



ISONIAZID PREVENTIVE THERAPY UTILIZATION RATE AND ASSOCIATED FACTORS IN ADULT HIV/AIDS PATIENTS IN JIMMA UNIVERSITY SPECIALIZED HOSPITAL ART CLINIC: A CROSS-SECTIONAL STUDY

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ABSTRACT

Tuberculosis (TB) is the most frequent life-threatening infection and a common cause of death for people living with HIV (PLHIV). The influence of TB and HIV infection has enhanced the magnitude of both epidemics. IPT is one of the key interventions recommended by the world health organization (WHO) for the prevention of TB in patients infected with HIV. Hence the present study includes quantitative investigation that aimed to determine IPT utilization rate among adult HIV infected patients enrolled in HIV care and qualitative analysis which explore the factors that influence IPT use among PLHIV under follow-up, Health care providers (HCP's) and TB/HIV coordinators working in Jimma University Specialized Hospital (JUSH) ART clinic, Ethiopia. An Institution based mixed cross-sectional study was conducted in JUSH ART clinic, Oromia region, Ethiopia. Adult HIV infected patients were registered and enrolled by a systematic sampling technique from the registered medical records of JUSH HIV care. PLHIV who were on follow-up during the study period, permanent HCP's and TB/HIV coordinators working in ART clinic, who showed voluntary participation for semi-structured questioners and in-depth interviews were included in the quantitative investigation. All statistical analysis was compiled by Epidata 3.1 and SPSS 20. Demographic and clinical factors are not significant in PLHIV, but ethnicity ($P \leq 0.02^{**}$) was highly significant with IPT use in binary logistic regression model. With regard to IPT use, 59.2% of the patients have been prescribed and taken at least one-month course of IPT while 40.8% have not been taken IPT. Adult HIV infected patients eligible for IPT prescription, HCP's and TB/HIV coordinators were interviewed on identifying the factors and barriers that increase the utilization of IPT. The results of in-depth interviews are grouped into three core categories as patient perceptions, HCP's and TB/HIV coordinator perspectives. PLHIV, HCP's and TB/HIV coordinators suggested their overall response as periodic counseling for target groups, educating the benefits of IPT and increasing public awareness on TB prophylaxis in PLHIV. Higher attention should be provided in linking all HIV patients to the nearest health facilities for receiving free service packages and medical care.

Key words: IPT, TB /HIV, PLHIV, ART, INH prophylaxis.

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INTRODUCTION

TB and Human Immunodeficiency Virus (HIV) are the two opportunistic infections that cause high morbidity and mortality in the world [1]. HIV infection is one of the greatest risk factors in developing TB disease [2, 3]. PLHIV are at least 26 times more likely to develop TB disease than people without HIV [4]. HIV suppresses the immune system by reducing CD4 count and increases the risk of developing TB infection among PLHIV.

Therefore, prevention of TB is one of the most important measures needed to reduce morbidity and mortality among PLHIV, especially in countries with a high TB and HIV burden. A report rendered by WHO, 2012 stated that Ethiopia is one among 22 high TB burden countries ranking top five in African countries and ninth in the world.

The incidence and prevalence of TB was about 261 and 394 per 100,000 populations and TB-related mortality rate for the same year is 35/100,000 population [5, 6]. The rate of TB patients co-infected with HIV was between 10% and 15% in Ethiopia and nearly 88% of TB/HIV conected patients were found on ART regimen [7]. Multiple strategies are existing in the prevention of TB disease such as intensified case finding (ICF), isoniazid preventive therapy (IPT) and TB infection control (IC), along with ART [8]. Earlier research reports recommend the use of IPT with ART in reducing the burden of TB among PLHIV [9, 10, 11].

WHO strongly recommends providing at least 6 months of IPT for PLHIV without active TB, including those receiving ART and those who have successfully completed TB treatment conditionally recommends providing isoniazid for 36 months for PLHIV [12, 13, 14]. Earlier research findings emphasised various factors that hinder the implementation of IPT such as complexities observed in organizing national and regional TB / HIV programs, lack of confidence on IPT, fear on drug resistance and pill burden.

Moreover lack of counselling for target groups, work burden, fear of stigma, lack of money for travelling long distance to the health centres, prolonged waiting time for investigation and misinformation about IPT are some of the highlighted factors that inhibit the utilization of IPT among PL HIV [15, 16]. In controversy, the report of a pilot study conducted in Vietnam among HIV infected patients reported that acceptability and completion rate was high (80%; 91.8%) and no adverse effects were reported on IPT use [17]. A research study was done in sub-Saharan Africa recommended that IPT can be prescribed safely during the early course of HIV disease [18].

Therefore, determining the IPT use and suggestions to improve IPT implementation in representative population increases the strength of further TB/HIV programs conducted on large scale.

Objectives

The general objective of the study were to investigate the IPT utilization rate and determinant factors among adult HIV infected patients at JUSH ART clinic, Oromia region, Ethiopia.

Specific Objectives

The specific objectives of this study are the following:

- To identify the IPT utilization rate among adult HIV infected patients enrolled in HIV care at JUSH ART clinic.
- To describe the factors that influence IPT use among adult HIV cases from PLHIV, HCP's and TB/HIV coordinators.

Research Methods and Design

Study Setting and design

An Institution based cross-sectional study was conducted on 1st January 2016 – 30 June 2016 in JUSH HIV care, Oromia region, Ethiopia. JUSH is located in Jimma town, which provides health service for 15 million people residing in South West of the country. It has one ART clinic launched in the year 1998 GC. The total number of PLHIV enrolled in this clinic was 7690 and one thousand patients have stopped ART regimen. There were 6690 HIV-infected patients who are under follow up in the ART clinic on January 2016.

IPT program in Ethiopia

IPT implementation was initiated in 2008 in Ethiopia. Our government recognized the burden of TB/HIV confection and implemented the therapeutic guidelines in national TB – strategic plan 2011 – 2015. According to its policy, all PLHIV should be screened for TB using WHO four symptoms (current cough, fever, night sweats or weight loss) based screening. The eligible screened patients without active TB will be prescribed with IPT for 6 months. The National target for IPT initiation for eligible PLHIV is 100%.

Study population

Patients enrolled in HIV care at the age of 15 – 68 years who were eligible for IPT, HCP'S working in ART clinic and TB/HIV coordinators in JUSH are considered in the study.

Inclusion criteria for Participants

- HIV infected patients entered in JUSH, HIV care during their initial visit from 1st January 2016 to 30 April 2016 were enrolled through registration number for the study protocol.
- We included the adult PLHIV who are eligible in using IPT from the medical records and initiated the data collection period from 1st May to 30 June 2016. Adult PLHIV who were on follow-up and eligible for IPT during

our study period, permanent HCP's and TB/HIV coordinators working in JUSH HIV care, who showed voluntary participation for semi-structured questioners and an in-depth interviews were included as a participants in this study.

Exclusion criteria

Patients whose symptoms are positive in TB screening, identification of active TB, acute/chronic hepatitis, alcoholics, peripheral neuropathy, prior allergy or intolerance to isoniazid were excluded from the analysis.

Sampling method

The sample size was calculated by single population proportion formula $n = Z\alpha / 2 p (1 - p) / d^2$ using ($p=22\%$; 95% CI and 5% precision) the prevalence of IPT use in HIV-infected patients in ART clinic, Black lion hospital, Addis Ababa [16, 19]. We considered that 10% of the patient as expected loss and the final sample size were 287. The respondents were selected by systematic sampling technique. More explicitly, study subjects were at the 24th interval in the sampling frame and the initial respondent being the first patient in HIV care.

We excluded 9 patients who had active TB disease, and 2 had a history of chronic alcoholism for which we recruited an additional 11 patients to reach our sample size. We considered that, IPT as continuous a dependent variable and sex, age, marital status, education, ethnicity, religion, occupation, residence, BMI, WHO Clinical stages, duration of HIV care, types of HIV care, duration of HAART care, CD4 count, co-morbidity, previous TB treatment, patients taking medication, baseline availability of LFT, RFT, Hgb, HBsAg and Anti HCV as an independent variables.

To achieve the objectives of the study, we used a convenient sampling technique for semi-structured questioners and an in-depth interview from the patients who were included in the study (from both those who took IPT and those who did not take IPT). In addition, made a visit to the ART clinic during the study time, and interviewed the health care workers at TB/HIV clinics and TB/HIV coordinators working in JUSH, ART clinic. The questioners are developed according to standard WHO 6 health system frames [20], and in-depth interviews were employed till data saturation occurred.

The core ideas originated as barriers and factors that increase the IPT implementation are grouped into three categories as patient-related factors, HCP's and TB/HIV coordinator perspectives. All questionnaires were pre-coded and target group interviews were audio recorded and cross-checked for completeness prior to computation.

Definition of variables

IPT users/utilizers: PLHIV who are initiated on INH (isoniazid) 300mg daily as IPT and who are either taking

during data collection or whose status after initiation is known or unknown.

Previous TB treatment: patients who took the standard anti-TB drugs for ≥ 1 months and not taking the drugs during the study time despite the treatment outcomes

Adult PLHIV: defined as PLHIV whose age ≥ 15 years as this cut of age is used for classification of adult and pediatric clinics in JUSH and other governmental hospitals in Ethiopia.

Ethical Consideration

Ethical clearance was acquired from Institutional Review Board (IRB) of the College of Health science and Ethical review committee of JUSH (Ref. No: RPGC/14/2016). As per HIV programme protocols, the resident Physicians are permitted to collect the data for evaluating the strength and weakness of the program and to act accordingly. Written consent was obtained from each subject and passive parental consent from the parent (or) guardian was received for the patients < 18 years. All interview script was coded, and none of the patient identifiers as included in data assessment.

Statistical analysis

All quantitative data's, are coded through Epi Data 3.1 and then exported to SPSS version 20 for indepth analysis. Descriptive statistics, χ^2 test and bivariate analysis were done to sort variables for logistic regressions having value $P \leq 0.25$. A stepwise logistic regression model was used to generate factors strongly associated with the dependent variable. A value of $P < 0.05$ was considered as significant to declare the associations. Qualitative data were subjected to thematic analysis which involves identifying, coding, analyzing and clustering recurring factors into overarching themes with respective sub-themes. Additionally, data's collected from the patients, HCP's and TB/HIV coordinators for the IPT utilization were described based on their categories to add depth and richness to the findings.

RESULTS

The present study constitutes a baseline information collected from PLHIV enrolled in JUSH HIV care, clinical data from medical records, and qualitative data from PLHIV who were on follow-up and eligible for IPT, HCP's and TB/HIV coordinators working in JUSH ART clinic, Ethiopia. Accordingly, table – 1 represent the socio - demographic details collected from PLHIV during their initial enrolment in JUSH HIV care. The sex ratio constitutes 46.3% of males and 53.7% of females. With regard to the age group < 35 are 51.2% and age ≥ 35 are about 48.8%. Nearly 25.8% of the target groups are single; 23.7% of the study population is married; 17.4% are

divorced, 19.5% are widowed and 13.6% of the remaining groups are separated from their legal partners.

Concerning the education background, 21.6% of respondents had no formal education; 12.5% are able to read and write; 22.3% of the target groups have completed grade – 8; 27.5% of PLHIV completed grade – 12 and 16.0% had completed their university and BA/Bsc degree holders. With regard to ethnicity, Oromo ethnic group constitutes 52.6% followed by Amhara (12.2%), SNNP (27.2%), Tigre (1.7%) and other ethnic groups as 6.3%. Concerning the religion, nearly 59.2% of the participants are Orthodox Christians, 12.2% are protestant Christians; 24.4% are Muslims, and 4.2% are the followers of other groups. Almost 29.6% of the respondents are government employees; 19.2% are merchants; 13.6% of the target groups are farmers; 14.6% are housewives, 9.8% are daily labors; 5.6% are students and 7.7% are others. 62.4 percent of the study populations are residing in the urban area, and 37.6% of patients are live in the rural area.

According to the clinical data's collected from medical records (Table – 2) of PLHIV in JUSH HIV care about 28.2% of patients BMI are underweight; 33.8% are on normal category; 23% are in preobese – I and the rest 15% of the patients are obese. Nearly 28.6% of patients are in WHO Clinical stage - I; 21.3% are in stage – II; 30.7% are in stage – III and 19.5% are in stage IV. The overall HIV care duration in JUSH for patients < 10 years is 61% while the patients under follow up ≥ 10 years was about 39% and the duration of HAART care for patients < 10 years is 53.3% and PLHIV ≥ 10 years was about 46.7%.

The overall percentage for types of HIV care (pre – ART, 2.8%; ART, 97.2%), CD4 (< 199 is 47%; 200 – 499 was 41.8% and ≥ 500 was 11.1%) and IPT initiators are 59.2%. The percentage of HIV patients not initiating IPT was 40.8%. The types of TB screening methods used in those who were recommended for IPT are four TB symptom based screening (58.6%), four symptoms based together with CXR (5.8%), combined four symptom based with CXR and sputum AFB examination (10.3%) whereas it was unknown in 25.3%. The overall IPT utilization rate among PLHIV is 59.2% in JUSH ART clinic, Ethiopia.

World health organization TB/HIV program and Ethiopian TB/HIV guidelines recommended the IPT implementation as IPT initiation. Numerous studies conducted in African countries used the term 'IPT implemented for patients who have been given IPT for one or more months regardless of the status there after. So, we used the term IPT utilization for patients who have been prescribed INH for one or more month. On a whole 12.9%

of patients have comorbid condition and 80.1% of patients have taken cotrimoxazole; 5.6% of target groups using fluconazole; 12.5% of patients used other medications for > 1 month, 7.7% of patients have taken RUTF and 3.5% of respondents are prescribed with pyridoxine.

The data collected through questionnaire and medical record (Table – 3) shows that, the significance (*P ≤ 0.25), of all demographic and clinical variables of PLHIV, JUSH ART clinic, Ethiopia. Independent variables such as age (*P < 0.142), marital status (*P < 0.142), ethnicity (*P < 0.142), occupation (*P < 0.142), residence (*P < 0.142), duration of HIV care (*P < 0.142), types of HIV care (*P < 0.142), CD4 count (*P < 0.142), previous TB treatment (*P < 0.142), and hemoglobin (*P < 0.142) are included in the bivariate and binary logistic regression models.

In the logistic model, Oromo and Amhara ethnic groups were more likely to use IPT (Table – 4) than SNNP groups (**P < 0.02) and other variables like age, marital status, occupation, residence, duration of HIV care, previous TB treatment, CD4 and hemoglobin were not found to be statistically significant with IPT.

In qualitative analysis and in-depth interviews 60% and 40% of the respondents were females and males respectively. In addition the mean age of the respondents were 33 ± 4 . Around 40% of HCP's permanently working JUSH were included in the in-depth interviews which comprises 20% nurses (age: 27 ± 5.7) and 20% ART physicians (age: 26 ± 1.7) respectively. Average service days of HCP's were 92 ± 3.1 for nurses and 36 ± 3.2 for ART physicians. Nearly 10% of participants are TB/HIV coordinators (age: 41 ± 3.5), and their mean working experience was about 20 years in JUSH.

The result of the data (Table – 5) obtained through qualquant approach, the demographic characteristics of interviewed PLHIV at JUSH HIV care. Variables such as residence, monthly income, CD4 count, status of previous TB treatment and number of patients using cotrimoxazole and HAART between IPT users and non IPT users were collected by semi-structured questionnaires and their progressive response about the counseling, disclosure status and other core ideas were collected by in-depth interviews. The results are presented in median and IQR. All respondents including PLHIV, HCP's and TB/HIV coordinators responded that the core ideas and solutions in identifying factors which increases the IPT implementation. Conceptual results are presented in three core categories as patient perceptions, HCP's and TB/HIV coordinator perspectives.

Table 1. Socio-demographic figures of PLHIV in JUSH ART Clinic, Ethiopia

| Variables | Category | N% | 95% CI |
|----------------|------------------------|------------|-------------|
| Sex | Male | 133 (46.3) | 40.4 - 51.9 |
| | Female | 154 (53.7) | 48.1 - 59.6 |
| Age | < 35 | 147 (51.2) | 46.0 - 56.4 |
| | ≥ 35 | 140 (48.8) | 43.6 - 54.0 |
| Marital status | Married | 68 (23.7) | 18.9 - 28.2 |
| | Single | 74 (25.8) | 20.6 - 30.3 |
| | Divorced | 50 (17.4) | 13.9 - 22.9 |
| | Widowed | 56 (19.5) | 14.7 - 24.0 |
| | Separated | 39 (13.6) | 9.8 - 17.7 |
| Education | Illiterate | 62 (21.6) | 16.7 - 26.5 |
| | Know to read and write | 36 (12.5) | 8.8 - 16.4 |
| | completed ≤ grade - 8 | 64 (22.3) | 17.8 - 27.9 |
| | completed ≤ grade - 12 | 79 (27.5) | 23.0 - 33.4 |
| | Completed UG degree | 46 (16.0) | 11.8 - 20.2 |
| Ethnicity | Oromo | 151 (52.6) | 46.4 - 59.1 |
| | Amhara | 35 (12.2) | 8.4 - 16.3 |
| | SNNP | 78 (27.2) | 22.0 - 32.6 |
| | Tigre | 5 (1.7) | 0.3 - 3.5 |
| | Others | 18 (6.3) | 3.5 - 9 |
| Religion | Orthodox | 170 (59.2) | 53.7 - 64.7 |
| | Protestant | 35 (12.2) | 8.8 - 16.0 |
| | Muslim | 70 (24.4) | 19.9 - 29.5 |
| | Others | 12 (4.2) | 1.7 - 6.3 |
| Occupation | Government employee | 85 (29.6) | 23.5 - 34.8 |
| | Merchant | 55 (19.2) | 15.0 - 24.0 |
| | Farmer | 39 (13.6) | 10.1 - 18.4 |
| | House wife | 42 (14.6) | 10.8 - 18.8 |
| | Daily labours | 28 (9.8) | 6.6 - 13.2 |
| | Student | 16 (5.6) | 2.9 - 8.6 |
| | Others | 22 (7.7) | 4.5 - 10.7 |
| Residence | Urban | 179 (62.4) | 56.4 - 68.6 |
| | Rural | 108 (37.6) | 31.4 - 43.6 |

Note: N = Number of Respondents

Table 2. Clinical characteristics of PLHIV in JUSH ART clinic, Ethiopia

| Variables | Category | N% | 95% CI |
|------------------------|------------|------------|-------------|
| BMI | < 18.5 | 81 (28.2) | 22.7 - 33.7 |
| | 18.5-24.9 | 97 (33.8) | 28.2 - 38.7 |
| | 25-29.9 | 66 (23.0) | 18.8 - 28.9 |
| | ≥ 30 | 43 (15.0) | 10.5 - 19.5 |
| WHO Clinical stages | stage I | 82 (28.6) | 23.3 - 33.4 |
| | stage II | 61 (21.3) | 16.5 - 26.1 |
| | stage III | 88 (30.7) | 25.4 - 35.9 |
| | stage IV | 56 (19.5) | 14.6 - 24.9 |
| Duration of HIV care | < 10 years | 175 (61.0) | 55.1 - 67.5 |
| | ≥ 10 years | 112 (39.0) | 32.5 - 44.9 |
| Types of HIV care | Pre-ART | 8 (2.8) | 1.0 - 4.5 |
| | ART | 279 (97.2) | 95.5 - 99.0 |
| Duration of HAART care | < 10 years | 153 (53.3) | 47.7 - 59.2 |
| | ≥ 10 years | 134 (46.7) | 40.8 - 52.3 |
| CD4 count | ≤ 199 | 135 (47.0) | 40.8 - 52.9 |
| | 200 - 499 | 120 (41.8) | 36.2 - 47.9 |

| | | | |
|-----------------------------------|-----------------------------|------------|-------------|
| | ≥ 500 | 32 (11.1) | 7.7 -14.9 |
| IPT initiation | No | 117 (40.8) | 40.8 - 40.8 |
| | Yes | 170 (59.2) | 59.2 - 59.2 |
| Co-morbidity | Yes | 37 (12.9) | 9.1 - 16.7 |
| Previous TB treatment | Yes | 71 (24.7) | 20.3 - 30.3 |
| Patients taking medication | Co-trimaxole | 230 (80.1) | 75.1 - 85.0 |
| | Fluconazole | 16 (5.6) | 3.1 - 8.4 |
| | Other medications > 1 month | 36 (12.5) | 8.4 - 16.4 |
| | RUTF | 22 (7.7) | 4.9 - 10.8 |
| | Pyridoxine | 10 (3.5) | 1.4 - 5.6 |
| Baseline availability of LFT | | 81 (28.2) | 23.3 - 33.4 |
| Baseline availability of RFT | | 73 (25.4) | 19.6 - 30.9 |
| Baseline availability of Hgb | | 239 (83.3) | 78.8 - 87.8 |
| Baseline availability of HBsAg | | 34 (11.8) | 7.7 - 15.7 |
| Baseline availability of Anti HCV | | 12 (4.2) | 2.1- 6.6 |

Table 3. Variables and its association with IPT use on PLHIV in JUSH ART clinic, Ethiopia

| Variables | Category | Observed (Expected outcome) | | *P - value |
|----------------|------------------------|------------------------------|--------------------------|------------|
| | | Not initiating IPT (n = 117) | Initiating IPT (n = 170) | |
| Sex | Male | 57 (54.2) | 76 (78.8) | 0.5 |
| | Female | 60 (62.8) | 94 (91.2) | |
| Age | < 35 | 61 (59.9) | 86 (87.1) | 0.14* |
| | ≥ 35 | 56 (57.1) | 84 (82.9) | |
| Marital status | Married | 19 (27.7) | 49 (40.3) | 0.11* |
| | Single | 34 (30.2) | 40 (43.8) | |
| | Divorced | 22 (20.4) | 28 (29.6) | |
| | Widowed | 22 (22.8) | 34 (33.2) | |
| | Separated | 20 (15.9) | 19 (23.1) | |
| Education | Illiterate | 29 (25.3) | 33 (36.7) | 0.82 |
| | Know to read and write | 14 (14.7) | 22 (21.3) | |
| | completed ≤ grade - 8 | 26 (26.1) | 38 (37.9) | |
| | completed ≤ grade - 12 | 29 (32.2) | 50 (46.8) | |
| | Completed UG degree | 19 (18.8) | 27 (27.2) | |
| Ethnicity | Oromo | 51 (61.6) | 100 (89.4) | 0.06* |
| | Amhara | 19 (14.3) | 16 (20.7) | |
| | SNNP | 39 (31.8) | 39 (46.2) | |
| | Tigre | 2 (2.0) | 3 (3.0) | |
| | Others | 6 (7.3) | 12 (10.7) | |
| Religion | Orthodox | 67 (69.3) | 103 (100.7) | 0.81 |
| | Protestant | 16 (14.3) | 19 (20.7) | |
| | Muslim | 28 (28.5) | 42 (41.5) | |
| | Others | 6 (4.9) | 6 (7.1) | |
| Occupation | Government employee | 41 (34.7) | 44 (50.3) | 0.04* |
| | Merchant | 37 (22.4) | 18 (32.6) | |
| | Farmer | 10 (15.9) | 29 (23.1) | |
| | House wife | 21 (17.1) | 21 (24.9) | |
| | Daily labours | 2 (11.4) | 26 (16.6) | |
| | Student | 5 (6.5) | 11 (9.5) | |
| | Others | 1 (9.0) | 21 (13) | |
| Residence | Urban | 70 (73) | 109 (106) | 0.13* |
| | Rural | 47 (44) | 61 (64) | |

| | | | | | |
|-----------------------------------|-----------------------------|-------------|-------------|-----------|------|
| BMI | < 18.5 | 37 (33.0) | 44 (48.0) | 0.43 | |
| | 18.5-24.9 | 34 (39.5) | 63 (57.5) | | |
| | 25-29.9 | 26 (26.9) | 40 (39.1) | | |
| | ≥ 30 | 20 (22.8) | 23 (25.5) | | |
| WHO Clinical stages | stage I | 33 (33.4) | 49 (48.6) | 0.89 | |
| | stage II | 23 (24.9) | 38 (36.1) | | |
| | stage III | 36 (35.9) | 52 (52.1) | | |
| | stage IV | 25 (22.8) | 31 (33.2) | | |
| Duration of HIV care | < 10 years | 72 (71.3) | 103 (103.7) | 0.056* | |
| | ≥ 10 years | 45 (45.7) | 67 (66.3) | | |
| Types of HIV care | Pre-ART | 117 (113.7) | 162 (165.3) | 0.017* | |
| | ART | 0 (3.3) | 8 (4.7) | | |
| Duration of HAART care | < 10 years | 61 (62.4) | 92 (90.6) | 0.109 | |
| | ≥ 10 years | 56 (54.6) | 78 (79.4) | | |
| CD4 count | ≤ 199 | 58 (55.0) | 77 (80.0) | 0.074* | |
| | 200 - 499 | 47 (48.9) | 73 (71.1) | | |
| | ≥ 500 | 12 (13.0) | 20 (19.0) | | |
| Co-morbidity | Yes | 14 (15.1) | 23 (21.9) | 0.69 | |
| Previous TB treatment | Yes | 32 (28.9) | 39 (42.1) | 0.193* | |
| Patients taking medication (Yes) | Co-trimazole | 94 (93.8) | 136 (136.2) | 0.94 | |
| | Fluconazole | 4 (6.5) | 12 (9.5) | 0.28 | |
| | Other medications > 1 month | 12 (14.7) | 24 (21.3) | 0.33 | |
| | Special medications RUTF | | 6 (9.0) | 16 (13.0) | 0.26 |
| | | Pyridoxine | 2 (4.1) | 8 (5.9) | |
| Baseline availability of LFT | | 37 (33.0) | 44 (48.0) | 0.28 | |
| Baseline availability of RFT | | 27 (29.8) | 46 (43.2) | 0.44 | |
| Baseline availability of Hgb | | 101 (97.4) | 138 (141.6) | 0.25* | |
| Baseline availability of HBsAg | | 14 (13.9) | 20 (20.1) | 0.95 | |
| Baseline availability of Anti HCV | | 4 (3.6) | 2 (2.4) | 0.70 | |

Significance * P ≤ 0.25

Table: 4. Logistic Regression analysis of variables associated with IPT use among PLHIV at JUSH ART clinic, Ethiopia.

| Variables | Category | OR (95%CI) | df | P - value |
|----------------|---------------------|-------------------|----|-----------|
| Age | < 35 | 0.82 (0.5 - 1.5) | 1 | 0.495 |
| | ≥ 35 | 1 | | |
| Marital status | Married | 1.88 (0.6 - 4.9) | 4 | 0.691 |
| | Single | 1.22 (0.5 - 3.1) | | |
| | Divorced | 0.98 (0.4 - 2.6) | | |
| | Widowed | 1.5 (0.6 - 3.9) | | |
| | Separated | 1 | | |
| Ethnicity | Oromo | 0.71 (0.2 - 2.4) | 4 | 0.02** |
| | Amhara | 0.27 (0.1 - 1.1) | | |
| | SNNP | 0.28 (0.1 - 0.5) | | |
| | Tigre | 0.84 (0.09 - 7.3) | | |
| | Others | 1 | | |
| Occupation | Government employee | 0.36 (0.1 - 1.3) | 6 | 0.06 |
| | Merchant | 0.16 (0.04 - 0.6) | | |
| | Farmer | 1.08 (0.3 - 4.3) | | |
| | House wife | 0.44 (0.1 - 1.7) | | |
| | Daily labors | 5.41 (0.8 - 37.1) | | |

| | | | | |
|------------------------------|------------|-------------------|---|-------|
| | Student | 8.98 (0.9 - 93.1) | | |
| | Others | 1 | | |
| Residence | Urban | 0.99 (0.5 - 1.8) | 1 | 0.97 |
| | Rural | 1 | | |
| Duration of HIV care | < 10 years | 0.96 (0.4 - 1.6) | 1 | 0.905 |
| | ≥ 10 years | 1 | | |
| Previous TB treatment | No | 0.91 (0.5 - 1.8) | 1 | 0.791 |
| | Yes | 1 | | |
| CD4 count | ≤ 199 | 0.99 (0.4 - 2.6) | 2 | 0.802 |
| | 200 - 499 | 1.22 (0.5 - 3.3) | | |
| | ≥ 500 | 1 | | |
| Baseline availability of Hgb | No | 1.13 (0.5 - 2.6) | 1 | 0.775 |
| | Yes | 1 | | |

Significance ** P < 0.05

Table 5. Demographic characteristics of Interviewed PLHIV at JUSH ART clinic, Ethiopia

| Variable | IPT users (n = 18) | Non IPT users (n = 12) |
|-----------------------------------|--------------------|------------------------|
| Sex | 9.5 (5.3 - 13.8) | 6.5 (3.8 - 9.3) |
| Age | 45 (38 - 48) | 40 (31 - 47) |
| Marital status | 7 (4 - 10) | 9 (5 - 13) |
| Education level | 11 (6 - 16) | 5 (3 - 7) |
| Residence | 7.5 (4.3 - 10.8) | 8.5 (4.8 - 12.3) |
| Monthly income (ETB) | 2700 (1700 - 4500) | 1900 (1200 - 4000) |
| Counseling given | 10 (5.5 - 15) | 6 (3.5 - 8.5) |
| Disclosure status | 12 (6.5 - 17.5) | 4 (2.5 - 5.5) |
| CD4 count | 259 (184 - 334) | 322.5 (291 - 354) |
| Previous TB treatment | 11.5 (6.3 - 16.8) | 4.5 (2.8 - 6.3) |
| Patient treated with HAART | 7.5 (4.3 - 10.8) | 8.5 (4.8 - 12.3) |
| Patient treated with Clotrimoxole | 12.5 (6.8 - 18.3) | 3.5 (2.3 - 4.8) |

Note: All results are expressed in Median (Inter quartile range).

DISCUSSION

The present research aimed to define the IPT utilization rate and to identify the factors that influence IPT use among PLHIV, HCP's and TB/HIV coordinators in JUSH ART clinic, Ethiopia. With this regard the overall IPT utilization rate among PLHIV in ART clinic was 59.2%. The findings are 3 - 4 fold increase in IPT implementation compared with 30% implementation in Addis Ababa [21, 22] and 19.6% in Northern Ethiopia [23]. The current research finding shows that in accordance with other studies that recommended IPT use in combination with ART could effectively reduce TB risk in HIV-infected adults [18, 24, 25]. According to TB/HIV surveillance annual report, nearly 18.2% of HIV patients with no clinical symptoms of TB received IPT which varied by 5.6% in SNNP, 16% in Oromia and 55.9% in Harari regions respectively [19]. However, the government intention is to reach the target goal as 100% in HIV care users.

We investigated the demographic and clinical factors associated with IPT use in PLHIV. Accordingly age, marital status, occupation, residence, duration of HIV care, previous TB treatment, CD4 and hemoglobin were not found to be statistically significant with IPT use.

Astonishingly, the findings reveals that the age and sex had no significant association with IPT [26]; the only ethnicity was statistically significant with IPT use. Accordingly, Oromo and Amhara ethnics are (**P < 0.020) more likely to use IPT when compared to SNNP group. However, there were no quantitative studies done to associate ethnicity on IPT use and we used this findings to investigate a successive trials to evaluate the ethnic effect on IPT use.

Besides, we also collected the baseline information through semi-structured questionnaires and evaluated the factors that determine IPT use from PLHIV, HCP's and TB/HIV coordinators perspectives. PLHIV who have not used IPT were interviewed to mention the reasons or barriers that made them not use IPT and they responded that, lack of awareness, inefficiency of proper counselling about the benefits of IPT, unwillingness to disclose the disease, pill burden, misinformation and fear of side effects. Accordingly, almost 89% of HIV patients reported that counselling was beneficial by adhering to HIV treatment and to change their perception about the disease. In addition, they further responded that counselling motivate them to live a planned life. Nearly 60% of patients supported that disclosure was important which helped them to protect from infections and to have safer

sex with their partners and knowing their health status will at least help them not to have sex with them. In controversy, 40% of respondents argued that disclosure to other family members would result in stigma and discrimination in rural areas. All participants agreed that an increase in CD4 count and medications would prolong their life and protect them from TB/HIV disease. 35% of patients mentioned that they are fearful about the adverse effect of the drug and resistant capacity despite they believed that taking more medications are not good for their body. The group of IPT users mentioned the factors that motivated are counselling, fear of death from TB disease, concern for their family; maintain routine daily life and the trust that IPT can cure their disease. Some of the major constraints observed in non-IPT users are lack of counselling and awareness on IPT, unwillingness to disclose their disease, pill burden, misinformation and fear of side effects. Our findings are similar in previous studies done in Tanzania, Northern Thailand, South Africa and Addis Ababa [27, 28, 29, 20].

HCP's responded that implementation of IPT is one of the effective ways to prevent TB in PLHIV and they are a volunteer to prescribe for all eligible individuals with HIV. They underlined that, the IPT completion rate was very high and side effects are rare because it was given with pyridoxine for all patients. The positive attitude of HCP's observed in our study was supported by a report stated that IPT use without active TB was 42% in Oromia Region [30, 31]. They highlighted some major barriers as lack of knowledge among the respondents on adverse effect of TB and the benefits of IPT, fear on drug toxicity, pill burden and misinformation about IPT use. HCP's suggested their solution to improve IPT implementation by increasing public awareness through health education, regular counseling, launching advanced TB screening techniques and increasing sufficient number of HCP's at ART clinics.

TB/HIV coordinators of JUSH ART clinic responded that IPT implementation was monthly monitored by HIV coordinators and every quarterly period by CDC focal person which is further supervised by Oromia regional and National Health Bureau representatives. TB/HIV coordinators responded that their ultimate target was to achieve the highest implementation of IPT. Coordinators also replied that some patients refuse to use IPT and such patients are rigorously counseled for their active participation in the utilization of IPT. The overall responses from PLHIV, HCP's and TB/HIV program managers indicated the possibility of escalating IPT by periodic counseling, increasing the number of health care professionals and educating the safety aspects of IPT for PLHIV. Higher attention should be given on TB prophylaxis; linking patients in rural areas to the nearest health facilities in association with community based organization for effective health care. Higher priority in delivering free service packages for PLHIV, increasing

continuous supply of Pyridoxine with IPT and initiating computerized patient records are the core strategies responded by HCP's in implementation of IPT. Nearly 45% of HCP's and TB/HIV coordinators reacted that disclosure to the patient families and occupational independence will increase the acceptance and implementation of IPT in large scale.

Strength and Limitations of the study

The finding of the research shows that, one of the fewer studies conducted in a clinical care setting where patient management protocols are standardized and executed in practice. This is the first study in Oromia region integrating the perspectives and implementation of IPT among PLHIV, HCP's and TB/HIV coordinators. So the findings of our study could be used as a baseline for scale-up program in the community level and stake holder's extension packages. The limitations of this research are small sample size, lack of budget in extending the study period to monitor the completion rate and the researchers adapted the existing facilities because of resource limitation. Our only sampling site is JUSH, ART clinic which may limit the generalizability of our findings to other regions of Ethiopia. However, the results serve as a pilot trial to focus our upcoming research on finding innovative medical approaches and quantifying the effect of IPT to control TB in PLHIV.

CONCLUSION AND RECOMMENDATIONS

To sum up, the overall IPT utilization rate among patients enrolled in HIV care was 59.2%. The demographic and clinical factors are not significant, and ethnicity is highly significant with IPT use in PLHIV. The Qualitative study responses of PLHIV, HCP's and TB/HIV coordinators in escalating IPT use among PLHIV are periodic counseling, increasing the awareness on TB prophylaxis and educating the benefits of IPT for PLHIV, linking HIV patients to the nearest health facilities in association with community based organization for HIV care, delivering free service packages for target groups, increasing the number of health care professionals, maintaining computerized patient records and constant supply of Pyridoxine and IPT.

The Ethiopian government had framed systematic methods in IPT implementation and developed feasible policy in monitoring and evaluating TB/HIV patients. HIV case registered information and IPT provision can be assessed from the guidelines provided for ART clinics, Ethiopia. In addition, IPT registers could also be used to monitor IPT initiation, adherence, and any adverse events during treatment. Health care providers need to monitor the reporting systems and support the PLHIV through structured counseling, developing health education programs on IPT and to provide IPT with pyridoxine in stipulated time to reach the optimum goal in IPT utilization in the country.

Abbreviations

SNNP: Southern Nations, Nationalities and Peoples, which comprises many different ethnicities; BMI: Body mass index; WHO: world health organization; HAART: Highly active antiretroviral therapy; CD4: Cluster of differentiation; RUTF: Ready to use therapeutic feeding; LFT: Liver function test; RFT: Renal function test; Hgb: hemoglobin; HBsAg: Hepatitis B virus surface antigen; HCV: Anti- Hepatitis C virus Antibody.

Ethics approval and consent to participate

All participants involved in the study were provided with information on the risks and benefits of the project. A written consent form was received from the target groups and all respondents know that they had the right to withdraw at any stage of the study without giving any notification.

Availability of data and materials

All the data's analyzed during this study are included in this published article and the raw data's are available from the corresponding author on reasonable request.

Competing interests

The authors declare that there is no competing interest associated with this study and publication.

Authors' contributions

GI has designed the research, collected the data and conducted the analysis. VR drafted and reviewed the manuscript. KW engaged in guidance and data acquisition.

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