



Nutrition in Brain Damage

María José Maceira Franqueiro*

Nutritionist-Dietitian, Spain

***Corresponding Author:** María José Maceira Franqueiro, Nutritionist-Dietitian, Spain.

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Abstract

Many people are affected by the consequences of brain damage. The duration and severity of the different sequel or injuries that it provokes, constitute a health challenge of great importance. The causes of brain damage are diverse: cerebrovascular accident, traumatic brain injury, anoxia, brain tumor or infection that affects the brain level as meningitis.

One of the problems that most often affect these patients is dysphagia, a factor very related to respiratory complications, but especially with problems in the diet. It is essential, to minimize the risk of respiratory problems and to make the necessary adaptations in diets, to avoid the appearance of serious problems such as malnutrition and/or dehydration. To avoid these consequences, it is necessary to carry out an assessment of the nutritional status that facilitates the detection of these cases and perform a timely nutritional intervention.

Given the evidence that shows the relationship between a healthy diet and the evolution of the sequelae of brain damage, the early intervention of a nutrition professional is considered very important.

Keywords: Assessment of Nutritional Status; Nutritional Screening; Brain Nutrition; Brain Damage; Stroke; Traumatic Brain Injury; Malnutrition and Dysphagia

Introduction

Brain damage is defined as the set of injuries that occur suddenly and abruptly at the brain level, and that cause a group of different sequelae that the patient will suffer depending on the area of the brain affected [1]. These alterations affect to a greater or lesser extent the complex process of feeding.

The different sequelae derived from brain damage affect the level of: alertness, cognition (the ability of a person to learn, reflect and reason), verbal, written communication or both, at the motor level (affect balance, can appear the lack of sensitivity and mobility in some member of the body), of the emotions and of the

personality (different situations can occur: uninhibited attitude or apathy), of the development of the basic and instrumental activities of daily life and at the sensory level and sensitive (alteration of smell, aroma, taste, hearing, vision and proprioception) [2,3].

Etiology

Strokes and head injuries are the most important causes of brain damage [1]. Strokes are due to an interruption of the blood flow at the arterial level in a brain region (caused by a thrombosis or an embolism), or to cerebral hemorrhages, including the rupture of aneurysms or malformations of the blood vessels that supply the brain [4].

Head injury is "an affectation of the brain caused by extreme force that can lower the level of consciousness" [5]. Brain injury from a blow is usually caused by a car accident, work-related accident, sports accident, falls, or physical assault. Other causes of brain damage can be anoxia or hypoxia, brain tumors or infections or infections.

The anoxias are the almost total lack of oxygen and the hypoxias correspond to a poor oxygenation of the brain, during a certain time, causing the neuronal death of a part of the brain tissue. It can be due to a cardiocirculatory arrest or respiratory failure, although normally both situations are present [6].

Complications

After brain injury, many patients have swallowing problems and their ability to get, process, and carry food and drink to the mouth can be impaired. These people are at high risk of malnutrition, so it is of great importance to quickly recognize the signs and symptoms of injuries. An early diagnosis is essential to apply the most appropriate therapy, optimally covering the nutritional needs of the patient. It is also essential to give some dietary guidelines, both to the patient and the family, to properly guide the planning of the menu [4].

Dysphagia is a symptom that is defined as "difficulty swallowing." It causes the lack of efficiency of swallowing, affecting the ability to feed and hydrate properly, causing malnutrition and dehydration if not diagnosed. Other important consequences of dysphagia, from a nutritional point of view, are weight loss and anorexia. The safety of swallowing can also be impaired with the risk of serious respiratory complications (such as aspiration, pneumonia and choking) due to the passage of food and secretions into the respiratory system [8].

The appearance of malnutrition as a consequence of brain damage varies according to age and the presence of other pathologies, decreasing the quality of life of the patient. The origin of malnutrition in people with brain damage may be due to decreased intake, gastrointestinal problems, alterations in energy expenditure or active principles of drugs [9].

Dysphagia contributes to a clinical situation of dehydration due to insufficient fluid intake, a situation influenced and even aggravated by the existence of other diseases, age and iatrogenesis. The

diagnosis of dehydration is very difficult because its symptoms are nonspecific, as are the signs that may occur.

Objectives

In order to carry out the article, information on brain damage was sought and based on current scientific evidence, it was determined the most appropriate methods for carrying out the assessment of nutritional status in people with brain damage.

Method

A literature search was carried out in scientific databases and advanced nutrition books covering healthy eating and neurological diseases. Information provided by the different clinics or specialized associations was used.

For the experimental part, a sample of 24 people with brain damage is chosen. The study was carried out during the months of February and March 2019. The menu provided by the catering was analyzed, and the foods included in the mid-morning meal were studied.

Results

The assessment of the nutritional status in people with brain damage is carried out taking into account the causal factors of malnutrition and dysphagia. It is important to study the usual diet using a dietary history, comparing it with the most recent diet, to get an idea of the patient's intake [10].

Changes in body weight should be evaluated, analyzing the existence of loss of muscle mass by measuring the arm circumference and a loss of fat mass by measuring the triceps fold. Both measures are compared with normality tables validated according to sex and age [10].

The physical examination should include observation of the adequate function of the neuromuscular procedure in swallowing and assess to what extent it may be altered.

The most convenient nutritional screening method must be selected, it will be repeated every week or earlier, if necessary. If deemed necessary, the option of conducting a nutritional assessment and initiating nutritional therapy with oral supplementation or enteral nutrition will be considered. If the need for enteral nutrition is prolonged in time or when it is early intuited that the naso-

gastric tube is necessary for a long period of time, the placement of a percutaneous gastrostomy or a percutaneous jejunostomy will be proposed [11].

In the case of the existence of dysphagia, intervention may be made by assessing and monitoring its evolution, modifications of diets and its rehabilitation treatment [12]. After dysphagia screening, clinical decisions, a diet adaptation protocol, and patient follow-up are established to verify compliance and evolution. This dysphagia screening will be performed in people who can initiate oral feeding. There is a choice between two different dysphagia screening methods: the modified water test and the volume-viscosity clinical assessment method. The most used is the second.

The volume-viscosity clinical examination method can be repeated as many times as necessary and at any time to assess the evolution of dysphagia (it can be performed in bed, in consultation or in long-stay centers). This method gives information about the viscosity and the most suitable volume to feed the patient safely and efficiently. In order to determine the existence of silent aspirations, the patient must be monitored during the test with peripheral oxygen saturation, by means of a pulse oximeter and, in addition, in this way the test is more secure.

All patients with positive screening for dysphagia should be confirmed with a very specific instrumental test performed by a specialist. All instrumental tests are complementary to each other, and it is essential to know how to choose the most appropriate in each clinical case. Currently, the most used to functionally study swallowing are [13]: videofluoroscopy, fibrolaryngoscopy or pharyngoesophageal manometry.

Relationship between diet and brain damage

It is unknown how the homeostatic intake control system works in patients with neurological pathologies. Nutrition influences cognitive functions and the development of the nervous system. An adequate nutritional status and, among other factors, maintaining a healthy diet (based on abundant consumption of fruits and vegetables and diets moderate in saturated fat and cholesterol) are essential for optimal cognitive function [14].

The nervous system uses different essential nutrients, slightly decreased levels of these essential nutrients are enough to produce alterations in the development or functioning of the nervous system [14].

Glucose provides the energy the brain needs. In people who have not controlled glycemia, a change has been seen in some of the intellectual abilities and in the electroencephalogram. Amino acids make neurotransmitters.

The fat in the brain is part of its structure (phospholipids and cholesterol) and is necessary for the physical-chemical reactions that take place in it to develop. Around 33.3% of the fatty acids present in the brain are polyunsaturated acids, dependent on the diet to be able to be used. The fatty acids of the omega-3 series have a neuroprotective and also preventive behavior of neuronal apoptosis in the event of ischemia. Omega-3 fatty acids in the diet are currently being studied as a preventive and therapeutic means of different neurological diseases. Cognitive function is directly related to the plasma concentration of omega-3 fatty acids.

All vitamins are essential for the nervous system to function properly [14]

Thiamine, riboflavin, niacin, and folic acid are associated with abstract thinking.

- Ascorbic acid is related to visual ability.
- Cobalamin, pyridoxine, vitamin A, and tocopherol are related to visuospatial memory and abstract thinking.
- Vitamin A is involved in cognitive functions.
- Vitamin B1 has important functions in the metabolism of glucose, essential for the nervous system. Its short-term experimental deficit, six days, causes irritability, cramps and changes in the electroencephalogram.
- Low-level tocopherol causes sensorimotor polyneuropathy, ataxia, ophthalmoplegia, retinal degeneration, and myopathy.
- Ascorbic acid collaborates in hydroxylation reactions such as the production of serotonin and the conversion of dopamine to norepinephrine.
- Cobalamin deficiencies cause paresthesias of the hands and feet, a feeling of weakness in the legs, ataxia, and sometimes confusion or irritability. The deficit of specific micronutrients is related to neurological disorders, but the prevention of cognitive decline or its treatment with supplementation is not clear.

- Micronutrient deficiency worsens immunodeficiency and increases the possibility of developing pressure ulcers [14].
- Osteoporosis is common and is a consequence of immobilization, malnutrition and vitamin D deficiency. Phosphocalcium metabolism and bone mass should be evaluated early.
- Iron deficiency makes myelination and metabolism of oligodendrocytes difficult.
- Magnesium deficiency is usually not diagnosed. Malnutrition, the consumption of diuretics and the consumption of gastrointestinal protectors worsen the clinical state of the patient along with the decrease of this mineral.

The products of oxidative stress can be used as therapy to reduce the risk of neurodegenerative diseases [15]. This makes the goal of nutritional treatment to fight hypercatabolism and hypermetabolism caused by inflammation [14].

On the other hand, when there is dysphagia, it is very useful to modify the consistency of the food, since it can present from a dysphagia of mild difficulty to some consistency, to the impossibility of swallowing. Adaptations will be recommended for solid foods (modification of volume, consistency and texture) and for liquids (thickeners, gelled water), since a soft or pureed consistency reduces handling at the oral level. However, it should not be forgotten that the diet must be appetizing in addition to meeting nutritional needs. There are numerous techniques to increase acceptance in diets modified in consistency [4].

- The smell-aroma of food influences the appetite, so achieving an adequate smell intervenes in the feeling of hunger and improves intake. All foods should be tasted and when necessary, seasoned.
- The visual effect of the presentation of the food on the plate influences the appetite. Nutritious items such as compotes and meat juices can be used to garnish dishes.
- The use of a pastry bag, a food gun, a food syringe or food molds achieve an appetizing visual presentation because they allow different shapes to be made. Another very useful method is to grind each ingredient of the dish separately since the color of each food and even its flavor and aroma will be maintained.
- Vary food as much as possible, thus avoiding routine and increasing its attractiveness through its organoleptic characteristics.

- The patient is likely to eat more if meals are more frequent with small amounts.
- Avoid foods that break easily in the oral cavity, as they can increase the risk of suffocation.
- Take into account individual habits and the changes that are made must be agreed with the patient and his family.
- The texture of the food must be homogeneous, avoiding lumps and thorns. Food should be juicy and easy to chew.
- In dysphagia, patients with different adaptations to different textures can be found depending on the degree of impaired swallowing. There are three different textures to take into account [16]
 - Soft texture. It is made up of those foods that are soft in their natural state and also those that after being cooked or cut have this characteristic. The chewing to be carried out does not require biting. Using a fork, these foods can easily break apart and should be moist or served in sauce. Some examples that can be introduced in this texture are ripe bananas, yogurt, fish in sauce, juicy tortillas and boiled vegetables.
 - Chopped, moist and soft texture. The food or the result of the adaptation to achieve this texture should form the food bolus easily, something that will help to a greater extent
 - the movements of the tongue before the biting process. You can use a fork, with which you can crush the food, thus achieving the required texture, and use thick purees. May contain lumps if easily diluted by bolus with tongue.
 - Smooth crushed texture. This texture is achieved by grinding the food until there are no lumps. It is a consistency similar to commercial pudding.

The swallowing re-education diet is a transition diet from the crushed texture to the normal texture that is applied in cases of mild or moderate oral and/or pharyngeal phase dysphagia. These patients must have adequate chewing ability and must be able to handle the bolus in the oral cavity. Foods with a texture close to normal (semi-solid) are allowed but dangerous foods and textures should be avoided. This diet has allowed these people to progress favorably from diagnosis, maintaining a diet beyond purees, which used to be very little accepted [17]. Foods with aspiration risk textures in their natural form are [18].

- Double textures of liquids and solids

- (soups).
- Sticky foods: pastries, chocolate, honey, chewy candies, banana, bread.
- Foods that are easily dispersed through the mouth (do not form a cohesive bolus): peas, rice, legumes, pasta.
- Foods that give off water when biting: fruit.
- Foods that go from solid to liquid in the mouth: jellies.
- Fibrous foods: pineapple, lettuce, celery, asparagus.
- Foods with skin, lumps, bones, tendons and cartilage.
- Food with skins or seeds.
- Crispy, hard or dry foods.

Hydration, in people with fluid dysphagia cannot drink in the normal way, the oral route must always be the first option, modifying the viscosity of the liquids with gels or thickeners. The individual water needs of people with dysphagia are the same as for the general population. It should be remembered that patients with brain damage are associated, among other factors, with a physical or mental dependence and may have altered the sensation of thirst. Today there is gelled water on the market, an industrial drink with flavors with a gel texture. There is also a thickener in powder form to achieve the right texture for each person [19].

Patients and family members should identify the different viscosities and behaviors of the thickener in different foods. The different viscosities can be [16]

- Nectar type. This allows you to drink from a glass because it is a slightly thick texture. If it decants it flows fast and leaves a residue. It forms a fine thread when it falls.
- Honey type. This allows you to use a spoon or a glass because it is moderately thick. He is unable to continue his form. Forms thick drops when falling.
- Pudding type. It only allows the use of a spoon because it is very thick. It is able to continue its shape when falling, it remains in a block.

Characteristics of the study Population

Of the 24 people included in the study, 17 are men and 7 women, aged between 24 and 73 years. The specific characteristics of patients to take into account in their diet, collected in their medical records, are

- 5 people with dysphagia: one with legume and rice dysphagia, three with fluid dysphagia, one of which requires an easy-to-chew diet and a person with the need to consume a shredded diet.

On the other hand, it is observed that all the patients, except one of the 24, are polymedicated. Medication generally includes drugs to control body fat levels (HDL and LDL cholesterol and triglycerides) and blood pressure, as well as antiparkinsonians, analgesics, antidepressants, antipsychotics and antiepileptics. For this reason, the possible effect of drugs on the nutritional status of patients who consume them must be taken into account in order to take the appropriate nutritional measures in each case. The menu, which is served from Monday to Friday, and the foods included in the mid-morning meal were analyzed. The mid-morning intake consists of several options to choose from (decaffeinated coffee with skimmed milk with 2-3 teaspoons of sugar or fruit nectar or concentrated juices, cookies or fruit (orange, apple, pear or banana). It is concluded that the intakes of midmorning are made up of foods with a significant amount of simple sugar. Some patients show a dissatisfied attitude because they consider that it is a small amount of food, suggesting that they serve more. An anxious behavior is observed for coffee time, when it is time to mid-morning they begin to ask when they are going to the dining room and they lose focus on the activity they are doing.

The analysis of the menus was carried out on the basis of the characteristics of a healthy diet, that is, one that covers all the nutritional needs of the body by including quality food (the less industrially processed the better) and the use of suitable culinary preparations. (twenty). The menu is provided consists of two dishes, a slice of white bread, a dessert and water. Patients show an anxious and compulsive behavior for food (they eat very quickly and hardly chew, and most do not look up from the plate and introduce too large bites). However, patients with dysphagia eat more slowly than the rest of their peers. Because of the sequel, a patient is detected who must be reminded to eat because he forgets the task he is doing. In general, the plates are usually very full. The amount of food varies depending on the clinic aide serving it.

Conclusions

The various injuries that a person with brain damage can suffer, affect many aspects related to eating differently. Several studies

demonstrate the relationship between a healthy diet and the evolution of brain injuries, especially at the cognitive level, highlighting the importance of nutritional intervention. Dysphagia, malnutrition, and dehydration need to be properly diagnosed.

It is necessary to carry out more scientific studies aimed at the adequate intervention of the nutritionist in brain damage in the different cases that may occur.

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