

## Research Article

# Association between Daycare Assistance and Weight Alterations in Childhood

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## Abstract

**Background:** Overweight, obesity and malnutrition are alterations in which genetic, environmental and lifestyle aspects intervene. Working women increasingly require the support of daycare centers, where their children stay most of the day, eat and exercise. Alterations in weight in children cause less physical and intellectual capacity. According to ENSANUT 2012, 10.3% of children under five years of age present malnutrition and 9.7% are overweight and obese.

**Aim:** The purpose of this study is to determine the association between alterations in weight and attendance at daycare centers for children under 5 years of age in Tijuana, Mexico.

**Design and Setting:** Comparative cross-sectional study.

**Methods:** In 238 children in the Family Medicine Unit #27, Tijuana, Baja California, weight alterations, breastfeeding and daycare centers assistance were measured to make an association between them. The following variables were collected: weight alterations (malnutrition, overweight and obesity), age, sex, birth weight, breastfeeding, daycare centers assistance, child care time per week in daycare centers, schooling of the mother, age of the mother, monthly family income, working hours of the mother and socioeconomic level. For statistical analysis, association was established with odds ratio and chi-squared test with 95% interval confidence ( $p < 0.05$ ).

**Results:** The association between alterations in weight and assistance to daycare centers showed the following result: OR=0.33, 95% CI (0.11-0.94),  $p=0.03$ ] and the association between alterations of weight and breastfeeding showed the following result: OR=0.30, 95% CI (0.10-0.86),  $p=0.04$ ]; both associations had statistically significant differences.

**Conclusion:** Children assigned to FMU #27 have a frequency of alterations in nutritional status (malnutrition, overweight and obesity) lower than the national prevalence reported by ENSANUT 2012.

**Keywords:** Weight Alterations; Daycare Center; Breastfeeding

## Introduction

The evaluation of the nutritional status is an indispensable requirement in the monitoring of the healthy child, allows the early identification of alterations and facilitates the possibility of timely treatment, favors the primary prevention of diseases such as obesity, malnutrition and chronic degenerative diseases [1]. To evaluate the nutritional status in children under 5 years of age, the weight/age, height/age and weight/height indices have been conventionally used; in recent years, the body mass index (BMI= weight/height) has been added. The weight/age index has been used to identify low weight at a certain age and allows diagnosis of malnutrition when there is a deficit greater than 10%; height /age has been used to identify children with low height and weight/height to determine acute malnutrition. The BMI developed by Quetelet in 1869 has been used mainly in adults and, recently, to assess the nutritional status of children and adolescents. The BMI is an indicator of the relationship between weight and height that is frequently used to identify overweight and obesity. Because of

its reliability, low cost and adequate correlation with total body fat, the World Health Organization (WHO) recommends it to evaluate anthropometrically the nutritional status of the population under 20 years of age [2-3].

Obesity is a chronic disease of multifactorial etiology involving genetic, environmental, lifestyle, neuroendocrine and metabolic aspects. Obesity is a consequence of the ingestion of low-fiber diets with high energy density and sugary drinks combined with poor physical activity. Children eat a large number of meals without family supervision, which facilitates the consumption of energy-dense foods devoid of micronutrients that can cause inadequate increase in body weight [4]. During the first years and before the age of 18, obesity has important consequences for physical and mental health. Children with obesity are more likely to suffer from diseases such as metabolic syndrome, diabetes, hypertension, heart disease and orthopedic problems in the future [5]. A positive association has been established between working hours of parents and the obesity in children. It is

suggested that longer working hours lead to insufficient family interactions, in addition, mothers who work long hours do not have enough time to prepare nutritious meals and supervise the physical activity of their children [6].

Malnutrition is a systemic disease that affects all organs and systems, is caused by the acute or chronic reduction of food availability due to insufficient intake, inadequate absorption, excessive loss nutrients or by the combination of two or more of these factors. Once the diagnosis is made, it must be defined if the malnutrition in the patient is mild, moderate or severe. It can be caused by primary causes when it comes to ingestion of deficient nutrients; and it may be secondary, when the patient has a pathology associated with poor nutrient intake. Depending on its evolution, it can be acute (when the child has a deficit in the weight/height index) or chronic (when the deficit is height/age) [7]. Child malnutrition usually appears between 6-18 months of age, when the child's growth and brain development are particularly rapid. The levels of chronic malnutrition in children approaching the age of five are an indicator of the cumulative effects of stunting, which have severe effects on cognitive and behavioral areas. Child malnutrition results in lower physical capacity, lower intellectual performance, poor school and work performance [8-9].

Daycare centers are spaces where many children stay for most of the day, is a place where they consume a high proportion of calories and perform daily physical activity, for this reason, daycare centers are ideal for establishing actions to promote healthy behaviors. Based on the above, the main objective of this research is to determine the association between alterations in weight and attendance at daycare centers for children under 5 years of age in Tijuana, Mexico.

## Materials and Methods

A comparative cross-sectional study was carried out in the Family Medicine Unit #27 (FMU-27), of the Instituto Mexicano del Seguro Social (IMSS), located in Tijuana, Baja California, Mexico, in children that met the following inclusion criteria: age between 1 month and 5 years, parents that accepted and signed the informed consent; children with heart disease, kidney failure, sickle cell anemia, liver disease, psychomotor disability or in treatment for a chronic disease were not included and eliminated those who did not complete the survey or with incomplete information.

The following data were obtained directly from the parents or medical records: weight alterations (malnutrition, overweight and obesity), age, sex, birth weight, breastfeeding, daycare centers assistance, child care time per week in daycare centers, schooling of the mother, age of the mother, monthly family income, working hours of the mother and socioeconomic level. The procedure for the data collection was as follows: age was calculated in years according to the year of birth, sex was determined according to phenotypic characteristics of each patient, alterations in weight was evaluated with anthropometric indexes constructed through measurements of weight, height and age, which will be transformed into Z scores using the growth standard of the World Health Organization (WHO, 2006). A child with malnutrition will be classified if presents low weight for age, low height for age and low weight for height, that is, a Z score less than -2 standard deviations in weight for age, height for age and weight for height. Overweight was considered between +2

and +2.99 standard deviations (SD) of the weight for height indicator and obesity when the weight for height indicator is +3 SD according to the reference standards established by the WHO.

Birth weight, breastfeeding, daycare centers assistance, child care time per week in daycare centers, schooling of the mother, age of the mother, monthly family income and working hours of the mother was determined by asking directly to mothers; socioeconomic level was determined with Graffar-Mendez-Castellanos test, this test was developed in France by Dr. Graffar and adapted by Dr. Hernán Méndez Castellanos, which consists of a stratification of the population from the following five variables: profession of the head of the family, level of instruction of the parents, source of income and housing and neighborhood aspect. From the sum of the variables five strata are identified: high level (stratum I), medium-high level (stratum II), medium level (stratum III), labor (stratum IV) and marginal level (stratum V). The instrument is validated to Spanish with a Cronbach's alpha of 0.706 [12].

The recollected data was integrated into data collection sheets and analyzed using the SPSS program version 20 in Spanish, where we applied descriptive statistics; for qualitative variables, frequencies and percentages were used and for quantitative variables, mean and standard deviation were used. For the bivariate analysis, odds ratio and Ji-Square test was used to determinate association and statistically significant differences between the groups. The Kolmogorov-Smirnoff test was used to establish the normality of the data. It was considered a  $p < 0.05$  as statistically significant, with a 95% confidence interval. The Protocol was authorized by the Local Committee of Research and Ethics in Health Research from the Family Medicine Unit #27, where this study took place.

## Results

A total of 238 patients were included, 56.3% male ( $n = 134$ ) and 43.7% female ( $n = 104$ ), the patients were divided into two groups, 119 in daycare centers (cases) and 119 out of daycare centers (controls). The minimum age in both groups was 2 months and the maximum age was 59 months, with a mean of  $28.65 \pm 12.69$  for cases and  $28.66 \pm 15.62$  for controls. In birth weight, 8.8% had low weight ( $n = 21$ ), 82.4% normal weight ( $n = 196$ ) and 8.8% high weight ( $n = 21$ ). 86.1% received breastfeeding ( $n = 205$ ), with an average of  $8.94 \pm 7.17$  months, only 37.8% ( $n = 90$ ) received exclusive breastfeeding. The age of the mothers is between 18-46 years, with an average of  $28.56 \pm 6.42$ . In terms of maternal education, 0.4% ( $n = 1$ ) is without studies but can read and write, 10.1% ( $n = 24$ ) primary, 34.5% ( $n = 82$ ) secondary, 30.7% ( $n = 73$ ) high school and 24.4% ( $n = 58$ ) bachelor's degree.

63.9% of mothers work full time (40 hours a week or more), 10.1% part time (<40 hours a week) and 26.1% of mothers do not work. 70.6% ( $n = 84$ ) of children who are in daycare centers perform 2 meals a day and remain on average  $40 \pm 7.32$  hours, with a minimum of 20 and a maximum of 60 hours for week. In relation to the monthly household income, 20.2% ( $n = 48$ ) is less than \$5,000 pesos; 56.3% ( $n = 134$ ) between \$ 5,000-15,000; 18.5% ( $n = 44$ ) \$15,000-25,000 and 5% ( $n = 12$ ) greater than \$ 25,000. When stratifying social class with the Graffar Méndez-Castellano test, we found that 2.1% of families are in upper class ( $n = 5$ ), 20.2% upper middle class ( $n = 48$ ), 46.2% in lower middle class ( $n = 110$ ), 30.7% in working class ( $n = 73$ ) and 0.8%

**Table 1:** Association between weight alterations and daycare center assistance.

		Weight Alterations				OR	95% CI	p*
		Normal Weight	Malnutrition	Overweight	Obesity			
Daycare assistance	Yes	109	5	4	1	0.33	0.11-0.94	0.03
	No	95	14	6	4			

%= Percentage, p= Ji-Square, CI= confidence interval, \*= Association with malnutrition

**Table 2:** Association between weight alterations and breastfeeding.

		Weight Alterations				OR	95% CI	p*
		Normal Weight	Malnutrition	Overweight	Obesity			
Breastfeeding	Exclusive	73	8	6	3	0.3	0.1-0.8	0.04
	Mixed	107	5	2	2			
	No	24	6	2	0			

%= Percentage, p= Ji-Square, CI= confidence interval, \*= Association with malnutrition.

in marginal class (n= 2). 85.7% (n= 204) of children are in normal weight, 8% (n= 19) in malnutrition, 4.2% (n= 10) in overweight and 2.1% (n= 5) in obesity.

For bivariate analysis we make an association between alterations in weight, assistance to daycare centers and breastfeeding (Table 1); the association between alterations in weight and assistance to daycare centers showed the following result: OR=0.33, 95% CI (0.11-0.94), p=0.03]; the association between alterations of weight and breastfeeding showed the following result (Table 2): OR=0.30, 95% CI (0.10-0.86), p=0.04]; both associations had statistically significant differences.

## Discussion and Conclusion

Weight alterations in children under 5 years of age are an important health problem, since it is a preventable situation that can cause short and long-term health alterations; in this study, we used anthropometric indexes transformed to WHO scores; when comparing the results with ENSANUT 2012, the most recent publication that includes the evaluation in children under 5 years of age, the prevalence of malnutrition for Baja California was 10.3% and in our study it was 8%. Regarding overweight and obesity, we found a prevalence of 6.4%, which is 3 percentage points lower than the national average as reported in ENSANUT 2012 and almost half of what was reported for Baja California in this year [10-11]. Children assigned to FMU #27 have a frequency of alterations in nutritional status (malnutrition, overweight and obesity) lower than the national prevalence reported by ENSANUT 2012, this could be due to the accessibility of medical attention of the population studied and by the intervention of the family doctor. There is a relationship between daycare attendance and alterations in weight as a protective factor for malnutrition, which could be a reflection of the strictness of the diet in daycare centers, ensuring that the food provided is complete and balanced. Prospective studies are required in order to establish causality between variables and nutritional status.

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