Dietary Consumption; and Formulation of Iron Rich Complementary Food By Using Amaranth, Chickpea And Maize In Rural Kebeles Of Hawassa City, SNNPR Ethiopia

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Abstract

Introduction: 44% of under-five children are anemic in Ethiopia and IDA (iron deficiency anemia) constitutes half of the case. Thus, there is a need for sustainable methods to address IDA. **Objective:** This study was initiated to prepare iron rich complementary food by using amaranth and chickpea grains in Hawassa City rural kebeles, in SNNPRS. **Methodology:** The study has two phases: cross-sectional survey and laboratory analysis the result analyzed by using SPSS. **Result:** The dietary diversity score result was 2.74±.08. the study noted limited consumption of iron-rich foods(animal source) by the communities with 6.9%. Amaranth plant consumed by the study community as vegetable but not given to their children. All the formulated porridge, with different proportions of amaranth grains showed high content of iron, zinc, calcium, protein, fat and energy as compared with control (100% maize). Socking under lemon juice with 50°c for 24 hours and germinating under 32°c for 72 hours achieved the minimum phytate level result. All formulated product with different proportion of amaranth flour have accepted by panelist as well as mothers and children. **Conclusion**: The study indicated that amaranth grains can be effectively used at the community level to produce low-cost, iron-rich complementary food. Increased nutritional awareness, production and consumption of grain amaranth products may be the way to address iron deficiency in study area. **Key words**: Iron deficiency Anemia, complementary food, Amaranths, Phytate,

Background:

- The recent EDHS report of Ethiopia indicates that 44 percent of children aged 6-59 months are anemic and iron deficiency is the cause of half of all anemia cases (CSA, 2012).
- The major causes of iron deficiency are inadequate intake, low bioavailability, and infections.
- Animal products such as meat, fish, and poultry are source of bio-available iron. But these foods are unaffordable for majority of households and only 5 percent of children consume these foods in Ethiopia (CSA, 2012).
- Amaranth plant is very rich in iron, widely grown in research area, and could be an alternative to address iron deficiency. However, it is underutilized by the communities due to lack of knowhow.
- IDA can result in deficits in cognitive, behavioral, and motor development, and educational achievement (Domell, 2011)

Objective

To assess iron rich food consumption and effect of adding amaranth on the iron level of complementary food by using grain amaranths, chickpea and maize for children aged 6-23 month in Hawassa City Rural Kebeles, SNNPRS Ethiopia.

Figure 1 Amaranth Leave, grain and flour

Methods:

- The study conducted in Tulla Woreda, Hawassa city, from February to August 2013.
- Community based cross-sectional survey including focus group discussion was conducted to assess the consumption of iron rich foods and Amaranth by children.
- Laboratory based experimental study including grains processing, nutrient analysis, and sensory test were undertaken to assess the nutrient content and acceptability of the formulated porridge.

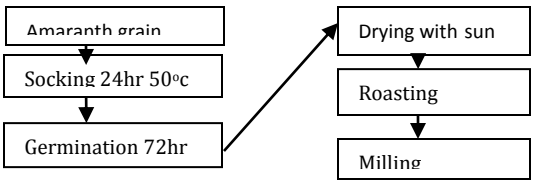

Fig: 2 Homemade Amaranth grain Processing

Table:2 Nutrient and phytate content of formulated porridge

Sample	Iron	Calcim	Zinc	Protein	Energy	Phytat
I	4.31	24.80	2.47	7.58	386.08	87.70
II	3.31	37.56	1.98	11.31	392.91	86.71
III	8.67	133.52	2.59	12.94	398.49	79.84
IV	13.67	209.53	2.83	14.85	400.11	74.97
V	15.16	244.71	2.59	16.39	404.64	44.90

Key: I (100%Maize), II (30%cchickpea:70%Maize), III(30%Chickpea:45%Maize: 25%Amaranth): IV (30%Chickpea:20%Maize:50%Amaranth), V(30%Chickpea:70%Amaranth)

Table :3. Sensory Evaluations of Porridge by Mothers and their Children

Sample	Color	Appearanc	Flavor	Taste	Overall accepta
I	4.9±0.2	4.7±0.4	4.7±0.4	4.2±0.7	3.2±1.0
II	4.7±0.4	4.6±0.5	4.6±0.5	3.4±0.8	2.5±1.0
III	3.6±0.8	4.5±0.6	4.5±0.6	3.8±0.9	2.5±1.1
IV	2.5±0.9	3.8±1.3	3.8±1.3	3.1±1.0	2.2±1.1
V	2.2±1.4	4.7±0.6	4.7±0.6	3.4±0.1	2.6±1.1
p-v	**<0.001**	**<0.001**	**<0.001**	**<0.001**	**<0.001**

Results/Findings:

- The mean dieter diversity score of the study area was **2.42**, and most frequently consumed food were cereals and roots
- Only **4.2 %** of children in study area consume flesh meat, fish, and chicken which is source of bio-available iron.
- Amaranth is very rich in iron and other nutrient. Iron, protein, calcium, and zinc level are increased significantly when the proportion of amaranth increased in the porridge.
- Homemade processing such as soaking amaranth grain in locally available lemon juice decreased the phytate level from **395 to 64mg/100g**
- Phytate **:** Iron molar ratio of processed 70% Amaranth and 30% Chickpea is 0.25
- Next to control, the porridge prepared from 70% amaranth and 30% chickpea showed higher sensory attributes score and accepted by mothers and their children.
- Despite higher content of iron and other nutrient, amaranth plant considered as weed in study area, and only leaf parts utilized by communities during drought time

Lessons and Recommendations:

- Children of the study area are not consuming iron rich foods and are vulnerable to iron deficiency anemia.
- Nutrition education on the importance of the consumption of iron rich foods should be delivered to the community in the study area.
- 70% amaranth and 30% chickpea combined product can be used as a complementary food for children with good iron content, and other nutrient.
- Policy makers should give attention to cultivation and utilization of amaranth, which is underutilized but it is nutritious to address malnutrition in Ethiopia.

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