

DIET AND STRESS FACTORS DURING IMPRISONMENT

Prof. LĂCRĂMIOARA BĂDĂRĂU
Colegiul Economic "Mihail Kogălniceanu" Focșani

ABSTRACT: *This study aimed to analyze the impact food has, especially fat intake, on the behaviour of people that are imprisoned.*

It is known that prisoners are subject to stressful situations, due to the long time spent living with people with different life habits, being prone to antisocial behaviour and subject to a controlled diet.

The study was conducted during November 2008 and December 2010 in a prison in Moldova and it concluded that prisoners who received the prison food could have increased levels of stress, which adversely affects health, due to food monotony because of fat composition and structure.

Key words: *stressful factors, depression, food rations*

Introduction

Human behaviour is rooted in a system of necessities and motives, often contradictory, which subjective value is given both by to their significance for the individual and to the possibilities and limitations of context and sociocultural norms.

The subjective value of motivation determines the intensity of the adaptation process which consists of a permanent on-going effort to address the new situations generated by the human subject dealing with the environment.

From the perspective of stressful factors (the situation) the stress is a set of physical, mental or social stimuli which through their complexity, intensity or duration of action put the body in a characteristic tension.

Noise, heat, cold, congestion, conflict or frustrating situations, negative life events, traumatic situations, overload in work, difficulties in interpersonal relationship, loss or professional or family status are all factors of stress.

In the detention conditions, the person faces a range of stressful situations that lead to different states:

1. Frustration can stimulate the body to solve problems or rather can lead to defensive reactions or pathologic states associated with chronic frustration or anxiety.

2. Aggression is always a consequence of frustration, as frustration always leads to some form of aggression (N. Mitrofan, 1996) and antisocial behaviour.

3. Apathy is a reaction consisting of an attitude of isolation or indifference to the source of frustration, leading to the installations of depressive episodes.

People who are imprisoned, who face stressful situations on a daily basis due to coexistence in confined spaces and overcrowding, may be at risk of cardiovascular disease, diabetes, psychiatric symptoms, depression or anorexia;

That is why the question arises whether the diet of such individuals may be a productive factor and potentially the harmful effect of external factors?

Aims

Considering the influence of nutrition on the individual's health and particularly on the nervous system and behaviour, we undertook a study on the feeding of prisoners through the intake of nutrients which participate at the brain level.

In this regard, taking into account the direct relationship between the amount of tryptophan in the ration and serotonin synthesis at the brain level and mental protective effect provided by omega-3 fatty

acids, the present study had the following objectives:

- a. Monitoring the standard variety of food;
- b. Assess the contribution of tryptophan in the standard of food;
- c. Qualitative analysis of lipids in normal patterns of food..

Background

The study was conducted on the qualitative and quantitative determinations of lipids in healthy standard of food given to prisoners, during November 2008 and December 2010.

In the detention centre, prisoner's food was produced in the nutrition unit, including the menu (standard food) for healthy prisoners who are receiving three meals: breakfast, lunch and dinner.

The group is made up of men aged 25-45 years old, some of which are allowed to work outside the prison and often work perform agricultural duties in the prison.

Experimental- method

Analysis were conducted using a sample of food rations, which were selected at random.

Then the hydrolysis of protein and carbohydrates substances in hot hydrochloric acid was performed, the insoluble part separated by filtration and then the fat was extracted with petroleum by Soxhlet method. Qualitative analysis was performed by the method of chromatographic fatty acid methyl ester. (ISO 5508-2002).

Results and Discussion

a. Frequency of food use in standard food

Food provided for the prisoners is obtained by the use of raw materials provided in food standard number 13, available in Romania. Between November 2008 and December 2010, 38 menus were analysed based on documentation.

Menus are based on a repetitive sequence of a small number of dishes that have raw vegetables and pork meat as their main ingredients.

Analysing how the basic raw materials are repeated in the rules of food composition it reached the following conclusions presented in table 1.

Table 1- the frequency of major food use of food regulation

Nr.crt	Raw vegetable/ dishes	Number of dishes	Frequency %
1	Root	60	54,5
2	Bacon	48	43,2
3	Pork meat	43	38,7
4	Beans	45	40,5
5	Biscuits	45	40,5
6	Potatos	34	30,6
7	Pasta	16	14,4
8	Cow cheese	16	14,4
9	Cabbage	9	8,1

Frequent use and predominant of root vegetables, cabbage, dried beans, with pork fat, highlight a small number of raw materials used. Lack of variety in the menu structure leads to installing of food monotony (5), which results in decreased appetite. Furthermore, the menu for dinner is made up of only tea, biscuits and bread for the entire period. We appreciate that the monotony of the menu is felt as a stress factor that can increase the risk that prisoners are exposed to emotional states known as “emotional hunger”.

Emotional hunger is the result of negative emotions, discomfort and stress, has

the following characteristic: occurs suddenly, without any relation to food intake, craving manifesting as a focus on eating a certain food as soon as possible, failing that to install a continuous state of emotional distress, with repercussions on behaviour.

b. The evaluation of the tryptophan intake in food regulation

This food component involved in the individual’s mental state by converting into serotonin, was evaluated approximately on the basis of the composition table from the menu (Table 2).

Table 2 - Tryptophan content of the rations

Data	Raw materials	Tryptophan bread, mg	Tryptophan in food standard, mg
24-04-09	Pork,bacon,beans, root spinach, onion, potatoes, oil, biscuits, bread	369	351
23-07-09	Pork, , fatty meat,beans,root, oil,onion, , potatoes Pasta, cheese, biscuits, bread	369	342
29-10-09	Pork,bacon,beans,root, cabbage, onion. , potatoes, oil, biscuits, bread	369	335
04-03-10	Pork,bacon,beans, root spinach, onion, peas , potatoes, oil, biscuits, bread	369	259

Knowing that the recommended daily amount of tryptophan is 12.5 mg/kg, for a person weighing 65 kg it may be considered necessary to intake 812mg of tryptophan/per day. Insufficient amount of tryptophan can be noted in the diet, this being due to insufficient quantity of protein in the standard food.

Taking in to consideration the relationship between the amount of tryptophan in the diet and produced serotonin one can say the following:

- food standard is often inadequate in tryptophan; this fact is the impact of the synthesis of serotonin and its beneficial effects on the physic aspect;

- because in the standard of food, the carbohydrates are provided only by the interim bread, gluten biscuits and jam, their consumption will not increase the synthesis of serotonin or endorphins, a fact verified in the case of chocolate and sweets confectionery in particular;
- with regard to the two findings, we can estimate that there may be a risk of episodes of anxiety or depression.

If one of these issues are added to the stress factors due to conditions of imprisonment, a major risk for the installation of appropriate behavioural symptoms of depressive or aggressive, with serious antisocial consequence.

c. Standard evaluation of food lipids

The study of lipid influence on the mental state must concern: the amount of omega-3 fatty acids, with a protective role and parallel analysis of the enhancer effect of saturated fatty installation of nerve disorder (Maggio, 2009)

Research (Horrobin, 1992) showed that the antidepressant effect of omega-3 can be explained by:

- 1 depression is the result of irregular and complex inflammatory reaction due to high levels of saturated fatty acids (AGS) and low omega-3;
- 1 are converted into various eicosanoids, such as prostaglandins, thromboxane and leukotriene with anti-inflammatory properties that directly influence the behaviour;
- 1 compete with arachidonic acid, to stop forming cytokine (inflammation) specific to the previous one, which can cause depression by abnormal activity of hypothalamic-pituitary axis hormones such as cortisol and thyroxine affect;
- 1 reduce the inflammation and attenuates the cytokine action, by inhibiting cyclooxygenase (COX-2) responsible for inflammation, pain and depression;
- 1 amend the transduction process of signal to the brain cells, which enhances the activity of neurotransmitters;
- 1 are incorporated into the cell membranes, where it acts on the physical structure and on fluidity of membranes, leading to optimal reception of serotonin;
- 1 data on the structure on lipid fatty acids present in food regulation are presented in table 3.

Table 3. Lipids qualitative analyses (referring to the research time interval)

Data	AGS,g	%Lt	% necesar	AGMN, ,g	%Lt	% necessary
recommended	33	33	100	34	34	100
20-11-09	50	38	152	66	49	193
05-05-10	17	55	52	12	39	36
20-07-10	20	40	62	22	44	65
29-11-10	32	39	97	37	45	132

Data	AGPN omega-6,g	%Lt	% necessary	AGPN omega-3,g	%Lt	% necessary	omega-6/ omega-3
recommended	27,5	27.5	100	5,5	5.5	100	5
20-11-09	16	12	58	3,0	9	54	5
10-05-10	1	3	4	0.7	3	19	1
20-07-10	7	15	25	0.6	0.3	11	11
29-11-10	12	15	44	1	1	18	12

Note: AGS-saturated fatty acids, AGMN-monounsaturated fatty acids, ,AGPN- polyunsaturated fatty acids.

To analyse the distribution of fat in the standard food we expressed this in terms of their nature and their energy value (in table no. 4, fig. 1).

Table 4. Energy intake of different types of fat in rations

Data	Caloric value of the ration kcal	Lipide energy kcal	AGS Energy kcal	AGMN Energy kcal	Omega-6 energy, kcal	Omega-3 energy, kcal
Recom.	2855	856	282	291	235	47
18-11-09	3218	1246	465	614	149	28
05-05-10	2002	288	158	112	9	7
20-07-10	2080	465	186	205	65	6
29-11-10	2525	762	298	344	112	9

Note: AGS-saturated fatty acids, AGMN-monounsaturated fatty acids

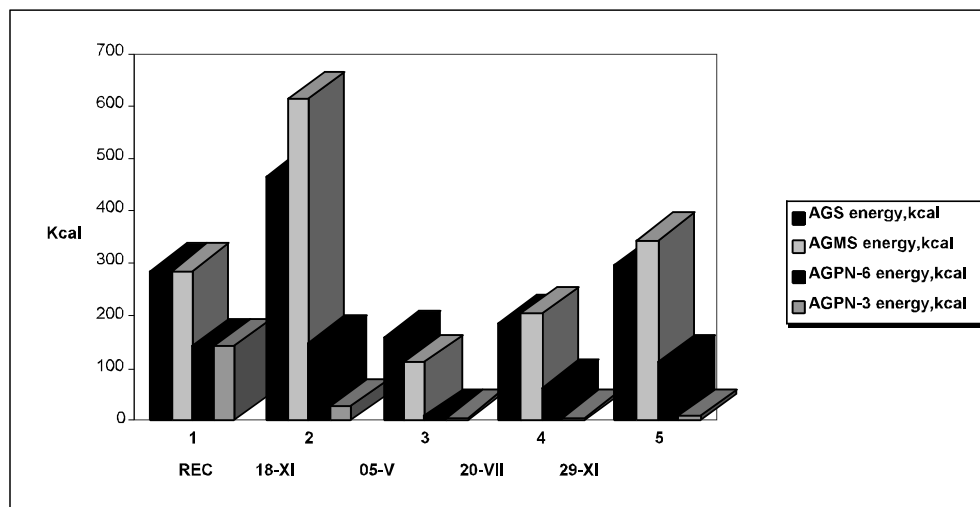


Fig. 1. Graphical representation of the structure of lipids intake

The information in table 4 and figure 1 are illustrative:

- 1 energy derived from saturated fatty acids is sufficient even excess of fatty acids for winter periods when sedentary and excess fat food become a cardiovascular risk;
- 1 energy derived from polyunsaturated fatty acids is lower than 10% of the daily energy share, resulting in increases in

- lipoproteidelor with low density (LDL), increasing the risk of accumulation of atherosclerosis on vessels and the occurrence of hypertension (Segal, 2006);
- 1 the amount of omega-3 fatty acids present in the ration is not enough to highlight the cardiovascular protective effect of anti-inflammatory requested (Orza, 2010)

Conclusions

1. The large amount of saturated fatty acids in the diet structure, increase the risk of cardiovascular diseases that are directly related to the installation of depression episodes (Connerney,2011)
 2. the large amount of saturated fatty acids in the diet structure, determines changes in the membrane structure leading to the inflammatory process to install
 3. the large amount of saturated fatty acids affects adversely(negative) the serotonin synthesis, a transmitter synthesized at neurons level of the central nervous system, at cells or platelets enterocromafine level, which has an important role in producing sleep, mental and emotional process, in motor functions, in thermoregulation and the blood pressure regulation
 4. Deficient amounts of tryptophan from raw materials from which the standard of food is obtained
 5. Low level of serotonin and endorphins may increase the influence of depression and social behaviour
 6. The risk of depression may increase in autumn-winter periods when the intake of saturated fatty acids in the standard of food is high (Kalmijn, 2004)
 7. Insufficient quantities of omega-3 polyunsaturated fatty acids in the regulation of food shortage could lead to cancellation of transduction and protective anti-inflammatory effect (Stoll, 2001).
 8. Insufficient quantities of omega-3 fatty acids may cause a decrease in the functioning of the endogenous circadian clock leading to the occurrence of irritability and increase anxiety (Mendoza, 2008)
 9. Presence of arachidonic acid in the diet composition from pork meat result in the formation of cytokines and leukine which have a negative effect on behaviour (Banu, 2009)
 10. A high level of omega-6/ omega-3 may increase the risk for both depression and inflammatory diseases (Kiecolt Glaser, 2008)
 11. Limited range of food from the standard diet and monotone character of the ration may increase the risk of known condition as “emotional hunger”
 12. Such a diet can trigger a large register of reactions and events –the resignation and apathy to despair and anger that in the context of paroxysmal crowd was amplified by contagion(positive feedback) with increased emotional (instinctual unchaining)(Hill, 2007)
 13. highly probable link between stress-monotonous food - depression
- A serious problem is the fact that people suffering from mental illness have a low quality of life, requiring specialized care, therefore causing additional cost to society; cost that could be greatly reduced by careful management and the correct diet.

REFERENCES

1. P.ARTIMIS, A. SIMOPOULOS: The Importance of the Omega-6/Omega-3 Fatty Acid Ratio in Cardiovascular Disease and Other Chronic Diseases, *Experimental Biology and Medicine*,233, 2008, 674-688.
2. C. BANU:Alimentație pentru sănătate, Editura ASAB, București,2009.
3. F. CALON : Dietary n-3 polyunsaturated fatty acid depletion activates caspases and decreases NMDA receptors in the brain of a transgenic mouse model of Alzheimer's disease, *European Journal of Neuroscience*, 22(3), 2005, 617 – 626.

4. I. CONNERNEY : Depression Is Associated With Increased Mortality 10 Years After Coronary Artery Bypass Surgery, *Psychosomatic Medicine*, 72, 2011, 874-881 .
5. A. GIL. : Polyunsaturated fatty acids and inflammatory diseases ,*Biomedicine & Pharmacotherapy*, 56(8), 2002, 388-396.
6. K. HARNEY: Long-chain saturated fatty acids induce pro-inflammatory responses and impact endothelial cell growth, *Clinical Nutrition*, 29(4), 2010, 492-500.
7. S. KALMIJN: Dietary fat intake and the risk of incident dementia in the Rotterdam study, *American Neurological Association*, 42(5), 2004, 776 – 7828,
8. J.K KIECOLT-GLASER: Depressive Symptoms, omega-6:omega-3 Fatty Acids, and Inflammation in Older Adults, *Psychosomatic Medicine* ,69, 2007, 217-224.
9. J.K. KIECOLT-GLASER : Stress, Food and Inflammation: Psychoneuroimmunology and Nutrition at the Cutting Edge, *Psychosomatic Medicine*, 72, 2010, 365-369.
10. M. MAGGIO : The Impact of Omega-3 Fatty Acids on Osteoporosis, *Current Pharmaceutical Design*, 15(36), 2009 , 4157-4165.
11. J. MENDOZA.: High-fat feeding alters the clock synchronization to light, *Journal of Physiology*, 2008.
12. N. MITROFAN: Psihologie judiciară, Editura Șansa,1997.
13. P W. HOEN: Differential Associations Between Specific Depressive Symptoms and Cardiovascular Prognosis in Patients With Stable Coronary Heart Disease,*Journal of the College of Cardiology*, 56, 2010, 838-844.
14. R.SEGAL: Biochimia produselor alimentare,Editura Academica,București 2006
15. A. STOLL: The omega -3connection,the groundbreaking omega -3 antidepression diet and brain program, Andrew L Stoll,M.D.2001.
16. N. TIEMEIER: Plasma fatty acid composition and depression are associated in the elderly: the Rotterdam Study, *American Journal of Clinical Nutrition*, 78(1), 2003.