



CLÍNICA

Effects of an intervention on line in self-care feeding behavior

Efectos de una intervención on line en conductas de autocuidado asociadas a la alimentación

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Palabras Clave: Alimentación escolar; sobrepeso; obesidad; autocuidado; conducta alimentaria..

ABSTRACT

Results of the project "Prevention of overweight and obesity in Chilean school children: A bet on the enterprising capacity of children" (FONIS SA10I20016), in response to the question: Is it possible to help change behaviors associated with overweight and obesity through an intervention designed for this purpose?

Material and Methods: A quasi-experimental study in 5th and 6th grade children of primary municipal schools, La Pintana, Metropolitan Region, Chile. After obtaining informed consent, 6 schools were selected by random cluster sampling for the study group n = 442 and 6 schools for control group n = 328. The intervention, with software supported in Web page, was performed according to the auto diagnostics of behaviors associated with feeding, identified with the Moore-Child Nutrition Index (MIN-C ©) instrument. The analysis of results used parametric tests with R 2012.

Results: There is a positive effect of number of times entered to the website on behaviors observed in the post test compared with the pretest in the intervention group.

Conclusion: The effect of the intervention was statistically significant for the studied behaviors, in children who used the software 8 times or more.

RESUMEN

Resultados del proyecto “Prevención del sobrepeso y de la obesidad en escolares chilenos: Apuesta a la capacidad emprendedora de los niños” (FONIS SA10I20016) en respuesta a la interrogante: ¿Es posible contribuir al cambio de conductas asociadas a sobrepeso y obesidad a través de una intervención diseñada para este fin?

Material y Métodos: Estudio cuasi experimental en niños/as de 5º y 6º año básico de colegios municipalizados, comuna La Pintana, Región Metropolitana, Chile. Previa obtención de consentimiento informado, se seleccionaron mediante muestreo aleatorio por conglomerado 6 colegios para grupo estudio n=442 y 6 colegios para grupo control n=328. La intervención, con apoyo de software en página Web, se realizó en función del auto diagnóstico de conductas asociadas a la alimentación, identificadas con el instrumento Moore Index Nutrition-Child (MIN-C©), diseñado de acuerdo al marco conceptual de la Teoría de Déficit de Autocuidado de Dorothea Orem. El análisis de resultados utilizó pruebas paramétricas con software R 2012.

Resultados: Existe efecto positivo del número de ingresos al sitio web sobre las conductas observadas en el post test comparadas con las del pretest en el grupo intervenido.

Conclusión: El efecto de la intervención fue estadísticamente significativo para las conductas estudiadas, en los niños/as que utilizaron el software 8 y más veces. El marco teórico de Orem permite el diseño de una intervención dirigida a motivar el cambio de conductas asociadas a una alimentación saludable.

INTRODUCTION

In Chile, as in most parts of the world, the magnitude of overweight and obesity as public health problems is worrying. WHO states that its prevalence has increased at an alarming rate. It considered the epidemic of the century and one of the most serious problems of the XXI century public health; that is progressively affecting many low- and middle-income countries, especially in urban areas. Each time the proportion of overweight children living in developing countries is higher⁽¹⁻⁵⁾. In our country the problem started slowly over a quarter century ago and nutritional transition has occurred at high speed at all ages⁽⁶⁾. The current prevalence is higher than expected for 1st grade primary school students in health objectives of Chile from 2000 to 2010 and otherwise the problem increased from 16% in 2000 to 19% in 2008⁽⁷⁾ Within Latin America, Chile is one of the countries with the highest rate of overweight and obesity and where the increase has been significant⁽⁸⁾

The high prevalence rates of overweight and obesity worldwide can be interpreted as a failure of health policy and education. The sedentary lifestyles and inadequate feeding in quality and in quantity are considered social causes of obesity, which interact with the latent genetic conditions. The Foresight Report 2007, states that there is evidence and consensus that modern life has become the main trigger of obesity^(9,10). Recent research shows that environments and social networks contribute and affect obesity⁽¹¹⁾ As one of the suggestions to reverse the problem of overweight and obesity, Amigo suggests to establish national strategies for healthy life since childhood, where the change in diet and physical activity are key actions⁽⁸⁾

This work communicates results of Project “Prevention of overweight and obesity in Chilean schoolchildren: A bet on the enterprising capacity of children” Fonis SA10I20016⁽¹²⁾ designed to answer the question: Is it possible to help change behaviors associated to overweight and obesity through an intervention designed for this purpose? In it, in order to positively influence the prevention of this problem, we studied whether an intervention with active participation of students in 5th and 6th

grade of primary schools that involves teachers, contributed to change behaviors related to healthy eating.

The intervention, as a preventive action, contemplates the use of software embedded in a Web page. Through this, children self-assess their diet, plan and adjust their diet according to the recommendations, view graphically how close to the recommendations of macronutrients is their diet, so that they can correct it if necessary, and design plans for behavioral change through making commitments. The procedure is performed in function of auto diagnostics of self-care behaviors related to food, using the Moore-Child Nutrition Index (MIN-C ©) instrument designed by JB Moore, based on Dorothea Orem's conceptual framework: Theory of Self-Care Deficit; which has been applied in schoolchildren in USA, Nicaragua and Chile.^(13, 14, 15)

We worked for 15 weeks in the 12 municipal schools of commune La Pintana, with students of 6 of them as study group and 6 as a control group. This is one of the districts of the Metropolitan Region of Chile located in the southern area of Santiago; a commune that is considered of high social vulnerability. In this intervention, the role to be played by teachers as benchmarks and leaders in the strengthening and consolidation of healthy behaviors is essential to its success.

MATERIAL AND METHODS

Prospective quasi-experimental design with non-equivalent control group, cluster randomized, which saw schools as the unit of randomization. In the 12 municipal schools in the district of La Pintana, after obtaining informed consent from children and their parents, students of 6 of them (study group), with a total of 442 children, underwent intervention for 3-4 months and compared with 6 schools of similar characteristics (control group) with a total of 328 children. Before the intervention as preventive recourse, and with the support of an application embedded in a Web page called MeKuido, baseline measurements of nutritional status and self-care behaviors were performed. The measurement of nutritional status was performed according to Nutrition Assessment Standards for Children 6 to 18 years proposed by the Chilean Ministry of Health 2003⁽¹⁶⁾ This regulation proposes that evaluation indicators are: Body Mass Index for age and Height for Age; adjusted BMI value depending on the degree of pubertal development or Tanner stage. The measurement of behaviors associated with feeding was performed with the MIN-C © instrument validated in Spanish^(14, 17), which post intervention was applied again to measure its effect. 379 children of the study group and 300 of the control group answered the instrument in the post intervention application. Declining children is explained by school absences and retirement during the study period. This instrument was designed according to the conceptual framework of Self-Care Deficit Theory of Dorothea Orem^(13, 14) and contains three subscales: one of estimative operations, preferably measures the interest in obtaining information on the subject; other of transitional operations, preferably measures the intention to perform a certain action; and a third of productive operations, which measures the actions that are already running. The students, supervised by a teacher, worked for 15 weeks with MeKuido software, alternating with group sessions with the teacher.

To measure the effect of the intervention, a comparison of the behaviors studied intragroup and intergroup level was performed. To compare the average scores obtained in the full scale and at each of its subscales in both groups (intervened vs. control) and before and after the intervention, analysis of variance for repeated

measures in time were used, after verification of assumptions of the analysis, by Shapiro-Wilks normality tests and Levene homogeneity of variance tests ⁽¹⁸⁾. Because in the comparison of full scale and subscales differences observed intragroup were marginal, we searched to identify the effect of the number of times children used the website. Therefore, the study group was categorized in two new groups of children: those who entered less than 8 times to the website (insufficient entries) and those who entered 8 or more times (sufficient entries). Children with no entries to the web site were removed from analysis. Thus, the new group was composed of 289 children: 195 of insufficient entries group and 94 of sufficient entries group. The comparison between the two groups for the total scale and subscales measured before and after the intervention was performed using factorial analysis of variance 2x2 after verification of assumptions of the analysis, by Shapiro-Wilks normality tests and Levene homogeneity of variance tests ⁽¹⁸⁾. All statistical tests were performed considering an alpha value of 5% using the statistical software R, 2012 ⁽¹⁹⁾

Behaviors, as ordinal variable, were categorized as unhealthy behaviors if the score was 1 or 2 in Likert scale, and healthy when it was 4 or 5. For comparison of average obtained by questions before and after the intervention Student t test for paired samples was used.

The project "Prevention of overweight and obesity in Chilean school children: A bet on the enterprising capacity of children" (FONIS SA10I20016) was approved by the Ethics Committee of the School of Nursing at the Pontifical Catholic University of Chile.

Instrument:

The dependent variable self-care practices related to food was studied with Moore Index of Nutrition-Child (MIN-C) ⁽²⁰⁾ available in English and Spanish. It consists of 50 items on Likert scale with five possible answers, measuring frequency of behavior. Higher scores indicate practices associated with healthier eating. The reliability of the Spanish version adapted in Chile by authors of this project, had an alpha coefficient of .89 ⁽²¹⁾. In this paper results of the first 42 items considered for analysis as "full scale" with a perfect score of 210 points, including 13 items of estimative operations, 12 of transitional and 17 of productive operations forming the 3 subscales, were analyzed. The possible answers are never, rarely, sometimes, often and always. No results are included relating to the scale of 8 items that measures frequency of consumption of certain foods, because they have a different response category (never, once or twice a week, once a day, twice a day and 3 or more times a day).

RESULTS

Study group description

The baseline diagnosis was performed with 796 children. Of these, 52% were female and 48% male. Their ages ranged from 9 to 15 years, with an average of 11. The assessment of nutritional status showed that 43% of children were in normal range, 36% at risk of obesity similar in both genders, and 19% obese. Higher proportion of women was found to be obese, 21% vs. 17%. Only 2% of children were found under weight. Regarding self-care practices, baseline measurement showed that in most cases these were regular (90.6%). Only 20 children had healthy practices (2.5%) and 55 showed unhealthy (6.9%) practices. The average score obtained in the first 42

items of the scale MIN-C © was 132 points of a perfect score of 210, which represents 62.9%.

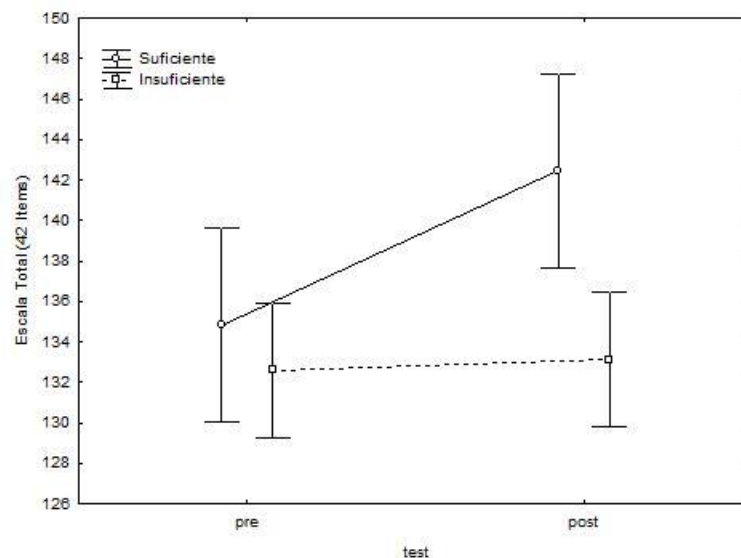
Comparison intervention group and control group

The analysis of variance for repeated measures both in the 42 items studied (full scale) of MIN-C © as the items of the 3 subscales that form it, shows that although there is a tendency to increase the score in the post test, the difference between the two groups (control vs intervened), is not significant because the probability value of factor groups is higher than 0.05.

Comparison intra intervention group

In the intervention group we can identify a positive relationship between the number of entries to the website and the difference in average scores between pre and posttest, but not strong enough to reach statistical significance. For this reason, the children were divided in two categories: Insufficient and sufficient entries. According to this new classification of the intervention group, 205 children were identified in the insufficient category and 94 children in sufficient category. When comparing both groups, significant differences in the total scale, and in each of the subscales were observed. For the full scale (42 items), the change rate is higher for the group of children listed as sufficient compared to the group listed as insufficient, statistically significant difference $F(1,574) = 7.62$; $p < 0.05$. No effect of time alone was evidenced between pre and posttest. (Figure 1)

Figure 1. Pre- and post-test comparison between groups with sufficient vs insufficient entries. Total scale (42 items)

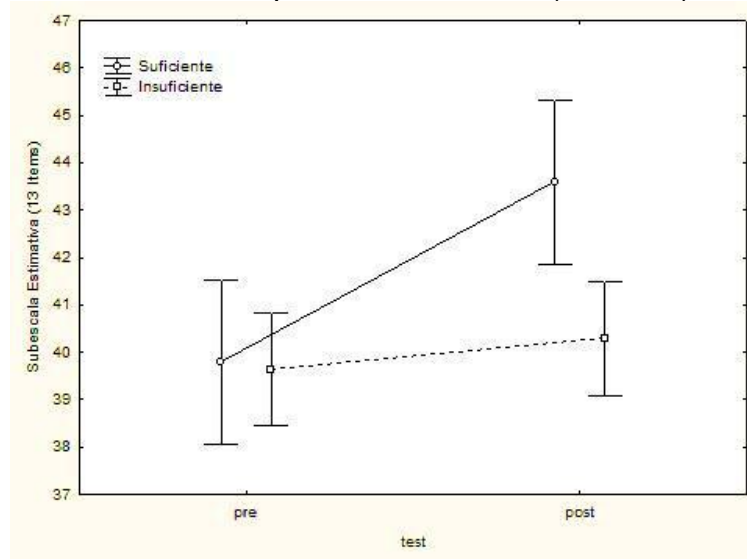


The bars indicate a confidence interval of 95%

For the scale of estimative operations (13 items), the time affected more strongly to Sufficient group, which in turn differs statistically from the Insufficient group. Significant differences in the interaction between time alone and the group are observed ($F(1,574) = 4.29$; $p < 0.05$), for level of entries (vs. Sufficient Insufficient) $F(1,574) = 5.18$; $p < 0.05$, as well as the effect of time between the pre and posttest $F(1,574) = 8.62$; $p < 0.05$. (Figure 2) Among the items in this subscale that showed a significant change

between the pre and posttest we can mention "I talk to my friends about which healthy foods to eat" (-2044 p t-value <0.05).

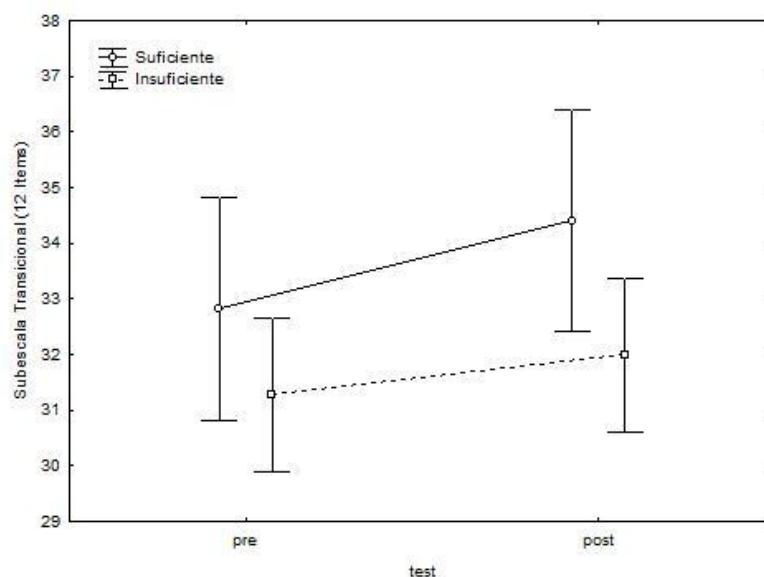
Figure 2. Pre- and post-test comparison between groups with sufficient vs insufficient entries. Estimative Operations subscale (13 items)



The bars indicate a confidence interval of 95%

For transitional operations scale (12 items) there is a tendency to increase in both groups (Sufficient vs Insufficient), but is higher in the group Sufficient and the differences between groups are significant ($F_{1,574} = 1.72, P < 0.05$). (Figure 3) Among the items in this subscale which showed a significant change between the pre and posttest we can mention the increased score on "I choose to eat foods that contain vitamins" (2375 t-value $p < 0.05$) and "I consider whether my meals have enough protein" (2894 t-value $p < 0.05$) and decreased score on "I drink soda instead of fruit juices" (1789 t p -value < 0.05), "I would choose to eat sweets instead of a piece of fruit" (2345 t p -value < 0.05).

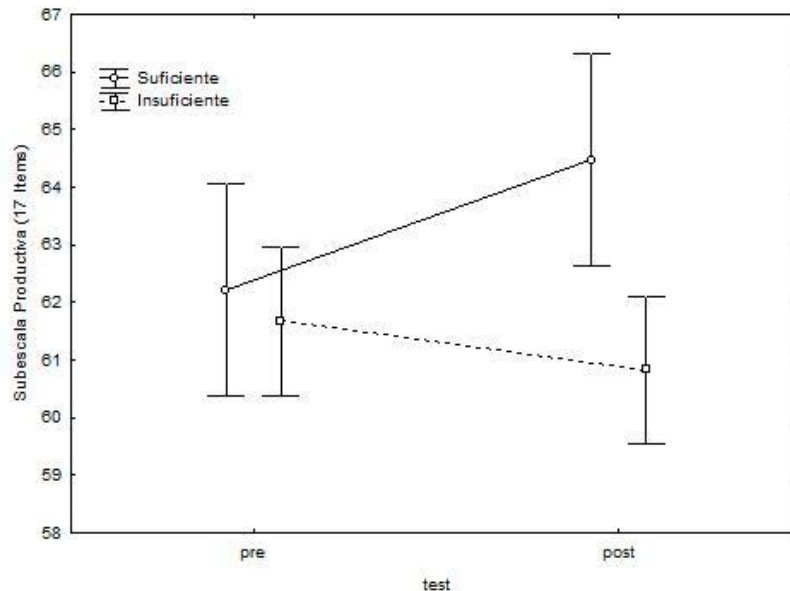
Figure 3. Pre- and post-test comparison between groups with sufficient vs insufficient entries. Transitional Operations subscale (12 items)



The bars indicate a confidence interval of 95%

For the scale of productive operations (17 items), statistically significant differences between groups ($F(1,574) = 669, p < 0.05$) was observed, whereas effect is not evidenced in time alone. (Figure 4) Among the items in this subscale which showed a significant change between the pre and posttest we can mention "I eat foods containing iron" (2375 t p-value < 0.05) and "I eat protein at every meal" (2044 t p-value < 0.05).

Figure 4. Pre- and post-test comparison groups sufficient vs insufficient entries. Productive Operations subscale (17 items)



The bars indicate a confidence interval of 95%

DISCUSSION

Feeding behaviors have deteriorated in recent years and the pursuit of strategies is needed to reverse this. There have been various interventions in schools to change eating habits and promoting physical activity to reduce the prevalence of obesity. Most of them focus on education in the subject and promotion of physical activity, and consist mainly of observational studies, with a short observation period, so it is hard to see results in terms of body mass index ⁽²²⁾. The behavioral change is essential to ensure any response to overweight and obesity component. However, it is a complex process that goes beyond education and information delivery. Changes in environment are needed to prevent unhealthy behaviors. Evidence suggests that strategies currently used are failing to obtain sufficient impact because they do not cover all the variables that influence ⁽⁹⁾. Most obesity treatments have proved ineffective and endure over time ⁽²³⁾. Therefore, given the difficulty in achieving behavioral changes in this area, the emphasis in addressing this problem should be on promoting healthy lifestyles and prevention. The innovation in this project is based on holistic learning models that include contextual, cognitive and affective factors; participation, and inclusion of media in the intervention.

This study provides information on the prevention of overweight and obesity in Chilean schoolchildren, focusing on the self-care practices or behaviors related to food and the ability of the children to modify them, rather than delivering educational content and practice physical activity. The basal diagnosis made through the MIN-C © showed that

children present practices that need to be improved. The result is similar to that found in a previous study conducted in our country to validate the instrument ⁽¹⁷⁾ and to that found by the author of MIN-C © in Washington DC ⁽²¹⁾. This shows the importance of continuing the search of the best strategies to change this situation.

Among the interventions that have been successfully performed for this purpose we can include: A study of two years' duration that conducted an educational intervention on healthy eating and physical activity as an extracurricular activity in schoolchildren of 5th and 6th grades in Spain, found a decrease in the increase of BMI, and favorable changes in eating habits in children of the study group compared with the control group ⁽²⁴⁾. Fahlman, Dake, McCaughtry and Martin found that the group of students with average age of 12 years, intervened with a Curriculum Model of Nutrition at Michigan, improved its knowledge post intervention, and subsequently had greater willingness to consumption of fruits and vegetables and less junk food than the control group, as well as greater confidence in consuming healthy eating ⁽²⁵⁾. A pilot study conducted in Washington by the author of MIN-C © instrument, studied the effect of a nutrition education program called Color My Pyramid, aimed at children of 4th and 5th grade. They analyzed knowledge, self-care practices, physical activity levels and nutritional status in a quasi-experimental study. The intervention used the online www.MyPyramid.gov component and D. Orem's theory of self-care deficit. The results showed an increase in knowledge of nutrition and physical activity in the period between pre and posttest ⁽²⁰⁾. In Chile, the Chilean Challenge Program for an Active Life was applied in schools of Casablanca, consisting of food and nutrition education using specific methodologies and educational materials, and physical activity in their daily work. While weight changes were significant in the first two years of follow up, the intervention was not sustainable over time ^(26, 3). Rajalakshmi Lakshman, Sharp, Ong and Forouhi developed a card game to teach nutrition to primary school children in Great Britain and showed that this game facilitates learning. They also found better habits in the study group than in the control group after the intervention of nine weeks⁽²⁷⁾

These different strategies that aimed prevention of overweight in schoolchildren are a sign that if incorporated as regular activities in educational establishments, positive results are obtained. The MeKuido strategy is one more of them, but it shows that if used systematically, in an entertaining and unsophisticated way, children are interested in the subject and make changes in their self-care practices. The challenge is to find ways in which the strategy is incorporated into educational curricula of schools.

The study had some important limitations such as: Removal of one school starting in 2011, so we counted with 12 schools instead of 13 as planned; the non-acceptance to participate in the study of a considerable number of children, along with the loss or lack of return of Informed Consent by children and parents, which reduced the sample size with which it was thought to work, but the power of the results was not affected; the lack of appropriate programming of teachers and managers limited the number of times children attended the computer room with their teachers, reducing to 94 the number of children that actually used the software 8 times or more, where a significant change was observed to favorable practices related to food.

In addition to the constraints, we identified as strengths of the study, on the one hand that the instrument used to measure self-care practices in children was easy to understand, and can be used to measure the effect of interventions to prevent

overweight and obesity in our country, and secondly that a simple and attractive software was designed with which children in schools of vulnerable sectors of the Metropolitan Region of Chile, can work without difficulty.

CONCLUSIONS

It is possible to contribute to changing behaviors associated with overweight and obesity in students from 5th and 6th grade of primary education in the district of La Pintana, Metropolitan Region of Chile, through an intervention with active participation of students and teachers involving, if the software designed for this purpose is used systematically, working on it at least 8 times.

The theoretical Orem's framework, by which the MIN-C © instrument is built on, allows the design of an intervention to motivate behavior change associated with healthy eating.

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