

Full Length Research Paper

Level of micronutrient supplements uptake among people living with HIV/AIDS in Kayole, Nairobi County, Kenya

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Micronutrients reduce morbidity and slow the rate of disease progression and thus, micronutrient supplementation in HIV is recommended. This study established the level of uptake of micronutrient supplements among people living with HIV in Kayole, Nairobi County. A cross-sectional analytical design was adopted on a comprehensive sample of 153 adults living with HIV, enrolled at Comprehensive Care Centre in Kayole Health Centre. Data is described by use of percentages while relationships are assessed using chi-square. Qualitative data from focus group discussions and key informants was transcribed and analyzed to complement the quantitative findings. Results showed that only 13.7% of the respondents were on micronutrients at the time of the study. The micronutrient supplements commonly supplemented were vitamin and mineral mix (50.3%), zinc (34%), vitamin B6 (24.2%), vitamin A (24.2%), folate (12.4%), and iron (15%). The main reason for supplementation was; those on Antiretroviral Therapy (66.7%), due to the presence of opportunistic infections (40.5%), those who had no appetite (28.1%), underweight cases (21.6%) and those on tuberculosis treatment (17.0%). The main reason for low uptake was due to stock outs at treatment centre (24.8%), the high cost of supplements (13.7%) and side effects after intake (5.9%). Adults living with HIV are aware of the importance of micronutrients and had taken micronutrient supplements at one point during the treatment period. However, uptake at the time of the study was low. This was due to lack of guidelines for supplementation, high cost of supplements, stock-outs in health facilities and side effects. This study recommends proper education and sensitization on supplementation. Standard guidelines and policies for micronutrient supplementation should be developed. A pull system should be adapted in the supply of supplements.

Key words: Micronutrients, supplementation, people living with HIV, Kenya, adults.

INTRODUCTION

Human immunodeficiency virus (HIV) remains a major cause of mortality worldwide. Micronutrients improve

physiological, immunologic functions and metabolic processes important for optimal health. A deficient

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micronutrient profile has been reported in people living with HIV (PLHIV) even when antiretroviral therapy (ART) is taken (Balfour et al., 2014). Micronutrient deficiencies have been problematic in sub-Saharan Africa with a link to high morbidity and mortality rates (Fawzi et al., 2004). Kenya has been reported to have increased rates of HIV infection (Kimanga et al., 2014; Waruiru et al., 2014). It is common that patients with HIV suffer from micronutrient deficiencies especially vitamins A, B complex, C and E and minerals like zinc and selenium (Mehta and Fawzi, 2010). These are fundamental for the integrity of the immune response (Villamor and Fawzi, 2005; Webb and Villamor, 2007). Specifically low levels of vitamins A, B₆, B₁₂, C, D, E, beta-carotene and minerals namely; selenium, zinc, copper, magnesium and iron have been reported in the blood of various HIV positive populations (Tang et al., 2005). These deficiencies are particularly common in HIV-infected persons in developing countries where diets are inadequate (Hussey et al., 2005). Micronutrient deficiency in PLHIV has been associated with accelerated disease progression and mortality (Fawzi et al., 2004). Micronutrient deficiencies are commonly observed with advanced HIV disease and have been associated with higher risks of HIV disease progression and mortality (Balfour et al., 2014). Micronutrient deficiencies may increase viral load by enabling HIV to replicate faster or by weakening the immune system (Baum et al., 2013). Research has found that people with HIV are more likely to show signs of micronutrient deficiencies, compared to uninfected people (Drain et al., 2007; Tang et al., 2005).

Some studies have shown that micronutrient supplementation can correct micronutrient deficiency among malnourished PLHIV (Fawzi et al., 2004). It has been hypothesized that micronutrient supplementation can help to reduce morbidity and mortality of HIV-infected individuals (Balfour et al., 2014). This would be particularly significant for developing countries, where nutritional deficiencies are common due to dietary insufficiencies and recurrent infections (Bhutta et al., 2013). Multivitamin supplements delay the progression of HIV disease and provide an effective, low-cost means of delaying the initiation of antiretroviral therapy (Fawzi et al., 2004). Daily selenium supplementation can suppress the progression of HIV-1 viral burden and provide indirect improvement of the CD4 count. A study by Villamor et al. (2008), showed that micronutrient supplementation had a positive influence on the CD4 count, reduction of genital ulcers incidence, reduction of risk for peripheral neuropathy and decreased risk for clinical diagnoses of extra-pulmonary tuberculosis (TB).

Fortified blended food (FBF) is designed to facilitate faster recovery of moderate and mild malnutrition in HIV (Wood et al., 2008). These are nutrient-dense and contain recommended daily allowances (RDAs) for selected vitamins and minerals levels. The aim is to provide about 50% (1350 kcal day or 300 g FBF/day) of

energy, over 70% of whole protein and essential fatty acids along with about RDA of key micronutrients for moderately undernourished adults (Bello et al., 2011).

Micronutrients play very important roles in the proper functioning of the body. The deficiencies have an adverse effect on HIV where the immunity is compromised. Selenium prevents morbidities and risk of diarrhea (Ximena et al., 2002). Zinc plays a critical role for immune functions with its deficiency leading to increased susceptibility to infections (Fraker et al., 2002; Mburu et al., 2010). Vitamin A has immunoregulatory properties and promotes the maintenance of epithelia integrity (McClelland et al., 2004; Fawzi et al., 2004). Vitamin B6 is useful for increased lymphocyte and antibody production, cell-mediated toxicity and delayed-type hypersensitivity responses. Vitamin B-12 promotes humoral responses, folic acid promotes the cell-mediated immunity response, vitamin E reduces the production of inflammatory cytokines and vitamin C improves a cell-mediated immune response. Riboflavin promotes the generation of a humoral antibody response (Villamor et al., 2008).

Use of micronutrients is ideal for improving the quality of life among PLHIV. However, this has not been practically realized in the management of HIV (Nunnari et al., 2012). Most PLHIV research to date evaluates the impact of micronutrients on the quality of life (Forrester and Sztam, 2011). However, minimal information on the level of uptake of micronutrients among PLHIV exists especially in the low-income setting where nutrient intake is compromised and vulnerability to deficiencies is high. This study was conducted to determine the level of micronutrient supplements uptake among PLHIV in Kenya and the determinants. This is with a hypothesis that the micronutrient uptake among PLHIV in Kenya is low.

METHODOLOGY

This study adopted a cross-sectional analytical design to determine the uptake of micronutrient supplements in PLHIV. The study population consisted PLHIV, above 18 years who were not bed ridden. The study purposively focused only on PLHIV. From hospital records, the Comprehensive Care Center in Kayole Health Centre have 160 PLHIV who are enrolled and visits the clinic once a month. The study focused on the comprehensive sample from which only 153 responded.

A researcher-administered questionnaire, key informants interviews (KIs) and focus group discussions (FGDs) guides which were pretested were used for data collection. The participants were interviewed by the researchers on the dates when they were scheduled to visit the clinic. This was by administering the questionnaire which took an average of 20 minutes. The outcome variables that the study focused on were the level of micronutrient uptake and the associated determinants. The questions asked included; the type of supplements taken, reason as to why they were given the supplements, how frequent they were taken and an explanation for the uptake status. Individual medical records were assessed for clarification on the type of micronutrient the participants were taking. The schedule for uptake was provided by

Table 1. Socio-economic characteristics of respondents (see author guides).

Socio-economic characteristics		n (153)	%
Sex	Male	49	32.0
	Female	104	68.0
Age	18-30	63	41.2
	31-45	76	49.7
	>46	14	9.2
Marital status	Married	67	43.8*
	Widowed	51	33.3
	Divorced/separated	22	14.4
	Single	13	8.5
Educational level	None	9	5.9
	Primary	17	11.1
	Secondary	38	24.8
	Middle-level colleges	67	43.8*
	University	22	14.4
Occupation*	Self-employed	61	39.9*
	Formal employment	32	20.9
	Casual labour	47	30.7
	Unemployed	13	8.5

the respondent. To test for knowledge, 10 questions were asked, where the expected response was either agree or disagree. The questions were based on what they thought micronutrients paly to PLHIV. This were later translated to a score. The participants also responded to an open ended question on the various challenges that affected their micronutrient uptake.

Data from the completed questionnaires were entered into Cs-Pro software and cleaned. It was later exported to SPSS software version 20.0 for analyses. Data for seven participant with incomplete data were removed from the total sample to remain with a sample of 153. The quantitative data was described by use of frequencies and percentages. Chi-square was used to assess relationships between selected variables namely education level, occupation, income, gender, age marital status and the level of micronutrient uptake. Qualitative data complemented the quantitative findings. From the list of the 153 participants, a sub-sample of 10 men and 10 women was randomly selected using random number generator and invited to participate in the FGD. The key informants interviews (KIs) were conducted on health workers from the comprehensive care center who directly dealt with the PLHIV. This included 3 nurses, one Clinical Officer and one Pharmacist.

Ethical approvals were obtained and protocols for research in Kenya were observed. Ethical clearance will be obtained from Kenya Medical Research Institute (KEMRI) Ethical Review Committee. Informed consent was sought from the respondents whose confidentiality was assured. There was no direct reference of their names. The PLHIV were notified that participation in the study was voluntary. They were assured that confidentiality on information given would be maintained and information would only be used for the purpose of the study. All the procedures to be followed or any associated with answering the questions were explained. They were infromed that they had the right to decline participation and as such they would be treated the same as those who agree to join the study. They were to ask questions related to the study at any time and could refuse to respond to any questions

and or stop an interview at any time without any consequences. The interviews and examinations was conducted in a private setting within the hospital where the respondent was comfortable. They were assured that the name would only be recorded and only initials for questionnaire tracking purpose but not for any other use.

RESULTS

Respondents' characteristics

The majority of the respondents were females (68%) (Table 1). The age category with the highest proportion of participants was 31-45 years (49.7%). Further the study identified that majority of the respondents were either married (43.8%) or widowed (33.3%). The majority of the respondents had attended middle-level college. The main occupation was self-employment in small business (39.9%) followed by casual labour (30.7%), which could be due to the setting of the study, which is a low-income setting.

Majority were females who were married, with middle-level college education who engaged were self-employed.

*The question established what participants actually did for a living, which was later categorized.

Knowledge on the role of micronutrients by respondents

From the nutrition knowledge test, all the respondents

Table 2. Micronutrient supplementation in HIV.

Response		Male		Female		All	
		n (49)	%	n (104)	%	n (153)	%
Taking supplements at the time of study	Yes	5	3.3	16	10.5	21	13.7
	Vitamin/mineral mix	6	3.9	12	7.8	18	11.8
	Zinc	3	2.0	5	3.3	8	5.2
	Vitamin A	5	3.3	11	7.2	16	10.5
Type of supplement ever taken	Vitamin B6	2	1.3	5	3.3	7	4.6
	Iron	2	1.3	7	4.6	9	5.9
	Folate	1	0.7	4	2.6	5	3.3
	Not aware	15	9.8	19	12.4	34	22.2
Have ever taken food supplements	Yes	10	6.5	22	14.4	32	20.9

Table 3. Reasons for micronutrient supplementation.

Micronutrient supplementation	Male		Female		All	
	n (49)	%	n (104)	%	n (153)	%
On ART	39	25.5	63	41.2	102	66.7
Presence of opportunistic infections	25	16.3	37	24.2	62	40.5
Had no appetite	10	6.5	33	21.6	43	28.1
Underweight cases	8	5.2	25	16.3	33	21.6
On TB treatment	9	5.9	17	11.1	26	17.0

Reasons as to why they were given supplements.

were reported to understand the importance of micronutrient supplements and indicated that they were necessary to help protect the body from recurrent infections. These were complimented by information from FGDs which noted that PLHIV appreciated the function of micronutrients with the main functions mentioned as boosting the immune system, preventing them from getting opportunistic infections (OIs), faster healing when with OIs and in reducing the number of hospitalizations.

Micronutrient supplementation status

Only 13.7% of all respondents were taking micronutrients at the time of the study. However, all respondents indicated that they had been on micronutrient supplements at one point during the treatment period. From the total sample (n=153), the micronutrient supplements commonly supplemented were vitamin and mineral mix (50.3%), zinc (34%), vitamin B6 (24.2%), vitamin A (24.2%), folate (12.4%) and iron (15%) (Table 2). The proportion of the respondents who indicated that they were on FBF was (27.5%). This is an indication of the number of patients who were acutely malnourished at the time of the study.

Some of the respondents (41.2%) indicated that they

were not aware of the type of micronutrient they were taking. From FGDs this was attributed to lack of proper counseling before the prescription could be made. All respondents who reported to have had malnutrition at any point of their treatment were given multivitamin supplements and FBF. All respondents on TB treatment (19.0%) also indicated that they were on vitamin A and vitamin B6 (pyridoxine) supplementation, respectively. The main reason for vitamin B6 supplementation was the effect of TB drugs on the vitamins metabolism and utilization.

Reasons for providing supplements to people living with HIV

Supplements were given to respondents on Anti-Retroviral Therapy (ART) (66.7%), due to the presence of opportunistic infections (40.5), those who had no appetite (28.1%), underweight cases (21.6%) and those on TB treatment (17.0%) (Table 3).

Morbidity profile and micronutrient intake among people living with HIV

The prevalence of opportunistic infections as asked and

Table 4. Various illnesses among the PLHIV.

Illness	Presence of illness		Proportion taking supplements	
	n (153)	%	n	%
Upper respiratory infections	77	50.3	62	40.5
Urinary tract infections	59	38.6	51	33.3
Diarrhea	54	35.3	48	31.4
Lack of appetite	43	28.1	42	27.5
Tuberculosis	28	18.3	26	17.0
Candidiasis	17	11.1	12	7.8
Dermatitis	10	6.5	6	3.9
Peripheral neuropathy	6	3.9	4	2.6

Illness among the respondents.

Table 5. Relationship between the level of uptake and socio-demographic characteristics.

Variable	Statistical test	P value
Education level	Chi-square	0.016*
Occupation	Chi-square	0.031*
Income	r = 0.41	<0.001*
Gender	Chi-square	0.0401
Age	r = 0.13	0.312
Marital status	Chi-square	0.14

confirmed from the health card was; upper respiratory infections (50.3%), urinary tract infections (38.6%), diarrhea (35.3%) and dermatitis 65%. Some respondents were noted to have multiple illnesses. Those with various illness were taking supplements (Table 4).

Relationship between the level of uptake and socio-demographic characteristics

The study show significant relationship between the level of uptake and education level, occupation, income and gender. Higher level of education, occupation that was not very time consuming and high income was found to increase the level of uptake. In addition, women were found to have a higher uptake of supplements than men (Table 4).

Challenges effecting micronutrients uptake

The study noted that the factors affecting the uptake of micronutrient supplements were diverse. More than half (55.6%) of the respondents indicated that supplementation intake schedule was inconsistent throughout the treatment period. The reasons given included stock outs at treatment centres (24.8%), high

costs of supplements (13.7%), bad taste (23.5%) and the presence of side effects (24.2%) (Table 6). Information from the KIIs indicate that, replenishment of micronutrients in the health facility was inconsistent and this affected their availability. The high cost of micronutrients also affected the uptake as most respondents were economically unable to procure the supplements when prescribed by clinicians.

The presence of side effects of the supplements leads to withdrawal from the intake. The side effects reported were; vomiting and nausea (86.5%) and change in urine coloration (70.3%) (Table 5). From FGDS and KIIs, the inconsistency in supplementation was reported as due to lack of comprehensive guidelines and policies to micronutrient supplementation in HIV. In addition, it was attributed to failure by the supplier agency to honour the actual requests by the health facilities.

DISCUSSION

There were more females attending comprehensive care center than males. This is similar to a study by KDHS (2014) that indicated that there are more females infected than men and one by Gielen et al. (2001) that show that more women than men attend care centers for PLHIV. The study noted that the uptake was significantly lower

Table 6. Challenges effecting micronutrients uptake.

Challenge		N	%
Challenges effecting micronutrients uptake	Stock-outs at treatment centre	44	28.8
	High cost of supplements	21	13.7
	Side effects of the supplements	37	24.2
Side effects experienced after micronutrient intake	Vomiting/nausea	32	20.9
	Change in urine coloration	26	17.0
	Diarrhea	21	13.7
	Rashes	13	8.5
	Drowsiness	7	4.6
	Dizziness	4	2.6

than by a studies by Semba et al. (2007) and Visser et al. (2011). This is an indication of decline in uptake. The main challenges attributed to this are supplements being out of stock, high cost as well as presence of side effects of the supplements which lead to withdrawal from intake. This study accepted the hypothesis that the uptake of micronutrients supplements is low.

A study by Semba et al. (2007), noted that micronutrients were given mainly to those on ART and TB treatment. A study done in Kaplan et al. (2009) and Masur et al. (2014) noted that micronutrients supplements were given to PLHIV who presents with opportunistic infections which is in agreement with this study. Other studies in agreement with this study indicate situations where PLHIV were provided with micronutrients supplements due to lack of appetite and for those who were underweight (Rehman et al., 1999; Kayira et al., 2012). Studies have attributed the low uptake to poor knowledge on importance of supplements, lack of guidelines to both the prescribers and the PLHIV (SS et al., 2015).

Limitations of the study

This study mainly relied on recall of various aspects of uptake of micronutrients. Recall bias, would have limited the accuracy of the information. Some participants did not remember the type of supplement given. The study mainly focused on use of health card for confirmation as much as possible to address this limitation.

Conclusion

PLHIV clearly understood the importance of micronutrient in improving the quality of life. However, the uptake of micronutrients was low mainly due to lack of guidelines for supplementation to PLHIV, high cost, stock-outs in health facilities and side effects. All respondents had taken micronutrient supplement at one point as prescribed due to prevailing OIs.

RECOMMENDATION

Based on the research findings, micronutrient supplementation for PLHIV should be regulated. Policies should be formulated to support PLHIV at levels of treatment. Proper assessment and counseling should be conducted before supplementation to prevent defaulting due to side effects. Based on the poor uptake of nutrients from food, there is need of ensuring that all HIV persons take micronutrients consistently. To ensure consistency, supplementation and avoid stock outs, the PULL system should be adapted.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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