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Effect of an Educational Intervention on the Motivation of the Mother to Feed Her Child with Overweight or Obesity: A Quasi-Experimental Study

Maria Isabel Ibarra-Resendiz[1], Nicolas Padilla-Raygoza[2, *], Georgina Olvera Villanueva[2]

[1]Division of Health Sciences and Engineering, Campus Celaya Salvatierra, University of Guanajuato, Celaya, Mexico
[2]Department of Nursing and Obstetrics, Division of Health Sciences and Engineering, Campus Celaya Salvatierra, University of Guanajuato Celaya, Mexico City, Mexico

Email address
padillawarm@gmail.com (N. Padilla-Raygoza), raygosan@ugto.mx (N. Padilla-Raygoza)
[*]Corresponding author

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Abstract
Overweight / obesity is an imbalance between caloric intake and energy expenditure of the person; food intake of preschool-age children depends primarily on the mother. The objective was to determine the effect of a nursing intervention to increase motivations in mothers of preschool-age children with overweight / obesity (BMI from percentile 85, CDC Curves 2000). It was a quasi-experimental design; it was randomized selected two rural communities in San Luis Potosi, Mexico and invited mothers with children from 3 to 6 years with overweight / obesity; Puente del Carmen community was selected as a group to intervene and the community of San Marcos as a comparison group. The motivations and stages of transtheroic model were measured; a motivational educational intervention for three months with sessions each 15 days was applied to mothers. Statistical analysis was with Chi square test and p value and in some cases Z for two independent proportions. The experimental and comparison groups were integrated by 21 and 25 mothers, respectively. After the educative intervention, motivation was high at 90.48% in the experimental group and 40% in the comparison group (X^2 = 12.48, df 1, p = 0.0001). Conclusion: Motivational educational intervention increased the motivation of mothers to prepare and give a healthier feeding for preschool-age children with overweight/obesity.

1. Background

The World Health Organization (WHO) reports that obesity has become pandemic of the century, and estimated that in 2010, more than 42 million children under 5 suffered from overweight / obesity in the world, of them almost 35 million live in developing countries [1]. In Mexico according to the National Health and Nutrition Survey 2012 (ENSANUT), 10 of every 100 children under 5 are overweight; the prevalence of overweight and obesity in this age has been a slight rise over time, almost 2% from 1988 to 2012 from 7.8% to 9.7% [2]. In the state of San Luis Potosi, Mexico, in 2012 the

prevalence of overweight / obesity in children under five years was 7.3% and for age 5 to 9 years the prevalence was 27.2% [3]. The data are alarming that reveals that the problem of overweight and obesity is presented at ever younger ages.

Food has a key role in overweight / obesity, as these are the result of the imbalance between intake and energy expenditure; during the early years of a child's life, parents play a key role in their children transmission of values, norms, habits, routines and habits that often have a persistent character over time, and the foods are important among them [4].

Habits are a reflection of the culture in which the person lives; in food culture, Mexico undergoes a transition to a westernized diet, highlighting the increased availability at low cost of processed foods with high amounts of added fat, sugar and salt. It is emphasized that the consumption of caloric beverages has increased and there are significant changes in buying some foods, such as reducing the acquisition of fruits and vegetables by 29.3%, milk 26.7%, and meat 18.8% [5]. The relevance of this information rose falls on the role of women and the process behind the provision of food to their children, which included all the interactions that happen around food as the selection, purchase, ingestion, attitudes and behaviors [6].

The modification of unhealthy eating behaviors from an early age, encourages active participation of the mother [6, 7]; it considers how essential to explore the perceptions and behaviors of care in feeding mothers, since in most families, it is she who decides to buy the foods and how to prepare them [8].

Gonzalez et al., reported that currently remains the mother family figure who best knows the food needs of their children [9]. While this is true, the decision to these needs can rebut; for example, believe that the more food be provided to the child, this will be healthier or preferences based on child makes them better mothers. Giordano and Saorti show that there is a 49% change in maternal perception on actual body image of the son, even greater in mothers with children who are overweight and obesity; it is considered that this condition is dangerous, since overweight can advance without parents perceive it [10].

Feeding practices of mothers should be routed to the child to learn by assimilation rules or standards of conduct from their usual environment to lead this great responsibility mothers should be motivated, basic element that allows you to be consistent in the formation of habits healthy, according to the definition of motivation [6].

Orem defines motivation as the orientation of care to a health objective, another definition states that this arises depending on the circumstances to do or behave in certain ways, as long as a person wants to do things, so the person motivated tilts or is prone to do something or behave in a certain way. This definition allows instrumental from exercising their behavior can infer that are motivated, so that is through a process of abstraction that a lower or higher motivation is set to do something or behave in any way [11].

The first step to find out whether there is motivation according to transtheoric model [12] which establishes five stages to behavior change, is based on the first stage called pre-contemplative, which assesses whether the person really is aware of the risk the exercise of certain conduct; in relation to this point the Center of Social Studies and Public Opinion (CSSPO) in a study on the situation of the family and children applied in 2011 revealed that 15% of respondents considered very serious and 30% severe, the problems of obesity and overweight, in contrast, 39% consider it little serious and 16% nothing serious [13].

These data suggest that there is still no full awareness among people about the risks associated with this condition, then we need to seek a conscious and voluntary participation for participatory action and generate changes in feeding practices through motivation. Direct intervention to mothers, means that cause changes in them makes up a strategy to influence people in their charge, which can ensure new preparations elements [14] on the responsibility of health. To do motivational interviewing as a nursing intervention strategy, which is a concrete way to help people to recognize and deal with potential and current problems was implemented [15, 16].

The objective was to increase the motivation of the mother of preschool children with overweight / obesity to improve the nutrition of their children and see if they changed the stage of transtheroic model.

2. Methodology

The protocol was reviewed and approved by the Committee on Research and Committee on Bioethics, Division of Health Sciences and Engineering, Campus Celaya Salvatierra University of Guanajuato, Mexico.

Study design: A quasi-experimental, longitudinal, prospective, comparative study was designed.

The universe were mothers who had children aged 3 to 6 years old with overweight and obesity in the communities Puente del Carmen and San Marcos, in the municipality of Rio Verde, San Luis Potosi, Mexico, from January to December 2014.

2.1. Sampling

Two communities of similar characteristics in geography and population in the municipality of Rio Verde, San Luis Potosi, which have a minimum of two kindergartens, were selected, Puente del Carmen and San Marcos. So these communities underwent randomization to choose experimental and comparison groups, leaving the Puente del Carmen as a experimental community and the community of San Marcos as a comparison group.

2.2. Selection of Participating Mothers

2.2.1. Inclusion Criteria

Mother of family or primary caregiver more than 18 years old, responsible for feeding children age 3 to 6 years with

overweight or obesity, who agree to participate voluntarily in the study by signing the informed consent.

2.2.2. Exclusion Criteria

Family mothers or primary caregivers, who have children with overweight / obesity undergoing dietary treatment.

Mothers who have children diagnosed with metabolic diseases.

2.3. Variables

2.3.1. Sociodemographic

Data on age, years of schooling, number of family members and number of children, besides marital status, occupation, education level, monthly income and religion were obtained.

2.3.2. Study Variables

Level of motivation, is a dichotomous categorical variable, based on Questionnaire score, is the desire of the mother by a change in feeding your child; it was measured as low / medium (score 30-110) and high (score of 111-150); it presented with frequencies and percentages.

Stages of change from transtheoric model is an ordinal categorical variable; it is the stage when the mother is in relation to overweight / obesity son; it measured in pre-contemplation, contemplation, preparation, action and maintenance; it presented with frequencies and percentages.

Body Mass Index (BMI) of school-age children, is a quantitative variable; is the body mass expressed in kg/m^2; it measured with the measured weight digital scale with altimeter, with the least possible clothes, no shoes and the weight is recorded; height is measured in meters on the same scale. when standing with eyes front and height were recorded: measured in Kg / m^2 and summarized with mean and standard deviation.

2.4. Questionnaires

The instrument is a document ex profeso, self-applicable to which was given the name of “Motivation in the agent dependent care: actions for food”, was evaluated by a pilot test with a sample of 30 subjects, the index calculation was performed internal consistency Cronbach's alpha (α) obtaining a value of 0.7, then a restructuring of the items was performed and again applied a pilot test in 15 subjects obtaining a $\alpha = 0.84$.

Construct validity through the literature review and analysis of an instrument, which uses stages of change of conduct from transtheoric model, which was to support the orientation of the approach of the items for each stage is performed [17].

2.5. Intervention

The program was structured by sessions where it work with motivational interviewing, called "Educative nursing programme to increase motivation on feeding practices of the mothers of child with overweight or obesity”.

The intervention consisted of 6 individual sessions of a non-maximum 30 minutes in each session, the date were agreed upon availability of each participant, one session every two weeks for 3 months between the revised issues were the following: Food consumption for the child and the risk for overweight or obese, nutritional value food preparation and presentation options of how to integrate food fruits, vegetables and cereals, types of beverages, consumer benefits and risks and finally shopping and lots of food for children.

A theme was used for each session with a semi-structured interview based on some strategies as stated in motivational interviewing style as used: use of evocative questions, confrontation, the decisional balance, recapitulation, reflective listening, information and advice, develop and negotiate a plan.

In each session an activity to practice at home and was allocated from the results given pattern to continue or to reinforce the goal of the session. Between the fifth and sixth session it is beginning to design a plan of action that was more than anything in commitments to give continuity to the actions (b.p. change the soda water) raised and accepted by the child's mother.

2.6. Statistical Analysis

Descriptive statistics, frequencies and proportions for categorical variables, and measures of central tendency for quantitative variables from mothers and their preschool age children.

Chi square test and p value was used, or Z for two proportions to demonstrate comparability of the groups.

To demonstrate association between groups and motivation, Chi square test and p value was calculated. For the stages of change Z was calculated for two independent proportions.

It was calculated t Student for two independent means, degree of freedom and p-values, among BMI of preschool-age children of experimental versus comparison group, pre and post-intervention; also, it was calculated the difference of BMI pre-post intervention in each group, and t Student for paired mean degree of freedom and p-values.

To demonstrate statistical significance of the results the p value was set at 0.05.

Statistical analysis was performed using STATA 13.0 (Stata Corp., College Station, TX, USA).

3. Results

The results are based on the sample of 46 mothers, 21 belonging to the experimental group and 25 in the comparison group.

In Table 1 we can see no difference between the mean age, years of schooling and number of children ($p > 0.05$).

Table 1. *Sociodemographics quantitative characteristics of the mothers from preschool age children with overweight/obesity, 2014.*

	Groups		t	df	p-value
	Experimental (n=21)	Comparison (n=25)			
Age of the mother (years)			1.33	44	0.97
Range	24 – 58	23-50			
Mean	33.90	30.80			
Standard deviation	8.64	7.30			
Years of school			0.03	44	0.97
Range	6 – 16	6 – 12			
Mean	9.38	9.36			
Standard deviation	2.73	1.8			
Number of family members			-0.14	44	0.89
Range	3 – 8	3 – 9			
Mean	4.90	4.96			
Standard deviation	1.48	1.40			
Number of children			0.78	44	0.44
Range	1 – 5	1 – 5			
Mean	2.38	2.08			
Standard deviation	1.53	1.07			

df= degree of freedom
Source: Study questionnaires

Mothers in the experimental group predominated married, housewives, with completed secondary school, with monthly income of $ 1000 to $ 2000 Mexican pesos (59-110 USD) and Catholic religion; in the comparison group they predominated living cohabiting mothers, housewives, with completed secondary income of $ 1000 to $ 2000 Mexican pesos (59-110 USD) and Catholic religion. No significant differences between groups for these variables (p> 0.05) (Table 2) were found.

Table 2. *Sociodemographics categorical characteristics of mother of preschool age children with overweight/obesity, 2014.*

	Groups				X^2	df	p-value
	Experimental (n=21)		Comparison (n=25)				
	f	%	f	%			
Civil status					3.28	3	0.35
Single	9	4.76	3	12.00			
Married	12	57.14	8	32.00			
Free union	7	33.33	13	52.00			
Widow	1	4.76	1	4.00			
Ocupation							
Housekeeper	12	57.14	21	84.00			
Employer	7	33.33	3	12.00			
Self employer	2	9.52	1	4.00	4.07	2	0.13
School							
Elementary	4	19.06	3	12.00	0.66*		0.51
Secondary	13	61.90	16	64.00	-0.15*		0.88
High school	2	9.52	6	24.00	1.29*		0.20
University	2	9.52	0	0.00	1.58*		0.11
Income							
<1000	5	23.81	5	20.00	0.31*		0.76
1000 – 2000	7	33.33	12	48.00	-1.01*		0.31
2001 – 3000	3	14.29	5	20.00	-0.51*		0.61
3001 – 4000	5	23.81	3	12.00	1.05*		0.29
>4000	1	4.76	0	0.00	1.10*		0.27
Religion							
Catholic	18	85.72	24	96.00	-1.23*		0.22
Christian	0	0.00	1	4.00	-0.93*		0.35
Jehova Witnes	2	9.52	0	0.00	1.58*		0.11
Other	1	4.76	0	0.00	1.10*		0.27

df = degree of freedom * Z for two proportions
Source: Study questionnaire

Before the intervention, in the experimental group predominated low motivation of mothers and the contemplation stage, and in the comparison group was predominant low motivation and contemplation stage; no statistically significant differences between groups were detected (Table 3).

Table 3. *Motivation level and change in behaviour between experimental and comparison groups, preintervention, 2014.*

Variable	Groups				X^2	df	p-value
	Experimental (n=21)		Comparison (n=25)				
	n	%	n	%			
Motivation level					0.21	1	0.64
High	7	33.33	10	40.00			
Medium/Low	14	66.67	15	60.00			
Change stages					4.70	3	0.19
Contemplation	10	47.62	17	68.00			
Preparation	6	28.57	4	16.00			
Action	4	19.05	1	4.00			
Maintenance	1	4.76	3	12.00			

df = degree of freedom
Source: Study questionnaire

All preschool-age children were overweight / obese according to BMI, pre-intervention.

In motivation post-intervention there were significant differences between the experimental and comparison groups ($p < 0.05$) and the stages of change was found that comparing the groups were statistically significant differences for the stages of contemplation and maintenance ($p < 0.05$) (Table 4).

Table 4. *Motivation level and change in behaviour between experimental and comparison groups, post-intervention, 2014.*

Variable	Groups				X^2	df	p-value
	Experimental (n=21)		Comparison (n=25)				
	n	%	n	%			
Motivation					12.48	1	0.0001
High	19	90.48	10	40.00			
Medium/low	2	9.52	15	60.00			
Change stages							
Pre contemplative	0	0.00	1	4.00	-0.93*		0.35
Contemplation	4	19.05	13	52.00	-2.31*		0.02
Preparation	1	4.76	5	20.00	-1.53*		0.13
Action	6	28.57	4	16.00	1.03*		0.30
Maintenance	10	47.62	2	8.00	3.05*		0.002

*Z test for two independent proportions df = degree of freedom
Source: Study questionnaires

As for the BMI of preschool-age children, there were no found significative differences among groups in mean of BMI, pre-intervention and post-intervention ($p>0.05$) (Table 5).

Table 5. *Body mass index between groups of preschool-age children, pre and post intervention 2015.*

	Pre-intervention		Post-intervention	
	Experimental group	Comparison group	Experimental group	Comparison group
Body Mass Index (kg/m^2)				
Range	16.8 to 24	15.4 to 29.0	15.5 to 25	16.8 to 30
Mean	18.89	19.41	18.96	20.06
SD	2.07	3.29	2.52	3.74
Difference of means	-0.52		-1.1	
t Student	-0.63		-1.15	
df	44		44	
p-value	0.53		0.26	

SD Standard deviation df degree of freedom
Source: Questionnaires of the study

BMI differences prior to post-intervention measurement in each group were also calculated independently and Student t test for paired averages calculated; we found that the mean difference was not different from 0 in each group ($p >0.05$) (Table 6).

Table 6. *Mean of differences between Body Mass Index in each group of preschool-age children, 2015.*

	Experimental group n=21	**Comparison group n=25**
Mean of differences	- 0.076	-0.65
SD	2.03	1.62
t Student	-0.17	-2.01
df	20	24
p-value	0.87	0.06

SD Standard deviation df degree of freedom
Source: Questionnaires of the study

4. Discussion

Mostly participating mothers of both groups did not reflect a full awareness of the nutritional status of the child; managed in terms of overweight and obesity, only in cases where the physical constitution of the child was very evident; according Giordano and Leah Saorti [10], the results of their study show that maternal perception alteration on their child's weight was 49%, being higher in mothers with children who are overweight and obese.

Relating to the concept of motivation described by Dorothea E. Orem, who mentions that it is orientation dependent care toward a goal that agree with the characteristics and meaning to life, health and welfare [14], is because the results that the level of medium/low motivation obtained the highest percentage in both groups, just as the contemplation stage concentrated the highest percentages to assess the inclination of the balance between change or no change due to the risks –profit [12], just as the average level of motivation supports the ambivalence of mothers when feeding practices in children.

The concept of motivation is perceived in some responses of mothers, but on the other hand do not seem to recognize the health risks of some feeding practices, reflected in the frequency of responses, care has a reason to be in the child and going aimed at a target in this case the unit power, however perhaps the features that this must have on your health and wellness meaning still is not clear; Sanches and Andrade say that mothers know the importance of the quantity and quality of food eaten and some potential health consequences [18]. However, coupled with the knowledge required to support mothers so that they are put into practice through the formulation of objectives that have meaning for them, this is where the motivation could be integrated, so that changes feeding practices can be healthier and constant each time.

The definition of motivation in the mother can be better understood if the following concepts are understood: parenting styles are defined by Hughes et al. as a reflection of the parent-child interaction that provide socio-emotional context in specific practices, which leads to eating styles described as the interactions between parents and children through situations related to food, to finish in the feeding practices [19], which include specific behaviors or strategies that parents use to influence infant feeding, analyzing the latter term is understood to include purchasing decisions, preparation and lots of food and care should be oriented wellness goals.

The styles of food, in particular, often already have some features that gives them their classification as permissive or restrictive, which can integrate into their strategies, some inadequate as exchange, punishment, coercion, insistence, camouflage food not accepted in the preferred, game and offer, only of favorite foods. Generally the use of such strategies usually indicates a lack of knowledge and trusted by the mother, which can affect its competence as promoting healthy eating habits for their child [18].

Several studies support the fact that exercise control of restrictive feeding by parents contribute to an increased risk of overweight or obesity; Dev et al., reported in their study that children receiving this type of control by the parent had 1.75 times higher risk of being overweight [20]. Holland et al., supported this statement and mentioned that as parents become less restrictive in their feeding practices, children consumed less amount of food energy from high energy density and energy from protein [21].

Finding a balance between too much control and permissiveness, create healthier environments that not only helps the child which was demonstrated in the study by Holland et al., where parents improved the perception of overweight children and increased monitoring power, and consequently the concern of parents for the child's weight and restriction decreased significantly ($P < 0.001$) [21].

The American Academy of Pediatrics (AAP) recommends assess and advise parents about the specific recommendations of behavior in feeding children, including and in reference to the issue of food is to limit consumption of sugary drinks; eat at least five servings of fruits and vegetables a day; breakfast daily; limit eating out of home, especially avoid eating fast food; having regular family meals; and limiting portion sizes. In relation to these recommendations Ture et al., in the analysis of the association between the performance of a target behavior of the recommendations of the AAP by the mother and child, when mothers knew and met the objective of the relevant recommendation, the child was more likely to compliance it six times higher for not drinking any sugary drink, high nearly seven times more to eat five or more servings of fruits and vegetables a day, and almost 67 times more likely to eat less fast food weekly [22].

The above results even if no mention the motivation, it can denote from the definition that gives Orem, which supports the idea that the guidance in caring for mothers focused they planted by themselves goals to benefit the health of the child, give positive results in favor of better feeding practices, which is also seen in the study results in the variable level of motivation post-intervention, these results showed a significant difference in the level medium-low to high motivation ($p = 0.0001$).

Other facts that support motivation as an important element for behavior change was precisely the step change post-intervention; stages of behavior change are described as a circle where the subject may have a relapse at a stage already achieved but the dynamics of the cycle allows you to

move again, so motivational educational guidance is presented as aid through strategies evocation of the capabilities of the mother to move through these.

In analysis of the stages of change transtheoretical theory adapted as dimensions of the instrument a significant difference post-intervention between groups, obtaining a $p = 0.002$ value, however by the end of the study the change is envisaged only in terms of increase it was obtained the frequency of implementation of each item, because the time spent on the intervention was limited lasting a maximum of three months and taking into account that the transtheoretical theory evaluates the maintenance phase to a minimum of 6 months.

It is remarkable the change of mothers with high motivation before and after the intervention, 7 and 19, respectively in the experimental group and remained unchanged in the comparison group (Tables 3 and 4).

Despite finding no further significant differences between the experimental and the comparison group, it is important to note that unlike before intervention was -0.52 in BMI but after the intervention was -1.1 of BMI. In both cases the BMI measurements were higher in the comparison group, but the difference was greater after the intervention, indicating that the experimental group was lower BMI increase in the 4-month follow-up (Table 5)

By obtaining the difference in BMI measurements in the experimental group, the mean difference was -0.076 ($p < 0.05$) but was lower than the comparison group -0.65 ($p < 0.05$) (Table 6).

It is important to note that although the differences were not significant in the experimental group, almost BMI remained the same before and after the intervention; unlike the comparison group, where preschool-age children, increased their BMI by up to 0.65 kg/m^2.

5. Conclusion

The educational intervention changed the motivations of mothers of preschool age children with overweight / obesity and the mother also got amend the stage of transtheoric model post-intervention.

It would be advisable to increase the intervention to a year to achieve change BMI of preschool-age children and not only increase the motivation of the mother in the shift towards healthy eating behavior.

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