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Original Article

Community Medicine Section

Retention and Treatment Outcomes of an Undernutrition Program for HIV patients involving Ready-to-Use Therapeutic Food at Gondar University Hospital, Ethiopia: A Cross-Sectional Study

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ABSTRACT

Introduction: Despite global efforts to eradicate poverty and hunger, under-nutrition is still a major health problem, especially in Sub-Saharan Africa, where HIV/AIDS prevalence is also a serious burden.

Aim: To assess the retention and outcomes of under-nutrition treatment program in Gondar University Hospital, Ethiopia.

Settings and Design: A cross-sectional study was conducted in HIV positive children and adults participating in the Ready-to-use Therapeutic Food (RUTF) treatment program at Gondar University Hospital ART clinic for one year from November 2012 to November 2013.

Materials and Methods: Six hundred and thirty six patient records were followed-up for one year. Outcome variables were Mid-Upper Arm Circumference (MUAC) values measured as severe, moderate acute malnutrition, normal after treatment, non-respondent, relapsed and lost to follow-up using the hospital records of HIV positive children and adults eligible for the program.

Statistical Analysis: Univariate and multivariate analysis were performed to compute Crude Odds Ratio (COR) and Adjusted Odds Ratio (AOR). Statistical significance was set at p-value<0.05.

Results: Among 636 clients, 44.2% achieved MUAC measures ≥ 125 mm for children and ≥ 21 cm for adults at 4 and 6 months. 70.1% of those were children while 29.9% of the 281 were adults. Moreover, a more positive initial response to ready-to-use therapeutic food was found among children as there was significant increase (p<0.05) in MUAC value after the second month of initiating treatment while adults achieved a significant (p<0.05, p<0.01) in MUAC at the 4th and 6th month respectively. There was a significant association between age, nutrition status and treatment outcome, while sex, HIV status, education and residency were not associated with treatment outcome.

Conclusion: Recovery and weight gain rates were below 50%. Defaulter rates were higher than the Sphere standards and recovery was better in children than adults. Integrated RUTF and HIV program and strict follow-up and education or counselling of HIV positive patients should be strengthened.

Keywords: Malnutrition, Mid-upper arm circumference, Severe acute malnutrition

INTRODUCTION

Malnutrition continues to be a major global health problem [1,2]. Undernutrition, defined as the outcome of insufficient food intake and repeated infectious diseases, is highly prevalent in low and middle income countries [3]. Maternal and child undernutrition is the underlying cause of 3.5 million deaths, 35% of the disease burden in children younger than 5 years and 11% of total global Disability-Adjusted Life-Years (DALYs) [4]. In Africa, >31% of children under 5 years are underweight and undernutrition is increasing among adults with HIV [5]. Ethiopia has one of the highest rates of malnutrition in Africa with an estimated prevalence of 42% of children being underweight [6]. The four major forms of malnutrition (undernutrition) are acute and chronic malnutrition, iron deficiency anaemia, vitamin A deficiency and iodine deficiency disorder. In addition to these, Sever Acute Malnutrition (SAM) affects about 20 million children globally and contributes to an estimated 1.7 million child deaths every year while 3.6 million die because of Moderate Acute Malnutrition (MAM) [7]. The diagnostic criteria for referring children and adults with SAM are based on the standard weight-for-height Z score and Mid-Upper Arm Circumference (MUAC) of which MUAC being a reliable measurement method as it is less affected by dehydration [8]. Further, the referring infants and children who are 6–59 months of age and have a MUAC <115 mm or a weight-for height/length <–3 Z-score 1 of the WHO growth standards, or have bilateral oedema, should be immediately admitted to a programme for the management of severe acute malnutrition and the diagnostic criteria for adults with HIV include Body Mass Index (BMI) <18.5 [9].

In 2000, the United Nations (UN) established the eradication of extreme poverty and hunger as a goal of precedence and listed it first among the Eighth Millennium Development Goals [10].

Nutrition aid is considered the best intervention strategy for improving nutrition status in undernourished children and adults. Several health aided organizations such as WHO, UNICEF, and the UN World food programme recommend fortified sachet powders or supplements like Ready-To-Use Therapeutic Food (RUTF) for managing the SAM as emergency community management to improve the nutritional status [11,12]. Plumpy' Nut is a therapeutic food product comprised of an energy dense lipid paste made of peanut butter, milk powder, oil, sugar, minerals, vitamin, and protein mixture specifically designed for treating severe malnutrition in Ethiopia as shown in [Table/Fig-1] [13]. The product can be consumed directly without any preparation. In Africa, Plumpy' Nut has been found to be useful in treating the long term chronic malnutrition of children as well as adults outside the hospital without the close supervision of medical workers [14] and the therapeutic food dosage in Ethiopia is shown in [Table/Fig-2] [15].

Ingredient	% Weight
Full fat milk	30
Variables	**Frequency (%)**
Sugar	28
Vegetables oil	15
Peanut butter	25
Mineral Vitamin Mix	1.6

[Table/Fig-1]: Composition of RUTF.

Class of weight (kg)	RUTF paste		PLUMPY'NUT	
	Grams per day	Grams per week	Sachet per day	Sachet per week
3.0-3.4	105	750	1 ¼	8
3.5-4.9	130	900	1 ½	10
5.0-6.9	200	1400	2	15
7.0-9.9	260	1800	3	20
10-14.9	400	2800	4	30
15-19.9	450	3200	5	35
20-29.9	500	3500	6	40
30-39.9	650	4500	7	50
40-60	700	5000	8	55

[Table/Fig-2]: RUTF dosage reference in Ethiopia.

In Ethiopia and other countries in Africa hospitals and non-government organizations are engaged in the community-based management of malnutrition using imported and locally processed foods along with intensive nutrition education [16-18]. These programs enable parents to meet the nutritional requirements of their children with foods that are available through aid or at low cost. Plumpy' Nut was previously given to children with severe wasting (Weight-for-height Z-score (WHZ) ≤3SD) or underweight (Weight-for-age Z-score (WAZ) ≤3SD) or both severe wasting and underweight. Now, with an increased aid from donors, children on MAM and adults with HIV are included in the clinical nutrition care program [19].

In Ethiopia 1.3% of the population aged 15-49 is HIV positive [20]. A low BMI after the start of Antiretroviral Therapy (ART) has been found to be an independent predictor of early mortality [21]. This highlights the need for a comprehensive approach to health care involving therapeutic and food security interventions. The combination of RUTF and ART treatments has been shown to promote weight gain and reduce case fatality rates among HIV-positive adults [22]. ART improves immunity, reduces energy loss, and may improve appetite [23,24]. Few studies have evaluated the effectiveness of RUTF and ART interventions and their outcomes in Low and Middle Income Countries (LMIC) [25]. Only one study has shown that the initiation of RUTF and ART may improve wasting status among HIV-positive children [26,27]. The studies examining initiation of ART among patients treated with RUTF focus on wasting alone and the association of RUTF treatment duration and nutrition status was not analysed [28]. This highlights a gap in knowledge concerning the impact of RUTF in HIV settings [29]. In Ethiopia, RUTF is a community and hospital or health center based intervention given to undernourished children irrespective of their HIV status and HIV positive adults [21]. However, little is known concerning the outcome and retention of such patients in treatment programs. Hence, the study reported in this paper aimed to assess the outcomes/recovery, default, non-respondent and retention in treatment which might be used as a bench mark for further large scale studies and subsequent interventions.

MATERIALS AND METHODS

A retrospective cross-sectional study was conducted at Gondar University Hospital ART clinic to assess the retention and outcomes of HIV positive children and adults participating in the RUTF treatment program for one year from November 2012 to November 2013.

The sample size was determined using a formula for estimation of single population proportion with the assumption of 95% confidence level, margin of error of 5% and the prevalence rate of 50% [30].

$(n = (Z\alpha/2)^2 \times p\ (1-p)/d^2,\ n = (1.96)^2 \times 0.5(1-0.5)/\ (0.05)^2 = 385)$

d = marginal error, p = proportion of sample population with confidence interval of 95%, $Z\alpha/2$= the value under standard normal table for the given value of confidence interval, n = sample size.

We have increased this to 462 to account for possible drop outs and loss of follow-up of 20% (385 X 20/100 = 77). The minimum sample size required for this cross sectional study design was 462 (385 + 7).

De-identified data from the patient's follow-up registry at the ART clinic at the Gondar University Hospital was used for this study. Anthropometric measurements were recorded including BMI, MUAC, weight and height. Clinical criteria in treatment of malnutrition for the admission of outpatients at the ART clinic as inpatients to the hospital included Infants age <6 months, presence of danger signs, presence of medical complications, severe oedema (+++), and miasmic Kwashiorkor. Furthermore, patients who did not fall into these categories, but were deemed acute will undergo an appetite test to decide whether to manage the nutrition problem in an outpatient or inpatient setting.

Protocols and Operational Definitions

According to the Ethiopian guide to clinical nutrition care for children and adults with HIV, children with a MUAC value of less than 11cm and between 11-11.99cm were considered as SAM and MAM, respectively. For adults, a MUAC value of less than 17 cm was considered SAM and 17-21cm was considered as MAM [31]. According to hospital's follow-up scheme, a patient with SAM needs to be followed-up for six months and a patient on MAM for four months to see the outcomes of RUTF intervention treatment. After admission, patients received a monthly supply of Plumpy' Nut sachets according to their body weight. At each month of patient's visit, progress was recorded on the patient tracking chart.

Patients were declared "recovered" and discharged after they meet the criteria of MUAC (6-11 months >12cm, 12-59 months->13cm, adult>21cm). A patient is declared "Defaulter" considered lost to follow-up if he/she fails to show for appointments in two consecutive week period and it was confirmed that the patient has not died via a home visit or phone call. The patient who did not reach the discharge criteria after six months in the program was determined to be "Non-respondent". A patient who has been declared "recovered" under the criteria, but re-admitted in the treatment program with SAM or MAM state was considered as "Relapsed".

Data Collection

Individual patient data were collected including socio-demographic characteristics (gender, age, residency, nutrition and HIV status), clinical diagnosis (SAM, MAM), anthropometrics [MUAC values at presentation (0 months) and MUAC values at each month for 6 months follow-up] and Treatment outcome (normal after treatment (recovered), not responded to treatment (non-respondent), readmitted post discharge (relapsed) and lost to follow-up (defaulter). The primary outcome measure was treatment outcome defined as recovered, non-respondent, relapsed and defaulter. The secondary outcome was MUAC values measured for both SAM and MAM.

Ethical Approval

Ethical clearance was obtained from the Ethical Review Committee at School of Pharmacy, College of Medicine and Health Sciences, University of Gondar, Ethiopia Furthermore,

permission was obtained from the hospital administration and relevant departments.

STATISTICAL ANALYSIS

Statistical Package for Social Sciences (SPSS) version 19.00 was used for analysis. Frequencies with percentage and cross-tabulations were used to summarize descriptive statistics. Bivariate and multivariate analyses were performed to test associations between age, nutritional status, HIV status, sex, residency and RUTF treatment outcome. The statistical significant was set at < 0.05.

RESULTS

A total of 636 HIV patients were registered for the management of the SAM and MAM for one year between November 2012 and November 2013. The mean age of children and adults were 5 ± 0.8 years and 34 ± 1.3 years, respectively. There were 320 (50.3%) females and 316 (49.7%) males. Of the total, 398 (62.6%) were children (≤18years) and 238 (37.4%) were adults (>18 years). The majority of subjects (396, 62.3%) were admitted for MAM and 240 (37.7%) for SAM. A total of 433 (68.1%) were on ART treatment and attending the ART clinic, while 203 (31.9%) were not on ART (pre-ART) [Table/Fig-3].

The analysis involved calculating the mean values of MUAC which had been measured and recorded each month in children and adults during their treatment. The mean values of MUAC in SAM cohort at each month has increased significantly ($p<0.05$) for children on month 2 and 3 with more significant changes in mean values of MUAC after 4 to 6 months ($p<0.01$). However, in adults the mean values of MUAC in SAM cohort changes significantly on month 4 and onwards as compared to baseline ($p<0.05$). The mean values of MUAC in SAM for adults did not change during month 2 and 3 as compared to baseline ($p>0.05$).

The mean values of MUAC in MAM cohort at each month has increased significantly ($p<0.01$) for children on month 3 and 4. However, in adults the mean values of MUAC in MAM cohort changes significantly at month 4 as compared to baseline ($p<0.05$). The mean values of MUAC in MAM for adults did not change during month 1, 2 and 3 as compared to baseline ($p>0.05$). The mean values of MUAC for each month (0 to 4 month) in children and adults were recorded and tabulated in [Table/Fig-4].

Patient Profile	Variables	Frequency (%)
Gender	Male	316 (49.7)
	Female	320 (50.3)
Age	<18 years	398 (62.6)
	>18 years	238 (37.4)
Nutrition status	MAM	396 (62.3)
	SAM	240 (37.7)
HIV status	On ART	433 (68.1)
	Pre-ART	203 (31.9)

[Table/Fig-3]: Gender, age, nutritional and HIV status (N = 636).
Key: HIV= Human Immunodeficiency Virus, MAM = Moderate acute malnutrition (MUAC of 11-11.99cm for children/17-21cm for adults), SAM= Severe acute malnutrition (MUAC of <11cm for children/<17cm for adults) [28], ART= Antiretroviral therapy, Pre-ART= not on antiretroviral therapy despite HIV positive.

Month of Initiation of RUTF	Mean Value of MUAC (cm)			
	≤18 years		>18 years	
	SAM	MAM	SAM	MAM
Baseline (0)	7 ±1.5	11±0.65	14 ±1.3	17±1.1
1	8±1.3	12 ±0.42	14 ±1.8	17 ±1.9
2	10 ±1.6*	14 ±0.93	15 ±1.6	18±1.3
3	10 ±1.8*	15 ±0.84**	16 ±1.2	19±1.4
4	11 ±1.2**	16 ±0.28**	17 ±1.2*	21±1.8*
5	12 ±1.7**	-	18 ±1.7*	-
6	13 +1.4**	-	21 +1.5*	-

[Table/Fig-4]: Baseline and monthly RUTF treatment for MAM and SAM based on MUAC.
Key: RUTF = Ready-to-use therapeutic food, MAM = Moderate acute malnutrition (MUAC of 11-11.99cm for children/17-21cm for adults), SAM = Severe acute malnutrition (MUAC of <11cm children/<17cm for adults) [28], MUAC = Mean upper arm circumference,*p<0.05 versus MUAC at Month 0, **p<0.01 versus MUAC at Month 0.

According to treatment outcome post RUTF based on MUAC (4 and six months for MAM and SAM), 322 (52.2%) cases were identified for treatment of MAM and 304 (47.8%) were for SAM. In both cases, 281 (44.2%) recovered with proper achievement of MUAC after 4-6 months of follow-up. Children were found to have more rapid recovery rate than adults (49.5% ≤18 years versus 35.3% >18 years, $p<0.05$). The overall defaulted cases were found to be 24.8% (SAM 29.9% versus MAM 20.2%) with statistically significant difference ($p<0.01$) between those >18 years (29.0%) than those ≤18 years (22.4%). Not responded cases comprise 18.6% with SAM prevailing over MAM (22.4% vs. 15.1%). The group with age > 18 years has shown preponderance over those with ≤18 years (22.3% vs. 16.3%). Relapsed cases (12.4%) were evenly distributed between the SAM (12.2%), MAM (12.6%), >18 years (13.4%) and ≤18 years (11.8%) groups. This denotes a highest relapse rate in the group with age > 18 years. The results were presented on [Table/Fig-5].

Logistic regression (with predictor variables) based on post RUTF recovery and additional analysis with logical logistic regression model was performed on five variables denoted as gender, age (≤18, >18 years), HIV status, nutritional status and residency (Gondar and outside Gondar-suburban). The analysis has revealed that there was a statistically significant risk for MAM (COR=0.169; 95%CI (0.151-0.218) vs. AOR=0.173; 95%CI (0.1611-0.224)) associated with age ≤18 years (COR=0.353; 95%CI (0.231-0.532) vs. AOR=0.463; 95% CI (0.291-0.737)) for recovery. There were no significant associations observed with gender, residency and HIV status for recovery [Table/Fig-6].

DISCUSSION

Individuals affected with severe and moderate under nutrition require artificial nutrition support [22] particularly those who are HIV positive. The practice of using RUTF, although common in Ethiopian health settings has not been well explored in population who are HIV positive. We have retrieved data of 636 cases (adult

Treatment outcome	SAM F, (%)	MAM F, (%)	Total outcome (SAM/MAM) F, (%)	>18years F, (%)	≤18years F, (%)	Total for cases (>18/≤18 years) F, (%)
Recovered	108 (35.5)	173 (52.1)	281 (44.2)	84 (35.3)	197 (49.5)	281 (44.2)
Defaulted	91 (29.9)	67 (20.2)	158 (24.8)	69 (29.0)	89 (22.4)	158 (24.8)
Not responded	68 (22.4)	50 (15.1)	118 (18.6)	53 (22.3)	65 (16.3)	118 (18.6)
Relapsed	37 (12.2)	42 (12.6)	79 (12.4)	32 (13.4)	47 (11.8)	79 (12.4)
Total at columns	304 (100.0)	332 (100.0)	636 (100.0)	238 (100.0)	398 (100.0)	636 (100.0)

[Table/Fig-5]: Treatment outcome post RUTF (4 and 6 months for MAM and SAM).
Key: RUTF= Ready-to-use therapeutic food, MUAC= Mean upper arm circumference, MAM = Moderate acute malnutrition(mean upper arm circumference "MUAC" of 11-11.99 cm for children/17-21 cm for adult), [28], SAM= Severe acute malnutrition (MUAC- <11 cm children/ <17 cm adult), [28], F= Frequency, (%)= Percentage, Recovered: MUAC (6-11 months >12cm, 12-59 months>13cm, adult: >21cm), Defaulted: loss of follow-up if he/she falls to show for appointments in a two consecutive week period, Non-respondent: Patient has not reached the discharge criteria after 6 months initiation of RUTF, Relapse: re-admitted in the treatment program with SAM or MAM

Predictor variable	Recovered				p-value
	Yes	No	COR(95%CI)	AOR(95%CI)	
Gender					
Male	147	169	1.105(0.894-1.251)	1.052(0.865-1.288)	0.603
Female**	134	186			
Age					
≤18 years	197	201	0.353(0.231-0.532)	0.463(0.291-0.737)*	**<0.001**
>18 years**	84	154			
HIV status					
On ART	194	236	1.132(0.748-1.311)	1.124(0.798-1.323)	0.722
Pre ART**	87	116			
Nutrition status					
MAM	173	223	0.169(0.151-0.218)	0.173(0.161-0.224)*	**<0.001**
SAM**	108	132			
Residency					
Gondar	157	90	1.211(0.914-1.541)	1.312(0.865-1.288)	0.832
Outside Gondar**	124	265			

[Table/Fig-6]: Logistic regression (with predictor variables) based on recovery post RUTF.
Key: RUTF= Ready-to-use therapeutic food, COR = Crude odds ratio, 95% CI = 95% confidence interval, AOR= Adjusted odds ratio,*p-value <0.05, **Denotes a reference category, MUAC = Mean upper arm circumference, MAM = Moderate acute malnutrition (MUAC of 11-11.99cm for children/17-21cm for adults), SAM = Severe acute malnutrition (MUAC of <11cm for children/ <17cm for adults) [29].

and children) with HIV positive who were engaged in RUTF program. The main finding of this study was the explored pivotal role of RUTF at hospital and community level. We have documented a significant effect of RUTF on addressing SAM and MAM in both children and adults.

A statistically significant improvement in MUAC values after RUTF treatment was more observed in patients ≤18 years than in patients >18 years. One possible explanation for this can be attributed to the fact that adults (>18 years) may share or sell some of their RUTF supplies and hence, not consuming the required amount. This concurs with the findings of other study that shows the links between HIV, under nutrition and food insecurity [32].

People living with HIV infection (themselves or among family members) face not just illness but also impaired productivity, declining income, and increasingly difficult choices among essential but competing expenses, such as food versus health care or schooling versus rent [32]. Understanding how food is shared within families and how therapeutic food is perceived of is essential to the distribution of RUTF [33].

The mean values of MUAC in SAM and MAM cohorts for patients ≤18 year have shown significant ascending increase at an early stage of 2 to 3 months (for SAM) and months 3 and 4 (for MAM) of RUTF treatment. On the contrary, patients >18 years did not change during the same period for SAM, except at 4 months for group with MAM. This denotes that baseline characteristics were not effective in adult after stabilisation period. Therefore, improvement in nutritional status independent of the baseline characteristics raises concern about the adults were MAM at the start of the treatment need to further examined.

The number of patients recovered with proper achievement of MUAC post RUTF were almost nearly half 281 (44.2%) of the overall retrieved cohort. We have reported higher percent of recovery for achieving MUAC with those ≤18 years (49.5%) than those >18 years (35.3%). The overall percent of patients with defaulter (24.8%) was not with the international Sphere standards of 15% [34]. Moreover, defaulters were higher in those > 18 years (29%) compared to those ≤18 years (22.4%). These findings were similar to studies among other HIV populations. A longitudinal study of HIV positive malnourished adults treated with RUTF in Sub-Saharan Africa noted that 47.4% of patients were considered cured and 22.6% defaulted from care [35].

Intensive follow-up of defaulters can improve recovery rates in children in a population of high HIV prevalence as found in research by Sadler K and co-workers [36]. In this study, the costs of getting to the nutrition rehabilitation unit and associated long distances were found to impact defaulter rates and care givers appreciated follow-up at home. Community based RUFT and ART distribution may deliver better outcomes for both HIV positive malnourished children and adults [37]. Experience in delivering RUFT programs in humanitarian emergencies, has found low defaulter rates that may be linked to follow-up [37-39].

The overall not responded cases comprised 18.6%, which has shown more cases in SAM and children ≤18 years. This implies that more effort is deemed to investigate the possible causes underlining the non-respondent group. The relapsed cases were 12.4% with no noted differences between SAM and MAM (12.6%) and minor differences between those >18 years and ≤18 years. This dictated more targeted interventions to reduce the relapse of SAM and MAM in HIV positive population.

There was a significant association between age, nutrition status and treatment outcome. However, gender, HIV status, education and residency were not associated with treatment outcome. The study findings revealed significant risk for MAM associated with age ≤18 years for recovery.

In one study, children who attended a therapeutic program were examined for appetite, history of diarrhoea, thirst and dehydration status on daily bases by the clinical nutrition, in Darfur-Sudan [38]. In addition to complete medical examination, the nutritionist authenticated the existence of caregiver who counselled and witnessed the child taking Plumpy' Nut [40].

However, in Gondar, patients were counselled at the health facility only at the beginning of the treatment. This may be due to high patient load which may result in insufficient time to provide counselling and feedback. Patients were checked at the end of each month, but not in-between their appointment times. The application of more stringent follow-up of children and adult under treatment at home could result in improved RUTF outcome.

Despite on-going goals to reduce RUTF treatment defaulter rates and improve recovery rates of malnourished children and adults who are HIV positive, ensuring compliance with CD4 count monitoring and ART and addressing the needs of pregnant women through clinic, as well as home based care may need to be further integrated. This is well illustrated in research in Haiti where an integrated facility based micronutrient and HIV program was found to improve body mass index, food security and clinic attendance [41].

The guidelines of RUTF treatment denoted that persons and respective caregivers in receipt of supportive nutrition should be well-versed about their management strategy. Furthermore, customized in sequence information and chances to engage in their care plan, discuss options, converse social, physical and psychological concerns [42].

The contact details of respective support working groups, international and local charities and deliberate organizations should be made available to patients. Nutrition education and counselling interventions should be strategically designed and implemented for patients with HIV [43]. The Ethiopian National Guidelines for HIV/AIDS and Nutrition calls for the use of counselling cards and behaviour change communication materials [44]. However, tailored socio-culturally appropriate including gender specific

health education and promotion may be required. Additional training for providers delivering services, care and information to malnourished HIV patients may assist to improve the design and increase the use of such tools that may help to improve defaulter and recovery rates.

LIMITATION

In our study the Z scores of WHO growth standard for children referral (6 to 59 months of age with SAM) were not well documented in the patient's record case sheets and as a result were not included as variables in this study. Furthermore, bilateral oedema was not regularly observed and recorded so reliable measures could not be undertaken. While this may affect the comprehensive assessment of children, consistent use of MUAC as per WHO guidelines identify that children had severe acute malnutrition and then MUAC assess and confirm nutritional recovery.

In the present study we have also used MUAC to assess adults rather than BMI and other criteria but again the use of this consistent measure was considered to be useful to assess recovery from SAM and MAM. Of the 636 participants in this study just less than 32% were HIV positive but not on ART. This may have affected the slower than expected recovery and weight gain particularly among adult participants and identifies the need for more research to examine the relationship between integrated ART and RUTF treatment programs.

CONCLUSION

The finding of our study confirmed that recovery rate were below half in the reviewed patients and lower than the Sphere standards with strong association between age, nutrition status and recovery. Defaulter rate were high which deem further research to identify contributing factors and respective interventions. More attention is deemed for persons with SAM and age >18 years. Follow-up of defaulters coupled with education and counselling of HIV positive patients should be strengthened. A program encompassing RUTF along with HIV management may offer congruous tactical choice.

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