STUDY REGARDING FOOD AND NUTRITIONAL STATUS OF PATIENTS HOSPITALISED WITH MUSCULOSKELETAL DISORDERS

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Abstract: *The present study aims to both help detect dietary mistakes in patients hospitalized with musculoskeletal disorders, and to present suggestions of good eating habits that ensure such patients achieve the recommended necessary nutritional intake. In addition, the present study also aims to highlight the connection between nutritional diet mistakes that, along with low levels of physical activity, can lead to the development of early degenerative musculoskeletal disorders. Finally, we recommend methods through which patients can adhere to a programme of preventive, not only therapeutic, exercise.*

INTRODUCTION

In recent years there have been noted dietary imbalances both by overconsumption and by underconsumption. To aid these imbalances, nutritional policy, both at the European and national levels, aimed to improve population health by preventing and decreasing disorders caused by diet and nutrition, specifically in vulnerable groups such as children, the elderly, people with various diseases or those unemployed.(1,2)

Diet that covers the recommended necessary nutritional intake has a positive influence on health in general but also specifically on the musculoskeletal system's proper development and functionality. The same can be said about the influence of physical activity.(3,4)

It should, however, be noted that certain changes to consumption behaviour and diet structure can negatively influence patients' health. Therefore, when food intake is not consistent with the daily requirement health can change and nutritional disorders begin to occur. These can be the result of qualitative or quantitative nutritional mistakes, abuses or deficits, over long periods of time.(5) Furthermore, localized degenerative aspects of the musculoskeletal system can be caused both by mistakes in nutrition and mistakes related to lack of exercise.(6)

Recent socio-economic transformations have had major repercussions on the structure of our country's nutrition and eating habits, which are being felt throughout the course of patients' hospitalization. The food patients receive is scientifically chosen according to dietary requirements. It is prepared and served hygienically.(7) Patients begin with a programme of rest, from which they can then move on to take part in physiotherapy and medical rehabilitation programmes. Patients are under permanent medical supervision. Small differences, or mistakes, in each patient's diet come from food brought in by other carers, outside their fixed menu.

Alongside this nutritional behaviour, a drop has also been observed in patients' physical activity with regards to functional maintenance, the lowering of excess weight and maintaining stable health. This suggests that, even from an early age, conscientiously seeking and performing recommended physical exercise programmes while correcting potential nutritional imbalances could prevent early onset of musculoskeletal disorders, including degenerative disorders.(3)

MATERIALS AND METHODS

This study was conducted during 2013, in the Bucharest Emergency Hospital "Floreasca", with a sample of 200 randomly recruited patients, aged between 15 and 79 years.

The type of food offered during hospitalization was recorded from daily lists of food removed from hospital stores. Participants used a 24-hour recall to estimate the food brought in from outside, either by relatives or by the patients themselves, which they ate on top of the menus offered. A food frequency questionnaire was also recorded every quarter of 2013 (winter, spring, summer and autumn). Using the daily food lists we calculated the average daily amount of food for each person and the average annual daily intake. Using food composition tables to determine the nutritional and caloric intake accounted for proteins, lipids and carbohydrates, we calculated the nutritional value of patients' menus.(8)

Patients' level of physical activity was determined using a questionnaire. This recorded the level of physical effort in ratings of easy, medium, and increased compared to daily (professional and household) activities. It also recorded whether the patient participates in an organized form of physical activity and sport.(9)

Admission diagnosis was recorded from patients' official medical files. These results were corroborated by individual somatic examination, waist measurement and body weight, which determined body mass index-BMI.(6,9) Antropometric measurements taken to calculate BMI were performed using a mechanical scale with adult height meter metrologically calibrated and verified.

Resulting patient food consumption, physiological and pathological history (recorded from hospital official medical files), and the somatrometric results were statistically analysed. Patients were hospitalised with musculoskeletal disorders; however, we accounted for existing associated diagnoses (comorbidities). This data was analysed in regards to patients' gender, age group, socioeconomic status, and level of exercise. The level was exercise took into consideration its adherence to

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an organized programme of physical activity and sport.

RESULTS AND DISCUSSIONS

A. Sociodemographic Characteristics

In table no. 1, on can see the sample component that includes 200 subjects, of which 92 males (46%) and 108 women (54%), as well as distribution by gender and age group. As seen, there is a high percentage of young to middle aged female participants, 20-39 and 40-59 years old.

Table no. 1. Sample breakdown by gender and age

Age (in years)	Male		Female		Total	
	N	%	N	%	N	%
15-19	12	6	10	5	22	11
20-39	26	13	40	20	66	33
40-59	27	13,5	41	20,5	68	34
60-79	27	13,5	17	8,5	44	22
Total	92	46,0	108	54,0	200	100

B. Quarterly and yearly individual daily food intake, including quality content of food consumed in calories and nutrients; proteins, lipids, carbohydrates (expressed in grams per 100 g of food consumed)

Table no. 2 shows patients' average daily food intake (in grams/person) over each quarter and yearly.

This table shows the results of food surveys, based on food lists, on patients' individual food types (grams/person) consumed while hospitalised with musculoskeletal disorders. These were calculated using the ingredient lists used in preparing daily meals, multiplied by each quarter or yearly seasons.

These results show that milk, dairy products, cheese, meat and meat products, fruits, and vegetables other than potatoes were consumed in insufficient quantities. Finally, amounts of fat, eggs, bread and other derivatives from cereals, potatoes and sugar confectionery exceeded the recommended quantities.(10,11)

Table no. 2 Patients' daily average food intake (grams/person)

Food Group	Q1	Q2	Q3	Q4	Yearly	Recommended	Deviation %
Milk and milk products	350	330,7	290,6	325,8	324,3	500	-35,1
Meat and meat equivalent	157,2	148,6	132	134	142,9	190	-24,8
Eggs	40,7	36,5	39,7	38	38,7	35	+10,6
Total fat,	59,8	56	57,2	61,4	58,6	45	+30,2
out of which vegetable fat	55,4	44,8	50,3	56,2	51,7	25	+106,8
Bread and derivates	480,9	478,6	476	481	479,1	450	+6,5
Potatoes	251	228,1	234,3	262,7	244	200	+22
Other vegetables	278	280,4	272	285,9	279,1	300	-6,9
Fruit	79,5	130,3	123,8	152	121,4	170	-28,6
Sugar and sugar products	75	64,5	71,7	74,2	71,3	60	+18,9

Table no. 3 shows consumed food's nutrient content such as proteins, lipids, carbohydrates (in grams per 100 g food consumed) and calories. Food surveys also showed an unbalanced intake of nutrients for the main food groups, along with an excess in calories as seen in table 3. Specifically, protein content negatively deviated by -1.7% from the recommended intake, while lipids and carbohydrates positively deviated by +10.8% and +9%, respectively. Energy intake showed a positive deviation of + 7%.

Table no. 3. Nutrient content of protein, fat, and carbohydrates (in grams per 100g food consumed) and calories of food consumed

Main food	Q1	Q2	Q3	Q4	Yearly	Recommended	Deviation %
Total proteins	105,2	91,8	94,7	101,4	98,3	100	-1,7
Animal proteins	35,3	39	40,2	41,4	39	50	-22
Vegetable proteins	69,9	52,8	54,5	60	59,3	50	+18,6
Total lipids	115,4	95,9	104,7	105	105,2	95	+10,8
Carbohydrates	437	428,6	409,3	382,8	414,4	380	+9
Calories	3084,1	2899,3	2901	3102,6	2996,7	2800	+7

C. Patients' exercise levels, based on daily activities and patient participation in an organized form of physical activity and sport.

Each patient's level of exercise, based on daily activities (professional and household), was recorded as either light, moderate, or high using a questionnaire. The results highlight prevailing low to moderate levels of physical effort, more so in females than males (table no. 4).

Table no. 4. Levels of exercise, based on daily activities (professional and household), recorded using a questionnaire

Gender (N)	Patient's level of exercise, based on daily activities					
	Light		Moderate		High	
	N	%	N	%	N	%
Male (92)	26	28,26	41	44,57	25	27,17
Female (108)	27	25	61	56,48	20	18,52
Total (200)	53	26,5	102	51	45	22,5

Table no. 5 shows patient participation in at least one form of organized physical activity and sport. These results further highlight the low engagement patients have with any organized forms of physical activity or sport, such as aerobics, fitness, cycling, jogging, pilates programs, or swimming. This is especially noticeable with females. Reported are static work, or office work, and typical household activities.(6) As it has been observed, caloric needs are surpassed by energy intake.

Table no. 5. Patients' participation in at least one form of organized physical activity

Gender (N)	Organized physical activity and sport			
	YES – participate		NO – does not participate	
	N	%	N	%
Male (92)	29	31,52	63	68,48
Female (108)	25	23,15	83	76,85
Total (200)	54	27	146	73

D. Musculoskeletal diseases and comorbidities or other conditions or chronic diseases in the patient sample

Admission diagnosis was extracted from patients' official medical file. Analysis of these diagnoses shows that patients presented with a number of musculoskeletal diseases: discal and vertebral degenerative disorders, hip and knee osteoarthritis, phase III spinal lumbar discopathy with or without herniated disc that may or may not have required neurosurgical intervention, had as well musculoskeletal trauma resulting in fractures, sprains, contusions which led to orthopedic surgery intervention, staturoposturale changes were present such as scoliosis and kyphosis, inflammatory diseases were found with chronic course, such as spondilytis arthritis (SA) and rheumatoid arthritis (RA), gout and other metabolic disorders with repercussions to the locomotor system, such as psoriatic arthritis.

Table no. 6. Musculoskeletal diseases

Gender (N)	Musculoskeletal diseases									
	Degenerative rheumatic disease (osteoarthritis)		Spinal lumbar discopathy- phase III +/- herniated disc surgery		Musculoskeletal trauma +/- intervention		Staturo-postural changes		SA and RA, gout, psoriatic arthritis, others	
	N	%	N	%	N	%	N	%	N	%
Male (92)	65	70,65	8	8,70	10	10,87	6	6,52	3	3,26
Female (108)	89	82,41	2	1,85	4	3,70	11	10,19	2	1,85
Total	154	77	10	5	14	7	17	8,5	5	2,5

Table no. 7. Patients with musculoskeletal degenerative diseases and chronic diseases for whom these diseases directly influence their nutritional status

Gender (N)	Chronic diseases with influence on the nutritional status of patients with musculoskeletal disorders							
	Digestive disorders		Endocrine and metabolic diseases		Osteoporosis		Other conditions	
	N	%	N	%	N	%	N	%
Male (92)	34	36,96	38	41,30	9	9,78	11	11,96
Female (108)	39	36,11	41	37,96	24	22,22	4	3,71
Total	73	36,5	79	39,5	33	16,5	15	7,5

Table no. 8. Number of patients by Body Mass Index

BMI	Female		Male		Total	
	N	%	N	%	N	%
< 18,5 (underweight)	5	2.5	2	1	7	3,5
18,5-24,9 (normal weight)	87	43.5	69	34.5	156	78
25-29,9 (overweight)	10	5	13	6.5	23	11,5
> 30 (obese)	6	3	8	4	14	7
Total	108	54	92	46	200	100

Table no. 6 shows these results. Out of all the musculoskeletal diseases, degenerative rheumatic disease (osteoarthritis) had the highest frequency in patients investigated. Depending on the location, diagnosed osteoarthritis were localized in the knees, hip, and spine (discal and vertebral degenerative disorders).(12,13)

Also studying these results from the official patients' medical file showed that patients hospitalized with musculoskeletal diseases encapsulate a varied range of comorbidities or other chronic diseases and other conditions. The presented pathology, such as digestive disorders (peptic ulcer, liver cholecystitis, pancreatitis), endocrine and metabolic diseases (diabetes, gout, dyslipidemia, vitamin D insufficiency) or osteoporosis, could affect a certain percentage of their normal nutritional status (table no. 7).

E. Body weight - deviations from normal weight

In order to assess deviations from ideal weight, using hospitalized patients' current weight, the body mass index BMI was calculated. The body mass index, also known as the Quetelet index, represents the ratio between the person's body weight (in kilograms) and the squared value of the waist (in meters). Its particularly valuable as it highly correlates to the total mass of body fat, higher than other indices of weight and height. Overweight was defined as BMI between 25.00 and 29.9 kg / m2, obesity for BMI ≥ 30 kg / m2 and malnutrition for BMI under 18.5 kg / m2; a normal weighing adult should have a BMI between 18,5-24,9 kg/mp

Table 8 shows patient numbers with normal or pathological BMI. The results show that 156 patients (69 males, 34.7%) in this study had a normal weight, 7 patients were underweight, with the remaining 37 being overweight or obese.

CONCLUSIONS

1. The results of this study have shown several issues in the diet of patients with muskoskeletal disorders. The most important of these are: the low consumption of milk and dairy products, vegetables and fruit, as well as an increased consumption of fat and sugar confectionery.(10)

2. Additionally, only a small number of patients participated in any organized form of physical activity or sport. Indeed, more than half of the patients were not involved in any physical activities, with the exception of typical household activities and office work.

Out of all the musculoskeletal diseases, degenerative rheumatic disease (osteoarthritis) had the highest frequency in patients investigated. Depending on the location, diagnosed osteoarthritis was localized in the knees, hip, and spine (discal and vertebral degenerative disorders). This result may be linked to lack of involvement in any physical activities, with the exception of typical household activities and office work.

3. Osteoporosis was one of the causes among comorbidities for which the studied patients were hospitalized. Among the factors involved in this disease's onset we can consider a low intake of calcium and phosphorus due to insufficient consumption of dairy products, a reduction of intestinal calcium absorption following digestive apparatus changes, and vitamin D deficiency (from lowered food intake and insufficient exposure to sunlight). Statistical results further found that around 50% of women aged over 50 had osteoporosis fractures. Women commonly suffer from this disease, as a result of bone loss during menopause, caused by estrogen deficiency, leaving men more protected against this disease. The disease can have very serious consequences as up to 60% of the people diagnosed with osteoporosis continue to live with severe disabilities, while some even risk dying.(6)

In conclusion, this study found that both dietary mistakes and lack of physical activity have a cumulative causal effect on our patients' degenerative musculoskeletal diseases. As considered a chronic disease with influence on the nutritional status of patients with musculoskeletal disorders, osteoporosis

was one of the causes among comorbidities. For this reason, recommendations were made both to correct errors in the food served, and to encourage positive attitudes towards physical activity, in whatever form this might take, and, of course, under the guidance of the physician where appropriate.(3,4)

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