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HIV: A WEAPON OF CRIME AND ITS PHYLOGENETIC ANALYSIS

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ABSTRACT

AIDS is the most lethal disease affecting mankind in current times. It is the final stage of the infection, caused by HIV. This deadly disease can be transmitted to a healthy individual through body fluids, placenta, tattooing, unprotected sexual intercourse, etc. It can spread accidentally or intentionally. The World Health Organization (WHO) estimates that around 34 million people in the world are living with HIV and 1.8 million died of AIDS-related illnesses worldwide in 2010. An increasing number of HIV infected people are being prosecuted for transmitting the virus to their sexual partner(s). As widely reported by sundry media houses, criminal journals, print media and above all in true light of the day there has been a deliberate endeavor or case of recklessness / intentional attempt to transmit virus to non infected Homo sapiens. The three categories of HIV transmission in the context of the law are intentional, reckless, and accidental. Intentional transmission is considered as the most serious form of criminal transmission and some of the individuals concerned have even been imprisoned. Some cases have reported individuals who have used needles or other implements to intentionally infect another individuals with HIV. While some have been established on HIV affirmative individuals who have had sexual relations with the primary intent of transmitting the virus to their partner. This review paper aims to focus on how HIV is being used as a bio-weapon and how transmission of the disease can be linked to the virus employing Phylogenetic Analysis. Thus, Phylogenetic analysis can be utilized as forensic evidence in criminal HIV transmission prosecution.

Keywords: HIV, Criminal Transmission, Phylogenetic Analysis.

INTRODUCTION

Human immunodeficiency virus infection - acquired immunodeficiency syndrome (HIV-AIDS) is a disease of the human immune system caused by infection with human immunodeficiency virus (HIV). HIV is the mainspring of the rainbow of epidemic avowed as HIV-AIDS. Predominantly the human immune system constituents like macrophages, dendritic cells and CD4⁺ T cells are contaminated owing to HIV, which is a retrovirus. There are two classifications of HIV: HIV-1 and HIV-2. Most pernicious being HIV-1, is more easily instilled and contributes to majority of HIV infections

globally. Both types of HIV impair a person's body by destroying definitive blood cells.

HIV is disseminated primarily via unprotected sexual intercourse (entailing sonant and even anal sex), hypodermic needles, infected blood transfers, wet-nursing and from infant bearer to infant during pregnancy, labor or breast feeding. Upon any less condition than being contaminated with blood, exposure to the following does not pose any threat of amassing HIV: Regurgitate, Sudor, Sputum, Nasal Suppuration, Feculence, Tears or Urine. Dilatorily stage of HIV infection is called AIDS, person's immune system it gravely damages and has difficulty fighting diseases and

certain cancers. AIDS is the most lethal disease affecting mankind in current times. The WHO estimates that around 34 million people in the world are living with HIV and 1.8 million died of AIDS-related illness worldwide in 2010.

Criminal Transmission of HIV

There has been constant reporting by sundry NGO's and gregarious groups about the rapid increase where in the HIV positive people are inculpated and constant prosecution proceedings are being initiated on the charge of transmitting infection/virus to the partners with whom they indulge sexually. Criminal Transmission of HIV is differentiated into three categories - Intentional, Reckless or Accidental in context to law.

Intentional or deliberate or willful transmission of HIV means intentional transmission of virus from the infected person to the uninfected person. The reason for intentional transmission can be revenge to a person or society by various modes such as use of unprotected sexual intercourse, needles and other implements. There are also some rare cases where negative partner has an active desire to become infected with HIV (no prosecution in this case because it was consensual).

Reckless or careless act of transmission of HIV is the act of transmission of virus by the infected person to the uninfected person out of sexual gratification or having unprotected sex but fails to inform about the HIV positive status.

Accidental transmission of HIV is the act of transmission of virus by having unprotected sex without being aware of the HIV status or upon the partners being aware, use of protection (condoms) that failed.

Cases where deliberate or criminal intention on part of any HIV infected person transmitting infection to non- infected person even if prime facie comes to light then in such cases "law of land of that individual's homeland prevails". In some locations there is no differentiation amongst the two.

In addition to HIV a new virus has been detected that is sweeping the world and that is HIL (Highly

Ineffective Laws). The adoption of a large number of laws relating to punish persons convicted of transmitting HIV to others, in the past five years or so, different countries have added a new factor to the HIV epidemic.

HIV-AIDS is not a commonplace health status. It is an exceptional global pandemic with numerous communal and legal implications. Safe sex is advised even when both partners are HIV positive. Infection with HIV is such a life changing event that people get angry at such conduct, they look for retribution and punishment, thus a suggestion of willful, deliberate or completely reckless transmission of HIV to a sexual partner. With the exception of cases where individual actually intends to do harm, criminalizing HIV transmission does not empower people to avoid HIV infection. In fact it may make it more difficult for them to do so endangering both public health and human rights.

Countries with laws and prosecution for Criminal Transmission of HIV:

Approximately 600 people living with HIV in 24 countries have been convicted of criminal transmission of HIV till 2010. The conviction was either through general laws relating to assault or through HIV-specific legislation. Since every nation enjoys sovereignty and therefore have their own criminal laws. It is therefore, worth mentioning that quantum of punishment on conviction after following due process of law varies country to country where the judicial prosecution takes place.

United States of America

American states have prosecuted HIV positive individuals for criminal transmission or HIV exposure, with many laws specifically mentioning HIV. Quantum of punishment on conviction varies from severe to even more severe if it is proved that accused had complete knowledge of his being a carrier of HIV, even though aware of this fact he forgoes and indulges in sexual act whether by means of prostitution or in case of rape. Spitting or emitting HIV-infected bodily

fluids at another person while in prison is also an offence in some states. Prosecution of an accused can be initiated irrespective of the intention which in such cases is irrelevant if an accused chose not to disclose about his being HIV positive to his sexual partner.

United Kingdom

There are numerous citations in England and Wales where there have been conviction of accused under Section 20 of Offences against the Person Act (OAPA) 1861. In 2010, the Association of Police Officers issued guidance for police investigating the criminal transmission of HIV. Under the new guidelines, people living with HIV in Wales, England and Northern Ireland can expect an investigation of reckless transmission by the police only to be pursued if a complainant has been infected with HIV.

West Africa

Several nations in West Africa have adopted HIV laws based on a 'model law' formulated in 2004 by Action for West Africa Region - HIV/AIDS (AWARE-HIV/AIDS). Willful transmission of HIV has been identified as an offence prescribed under Article 36.

Australia

In Australia where a law is even more stringent and therefore any criminal transmission of HIV is dealt within ambit of criminal law as well as public health also. Various sovereign states to curb the menace of reckless or deliberate attempt to transmit HIV have also formulated various public health laws. Australian state criminal laws that would likely apply to HIV transmission include criminalizing actions that convey, or risk transmitting, a grave disease (including HIV), recklessly threatening another person's life or instating grievous whole body harm.

India

Many cases have been reported of HIV criminalization but there are no specific laws dealing with prosecution and penalization of such cases. Presently the cases are being registered under section 269 (Negligent act likely to spread

infection of disease dangerous to life) and section 270 (Malignant act likely to spread infection of disease dangerous to life) of IPC. There is a bill titled The HIV/AIDS Bill, 2007 which provides the protection and promotion of human rights in relation to HIV/AIDS. It promotes avoidance, perception, care, support and remedy programmes to command the disperse of HIV. Its section 99 states that all offences under this Act shall be tried summarily in the manner provided for summary trial under the Code of Criminal Procedure, 1973 (2 of 1974).

Some Cases Reported in India

A case of deliberate transmission of HIV was filed against a man (Doctor) by his wife in Nandurbar town in Nashik district of Maharashtra, India (2004) in which it was alleged that the person injected HIV infection to his wife and daughter to get rid of them.

A case of reckless transmission of HIV was reported in December, 2007 in Bombay, India in which the police refused to register a complaint from a woman against a HIV positive husband as he had not disclosed his HIV status before marriage.

Another case of criminal HIV transmission was reported in April, 2008 in Tamil Nadu, India against a man who allegedly raped two minors and infected them with HIV.

Very recently in August, 2013 an incidence of negligence or reckless transmission of HIV has been reported in Guwahati, Assam. In this case the officials have done transfusion of HIV positive blood to four patients at Daarang Civil Hospital. The officials are alleging that the patients were HIV positive prior to the transmission but the locals says that a HIV positive person has been donating blood in the blood bank.

A study was conducted for identifying factor associated with transmission of HIV from Injecting Drug Users (IDU) to their non injecting wives in Manipur, India which concluded that 45% of the wives were HIV positive. Transmission of HIV from injecting drug users to

their wives was analyzed in Manipur, North-east India, where the prevalence of HIV among IDUs is 80% during September 1996 to August 1997. However a solid conclusion could not be made then due to lack of reliable analytical techniques. How then can we establish a solid relationship between the various HIV strains to determine the direction of transmission? The transmission of HIV can be determined using Molecular Genetic Techniques and one of them is Phylogenetic Analysis.

Phylogenetic Analysis

Phylogenetic assay has taken boost connotation as lawfully admissible clues in the following and inquisition of happenings premier to HIV infections, also known as HIV forensics. Scant discordance in HIV's genes is scrutinized by means of Phylogenetic assay, utilizing computational procedures to calculate the genetic expanse between strains.

It can determine the degree of relatedness of two samples of HIV. Increased amount of genetic diversity is also owing to the fact that HIV's RNA transforms at a much higher pace than that of a human DNA, which for the entire lifespan remains constant and stable. This diversity means that researchers, utilizing Phylogenetic analysis have been able to establish where HIV comes from, as well as pathway the various strains of HIV that exist worldwide.

Assay of multiple genetic clones from each individual can invigorate the recommended reciprocity when a simple Phylogenetic tree is evocative of genetic congruence between viruses conveyed by the two individuals.

Phylogenetics acts as an important tool in the event of criminal HIV transmission. To aid criminal transmission trial in 1998 Schmidt's case, Phylogenetic or evolutionary analysis were utilized for the first time ever. Additionally the analysis helped in determining source of infection for five patients treated by Florida dentist, Dr David Acer, who was HIV positive. Since then it has been utilized as a component of the overall

evidence in several HIV criminal transmission tribulations in the Amalgamated States, including a 2004 case in Washington and a 2009 case in Texas.

Basically HIV-1 isolates are classified in three groups: M, O and N group (Figure 1), of which group M is responsible for majority of infections in the HIV-1 worldwide epidemic. The group M can be further subdivided into 10 recognized Phylogenetic subtypes or clades {A - K, excluding E, which is actually a Circulating Recombinant Form (CRF)}. HIV-1 Phylogenetic collocations are presently established either on nucleotide array imitative from multifarious sub genomic regions- *gag* (group antigens), *pol* (reverse transcriptase, RNase H and integrase activity) and *env* (envelope protein) of the same isolates or on full-length genome sequence analysis. These regions can be used to distinguish between different HIV isolates and establish relatedness between them.

The skyward proclivity in global HIV-1 variegation has continued tenaciously, with newer groups, subtypes, and exclusive and circulating recombinants increasingly being described, particularly in Africa. West Central Africa, which is the epicenter of AIDS, shows a very diverse population of HIV-1 subtypes with A (A1, A2, A3, A4, A5), C, CRF02_AG, and D responsible for about 85% of new infections. Subtype A and D appear to be the dominant strains in Eastern Africa, while subtype C has remained stable in Southern Africa. Western Africa shows a high stability for A, G, CRF02_AG, and CRF06_cpx, and as for the Northern region of the continent, subtype B and CRF02_AG are the dominant recombinants. Two citizens from Republic of Cameroon were reportedly found to have a unique suppositional group, designated P in the recent past.

In Bolivia, Phylogenetic analysis of *env* and *pol* regions confirmed the predominance of subtype B (72.5%). Molecular typing followed by Phylogenetic analysis of *gag* gene in HIV strains in Bangladesh indicated that subtype C was the

predominant type, causing 41% of the HIV infections in the country.

In Finland and Estonia, 30 patients were analyzed for their *gag p7/p9* coding regions using Solid Phase Direct Sequencing to determine genetic subtype of HIV-1 strains. Proviral perpetuity was found to embody at smallest four, (even five) disparate, highly diverged foremost lineages.

In Punjab, a fragment encompassing C2/V3-V5 regions of HIV-1 gp120 (650bps) was amplified and analyzed from lymphocytes of 12 Indian patients. It was concluded that the predominant strain of HIV-1 in India belongs to subtype C and little inter-patient nucleotide sequence divergence in the majority of cases could be suggestive of recent spread of HIV-1 in this region.

In Italy, Phylogenetic characterization was performed on HIV-1 variants during 1995-2005, wherein C2-V5 and p17 of *env* and *gag* amplified respectively. The average divergence in *env* C2-V3 region was found to be 18.08% and in *gag* p17 it was 11.13%. Phylogenetic analysis on *pol* and *env* sequences of HIV-2 strains was also done and *env* V3 region showed more similarity to group B viruses.

DISCUSSION

Thus the regional distributions of individual subtypes and recombinants although broadly stable, also show an increasing diversity and this knowledge can be exploited in HIV forensics. And although current data does not allow a clear, accurate estimation of the direction of transfer, Phylogenetic analysis can be and has recently been used in criminal trials as evidence of responsibility for HIV transmission to at least exonerate individuals and exclude the possibility that the defendant was responsible for HIV transmission.

In India, not much research work has been done on HIV forensics. Also, there are no specific/special laws criminalizing knowing exposure to or transmission of HIV. Phylogenetic analysis of various HIV isolates in the country could help set up an accessible database providing information

about the regional distribution of the subtypes. This could be further employed to understand the recombination events and thereby establish a link to the direction of transfer of the virus. This along with effective enforcement of appropriate laws will help in the arrests, prosecutions, convictions and sentencing in cases of criminal transmission of HIV in the country.

CONCLUSION

From the above studies and reports cited we can infer that there are many countries which have laws for the prosecution for criminalizing the spread of HIV virus with or without intention. Country's like USA has already used Phylogenetic analysis for the prosecution of crimes related to transmission of HIV. In India, there are laws for the protection of rights of the people living with the menace of HIV but there are no specific laws criminalizing the spread of HIV. There is also a need of applying Phylogenetic analysis for legal prosecution in cases of criminal transmission of HIV.

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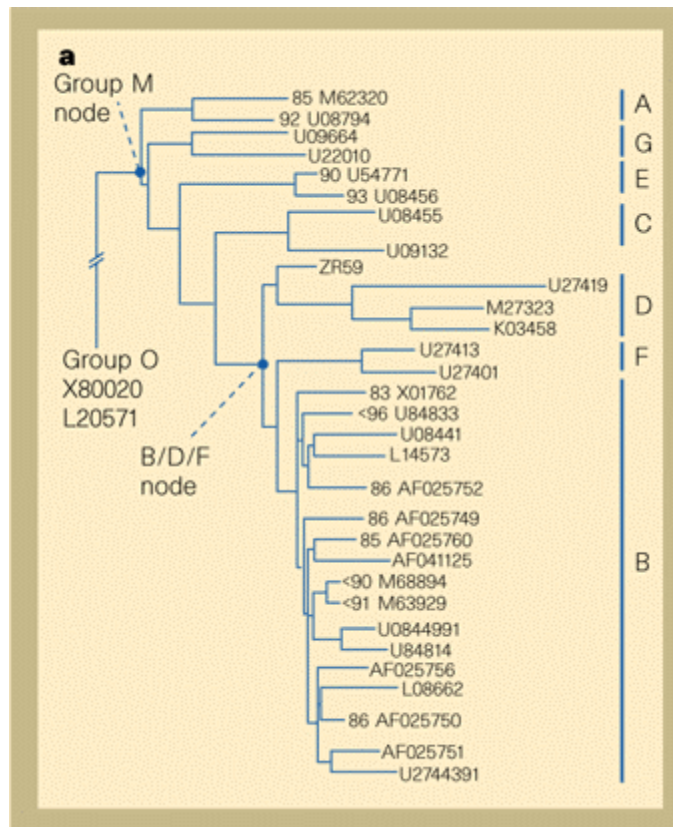


Figure 1: Phylogenetic Tree showing Group M, N and O in HIV-1.