

## ORIGINAL RESEARCH

# An intervention based on self efficacy and parenting competence to help recovery childhood malnutrition

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## ABSTRACT

**Objective:** To assess the effect of the program “Foundations for a healthy life” on parental competence for correct nutrition and on nutritional status of malnourished grade 1 children on a program of nutritional recovery with Amaranth.

**Methods:** *Design:* Before-after study with intervention and follow up, from June 2015 to November 2017. *Instruments:* Scale Seca 700, stadiometer Seca 220, Reminder 24 hours and Self-perception of Parental Competence Tool. *Setting:* Ministry of Health: Nutritional Recovery Program. *Participants:* Intervention group: Twenty-six dyads caregiver-malnourished grade one children; Control group: Thirty-two malnourished grade one children. *Intervention:* “Foundations for a healthy life” program. *Variables:* Nutritional status, parental competence, Kilocalories, macronutrients, fruit and vegetables. *Analysis:* Wilcoxon and t student tests, Relative Risk, 95% CI, significance  $p \leq .05$ .

**Results:** Intervention vs control group: normalization on the nutritional status 63% vs 29% ( $p \leq .05$ ). Caloric adequacy 27% to 81% and protein adequacy 23% to 58%, increased intake of fruits and vegetables. Caregivers trained was associated with the improvement of the nutritional status of the children: post-intervention third month (RR 2.27, 95% CI,  $p \leq .05$ ).

**Conclusions and Implications:** The program was effective in improving nutritional status and PCCN by continuing for three months. It is recommended follow-up six months to verify development of new habits.

**Key Words:** Malnutrition, Nutrition rehabilitation, Amaranth, Self efficacy, Parenting competence, Social learning

## 1. INTRODUCTION

In the last decade > 170 million children under five suffered from chronic malnutrition worldwide. In Mexico emaciation reduced from 6.2% to 1.6%, the underweight from 10.8% to 2.8%, whereas chronic malnutrition did it from 26.9% to 13.6% from 1988 to 2012 despite which, by 2012 there were 1.5 million malnourished children.<sup>[1]</sup> The malnutrition in utero and in the first two years of life contributes to 35% of under-five child mortality and with an 11% to the global burden of disease.<sup>[2]</sup> Paradoxically, there is a risk of developing obesity and chronic diseases in adulthood.<sup>[3]</sup> Malnutrition has been fought through nutrition recovery programs with micronutrients and fortified foods through the Program Opor-

tunidades (Opportunities).<sup>[4-8]</sup> In a descriptive study, it was found that children under 5 years of age with malnutrition remain in the nutritional recovery programs after the sixth month of life without the expected rehabilitation.<sup>[9]</sup> Additionally, the strategy of nutritional recovery through the intake of amaranth flour known for its high nutritional quality (16%-18% protein, eight essential amino acids, vitamins and minerals) has been used; nonetheless, in program evaluations, it was reported that children did not like to eat it. Therefore in interventions, it is necessary to seek strategies for the acceptance and ingesting of this food in an adequate way and adequate amount.<sup>[9,10]</sup>

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Malnutrition, the lack of acceptance of supplements for nutritional recovery and lifestyles with little control of one’s health, place at risk the quality of life and sustainability of health systems. Health promotion, from the perspective of behavioral sciences implies having a correct perception of internal locus of control and self-efficacy,<sup>[11–16]</sup> as well as parental styles for establishing healthy habits.<sup>[16–19]</sup> These elements must be developed in the primary caregivers for the establishment of habits and prioritization of the healthy nutritional status of the children; they should be included in the educational interventions for the achievement of the parental competence for correct nourishing (PCCN).<sup>[16–18,20,21]</sup> Studies have found that increasing the perception of self-efficacy and development of parenting skills has a positive effect on nutritional recovery. Health knowledge helps healthy behaviors, but the condition is that they have a follow-up and feedback.<sup>[14,15,22,23]</sup> The aim of the study was to assess the effect of the program “Foundations for a Healthy Life” (FHL) on real and self-perceived parental competence for the correct nutrition and nutritional status of children under five years of age with malnutrition grade I (GI) in a program of nutritional recovery.

**2. METHODS**

**2.1 Design**

Before-after study with intervention and follow up with Control group solely for the variable weight for size (W/S).<sup>[24]</sup> Developed from June 2015 to November 2017.

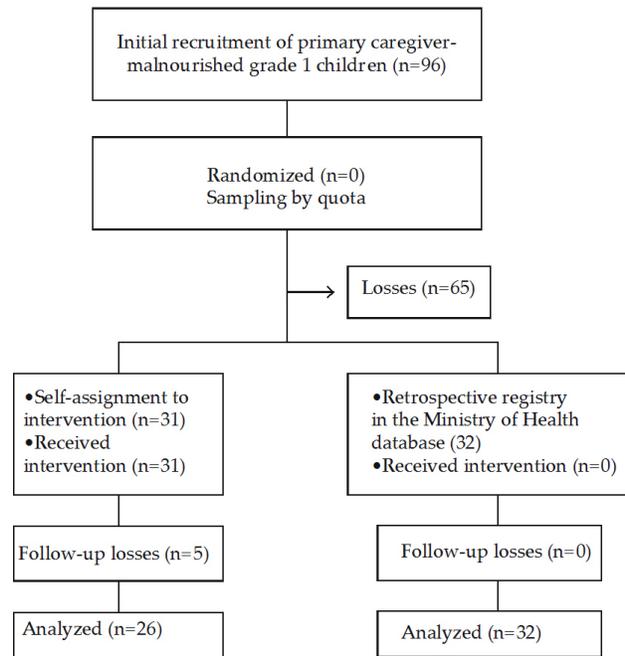
**2.2 Sample**

Once the approval of the Ethics Committee and of the field of study in three health centers of the Ministry of Health (SSA) was obtained, the target population was identified in the nutritional control census that met the inclusion criteria: primary caregivers and children between 2 and 5 years of both sexes with first degree- malnutrition, receiving amaranth as a food supplement. After the briefing about the study and its ethical implications, 96 primary caregiver accepted to participate and signed the informed consent. In the process 70 dyads were lost, the final sample of the Intervention Group (IG) was sample = 26. While the control group (CG) was created afterward from a database of 1,038 children with malnutrition GI according to weight for size (W/S) appointed to program of nutritional recovery, which had nutritional control at least six months, only 31 children registered from 2015 to 2017 met the selection criteria (see Figure 1).

**2.3 Study variables**

The independent variable was the 12-hour FHL course-workshop for six weeks, based on the Bandura model of social learning to raise self-worth, locus of control and self-

efficacy and thus improve the PCCN.<sup>[23,26]</sup> The educational strategy was based on the behavioral rehearsal, during the workshop or as a task between sessions and modeling (learning new behaviors through observation and imitation of “models”) from other caregivers with successful experiences in correct nourishing.<sup>[27,28]</sup>



**Figure 1.** Recruitment of primary caregiver- malnourished grade I children

The assessed dependent variables were: Nutritional status, PCCN as kilocalories (Kcal), intake of macronutrients, fruits, and vegetables

**2.4 Instruments**

Mechanical scale 700 with a stadiometer, Seca 220 (SECA GmbH & Co., Hamburg, Germany 2015). Weight tables for size WHO,<sup>[29]</sup> 24-hour reminder (R24) to assess intake and correct nourishing as it approached the recommended requirements for children. Instrument Self-perception of Parental Competence constructed with theoretical basis and subjected to judging with experts in psychology, a pilot test was conducted with 80 parents of the Educational Centers of the Sistema Mexicano para el Desarrollo Integral de la Familia (DIF) [Mexican System for the Integral Development of Family], caregivers felt that the instrument was clear and easy to answer, the internal consistency was analyzed (Cronbach’s alpha of 0 .883). Self-Perception Of Parental Competence is Likert type scale with 28 reagents, with a total score of one hundred forty (range 28-140) and composed of four dimensions: a) Self-worth (feeling of being a valuable person) five reagents, a score of five to twenty-five. b) Internal Locus of Control (control capacity on own and

children's health and nutrition) Eight reagents and scores of eight to forty. c) Assessment of health (value giving to health in life) five reagents, with a score of five to twenty-five.

d) Self-efficacy (perception of efficacy to influence own and children's health and nutrition) Ten reagents and scores from ten to fifty.<sup>[30]</sup>

**Table 1.** Programming of the workshop-course "Foundations for a healthy life" aimed at primary caregivers of children from 2 to 5 years with malnutrition grade I

Session (2 hours)/Topic	Teaching strategies
<b>Session 1</b>	
<ul style="list-style-type: none"> <li>Physiological needs of children under 5 years of age.</li> <li>Characteristics and consequences of malnutrition.</li> <li>Benefits of the Amaranth Flour supplement.</li> </ul>	PVS
<b>Session 2</b>	
<ul style="list-style-type: none"> <li>Awareness of the <i>Locus</i> of Control in primary caregivers and the importance of making decisions on a day-to-day basis.</li> </ul>	FB BR
<b>Session 3</b>	
<ul style="list-style-type: none"> <li>Functions of the family and primary caregivers to facilitate the healthy development of their children.</li> </ul>	FB PVS
<b>Session 4</b>	
<ul style="list-style-type: none"> <li>Enabling in the selection of food and the preparation of low-cost healthy menus and how to introduce Amaranth flour in children's diet.</li> <li>Cooking workshop and development of menus based on good eating Dish (*).</li> </ul>	Mo BR FB
<b>Session 5</b>	
<ul style="list-style-type: none"> <li>Tools to establish effective eating habits in children in a safe emotional environment.</li> </ul>	Mo BR FB
<b>Session 6</b>	
<ul style="list-style-type: none"> <li>More effective and assertive parental styles and how to develop the skills to put them in practice in establishing healthy eating habits.</li> </ul>	Mo BR FB

Note. PVS = Presentation with visual supports, FB = Feedback, BR = Behavioral Rehearsal, Mo = Modeling, (\*) NOM-043-SSA-2005<sup>[25]</sup>.

## 2.5 Procedures for data collection

The primary caregivers and their children appeared to perform anthropometric measurements of children and baseline nutritional status in the intervention group (IG) was obtained. The nutritional diagnosis was made based on the Geneva tables, accepted by WHO, according to NOM (Mexican Official Standard) -031-SSA2-1999 for the care to the child's health.<sup>[29]</sup> The weight-for-size (W/S) index was used due to its sensitivity and specificity for nutritional diagnosis in children under five years.<sup>[31]</sup> The R24 was applied and the intake analysis was based on the percentage of adequacy according to the Inano et al formula, (Excess > 110%, good 90 to 110%, acceptable 67 to 90% and deficient < 67%)<sup>[32]</sup> and the Self-Perception Of Parental Competence to the caregivers to obtain the PCCN measurement.

The educational and assessment program were implemented in the health centers and through home visits. Dependent variables were evaluated at the first- and fourth-month post-intervention.

## 2.6 Statistical analysis

The data were captured and processed with SPSS program version 18. Descriptive statistics as frequencies, percent-

ages, measures of central tendency and dispersion, measure of association of relative risk (RR), differences in PCCN scores before and after the training with *t*-test of student and Wilcoxon for related samples were used (95% CI,  $p \leq .05$ ).

## 2.7 Ethical and legal considerations

The study was developed according to the guidelines of the Helsinki Declaration of the World Medical Association, General Health Law in Mexico and Health Law of the State of San Luis Potosí.<sup>[33]</sup> Approval by the Bioethics Committee of the School of Nursing and Nutrition and by the Health Ministry (SSA) and consent signed by the primary caregivers.

## 3. RESULTS

### 3.1 Study population

IG: 26 primary caregivers (21 mothers, one family father with an average age of 35 years (SD  $\pm$  9.9) and four grandmothers > 50 years). Schooling was basic level (elementary 27% and secondary 54%), high school 11% and technical career 8%. The malnutrition GI children of IG had an average age of 3-10 years, SD  $\pm$  0.8 months.

For the CG the average was 2-9 years, SD  $\pm$  0.8. Both groups were equivalent in the stay in the program of nutri-

tional recovery (IG: 1-9 years SD ± 1.3, CG: 1-11 years, SD ± 1.3,  $p \geq .05$ ).

**3.2 Nutritional effects**

In IG after a post-intervention month, 73% progressed to a diagnosis of normal nutritional status and 27% continued with malnutrition GI, while the CG only 8% reached normality. In the monitoring phase at three months, 67% of IG continued in normal nutritional status while only 29% of the

CG obtained normalization ( $p \leq .05$ ).

**3.3 Effects on parental competence for correct nourishing**

The self-perceived parental competence raised the post-intervention score at three months in three of four dimensions: self-worth, locus of control, self-efficacy ( $p \leq .05$ ) with a slight improvement in the value they give to health only with marginal significance.

**Table 2.** Nutritional diagnoses of children under five years of age according to weight for size, pre-post intervention

Group	Diagnosis	Pre-intervention		Post-intervention		Follow-up	
				(1 month)		(4 months)	
		f	%	f	%	f	%
Intervened	MMGI	26	100	7	26.9**	5	27.8
	N	0	0	19	73.1	12	66.8
	MMGII	0	0	0	0	1	5.6
Total		26	100	26	100	18	100
Control	MMGI	32	100	23	71.9**	11	64.7
	N	0	0	8	25	5	29.4
	MMGII	0	0	1	3.1	1	5.9
Total		32	100	32	100	17	100

Note. MMGI (Mild Malnutrition), N (Normal), MMGII (Moderate Malnutrition). \*\*  $p \leq .01$ . Student *t* test.

**Table 3.** Assessment of the competence self-perception of the primary caregivers for healthy nutrition pre-post intervention in the experimental group

Dimension	Maximum Score	Pre-Intervention	Post-Intervention
		Mean (SD)	Mean (SD)
Self-worth	25	21.0 (2.9)	22.2 (2.2)*
Locus of control	40	33.9 (3.5)	36.0 (3.0)**
Self-efficacy	50	41.1 (4.9)	44.0 (5.1)*
Value of health	25	21.6 (3.5)	23.0 (2.1)
TOTAL	140	117.8 (12.7)	125.4 (9.8)**

Note. Student *t* for CI 95% related samples. Bilateral significance: \* $p \leq .05$ , \*\* $p \leq .01$

The behavioral change of the primary caregivers to correctly nourish was assessed through R24. 54% of children had an excessive caloric intake at baseline assessment which was modified in 81% to a good level of adequacy in the intake post-intervention. We also found significant improvement post intervention in the general intake of macronutrients and kilocalories in 24 hours.

The intake of fruit and vegetable rations in pre-post intervention measurements was also increased, which went from a range of zero to three fruits and vegetables per day to one of four to five.

The participation of the primary caregiver in the FHL course-workshop was associated with the improvement of the nu-

tritional status of the children both in the post-intervention measurement (RR = 2.92, 95% CI,  $p \leq .05$ ) and in the follow-up (RR = 2.27, 95% CI,  $p \leq .05$ ).

**Table 4.** Quality in the adequacy of the macronutrient intake of children between 2 and 5 years old participating in the pre-post intervention

	Adequacy	Pre-intervention Mean (SD)	Post-intervention Mean (SD)
Kilocalories	G	1022.8 (69.6)	1023.2 (59.5)
	F	744.0 (75.7)	960 (82.1)*
	D	-	-
	E	1429.1 (331.3)	1066.36 (106.8)**
	G	62.6 (3.3)	62.9 (4.9)
Proteins (g)	F	47.4 (4.3)	60.4 (8.0)*
	D	31.8 (3.3)	51(4.8)*
	E	75.9 (7.4)	47.4 (7.8)*
	G	28.8 (0.9)	27.8 (4.0)
Lipids (g)	F	21.7 (1.4)	29.76 (2.8)*
	D	13.4 (2.8)	26.6 (1.9)*
	E	45.4 (17.0)	26.3 (3.5)*
	G	123.5 (9.1)	130.0 (13.6)
Carbohydrates (g)	F	-	-
	D	-	-
	E	200.9 (51.9)	141.0 (25.6)**

Note. G = Good F = Fair D = Deficit E = Excess.

Wilcoxon test for related samples \* $p \leq .05$ , \*\* $p \leq .01$ .

**Table 5.** Weight index for the size of children 2 to 5 years old, between the intervened group and the control group in pre/post-intervention and follow-up measurements

		Index weight for size (%)		
		Pre-Intervention	Post-Intervention	Follow-up
Intervened Group	Mean (DE)	89.9 (4.4)	92.1 (3.8)*	91.0 (5.0)*
Control Group	Mean (DE)	87.3 (2.5)	87.5 (8.9)	85.8 (8.5)

Note. Statistic: U of Mann-Whitney-Wilcoxon \* $p \leq .05$  \*\* $p \leq .01$ .

#### 4. DISCUSSION

The permanence of children in the recovery program was long, more than a year, without changing their malnutrition GI diagnosis to a nutritional state of normalcy, situation consistent with the results of a descriptive study also of Mexican children assigned to the Oportunidades program in which they were provided with a nutritional supplement, however they had not recovered nutritionally in a period between six months to two years.<sup>[9]</sup> Through the FHL program, learning and behavioral change strategies were proposed, these favorably influenced the real and perceived PCCN for correct nutrition and therefore, in the nutritional status of children. FHL is then conceived as a strategy to effectively influence the nutritional recovery of the children. This has been shown in similar studies through educational interventions aimed at primary caregivers through cooking workshops and the increase in significant knowledge. In a cluster-randomized study made in China, an improvement in the nutritional status of under-fives with malnutrition obtained higher Z scores in the W/S.<sup>[34]</sup> In an educational intervention based on aspects of nutrition, feeding and health, including a workshops on selection and preparation of healthy foods with respect to culinary culture addressed to Mexican preschoolers and their mothers, the results showed that the W/S significantly improved post-intervention at a six months follow-up.<sup>[35]</sup>

The improvement in PCCN according to the self-perception of the caregivers in this study could have enhanced its performance, given that the perception of internal locus of control and self-efficacy are associated with better practices of self-care, adherence to treatment and healthy lifestyles according to reports from other studies in that sense.<sup>[36-40]</sup> In some meta-analysis successful interventions were reported to increase intake of fruit and vegetables, the time and quality of physical activity, improvement in anthropometric measures, the common strategy was the development of parental abilities.<sup>[41,42]</sup>

Group work could be a factor to facilitate learning because the participants shared success stories as a model and as a reference of the subjective norm that motivates the change, as suggested by the theory of planned behavior of Fishbein and Ajzen.<sup>[43,44]</sup> On the other hand, in studies with educational

and environmental interventions in which group learning was not used, no significant changes were achieved in the nutritional status of the participating children, nor in the nutritional practices, nor in the physical activity time, nor did the intake of products of high energetic content decrease.<sup>[45,46]</sup> This suggests that group interventions for primary caregivers in which the exchange of ideas and successful experiences is favored and educating in parental skills through modeling, guided practice, and feedback, have a greater impact to achieve the goal to properly nourish children.<sup>[47-50]</sup>

The menu preparation workshop also contributed to the correct diet. As found in the results obtained, the corrected intake of the children improved the adequacy percentage for each macronutrient significantly, that is, they showed a tendency to normalize. This shows that primary caregivers improved the quality of the diet and made the children eat it, approaching or keeping them in the category of good adequacy. In a similar manner to the findings of mixed methods study carried out in China, in which once the nutritional deficiencies were analyzed through R24, mothers were taught to cook recipes whose ingredients ensured a better nutrition for their children, considering common ingredients, easy to access and respecting the culinary culture of the participants.<sup>[51]</sup>

#### 5. CONCLUSIONS AND IMPLICATIONS FOR RESEARCH AND PRACTICE

The difference in favorable results for the IG, is not so for the CG according to the W/S in the children of this study, which show the relevance of raising knowledge on health and nutrition, enabling and supporting the behavioral change of the primary caregivers showing them how to establish their peer support networks to improve the quality of life and health of their family which will last over time.

The results of the FHL intervention from baseline, one-month post-intervention and a three months follow-up, shows the evolution of the favorable nutritional status of the intervened Group versus control Group that did not achieve nutritional stabilization.

The “Cimientos para una vida sana” [“Foundations for a

Healthy Life”] program was effective in improving nutritional status in most children between 2 and 5 years old with first degree malnutrition that had remained in a program of nutritional recovery for nearly two years without improvement, through the development of real and self-perceived parental competence for correct nutrition by best feeding their children.

Having a proven strategy based on improving self-efficacy, locus of internal control and food practices of caregivers to achieve nutritional recovery of children between 2 and 5 years with chronic malnutrition, is encouraging. “Foundation

for a healthy life” program has proved its efficacy.

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## CONFLICTS OF INTEREST DISCLOSURE

The authors declare that there is no conflict of interest.

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