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ORIGINAL ARTICLE

The Role of Non-Governmental Organization in Providing Food Needs in Burn Patients

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ABSTRACT

Background: Non-governmental organizations' (NGOs) are one of the financial providers of the health sector and one of the key factors in development of social partnership in the community. In this study, the role of NGOs was evaluated in improvement of the dietary intake of burn patients.

Methods: In this case-control study, nutritional indices of 30 burn patients who received nutritional support by NGOs were compared with nutritional indices in 30 matched burn patients who were treated before the start of nutritional support by NGOs. Dietary intake for the three-day record was provided. Finally, the amount of macro- and micronutrients intake was analyzed by Nutritionist IV software. Laboratory and clinical data were compared between the two groups.

Results: Burn percentage in the intervention group was 39±20.27% and in the control group was 28.91±16.40%. The mean age of case group was 40.74±17.02 years and of the control group was 41.60±20.80 years. Charity aid increased calorie intake in the case group (1425.77±432.93 vs. 1038.12±438.40 Kcal, p=0.002). Patients in the case group received a significantly higher amount of protein (60.28±16.32 vs. 45.03±17.16 g, p= 0.002). The changes in blood urea nitrogen (BUN) and creatinine were higher in cases, when compared to the controls: BUN: (2.34±16.67 vs. -6.9±12.55 mg/dL, p=0.03); creatinine (0.1±0.36 vs. -0.21±0.4 mg/dL, p=0.002).

Conclusion: NGOs' support can be effective in improvement of nutritional indices in severely burn patients, especially in developing countries, where hospital and families are not able to supply expensive nutritional supplements.

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Introduction

Humanitarian aid has existed for centuries based on human nature; but since the 1990s, fundamental changes in the formation of this type of support were created. Nowadays in the world, the budget allocated to this type of assistance annually is around US$ 10 billion (1). The second modification is formation and development of the non-governmental

organizations (NGOs). Governmental reports show that in 1980, 1600 and in 2000, more than 40,000 NGOs are registered (2). The number of these organizations in 2017 is estimated to be around 10 million (3). In 2015, about one-third of the world's population (31.5%) donated to NGOs and about one quarter (24%) worked with these organizations (3). NGO is an organization that is characterized by humanitarian activities; such as alleviating human suffering and poverty, protecting the environment, providing essential social services and developing backward communities (4).

NGOs idea is "good practice" and their activities are without financial gain and away from political goals (5, 6). These organizations can play a pivotal role in the health system to meet its financial needs. With this support, beneficial changes in health care and health services occurred, especially for poor people as the target group (6). In addition to public sector care, NGOs also provide health services to people; including the care or rehabilitation in specific diseases. The performance of an NGO in the field of health system depends on the civilization, culture, extent of development and needs of the community. In developed countries, NGOs are more likely to support clinical research in health care, and in developing ones; more services are aimed at raising awareness and disease prevention (7, 8).

Burn is one of the major public health problems worldwide, especially in developing countries (9). A major burn injury, not only threatens the life of these patients, but also has a serious physical, psychological and economic impact on individuals, their family and society (10). In recent years, the incidence and cost of burn injuries have reached a level that is considered a major concern (11). According to the reports by Burn Institute in the United States, 1,250,000 people were hospitalized worldwide for burns each year. Only 4.2 million people in the United States were demonstrated to suffer from severe burns to the extent that they require medical attention. About 70,000 of these patients were hospitalized, and consequently, 5 thousand people died due to burns (12). Based on statistics provided by the Ministry of Health of Iran (2002), at least eight people per day have died due to burns that their average age was 35 years (10).

The catabolic response in burn patients increases the energy requirement up to 100% of baseline, when compared to healthy subjects. Failure to supply this energy leads to nitrogen imbalance, increased lipolysis and proteolysis and weight loss (13-15). Adequate nutritional support is one of the important aspects of treatment in burn patients, which greatly affects the outcome of burn patients. Adequate nutritional support is one of the best ways to reduce hyper-metabolic and hyper-catabolic responses. There is conclusive evidence that mortality in burn patients with a high protein and carbohydrate diet, and low fat is reduced. Inadequate micronutrients would have irreversible effects on burn patients. Some studies showed that the supply of omega-3 fatty acids would have a beneficial effect on the immune system and decrease the inflammatory response. Excessive consumption of omega-6 fatty acids would cause inflammatory responses too (16, 17).

Taking antioxidants has beneficial effects in burn patients. Vitamin C and E were illustrated to be effective in reducing lipid peroxide and healing of wounds. Zinc is also a beneficial factor to improve the wound healing process. Selenium is effective in healing of burn too, based on activation of glutathione peroxidase. High protein and carbohydrate, and low fat dietary supplements were recommended for burn patients. This type of supplement is one of the best ways to treat hypermetabolic states in burn patients (18-20). Prescribing vitamins and minerals as the recommended amount would reduce the length of hospital stay by one day. Consumption of minerals and vitamins in burn patients can also reduce the risk of stomach ulcers and bed sores (21, 22). As there has been no study to evaluate the effect of charity aid on improvement of hospitalized burn patients, this study was undertaken to assess the role of NGOs in improving the nutritional indices in burn patients.

Materials and Methods

This case-control study in October 2016 was conducted on 60 burn patients who were admitted to the Burn Center of Imam Reza Hospital in Mashhad, Iran. The study lasted for two months. Based on review studies (23) and considering the confidence interval of 95% and the test power of 80%, the minimum required sample of 30 subjects in each group was calculated. The study protocol was approved by the Department of Surgery at Mashhad University of Medical Sciences, Mashhad, Iran and informed consent was obtained from the selected patients or their legal guardians. Only adult thermally injured patients (≥ 18 years old) with percent of burn total body surface area (TBSA%) more than 10% were included. Severely ill patients who were unable to consume food orally were not enrolled. The exclusion criteria were pregnant or lactating women and patients with pre-existing pathologies (e.g., cancer and organ dysfunction). Patients who were allergic to food consumption during the study were excluded too.

This design used a historical control group obtained from a database collected before the start of

NGO's support for supplementary nutrition. The case group data have been collected since the beginning of the benevolent group's assistance. Patients in the control group were selected from the database according to the same inclusion criteria as the intervention group. In the control group, 30 patients were randomly selected according to criteria from the Health Information System (HIS) Database. Food data were also available in the database according to the present study.

Demographic data were collected using a check list. Burn percentage and laboratory data were extracted from the patients' medical record and the TBSA% was used to collect the data with nutrient intake analysis (NIA). Patients in the case group received a package containing 30 grams of nuts (pistachio, almond, and hazelnut) and a high-protein dessert as a daily snack. The nuts were packaged hygienically by the researcher. Each of the packages contained 10 grams of pistachios, almonds and hazelnuts. Dessert (Danone, Iran) was based on milk, which contained 5 grams of protein per 100 grams. As a part of infection control policy, entry and exit were limited in the burn center. In coordination with the nursing staff, the benevolent group was permitted to be present at the snack time and serving the snack to the patients. The benefactors were also trained in psychological support, so they were able to help patients in this regard.

These services were continued throughout the hospital stay. From the second day of hospitalization, three-day food records were obtained. For food records, data were collected through the direct observation of consumed foods and 24-hour dietary recall. In several cases, photographs were taken using a smart phone to document the amount of the consumed food. Moreover, individual nutritional intakes were assessed using the Nutritionist IV software, which could identify and analyze the macro- and micronutrient intakes. Daily energy requirements were also calculated using the Curreri formula.

Data analysis was performed by SPSS (version 16, SPSS Inc., Chicago, IL, USA) using the Kolmogorov-Smirnov test to evaluate the normality of the variables. Independent sample t test was used to compare quantitative data between two groups. On the other hands, Chi Square test was utilized to assess the association between two quantitative variables. All the statistical analyses were two-sided, and the P value of less than 0.05 was considered significant.

Results

The baseline characteristics of the patients were presented in Table 1 showing that the two groups were homogeneous in terms of sex, age and the percentage of burns. In the control group, five individuals did not have complete information (dietary information, and laboratory data) and were excluded. In the case group, three people were excluded for reasons such as non-cooperation and non-continuation of the treatment process.

The average daily energy intake in the case group was 1425.77±432.93 calories and in the control group was 1038.12±438.40 calories (p=0.002). The mean daily carbohydrate, protein and fat intake was significantly higher in the case group, when compared to the control group (Table 2). Nutritional aids in the case group significantly increased minerals intake. Despite the increase in the level of vitamins intake in the case group, it was not statistically significant (Table 3). On average, patients in the case group lost 3.98 kg and in control group 1.88 kg of their

Table 1. Baseline characteristics of patients.

Variable	NGO N=27	Control N=25	*p* value
Gender (male) (%)	15 (55.6%)	9 (36%)	0.177
Age (years)	40.74±17.02	41.60±20.80	0.85
Length of hospital stay (day)	25.85±12.24	25.68±10.60	0.252
Total body surface area (%)	39.0±20.27	28.91±16.40	0.06
Baux-index	77.55±21.25	69.79±21.99	0.20

NGO: Non-governmental organization. Values were expressed as mean±SD or frequency (percentage).

Table 2: Comparison of energy and macronutrient intake in case and control groups.

Variable	NGO	Control	*p* value
Calorie (kcal)	1425.77±432.93	1038.12±438.40	0.002
Carbohydrate (g)	185.00±68.25	141.40±71.95	0.01
Protein (g)	60.28±16.32	45.03±17.16	0.002
Fat (g)	48.20±15.83	32.49± 15.03	0.001

NGO: Non-governmental organization. Values were expressed as mean±SD.

Table 3: Comparison of vitamin and mineral intake in case and control groups.

Variable	NGO	Control	*p* value
Vitamin A (IU)	438.41±745.15	370.46±554.23	0.24
Folate (mcg)	140.01±148.87	100.98±101.14	0.13
Vitamin C (mg)	184.82±161.03	169.00±118.10	0.90
Vitamin D (IU)	28.18±137.86	1.49±0.80	0.30
Zinc (mg)	6.01±2.12	4.45±1.81	0.007
Copper (mg)	0.77±0.30	0.57±0.27	0.01
Selenium (mcg)	0.02±0.008	0.02±0.11	0.89
Iron (mg)	50.28±220.59	5.70±2.69	0.007
Calcium (mg)	759.81±223.27	542.55±217.82	0.001

NGO: Non-governmental organization. Values were expressed as mean±SD.

Table 4: Comparison of clinical and laboratory data in case and control groups.

Variable	NGO	Control	*p* value
Weight change (kg)	-3.98±3.78	-1.88±2.39	0.053
Albumin change (mg/dL)	0.19± 0.57	-0.14± 0.66	0.76
Total protein change (mg/dL)	0.13±0.94	-0.4±1.09	0.08
BUN change (mg/dL)	2.34±16.67	-6.9±12.55	0.03
Creatinine change (mg/dL)	0.1±0.36	-0.21±0.4	0.002

NGO: Non-governmental organization. BUN: Blood urea nitrogen. Values were expressed as mean±SD.

Table 5: Comparison of percentage of energy and protein intake to total need in case and control groups.

Variable	NGO (%)	Control (%)	*p* value
Ratio of calorie intake	65.25	50.68	0.05
Ratio of calorie intake	38.45	30.41	0.05

weight during the hospitalization period (p=0.053). Although not statistically significant, Albumin levels of patients in the case group increased by 0.19 mg/dL, but it decreased by 0.14 mg/dL in the control group. However, the changes in blood urea nitrogen (BUN) and creatinine in the case and control groups were significant (Table 4). Comparison of percentage of energy and protein intake to total need in case and control groups was illustrated in Table 5.

Discussion

We evaluated the effect of NGO's assistance on nutritional indices in burn patients. In both developing and developed countries, the necessity of such organizations has been proven for more than a half-century. Social development is to meet human needs and raise the living standards of all groups. These needs are extensive and unlimited and governments alone cannot meet all those necessities. NGOs are the most important and best-known tool for public participation (24). Nutritional support, like medical care and surgery are necessary for burnt patients. Meeting the nutritional needs of burn patients greatly affects the clinical condition (25).

In this study, we discussed the effects of using the financial and spiritual assistance of charities on the food intake of burn patients. Considering the extent of injuries, intolerable pain without movement and restrictive dressings make burn patients not to be able to eat and drink enough by themselves. On the other hand, as a part of infection control policy, relatives of burn patients only are permitted to be present in burn ward for a few hours during the meal times and they are not able to cope with nutritional needs of a commonly poor appetite of burn patients. Besides burns that often occur in low-income people and their families not to be able to provide nourishing snacks for patients, the energy requirements increase significantly after major burns as much as twice of basal resting energy expenditure (REE) (26).

The protein needs of burned patients are increased because of protein loss through urine and wounds, increased use in gluconeogenesis, and wound healing. High-protein feedings have been successful in improving the burn and preventing the loss of lean body tissues of burn patients (27). The results of our study showed that charity aid has significantly increased energy and protein intake. However, the case group received 65% of the minimum energy and 38% of the required minimum protein. The control group received 50% of the required calories and 30% of the required protein. The amount of excess intake of calories and protein in cases was not enough to cause a significant change in indices, such as hospital stay.

Patients in the control group consumed more fruit juices provided by their families. Patients in the case group received more supplements and nuts which were good sources of minerals. Dietary changes in both groups may be affected by these differences. Charity group provided about 500 additional calories and 18 grams of protein per day for each patient; while the average energy intake of the case group was 386 calories more than the control group and the protein intake was 15.25 grams more than the control group. The results showed a reasonable and expected increase. It seems that patients have not been able to consume all the food provided by the charity group.

In the case group, patients lost more weight, although it was not statistically significant. This may be due to the more extensive burns in the intervention group. However, blood albumin and total protein levels have been higher in patients in the case group, although these changes have not been significant. The BUN and creatinine increased significantly in the case group within the normal ranges. An increase in blood BUN above 30% may indicate a lack of body water or an increase in protein intake (28).

All of these indicators showed the beneficial effect of charity aid on improving the burn patients. Until now, no study has been done on the role of charity aid in improving the nutritional indicators of burn patients. The limitations of this study were the short duration of the study and the low number of charitable resources available. It is suggested in future studies that more extensive charitable donations to be enrolled, a larger sample size to be studied, and study to be done over a longer period.

Our study revealed that the support of NGOs could improve macro- and micronutrients intakes in burn patients and increase BUN and creatinine levels in the normal range. Increasing BUN and creatinine levels shows progress in improving nutrition indicators. However, due to the high need of burn patients for nutrients and limited resources of NGOs, anthropometric indices did not change. Given the limited financial resources of health organizations and the importance of treating patients, governments should pay attention to the effective role of non-governmental organizations in meeting the needs of patients.

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Conflict of Interest

None declared.

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