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Magnitude of HIV Index Case Testing among HIV Positive Clients Attending ART Clinic in University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia, 2023

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Abstract

Background: Index case testing is the provision of HIV testing services to family members or sexual partners of individuals already diagnosed with HIV. Its promotion stems from its potential to detect new cases, improve testing coverage, enhance ART retention, and provide convenience to affected families. Although evidence on index case testing in Ethiopia, particularly in the study area, is lacking, even, it is regarded as a crucial strategy for reducing HIV transmission among those unaware of their HIV status.

Objective: This study aimed to determine the prevalence and associated factors with HIV index testing in Northwest Ethiopia.

Methods: The study utilized an institution-based cross-sectional study design. The recruitment of 387 HIV-positive clients was done using a simple random sampling technique, and structured interviewer-administered questionnaires were employed for data collection. The collected data was entered into Kobo Collect software and later exported to STATA version 16 for analysis. In binary logistic regression, variables with a p-value below 0.25 were considered as candidates for multivariate logistic regression. An association was assessing if the p-value was below 0.05 with a 95% confidence interval.

Results: In the study, 380 (98.19% of participants) underwent the interview. The prevalence of HIV index case testing service was 38.7% (CI: 36.45% to 42.03%). Significant associations were observed between HIV index case testing and certain factors. Those with a higher education level (college and above) had 1.21 times higher odds (AOR) of undergoing index case testing (CI: 1.05 to 3.11). Married individuals had 2.30 times higher odds of receiving index case testing (AOR) (CI: 1.98 to 4.20). Participants engaged in work for monetary compensation had 1.66 times higher odds of undergoing index case testing (AOR) (CI: 1.58 to 4.71).

Conclusion: The utilization of index case testing service was lower in this study compared to previous research. Higher education level (college and above), occupation involving work for monetary compensation, and being married were associated with HIV index case testing. To enhance uptake, community-based education programs and targeted training for HIV-positive individuals are recommended. These measures can raise awareness and encourage greater participation in index case testing.

Keywords: HIV Counseling, HIV index case testing, HIV infection, HIV prevention, University of Gondar Specialized Hospital

Introduction

The Human Immunodeficiency Virus (HIV) and its sequelae, acquired immunodeficiency syndrome (AIDS), remain a significant global public health challenge. According to the World Health Organization [1], approximately 38.4 million people globally were living with HIV in 2021, with 1.5 million new infections and 650,000 AIDS-related deaths. Antiretroviral therapy (ART) has been instrumental in managing HIV, improving quality of life, and achieving viral suppression, thereby preventing onward transmission [2]. In 2020, there were an estimated 1.5 million people newly infected with HIV and 67.5% were in sub-Saharan Africa [3].

HIV testing and counseling was the gateway to ART, reducing morbidity and mortality and motivating individuals to change risky behaviours, as well as preventing infection by suppressing viral load in HIV-infected people [4,5] To achieve the UNAIDS Project 95-95-95 objectives, which aim to ensure that 95% of people with HIV know their HIV status, 95% of those diagnosed with HIV are on antiretroviral therapy (ART), and 95% of those on ART achieve virologic control, alternative and cost-effective methods are needed. These methods include partner profiles and index partner-testing strategies, which can identify the HIV status of 95% of individuals with HIV. These strategies specifically target those who are on ART, ensuring that they receive the necessary support and interventions to achieve viral suppression and maintain good health [6-8] . In response to the devastating impact of HIV/AIDS, the government of Ethiopia has taken action to prevent further transmission and control the spread of the disease. The objective of the index case trial is to interrupt the chain of HIV transmission by promptly connecting HIV-negative individuals who are identified as being at risk to appropriate care and treatment in the event of HIV infection. This approach aims to effectively address the spread of HIV/AIDS and improve the overall health outcomes of affected individuals [9-11]. HIV index case testing is advocated for its ability to yield a high number of positive cases, enhance testing coverage, improve retention in antiretroviral therapy (ART), and provide a convenient service for families affected by HIV infection [10,12,13]. On a national scale, the proportion of males and females who underwent HIV testing among index cases in 2016 was 78.95% and 78.3%, respectively [14]. Demand generation and novel testing approaches will be necessary to reach undiagnosed people living with HIV and to promote frequent retesting among sexual contact of index case [11,15]. Because it has high yield positivity, improves testing coverage, improves ART retention, and offers a convenient service for families affected by HIV irrespective of the background of HIV prevalence in the country [16].

Despite the effectiveness of index case testing in identifying individuals at high risk of acquiring HIV and yielding positive cases, there is a significant lack of participation in Ethiopia, with many index clients failing to involve their partners and biological children in testing. Therefore, the aim of this study was to assess the index case testing and it's associated factors in the study area. And also used for empirical evidence of HIV/AIDS index case testing magnitude.

Methods

Study area and period

The study was conducted in University of Gondar Comprehensive Specialized Hospital, ART clinic from April 20/2023 to May 20/2023. Gondar Comprehensive Specialized Hospital is located in Gondar city, which is 735 km far from Addis Ababa, capital city of Ethiopia. There are ten governmental facilities in Gondar (eight health facilities and two hospitals) [17]. According to the hospital administration head report, University of Gondar Comprehensive Specialized Hospital serves nearly 250,000 patients in outpatient services; of this about 4,244 adult patients were ART users.

Study design

An Institution based cross-sectional study design was conducted.

Source population: All HIV positive adults who were attending ART clinic in Gondar Comprehensive Specialized Hospital.

Study population

All HIV positive adults >18 years who were receiving anti-retro viral therapy during data collection period.

Sample size determination

It was determined by using single population proportion formula by taking p=50%, because there is no previously similar study done in the country, marigion of error, d=0.05 and 95% confidence interval. So, the calculated sample size was 384. Since the source population is less than 10,000, N= 4,244 using finite population correction formula we calculated the final sample size $n_f = \frac{n}{1+\frac{n}{N}}$, then, it gives the sample size of 387 adult HIV positive clients with 10% non-response rate.

Sampling procedure

Systematic random sampling technique was used by considering the average number of adult HIV positive clients visit in this hospital per month and the desired number of sample size to determine the interval of respondent was interviewed (k). Based on the registration book and ART focal health professional report, on average 25 clients visited this hospital per day. Therefore, with 20 working days in a month, 500 outpatients visit monthly and led to take every k=2nd interval of clients from ART clinic by selecting the first patient by lottery method.

Measurements

HIV index case testing: HIV testing for partner or family or any other sexual partner. Which was measured as "Yes" for did your HIV status elicite by index case contact? [18]

Index cases: Individuals diagnosed HIV positive that aware already enrolled in HIV care and treatment center [19].

Waiting time to HIV test result: The time taken to produce either positive or negative result [20].

Testing place: Index case testing service took place at community or facility [21].

Data collection procedure: Structured questionnaire was developed by referring different literatures fom standard HIV index case testing tool [11,19,20,22-24]. The interview was translated into Amharic language then it was translated back to English to ensure consistency of questions. The questionnaire was separated into socio demographic, HIV index case testing, related variables, and other variables. A data collector was selected from health professionals who were trained on HIV testing program and with previous experience in data collection. Two diploma nurses were assigned as data collectors and one BSc nurse was assigned as a supervisor.

Data quality control: To ensure the quality of data, pretesting was done among 19 (5%) adult HIV positive clients at Debark ART clinic. A two-day training was given about questionnaire. Prior to analysis, data was cleaned up and cross-checked. The principal investigator and the supervisor closely monitored the process throughout the data collection period and made due corrections.

Data management and analysis: The filled questionnaires were exported from open data kit/ODK to STATA version 16 for further analysis. Descriptive and summary statistics were presented in the form of text and tables. In binary logistic regression, variables with a p-value below 0.25 were considered as candidates for multivariate logistic regression. An association was assessing if the p-value was below 0.05 with a 95% confidence interval. Multi-co linearity was checked using variance inflation factor (VIF), which was 1.68. We assessed the goodness of fit for the corresponding model using the Pearson goodness-of-fit which was insignificant (p-value=0.16), therefore our model is a good fitted model.

Results

Among the total study participants, 380 (98.19%) were involved in the interview. Regarding their religion, 320 (84.21%) were Orthodox Christians, and 316 (83.83%) of them were urban residents. Concerning their educational status, the majority, 106 (27.89%) of them attended secondary education (**Table 1**).

Table 1. Socio-Demographic Characteristics of study participants in University of Gondar Comprehensive Specialized Hospital in Northwest Ethiopia in 2023 (n=380).

Variables	Category	Frequency	Percentage
Age	19-30	76	20
	31-40	105	27.63
	41-50	112	29.17
	≥ 51	87	22.84
Sex	Male	161	42.36
	Female	219	57.64
Place of residence	Urban	316	83.83
	Rural	64	16.17
Religion	Muslims	56	14.74
	Orthodox	320	84.21
	Others	4	1.05
Educational status	Unable to read & write	89	23.42
	Able to read & write	37	9.73
	Primary school	82	21.57
	Secondary school	106	27.89
	College & above	56	14.73
Marital status	Married	178	46.82
	Unmarried	202	53.18

Occupational status	Farmer	148	38.94
	Governmental	103	27.10
	Housewife	107	28.15
	Others	12	3.15
Work for money	No	71	18.69
	Yes	309	81.31
Sex with spousal partner	No	147	38.68
	Yes	233	61.32
Others=Merchant, Student, Private.			

HIV index case testing and other characterstics

This study assessed the magnitude of HIV index case testing, only 39.21% (CI=36. 45%, 42.03%) of the respondents. Regarding waiting time to HIV test result 281 (73.95%) said 15-30 minute, and 305 (80.30%) of them were tested at the facility. The majority 324 (85.26%) of them were taking ART to manage HIV, and 242 (63.68%) were badly treated because they have HIV (**Table 2**).

Associated factors with index case testing

In this model, variables such as sex marital status, sex with spousal, education, work for money, as well as testing place were included in multivariable regression since their overall p-value in bi-variable regression was less than 0.25. On multiple logistic regression analysis, three variables were found to be associated with the HIV index case testing, which were work for money, education, and marital status.

Thus, our study showed participants who had educational status, college & above increased the odds of HIV index testing by a factor of 1.21 times (AOR=1.21, 95%, CI, 1.05, 3.11) as compared to those who can't read and write. Another finding also suggested that those who were married increased the odds of HIV index testing by 2.30 times (AOR=2.30, 95%, CI, 1.98, 4.20) as compared to their counterpart. Additionally, study participants who work for money increased 1.66 times HIV index testing (AOR=1.66, 95%, CI, 1.58, 4.71) as compared their counterpart (**Table 3**).

Discussion

This study assessed HIV index case testing service in the University of Gondar hospital. The results showed that only 39.21% (CI=36. 45%, 42.03%) of the respondents got the HIV index case. This means that HIV index case testing service provided to the index case client was in a substandared way. As a result, the transmitsion of HIV becomes high.

This study is inline with study done in Lesotho, which was 37.3% [24]. The posibile justification might be having similar infrastructure and health system policy regarding HIV testing service but, the finding is lower than the WHO standard,

Table 2. HIV index case testing, related variables, and other variables in the University of Gondar Comprehensive Specialized Hospital in Northwest Ethiopia, 2023 (n=380).

Variables	Category	Frequency	Percentage
Waiting time to HIV test result	15-30 minute	281	73.95
	31-60 minute	61	16.05
	61-90 minute	26	6.84
	91-max minute	12	3.16
Testing place	Community	75	19.70
	Facility	305	80.30
Taking ART to manage HIV	Yes	324	15
	No	56	85
heard about badly treated	Yes	236	63
	No	144	37
Index case test their contact	No	231	61.49
	Yes	149	39.21

Table 3. Multiple logistic regression of HIV index case testing in in University of Gondar Comprehensive Specialized Hospital in Northwest Ethiopia.in 2023(n=380).

Variables	Categories	Index case testing		COR (95%CI)	AOR (95%CI)
		Yes	No		
Sex	Male	80	81	0.46 (0.04, 0.950)	0.15 (0.07, 2.4)
	Female	69	150	1.00	1.00
Mstatus	Married	41	137	3.83 (1.2, 9.14) **	2.30 (1.98, 4.20) *
	Unmarried	108	94	1.00	1.00
Spousal sex	Yes	81	152	1.61 (0.91, 5.04)	1.40 (0.97, 3.91)
	No	68	79	1.00	1.00
Education	College & above	26	30	0.35 (0.75, 2.40) **	0.21 (0.15, 0.91) *
	Secondary	44	62	0.43 (0.75, 2.40)	0.15 (0.05, 3.01)
	Primary	28	54	0.59 (0.51, 1.53)	0.45 (0.75, 2.28)
	Able to read &write	30	17	0.17 (1.15, 2.42)	0.21 (1.17, 52)
	Unable to read &write	21	68	1.00	1.00
Work for money	Yes	99	210	5.05 (1.27, 8.36) **	1.66 (1.58, 4.71) *
	No	50	21	1.00	1.00
Testing place	Community	50	25	0.24 (0.11, 1.67)	0.21 (0.01, 0.67)
	Facility	99	206	1.00	1.00

Note: COR: Crude Odd Ratio; AOR: Adjusted Odd Ratio

the National HIV index case testing strategy of Ethiopia and PEPFAR guidline [24,25]. The possible explanations might be due to HIV index case testing in the current study could be the nature of the HIV intervention, as it is a complex intervention and resource-intensive demanding trained providers. Hence, resource limitation, lack of training of the ICT providers', budget constraints, and lack of NGOs support in the study area could be the potential reasons. This finding is also relatively similar from a study conducted in Eswatini, where index case did not got the index case testing service according to standared [25]. A possible reason for this similarity could be the similarity of the health system infrastructure, the presence of the same methodology and dimensions used to measure index case testing.

Thus, our study showed participants who had educational status, college & above increase the odds of HIV index testing by a factor of 1.21 times (AOR=1.21, 95%, CI, 1.05, 3.11) as compared to those who can't read and write. This finding were supported by a study done in Gamo Gofa and study done in SNNPR [24,26]. This is because, when educational status increases, client responsiveness on index case testing service also increases this may be due to those who are attending higher education may have a variety of experiences. Another finding also suggested that those who were married increases the odds of HIV index testing by 2.30 times (AOR=2.30, 95%, CI, 1.98, 4.20) as compared to their counterparts. This finding is supported by a study done in USA, where married individuals were 4.3 times more likely invove in HIV index testing service than unmarried individuals [27] and a study done in western Kenya, where single/never married persons were 13 times as less likely to involve in HIV/AIDS service than married individuals [28]. This might be due to the fact that, HIV clients who are married disclose their HIV status to others and they have a tendency to notify their sexual clients/ partners. Additionally, study participants who work for money increases 1.66 times HIV index testing (AOR=1.66, 95%, CI, 1.58, 4.71) as compared to their counterparts. It might be low socio-economic status such as lack of transportation to health facility, poverty, and poor health, ultimately affect economic status of individual.

Strength and imitations of study

This study was conducted in a less studied population. It is the first study of its kind in the study area with a validated and comprehensive tool, which provides updated information. And also, it may serve as the basis for future studies and may offer suggestions for strengthening HIV index case testing service that can be used as an input for improvement of HIV transmission.

However, self-reported information is subjected to reporting errors, or there might be social desirability bias, and this may lead to overestimate/underestimate the finding.

Conclusion

Factors such as having a college education or higher, engaging in work for monetary compensation, and being married were associated with higher rates of HIV index case testing. To improve the uptake of HIV index case testing, it is recommended to implement community-based education programs, provide training for healthcare professionals, and raise awareness among individuals receiving antiretroviral therapy (ART). These measures can contribute to enhancing HIV index case testing rates.

Abbreviations

ART: Anti-Retroviral Therapy, AOR: Adjusted odd ratio, ARV: Anti-Retroviral, CDC: Centers of Disease Control and Prevention, CI: Confidence Interval, COR: Crude odd ratio, FSWs: Female Sex Workers, HIV: Human immune-deficiency virus, HTS: HIV Testing Service, ICT: Index Case Testing

Declaration

Ethical approval was obtained from the institution review board of the University of Gondar, Institute of Public Health. Oral informed consent was obtained from participants in the Ethical approval process. Confidentiality of information and privacy of participants were assured for all the information provided. All the collected information was put to assure personal confidentiality using digital data collection technique and locked by password for digital instruments. Informed consent was completely volunteer, and participants could withdraw or refuse at any time during the process and their data was used only for research purposes. In case the participants were unable to read and write, the uardians were involved during informed consent.

Consent for Publication

Not applicable.

Availability of Data and Materials

All necessary data are included in this manuscript.

Competing Interest

Authors declare that they have no conflict of interest.

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Authors' Contribution

Conceptualization: LA & ZY, data curation: LA & TA, formal analysis: LA & TA, investigation: LA & CA, methodology: LA, software: LA, validation: LA & ZY, visualization: LA, ZY, & TA, writing original draft: LA, writing review & editing: LA, ZY, &TA. All authors contributed to the article and approved the submitted version accordingly based on the above descriptions.

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