HIV Prevention through Socio-Behavioral, Biomedical and Structural Interventions

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ABSTRACT

HIV is a global health disease and number of people living with this all over the world. UNAIDS took several measures to control spread of disease. There is no cure for HIV infection, where prevention, diagnosis, treatment and care plays an important role. Spread of HIV on human health only can be reversed by combination of various strategies. It includes social, biomedical, structural interventions, like educational, motivational and normative approaches to communities for improving their knowledge about risk and related activities, which are prone to HIV infection. This study is to review various literatures published in peer reviewed journals for HIV prevention by intervention of behavioral, biomedical, structural implications, awareness about HIV spread their prevention and find out the best method for the same. Inclusion criteria in this review were identified articles published in a peer-reviewed journal, presented at an international conference, workshops and WHO guidelines. Strategies belonging to Socio-behavioral is more effective and have great potential when works at multilevel instead of working in isolated region. Broad discussion means broad awareness and changes the social behavior of individual indulging in risks. It reduces HIV burdens in community.

Key Words: HIV, Social, Behavioral, Structural Interventions

INTRODUCTION

HIV is a major global health issue; encounters more than 39.9 people lives and 1.3 million people newly affected in 2023.Since 2010, the number of people acquiring HIV has been reduced by 39%. An estimation of 0.7% people affected with this belongs to the age of 15-49 years. In 2023 estimated death was6,30,000 due to HIV. About one third of the people were affected in African regions. Current target of UNAIDS is 95-95-95. The aim is to diagnose 95% of all HIV-positive individuals, provide antiretroviral therapy (ART) for 95% of those diagnosed and achieve viral suppression for 95% of those treated by 2030. HIV infections between (Man sex with Man) MSM has been increasing around the world. Intravenous drug users, Female sex workers are also increasing the burden of HIV globally. MSM may work as “bridge” in the spread of HIV in general public, as due to social and cultural pressure they have to engage themselves in heterosexual marital relations which may lead to HIV in their partners and in future to their children[1]. The adolescents in the absence of suitable guidance and knowledge about HIV put themselves at risk due to wrong practices and are susceptible to HIV infections.

HIV affects the immune system and weakens the person against several opportunistic infections. The progression of disease varies from individual to individual and most advance stage of HIV is Acquired Immuno Deficiency Syndrome (AIDS), it will develop if untreated and along with treatment and healthy lifestyle, people can survive more than that in comparison to untreated fellow.

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People living with serious mental problem/illness have higher rate of HIV infection among the general population in particular geographic area, a significant proportion in this group are sexually active and at a higher risk due to their engagement in HIV risk behaviors, willingly or unwillingly; like multiple sexual partners, infrequent use of condoms, trading sex for money or drugs etc.

Since there is no cure for HIV infection, where prevention, diagnosis, treatment and care plays an important role. It enables people living with HIV to lead long and healthy lives. People can reduce risk of infection by limiting exposure to the risk factors, which includes several means like, avoid unprotected sex, prevention from mother to child transmission, avoids use of same syringe by intravenous drug abusers, using safe blood and blood products from licensed/recognized blood banks for transfusion. These are some safety measures to prevent HIV infection. Apart from this, change in social and mental behavior of individual will also play an important way to prevent the spread of HIV infection. A person living far away from his/her family, have more chances to indulging with risk factors for HIV. Individuals who do not have strong will power, also have chance to indulge in wrong practices which are at risk.

This extraordinary troll of HIV on human health only can be reversed by combination of various strategies. It includes social, biomedical, structural interventions. In adolescence and individuals, who live far from their families for study purposes, for jobs or any other reasons, their awareness about HIV infection, and shift in social and mental behavioral conditions, plays key to avert from risk factors of HIV. So there is a need for combination among medical, behavioral and structural interventions[2,3] . It involves engagement of local communities, hospital care and treatment centers to make people aware with the involvement of social interaction and change in behavior regarding risk factors of HIV. It includes various mechanisms, like educational, motivational and normative approaches to communities for improving their knowledge about risk and related activities, which are prone to HIV infection.

Human behavior plays a central role in determining the effectiveness of various behavioral, medical and social interventions on HIV Programs. Scarcity of resources, particularly money food or family support also affects behavior and cognitive ability, resulting in proper decision about personal health and welfare.[4]

"***The impact of AIDS is no less destructive than war itself, and by some measures, far worse" U.N. Secretary: General Kofi Annan***

"At the moment, education and communication are the only weapons we have against HIV/AIDS"

Dr. Jonathan Mann, former Executive Director, World Health Organization / Global Programme on AIDS

"Change in behavior of individuals and social units by using a range of educational, motivational, peer-led, skill-building approaches as well as community normative approaches" (Coates and Gable 2008).

To reach decline in HIV Prevalence, it includes knowledge, attitudes, risk perception, norms, HIV service demand and skills. Platforms for implementation of social behavior are community outreach, schools, health facilities, workplaces or other settings. Biomedical interventions use the combinations of clinical and medical approaches and are important tools to reduce HIV transmission[5]. These include distribution of condoms, sterile needle and syringe, opioid substitution therapy, voluntary medical male circumcision (VMMC), antiretroviral therapy for prevention, pre-exposure prophylaxis (PrEP).

Structural interventions are activities designed to address the underlying environmental vulnerabilities of HIV infection, including political, legal, economic, physical, social and cultural barriers such as inequitable gender norms or HIV-related stigma and discrimination. Interventions include measures to increase community empowerment, promote human rights and remove punitive laws, policies and practices[5]. For the purpose of this review of behavioral interventions, condom programs were included because of their close reliance on consistent behaviors. Although HIV Counseling and Testing Services (HCTS)are primarily aimed at diagnosis, they were often implemented with the objective of changing behavior and therefore are included in this review.

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Objective

The objective of this study is to review various literatures published in peer reviewed journals for HIV prevention by intervention of behavioral, biomedical, structural implications, awareness about HIV spread their prevention and find out the best method for the same. It involves studies with evidence of effectiveness of interventions among educational, motivational and other approaches, to aware community and shifting towards HIV preventions.

Study Collection and Search Strategy

Inclusion criteria in this review were identified articles published in a peer-reviewed journal, presented at an international conference, workshops and WHO guidelines. Electronic searches were conducted in search engines using the following strategy: term ‘‘Behavioral change’’ in the title, abstract or keywords was combined with ‘‘HIV Prevention’’, ‘‘Social Change’’ or ‘‘Educational Awareness for HIV’’ in the title, abstract or keywords generating articles, subset by ‘‘in the title, abstract or keywords producing articles, and finally limited to English language articles published. Electronic search conducted in Google Scholar using phrase ‘‘Social & Behavioral Change and impact on HIV prevention’’ resulted in publications.

METHODOLOGY

Behavioral interventions falls into various categories, various measures to change social behavioral changes in our healthcare facilities to prevent HIV prevalence.

Effectiveness of counseling in HCTS to change social behavior of individuals: Communication or discussion with individual plays key ingredient as social vaccine of HIV, for such discussion HIV Counseling and testing services (HCTS)is an effective measure in HIV prevention[6]. Maximum involvement with HIV positive people reduces the risk after counseling by trained healthcare person in HCTS facility. The street children, orphans, child laborer’s, young girls at risk of prostitutions are at a very high risk. Pre and post-test counseling are an element to risk reduction of HIV, duration of counseling is variable and often truncated or less intense for HIV negative people. Main intervention of post test counseling is preventive and people change their sexual behavior to avoid risk of HIV transmission. Change in sexual behavior, prevents transmission in sero-discordant couple. Several past studies provide confirmation that post test counseling changes sexual behavior and prevent HIV transmission in individuals. Counseling increases the reduction in HIV prevalence among sero-discordant couples by using condom and other precautionary measures. Sexual partner testing in sero-discordant couples decrease HIV transmission due to protected sex by change in sexual behavior that includes proper counseling by trained counselors in HCTS. It includes interpersonal communication or group communication to reduce HIV prevalence.

Provider initiated testing and counseling increases testing coverage and encourages women to discuss sexual health with partners, similarly high-risk group individuals who are counseled by provider initiator for HIV counseling and testing. Community based interventions also play an important aspect to change sexual behavior and promote the use of protective measures to prevent HIV risk[7]. Campaigning in High Risk Behavior (HRG) community increase uptake of HCTS in adults. Dramas and localsmall media programs for awareness also increases HCTS utilization and condom promotion.

Biomedical Interventionsincludes several ways to prevent entry of virus in new host, some of biomedical interventions are as follows-

1. **Male condoms:** Male latex condoms are extremely effective in preventive the sexual transmission of HIV and other sexually infected infections. Among HRGs, increase availability of condom, their accessibility and acceptability have shown decline in HIV prevalence. In case of sero-discordant couple, who use condom consistently, their HIV negative partner is less likely to become infected in comparison to another sero-discordant couple, who did not use condom[8].

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2. **Female condoms:** It was developed for biomedical HIV prevention control among females, made from polyurethane or latex and provide physical barrier to HIV and prevent exposures from genital secretions containing infectious pathogens The counter partner is not aware of the female condom, it provide prevention that is independent of male willingness. Similarly in 2006, WHO concluded that, female condom is an effective mechanical barrier for semen, virus and other pathogens, if consistently and correctly used. Similarly in 2009 FDA approved second generation of female condom for prevention of HIV, other sexually transmitted infections and unintended pregnancy. Various studied has been conducted to show that, female condom is widely acceptable and truthful alternative to the male condoms.

3. **Voluntary Medical Male Circumcision (VMMC):** It is the surgical removal of foreskin called as prepuce from the penis by trained person. Initially, it reduces men's risk of HIV acquisition by 50-60% and extended protective effects upto 68%. UNAIDS and WHO reveals that, VMMC should be actively promoted as a part of HIV preventions. The age of circumcision has also encountered with HIV prevalence, if it occurs at the age of puberty, it will play an important role in prevalence of infection rather than after involvement in sexual practices[9].

4. **Antiviral therapy:** Antiviral treatment of positive individuals also an important biomedical approach to decline the viral load in positive people.

Structural interventions: Structural interventions defined as "social, political, physical, cultural, organizational, economic, legal, policy and political environment that prevents HIV risks in community and globally. This approach reduces HIV infections in communities with high rates of infection and improves the health outcomes of target people. It involves various measures like change in organizational and institutional policies, practices with involvement of legislative and regulatory bodies to change the environment or surroundings that influences HIV prevalence[10].

1. **All services at one place/One Stop Solution**: It is an important subset of structural approach, in which all the required and essential services are co-located for targeted people. It is convenient and better approach of intended users.

2. **Change in physical structures in nontraditional settings**. Development of infrastructures in targeted communities like health setup and provide services made available to their homes. Work-places, prisons, schools etc[11].

DISCUSSION

Strategies belonging to Socio-behavioral is more effective and have great potential when works at multilevel instead of working in isolated region. Broad discussion means broad awareness and changes the social behavior of individual indulging in risks. It reduces HIV burdens in community. Reviews shown that several personsinvolve in high-risk activity like physical relationship (MSM & FSW and general population), intravenous drug users decrease their risks after knowing their positive status and proper social and behavioral changes[12]. Now it's vibrant that, transmission of HIV follows different outline, which based on intimate relations, surrounding environments, community values, money matters. Positive individual with low or high viral load has chances to spread disease, with post-test counseling, changes in behavior reduces transmission to their single or multiple partners. Awareness about HIV also changes the life style of healthy persons, that they must be aware HIV transmission and not indulging with risks. It is concluded that, prevention of HIV transmission by behavioural strategies are necessary but not sufficient to reduce HIV transmission, it need to be combinations of approaches at multiple levels of influence.

Biomedical intervention also an important ingredient of HIV prevention. Proper use of protective barriers male condoms and female condoms prevents HIV transmission. Male circumcsision also prevents HIV transmission in several countries[13]. Voluntary circumcision criteria have followed in several countries to reduce burden of disease. Female condom is highly effective in female sex workers. Antiretroviral pre exposure prophylaxis and post exposure prophylaxis have crucial impact on viral load in individual and their transmissible rates. Early

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diagnosis and immediate treatment reduces viral load and behavior changes, precaution reduces the transmission rate in their sexual active partner. Similarly in needle stick injury and other risk behavior, pre exposure prophylaxis of ART drugs copiously effective and reduces the HIV viral load in person.

Structural changes study reveals that individuals belongs to bottom ring of socio-economic strata are most vulnerable to HIV/AIDS, due to least access to information, less income, poor nutritional level, lack of better health care facility at ground level, illiteracy[14]. The developing countries are most susceptible to AIDS. To overcome burden of HIV in developing countries, one stop solution is best way to provide all the healthcare facilities at one place, develop infrastructure, increase literacy level at lower strata of community, provide awareness, increase their per capita income at their habitat, prevent migration from rural to urban.

This study includes heterogeneity of intervention used to overcome HIV risks in individuals, it is not possible to conclude general inferences about effectiveness these interventions. Collectively all of them plays significant role in prevention of HIV transmission and combining together reduces the HIV burden globally.

If sufficient numbers of the people are circumcised, it will be prevent transmission of HIV and will also protect their sex partners. HIV prevention by MC also depends upon the age of circumcision. An infant circumcision is preferred over pubertal circumcision. Acceptance of MC in non-circumcising communities is crucial approach.

CONCLUSION

Research evidence from published studies indicates that social, behavioural, biomedical, and structural interventions all contribute significantly to HIV prevention; however, their relative impact differs depending on the target population and implementation context.

Behavioural interventions, including comprehensive sex education, risk-reduction counselling, partner communication, assertiveness training, condom promotion, and group counselling, have consistently demonstrated the greatest influence on reducing risky sexual behaviours. These interventions directly improve knowledge, attitudes, self-efficacy, and adherence to preventive practices, resulting in sustained behaviour change among both high-risk groups (HRGs) and the general population.

Social interventions complement behavioural strategies by reducing stigma and discrimination, strengthening community engagement, improving family and peer support, and increasing the acceptance and uptake of HIV prevention and testing services. Their effectiveness is particularly evident when implemented at the community level.

Structural interventions, such as supportive policies, legal reforms, improved access to healthcare services, poverty reduction, gender equity, and expanded availability of HIV prevention commodities, create an enabling environment that sustains the benefits of behavioural and social interventions over the long term. Although structural interventions alone may not immediately change individual behaviour, they are essential for achieving population-level and sustainable HIV control.

Overall, the available evidence suggests that behavioural interventions have the most direct and immediate impact on HIV prevention, while social and structural interventions enhance and sustain these outcomes. Therefore, future HIV prevention strategies should prioritize integrated interventions, with behavioural change communication as the central component, supported by strong social mobilization and enabling structural policies. Such a comprehensive approach is likely to achieve the greatest reduction in HIV transmission among both high-risk populations and the general community.

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