A specific nursing educational program in patients with cushing’s syndrome

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Abstract Cushing’s syndrome (CS) is a rare endocrine disease, due to cortisol hypersecretion. CS patients have comorbidities, often still present after biochemical cure. Specific nursing healthcare programs to address this disease and achieve improved health related quality of life (HRQoL) are lacking. Thus, an educational nursing intervention, through the development and promotion of specific educational tools, appears to be justified. The objective of this study is to assess the effectiveness of an educational nursing program in CS patients on HRQoL, clinical parameters, level of pain and physical activity, patterns of rest, and use of health resources. A prospective, randomized study was conducted in two reference hospitals. Sixty-one patients (mean age 47 ± 12.7 years, 83.6 % females) were enrolled and divided into 2 groups: an “intervention” group where educational sessions were performed over 9 months and a “control” group, without these sessions. Specific questionnaires were used at the beginning and end of the study. After educational sessions, the intervention group had a better score in the CushingQoL questionnaire (p < 0.01), reduced level of pain (p < 0.05), improved physical activity (p < 0.01) and healthy lifestyle (p < 0.001) compared to the control group. A correlation between the CushingQoL score and reduced pain (r = 0.46, p < 0.05), improved physical activity (r = 0.89, p < 0.01), and sleep (r = 0.53, p = 0.01) was observed. This educational nursing program improved physical activity, healthy lifestyle, better sleep patterns, and reduced pain in CS patients, influencing HRQoL and reducing consumption of health resources. Moreover, the brief nature of the program suggests it as a good candidate to be used in CS patients.

Keywords Cushing’s syndrome · Nursing · Educational program · Health-related quality of life

Introduction

Patients with cushing’s syndrome (CS) suffer from multiple comorbidities, mainly cardiovascular (hypertension, atherosclerosis, changes in heart functionality), and metabolic (dyslipidemia, central obesity, diabetes), as well as thrombotic disorders, bone disorders, cognitive and neuropsychological impairment, and impaired sexual function due to glucocorticoid (GC) excess [1–6]. The assumption that resolution of hypercortisolism normalized comorbidities is currently questioned, since
there is evidence that cured CS patients still have increased morbidity and mortality despite endocrine control [7–9].

Most patients with CS develop metabolic syndrome, which may persist after remission of hypercortisolism, contributing to increased cardiovascular risk and deserve to be treated according to common standard practice [7].

Awareness of this persistent increase in cardiovascular risk in CS patients after endocrine cure leads to strict control of improvable factors, including blood pressure, dyslipemia, hyperglycemia, smoking, obesity, and prothrombotic state [10].

There is ample evidence on the positive effect of educational nursing interventions in the management of each of the comorbidities described above [11–14]. Educational nursing interventions in chronic diseases like ischemic heart disease, rheumatoid arthritis, osteoporosis, diabetes, hypertension, etc., improve the outcome of these patients.

This sort of intervention reduces consumption of drugs, changes dietary habits, and physical activity, favoring a better self-management, increasing self-efficacy and self-care [11, 12]. Health education not only informs the patient and family about the disease but modifies their behavior by adopting new life habits, in order to actively manage their care [13–15]. Many studies confirm the important role of nurses in education of diabetic patients to improve dietary habits, control chronic diseases, and reduce cardiovascular risk [16–23].

Health-related quality of life (HRQoL) in patients with CS is also severely affected, especially in active disease [24], and still impaired after cure of hypercortisolism [25, 26]; this limits social activity of patients and may increase pain perception [27]. Since we were unaware of any educational program for patients with CS, we aimed to develop a specific nursing educational program, with specific educational tools. We investigated their outcome after following the program, in a prospective randomized study.

Patients and methods

Patients

Patients with CS of pituitary or adrenal origin followed in 2 reference centers [Hospital Sant Pau (HSP) and Hospital Clinic (HC)] were included in this multicenter, prospective, randomized study.

Patients who did not attend 100% of the educational program sessions and those who for cognitive reasons or psychiatric or neurological problems could not continue the education sessions were excluded. All patients signed an informed consent after study approval by the hospitals Ethics Committee.

Of the 137 patients treated in HSP and HC, 37 declined to participate. Of the remaining 100, 39 did not meet the inclusion criteria (30 did not accept to participate, and the remaining 9 patients had functional or psychiatric limitations). The final sample included 61 patients, 48 were of pituitary origin and 13 of adrenal origin.

Of the final sample, 45 were considered cured (repeatedly normal 24-h urinary-free cortisol, serum cortisol suppression after overnight 1 mg dexamethasone <50 nmol/L or adrenal insufficiency with hydrocortisone substitution therapy); 24 had undergone radiotherapy and nine suffered hypopituitarism. Sixteen were active, all on medical therapy with ketokonazole and eight also with metyrapone.

Remission was re-confirmed in all patients after the 9 months of follow up. No patients developed any recurrence during that period. The two cohorts of patients had similar clinical characteristics, and no differences in duration of remission were present. The patients were followed up long term over the years, and they were not in the early phase of surgical remission. Moreover, eucortisolism was confirmed in all patients on medical therapy.

Sociodemographic and clinical variables were collected during a clinical interview and included personal data, age, sex, education level, employment status, and social activity. Anthropometric variables included weight, height, body mass index (BMI), waist, and hip circumference, and systolic and diastolic blood pressure. Details related to CS-like type of surgery, size of the lesion, symptoms, treatments, and recurrence were also collected. Table 1 shows the baseline clinical characteristics of the study participants. Table 2 shows urinary-free cortisol (UFC), ACTH values, and comorbidities at the end of the study.

Patients were randomized into two groups: (1) Intervention group (31 patients), who followed a specific nursing interventional program and (2) Control group (30 patients), who did not undergo the specific nursing interventional program. This randomization was stratified by center, by a computer generation of random numbers.

Nursing educational intervention

The educational intervention was carried out over 9 months in the University School of Nursing, HSP. There were 5 visits: 4 educational sessions and 1 last visit, when questionnaires were repeated and final data were collected.

The 4 educational sessions lasted 2 h, with intervals between sessions of 30 to 40 days, with a compulsory attendance for all the sessions. The first educational session was named as “baseline” (visit 1), and the last was named as “final visit” (visit 4). The study finalized (visit 5, “end of study”) 9 months after the baseline session. All educational sessions were conducted by a nurse experienced in
educational programs for secondary prevention of cardiovascular risk factors (CG). Schedule and contents of educational sessions are reported in Table 3.

There was a progression in the different contents and in the patient’s autonomy in the management of the knowledge of the disease, as indicated in Table 2. Educational resources with reference material were offered to the patient and family throughout the visits, and all the materials were in Spanish.

All questionnaires were administered at baseline (visit 1) and end of the study (visit 5), both to the control group and to the intervention group by the nurse who conducted the educational sessions. The time to complete all questionnaires was approximately one hour.

The intervention group received the educational program progressively during 4 sessions; it included knowledge on CS, comorbidities, treatments, general management, and autonomy in healthy lifestyles (Table 2). By contrast, the control group only attended their usual medical appointments, with the information given by their doctor during scheduled visits, without any specific monitoring program or educational intervention visits (“treatment as usual”).

Three sessions were patients group sessions (2nd, 3rd, and 5th), attended only by the patients, and in the other two sessions (1st, 4th), the patients could be accompanied by their families (Table 2). The aim of these latter sessions was that the relatives participated in the learning process and in the promotion of healthier lifestyles.

This specific nursing interventional program had four main priorities:

1. To identify signs and symptoms of CS and their comorbidities.

| Table 1 Baseline clinical characteristics of study participants |
|---------------------------------------------------------------|
| **Demographic data**                                          |
| Number of patients | 61  | 30 | 31 |
| Males              | 10  | 5  | 5  |
| Females            | 51  | 25 | 26 |
| Age (mean ± SD)    | 47.25 ± 12.6 | 48.3 ± 13.2 | 46.1 ± 12.2 |
| **Educational level**                                       |
| Incomplete primary school | 2  | 2  | 0  |
| Primary school     | 22  | 8  | 13 |
| Secondary school   | 18  | 8  | 10 |
| University         | 19  | 12 | 8  |
| **Previous health education**                               |
| No                 | 58  | 29 | 29 |
| Yes                | 3   | 1  | 2  |
| **Type of Cushing's Sd**                                    |
| Pituitary          | 48  | 24 | 24 |
| Adrenal            | 13  | 6  | 7  |
| **Disease duration (years)**                                |
| Mean ± SD          | 2.5 ± 1.5 | 2.7 ± 1.7 | 2.3 ± 1.3 |
| **Active/cured**                                           |
| Number of patients | 16/45| 7/23| 9/22|
| **Urinary-free cortisol (UFC) (nmol/24 h)**                  |
| Mean ± SD          | 111.1 ± 78.2 | 104.3 ± 81.88 | 118.1 ± 77.52 |
| **ACTH (pg/mL)**                                            |
| Mean ± SD          | 16.5 ± 17.0 | 18.9 ± 18.1 | 14.1 ± 14.9 |
| **Pituitary tumor size**                                    |
| Number of patients | 48  | 24 | 24 |
| Macro/microadenoma  | 2/46| 1/23| 1/23|
| **Duration of remission in cured patients (n = 45)**         |
| Years (mean ± SD)                                           |
| 6.67 ± 5.19 | 7.37 ± 5.70 | 5.88 ± 4.61 |
| **Partial, hypopituitarism**                                |
| Number of patients | 5   | 4  | 1  |
| **Total, hypopituitarism**                                  |
| Number of patients | 4   | 2  | 2  |
| **Hypertension**                                            |
| Number of patients | 23  | 8  | 15 |
| **Obesity**                                                 |
| Number of patients | 29  | 12 | 17 |
| **Hypercholesterolemia**                                    |
| Number of patients | 33  | 16 | 17 |
| **Diabetes**                                                |
| Number of patients | 8   | 3  | 5  |
| **Depression**                                              |
| Number of patients | 13  | 4  | 9  |
| **Osteoporosis**                                            |
| Number of patients | 9   | 3  | 6  |

No differences in the clinical characteristics were evidenced between intervention and control groups.
2. To demonstrate and to learn capacity for self-control and monitoring of specific comorbidities of CS.

3. To apply the acquired knowledge to improve outcome of those comorbidities that negatively affect their long-term prognosis.

4. To give the patients tools to facilitate the learning process and its application.

Data collection and questionnaires

The variables studied, collected in both the control group and intervention group at baseline (visit 1) and at the end of the study (visit 5), were the following:

- Health-related quality of life (HRQoL) It was measured with the CushingQoL questionnaire, specifically designed for patients with CS, and demonstrated to be feasible, reliable, and valid [24, 28].

- Level of pain measured with the Spanish Pain Questionnaire, a standard pain measurement instrument [29–31].

- Level of physical activity measured with the International Physical Activity Questionnaire (IPAQ) [32, 33]; it collects weekly physical activity measured in METs (Metabolic Equivalent of Task). One MET is a physiological measure expressing the energy cost of physical activities. It is defined as the energy cost of sitting quietly and is equivalent to a caloric consumption of 1 kcal/kg/h. There are three levels of physical activity: low, moderate, and high. It is estimated that compared with sitting quietly, a person’s caloric consumption is three to six times higher when being moderately active (3–6 METs) and more than 6 times higher when being vigorously active (>6 METs).

- Level of rest or sleep measured with the Oviedo Sleep Questionnaire (OSQ) [34, 35] and with two specific questions asking for the number of hours of rest and for the self-reported satisfaction with rest (the answer was “yes” or “no”).

- The use of health resources the number of hospital admissions during the study period, of unscheduled visits or outpatient visits to their own endocrinologist or other health providers, was included.

- Level of nicotine dependence measured with the Fagerstrom Test for Nicotine Dependence (FTND) to evaluate smoking [36–39].

- Erectile dysfunction measured with the Spanish version of the Index of Erectile Function (IEF 5) [40].

- Female sexual function measured with the Spanish version of the Female Sexual Functioning Inventory (FSFI) and with the Female Sexual Function Questionnaire brief profile (B- PFSF) [41–43].

- Compliance with nutritional habits measured with the Lifestyle Associated Questionnaire [44, 45].

Statistical analysis

Statistical analysis was performed using SAS version 9.3 software program (SAS Institute, USA). The normality assumption was tested using the Kolmogorov-Smirnov test.
Table 3 Schedule and contents of educational sessions

| Educational session                  | Type of session       | Content                                                                 |
|--------------------------------------|-----------------------|-------------------------------------------------------------------------|
| Visit 1 baseline                     | Patients + family,    | Data Collection and baseline Questionnaires                            |
|                                      | group sessions        | Pathophysiological basis of Cushing’s syndrome                         |
|                                      |                       | Cause, effect, and origin of hypercortisolism                          |
|                                      |                       | Difference between cured and active disease                            |
|                                      |                       | Description and management of comorbidities that occur in Cushing’s    |
|                                      |                       | Basis of self-care in Cushing’s syndrome                                |
| Visit 2 (1.5 months after baseline)  | Patients group        | Effects, dosage, and side effects of treatments                        |
|                                      | sessions               | Risk factors and health care                                           |
|                                      |                       | Type of comorbidities associated with the disease                      |
|                                      |                       | Difficulties and limitations of self-care                              |
|                                      |                       | Perception of patient experiences.                                     |
|                                      |                       | Healthstyle instructions: diet, exercise, physical activity, smoke      |
|                                      |                       | Specific recommendations for physical activity                         |
| Visit 3 (2 months after baseline)    | Patients group        | Banned or restricted food consumption                                  |
|                                      | sessions               | Role of salt, phosphorus, calcium, magnesium, and fats                 |
|                                      |                       | Foods allowed and prohibited for each risk factor                      |
|                                      |                       | Practice on balanced diets                                             |
|                                      |                       | Practical calculation of caloric content                               |
|                                      |                       | Basic rules for an optimal level of relaxation                         |
|                                      |                       | Problems and limitation of sexual activity                             |
|                                      |                       | Strengthen physical activity recommendations                           |
| Visit 4 Final visit (2.5 months     | Patients + family,    | Proper diet, food groups (carbohydrates, protein, saturated and        |
| after baseline)                      | group sessions        | unsaturated fats, vitamins, water, trace elements, foods rich in      |
|                                      |                       | calcium, phosphorus, and magnesium, fiber                              |
|                                      |                       | Workshop on preparation of balanced diets                              |
| Visit 5 End of the study             | Patients group        | Final data Collection and final Questionnaires                          |
| (9 months after baseline)            | sessions               |                                                                         |

Visit 1 information on themes related to the knowledge of the pathology and comorbidities
Visit 2 information on themes related to the treatment, difficulties in the management of the disease and patient perceptions
Visit 3 information on themes related to the correct management of the disease and healthy living habits
Visit 4 information on nutrition and healthcare habits

Results

Of the 61 patients enrolled (30 in the control group without educational intervention and 31 in the intervention group with educational intervention), 57 (93.4 %) completed the study as planned in the protocol; 4 patients ended prematurely for various reasons (illness or moving to another city).

No significant differences in terms of baseline clinical characteristics were detected between control and intervention group (Table 1).

The majority were women (83.6 %), with a mean age of 47 ± 12.7 years. A mean of 2.5 years had elapsed from the onset of symptoms to diagnosis (range 0–8 years). The mean time from diagnosis to the study was 10.5 years; only 4.9 % of patients reported having received health care. Categorical variables are indicated as percentages. Quantitative variables are expressed as mean ± standard deviation (SD). Student t test was used for quantitative variables. Chi-square test or a Fisher test (when appropriate) was used for categorical variables. Two types of analyses were done for all variables: one compared the differences between control group and intervention group, firstly at baseline and secondly at the end of the study. The other type of analysis compared the changes within each group (on one hand control group and on the other hand intervention group) in all the variables, throughout the study. Both analyses used Student t tests. Pearson test was used to find correlations between variables. A statistically significant level of <0.05 was considered.
education, despite the long period since diagnosis. There were no differences in waist, waist hip ratio, weight, or blood pressure between groups at the end of the study or changes within groups throughout the study.

No differences in the questionnaires’ scores were evidenced between intervention group and control group at baseline.

Quality of life

The intervention group had a better CushingQoL score compared to control group, at the end of the study (56.47 ± 19.18 vs. 48.49 ± 20.02, p < 0.01). No changes in the CushingQoL score were evidenced within the intervention group. By contrast, the control group decreased their CushingQoL score from baseline to the end of the study (59.27 ± 19.79 vs. 48.49 ± 20.02, p < 0.01), indicating a worsening in HRQoL, (Fig. 1).

Finally, the subgroup of patients of the intervention group with worse HRQoL at baseline showed an improvement in the CushingQoL score at the end of the study (p < 0.01).

Pain

Pain intensity was less in the intervention group than in the control group, at the end of the study (5.00 ± 4.06 vs. 5.97 ± 4.72, p < 0.05). Moreover, the final pain intensity fell in the intervention group compared to its baseline scores (7.21 ± 4.36 vs. 5.00 ± 4.06, p < 0.01). By the contrast, no differences in pain intensity have been evidenced in the control group compared to its baseline scores (Fig. 2).

Finally, there was a positive correlation between reduced level of pain and improvement in HRQoL (r = 0.46, p < 0.05).

Physical activity

The percentage of high physical activity level was higher in the intervention group compared to control group, at the end of the study (46.4 vs. 10.3 %, p < 0.01). Moreover, an increase in the percentage of patients with high physical activity level (from 17.9 to 46.4 %, p < 0.001) was observed in the intervention group. By the contrast, physical activity did not vary from baseline to the end of the study in the control group.

Finally, there was a positive correlation between high physical activity level and the improvement in HRQoL (r = 0.89, p < 0.01).

Rest

The OSQ indicated insomnia and hypersomnia in CS patients at baseline, without differences between intervention and control group. Moreover, no changes were seen between baseline and the end of the study in either group.

However, there was a significant improvement in self-reported quantity (= number or hours, 7.53 ± 1.10 vs. 6.39 ± 1.34, p < 0.05) and quality of rest (measured as the percentage of patients that referred satisfaction with the rest, 64 vs. 89 %, p < 0.05) throughout the study, in the intervention group.

Finally, there was a positive correlation between the quantity of rest and the improvement in HRQoL (r = 0.53, p = 0.01).

Healthy lifestyle

There was more adherence to educational instructions on healthy lifestyle in the intervention group compared to control group at the end of the study (4.00 ± 0.38 vs. 2.76 ± 0.29, p < 0.001).

Moreover, an improvement in the adherence to educational instructions on healthy lifestyle was seen in the intervention group at the end of the study compared to baseline (3.19 ± 0.32 vs. 4.00 ± 0.38, p < 0.05). By contrast, adherence worsened in the control group throughout the study period (3.00 ± 0.37 vs. 1.66 ± 0.29 p < 0.05).

Use of health resources

The intervention group has lower number of unscheduled visits (0.11 ± 0.57 vs. 2.38 ± 1.12 p < 0.01) and admissions to the emergency services (0.04 ± 0.09 vs. 1.55 ± 0.50 p < 0.05) compared to control group at the end of the study.

Moreover, there was a reduction in unscheduled visits (2.15 ± 1.40 vs. 0.11 ± 0.57 p < 0.01) and in admissions to the emergency services (0.55 ± 0.80 vs. 0.04 ± 0.09, p < 0.05) in the intervention group throughout the study period. By contrast, the number of unscheduled visits increased throughout the study period in the control group (1.30 ± 1.40 vs. 2.38 ± 1.12, p < 0.01), without changes in admissions to the emergency services.

Smoking

No differences between groups for nicotine dependence were observed at baseline or throughout the study; however, the number of daily smoked cigarettes tended to be lower in the intervention group at the end of the study (p = 0.06).

Sexual function

Forty percent of males with CS showed erectile dysfunction and 50 % of women had a Hypoactive Sexual Desire
However, no differences between groups or within each group in the IIEF 5, FSFI, and B-PFSF scores were evidenced between baseline and the end of the study.

**Discussion**

A specific nursing interventional program for patients with CS has been applied in this study, demonstrating an improvement in physical activity, healthy lifestyle habits, adherence to therapy, sleep patterns, and a reduction in pain level and in use of health resources. Furthermore, patients who participated in the educational sessions had better HRQoL than patients who did not participate, at the end of the study. In particular, patients with worse HRQoL at the baseline showed a greater improvement at the end of the study, indicating that those patients with severe impairment in their HRQoL benefit more from the educational intervention than the rest.
CS patients complained that the complex and specific characteristics of their disease and the absence of specific health education made it difficult for them to cope and to carry out their everyday activities. In fact, only 4.9% of our patients reported any health education over the years, without a clear specificity on CS comorbidities. Thus, the intervention group had a strong motivation which favored following all the education sessions and to improve their healthstyle.

This nursing educational intervention prevented deterioration of HRQoL in the intervention group, improving indicators of social life, confidence, relaxation, and pain measured by the CushingQoL questionnaire. This questionnaire indicated improvements in different health indicators, such as rest and physical activity, suggesting that an appropriate educational intervention in each of them has an additive effect on the final end point, in this case HRQoL.

This improvement was particularly evident in older, less educated, unemployed patients, or housewives; interestingly, the educational sessions were particularly useful in this group of patients, referred to as the most vulnerable in the literature, and therefore less likely to acquire healthy habits [14, 15, 17, 18, 46].

Educational programs are used in a range of chronic illnesses to enable patients to gain personal control and self-efficacy. Studies indicate that educated patients manage their symptoms more effectively, leading to a better HRQoL, with an enhanced sense of wellbeing and a reduction in healthcare costs [47]. In other words, patient education plays an essential role in promoting safe self-management practice. When developing and applying a competency-based patient education program, patients learn how to manage the disease and its consequent comorbidities; this leads to a better psychological status that also improves their physical status [16, 48]. The worsening in HRQoL in the control group is an intriguing point, and we do not have a clear explanation. It may be related to the lack of a specific education. The educational intervention focused on multiple dimensions that all together helped to improve HRQoL; by contrast, routine medical treatment approach could only deal with the medical dimension.

The results obtained in terms of HRQoL suggest new research fields, such as the relationship between the educational programs and the different bio-psycho-social characteristics of patients; they also suggest the need to use different health resources as nursing programs.

The reduction in perceived pain intensity in the intervention group after the educational sessions of our study may be related to different causes, approached during the sessions; these include a greater adherence to analgesic treatment, learning healthy posture patterns and increased daily physical activity. In addition, this reduction of pain generated a positive impact on other areas of health and HRQoL, such as rest, fatigue, and physical activity, as confirmed by the patients and as evidenced in similar studies in the literature [49, 50]. It is known that specific exercise protocols and walking programs have a positive effect on the HRQoL of elderly individuals with osteoarthritis [51, 52].

Insomnia is another problem in CS patients, creating a state of fatigue and anxiety that limits their HRQoL. The significant improvement in self-reported quantity (number of hours) and quality of rest (satisfaction) throughout the study in the intervention group clearly improved HRQoL. Apart from the intervention on sleep habits, the reduction of pain and the increased physical activity may also have positively influenced the sleep quality and quantity. Our study found a significant increase in the percentage of patients with a high physical activity level in the intervention group; due to the motivation, they had during the educational sessions. Data are emerging regarding the positive effect of physical activity level on rest in chronic diseases; moreover, the relationship between sleep quality and physical activity is bidirectional [53, 54].

Regarding nutritional habits, the intervention group learned specific diet recommendations and correct eating habits during the sessions, which included a workshop on preparation of balanced diets. Moreover, the active participation of the family in the group sessions favored patient’s engagement in changing eating behaviors. The intervention group significantly improved compliance to healthy lifestyle food habits at the end of the study; by contrast, the control group worsened during the study period. This is in line with literature data on educational processes in chronic diseases leading to changes in eating habits [55–57].

Regarding sexuality, even if there was not improvement after the educational program it is important to mention that a significant percentage of patients (both men and women) reported alterations, mainly erectile dysfunction and low sexual desire. As far as we know, this is the first study to address this issue with validated instruments. Our results indicate the convenience of evaluating these problems in clinical practice and of performing further interventions to improve sexual function in patients with CS.

Finally, our study evidenced a decrease in the number of admissions and unscheduled visits in the intervention group during the educational program, with the consequent decrease in consumed health resources.

Nine patients had hypopituitarism (5 partial and 4 total), equally distributed in the control and the intervention group, all were on stable replacement therapy started at least 2 years before the study. Therefore, hypopituitarism would not appear to influence the results of this educational program.

There were no differences in the type and severity of comorbidities between the control and intervention group,
neither at baseline nor at the end of the study, suggesting that they did not affect the investigated variables. However, one might have expected that the number of comorbidities, especially cardiometabolic, would have decreased in the educational group, although this cannot be excluded in the long term.

Limitations of our study included a limited time of the educational sessions; a longer educational program might have helped the patients in reducing their cardiometabolic comorbidities (reducing BMI and weight) and to improve further their HRQoL. Indeed the important role of the nursing management in education is well known, in particular that a structural evaluation of cardiovascular risk factors and an integrated nurse-led approach can successfully reduce risk in cardiovascular patients [58]. The number of daily smoked cigarettes only tended to be lower in the intervention group; possibly a longer time of educational sessions might have helped to stop smoking.

All active patients were on medical therapy, and eucortisolism was confirmed in all patients. In “naïve” patients, the educational sessions would probably have been more effective. However, on one hand, it is not ethical to maintain naïve of treatment a CS patient for 9 months, and on the other hand, controlling this condition during the study would influence the results of the program.

Regression analysis could have been done; however, we preferred to do t tests because regression analysis would evaluate the change along the time and not the values at baseline or at the end of the study.

Finally, the number of patients studied is relatively small despite including patients from two 2 reference centers, a problem which is practically unavoidable in rare diseases, especially if followed up long-term over the years.

Conclusions

A specific nursing educational program, addressed to CS patients, obtained a positive modification of different living habits, achieving an improvement of physical activity, healthy lifestyle habits, sleep patterns, and reduction in pain level. Even if the program only included 4 educational sessions, it considerably influenced patient’s HRQoL. In particular, patients with worse HRQoL at baseline showed a greater improvement at the end of the study. Moreover, the educational sessions allowed not only clinical improvement, but also a reduction of hospital admissions and unscheduled visits. Finally, the brief nature of the program makes it as a good candidate to be used in clinical management of patients with CS.

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Compliance with ethical standards

Disclosure

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