Acquired Human Immunodeficiency Syndrome and its Contributing Factors. A REVIEW ARTICLE

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ABSTRACT: This study attempted to examine the different aspects of AIDS and its multiple contributing factors, reflecting that AIDS is one of the greatest public health issues in many countries over the twenty-first century. Moreover, this study involved an analytical review of latest relevant papers throughout the world and search for keywords such as AIDS, HIV, disease, protease gene, infection, lymphocyte cells, CD 4, addiction, sexuality on several authentic scientific databases including Google Scholar and SID. As one of the greatest public health issues in many countries over the twenty-first century, AIDS is caused by human immunodeficiency virus (HIV) affecting all internal systems even the intellectual and social capabilities. HIV infection is associated with risky behaviors such as unprotected sex and injection drug use. Sex is the major way of spreading AIDS in the world.

Keywords: AIDS, HIV, lymphocytes, CD 4, sexual relations

INTRODUCTION

HIV/AIDS infection is perhaps the most important public health challenge in the past two decades (1). There have been cases of the disease reported from every country. Nowadays, it is regarded as one of the incurable diseases within the category of infectious diseases (2). Acquired immunodeficiency syndrome has made it into its third decade of emergence, becoming a pandemic disease threatening the entire population of the world. This disease is caused by human immunodeficiency virus (HIV) affecting all internal systems even the intellectual and social capabilities (3). AIDS pandemic can have destructive effects from the socioeconomic standpoint, especially in some countries in sub-Saharan Africa where the foundation of family collapses, production rate dramatically declines and life expectancy significantly drops (4). It is virtually impossible to treat the epidemiological AIDS patients since there are no effective vaccine available (5).

HIV virus

It is a member of retroviridae, a spherical particle with a diameter of about 100 nm, entailing a positive-polarity genome and lipid capsule comprising two layers of fat molecule originating from plasma membrane of the host cell during germination of viral particles (6, 7). HIV has an extreme rate of genetic mutations due to RT enzyme dysfunctional error (8).

Human immunodeficiency virus type 1 protease gene in patients with AIDS

Use of antiretroviral drugs can have a major impact in controlling the progression of the disease. In recent years, however, the emergence of drug-resistant strains have given rise to many concerns about effective antifungal therapy (9). The key factors associated with treatment failure include non-adherence to medication, inappropriate administration of drugs (10), dampened pharmacological effects of antiretroviral agents and most importantly the emergence of mutations associated with drug resistance (11). So long as the virus is able to continue proliferation in the presence of medication, drug-resistant strains will develop (12). Currently, all strains of the virus are able to develop resistance against all antiretroviral agents (13). Drug resistance in an individual depends on two factors: genetic diversity and recombination. Genetic diversity of HIV reverse lies in inability of reverse transcriptase to correct its errors (14). Studies have shown that drug resistance will develop after two years of treatment in 10% of patients who take medication. Additionally, about 30% of patients who have at least one mutation associated with resistance will experience treatment failure after six years (15). A drug-resistant virus can be transmitted from one person to another, leading to a public
health concern. Various studies have reported different rates of transmissions for drug-resistant strains ranging from below 10 percent in Europe and 15 percent in North America (16). Genotypic drug-resistance tests have been widely used to reflect resistance levels in the world, as an important factor in prescription of regimen for the patient (17). Studies have shown there are two way ways for developing Klatra resistance, one of which is similar to indinavir resistance developed through mutations M46I/L, I54V/L/M/A, and V82A/T/F/S (18,19) while the other is similar to fosamprenavir developed by mutations L76V, V32I, I47A/V and I50V (20,21). In one sample, Klatra resistance is extremely high, which is due to mutations in codons of L90M, I84V, V82A, I54V and M46I. Mutations V82A, I54V and M46I are categorized within the Klatra-resistant mutations. When these three mutations occur simultaneously, there will be moderate levels of resistance to Klatra (22).

L90M and I84V fall under minor mutations. These mutations can develop with low-level resistance against drugs. However, other studies have shown that there will be high-level Klatra resistance if those mutations are combined with main category mutations (23).

In another sample, there was Klatra resistance at moderate level where mutations V32I and I47A occurred (24). However, if it occurs through V32I mutation, it will develop Klatra resistance at a moderate level (25, 26).

Sexual relations and AIDS

HIV infection is associated with risky behaviors such as unprotected sex and injection drug use. Sex is the major way of spreading AIDS in the world. In fact, 85 percent of new cases of HIV are infected this way in Iran (27), where most of the viral transmission modes are drug injection and sexual contact, both of which are listed as high-risk behaviors (28).

Given the medical advances bringing about higher life expectancy for patients, prevention efforts in recent years have focused on AIDS. Patients may be exposed to risky behaviors and a weak immune system puts them more vulnerable to sexually transmitted diseases. It stresses the importance of health interventions in these patients (29, 30 and 31). Behavior and experience can put individual at high risk where transmission of the disease requires a behavioral process. As for the prevention, it is therefore crucial to evaluate high-risk behaviors in patients (32). Based on studies around the world, risky sexual behaviors in people with HIV persist as and their sexual partners are exposed to HIV and other sexually transmitted diseases (33). Moreover, drug and alcohol use is common in these patients (34), most of whom noted high risk behaviors before infection, expressing that they regretted and gave up risky behavior afterwards. Sense of remorse was evident in the statements of these patients. Nevertheless, since they were mostly single further high-risk behavior could aggravate the chances of spreading the disease to other people. Because the disease spreads through risky behavior and cannot be controlled by immunization, there are behavior change strategies adopted to prevent its transmission (35). In a study by Farhadi and Masoudi, most patients used condoms during sex, always pointing out their problem when there was the possibility of transmitting the infection to others (36). In a study by Zareban et al. on Chabahar sailors, most of the subjects never used condoms during sex with strangers on their trips (37). In a cross-sectional study conducted in Sao Paulo, the use of condoms in patients prior to diagnosis was 22.6-34.7 percent. More patients in this study were at the risk of disease prior to the diagnosis, due to lower rate of condom use (38).

Hence, the early diagnosis can prevent the continuation of risky behavior encouraging people to be tested for disease, which is in turn one of the prevention strategies. There are three approaches to controlling the disease: prevention, treatment and research (39).

Addiction and human immunodeficiency virus infection

Drug users are at a higher risk of infection by the human immunodeficiency virus than the general population (40). Over the past decade, there has been a significant increase in drug abuse especially among the unemployed. Moreover, the consumption method has shifted from inhalation to injection (41). Injection drug use (IDU) plays an important role in transmitting blood infections among injection drug users. One of the most important factors for HIV infection among injection drug users is the injecting tool (42, 43). Young people who inject drugs are at greater risk of developing viral infections such as HCV, HIV and HBV due to repeated injections through syringe and other common items, being victim of sex trade in exchange for money or drugs (44, 45). After injection risks, risky sexual behavior is associated with transmission of HIV infection (46). Moreover, injection drug users with risky sexual behavior are more likely to contract HIV infection (47). However, the highlighted risks of injection have often underestimated the risks of transmission through sexual relations among injection drug users (48). HIV infection is an epidemic issue in Eastern Europe where it can be found among IDUs and their sex partners (49). Russian Studies indicated that injection drug use and its association with HIV transmission is the main health problem in Russia, accounting for about 80% of AIDS cases (50, 51). It has been estimated that 3 million people (3% of the total adult Russian population) have used addictive substances, while about 2% of Russian adults are injection drug users (52). Moreover, studies in
China have suggested that a sexual high-risk behavior among injection drug users is typical among Chinese many of whom are vulnerable to infectious disease transmission (53).

In Iran similarly, most cases of HIV infection or AIDS (about 62 percent of reported cases) have been diagnosed among injection drug users (54). The results of a study in Mashad showed that among 101 imprisoned IDUs, 7 percent of patients had HIV infection. Among 222 IDUs attending treatment centers, none were infected. Moreover, injection drug users HIV+ (100%) were more likely to share needles or syringes compared to uninfected drug users (7.44%) (55).

**Acquired immune deficiency syndrome and T lymphocyte cells**

Acquired immune deficiency syndrome (AIDS) is caused by infection with immune deficiency virus (56). The main target of the virus is T lymphocyte cells entailing protein CD 4 in their membrane surface. This disease covers a wide range from a mild viremia to severe immunity defects associated with life-threatening opportunistic infections and AIDS-related malignancies (57).

**Pediatric AIDS**

Pediatric AIDS in Iran is still an unknown disease and most pediatricians even in specialized relevant fields have little experience and knowledge about the disease. In an IranMedex search, there was only one article about pediatric HIV where Dr. Almasi et al. reported 5 HIV-infected children (58).

It was assumed until recently that a small number of children with perinatal HIV (untreated) live longer than 5 years. Later studies, however, indicated that 17 percent of the children reach 15 years of age without treatment. It seems that children who are infected after birth through breast milk and in utero tend to be more prone to slow progression of HIV compared to cases who contracted the virus during birth or in utero. In this group, maximum virus count in the serum of infants was less than that of the group affected through in-utero or during delivery. Contrary to expectation, the percentage of HIV-positive children has escalated at a slow rate across Africa than in developed countries. In Africa, 1.3% of children with perinatal HIV have slow progression with an average life expectancy of 16 years without treatment. It seems that such discrepancy arises from the fact that HIV transmission in developing countries does not practically take place through breast milk, since all HIV-positive children were affected during or before childbirth, while up to half of HIV-positive children in less developed countries are infected through breast milk (59). In a 69-member group of Latin American young and adolescent people with perinatal HIV, 28% were first diagnosed with HIV after 10 years of age (60).

**Blood transfusion and AIDS**

In 1818, the first human blood transfusion was administered directly by needle from a donor to the recipient (61).

The risk of blood transmitted infections of these viruses depends on incomplete sensitivity to screening tests available varying from 90 percent in case of hepatitis C to more than 99 percent for HIV, and window phase covering the acute stage of infection until diagnostic tests are positive (62).

The remaining risk of blood-transmitted diseases arises primarily from donors at infection window non-diagnosable through serologic screening, while the greatest objective of transfusion medicine is to reduce the risk of these infections is (63, 64). Nowadays, the safety of stored blood in any country depends on the quality of screening measures. The potential risk of blood-transmitted diseases can be estimated based on review of reported blood donation cases, screening measures and prevalence of serological markers of infectious diseases. For that reason, blood transfusion organizations have arranged educational programs and screening methods serving to curtail the risk of transfusion-related infections (65). In Iran, according to the results of a study by Alavian (2002), the prevalence of Hepatitis C among blood donors was 1 percent (66). According to studies during 1991 to 1998 on 80% of American donors were regular. Moreover, the prevalence of viral infections in first-time donors was higher than that of regular donors (67).

**AIDS and CD 4**

AIDS is caused by a retrovirus called human immunodeficiency virus (HIV) characterized by severe suppression of cell-mediated immunity followed by the development of opportunistic infections and secondary cancers as well as neurological protestations. Once in the bloodstream, this virus binds to the cells entailing that membrane protein, due to its high affinity with CD 4 molecule. Then, it is combined with DNA of the host cell and remains latent. Whenever instigated, the active viral genetic content copies itself leading to the death of the host cell (68). Hence, virus destroys the immune cells, particularly CD 4 leading to immune deficiency. For a few years, the body is able to compensate for the missing T cells and the patient will show no clinical symptoms. After a certain period, however, host defense declines and CD 4 cells diminish (69), followed by patients with opportunistic infections, secondary cancers and nervous protestations (70). CD 4 count is the major marker of estimating immune deficiency, functioning as a prognosis of diseases (71). Given its
progressive pandemic, AIDS has been regarded as a serious human health issue in the last two decades, reflecting the incapability of patients to rapidly adapt to this aggravating epidemic (72).

**AIDS as a social phenomenon**

AIDS is not only one of the most destructive and horrific diseases in the current era, but is also a new social phenomenon influencing almost all aspects of social and economic life of people (73). Moreover, HIV is one of the deadliest viruses leading to excessive fatality rate, cost of intensive care, and threatening to the health and economy of communities (74, 75).

**AIDS, spirituality and quality of life**

Infection with this virus can weaken the immune system to the extent that resistance to infections will be impossible. Diagnosis of AIDS can give rise to considerable emotional and physical suffering, especially in terms of treatment limits including lack of access to antiretroviral drugs. Emotional trauma of the disease through shame and fear further aggravates the suffering in these patients (76). The suffering inflicted by AIDS extends beyond physical pain experience. It covers loss of financial, familial, psychological and spiritual aspects of life (77). Research has shown these factors are linked with physical and psychological health, spirituality and length of life-threatening diseases (78). In other words, spiritual perceptions of suffering are crucial for helping patients understand how to cope with pain and disease, anxiety, weakness, death, loss and humiliation encountered throughout life. Thus, religion and spirituality can be one of the main sources to overcome feelings of pain (79). For example, Cruise and Bastida found that suffering makes people aware of the existence of God, thereby to adopt religion and spirituality as a strategy to deal with the pain (80). Furthermore, Zilani and Seymour showed that religious beliefs of patients and prayer as a religious activity can help patients minimize their feelings of pain (81). It has been proven in many studies that people with chronic diseases tend to adopt spiritual practices as a method for coping with the disease, creating a sense of meaning and purpose in life and reducing the pain resulting from disease (82, 83, 84, 85, 86, 87, 88 and 89). For example, a study revealed that the mean scores of quality of life among people with AIDS in social, psychological and physical aspects for were evidently low (90). Moreover, Vizeh and Mordadi conducted a study on 112 female patients with AIDS, suggesting that 17% of patients had a very low quality of life, 51.8% had low quality of life and 31.2% had moderate quality of life (91).

In the study on the quality of life in patients with AIDS, it was found that psychological well-being, social support systems, coping strategies and spiritual well-being were important predictors of quality of life in these patients (92). The results of another study in relation to the quality of life in people with AIDS showed that spiritual well-being indicated that physical and spiritual aspects of quality of life were significantly correlated with spiritual well-being (93).

**AIDS in Iran**

Prevalence of HIV in Iran entails a warning status on the rise. Given that the primary route of transmission in the world is through sex, the main transmission in Iran takes place through injection drug users by about 69.9%. In this regard, patients contracted AIDS by an unknown case by 25%, sexual contact by 7.5%, human plasma-derived drugs by 1.7% and mother to the fetus by 0.4%. According to reports, about 160,000 to 36,000 people with an average of 66,000 people are infected with HIV in Iran, among whom an average of 1760 people died of AIDS by 2007 (94, 95).

**METHODOLOGY**

Moreover this study involved an analytical review of latest relevant papers throughout the world and search for keywords such as AIDS, HIV, disease, protease gene, infection, lymphocyte cells, CD 4, addiction, sexuality, spirituality and quality of life on several authentic scientific databases including Google Scholar and SID.

**CONCLUSIONS**

AIDS is one of the greatest public health problems in many countries in the twenty-first century. Acquired immunodeficiency syndrome has made it into the third decade of its emergence, becoming a pandemic disease threatening the entire population of the world. This viral disease is caused by human immunodeficiency virus (HIV), affecting all internal systems even the intellectual and social capabilities. HIV infection is associated with risky behaviors such as unprotected sex and injection drug use. Sex is the major way of spreading AIDS in the world. In fact, 85 percent of new cases of HIV are infected this way in Iran (27), where most of the viral transmission modes are drug injection and sexual contact, both of which are listed as high-risk behaviors. Drug users are at a higher risk of infection by the human immunodeficiency virus than the
general population. AIDS is not only one of the most destructive and horrific diseases in the current era, but is also a new social phenomenon influencing almost all aspects of social and economic life of people.

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