

# Nutritional and educational intervention to reduce malnutrition due to excess in university students

Intervención educativa nutricional para la reducción de malnutrición por exceso en estudiantes universitarios

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## Abstract

**Objective:** To assess the effect of a nutritional/educational intervention over malnutrition due to excess in university students.

**Materials & Methods:** A quantitative study with a descriptive approach. Intervention was conducted through the implementation of educational strategies promoting healthy lifestyles, nutritional status of participants was monitored throughout the entire scholar cycle (16 weeks). Non-probabilistic sampling was used including 52 university students who willingly accepted to participate. Data was processed using descriptive statistics (frequency, category variable percentages, measures of central tendency, dispersion for numerical variables). Nutritional profiles of the participants were evaluated based on the normality of the data through the use Kolmogorv Smirnov test, averages, T tests for related samples and the Wilcoxon test to evaluate the intervention effects.

**Results:** Weight average before intervention stage was 74.7 kg and 68.2 kg after intervention. Before intervention 42.31% presented malnutrition due to excess, after intervention 17.3% presented malnutrition due to excess which signifies a decrease of 25.01% was recorded ( $p$  value  $< 0.001$ )

**Conclusions:** Educational intervention had an impact on the nutritional status of university students in relation with the percentage of malnutrition due to excess normal weight students ratio was increased.

**Key Words:** Obesity; Nutritional status; Education.

## Resumen

**Objetivo:** Evaluar el efecto de una intervención educativa nutricional sobre la reducción de la malnutrición por exceso en estudiantes universitarios.

**Materiales y método:** Es un estudio cuantitativo con alcance descriptivo. La intervención se basó en la implementación de estrategias educativas que incidieran en estilos de vida saludables y se monitoreó el estado nutricional durante un ciclo escolar (16 semanas). El muestreo fue de tipo no probabilístico, incluyendo a 52 estudiantes universitarios, quienes aceptaron los términos del consentimiento informado. Para el procesamiento de datos se empleó estadística descriptiva (frecuencias, porcentajes para las variables categóricas, medidas de tendencia central y dispersión para las variables numéricas). El perfil nutricional de los participantes se evaluó en función de la normalidad de los datos mediante la prueba Kolmogorv Smirnov, se calcularon promedios, prueba t para muestras relacionadas y la prueba de Wilcoxon para evaluar el efecto de la intervención.

**Resultados:** El peso promedio antes de la intervención fue 74.7 kg y después de la intervención fue 68.2 kg. Antes de la intervención el 42.31% presentaron malnutrición por exceso y al final de la intervención el 17.3%, evidenciándose una disminución de 25.01% al finalizar la intervención ( $p$  valor  $< 0.001$ ).

**Conclusiones:** La intervención educativa incidió en el estado nutricional de los participantes, con relación a la malnutrición por exceso, se incrementó el porcentaje de estudiantes con estado nutricional normal.

**Palabras Clave:** Obesidad; Estado nutricional; Educación.

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## Introduction

Nowadays the number of overweight and obese people has increased; this is closely related to the lifestyles, bad nutritional habits, sedentarism and the lack of an educational strategy to convey the scope of the situation to the public<sup>1</sup>. Overweight and obesity are defined as an abnormal or excessive fat accumulation which can become harmful<sup>2</sup>, these conditions are related to genetical susceptibility, psychological, social and metabolic issues, which increases the risk of comorbidities such as high blood pressure, diabetes mellitus type 2, cardiovascular and cerebrovascular disease, also breast, endometrium, colon, and prostate neoplasia among other illnesses<sup>3,4</sup>.

Mexico occupies 2<sup>nd</sup> place globally on obesity and 1<sup>st</sup> place on child obesity this is a public health issue due to its magnitude and transcendence, since it is also aggravated by the existence of malnutrition on the general population as well<sup>3,5</sup>.

According to the National Health and Nutrition Survey (ENSANUT, 2018) data conveyed by the public health institute, combined obesity and overweight prevalence's on population over 20 years had an increase, from 71.3% to 75.2% from 2012 to 2018 with a higher ratio 3.9% on females, and 3.8% on males<sup>6</sup>. Recent studies show that when obesity and overweight cases increase, affected population interest in treatment decreases, this results in an increment on illnesses such as blindness, amputations, and kidney diseases and thus an overall reduction of productive life<sup>7</sup>.

On Health-related education program students' obesity and overweight prevalence has been observed from first year through graduation<sup>8,9</sup>, even though belonging to a health-related career, they have a limited number of abilities and tools to achieve and maintain a healthy weight, this accounts for the overweight and obesity prevalence.

Globally and increase in high calory food intake has been identified characterized by a high fat and simple carbohydrate content<sup>7</sup>, on the other hand physical activity has been reduced due to the city's growth, the use of motorized vehicles and food availability<sup>6,10</sup>.

It has been proved that theoretical and practical interventions at educational institutions help to increase physical activity and nutritional status of participating students; implementing changes on the professional formation of students promotes the development of a culture of health, examples of this could be the access on campus to healthy and nutritious food that covers all the energy requirements according to age and gender, physical, extracurricular activities and healthy habits promotion<sup>11,12</sup>.

The main goal of this research is to assess the impact of an educational intervention on excess malnutrition ratios on a health-related program university students.

## Materials and methods

A quantitative, descriptive within a generational cohort design research was conducted. A non-probabilistic sample was used, in which the entire 2019 student cohort participated, nutritional status was determined using body mass index data (according to the OMS) was obtained and classified of first year students enrolled at a health degree related program. Nutritional valuation was conducted using data collected by using of a specific quiz designed to that end at the nutritional status valuation laboratory. Related to the intervention the cognitive behavioral method was employed to promote healthy lifestyles, this method provides efficient tools to overcome the common barriers that prevent obese patients adherence to a healthy diet and also promote physical activity; using basically self-control technics, which gives the person the ability to identify and control its own behavior through the cause and effect manipulation to which behavior is related at its core; Its main goal is to improve feeding habits( what to eat, how much to eat, where to eat and when to eat) and physical activity.

The skills developed by the participants through this intervention were: Adoption of a healthy food diet, cognoscitive reengineering, social skills improvement, and stress management, change of attitude towards eating, relapse prevention and an incentive program based on extracurricular credit recognition.

Intervention was carried out in a 16-week period corresponding to an entire scholar cycle, divided in 3 stages, 1) before intervention: initial diagnosis of obesity and overweight prevalence, 2) Educational/Nutritional intervention, and 3) Results evaluation. Two main actions were taken to achieve the desired results.

As first action, twelve 2-hour seminars were carried out every Friday from 11:00 to 13:00 as part of the tutorial schedule, these seminars had an experience-based learning contents addressing obesity and overweight issues, nutritional status self-diagnosis, nutritional label interpretation, healthy breakfast confection, knowing my own weaknesses, emotions and food, life goals, my feeding habits, lifestyle betterment, etc.

As a second action, the physical activity program (PA) had a length of 64 hours throughout the 16-week period, 8 of them theory based, 40 of them practice, and 16 independent study related. A minimum of 3hours of physical activity per week were required for each of the students.

The contents imparted in this PA program was related to the benefits of regular PA, PA security, PA health prescription, warming for PA its characteristics and importance. Also, workout exhaustion identifying symptoms, consequences and exhaustion recovery methods were covered, heart rate measuring method, importance of food and hydration on PA, and games to strengthen physical condition.

The present research adhered to the recognized deontological norms and to the Mexican Health law, data gathering was carried out throughout the scholar period August-December 2019. Written consent was previously obtained, and data gathered was exclusively used for this study always keeping the students confidentiality. This research was evaluated and approved by the Education Program ethics board.

Results were processed using SPSS V.25.0 for Windows. Descriptive statistics were employed (frequency, category variable percentages, measures of central tendency, dispersion for numerical variables) Nutritional profiles of the participants were evaluated based on the normality of the data through the use Kolmogorv Smirnov test, averages, T tests for related samples and the Wilcoxon test to evaluate the intervention effects.

## Results

The research was integrated by a population of N=52, of which n=39 (75%) were females, and 13 (25%) males. In Table 1 general characteristics of the study population are shown.

**Table 1.** General Characteristics of population

Characteristics	Population	Females	Males
# of subjects	52	39	13
Age (years)	21.5 ± 3.0	23 ± 1.5	19.5 ± 1.5
Weight (kg)	74.7 ± 13.3	73.6 ± 13.9	75.8 ± 14.8
Height (cm)	162.3 ± 9.01	158.5 ± 7.4	166 ± 7.9
BMI (kg/m <sup>2</sup> )	28.4 ± 2.49	29.3 ± 3.3	27.5 ± 1.68

Source: prepared by the authors.

In the before intervention stage, 42.31% (32.69/9.62) presented a combined prevalence of overweight and obesity, while in the after-intervention stage 17.03% (15.38/1.92) presented malnutrition due to excesses, showing a decrease of 25.01% at the end of the intervention more details are shown on table 2. Also, it was shown initially, that 85% of the study population preferred a high saturated fat food intake, and 75% used to have high sugar content beverages to go with it. It is shown on this study results that total intake of high calory content food with excesses of saturated fat and

high sugar content was reduced by a 33%; also, water, and vegetable intake raised.

According to lifestyles described by students, 92.2% has breakfast at the university's cafeteria and 90.3% also has lunch in the same place. On the matter of physical activity, only 55.8% of the study's population were in the habit of doing a little bit of it.

**Table 2.** Nutritional Status before and after intervention.

Nutritional Status	Before Intervention		After Intervention	
	f	%	f	%
Low weight < 18.5	1	1.92	0	0.00
Normal weight 18.5 - 24.9	29	55.77	43	82.69
Overweight 25 - 29.9	17	32.69	8	15.38
Obesity > 30	5	9.62	1	1.92

Source: Prepared by the Authors.

## Discussion

The modern world, through the modern way of living has created millions of people with obesity, this has reached pandemic proportions. This directly related to nutritional factors and increments in a sedentary lifestyle. The increase on high saturated fat content, carbohydrates, industrialized food intake and the reduced dietary intake of vegetables and fish and a decrease on physical activity have helped to spread these conditions<sup>1</sup>.

Obesity is considered as a disease since excess of weight translates to health issues. Is also the main risk factor for morbidity and mortality on adults throughout the world, global distribution and prevalence being higher in developed and developing countries<sup>13</sup>. Latest calculations show that globally there are approximately 1,900 million adults with overweight of which more than 600 million are also obese. In general overweight and obese combined prevalence around the world is 52% of the adult global population<sup>14</sup>. Alarming data since Mexico occupies on a global level 1st place on child obesity and 2nd place on adult obesity<sup>3</sup>.

Through the evaluation of an educative and nutritional intervention focused on overweight and obesity reduction on a health-related education program at an university in southeast Mexico, evidence is shown of the relevance that educative institutions have in building health and prevention culture, since findings showed a decrease of 25.01% on overweight and obesity, similar to Galecio and Tarqui findings<sup>4</sup>, also Brennan *et al.*<sup>15</sup>, while using a cognitive and behavioral intervention, with an educative approach

on nutrition, achieved a decrease on BMI of the studied population, on the same subject, Castillo *et al.*<sup>12</sup>, carried out an educative intervention and change of behaviors in lifestyles, he focused on feeding habits, he showed that subject studies were able to reduce BMI and improved their quality of life.

It is important to stress out that the results reported by this research are lesser than those reported by Brennan *et al.*<sup>16</sup>, whose study was primary based on motivational interview and cognitive behavioral therapy for malnutrition due to excess treatment.

Study showed a positive effect on the healthy lifestyle adoption, this situation is coherent with the revised literature, where the influence that this has on the nutritional status of a person is exposed<sup>12,16,17</sup>, in this sense educative interventions focused to the fruit, vegetables, low fat, low sodium, sugar and industrialized food intake reduction and the promotion of physical activity, help in diminishing morbidity and mortality for non-transmissible diseases<sup>17</sup>.

A limitation for this research, is sample size, it is suggested for future educational/nutritional interventions to increase the number of participants and to have a control group.

## Conclusions

Educative and nutritional intervention had an impact on the nutritional status of the students, specially while diminishing the overweight and obesity indexes and increasing the normal weight student's ratio according to BMI.

The decrease on overweight was of a bigger magnitude in females and obesity was more notably reduced on males. Thus, a larger and longer educative and nutritional intervention, will have better results through time, on the study subjects.

Also, early diagnosis and prevention will help control this issue of general concern for the population; so, it is suggested that the authorities of the educative institution to implement educative intervention to promote fruit, vegetables, water intake and physical activity, at the same time, the reduction on animal origin high fat foods, processed sugars and sweet or salty snacks. Also, to create spaces and conscientize the people responsible of food points of sale on the sale of healthy foods.

## Conflicts of interests

Authors declare that there are no conflicts of interests for this research.

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