศพที่ตรวจพบการติดเชื้อ HIV ได้ทำการผ่าศพชันสูตร 67 ราย และได้จำแนกพยาธิสภาพที่ตรวจพบเป็น 5 กลุ่ม ดังนี้ (1) พบร่วมกับโรคติดเชื้อ 38 ราย (ร้อยละ 56.7) โรคติดเชื้อที่พบมากที่สุดคือ วัณโรคปอด ซึ่งพบเกือบ 1 ใน 3 (ร้อยละ 28.4) โรคติดเชื้ออื่นๆ ได้แก่ ปอดอักเสบ, cryptococcosis, histoplasmosis, toxoplasmosis และ salmonellosis, (2) พบร่วมกับโรคมะเร็ง 4 ราย (ร้อยละ 6.0) โดยโรคมะเร็งที่พบ ได้แก่ Kaposi's sarcoma, acute lymphoblastic leukemia และ squamous cell carcinoma, (3) พบร่วมกับโรคอื่นๆ 2 ราย (ร้อยละ 3.0) เช่น coronary atherosclerosis, (4) พบร่วมกับภาวะอื่นๆ 12 ราย (ร้อยละ 17.9) เช่น fatty change of liver, pulmonary edema, splenomegaly และ (5) ไม่พบพยาธิสภาพที่เฉพาะต่างๆ 11 ราย (ร้อยละ 16.4) โรคติดเชื้อที่พบร่วมกับโรคเอดส์มักพบการติดเชื้อร่วมกันมากกว่า 1 ชนิด เช่น พบวัณโรคปอดร่วมกับการติดเชื้อรา เป็นต้น

สรุป: พยาธิสภาพที่พบร่วมกับการติดเชื้อโรคเอดส์ ที่พบได้บ่อยในแต่ละกลุ่มคือ การติดเชื้อวัณโรคปอด การเป็นมะเร็งชนิด Kaposi's sarcoma โรคที่พบร่วมบ่อยคือ coronary atherosclerosis และ fatty change of liver เป็นภาวะอื่นๆ ที่พบร่วมบ่อยที่สุด ซึ่งพยาธิสภาพที่พบบ่อยนี้คล้ายกับรายงานอื่นๆ ทั้งในและต่างประเทศ โดยเฉพาะวัณโรคปอดพบได้สูงสุดถึงร้อยละ 28.4 และจากการศึกษาพบว่าอัตราการติดเชื้อโรคเอดส์ลดลงในช่วง 10 ปีหลัง ก็น่าจะสะท้อนถึงผลสำเร็จของโครงการโรคเอดส์แห่งชาติ ที่ได้ให้การรักษาผู้ป่วยด้วยยา antiretroviral มาอย่างต่อเนื่องจนถึงปัจจุบันนี้