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# Effectiveness of an Educational Strategy Focused on Obstructive Sleep Apnea

**Guerrero-Celis OA*, Gonzalez-Barron D and Garcia-Leija DL**

Department of Family Medicine, Family Medicine Unit #32 (IMSS), Nuevo Leon Delegation, Mexico

***Corresponding author:** Guerrero-Celis Oziel Alejandro, Department of Family Medicine, Family Medicine Unit #32 (IMSS), Nuevo Leon Delegation, México

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**Abstract**

**Background:** Obstructive Sleep Apnea Syndrome has been recognized as a global health problem. In the world there are more than 100 million people affected by this syndrome, which has been considered as an independent risk factor to cardiovascular risk, metabolic syndrome, occupational accidents and poor quality of life.

**Aim:** The purpose of this study is to determine the effectiveness of an educational intervention in patients with obstructive sleep apnea.

**Design and Setting:** Uncontrolled clinical trial, educational intervention before and after.

**Methods:** In 119 patients in the Family Medicine Unit #32, Nuevo Leon, Mexico an educational intervention was carried out. Eight educational sessions (one per week) were given in small groups, each educational intervention lasted 60-90 minutes; relevant topics about obstructive sleep apnea were taught. Two measurements of variables were made, one before and the other after the intervention; the Epworth Scale in Spanish was used to assess improvement. To determine differences between the knowledge before and after, the Wilcoxon test was used for statistical significance with 95% interval confidence ($p<0.05$).

**Results:** We analyzed 119 participants who attended all the educational sessions, there was no loss of patients. An increase in improvement in the measured variables after receiving the intervention was found (Wilcoxon $p<0.05$).

**Conclusion:** The educational strategy was effective in patients with obstructive sleep apnea. It is recommended to perform similar interventions in larger groups.

**Keywords:** Obstructive Sleep Apnea; Educational Strategy; Epworth

## Introduction

Obstructive Sleep Apnea Syndrome is defined by the American Academy of Sleep Medicine as a disease characterized by repetitive episodes of total or partial obstruction of the upper airway during sleep [1]. The term apnea means the absence of air flow for a minimum period of ten seconds. Hypoapnea is defined as the condition that meets one of the following criteria: reduction in airflow greater than 50%, moderate decrease (<50%) of flow with oxygen desaturation greater than 3% or moderate reduction in airflow with electroencephalographic evidence upon waking [2-3].

The apnea or hypopnea causes fragmentation of sleep due to micro-awakenings and an increase in stages 1 and 2 of light sleep due to an increase in respiratory effort, hypoxemia, carbon dioxide retention, excessive daytime sleepiness (EDS) and alterations in ventilatory mechanics and oxygenation that cause a compensatory adrenergic response, causing tachycardia, hypertension and different types of arrhythmias [4-5].

There are approximately more than one hundred million people worldwide with obstructive sleep apnea syndrome, affecting 24% of men and 9% of women [6]. In Mexico there are no exact statistics of OSA prevalence, some reports show that 3.2% of the population has excessive sleepiness, affecting more men (4.4%) than women (2.4%) [7-8]. Sleep disorders affect the quality of life and cause morbidity and premature mortality, the most frequent is insomnia and secondly the OSA, these two diseases affect the quality and quantity of sleep generating excessive daytime sleepiness [9].

The OSA has been recognized as a global health problem, it is an independent risk factor for presenting cardiovascular risk, metabolic syndrome, occupational accidents and poor quality of life [7]. The treatment for obstructive sleep apnea syndrome includes general measures such as education, weight loss, exercise, suspending alcoholism and smoking, the main treatment is the proper use of Continuous Positive Airway Pressure (CPAP) [10-12]. One reason why it has been shown that educational interventions work in patients with chronic diseases is by empowerment, which is the process where patients have the knowledge, skills, attitudes and self-awareness to be able to influence behavior. Similarly, patients can influence other patients with OSA to form a trend that is transmitted between each patient [13]. Based on the above, the main objective of this research is to determine the effectiveness of an educational intervention on patients with OSA.




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**Table 1:** Educational intervention sessions.

| Session | Topic | Key points |
|---|---|---|
| 1 | Introduction and diagnostic evaluation | Introduction and generalities: obesity and metabolism, the good eating dish |
| 2 | Nutrition in OSA | General points of good nutrition, changing lifestyles, introduction to food groups |
| 3 | Lipids in diet | Lipids in foods, types of lipids, food label reading |
| 4 | Relapse management | Food relapse management, define and identify relapses |
| 5 | Family support in OSA | Learn healthy eating habits and the importance of family support |
| 6 | Physical activity in OSA | Know the benefits of physical activity and exercises |
| 7 | Type of physical activity in OSA | Learn to perform physical activity safely, types of physical activity, muscle strengthening exercises |
| 8 | Support networks and final evaluation | Identify support networks and final evaluation of the strategy |

## Materials and Methods

An educational intervention study before and after was carried out in the Family Medicine Unit #32, of the Instituto Mexicano del Seguro Social (IMSS), located in Nuevo Leon, Mexico; in patients which were selected by a consecutive sampling techniques; that met the following inclusion criteria: any age, with OSA, any sex, that accepted and signed an informed consent; patients with neurological diseases were not included and eliminated those who did not complete the educational intervention or those with incomplete information.

The following data was obtained directly from the patients or medical records: age, sex, marital status, occupation, comorbidities, alcoholism, smoking, use of hypnotics, anatomical airway alterations, cervical perimeter, abdominal perimeter, nutritional status, apnea index, excessive daytime sleepiness and adherence to CPAP. The procedure for the data collection was as follows: age was calculated in years according to the year of birth; sex was determined by the phenotype characteristics of each individual; marital status was expressed by each patient; occupation, alcoholism and smoking were determined by asking directly to patients; comorbidities, anatomical airway alterations and use of hypnotics were recollected from medical records; nutritional status, cervical and abdominal perimeter were measured with a Braunker weighing machine model YP200CBMI and a Hergom tape measure; the apnea index and adherence to CPAP was evaluated with the monthly report of each patient and excessive daytime sleepiness was determined with the Epworth test which classifies patients into three categories, normal sleep (1-6 points), medium somnolence (7-8 points) and abnormal somnolence (9 or more). The educational intervention was divided into eight sessions (Table 1), with small groups, each session lasted 60-90 minutes once per week.

The recollected data was integrated into data collection sheets and analyzed using the EPI-INFO program version 7, 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, the Wilcoxon test was used to determinate statistically significant differences between the groups before and after the educational intervention. 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 #32, with registration number R-2019-1909-028.

## Results

We analyzed a sample of 119 patients, of whom 36 (30%) were women and 83 (70%) men. The mean age was 58.2 ± 12.3 years. According to marital status, 8% were single, 6% free union, 84 were married and 2% widowers. The most frequent occupation was employed (49%). The most frequent comorbidities were the following: diabetes 39% (n= 46), arterial hypertension 60% (n= 71), obesity 48% (n= 57), smoking 21% (n= 25), alcoholism 20% (n= 24), use of hypnotics 21% (n= 25) and metabolic syndrome 11% (n= 13). Anatomical alterations were deviation of nasal septum 11% (n= 13), tonsillar hypertrophy 33% (n= 39) and large uvula 13% (n= 15).

Within the pre-intervention clinical characteristics (Table 1), cervical circumference of low probability was reported in 48% (n= 57), high-risk abdominal circumference in 76% (n= 90) and overweight in 33% (n= 38) of the participants. The grade I apnea/hypopnea index had a frequency of 92% (n= 108) and grade II with 9% (n= 11). In the Epworth index, 88% obtained a score classified as normal (n = 105), in the adherence to CPAP, a correct use (100%) was reported in 60% (n= 71) of the patients. In the post-intervention clinical characteristics (table 1), cervical perimeter of low probability was reported in 55% (n= 66), high-risk abdominal perimeter in 75% (n= 89) and 34% overweight (n= 40). The grade I apnea/hypopnea index had a frequency of 92% (n= 110) and grade II with 8% (n= 9). In the Epworth index, 96% obtained a score classified as normal (n= 114), in the adherence to CPAP, a correct use (100%) was reported in 67% (n= 80) of the patients.

## Discussion and Conclusion

The most important finding of the research was an improvement in the clinical variables with the educational intervention. In the present study the scale of excessive daytime sleepiness (Epworth) was used, as well as the apnea/hypopnea index reported by the CPAP. There were a greater number of male participants which is similar to that reported by De la Paz [4]. In Mexico, despite not having exact data on the prevalence of OSA, Guerrero and Hidalgo [7-8] report a higher prevalence in men.

In the comorbidities found, arterial hypertension and obesity were reported more frequently, which is similar to that described by Guerrero [7], who mentioned OSA as an independent risk factor for presenting cardiovascular risk and metabolic syndrome. In the clinical characteristics collected before and after the intervention, there was an 8% increase in cervical circumference of low probability, a 0.84% decrease in cervical circumference of moderate probability and finally

**Table 2:** Baseline characteristic of patients before and after intervention.

| | Pre-intervention | | Post-Intervention | | |
|---|---|---|---|---|---|
| **Variable** | **n** | **%** | **n** | **%** | **p** |
| **Cervical perimeter** | | | | | |
| Low probability | 57 | 48% | 66 | 55% | |
| Moderate probability | 41 | 34% | 40 | 34% | >0.05 |
| High probability | 21 | 18% | 13 | 11% | |
| **Abdominal perimeter** | | | | | |
| Low risk | 7 | 6% | 10 | 8% | |
| Moderate risk | 22 | 18% | 20 | 17% | >0.05 |
| High risk | 90 | 76% | 89 | 75% | |
| **Body mass index** | | | | | |
| Normal | 30 | 26% | 34 | 29% | |
| Overweight | 38 | 33% | 40 | 34% | |
| Obesity grade 1 | 25 | 22% | 28 | 24% | >0.05 |
| Obesity grade 2 | 13 | 11% | 7 | 6% | |
| Obesity grade 3 | 9 | 8% | 8 | 7% | |
| **Apnea index** | | | | | |
| Grade I | 108 | 92% | 110 | 92% | |
| Grade II | 10 | 8% | 9 | 8% | >0.05 |
| **CPAP (100% use)** | | | | | |
| Yes | 71 | 60% | 80 | 67% | |
| No | 48 | 40% | 39 | 33% | <0.05 |
| **Epworth scale** | | | | | |
| Normal | 105 | 88% | 114 | 96% | |
| Marginal somnolence | 7 | 6% | 4 | 3% | <0.05 |
| Excessive somnolence | 7 | 6% | 1 | 1% | |

n= frequency, %= percentage, p=Wilcoxon test.

a 7% decrease in those with high probability. This means that there was a decrease in cervical circumference after the intervention.

In abdominal circumference, there was an increase in abdominal circumference of low risk of 3%, the moderate risk decreased 2% and the high risk decreased 1%. The body mass index remained stable, with no significant changes. In the objective and subjective variables of disease control, it was found that the apnea index remained the same before and after the intervention but the excessive daytime sleepiness measured with the Epworth scale had variations of 3% and 5% for marginal and excessive respectively. Finally, adherence to CPAP showed a greater use in post-intervention measurement.

Our study had as a limitation in the second measurement of the variables (post-intervention), this measurement was made at the end of the last session, but it would be interesting to track the participants at 6, 12, 24 and 36 months, which it would allow verifying the validity of the educational strategy. Despite this limitation, improvement of the clinical characteristics of post-intervention participants, such as cervical and abdominal circumference, was observed. Despite not having found a significant decrease in BMI in the participants, there was a decrease in weight, which supports the need for long-term follow-up to know the impact of the educational strategy. This research highlights the importance of making a timely diagnosis and management of obstructive sleep apnea syndrome through educational strategies such as the one implemented in this study, as well as preventive actions that help reduce the prevalence of this condition.

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