Original Article

Acupuncture and appetite in obese employees of a university hospital*

Acupuntura e apetite de trabalhadores obesos de um hospital universitário

Acupuntura y apetito de trabajadores obesos de un hospital universitario

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ABSTRACT

Objective: To evaluate the behavior of the sensation of hunger of the subjects before, during and after the intervention of acupuncture. **Methods:** A descriptive exploratory study. Data collection occurred in a university hospital in Maringá - PR, between July and October 2009, with 37 obese workers, who received eight weekly sessions of acupuncture. For measuring appetite, we used visual analogue scales. **Results:** It was demonstrated that the behavior of appetite in relation to satiety, fullness, desire for sweet and palatable food changed during the intervention. There was no reduction in weight or body mass index of subjects, however there was significant reduction in waist-hip ratio (p = 0.02) and control of the habit of using comfort food. **Conclusion:** The study findings contribute to the formation of the body of knowledge of acupuncture directed toward workers' health, especially in aspects related to obesity, its comorbidities, and trigger factors.

Keywords: Acupuncture; Apetite; Obesity; Occupational health; Nursing

RESUMO

Objetivo: Mensurar o comportamento da sensação de apetite dos sujeitos antes, durante e após a intervenção de acupuntura. **Métodos:** Estudo descritivo exploratório. A coleta de dados ocorreu em um hospital universitário em Maringá - PR, entre julho e outubro de 2009, com 37 trabalhadores obesos, que receberam oito sessões semanais de acupuntura. Para mensuração do apetite, foram utilizadas as Escalas Visuais Analógicas. **Resultados:** Demonstraram que o comportamento do apetite em relação à saciedade, plenitude, desejo por alimentos doces e palatáveis sofreu modificações durante a intervenção. Não houve redução de peso ou índice de massa corpórea dos sujeitos, contudo observou-se redução significativa na razão cintura-quadril (p=0,02) e controle no hábito de consumir alimento consolo. **Conclusão:** Os achados do estudo podem contribuir para a formação do corpo de conhecimento da acupuntura voltada à saúde do trabalhador, sobretudo nos aspectos relacionados à obesidade, suas comorbidades e fatores desencadeantes.

Descritores: Acupuntura; Apetite; Obesidade; Saúde do trabalhador. Enfermagem

RESUMEN

Objetivo: Mensurar el comportamiento de la sensación de apetito de los sujetos antes, durante y después de la intervención de acupuntura. **Métodos:** se trata de un estudio descriptivo exploratorio. La recolección de datos se llevó a cabo en un hospital universitario en Maringá - PR, entre julio y octubre del 2009, con 37 trabajadores obesos, que recibieron ocho sesiones semanales de acupuntura. Para la mensuración del apetito, fueron utilizadas las Escalas Visuales Analógicas. **Resultados:** Demostraron que el comportamiento del apetito en relación a la saciedad, plenitud, deseo de alimentos dulces y agradables al paladar sufrió modificaciones durante la intervención. No hubo reducción de peso o índice de masa corporal de los sujetos, con todo se observó reducción significativa en la razón cintura-cadera (p=0,02) y control en el hábito de consumir alimento consuelo. **Conclusión:** Los hallazgos del estudio pueden contribuir a la formación del cuerpo de conocimientos de la acupuntura volcada a la salud del trabajador, sobre todo en los aspectos relacionados a la obesidad, sus comorbidades y factores desencadenantes.

Descriptores: Acupuntura; Apetito; Obesidad; Salud laboral; Enfermería

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INTRODUCTION

Obesity is a chronic illness that until recently was considered a problem exclusive to developed countries. It has displayed an exponential growth in underdeveloped countries though, mainly in urban centers, turning into a true global pandemic[1].

This disease is diagnosed through the calculation of the body mass index, obtained by dividing weight (kg) by square height (m). Individuals with a BMI between 30 and 40 are considered obese and, the higher the index, the higher the risk of comorbidities, such as: cardiovascular diseases, Diabetes *mellitus*, bone-muscle disorders, among others[1].

Another disease risk indicator associated with obesity is the waist-hip ratio (WHR), which indicates body fat distribution, especially abdominal fat, of greater mortality and morbidity risk. The WHR is obtained by dividing the waist by the hip circumference. If higher than one for men and 0.85 for women, the risk for cardiovascular diseases is considered present[2].

Still without a defined primary cause, obesity involves multiple factors[3] and can be provoked by the increased intake of caloric foods or decreased physical exercise; it will definitely result in a calorie unbalance though, as more calories are consumed than spent.

The brain influences this metabolic mechanism, more specifically in the hypothalamus area, where the structures associated with hunger, eating and satiety processes are located[4]. This region is also responsible for motivation and reward mechanisms, which affect awakening, sleeping and addiction habits[4], which can influence eating behavior. Studies demonstrate that the desire for sugar-rich foods is associated with opioid receptors[4], suggesting that, when someone likes to eat and wants to eat, these feelings are mediated by dopamines and endogenous opiates[5]. This process is evidenced through the consumption of comfort food, very frequent among women and triggered by negative feelings, which later precipitate feelings of guilt. Foods with high levels of sugar and fat are more effective to mitigate these negative feelings during consolation episodes[4].

When transferring this problem to the hospital environment, it is highlighted that work activities developed in this context share characteristics inherent in the healthcare work process, which can provoke physical and psychic suffering, aggravating the risk for obesity. Factors like long work journeys, an insufficient number of human resources and lack of professional acknowledgement[6] can trigger or result from excess weight. It is certain that these problems should be prevented and solved in order to guarantee a better quality of life for these workers. A study accomplished at an Argentinean regional hospital, for example, revealed 24.3% of obesity among nursing team workers[7].

Health professionals should make sure to act in the control of this problem cycle marked by psychic suffering, which leads to *comfort* food behavior, which provokes overweight which, in turn, generates further psychic suffering and other health problems. In that sense, nurses play a crucial role in care for these patients, acting during primary care or periodical occupational consultations. Educative information on physiopathology and diet, physical exercise and lifestyle change orientations need to be part of these people's treatment, independently of the disease's severity. Then, community action is needed with a view to health promotion and prevention, clarifying the risks of obesity, besides acting in treatment, controlling signs of risk for other comorbidities and orienting the multiprofessional team and patients on other treatments that can be used[3].

Thus, nurses with a specialist degree in Acupuncture[8-9] can contribute to the reduction of these symptoms, using this technique as yet another care strategy for individuals going through this process. This professional nursing activity is based on the Ministry of Health's Integrative and Complementary Practice Program, which recommends Acupuncture as treatment for different health problems; as well as in the creation of Family Health Support Groups, allowing nurses to apply this technique in a safe, effective and autonomous way[9].

Acupuncture treatment originates in Traditional Chinese Medicine, which has been widely applied in the West due to its easy application, low cost and disbelief in allopathic treatments[10]. Electro acupuncture, then, a variation of the technique associated with electrical stimuli, has been widely applied in weight loss research. Evidence exists that its use affects appetite suppression by increasing the serum levels of serotonin in the central nervous system and by activating the satiety center of the hypothalamus[11]. Reports exist that both systemic and ear acupuncture effectively brought about weight loss in obese people[12]. Besides its anxiolytic effects, this technique has also demonstrated its effectiveness in cholesterol control and reduction[13].

It is important to remember that anxiety strongly influences the appetite of overweight people, and that handling this problem is complex and demands multiprofessional care, including medication, nutritional, psychological and habit re-education treatments[3].

It is sometimes difficult to establish whether anxiety is the cause of the increased appetite that leads to obesity, or whether it precedes this emotional imbalance. For the sake of this research, by isolating the first hypothesis as true, it is inquired whether this process can be interrupted through Acupuncture use. Thus, the aim of this study was to measure the subjects' appetite sensation behavior before, during and after an acupuncture intervention.

METHODS

A descriptive and exploratory study with a quantitative approach was developed at the *Hospital Universitário de Maringá*-PR (HUM) between July and October 2009. The sample comprised 37 obese workers, randomly selected based on a population of 526 employees, 110 (20.9%) of whom displayed obesity.

The sample was calculated in view of a 20.9% pilot prevalence, 90% confidence, 10% error and 30% margin for losses and replacements, preserving the same proportions found in the pilot population regarding the participants' gender.

Study participants were workers with a Body Mass Index (BMI) ranging between 30 and 40 and with cognitive skills to individually complete the research instruments. Exclusion criteria were the use of anticoagulants or suffering from a severe illness, but none of the workers were excluded as a result of these criteria.

The study variables included the participants' identification data and socio-demographic characteristics; anthropometric data about weight, height, body mass index, waist and hip circumference; and subjects' appetite behavior before, during and after the intervention.

Weight was verified on manual anthropometric scales with capacity of up to 150 kg, with 100 g divisions, available at the HUM Outpatient Clinic. Height was measured using the stadiometer attached to the scales, with a 200 cm range and 0.5 cm divisions. Waist and hip circumferences were verified using a plastic metric tape with millimeter divisions and a total length of 150 centimeters. All data were collected according to World Health Organization recommendations[2].

The Visual Analogue Scales (VAS) of Appetite used in this study were separate, 100-millimeter horizontal lines without divisions. Seven VAS were used to measure hunger and satisfaction behaviors, capacity to eat more and preference for sweet, salty, tasty and fatty foods.

On top of each scale, a question was displayed and, below, its answers, characterized by words placed at each end of the line, which described extreme and opposite ideas. The subjects were supposed to mark on the line what best corresponded to their feelings, followed by the quantification of the resulting distance between the extreme left end of the line and the mark[14].

In this study, the VAS used were grouped in a booklet, which the participants received during the first interview, together with orientations for their completion twice a day, always one hour after lunch and dinner, on preset days. The orientation was to mark on the line what the subject was feeling at that moment. To avoid confusion and forgetting to complete the scales, yellow paper sheets were used for daytime/lunch and blue ones for nighttime/dinner.

Every week, the researcher defined and wrote down the completion date so as to avoid mistakes. In the pre-intervention phase, the VAS had to be answered on three different days, at four-day intervals.

During the intervention, the subjects gave their answers twice per week, on the first and fourth day after the acupuncture session. The date was specified based on a study with rats that aimed to check appetite suppression through electro acupuncture, which verified that the appetite suppression effect was an immediate response that took up to 24 hours, using a 2Hz frequency[12].

In the post-intervention phase, the subjects answered the VAS on six dates, at four-day intervals, starting on the day after the final interview, which took place one week after the eighth and last acupuncture session. This period was longer than the pre-intervention period to determine the duration of the acupuncture treatment's effect on the participants' appetite.

During the intervention phase, the subjects received weekly electro acupuncture and ear acupuncture applications for eight weeks. The electro acupuncture sessions took 30 minutes, in square wave, at a frequency of 2Hz and 3V, one-second intervals, with the intensity adjusted to the patient's tolerance. Two 0.25X30mm Dongbang® needles were placed on the head: one on the *Baihui* (VG20) point, directed towards the forehead and connected with the cathode (black electrode); and the other on the *Yintang (MCP3)* point, directed towards the nose tip and connected to the anode (red electrode). Both points are indicated for anxiety[15] and were stimulated using an electro stimulation device at a frequency of 2Hz.

To apply the ear acupuncture, semi-permanent 0.15X1.5mm needles were applied to the ear points Shenmen, Hunger, Mouth, Anxiety 1 and 2, according to the Chinese School location[16], fixed with skin-colored tape. Benzoin tincture was also used to better fix the needles, removed and replaced by others each week, which were fixed on the opposite ear. A nurse with a specialist degree in Acupuncture and three years of experience performed both techniques.

For statistical analysis, Wilcoxon's non-parametric test for paired groups was used, in order to check for significant differences at 5% between median weight, BMI and WHR before and after the intervention. To compare the appetite score obtained from the VAS answers, Friedman's non-parametric ANOVA and its respective *Post-hoc* were used for multiple comparisons, if necessary[17].

This study followed the ethical guidelines of National Health Council Resolution No 196/96. Approval for the research project was obtained from the Ethics Committee at *Universidade Estadual de Maringá* (Opinion

No 094/2009). All participants signed two copies of the Informed Consent Term.

RESULTS

The intervention started with 39 participants, and one man and one woman dropped out before the end of the intervention, alleging personal reasons. Thus, 37 workers participated in the study, according to the identification characteristics (Table 1).

Participants' ages ranged between 32 and 67 years, with a mean 45.24 and standard deviation ± 8.20. As for marital status, 31 were married or lived with a fixed partner, three were single, two separated and one widowed.

Participants had different functions at the institution, with two nurses and 35 secondary-level and technical workers. Ten of these were nursing technicians, while the remaining 25 worked as operational cleaning aid (5), operational laundry aid (5), maintenance worker (4), administrative technician (4), and telephone operator, safety agent, driver, operating kitchen aid, cook, milk-bank technician and radiology technician (one each).

Weight was higher for men than for women, in line with BMI and WHR levels. Only the female gender demonstrated risk for cardiovascular diseases though, according to the WHR standard. The median BMI in this sample could be ranked as type I obesity, determinant for moderate risk of developing the comorbidities associated with overweight.

For this sample, a downward trend in median weight and BMI was observed, inversely proportional to age.

The median weight for the group of non-married participants before the acupuncture was six kilos higher than that of the married ones, which decreased to three kilos after the intervention.

As for the shifts, it was verified that, before the intervention, weight levels were the highest among afternoon-shift workers, followed by full-time workers. After the acupuncture, these positions switched ranks, as weight increased in both groups.

No decrease in weight and BMI was observed in the study group when comparing levels before and after the intervention. A median drop of two tenths in the workers' WHR was observed though after the acupuncture intervention.

A significant difference (p=0.02897) was verified between the median waist-hip ratios before and after the acupuncture. The same was not perceived for weight (p= 0.0611) and BMI (p=0.0740) data though.

Regarding the Visual Appetite Scales, no significant difference among after-dinner scores was found during the weeks before, during and after the intervention for all VAS, except on the 3rd VAS, related to the feeling of fullness. This scale showed a significant drop (p=0.015) when comparing the pre-intervention week with the 8th and last acupuncture week, only for the 4th day after the application.

When comparing the scores obtained on the first and fourth day of each application week, answered after dinner, significant differences were found during the 5th week for the 1st VAS (p=0.009) and during the 6th week for the 2nd VAS (p=0.032), 4th VAS (p=0.02) and 6th VAS (p=0.004).

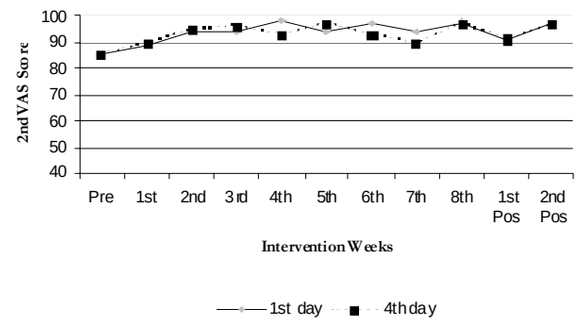
Data in Pictures 1 to 4 display the evolution in the median VAS scores.

The comparison of VAS scores answered after lunch showed no significant differences among the pre, during

Table 1 – Study subjects according to study variables before and after acupuncture. Maringá-PR, 2009.

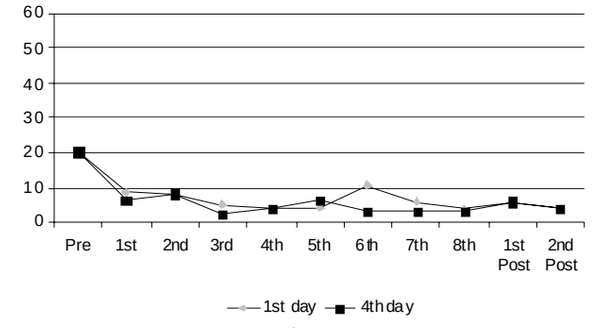
Variables	n	%	Median weight		Median BMI		WHR	
			Before	After	Before	After	Before	After
Gender								
Male	11	29.73	95.70	97.00	33.89	33.78	0.98	0.97
Female	26	70.27	79.65	79.90	33.11	33.22	0.91	0.89
Age range								
30|-40	26	70.27	94.10	95.00	34.30	34.63	0.93	0.89
40|-60	10	27.03	82.83	82.90	33.11	33.26	0.95	0.93
≥60	1	2.70	70.00	69.60	30.70	30.52	0.94	0.93
Marital status								
Married	31	83.78	83.30	86.40	33.08	32.89	0.94	0.93
Non married	6	16.22	89.30	89.10	34.00	33.78	0.95	0.94
Work shift								
Morning	10	27.03	82.25	82.25	32.97	33.16	0.94	0.93
Afternoon	10	27.03	89.60	90.05	32.40	32.68	0.92	0.92
Night	6	16.21	80.35	78.90	33.21	33.16	0.88	0.87
Full-time	11	29.73	86.60	92.30	33.89	33.94	0.99	0.96
General	37	100.00	85.70	86.40	33.14	33.55	0.91	0.93

and post-intervention periods for the 5th and 7th scales. The comparison between the pre-acupuncture week and the intervention weeks did show a significant difference, though, for the 1st VAS on the 4th day of application during the 6th week (p=0.045); for the 2nd VAS on the 1st (p=0.020) and 4th (p=0.044) days during the 8th week; for the 3rd VAS on the 4th day (p=0.049) during the 3rd, 5th and 6th weeks; for the 4ª VAS on the 4th day (p=0.018) during the 5th and 8th weeks; and, finally, for the 6ª EVA, on the 1st day (p=0.006) during the 6th week and on the 4th day (p=0.007) during the 5th and 6th weeks.



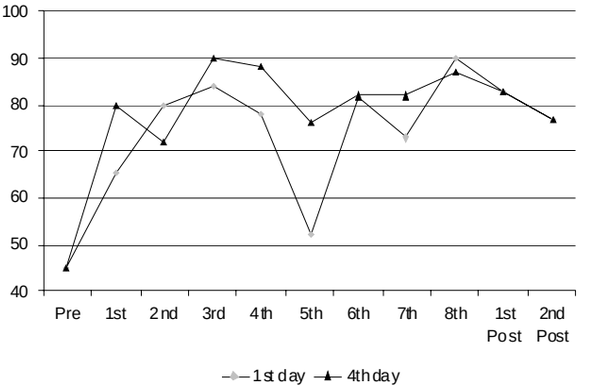
Picture 1 – Median of 2nd VAS (satiety) scores after lunch and intervention weeks in obese health workers. Maringá-PR, 2009.

No significant difference appeared when comparing the scores for the 1st and 4th days after the weekly acupuncture sessions, except for the 4th and 6th VAS. For the 4th VAS, significant differences were found during the 2nd (p=0.039), 4th (p=0.024) and 7th (p=0.037) weeks. For the 6th VAS, differences were significant during the 1st (p=0.017) and 5th (p=0.016) weeks.

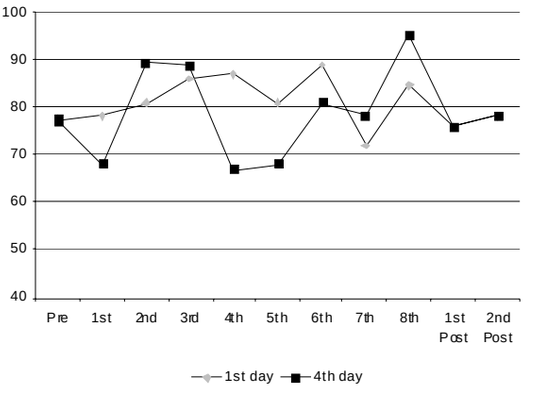


Picture 2 – Median of 3rd VAS (fullness) scores after lunch and intervention weeks in obese health workers. Maringá-PR, 2009.

The differences in the scores measured on the same days were also analyzed, comparing data obtained after lunch and dinner, but these were not significant for the 3rd, 5th and 7th VAS. For the 1st VAS, a difference was found on the 1st day (p=0.032), after the 8th application week; for the 2nd VAS, on the 4th day (p=0.036) of the 7th week; for the 6th VAS, on the 4th day of the 6th week (0.021); and, finally, for the 4th VAS, on the 1st (0.046) of the 1st weekly session, and on the 1st (p=0.029) and 4th day (p=0.027) of the 6th week.



Picture 3 – Median of 4th VAS (Desire for sweets) scores after lunch and intervention weeks in obese health workers. Maringá-PR, 2009.



Picture 4 – Median of 6th VAS (Desire for tasty foods) scores after lunch and intervention weeks in obese health workers. Maringá-PR, 2009.

DISCUSSION

These study data demonstrated significance when comparing appetite behavior before and during acupuncture, mainly regarding satiety, fullness and desire for sweet and tasty foods. The analysis of VAS data related to the desire for salty or fried foods observed a downward trend in the desire for these types of food. First, salty foods are not the preferred option as comfort food[4]; fried food is notoriously harmful for health and, as its bad effects are widely disseminated in the media, bias can be created due to the feeling of self-control to avoid these foods[18].

The eating-for-pleasure or eating-for-comfort mechanism is mediated by neurotransmitters that act in brain structures involved in creative, cognitive, emotional and reward processes[4], the so-called endogenous

opioids, and electro acupuncture applied at 2Hz triggers the production of these substances, including enkephalins and a-endorphins[19].

Studies demonstrating the efficacy of acupuncture to achieve weight loss are not rare in current scientific literature, but many involve animals, making it impossible to check the results when using the same methods in human beings. To give an example, ear acupuncture applied to rats led to neural activity alterations in the hypothalamus, reducing it in the lateral nucleus of the hypothalamus, considered the "nutrition center"; and increasing it in the ventromedial nucleus of the hypothalamus, considered the "satiety center"[20].

In another study that also involved rats, these were induced to obesity and later submitted to electro acupuncture three times per week, during four weeks, without any diet restriction. The obtained result was the significant drop in body weight through the reduced food intake, which only occurred on those days when electro acupuncture was applied, suggesting that the effect of this technique on appetite suppression only lasts 24 hours[12].

The present study data, on the opposite, demonstrated significant differences in appetite levels on the 4th day as well after the acupuncture application. Even when supposing that the acupuncture effects only lasted 24 hours, the results found permit inferring that the effect was prolonged due to the effect of the ear acupuncture, which was only removed during the next week, on the day of the next application, producing a continuous effect on the satiety feeling and desire for *comfort food*.

The significance levels found were important but scarce. More consistent findings were expected when comparing the scores obtained during the pre-acupuncture week with the other intervention weeks and also with the post-intervention weeks. The appetite feeling or sensation and desire for different types of flavors and foods is very subjective and hard to define or quantify, mainly in a small sample and, besides, they can be influenced by physiological and psychological variables, physical exercise, temperature and climate[14].

Visual Analogue Scales were chosen, which are frequently used to measure subjective feelings. VAS present good reliability and validity levels, as they are sensitive to experimental manipulations in intra-subject designs[21], i.e. designs in which the subject is considered its own control, like in the case of this study. In experimental studies aimed at measuring the motivation to eat, these instruments provide further information than the simple measurement of the diet consumed[21]. During the literature review, no instrument was found that had been validated for the Portuguese language and attended to the study aims. Thus, an English VAS was adopted[14], applied to examine the replicability and validity of the VAS to measure appetite feelings by testing foods for diet research purposes.

During this study, one limitation was the repeated application of the VAS, which may have caused completion bias, due to the participant's lack of attention and strict completion dates and times[18]. Another limiting factor was some participants' differentiated routine, due to their work shift, with great flexibility in meal times[22].

The method allowed participants to eat as usual, without any diet restrictions. None of them indicated changed routines during the intervention. Therefore, it was interpreted that nutritional behavior changes were actually due to the acupuncture, except for those variables beyond the researcher's control, such as exposure to stress agents or climate for example.

In China, a similar study was conducted without diet restrictions, involving 16 overweight people who received electro acupuncture at 2Hz, three times per week, for 12 weeks, on different body points. Body weight gradually dropped by up to 2.78% when compared with the original weight; four weeks after the treatment had been interrupted, weight gain was observed in 37% of subjects. When the intervention was restarted, during the next 15 weeks, again, weight loss was observed, corresponding to 3.9% of pre-treatment weight[12].

Differently from these results, in the present study, participants showed no weight or BMI reduction, suggesting that the acupuncture was not effective to achieve patients' weight loss and BMI reduction. It is highlighted that the acupuncture points used were indicated for anxiety and appetite control and not for weight loss. Thus, this study did not aim to check the effect of acupuncture on anthropometric alterations, which were only used as indirect indicators of improvements in the participants' quality of life.

CONCLUSION

The results demonstrated that appetite behavior regarding satiety, fullness, desire for sweet and tasty foods was modified before and during the intervention. No reduction occurred in the subjects' weight or body mass index, but a significant drop in the waist-hip ratio was observed.

The frequent and repetitive application of the visual appetite scale and the subjects' different meal times were limiting factors to interpret these study variables.

For this sample, acupuncture effectively controlled the obese workers' appetite, mainly regarding *comfort food* consumption habits, preferably sweets.

Acupuncture can be adopted as a nursing care strategy for these workers, especially in the hospital environment, which already has all physical and material resources

needed for its application. Besides, this technique is low-cost, entails minimal contamination or infection risks and has practically no side effects, as evidenced by its good acceptance, despite lack of previous knowledge on this treatment.

Thus, it can be concluded that the electro acupuncture and ear acupuncture interventions used in this study are practices that can be properly put in practice, whether at public or private, hospital, business or commercial institutions; with a view to improving their obese workers' quality of life. Hence, nurses specialized in Acupuncture can act at the three prevention levels to avoid the establishment of overweight, as well as to eliminate or control the signs and symptoms associated with such a prevalent morbidity nowadays.

It is highlighted that, although Acupuncture has been a Nursing specialty for at least one decade, scientific knowledge nurses produce remains below its potential. When using this technique or even monitoring its benefits in a multidisciplinary group, it is important to report the results for the construction of a specific body of knowledge on Acupuncture and nursing care. This process can reinforce nursing professionals' action in line with the proposal of the National Integrative and Complementary Practice Program, expanding its activity area in an autonomous, safe and effective way, entailing acknowledgement and professional satisfaction for nurses and wellbeing for patients.

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