Effect of Isoniazid Preventive Therapy among Children Living with HIV in Ola during Children's Hospital-Freetown, Sierra Leone

Buoga Dolphine Anyango[1]*, Job Mapesa[1] and Emily Muchina[1]

[1]Kenya Methodist University P.O Box 267, 60200, Meru, Kenya

**Correspondence email: dolphineanyango@yahoo.com*

Abstract

IPT is a prophylactic treatment used to stop active tuberculosis (TB), which is one of the leading causes of mortality among HIV-positive people. However, less than 30% of children living with HIV (CLHIV) are enrolled in the Isoniazid Preventive Therapy program at Ola during Children Hospital (ODCH) in Sierra Leone, indicating that many of the children may be at risk of developing active TB. Therefore, we sort to determine the effect of Isoniazid Preventive Therapy inactive TB prevention. Using census sampling technique of 323 CHLIV, a cross-sectional study design was employed. Data were collected using self-administered structured questionnaires. The data were analyzed using descriptive statistics and Chi-square for computation of ordinal logistic regression. About 50% of the children living with HIV were in stage II of WHO HIV classification. HIV-positive children aged less than 12 weeks, children aged 1-4 years old, 5-8 years old, 9-13 years old, and more than 13 years old were more likely to experience high cases of TB prevalence (OR=2.777, $p<0.05$). The low tuberculosis incidence indicated that the majority of the children enrolled in ODCH did not contract TB (97%, $x^2=284.24$, $p<0.05$), indicating that Isoniazid Preventive Therapy improves health outcomes. The study concludes that Isoniazid Preventive Therapy reduces the incidence of TB in children living with HIV.

Keywords: *IPT, Children HIV-Positive, Ola during Children's Hospital, Children Living with HIV*

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1.0 Introduction

Isoniazid Preventive Therapy (IPT) is the administration of Isoniazid (INH) to people with idle Tuberculosis (TB) disease. INH is one of the best bactericidal, hostile to TB and present in TB drugs accessible at present. While it secures against movement of inactive TB to dynamic sickness, it likewise forestalls TB reinfection present introduction on an open instance of TB in the two grown-ups and youngsters (WHO, 2015). In Cape Town, a rate of 24 cases for every 100 HIV-infected kids every year was reported during restricted admittance to ART. Preventive treatment for TB has been known to decrease frequency of TB infection among high-hazard people aged over 40 years. IPT is a

key general wellbeing mediation for the avoidance of TB among kids and adults living with HIV/AIDS. Nonetheless, it is not generally utilized, particularly in Sub-Saharan Africa. Because of the double plagues of TB and HIV in kids, serious case finding for dynamic TB, IPT, and disease control for TB is a fraction of the measures that, when actualized, will fundamentally diminish mortality in kids living with HIV/AIDS.

Studies have demonstrated that IPT is effective and more secure than Rifampicin and Pyrazinamide-containing regimens utilized for counteraction of inactive TB disease. IPT was likewise discovered to be successful in diminishing the occurrence of TB and passing on of HIV-tainted kids (Cohen et al., 2011). IPT lessens the general danger of creating TB by 33% when contrasted with a routine of Pyrazinamide, Rifampicin, and Rifapantin (WHO, 2015). Kids with HIV are 20–37 times bound to create dynamic TB from idle TB than those without HIV. HIV disease is the most grounded hazard factor for creating TB and has fueled its resurgence, particularly in sub-Saharan Africa (Cohen et al., 2011). In 2010, there were an expected 1.1 million episodes of TB among the 34 million individuals living with HIV around the world. It is assessed that between 30 to 50 % of HIV-positive people pass on TB, thus the need to forestall TB contamination in HIV-tainted people through the administration of IPT for a half year (Cohen et al., 2009).

Screening to rule out active TB can identify many children who need treatment for previously undiagnosed TB cases. IPT is efficacious and is recommended for all children in nations where TB is normal and co-contamination of dynamic TB documented. Although worldwide activities, for example, the United States President's Emergency Plan for AIDS Relief (PEPFAR), and the Global Fund to Fight AIDS, TB, and Malaria have zeroed in on scaling up ART(Antiretroviral Therapy), a huge number of children living with HIV need IPT (Lönnroth et al., 2015). Clinical preliminaries have indicated that IPT significantly decreases TB occurrence among children infected with HIV/AIDS (De Pinho et al., 2001).

Generally, IPT lessens the danger of TB by 33%; and by 64% in children with a positive tuberculin skin test. WHO and UNAIDS perceived the viability of IPT in children and suggested its utilization as a feature of a basic consideration bundle for patients (Lawn, Wood, and Wilkinson, 2010). Nonetheless, without HIV infection, most children with TB go inside WHO TB analytic Category III and ought to be treated during the underlying period of treatment with three medications, namely; Isoniazid, Rifampicin, and Pyrazinamide, for a very long time, trailed by a continuous period of treatment with two medications, Isoniazid and rifampicin, for four months. To effectively and successfully forestall TB in children, normalized proof-based methodologies ought to be consolidated into existing public TB programs rules and techniques. Preventive treatment, otherwise called chemoprophylaxis, with Isoniazid, decreases the danger of first scene TB happening for quite a while when exposed to contamination, dormant disease, or a repetitive scene of TB.

Generally, all children with inactive TB contamination who take INH are secured, and the best decrease in disease is seen in HIV-negative children (Harries et al., 2010).Tuberculosis is ranked third among the 10 high burden diseases in Sierra Leone, and TB prevalence incidence is increasing, especially among HIV-positive children and those exposed. For instance, the TB Case Notification Rate rose from 8% to 15% per 10,000 populations between 2010 and 2015.

In Sierra Leone, the second edition of the national TB guideline was published in 2015. However, the guideline has been very difficult to implement due to limitations in health services delivery. A baseline assessment in April 2017 showed that only 21% of HIV-positive children were on IPT at ODCH. Consequently, all IPT legible children were enrolled in the IPT project in August 2017.

It is for this reason that a quality improvement project was initiated as a strategy to improve IPT uptake among HIV-positive children at ODCH. ODCH is the only national pediatric HIV referral hospital in SL.Based on these assessment findings, a QI project was initiated in ODCH in May 2017 as a strategy to improve uptake of IPT among HIV-positive children on treatment and care. From August 2017 to date, all the IPT legible children have been enrolled into the IPT program in the facility. As a result, there was a need to evaluate the effect of IPT among positive children who completed IPT before February 2018 in ODCH, Sierra Leone. This study was therefore designed to determine the effect of IPT among HIV-positive children.

2.0 Materials and Methods

This study utilized a cross-sectional research design, and it employed quantitative data. The study was conducted at ODCH in Sierra Leone from June 2017 to March 2018. The target population was all CLHIV aged between 6 weeks and 15 years, and who enrolled and completed IPT before February 2018. The sample size was 323 CLHIV recruited using the census sampling technique. Data collection was done using a structured questionnaire, and a KII guide.

Quantitative data was checked for conciseness and consistency and later exported to SPSS V25 for analysis**.** Data were later analyzed using the descriptive analysis technique. , The study used Chi-square for inferential statistics. Key informant interview data collected from pediatric specialists were transcribed and analyzed using latent content analysis. On ethical considerations, the author ensured that the respondents gave consent before data collection commenced. The researcher assured the respondents that their anonymity, privacy, and confidentiality would be maintained.

3.0 Results and Discussion

Demographic Information

The study established that the children brought at the facility were in school, and the majority were in primary school (Table 1).

Table 1

Demographic Characteristics of Children

		N	%
Whether in school or not	Yes	282	(87.3%)
	No	41	(12.7%)
Level of Education	Nursery	56	(17.3%)
	Primary	159	(49.2%)
	Junior Secondary School	68	(21.1%)
	Senior Secondary School	40	(12.4%)
Religion	Christians	46	(14.2%)
	Muslim	277	(85.8%)

Table 2 shows clinical information is essential in the administration of IPT treatment and management of TB incidence. It was established that majority of the children at the facility weighed between 11-20 kg [200, 61.9%], while 20.4% weighed between 5-10 kgs; those who weighed above 21 kgs were 48[14.9%]. On the WHO HIV stage, most of the children were in stage II [176, 54.5%], while a third [101, 31.3%] were in stage III. Most of the children were in the 3TC drugs regime [184, 57.7%], compared to 80[25.1%] on the triple therapy ART regime, and all of the facilities used Cotrimoxazole as presented.

Table 2

Clinical information

Clinical information		**Frequency**	**[%]**	**Correlation with age**
Weight of the child	Less than 5 kg	9	[2.8]	
	Between 5-10 kgs	66	[20.4]	
	Between 11-20 kg	200	[61.9]	
	Between 21-30 kgs	48	[14.9]	r=0.093,p=0.095
WHO HIV stage	Stage One	46	[14.2]	
	Stage Two	176	[54.5]	
	Stage Three	101	[31.3]	r=-0.027,p=0.063
ART regime	AZT	10	[3.1]	
	3TC	184	[57.7]	
	NVP	45	[14.1]	
	AZT+3TC +NVP	80	[25.1]	r=0.098,p=0.082
Septrine use	Yes	273	84.5	
	No	50	15.5	r=0.062,p=0.265

TB Incidence in CLHIV

Following the assessment of TB incidence in CLHIV, it was evident that the majority of the children were not diagnosed with TB and hence, were not put on TB treatment (Table 3).

Table 3

Assessing Incidence of TB among HIV positive children post completion of IPT

			n[%]	x^2	**P value**
Children diagnosed with TB	Yes	10	[3.1]	284.2	0.001
	No	313	[96.9]		
Child on TB treatment	Yes	10	[3.1]	284.2	0.001
	No	313	[96.9]		

Effect of IPT on Quality of Life

The age of CLHIV was significant in relation to IPT treatment [p<0.05]. The odds of children living with HIV are 2.038 when you are below 4 years, and it reduces as the children grow old (Table 4).

Table 4

Effect of IPT on Mortality and Quality of Life using odds ration

Isoniazid Preventative Therapy (IPT)		B	Std. Error	Wald	P-value	Odds Ratio
Mortality	Intercept	-18.651	2.014	85.786	0.001	2.038
	[1-4 years]	-17.709	3586.138	0.0	0.006*	1.779
	[5-8 years]	0.576	1.034	0.311	0.577	0.655
	[9-13 years]	-0.423	1.011	0.175	0.675	2.777
Quality of Life	Intercept	-2.372	2.247	1.114	0.291	1.092
	[1-4 years]	-0.253	1.728	0.021	0.034*	1.146
	[5-8 years]	0.088	1.037	0.007	0.933	
	[9-13 years]	0.136	0.998	0.019	0.891	
	[>13 years]	0				

Furthermore, CLHIV aged less than one year compared to those aged 1-4 years, 5-8 years, 9 -13 years, and more than 13 years are more likely to have TB prevalence and poor quality of life (OR=2.777, p<0.05). The probability of CLHIV aged less than 12 weeks

experiencing higher TB prevalence and poor quality of life, with respect to children aged 1-4 years, 5-8 years, 9 -13 years, and more than 13 years was 2.777 times higher.

WHO total scores of Quality of Life and Ola during Children's Hospital

Table 5 outlines the Quality of Life of CLHIV on IPT therapy at ODCH. According to the WHO Quality of Life table, the higher the transformed scores, the higher and the quality of life. QoL scale is interpreted as 0-20=Very poor, 21-40-Poor, 41-60-Fair, 61-80-Good, and 81-100 excellent.

Under physical health of CLHIV, QoL improved to and was good while the physical health improved later after IPT. Generally, psychological health as well as the level of independence was fair. Further, social was fair while environment, spirituality and religion were worse, and were graded poor

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Table 5

Quality of life Scores in Ola during Children's Hospital

Domain	Raw Score	Transformed score (0-100)	Comment
Physical Health	24	63/100	Good
Psychological Health	18	50/100	Fair
Level of Independence	10	56/100	Fair
Social Relationships	9	50/100	Fair
Environment	25	56/100	Fair
Spirituality, Religion	15	38/100	Poor

Discussion

The study results show that majority of the children at Ola during Children's Hospital weighed between 11-20 kg (200, 61.9%). The administration of ART should be commensurate with the age of the child. While studies such as Newell *et al*. (2003) postulate that weight is not significant with the main effects of HIV, Okwara (2015) notes that low weight in patients increased their relative risk by 2-5 times, and concludes that when it comes to drug administration, weight is key. When it comes to WHO HIV staging, the study results reveal that majority of the children were in stage II (176, 54.5%), while a third (101, 31.3%) were in stage III.

In terms of regime, majority of the children were on the 3TC drugs regime (184, 57.7%) compared to 80 (25.1%) who were on three drugs, ART.

The hospital also used Cotrimoxazole for prevention against opportunistic infections. The protective effect of ART on TB risk was reported in children. The study results show that the resultant effect of ART is the reduction of susceptibility to M. *tuberculosis* by improving immunity and enabling TB infection containment. The results concur with the work of De Pinho et al., (2001) who note that there is a reduced susceptibility to

TB when ART is used.CLHIV also saw a risk reduction of up to 76% when receiving ART and IPT compared to those who received neither. The scaling of IPT treatment in addition to ART shows a beneficial effect on the reduction of TB in children in areas with a high TB/HIV burden.

The study results concur with the findings of (WHO 2016). Edessa and Likisa (2015) note that people living with HIV who are treated with HIV and ART have a lower likelihood of mortality and delayed time-to-death as compared to patients on ART alone.In terms of quality of life, CLHIV aged less than12 weeks compared to those aged 1-4 years were more likely to be infected with TB, and experience poor quality of life (OR=2.777, $p<0.05$). The results concur with the work of Sade (2013) who in assessing the impact of INH in the incidence of TB among CLHIV in Addis Ababa established that there was a reduced chance of contracting TB.

Their findings also show that the age of the patient is vital when it comes to TB incidence. Factors such as physical health, psychological health, and level of independence, social relationships, environment, spirituality, and religion affect the quality of life for CLHIV at Ola during Hospital. With the administration of IPT, it is important for children to receive social support, which enhances their recovery. Social support improves their behavioral skills and confidence among PLWHA, and the QoL increases subsequently. These results concur with the work of Chiegil (2017), who, when assessing the QoL from HIV Counseling and Social Support among CLHIV and PLWHIV Clinic attendees in Special Hospital Yola, Adamawa State Nigeria reveals that 98% of the clinic attendees experienced improved QoL. The WHO QoL table notes that the higher the transformed scores, the higher the QoL.

The study results concur with the work of Howard et al. (2017) who conducted a study to evaluate the effectiveness of combined intervention package to improve IPT initiation, adherence, and completion among PLHIV in Ethiopia. The results of the study show that IPT improved the QoL among TB patients living with HIV. From the study results at Ola during Children's Hospital, the overall effect of IPT treatment is improved QoL and reduction of risk of TB incidence, and reduction of susceptibility of *M. tuberculosis.*

4.0 Conclusion

The study results show that the effect of IPT is a reduced incidence of TB since the respondents were not diagnosed with TB after IPT completion, and combined IPT and ART. IPT combination with ART is encouraged to protect the occurrence of TB and improve immunity among CHLIV.

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Conflict of interest

The author declares that they have no conflict of interest.

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