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Formulation and Sensory Evaluation of Complementary Foods from Millet and Oyster Mushroom

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Abstract

Timely introduction of complementary foods is essential for nutrition as well as growth and development of child at the age of six month of life. locally available millets were used for formulation of complementary foods as control sample and value addition was done with dry mushroom powder. The sensory evaluation trials were conducted for consecutive three days for panel of ten judges and 76 mothers of the child between six to 12 months at the aganwadi center of the slums of Amravati city. The sensory quality of control and experimental complementary food were acceptable by judges as well as mothers. The value addition of oyster mushroom powder was found effective to improve protein content of the experimental complementary foods.

Keywords: Complementary Foods, Millets, Oyster Mushroom, Sensory Evaluation

Introduction

Inadequate intake of complementary food is major cause for the high incidence of morbidity and mortality in many developing countries. Timely introduction of complementary food in infancy is necessary for nutritional as well as development of the child. (WHO 2001). Introduction of complementary food generally begin after six months of life for better nutrition.This is the transition of liquid to solid,solid, semi-solid or soft foods like porridge, soften rice with dal, khichadi, cooked potato etc. is key to prevent nutrition deficiencies. Indian Academy of Pediatrics recommendsthe staple homemade food comprising of cereal pulse mixture in the ratio 2:1, and make them caloric and nutrient rich with locally available products. The complementary food should be a balanced diet consisting of variety of diverse as possiblefood groups in different combinations. Locally available, cost-effective seasonal uncooked fruits, green and other dark colored vegetables, milk and milk products, pulses/ legumes, animal foods, oil/ butter, sugar/ jaggery may be added in the staples gradually. Consistency ofcomplementary food should be appropriate as it develops readiness of the child in munching, chewing and swallowing ((IAP 2021).

National food security mission included millets under Poshan Mission Abhiyan by Ministry of Women and Child Development since 2018. Millets can be used to diversify the Indian diet (Verma and Patel, 2013).Finger millets are rich in calcium and important in nutrition due to availability of key minerals. (Hassan et al.2021).

Mushroom being unconventional rich source of protein, vitamins, and minerals when properly supplemented can be satisfactorily used as alternative source of protein and rich in B group vitamins.

Mushroom proteins are quality protein as it provides essential amino acids like lysine, tryptophan and methionine. Oyster mushroom is loaded with B complex hence experimental weaning foods provides B group vitamins (Chang, S.T. and P.G. Miles, 1990). The experiment was carried out for formulation of nutritious weaning food from local and readily available raw materials and value added with dry oyster mushroom powder.

Methodology

Experimental and control premixes of complementary foods were developed with the combination of locally available millets that is Ragi **(Eleusinecoracana)** and Bajara (**Pennisetumtyphoideum**). Groundnuts, Mungdal (**Phaseolus aureus**) and jaggery were added for taste and source of energy. Experimental complementary foods were the value addition of 10 per cent oyster mushroom (**Pleurotus spp**.) powder.

Development of Complementary foods

The selected grains were purchased from the local market and processed for development of control complementary food (CCF) as,

Cleaning of grains
⇩
Washing
⇩
Shadow drying
⇩
Roasting (at 80^{0C} for 5 min.)
⇩
Make Flour (Household Grinder)
⇩
Sieve (1 mm. sieve)
⇩
Mix in the proportions
⇩
Stored in air tight jars

Value addition of each CCF was done with 10% oyster mushroom powder. The dry oyster was purchased from the local grower. Make the powder in household grinder and sieve with 1 mm sieve and stored in airtight jar.

CCFR was the control ragi based sample and ECFR was experimental sample. and CCFB and ECFB were bajra based samples. The prepared pre-mixes were added 10% dry oyster mushroom powder. Nutritive value was calculated food composition table (NIN 2017), mushroom value (Chang, S.T. and P.G. Miles, 1990).

Table 1: **Ingredients and their proportion in CWF and EWF**

S.N.	Ingredients	CWF	EWF
1	Ragi/Bajra	40	30
2	Ground nut	10	10
3	Mung dal	10	10
4	Mushroom powder	-	10
5	Jaggery powder	40	40
	Total	100	100

Preparation of Porridge

Porridge was prepared with the proportion, as one table spoon (15 g approx..) of prepared premix in 1 cup of water make smooth paste and cook for two to three minutes on slow flame with continuous stirring. Served look warm for sensory evaluation.

Sensory Evaluation

Sensory evaluation is a science that measures, analyzes, and interprets the reactions of people to products as perceived by the senses. It is a means of determining whether product differences are perceived, the basis for the differences, and whether one product is liked more than another. Appearance, consistency, taste, and acceptability of all control and experimental samples were judged by the panel of 10 judges on nine-pointHeadonic scale. The acceptability test for of the children in the age of 6 to 12 months and their mothers were carried out in three Anganwadi (ICDS) centers in the Amravati city of Maharashtra. The prepared porridgeswere fed to child and their mother also tasted and assessed porridge on five-pointHeadonic scale. 76 mothers responded to sensory trials consistently for three days. The mean scores and standard deviation were calculated.

Result and Discussions

The prepared porridges were evaluated by panel of ten judges as well as mothers for three consecutive days the observed mean scores are presented.

Sensory Evaluation by Judges

Table 2: Mean scores for sensory evaluation by panel of judges (n= 10)

SN	Parameters	CCFR	ECFR	CCFB	ECFB
1	Appearance	7.4 +1.04	7.6 +0.96	7.1 +0.87	7.5 +0.94
2	Consistency	7.6 +0.37	7.5 +0.22	6.7 +1.32	6.8 + 1.64
3	Taste	7.2 +0.18	7.8 +0.69	8.1 +0.77	8.4 + 0.84
4	Acceptability	7.7 +0.90	7.9 +0.85	8.1 +0.75	8.3 +0.21

*Each value is average of three trials.

The ECFRreceived high scores for the appearance followed by CCFR; the consistency of CCFR was superior in all the sample followed by ECFR. The taste and acceptability of ECFB was high followed by CCFB. Bajara based control and experimental were not much liked for consistency.Judges revealed that all the samples were preferred for taste and acceptability.

Sensory Evaluation by Mothers

The acceptability trials of all samples were conducted for carried out for mothers and children between 6 to 12 months. Thedata are presented in table 3.

Table 3: Acceptability of Control and Experimental complementary foods by mothers(n= 76**)**

SN	Parameters	CCFR	ECFR	CCFB	ECFB
1	Appearance	4.75+0.22	4.67+0.23	3.53+0.24	4.0+0.27
2	Consistency	4.32 +0.41	4.66 +0.53	3.99 +0.45	4.56 +0.57
3	Taste	4.76 +0.23	4.67 +0.31	3.55 +0.41	4.33 +0.35
4	Acceptability	4.32 +0.25	4.69 +0.66	3.72 +0.54	4.01 +0.22

*Each value is average of three trials.

The ECFR was the highly preferred by mothers of the children, followed by CCFR on all parameters. CCFB was least preferred sample by the mothers. Role of mothers in introducing weaning foods to infants is significant hence acceptability by mothers were evaluated. Higher acceptability of experimental and control weaning foods were reported by mothers. Experimental and control weaning foods were equally consumed by maximum children. Theragi based samples were superior according to the mothers.

Proximate Composition

The proximate composition of the prepared premixes was calculated by using the nutritive value table (NIN 2017).

Table 4 Proximate composition of control and Experimental complementary foods (100 g)

Nutrients	CWFR	EWCR	Difference	CWFB	EWFB	Difference
Protein g.	8.51	10.41	1.9	9.83	11.73	1.9
Carbohydrates g.	67.63	60.01	-7.53	67.63	61.35	- 6.28
Fat g.	4.85	4.66	-0.19	6.26	5.71	- 0.55
Energy(KJ)	631.39	497.19	-134.19	676.99	531.8	- 145.19

The proximate composition of EWFB was the superior premix as compare to other premixes for protein followed by EWFR. Supplementation of 10% mushroom powder increases noteworthy amount of protein, which is crucial at weaning period.CWFB was the good source for carbohydrates and energy followed by CWFR.

Conclusions

Complementary foods formulated from locally available millets can add the variety of food for better nutrition and growth of the children at weaning stage. The sensory quality of control and experimental complementary food were acceptable by judges as well as mothers. The value addition of oyster mushroom powder was found effective to improve protein content of the experimental complementary foods.

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