

SELF-PERCEPTION OF BODY WEIGHT IN UNDERWEIGHT AND OVERWEIGHT-OBESE YOUNG ADULTS

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REZUMAT

Dezvoltarea cognitivă a tinerilor este legată de percepția propriei greutate și de imaginea corporală. Prezentul studiu și-a propus evaluarea percepției propriei greutate la o populație de studenți timișeni subponderali și supraponderali-obezi. Eșantionul de 619 studenți luat în studiu, 63,9% fete și 36,1% băieți, cu vârsta între 18-25 ani, 58,7% subponderali și 41,3% supraponderali și obezi, a rezultat prin aplicarea criteriului de selecție IMC, unui eșantion reprezentativ de 2076 studenți de la universități timișene. Metodele de lucru au fost antropometria și studiul populațional transversal cu aplicarea Chestionarului CORT 2004. La subponderali, 36% își percep corect greutatea, iar 64% își percep greșit greutatea, cu diferențe semnificative statistic între sexe, sexul feminin își apreciază de 2,37 ori mai frecvent decât sexul masculin în mod greșit propria greutate. La supraponderali și obezi, 71,1% își percep corect greutatea, iar 28,2% își percep greșit greutatea, fără a exista diferențe între sexe.

Cuvinte cheie: tineri subponderali și supraponderali-obezi, percepția propriei greutate

ABSTRACT

Cognitive development of young people is linked to the self-perception of body weight and appearance. The present study aimed to evaluate the self-perception of body weight in a population of underweight and overweight-obese students in Timis County. The sample of 619 students included into the study, 63.9% girls and 36.1% boys, aged between 18-25 years, 58.7% underweight and 41.3% overweight and obese, was selected according to the BMI criterion which was applied to a representative sample of 2076 students in Timis County Universities. The work methods were anthropometry and the transversal populational study by use of the CORT 2004 Questionnaire. In underweight subjects, 36% accurately perceive their own weight, while 64% perceive it inaccurately, with statistically significant differences between genders, female subjects inaccurately perceiving their own weight 2.37 times more frequently than males. In overweight and obese subjects, 71.1% correctly perceived their own weight, and 28.2% perceived it incorrectly, with no gender differences.

Keywords: underweight and overweight-obese young people, self-perception of body weight

INTRODUCTION

Young adulthood is a stage in human evolution characterized by marked changes in all segments. This stage involves the transition from childhood, characterized by dependence, to adult age, characterized by independence. Young people develop both physically and in the fields of cognition, identity and sexuality. They change their relationships with family members and peers in order to reach a degree of emancipation and the possibility to take over functional roles [1].

The cognitive development of young people is connected to the self perception of their own body weight and image. The lack of satisfaction related to body weight is due the influence of the media, body weight perception and health risk behaviours [2]. The body self perception is one of the motivational factors of ponderal reduction attempts [3] and a better predictor of such behaviours than the actual body weight in young people [4].

The present study aimed at assessing the self perception of body weight in a population of underweight and overweight-obese Timis County students.

MATERIAL AND METHODS

MATERIAL

The sample of 619 students included into the study, 63.9% girls and 36.1% boys, aged between 18-25 years, 58.7% underweight and 41.3% overweight and obese, was selected by the BMI criterion applied to a representative sample of 2076 students in Timis County higher education institutions.

METHODS

1. Anthropometry

By anthropometry, physical development direct indicators – height (m), weight (kg); body mass index (BMI) – calculated by the

formula: $\text{weight (kg)/height}^2 \text{ (m}^2\text{)}$, reported to the age and gender criteria are determined.

A BMI within the range of 18.50-24.99 corresponds to a normal weight reported to height; values under 18.49 indicate underweight; those between 25.00-29.9 indicate overweight; values from 30 and beyond indicate obesity. BMI values correspond to the United States National Centre for Health Statistics (NCHS) and World Health Organization (WHO) reference data [5,6].

2. The populational transversal study on self perception of body weight

The populational transversal study relied on the CORT 2004 Questionnaire on health risk behaviours in adolescents and young adults. The questionnaire was applied by direct interview. Inclusion of young people in the study was done only after freely expressed consent of each participant was obtained.

The data collection and processing uses state-of-the-art medical statistics methods. Data were electronically filed using the Epiinfo programme, version 6.0, 2001 and processed by PASW, version 18, 2010. Statistical significance threshold values $p < 0.05$ were considered as statistically significant, and $p < 0.01$ was highly significant. The following statistical tests were applied: the chi-squared test, the Mann-Whitney test [7].

RESULTS AND DISCUSSIONS

In the case of *underweight students*, 35.4% (129) accurately assessed their body weight as being under the normal values, 56% (204) considered their body weight as being approximately normal, and 6.9% (25) considered themselves as being overweight (Table 1, Figure 1).

Table 1. Distribution of underweight students according to self perception of body weight

How do you consider your body weight?*	Frequency	Percent	Valid percent	Cumulative percent
Under the normal weight	129	35.4	36.0	36.0
Around the normal weight	204	56.0	57.0	93.0
Over the normal weight	25	6.9	7.0	100.0
Total	358	98.4	100.0	
Missing data	6	1.6		
Total	364	100.0		

*BMI classification = underweight

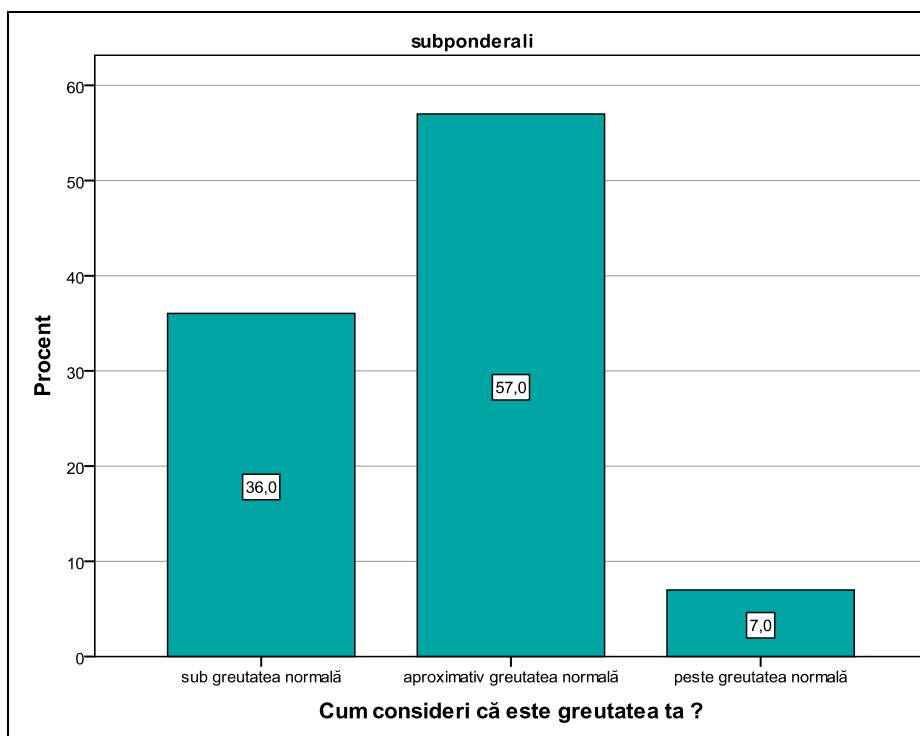


Figure 1. Percent distribution of underweight students according to self perception of body weight

In the case of *overweight and obese* students, 71.4% (182) of them accurately assessed their body weight to be over the normal values, 24.3% (62) considered their

body weight to be approximately normal, and 3.9% (10) considered themselves to be underweight (Table 2, Figure 2).

Table 2. Distribution of overweight and obese students according to their body weight self perception

How do you consider your body weight?*	Frecquency	Percent	Valid percent	Cumulative percent
Under the normal weight	10	3.9	3.9	3.9
Around the normal weight	62	24.3	24.4	28.3
Over the normal weight	182	71.4	71.7	100.0
Total	254	99.6	100.0	
Missing data	1	0.4		
Total	255	100.0		

*BMI Classification = overweight and obese

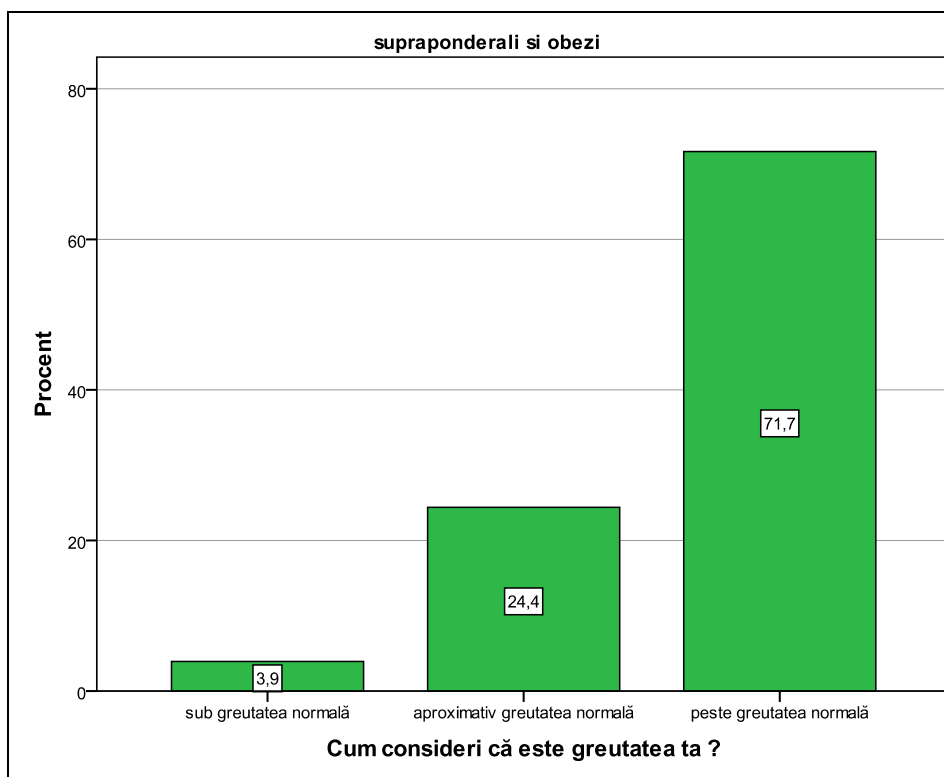


Figure 2. Percent distribution of overweight and obese students according to self perception of body weight

Regarding gender distribution, 29.4% (105) girls out of the total of 347 **underweight** students accurately consider their weight to be under the normal values, and 52.7% (188) think their body weight is within the normal range. There is a percent of 5.6 (20) among underweight girls who saw themselves as overweight. 6.7% (24) boys out of the 347 underweight students accurately assessed their body weight to be

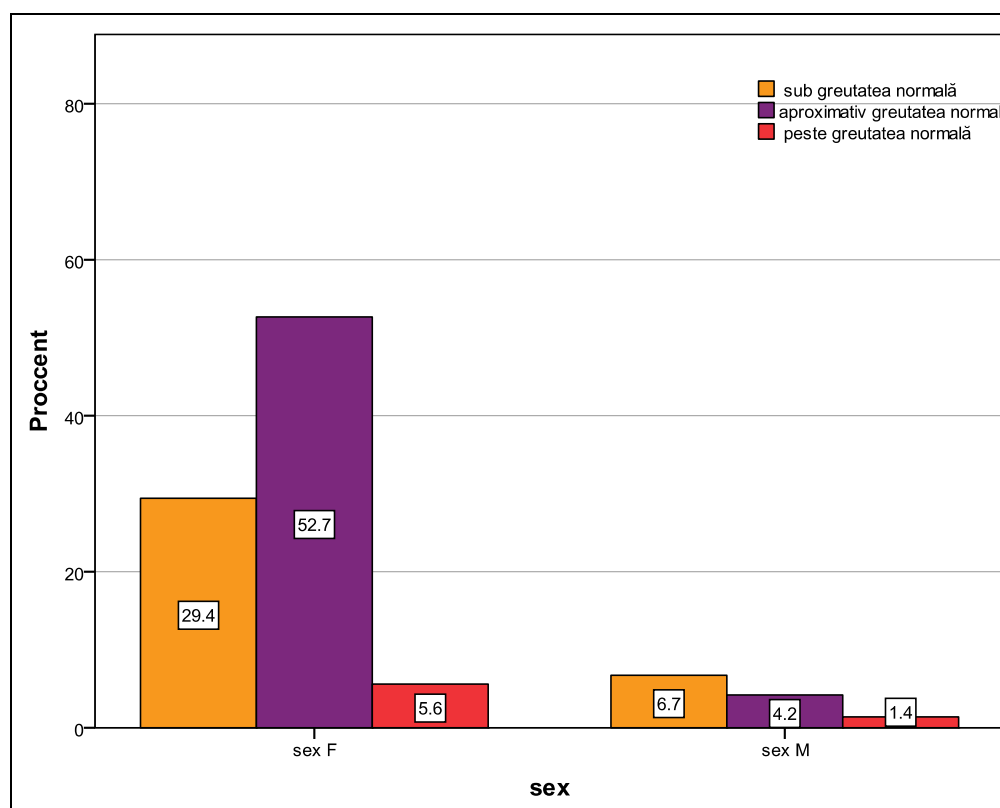
under the normal values, and 52.7% (188) thought their weight is within the normal range. There is a percent of 1 (5) among underweight boys who saw themselves as obese (Table 3, Figure 3).

We found that underweight girls more frequently consider their weight to be over the real values, as compared to boys, $U=5760$, $z=-2.0$, $p<0.05$.

Table 3. Distribution of underweight students according to self perception of body weight, with separate values for the two genders

How do you consider your body weight ?*		Gender		Total
		F	M	
Under the normal weight	Number	105	24	129
	% out of total	29.4%	6.7%	36.1%
Around the normal weight	Number	188	15	203
	% out of total	52.7%	4.2%	56.9%
Over the normal weight	Number	20	5	25
	% out of total	5.6%	1.4%	7.0%
Total	Number	313	44	357
	% out of total	87.7%	12.3%	100.0%

*BMI Classification = underweight

**Figure 3. Percent distribution of underweight students according to self perception of own body weight, with separate values for the two genders**

There are numerous studies reporting that women, as early as during adolescence, are less satisfied with their appearance and body weight than men [8,9], this dissatisfaction probably originating in the pressure from the mass-media with the ideal image of the modern woman presented as being slim.

Regarding gender distribution, 22.8% (58) girls out of the total of 254 **overweight and obese** students accurately assessed their body weight as being over the normal values, and 7.1% (18) considered their body weight to be within the normal range. There is a percent of 0.8 (2) of overweight girls

who see themselves as overweight or obese. 48.8% (124) boys of the total of 254 overweight students accurately assessed their body weight as being over the normal values, and 17.3% (44) consider that their body weight is within the normal range. There is a percent of 3.1% (8) overweight

boys who see themselves as being overweight (Table 4, Figure 4).

In overweight and obese students we found no significant differences in self perception of body weight between the two genders, $p > 0.05$.

Table 4. Distribution of overweight and obese students according to self perception of own body weight, in the two genders

How do you consider your body weight?*		Gender		Total
		F	M	
Under the normal values	Number	2	8	10
	% of total	.8%	3.1%	3.9%
Around the normal weight	Number	18	44	62
	% din total	7.1%	17.3%	24.4%
peste greutatea normală	Număr	58	124	182
	% of total	22.8%	48.8%	71.7%
Total	Number	78	176	254
	% of total	30.7%	69.3%	100.0%

*BMI Classification = overweight and obese

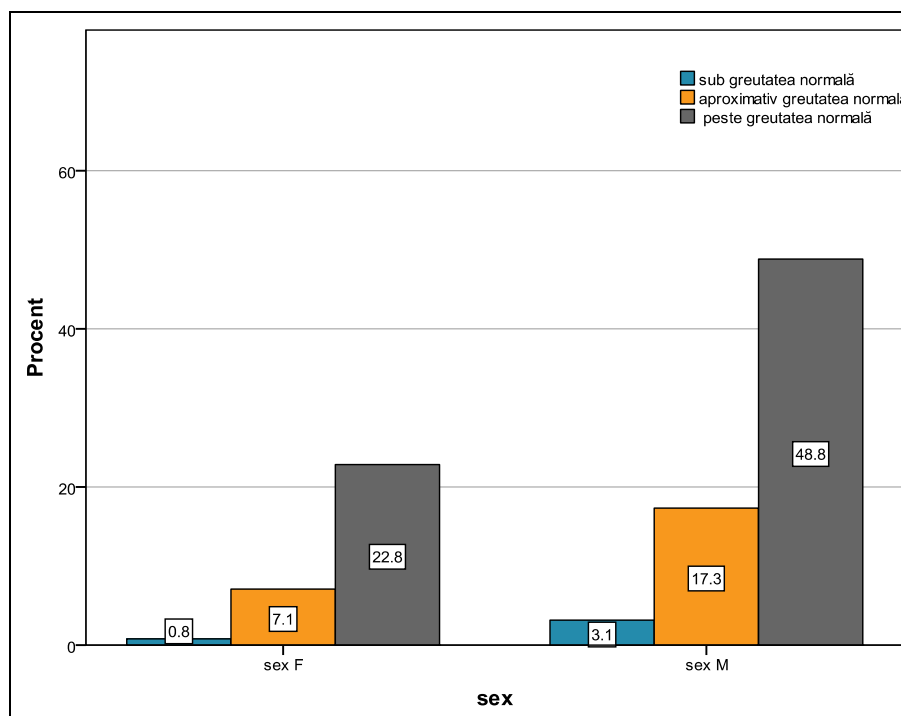


Figure 4. Percent distribution of overweight and obese students according to self perception of body weight, with separate values for the two genders

In a study performed in the USA [10], researchers demonstrated that numerous

overweight or obese students who do not consider themselves to be over the normal

weight, will not become involved in activities for the decrease of their body weight.

In the case of *underweight* students, 36% (129) of them accurately perceive their own body weight, and 64% (229) do not (Table 5, Figure 5).

Table 5. Distribution of underweight students according to self perception of body weight

Classification of body weight perception *	Frequency	Percent	Valid percent	Cumulative percent
correct	129	35.4	36.0	36.0
incorrect	229	62.9	64.0	100.0
Total	358	98.4	100.0	
Missing data	6	1.6		
Total	364	100.0		

*BMI Classification = underweight

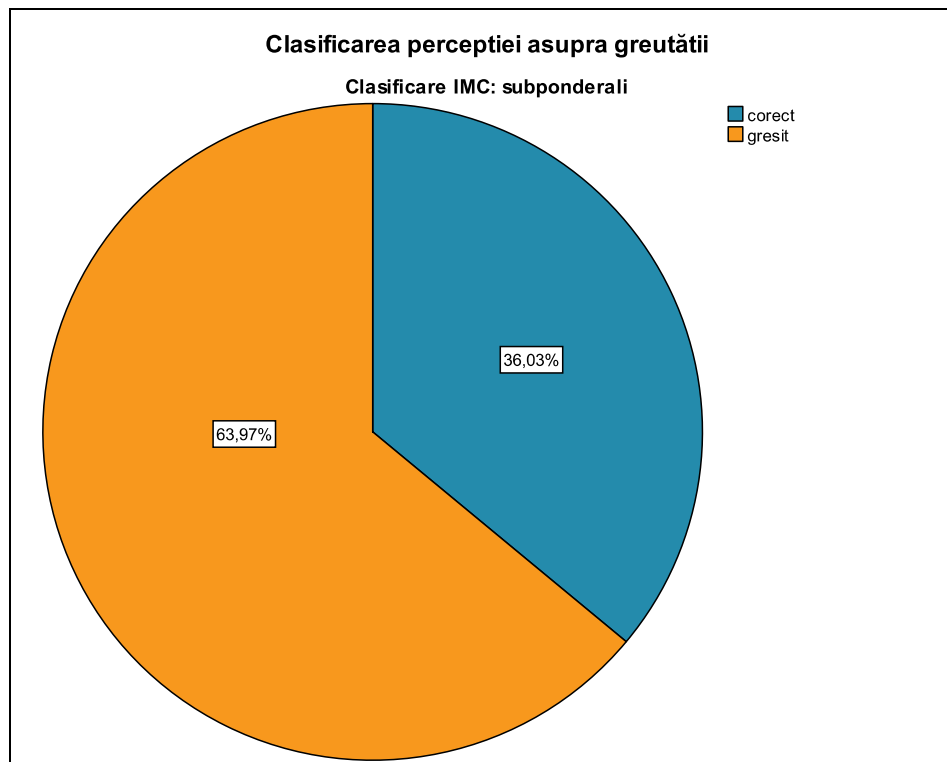


Figure 5. Percent distribution of underweight students according to the self perception of body weight

For both genders, underweight subjects perceive their body weight as shown in Table 6, Figure 6.

In the underweight group we found statistically significant differences between

the two genders regarding the self perception of body weight, female subjects inaccurately assessing their body weight 2.37 times more frequently than male subjects, $\chi^2=7.37$, $p<0.01$.

Table 6. Gender distribution of underweight students according to self perception of body weight

Classification of body weight perception*		Gender		Total
		F	M	
correct	Number	105	24	129
	% of total	29.4%	6.7%	36.1%
incorrect	Number	208	20	228
	% of total	58.3%	5.6%	63.9%
Total	Number	313	44	357
	% of total	87.7%	12.3%	100.0%

*BMI Classification = underweight

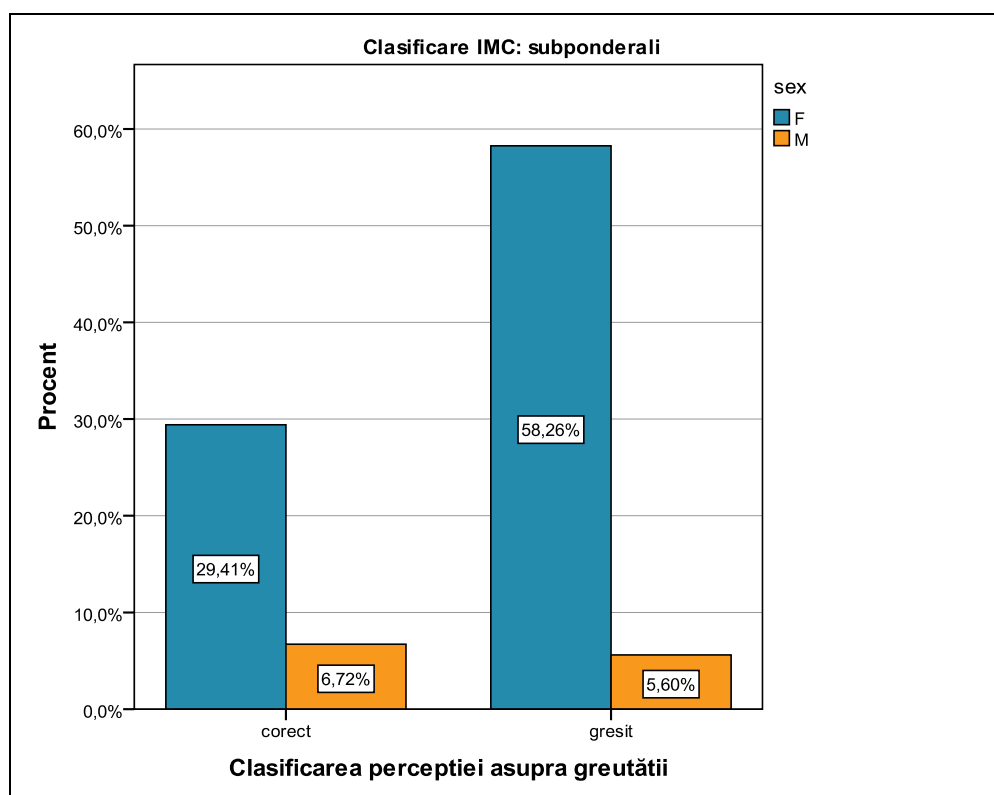


Figure 6. Percent distribution of underweight students according to self perception of body weight

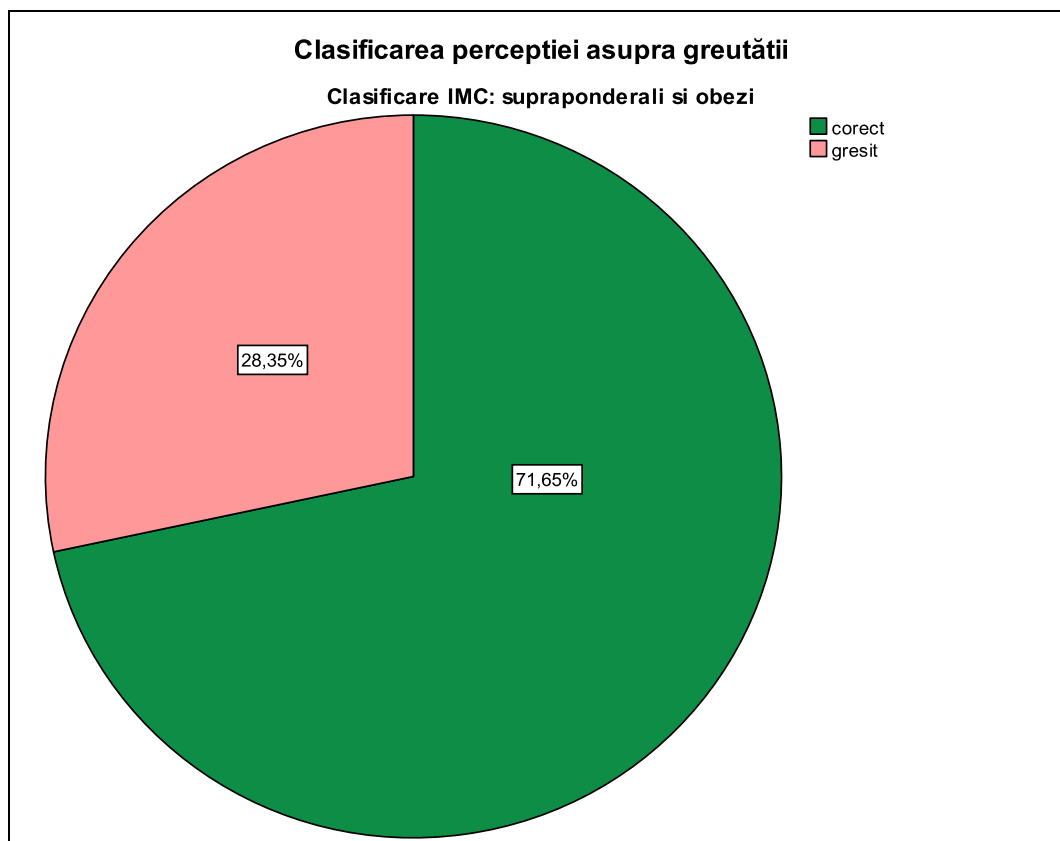
In the case of *overweight and obese* students, 71.1% (182) of them correctly perceive their own weight, and 28.2% (72)

perceive their body weight incorrectly (Table 7, Figure 7).

Table 7. Distribution of overweight and obese students according to self perception of body weight

Classification of body weight perception*	Frecquency	Percent	Valid percent	Cumulative percent
correct	182	71.4	71.7	71.7
incorrect	72	28.2	28.3	100.0
Total	254	99.6	100.0	
Missing data	1	.4		
Total	255	100.0		

*BMI Classification = overweight and obese

**Figure 7. Percent distribution of overweight and obese students according to self perception of body weight**

Considering the gender criterion (Table 8, Figure 8), we did not find statistically significant differences between the two

genders in the group of overweight and obese students regarding the self perception of body weight, $p > 0.05$.

Table 8. Distribution of overweight and obese students according to self perception of body weight

Classification of body weight perception*		Gender		Total
		F	M	
correct	Number	58	124	182
	% of total	22.8%	48.8%	71.7%
incorrect	Number	20	52	72
	% of total	7.9%	20.5%	28.3%
Total	Number	78	176	254
	% of total	30.7%	69.3%	100.0%

*BMI Classification = overweight and obese

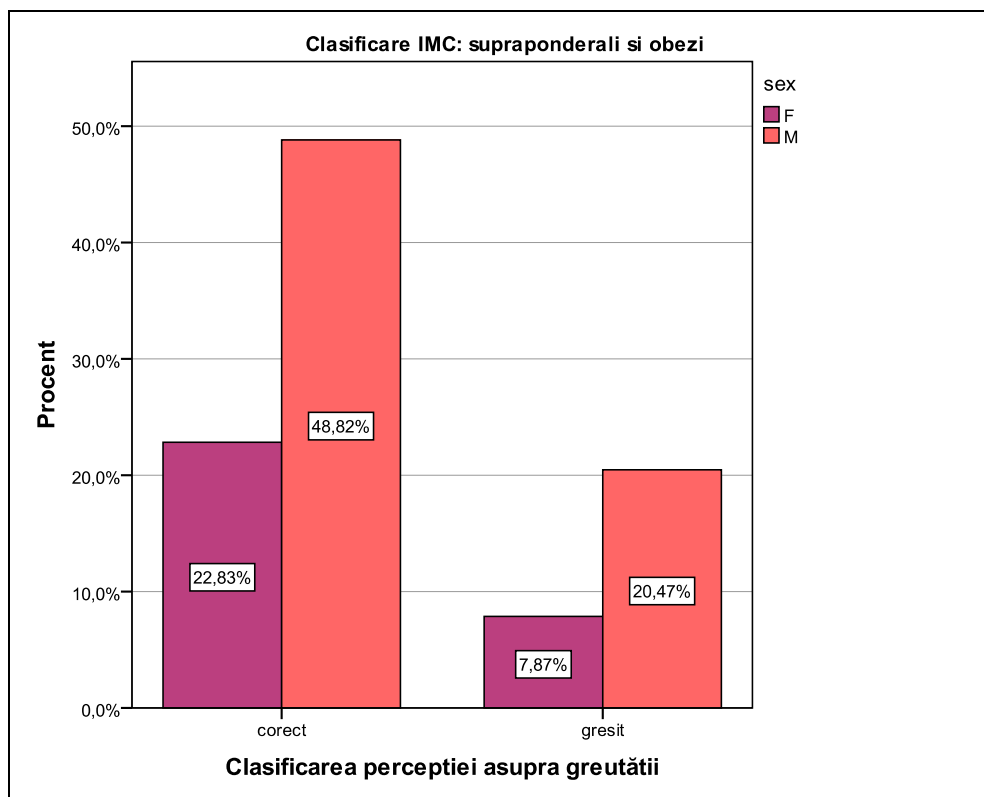


Figure 8. Percent distribution of overweight and obese students according to self perception of body weight

Many studies concluded that discrepancies exist between self perception and the actual body weight. In a trial on 1132 young subjects, Cheung et al [11], found a weak correlation between the BMI and self perception of body weight in women, while this correlation was moderate in men. They underlined the fact that women tended to use weight reducing means based upon the self perceived body weight, while men used

such weight reducing methods based both upon the self perceived and the actual body weight.

Al-Sendi et al [12] studies the relation between the BMI, self perception of body weight and the perception of parents and peers. The results indicated a statistically significant difference between the actual and

the perceived body weight, in both women and men.

CONCLUSIONS

In underweight students, 36% correctly perceive their body weight, and 64% do not. In underweight subjects we found statistically significant differences between

genders regarding the self perception of body weight, female subjects incorrectly assessing their body weight 2.37 times more frequently than male subjects. In the case of overweight and obese students, 71.1% correctly perceive their body weight, and 28.2% incorrectly perceive their body weight, with no gender differences.

REFERENCES

1. Ogden C.L., Flegal K.M., Carroll M.D., Johnson C.L., 2002, Prevalence and trends in overweight among US children and adolescents, 1999-2000, JAMA
2. Xie B., Chou C.P., Spruijt-Metz D., et al, 2006, Weight perception and weight-related sociocultural and behavioral factors in Chinese adolescents, Prev Med
3. Cash T.F., Pruzinsky T., 1990, Body image: development, deviance, and change, New York: Guilford Press
4. Desmond S.M., Price J.H., Gray N., O'Connell J.K., 1996, The etiology of adolescents' perceptions of their weight, J Youth Adolesc
5. Morone M., Rathbun A., 2003, Health education and food safety behavior in the university setting, Journal of Environmental Health
6. Mackey E.R., La Greca A., 2007, Adolescents eating, exercise and weight control behaviors: does peer crowd affiliation play a role. Journal of Pediatric Psychology
7. ***, 2004, grant tip A CNCSIS, cod 1167, 2003-2005, Evaluarea dimensiunii comportamentelor cu risc la liceeni și tineri din învățământul liceal, postliceal, profesional și universitar din județul Timiș
8. Datar A., Sturm R., Magnabosco J.L., 2004, Childhood overweight and academic performance: national study of kindergartners and first-graders, Obes Res
9. Crawford D., Campbell K., 1999, Lay definitions of ideal weight and overweight, Int J Obes
10. Brener N., Eaton D., Lowry R., McManus T., 2004, The Association between Weight Perception and BMI among High School Students, Obesity Research
11. Cheung P., Ip P., Lam S., Bibby H., 2007, A study on body weight perception and weight control behaviours among adolescents in Hong Kong. Hong Kong Medical Journal
12. Al-Sendi A., Shetty P., Musaiger A., 2004, Body weight perception among Bahraini adolescents. Child: Care, Health & Development

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STUDY CONCERNING THE FREQUENCY OF TOBACCO SMOKING IN UNDERWEIGHT AND OVERWEIGHT-OBESE STUDENTS

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REZUMAT

Mulți adulți tineri au o libertate considerabilă, fără restricții comportamentale. Se cunoaște realitatea comportamentelor cu risc asupra sănătății, inclusiv creșterea frecvenței fumatului. Eșantionul de 619 studenți luat în studiu, 63,9% fete și 36,1% băieți, cu vârsta între 18-25 ani, 58,7% subponderali și 41,3% supraponderali și obezi, a rezultat prin aplicarea criteriului de selecție IMC, unui eșantion reprezentativ de 2076 studenți de la universități timișene. Metodele de lucru au fost antropometria și studiul populațional transversal cu aplicarea Chestionarului CORT 2004. În ultimele 30 de zile, 72,5% dintre subponderali nu au fumat nici o zi, iar 16,1% au raportat consum zilnic de țigări. Dintre supraponderali și obezi, 55,7% nu au fumat nici o zi, iar 28,5% au raportat consum zilnic de țigări. Studenții supraponderali și obezi au fumat în ultima lună semnificativ mai multe zile decât studenții subponderali.

Cuvinte cheie: studenți subponderali și supraponderali-obezi, fumat

ABSTRACT

Many young people enjoy considerable freedom without behaviour restrictions. The reality of health risk behaviours, including the increasing frequency of tobacco smoking, is well known. The sample of 619 students included into the study, 63.9% girls and 36.1% boys, aged between 18-25 years, 58.7% underweight and 41.3% overweight and obese, was selected according to the BMI criterion which was applied to a representative sample of 2076 students in Timis County Universities. The work methods were anthropometry and the transversal populational study by use of the CORT 2004 Questionnaire. During the last 30 days, 72.5% of the underweight subjects did not smoke at all, and 16.1% reported daily cigarette smoking. Among the overweight and obese subjects, 55.7% did not smoke in any of the days, and 28.5% reported daily cigarette consumption. Overweight and obese students smoked on a significantly higher number of days as compared to underweight students.

Keywords: underweight and overweight-obese students, tobacco smoking

INTRODUCTION

The period of early adulthood between the ages of 18 and 25 years, includes exploring and growth, and differs from adolescence and adulthood [1,2].

The transition towards adulthood is a distinct development stage and brings challenges, as well as opportunities, for the young adult going through this phase, especially the occasion to create new relationships and identifications [3].

Shanahan (2000) observed that throughout one individual's life the stage of young adulthood presents greater change and variation of social roles than any other life period [4]. Many young adults enjoy considerable freedom, with no behaviour restrictions [5].

Numerous studies documented health risk behaviours in students, such as low physical activity, increased frequency of tobacco smoking and alcohol consumption and the overall decrease of diet quality [6-9]. Health risk behaviours may be regarded as the result of a number of determinants which vary from certain behaviours perceived as social norms [10,11], to other factors, such as personality [12-14] or socio-economic position [15]. Various indicators of psychological-social suffering, with frequent low self-esteem, have been associated to increased frequency of health risk behaviours in young adults.

The present study aimed to evaluate cigarette consumption in relation to the self perception of body weight in underweight and overweight-obese Timis County students.

MATERIAL AND METHODS

MATERIAL

The sample of 619 students included into the study, 63.9% girls and 36.1% boys, aged between 18-25 years, 58.7% underweight

and 41.3% overweight and obese, was selected according to the BMI criterion which was applied to a representative sample of 2076 students in Timis County Universities.

METHODS

1. Anthropometry

By anthropometry, physical development direct indicators – height (m), weight (kg); body mass index (BMI) – calculated by the formula: $\text{weight (kg)/height}^2 \text{ (m}^2\text{)}$, reported to the age and gender criteria are determined.

A BMI within the range of 18.50-24.99 corresponds to a normal weight reported to height; values under 18.49 indicate underweight; those between 25.00-29.9 indicate overweight; values from 30 and beyond indicate obesity. BMI values correspond to the United States National Centre for Health Statistics (NCHS) and World Health Organization (WHO) reference data [16,17].

2. The populational transversal study on self perception of body weight

The populational transversal study relied on the CORT 2004 Questionnaire on health risk behaviours in adolescents and young adults. The questionnaire was applied by direct interview. Inclusion of young people in the study was done only after freely expressed consent of each participant was obtained.

The data collection and processing uses state-of-the-art medical statistics methods. Data were electronically filed using the Epiinfo programme, version 6.0, 2001 and processed by PASW, version 18, 2010. Statistical significance threshold values $p < 0.05$ were considered as statistically significant, and $p < 0.01$ was highly statistically significant. The chi-squared and Mann-Whitney statistical tests were applied [18].

RESULTS AND DISCUSSIONS

During the last 30 days, 72.5% (216) of the *underweight students* reported not smoking in any of the days, and 16.1% (58) reported daily cigarette consumption.

We found no statistically significant differences between the girls and boys in the underweight studied group regarding the number of days with cigarette smoking, $p>0.05$ (Table 1, Figure 1).

Table 1. Distribution of underweight students according to the number of days with cigarette smoking, with separate values for the two genders

In how many of the last 30 days did you smoke cigarettes?*		Gender		Total
		F	M	
0 days	Number	227	34	261
	% of total	63.1%	9.4%	72.5%
1-2 days	Number	8	1	9
	% of total	2.2%	.3%	2.5%
3-5 days	Number	4	1	5
	% of total	1.1%	.3%	1.4%
6-9 days	Number	3	0	3
	% of total	.8%	.0%	.8%
10-19 days	Number	11	0	11
	% of total	3.1%	.0%	3.1%
20-29 days	Număr	10	3	13
	% of total	2.8%	.8%	3.6%
Every day	Number	51	7	58
	% of total	14.2%	1.9%	16.1%
Total	Number	314	46	360
	% of total	87.2%	12.8%	100.0%

*BMI Classification = underweight

We found no statistically significant differences in the group of underweight students between those correctly perceiving their body weight and those perceiving it

incorrectly regarding the number of days during which they smoked, $p>0.05$ (Table 2, Figure 2).

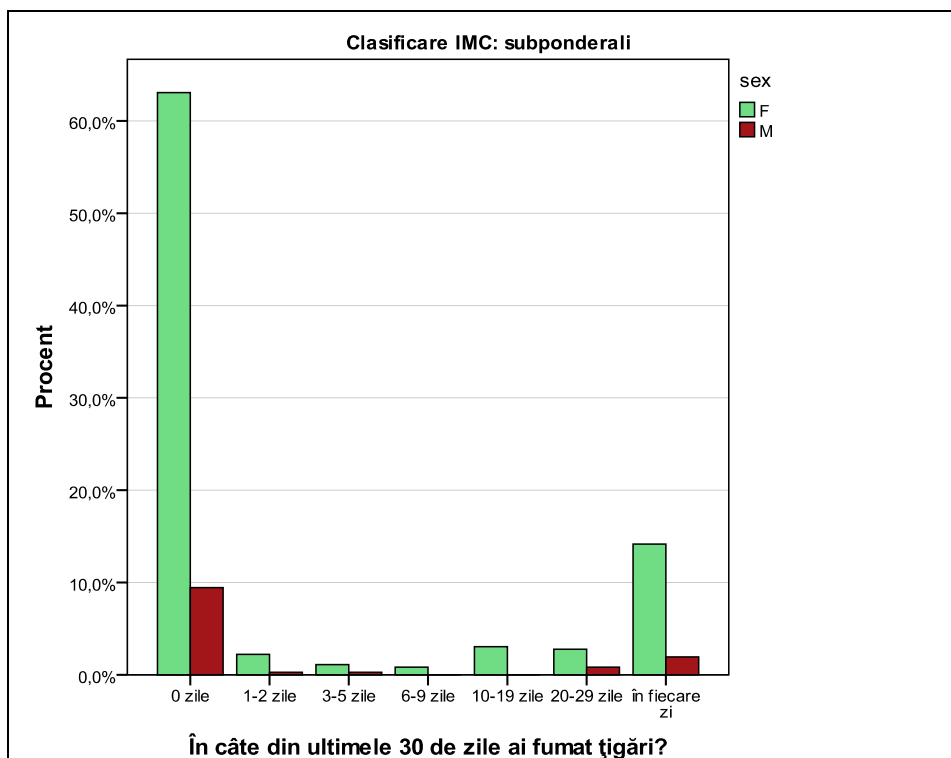


Figure 1. Percent distribution of underweight students according to the number of cigarette smoking days, with separate values for the two genders

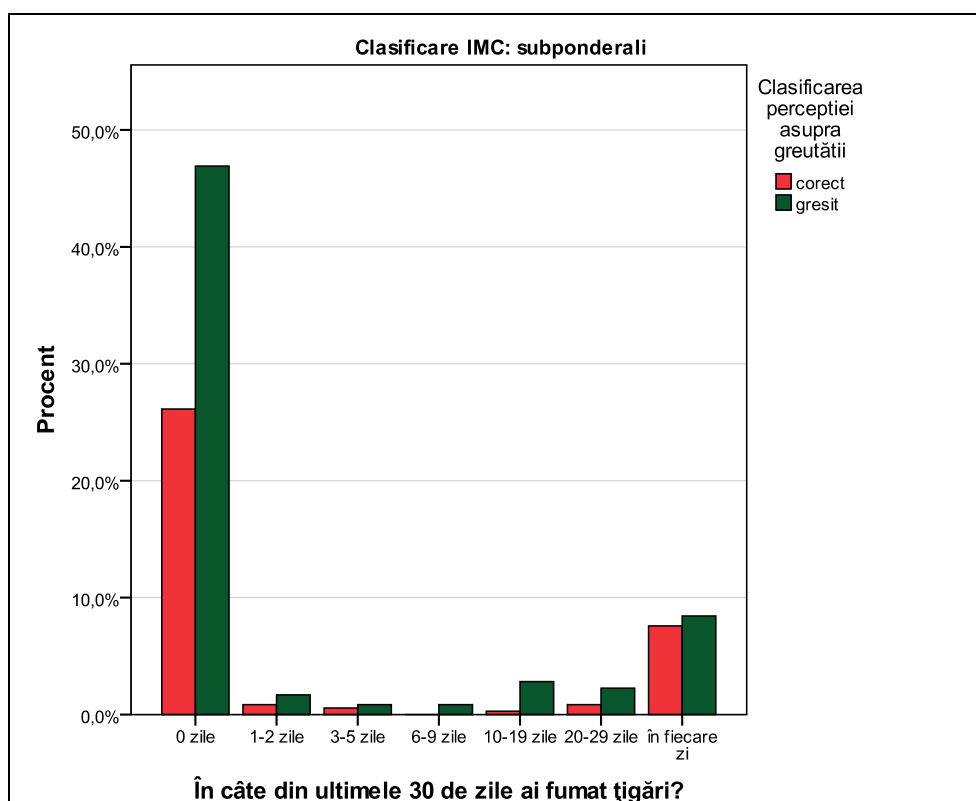


Figure 2. Percent distribution of underweight students according to the number of cigarette smoking days and to the self perception of body weight

Table 2. Distribution of underweight students according to the number of cigarette smoking days and to the self perception of body weight

In how many of the last 30 days did you smoke cigarettes?*		Classification of body weight self perception		Total
		correct	incorrect	
0 days	Number	93	167	260
	% of total	26.1%	46.9%	73.0%
1-2 days	Number	3	6	9
	% of total	.8%	1.7%	2.5%
3-5 days	Number	2	3	5
	% of total	.6%	.8%	1.4%
6-9 days	Number	0	3	3
	% of total	.0%	.8%	.8%
10-19 days	Number	1	10	11
	% of total	.3%	2.8%	3.1%
20-29 days	Number	3	8	11
	% of total	.8%	2.2%	3.1%
Every day	Number	27	30	57
	% of total	7.6%	8.4%	16.0%
Total	Number	129	227	356
	% of total	36.2%	63.8%	100.0%

*BMI Classification = underweight

During the last 30 days, 55.7% (141) of the *overweight and obese* students reported not smoking in any of the days, and 28.5% (72) reported daily cigarette consumption.

We found no statistically significant differences in the group of overweight and obese students regarding the number of days during which they smoked, $p > 0.05$ (Table 3, Figure 3).

Table 3. Distribution of overweight and obese students according to the number of cigarette smoking days, with separate values for the two genders

In how many of the last 30 days did you smoke cigarettes?*		Gender		Total
		F	M	
0 days	Number	43	98	141
	% of total	17.0%	38.7%	55.7%
1-2 days	Number	4	7	11
	% of total	1.6%	2.8%	4.3%
3-5 days	Number	0	5	5
	% of total	.0%	2.0%	2.0%
6-9 days	Number	6	2	8
	% of total	2.4%	.8%	3.2%
10-19 days	Number	3	4	7
	% of total	1.2%	1.6%	2.8%
20-29 days	Number	3	6	9
	% of total	1.2%	2.4%	3.6%
Every day	Number	18	54	72
	% of total	7.1%	21.3%	28.5%
Total	Number	77	176	253
	% of total	30.4%	69.6%	100.0%

*BMI Classification = overweight and obese

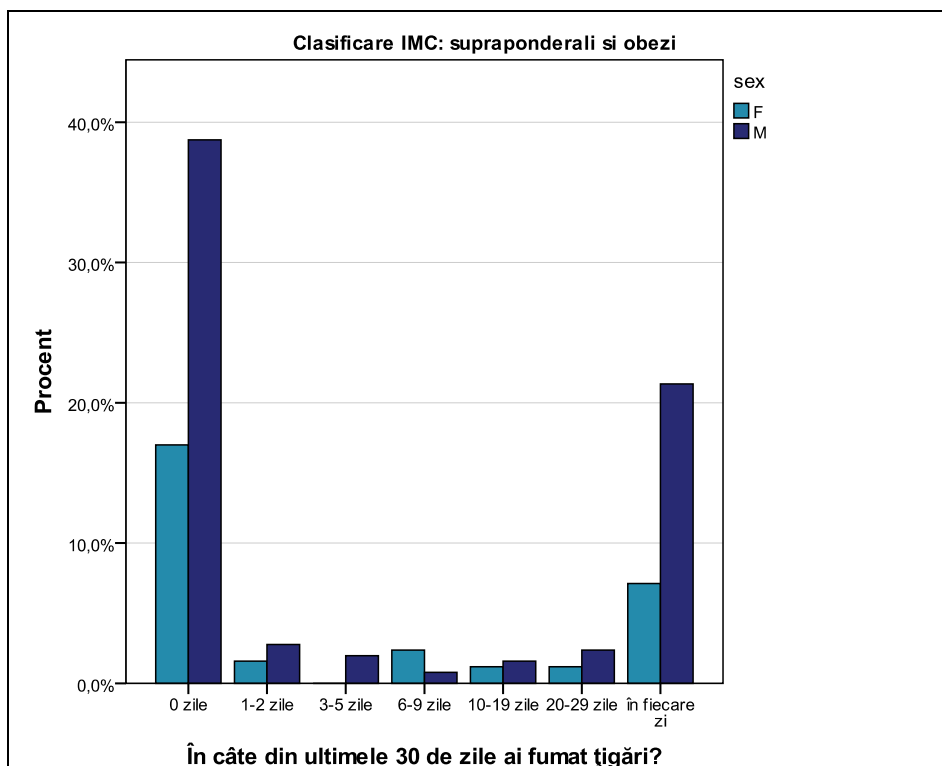


Figure 3. Percent distribution of overweight and obese students according to the number of cigarette smoking days, with separate values for the two genders

We found no statistically significant differences in the group of overweight and obese students between those who correctly perceive their body weight and those who

do not regarding the number of days of cigarette smoking, $p > 0.05$ (Table 4, Figure 4).

Table 4. Distribution of overweight and obese students according to the number of cigarette smoking days and to the self perception of body weight

In how many of the last 30 days did you smoke cigarettes?*		Classification of body weight self perception		Total
		correct	incorrect	
0 days	Number	99	41	140
	% of total	39.3%	16.3%	55.6%
1-2 days	Number	7	4	11
	% of total	2.8%	1.6%	4.4%
3-5 days	Number	3	2	5
	% of total	1.2%	.8%	2.0%
6-9 days	Number	6	2	8
	% of total	2.4%	.8%	3.2%
10-19 days	Number	4	3	7
	% of total	1.6%	1.2%	2.8%
20-29 days	Number	7	2	9
	% of total	2.8%	.8%	3.6%
Every day	Number	56	16	72
	% of total	22.2%	6.3%	28.6%
Total	Number	182	70	252
	% of total	72.2%	27.8%	100.0%

*BMI Classification = overweight and obese

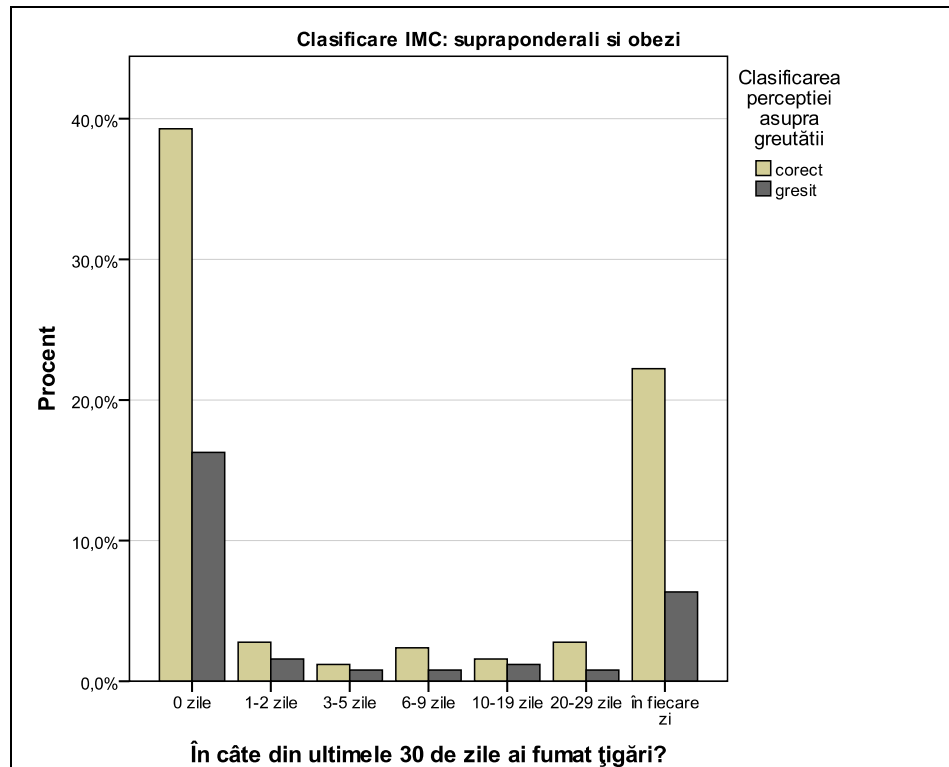


Figure 4. Percent distribution of overweight and obese students according to the number of cigarette smoking days and to the self perception of body weight

During the last month, overweight and obese students smoked in a significantly higher number of days as compared to

underweight students, $U=37779$, $z=-4.33$, $p<0.001$ (Table 5, Figure 5).

Table 5. Distribution of students according to the number of cigarette smoking days and to the BMI classification

In how many of the last 30 days did you smoke cigarettes?*		BMI Classification		Total
		underweight	Overweight and obese	
0 days	Number	262	141	403
	% of total	42.7%	23.0%	65.6%
1-2 days	Number	9	11	20
	% of total	1.5%	1.8%	3.3%
3-5 days	Number	5	5	10
	% of total	.8%	.8%	1.6%
6-9 days	Number	3	8	11
	% of total	.5%	1.3%	1.8%
10-19 days	Number	11	7	18
	% of total	1.8%	1.1%	2.9%
20-29 days	Number	13	9	22
	% of total	2.1%	1.5%	3.6%

Every day	Number	58	72	130
	% of total	9.4%	11.7%	21.2%
Total	Number	361	253	614
	% of total	58.8%	41.2%	100.0%

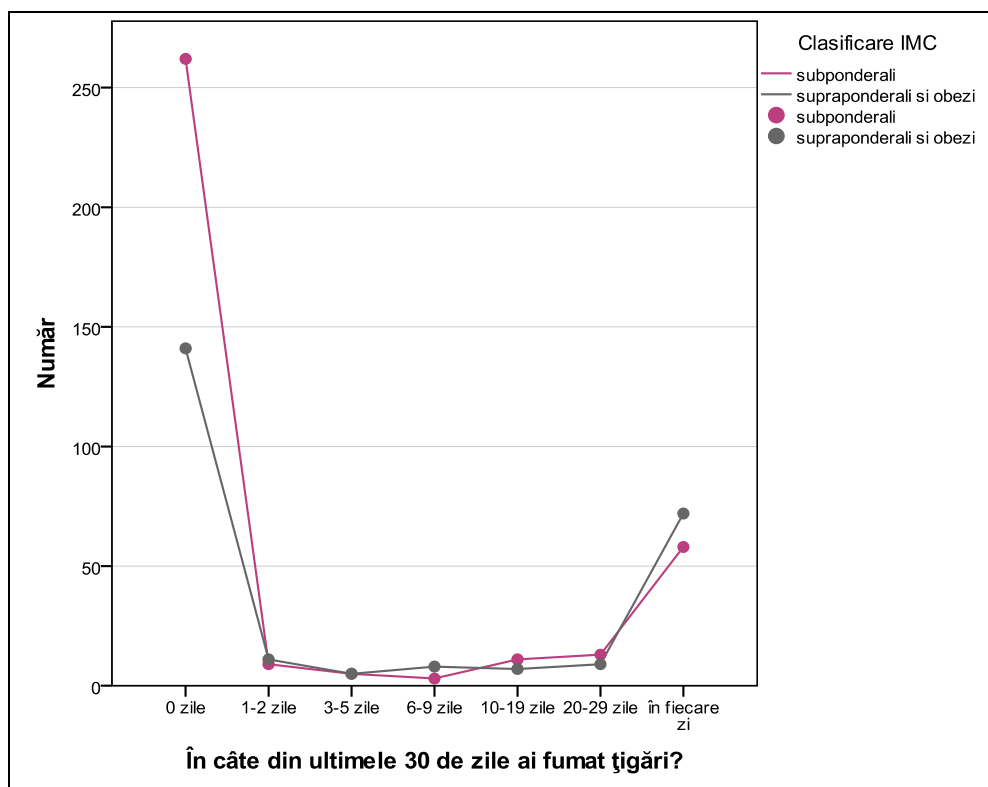


Figure 5. Distribution of students according to the number of cigarette smoking days and to BMI classification

A study performed in 2002 [19] on a group of students, revealed that the chance of being a smoker was significantly higher in students who perceived themselves as overweight and who tried to control their body weight by various methods during the last 12 months. In male gender participants, the chances of being a smoker were significantly higher among those who skipped meals during the last 12 months.

In another study [20] conducted on a group of smoker students, female gender subjects with a higher BMI proved to perceive their body weight higher than the actual levels and smoked more cigarettes daily (OR=1).

CONCLUSIONS

During the last 30 days, 72.5% of the underweight subjects did not smoke at all, while 16.1% reported daily cigarette consumption.

A percent of 55.7 of the overweight and obese students did not smoke in any of the days, and 28.5% reported daily cigarette consumption.

During the last month, overweight and obese students smoked on a significantly higher number of days than underweight students.

REFERENCES

1. Sparud-Lundin C., Ohrn I., Danielson E., 2009, Redefining relationships and identity in young adults with type 1 diabetes, *Journal of Advanced Nursing*
2. Arnett J.J., 2000, High hopes in a grim world: Emerging adults' views of their futures and of "Generation X." *Youth & Society*
3. Arnett J.J., 2006, Emerging Adulthood in Europe: A Response to Bynner, *Journal of Youth Studies*
4. Shanahan et al., 2000, Pathways to Adulthood in Changing Societies: Variability and Mechanisms in Life Course Perspective, *Annual Review of Sociology*
5. Gladstone et al., 2006, The influence of parental depression in youth transition to adulthood. Uncharted territory and opportunities for preventive intervention, report of the Center for Mental Health Services
6. Cullen K.W., Koehly L.M., Anderson C., Baranowski T., Prokhorov A., Basen-Engquist K., Wetter D., Hergenroeder A., 1999, Gender differences in chronic disease risk behaviors through the transition out of high school. *Am J Prev Med*, 17:1-7
7. Crombie A.P., Ilich J.Z., Dutton G.R., Panton L.B., Abood D.A., 2009, The freshman weight gain phenomenon revisited. *Nutr Rev*, 67:83-94
8. Butler S.M., Black D.R., Blue C.L., Gretebeck R.J., 2004, Change in diet, physical activity, and body weight in female college freshman. *Am J Health Behav*, 28:24-32
9. Demory-Luce D., Morales M., Nicklas T., Baranowski T., Zakeri I., Berenson G., 2004, Changes in food group consumption patterns from childhood to young adulthood: the Bogalusa Heart Study. *J Am Diet Assoc*, 104:1684-91
10. Kotchick B.A., Shaffer A., Forehand R., Miller K.S., 2001, Adolescent sexual risk behavior: a multi-system perspective. *Clin Psychol Rev*, 21:493-519
11. Jessor R., 1991, Risk behavior in adolescence: a psychosocial framework for understanding and action. *J Adolesc Health*, 12:597-605
12. Jessor R., 1987, Problem-behavior theory, psychosocial development, and adolescent problem drinking. *Br J Addict*, 82:331-342
13. Hoyle R.H., 2000, Personality processes and problem behavior. *J Pers*, 68:953-966
14. Reitman D., St Lawrence J.S., Jefferson K.W., Alleyne E., Brasfield T.L., Shirley A., 1996, Predictors of African American adolescents' condom use and HIV risk behavior. *AIDS Educ Prev*, 8:499-515
15. Santelli J.S., Lowry R., Brener N.D., Robin L., 2000, The association of sexual behaviors with socioeconomic status, family structure, and race/ethnicity among US adolescents. *Am J Public Health*, 90:1582-1588
16. Morone M., Rathbun A., 2003, Health education and food safety behavior in the university setting, *Journal of Environmental Health*
17. Mackey E.R., La Greca A., 2007, Adolescents eating, exercise and weight control behaviors:

- does peer crowd affiliation play a role. Journal of Pediatric Psychology
18. ***, 2004, grant tip A CNCSIS, cod 1167, 2003-2005, Evaluarea dimensiunii comportamentelor cu risc la liceeni și tineri din învățământul liceal, postliceal, profesional și universitar din județul Timiș
19. Winter A.L., Guia N.A., Ferrence R., Cohen J.E., 2002, The relationship between body weight perceptions, weight control behaviours and smoking status among adolescents, Can J Public Health
20. Lee R.E., Harris K.J., Catley D., et al, 2005, Factors Associated with BMI, Weight Perceptions and Trying to Lose Weight in African-American Smokers, Journal of the National Medical Association

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EXCESSIVE CRYING – CHARACTERISTICS, DIFFERENTIAL DIAGNOSIS, MANAGEMENT

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REZUMAT

Când un copil se naște, bucuria este de partea tuturor, întrucât nou-născutul anunță începutul vieții extrauterine și debutul respirației printr-un strigăt viguros. Plânsul nu este numai un semnal al speranței copilului, ci și nevoia sa de confort și asistență. Problemele asociate cu episoadele de plâns prelungite devin elemente stresante nu numai pentru nou-născut, dar și pentru cei care îl au în grijă. În situații extreme, plânsul excesiv și greu de liniștit poate precipita maltratarea nou-născutului. Plânsul neliniștește în egală măsură părinții și cadrele medicale. Mai mult decât atât, există o societate internațională a cărei preocupare este studiul plânsului sugarului, și al cărei scop este împărtășirea rezultatelor privind natura și tulburările plânsului sugarului.

Cuvinte cheie: plâns, nou-născut

ABSTRACT

When a child is born, the joy is shared by everybody, as the newborn announces the beginning of the extrauterine life and the first breath by a vigorous cry. Crying is not only a signal of the child's hope but also the need for comfort and assistance. Problems associated to prolonged crying episodes become stressful not only for the newborn but also for those who need to take care of him. In extreme situations, excessive and hard to comfort crying may precipitate mistreatment of the newborn. Crying equally worries parents and health care staff members. Moreover, there is an international society focusing on the study of newborn crying with the purpose to share results concerning the nature and disturbances of crying in newborns.

Keywords: crying, newborn

NORMAL CRYING

Crying is an adaptative response of the newborn confronted to stressful situations. It is usually associated to some unpleasant states such as physical (e.g. pain, hunger) or emotional discomfort (e.g. anger, fear,

ignorance). From an evolutive point of view, crying may have survival purpose and value. It is, by excellence, a communication mechanism used by the newborn in order to have a „dialogue” with those who take care of him/her. Crying has also been reported in primates, such as chimpanzees [1] who cry

similarly to human newborns during the first weeks of life. In other species, crying occurs as an alarm signal during parents' salvation efforts and the persistence of crying in baby birds shows their need for food. In human newborns, crying may be interpreted as a communication device with two main purposes: signaling and support in the parent-child relationship. As a signal, crying in a scared newborn may show pain, discomfort, hunger and fear, but it is also an immediate and premonitory transmission stimulus towards the parent [2]. Another main purpose is to serve as an instrument to promote, maintain and consolidate the parent-child relationship and to further develop attachment. Individually, in newborns, crying is directly related to the maturation curve. Concerning quantity and duration, crying reaches a peak during the sixth week of postnatal life in normal term babies. This peak is composed of 2.5 hours of crying during 24 hours which has been proven to be sufficiently consistent in studies on crying which use audio records [3]. The maturation process during crying has been observed in preterm newborns in whom crying reaches the peak during the sixth week of life (corrected age). This change in the duration of crying has been attributed to the maturation of the Central Nervous System, the infant developing the ability to stop, stabilize and regulate crying, thus becoming able to cope with the environment. Nevertheless, a part of the infants will continue to cry intensely for over 3 hours a day during the first year of life. A recent study reveals that 40% of infants who cried excessively during their first 3 months of life, continued to cry very much throughout their entire first year [4].

During the first months of life, crying in infants has a tonal quality – i.e. episodes start and continue for a period of time – with unique acoustics. During subsequent months, crying becomes phasic, each episode being much more discrete, shorter and acoustically different as compared to crying during the newborn stage [5].

CRYING AS A TRANSACTION PHENOMENON

– Crying is a form of communication targeting a certain reaction from the person (e.g. parent) receiving the signal. Characteristics of crying (such as duration) not only depend on the initial effect of the signal but also on the parent's response to crying. The parents' reaction varies in the capacity to respond to crying, not only according to the type of personality, experience and knowledge of the child's development stages, but also due to concomitant stress factors acting at some given moment. In such circumstances, the more stressed the parent or the more he/she perceives crying as a difficult or intolerable event, the higher the risk of a negative reaction towards the newborn [6].

CRYING AS A CULTURAL AND SOCIAL PHENOMENON

– According to Kung, but also in Manali, India [7], a plateau of crying has been recorded in newborns even though they tended towards shorter daytime crying periods. It was assumed that the short crying period is related to the amount of care the newborn receives, to the closeness to the mother's body and to the frequency of breastfeeding (upon request, rather than according to a schedule). Bensele studied crying patterns in children from Freiburg, Germany and found a short crying duration in that community in an industrialized country [8]. In Manali, India and, according to Kung, in Africa, crying episodes were shorter as compared to those in industrialized countries. Thus, the beliefs of parents and of society on normality and on the way parents should react determine the behavior and response of the newborn, respectively.

EPIDEMIOLOGICAL ASPECTS OF NORMAL CRYING

– Many researchers studied the phenomenon of newborn normal crying in countries such as Canada, England, Germany compared to non-industrialized countries. These studies suggest a standardized progression in the

duration and quality of crying. Multicentric studies revealed that exclusively breastfed newborns cry less than those artificially fed [9]. Mothers with a high social status observe prolonged crying.

THE NORMAL CRYING PHENOMENON – In this section two controversial concepts are briefly reviewed: difficult temper and the presence of gripes.

Difficult temper – Several behavior characteristics tend to occur concomitantly during the first month of life defining the responses. These characteristics further shape the child's future temper. According to the temper concept, primary characteristics were considered mostly constitutional. In further studies, these were described as results of predisposition to surrounding persons influencing behavioral manifestation. One of the behavioral subtypes, labeled as „difficult” by Chess and Thomas was observed in approximately 10% of newborns. The difficult temper consists of short periods of attention, difficulty to focus on a stimulus, irritability and poor regularity. Even though difficult temper is considered as a normal variant of newborn characteristics (others having passive, intermediate and non-differentiated tempers, respectively), the way difficult temper is superposed on behavioral disturbances is not clear. This superposition manifests by sleeping and feeding disorders, discrete neurophysiological changes [10], and difficulties in changing the further psychological-emotional status.

Gripes – In the Western world, gripes are traditionally incriminated by both medical staff and parents, despite their weak definition and multiple uncertainties on physiopathological mechanisms. The frequency of gripes during the first 3 months of life is 20-30%. But, the presence of gripes should be differentiated from excessive crying which continues after 6 months. Gripes might, consequently, be considered as a relatively normal entity which usually

occurs during the first months of life and disappears around the age of 4 months. When excessive crying persists after the age of 6 months, gripes are ruled out [11]. The causes of crying might be: increased intestinal peristalsis with abdominal meteorism due to CO₂, methane and H₂ accumulation as a result of intestinal metabolism, communication problems, or even a normal variation of crying. Lehtonen [12] identified the level of stress and family psycho-social problems (e.g. marital conflict, a history of birth-related complications, a negative attitude towards pregnancy) as factors contributing to gripes, while others [13] correlate gripes to a high socio-economic status. In the description of gripes, crying occurs after meals or during the night. During this period, the newborn cries intensely and does not respond to arm holding (pampering) or to stimulation techniques applied by the mother. The legs of the newborn are flexed and the abdomen is meteoristic.

EXCESSIVE AND PERSISTENT CRYING – The problem of excessive and persistent crying is important given its frequency, the sufferance reflected on the newborn, the aversion towards parents and other surrounding individuals. Crying is excessive when it lasts for a relatively long period per episode or during a day compared to the duration of crying in normal circumstances. This means that during a day, the newborn spends a comparatively longer period of time in a state of crying and agitation than in a state of tranquility. Crying is persistent when it does not tend to diminish in time. This is not a disturbance per se and may be perceived as a set of behavioral problems in the newborn or as a multiple cause syndrome. When crying is intense, lasts long and is very difficult to stop, the adaptative value for the child tends to disappear. When it becomes a problem per se, negative consequences for the newborn, parents and the further attachment relationship occur. Excessive crying has also been defined as the **persistent painful**

mother-newborn syndrome, which Barr describes as occurring in a minority of infants who, during their first 3 months of life, are diagnosed with gripes, and continue to manifest excessive irritability and crying for many months. Clinically, there are infants who cry over 3 accumulated hours during a 24 hours period.

EPIDEMIOLOGY – Unfortunately, excessive crying is not rare. Certain epidemiologic studies determined researchers to suggest up to 10% infants being affected during their first year of life. This prevalence was found in infants in urban London and in an urban community in Denmark. A recent study in the Netherlands on 1826 infants during their first 6 months of life reported a prevalence of excessive crying of around 7.6% while mothers describe the baby as "crying very much" (14%) and being "hard to comfort" (10.3%) [9]. The overall prevalence of problematic crying (i.e. problematic for parents) was stated by 20.3% of mothers.

EVALUATION – The direct examination of the baby should evaluate specific sensitivities, motion patterns, language, psycho-emotional status, cognitive relations and development. The relational context of the baby is crucial to understand crying.

CAUSES AND PHENOMENOLOGY – In a review of 167 cases admitted in the Clinic for Infantile Neuropsychiatry, infants fitting the arbitrary definition of excessive crying (defined as the presence of at least 3 out of 10 criteria such as: agitation, crying and irritability) were detected.

In a group of 100 cases, over 50% had criteria for excessive crying. Frequent causes for excessive crying were revealed as follows: comorbidities, withdrawal effects, hunger and gastroesophageal reflux [14].

Comorbidities – Initially, both parents and clinician should be concerned if crying has an organic cause such as: otitis, gastro-

intestinal diseases, neurologic disorders (e.g. hydrocephalus) [15] and cephalalgia [16].

The Withdrawal Effect - In the United States, up to 20% of newborns may be born after antepartum exposure to drugs and alcohol. These newborns are at an increased risk to develop adjustment disorders due to the mother's intake of harmful substances during pregnancy which varies from transitory behavior changes to physical malformations. During the neonatal period, if the child constantly presents irritability, marked agitation and excessive crying, the medical staff should consider the possibility of the neonatal withdrawal syndrome, even if parents deny the consumption of substances such as: alcohol, benzodiazepines, cocaine or even inhalatory substances [17]. The withdrawal syndrome includes marked irritability, extreme sensitivity to the most minor environmental changes, hypertonic answer to stimuli up to convulsions [18].

Hunger – Newborns and infants present variations in the periodicity of feeding needs. Exclusively breast fed children are fed upon request, as compared to artificially fed ones who have a predefined schedule. During periods of disease, due to the increased cell catabolism, the infant might need an increased number of meals. Less experienced parents or those with anacastic personalities may believe that the infant must be fed at fixed intervals. In order to achieve this, the mother neglects intuitive reactions, such as breast feeding upon request, in order to follow a strict rule of feeding every 3 or 4 hours, they may restrict the quantity or the frequency of meals, and consequently the infant will experience hunger and will cry frequently and excessively [19,20].

The Gastroesophageal Reflux – The physiological condition of gastroesophageal reflux may be encountered during the first 6 months of life, but it may persist even after this age. It consists of the reflux of the

gastric content into the esophagus, leading to frequent regurgitation of milk. As a result of the esophagus exposure to the acid gastric content, the reflux may cause esophagitis. This disease occurs in approximately 3% up to 8% of newborns, and it is much more frequent in premature newborns [21]. One of the manifestations is irritability and excessive crying. Other manifestations are: food rejection, repeated regurgitations or vomiting, the Sandifer syndrome (persistent inclination of the head), suffocating with sensation of imminent death and weight loss.

THERAPEUTIC STRATEGIES – The chosen strategies will aim to alleviate excessive crying, a sign of discomfort in the newborn. Due to the infant's individuality, the therapeutic approach to alleviate crying will differ from one infant to the other.

There are three categories of strategies:

- 1) techniques preventing the infant's overstimulation, overwhelming or discomfort
- 2) comforting techniques
- 3) infant – parent relationship consolidating techniques in accordance to the infant's individuality.

In clinical practice these strategies are often concomitantly applied.

QUANTITY, DURATION AND QUALITY OF THE STIMULATION

A principle determining the characteristics of stimuli is represented by the close observation of the infant and of the response to environmental stimuli. Only by an attentive observation and a detailed interrogation of parents may we detect stimuli causing hyperexcitability, psychosomatic overload, excessive crying, agitation and irritability of the infant.

Tactile Sensorial Stimulation – Infants who negatively react to tactile stimulation even in the case of a slight touch, or those

presenting an increased irritability in the presence of other persons may need comforting periods, slight touches being received in a defensive manner; some prefer more profound touches as an alternative to simple touches. Parents intuitively touch their newborns with a lot of tenderness and love. Nevertheless, newborns may perceive this form of tenderness in a defensive manner, especially in the case of premature newborns.

The Auditive Sensorial Stimulation – The newborn may be sensitive to certain sounds: the intensity, rhythmicity, volume and quantity of auditive stimulation during a given time interval. Even though the infant may receive the voice of a single person, the voices of two or more persons precipitate the onset of excessive crying. In some instances, auditive overstimulation may be represented by the television set, parents not being aware of this aspect. In order to prevent the auditive overstimulation, moderating the volume of the voice, keeping a certain frequency, but also the number of concomitant auditive stimuli (e.g. voice, television set, radio, hair dryer) are equally important.

The Visual Sensorial Stimulation – The newborn may react intensely to stimuli which appear as harmless to other persons: sun light, intense colors, and visual patterns. In order to make the environment interesting, care centers decorate the rooms using intense colors and many images thus favoring visual overstimulation. Diminishing the models, the intensity of mural colors but also removing certain objects may represent prophylactic methods for visual overstimulation.

DESENSITIZING, ORGANISATION AND REGULATION METHODS

Various methods may support the newborn by offering protection from environmental stimuli.

Swaddling and isolation – Swaddling is indicated for very small infants because it may be similar to uterine compression, especially at the end of gestation. Other methods such as placing the arms on the median line, putting the hands near the face or mouth and firmly touching the infant's body may also be useful.

Massage – According to some studies, touching the newborns, and especially prematurely born babies, causes the release of certain neurotransmitters which determine weight gain, thus inducing a feeling of safeness [22]. Clinically, hypertonic and agitated infants may be helped to cope with these moods by massage and finger pressure.

Vibratory Stimulation – A technique used during tactile maneuvers is represented by the vibratory stimulation which is a relaxing and comforting method. Slightly vibratory objects applied on the arms, legs and back of the infant induce a state of calm.

Oral Stimulation – The infant explores the environment by putting various objects in the mouth. This is due to the increased concentration of infant-specific proprioceptors in the oral cavity. For many newborns this activity helps the development of self-organization, discipline and pleasure. In some infants, this exploration may take the shape of non-feeding suckling, and in elder infants it may

involve the biting of hands, toys, clothing or other objects.

Vestibular Stimulation - Dieter and Emory [23] stated that vestibular stimulation – balancing or moving the infant in the air along the horizontal or vertical axis – may induce a state of vigilance and at the same time it may produce a calming and soothing effect. Parents intuitively perform this soothing stimulation when they ensure the rhythmic movement of a crying child in order to help him calm down. Such a movement may release the neurotransmitters helping the infant to better relax.

Auditive Stimulation - A complex range of auditive stimuli, from music to speaking, with white or neutral sounds, may be helpful. Some infants prefer auditive stimulation, being exceptionally receptive to music and to a gentle tone of voice. At times of marked psychomotor agitation, low frequency sounds, the rhythmic vocal noise or interesting noises may help the infant to focus and to synchronize with the rhythm and to regain a state of self-organization and calm. Parents may use favorite tunes which may help the infant to calm down. The white noise is another form of light stimulation which may help the infant. Nowadays, in addition to simple white noise producing techniques (ventilator set at a low intensity), white noise devices, reproducing sounds of rain, running water and wind, are available.

The crying of the newborn and infant may equally represent a non-verbal communication, a symptom and a possible alarm signal. Physicians who assist newborns and infants must be aware that they perceive pain at least as intensely as adults do. In clinical practice, the main purpose is to correctly evaluate this excessive crying and to adopt an adequate position.

REFERENCES

1. Bard K.A., 1995, Parenting in primates, in Handbook of Parenting: Biology and Ecology of Parenting, Vol 2. Ed. Bornstein MH. Mahwah, NJ, Erlbaum, 27–58
2. Bense J., 1996, Haug-Schnabel G., Primär exzessives Schreien in den ersten drei Lebensmonaten [Primary excessive crying in the first three months of life], in Handbuch der Kleinkindforschung [Handbook of Research in Early Childhood], 2 Auflage (2nd Edition). Ed. Keller H. Bern, Switzerland, Hans Huber, 45–61
3. Barr R.G., 1998, Crying in the first year of life: good news in the midst of distress, *Child Care Health Dev* 24(5):425–439
4. Wurmser H., Laubereau B., Hermann M., et al., 2001, Excessive infant crying: often not confined to the first 3 months of age. *Early Hum Dev* 64(1):1–6
5. Papousek H., Papousek M., 1995, Intuitive parenting, in Handbook of Parenting: Biology and Ecology of Parenting, Vol 2, Ed. Bornstein MH. Mahwah, NJ, Erlbaum, 117–136
6. Crowe H.P., Zeskind P.S., 1992, Psychophysiological and perceptual responses to infant cries varying in pitch: comparison of adults with low and high scores on the Child Abuse Potential Inventory. *Child Abuse Negl* 15:19–29
7. St. James-Roberts I., Bowyer J., Varghese S., et al., 1994, Infant crying patterns in Manali and London. *Child Care Health Dev* 20:323–337
8. Bense J., Haug-Schnabel G., 1997, Nature meets nurture: excessive crying in a German sample. Paper presented at the Sixth International Workshop on Infant Cry Research. Lancaster, UK
9. Van der Wal M.F., van den Boom D.C., Pauw-Plomp H., et al., 1998, Mothers' reports of infant crying and soothing in a multicultural population. *Arch Dis Child* 79: 312–317
10. Von Hofacker N., Papousek M., 1998, Disorders of excessive crying, feeding and sleeping: the Munich interdisciplinary research and intervention program. *Infant Mental Health Journal* 19(2):180–201
11. Stifter C.A., Braungart J., 1992, Infant colic: a transient condition with no apparent effects. *Journal of Applied Developmental Psychology* 13:447–462
12. Lehtonen L., 1994, Infantile colic. Turun Yliopiston Julkaisuja [Turku University Press] *Annales Universitatis Turkuensis [Annals of Turku University, Turku, Finland]* 151:1–51.
13. Crowcroft N.S., Strachan D.P., 1997, The social origins of infantile colic: questionnaire study covering 76,747 infants. *BMJ* 314(7090):1325
14. Maldonado-Durán J.M., Holigrocki R., Moody C., 1998, Excessive crying, feeding and sleeping problems, and the caretaking environment. Paper presented at the Eleventh International Conference of the International Society for Infant Studies, Atlanta, GA.
15. Poole S., Magilner D., 2000, Crying complaints in the emergency department, in *Crying as a*

- Sign, Symptom and a Signal.
Ed. Barr RG, Hopkins B,
Green JA. London, MacKeith
Press, 95–105
16. Guidetti V., Galli F., Cerutti R., et al.,
2000, “From 0 to 18”: what
happens to the child and his
headache? *Funct Neurol* 15
(suppl 3):122–129
17. Jones H.E., Balster R.L., 1998, Inhalant
abuse in pregnancy. *Obstet
Gynecol Clin North Am*
25:153–167
18. Chasnoff I.J., Griffith D.R., Freier C., et
al., 1992, Cocaine-polydrug
use in pregnancy: two year
follow-up. *Pediatrics* 89:284–
289
19. Maldonado-Durán J.M., Saucedo-Garcia
J.M., 1998, La madre con
dificultades de alimentación y
sus efectos en el bebé y el niño
de edad pre-escolar [Mothers
with eating disorder and
effects in the infant and
preschool age child], in *La
alimentación en la primera*
*infancia y sus efectos en el
desarrollo [Feeding in Infancy
and Its Effects on
Development]*, Ed. Lartigue
T., Maldonado-Durán J.M.,
Ávila H. México City, Plaza y
Valdez, 235–256
20. Stein A., Murray L., Cooper P., et al.,
1996, Infant growth in the
context of maternal eating
disorders and maternal
depression: a comparative
study. *Psychol Med*
26(3):569–574
21. Orenstein S.R., Izadnia F., Khan S.,
1999, Gastroesophageal reflux
disease in children,
*Gastroenterology Clin North
Am* 28:947–970
22. Field T., 1995, Massage therapy for
infants and children. *J Dev
Behav Pediatr* 15(2):105–111
23. Dieter J.N., Emory E.K., 1997,
Supplemental stimulation of
premature infants: a treatment
model. *J Pediatr Psychol*
22(3):281–295

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HISTOLOGICAL GRADE OF THE BREAST CANCER

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REZUMAT

Cancerul de sân este cea mai frecventă formă de cancer la femei și o cauză principală de deces la nivel mondial. Managementul cancerului de sân se bazează pe disponibilitatea factorilor de prognostic și predictivi necesari în selectarea opțiunilor de tratament. În cazul cancerului de sân aflat în stadiu incipient, caz în care terapia sistemică este individualizată, trei factori determinanți prognostic sunt utilizați în practica de rutină: statusul ganglionilor, mărimea tumorii și gradul histologic. Gradul tumoral histologic ce are la bază gradul de diferențiere al țesutului tumoral, în cancerul de sân presupune evaluarea semi-cantitativă a caracteristicilor morfologice fiind o metodă relativ simplă și ieftină, care necesită doar colorarea cu hematoxilină și eozină a secțiunilor de țesutul tumoral, secțiuni care urmează să fie evaluate de către un patolog experimentat folosind un protocol standard. În acest articol prezentăm pe scurt evaluarea și semnificația de gradului histologic ca factor de prognostic în cancerul mamar.

Cuvinte cheie: grad histologic, factor de prognostic, cancer mamar

ABSTRACT

Breast cancer is the most common cancer in women and a leading cause of cancer death worldwide. Management of breast cancer relies on the availability of prognostic and predictive factors to guide patient decision making and the selection of treatment options. In early-stage breast cancer, where the use of systemic therapy has to be determined for every patient, the three main prognostic determinants used in routine practice are: lymph node status, tumor size, and histological grade. Histological tumor grade is based on the degree of differentiation of the tumor tissue; in breast cancer, it refers to the semi-quantitative evaluation of morphological characteristics and is a relatively simple and lowcost method, requiring only adequately prepared hematoxylin-eosin-stained tumor tissue sections to be assessed by an appropriately trained pathologist using a standard protocol. In this article we present briefly the assessment and the significance of histologic grade as a prognostic factor in breast cancer.

Keywords: histological grade, prognostic factor, breast cancer

INTRODUCTION

In 1925 Greenough introduced breast carcinoma grading using eight histologic characteristics to classify breast carcinomas into three grades of malignancy. Patey and Scarff, in 1928 selected that tubule formation, variation in nuclear size and nuclear hyperchromatism were the most important variables. In 1957, Bloom and Richardson proposed a simplified system which utilized only three of Greenough's variables: gland-formation (tubularity), degree of variation in nuclear size and shape (pleomorphism), and "hyperchromatic figures" to estimate proliferation. In 1968, the Patey and Scarff method with the modifications made by Bloom and Richardson has become known colloquially as the Scarff-Bloom-Richardson (SBR) grading system and this is the most common grading systems used in the United States until recently. In Europe, the Elston-Ellis modification of the SBR grading system (Nottingham Grading System) is preferred and is becoming increasingly popular in the US. This modification provides somewhat more objective criteria for the three component elements of grading and specifically addresses mitosis counting in a more rigorous fashion. For example hyperchromatic nuclei and apoptotic cells which are counted in the original SBR system are excluded in the Elston-Ellis modification and the area being assessed is specifically defined in square millimeters. These modifications have enhanced reproducibility of grading among pathologists and to a considerable extent have fostered acceptance of grading by clinicians. The Nottingham (Elston-Ellis) modification of the Scarff-Bloom-Richardson grading system, also known as the Nottingham Grading System (NGS), based on the evaluation of three morphological features: degree of tubule or gland formation, nuclear pleomorphism and mitotic count, is now the grading system recommended by various professional

bodies internationally (World Health Organization-WHO, American Joint Committee on Cancer-AJCC, European Union-EU, and the Royal College of Pathologists-UK RCPATH) [1-3].

BASIC PRINCIPLE OF GRADING

The first prerequisite for accurate histological grading is good, careful specimen preparation and strict adherence to the protocol. The fixation step entails 3 elements: thickness of tissue, type and volume of fixative, and time. Recommended fixation is in phosphate-buffered formalin using 10% neutral phosphate-buffered formalin (pH 7). This gives perfectly adequate preservation, but the best results are obtained if the tumour is sliced in the fresh state to allow good penetration of fixative. Start and colleagues, have shown that as little as a six-hour delay may reduce the number of mitoses in a given sample by up to 76%. The length of time a tissue remains in fixative has also become an issue in sample preparation. It has been reported that standard time for complete fixation of tissues are a minimum of 5 hours for needle core biopsies (NCB) and 12 or more hours for sections from larger specimens. In addition, time between removal of tissue and fixation should be minimized as mitoses may complete their cycle, even after the tissue has been removed from the body, and disappear. Therefore, the specimen should be sent immediately, ideally in the fresh state, to the pathology laboratory. If this is not possible, it should be immediately placed in a fixative after making single or 90 degree cruciate pair of incisions into the lesion from the posterior deep fascial plane, thus preserving the integrity of margins while allowing immediate penetration of fixative. It has been argued that the benefits of rapid fixation in general outweigh the desire to preserve the specimen intact prior to examination particularly in mastectomy specimens. Moreover, slicing tumours in a

cruciate manner from the posterior aspect also allow accurate measurement of tumour size in three planes. The practice of immersing the whole breast unsliced in fixative will lead to poor preservation of morphological details and should be discouraged. Sub-optimal tissue fixation has been clearly demonstrated to impact adversely on ability to assess mitotic frequency resulting in a systematic down grading of a proportion of cases. This typically results in a reduction in the proportion of cases assigned to grade 3 with resultant increase in grade 2 cases. The amount of fixative should be greater than the volume of tissue and the optimum formalin to tissue ratio is 10:1 [3,4].

Blocks should be selected to give good representation of the whole tumour and in particular the periphery. The number of blocks taken will depend on the size of the tumour. Tumour blocks should be of optimal thickness (3–4 mm) and should be fixed immediately in neutral buffered formalin. Careful processing is important and sections should be cut at 4-6 mm; if sections are cut too thick, nuclear detail is obscured. Most authorities suggest that the section thickness should be standardised at 5 μm [3,4].

HISTOLOGIC ASSESSMENT

Conventional staining with haematoxylin and eosin (H&E) is sufficient for histologic assessment and special stains are not required. Slides of poor quality should not be accepted. Grading of invasive carcinomas is only carried out in invasive components. Grading should be carried out for all histological types of invasive carcinoma and is not restricted to tumors of no special type (ductal NST) [1,3].

The Nottingham combined histological grading system (NGS) is based on the evaluation of three morphological features: degree of tubule or gland formation, nuclear pleomorphism, and mitotic count, for each is given a score of 1 to 3.

1. Tubule (and gland) formation

Tubule (and gland) formation is a histological feature that reflects degree of tumour differentiation and its resemblance to the normal glandular tissue of the breast. In the assessment of tubule/gland formation, only structures in which there are clearly defined central lumens, surrounded by polarised tumour cells, should be counted. It is important to emphasize that this refers to not only to the tubules seen in pure tubular carcinomas but to any glandular structure, even if it is part of a ductal NST carcinoma or other type; the presence of apical snouts within a clear central lumen is useful but not mandatory. Care must be taken not to mistake clefts induced by shrinkage artefact for tubules.

All parts of a tumour are scanned and the proportion occupied by clear glandular structures is assessed semi-quantitatively. Some degree of variation in appearance from one part of a tumour to another occurs; this is particularly true of tumors with areas of variant special type appearance and is one of the main reasons for examining multiple blocks. Assessment of tubular differentiation is made on the overall appearances of the tumour and so account is taken of any variation. This assessment is generally carried out during the initial low power scan of the tumour sections. A score of 1 point is given when more than 75% of the area of the tumour cell islands exhibit tubule formation. Two points are appropriate for tumours in which between 10% and 75% of the area show tubule formation. Where tubules occupy 10% or less of the tumour the score is given as 3 points. These cut-off points may appear to be rather arbitrary but they are based on a study which showed them to give the best prognostic separation in life table analysis [1,3].

2. Nuclear pleomorphism

Nuclear pleomorphism is morphological measurement of tumour differentiation at

the cytologic level, and from a genetic point of view it can be considered as an indirect measure of levels of aneuploidy, genetic instability and transcription. Assessment of nuclear pleomorphism is the most subjective element of histological grade and individual pathologists differ markedly in their approach to nuclear grading. It has been reported that breast specialists appear to allocate higher grades than non-specialists. In order to introduce a degree of objectivity, the size and shape of normal epithelial cells present in breast tissue within or adjacent to the tumour can be used as the reference point. If normal epithelial cells cannot be identified, then stromal lymphoid cells may be used as a surrogate, with appropriate adjustment for their relatively smaller size. Tumors in which nuclei are small, showing little variation in size and shape compared with normal nuclei, with regular outlines and uniform nuclear chromatin are given 1 point. It should be pointed out that most tumours exhibit some degree of nuclear enlargement and pleomorphism and it is rare to attribute a score of 1 to the common forms of invasive cancer. Two points are given when the nuclei are larger than normal, have a more open vesicular structure and there is a moderate variation in size and shape. Vesicular nuclei, often with prominent nucleoli, exhibiting a marked variation in size and shape particularly when very large and bizarre nuclei are present, scores 3 points. In the latter two categories nucleoli are often present, and multiple nucleoli in a nucleus favour a score of 3. Relatively regular, single nucleoli do not decide assignment because they may be present in low nuclear grade cases. The minimum proportion of tumour nuclei which should show marked nuclear atypia/pleomorphism before a score of 3 is allocated has not been defined, but the finding of an occasional enlarged or bizarre nucleus should not be used to give a score of 3 rather than a score of 2. Nuclear grading should be evaluated at the periphery and/or at the least differentiated area of the tumour

to preclude differences between the growing edge and the less active centre [1, 3].

3. Mitotic counts

The prognostic significance of mitotic count in breast cancer was first described in 1925 by Greenhough. Mitotic count reflects the proliferation activity of tumours and is probably the most prognostically significant component of histological grade. It is in this category that the Nottingham grading system (NGS) differs most from those described previously, which assessed both hyperchromatic nuclei and mitotic figures. It is now known that hyperchromicity is more likely to indicate individual cell necrosis (apoptosis) than proliferation and such nuclei should therefore be excluded from the counts. Therefore, only figures which clearly fulfill the morphological criteria for the various stages of mitosis should be included; application of very strict criteria for prophase figures should eliminate problems caused by apoptotic nuclei and intratumoral lymphocytes. Identification of a mitotic figure is based on the absence of the nuclear membrane (cell has passed into prophase) and observation of at least one separate chromosome, usually seen as a small protuberance or a clear hairy projection at the outline of the mitotic figure. Triangular or spiky, rather than the hairy chromosomes of mitosis, favours apoptosis. The surrounding cytoplasm should not be eosinophilic (eosinophilic cytoplasm suggest that the cell is undergoing apoptosis). Structures with empty central zones are often not mitoses. Doubtful structures should be excluded and the fact that pyknotic nuclei and apoptotic bodies are common in most tumours should be always remembered. Accurate mitosis counting requires high quality tissue fixation, processing and staining. Slides of poor quality should be rejected as distinction between mitotic figures and pyknotic nuclei may be difficult or impossible [1-3].

It is now known that the size of a 'high power field' (HPF; the area of the tumour

examined) may vary up to six-fold from one microscope to another and it has been calculated that the count for the same tumour assessed by different instruments may range from 3-20 mitoses per 10 HPF. A minimum of 10 fields is counted at the periphery of the tumour, where it has been demonstrated that proliferative activity is greatest. If there appears to be a variation in the number of mitoses in different areas of the tumor further groups of 10 fields should be assessed to establish the correct score. The field diameter of the microscope should be measured using the stage graticule or a Vernier scale, and the scoring categories should be read from the corresponding line of table (which is included in the protocol). Field selection is important to ensure that false underscoring of mitotic counts does not occur. All the slides of the specimen should be looked at and then select the slide with the highest mitotic activity. After selecting the areas with the highest mitotic activity (hot spot), mitotic counting is restricted to a series of consecutive fields. In mixed tumours, the least differentiated area should be counted [1-3].

To obtain the overall tumour grade the score for each category are added together, giving a possible total of 3-9 points. The grade is then allocated on the following basis: 3-5 points = grade 1 (low grade), 6-7 points = grade 2 (intermediate grade), and 8-9 points = grade 3 (high grade) [1].

HISTOLOGICAL GRADE AND OTHER PROGNOSIS FACTORS

The prognostic relevance of NGS in breast cancer was initially demonstrated in 1991 and has been validated subsequently in multiple independent studies.

Multiple independent studies have shown that NGS has prognostic value that is equivalent to that of lymph node (LN) status and greater than that of tumor size. In a large study, Henson and colleagues, who assessed survival rates of 22616 cases of

breast cancer, demonstrated that patients with histological grade 1, stage II disease had the same survival as those with grade 3, stage I disease. The authors also found that patients with grade 1 tumors of less than 2 cm in size had an excellent prognosis, with 99% 5-year survival, even when they presented with positive LN. There is compelling evidence to suggest that histological grade can accurately predict tumor behavior, particularly in earlier small tumors (tumor, lymph node, metastasis [TNM] stage pT1), more than other 'time-dependent' prognostic factors such as tumor size (pT1a, pT1b, and pT1c). Studies have also demonstrated that grade is an independent prognostic factor in specific subgroups of breast cancer, including estrogen receptor-positive (ER-positive) breast cancer patients who have not or who have received neoadjuvant endocrine therapy and patients with LN-negative or LN-positive breast cancer regardless of ER expression. Recently, Desmedt and colleagues demonstrated that in the ER-positive/Human epidermal growth factor receptor 2-negative tumors (n=628), only histological grade and the proliferation index retained their association with relapse-free survival (RFS) in the multivariate analysis. Therefore, histological grade can provide important prognostic information for clinically relevant subgroups in which the benefit of chemotherapy is less certain (for example, LN-negative/ER-positive or in patients with low-volume LN metastatic disease) [5-8].

Rakha et colleagues have noted, an important association between histological grade and pattern of survival. Akin to high-grade lymphoma, high-grade breast cancers tend to recur and metastasize early following diagnosis, typically within the first 8 years; thereafter, breast cancer-related deaths decrease in frequency. Low-grade tumors tend to show a very good outcome, and few (if any) events occur. Grade 2 tumors show an intermediate outcome during the early years of follow-up;

however, on longterm follow-up, they show an obvious trend for continued recurrence and impaired outcome in the long term [9].

High-grade tumors, with their risk of early recurrence and death, require consideration for prompt use of adjuvant chemotherapy, whereas patients with grade 1 tumors, which are almost invariably ER-positive, could be offered a long-term follow-up with or without a potentially less toxic systemic therapy (that is, endocrine therapy) [9].

The prognostic value of histological grade has been documented in most tumor types, including invasive lobular carcinomas. Medullary carcinoma might appear to be one subtype in which grading is less significant. By definition, these tumors are of high histological grade (grade 3) but may have a more favorable prognosis than their histological grade would imply. However, a recent study shows that medullary carcinomas account for less than 1% of breast cancers as a result of the strict criteria required for its recognition and that they do not have a prognosis significantly different than that of other forms of grade 3 ductal carcinoma with prominent inflammation [1,3].

Since NGS has independent but equally powerful prognostic value, it has been combined with LN stage and tumor size to form prognostic indices: the Nottingham Prognostic Index (NPI) which includes

NGS and LN stage with equal weighting, and the Kalmar Prognostic Index, in which to grade is given a higher-weighted value. Owing to the prognostic information provided by NGS, it has also been incorporated in algorithms and guidelines to determine the use of adjuvant chemotherapy. NGS provides a simple, inexpensive, and routinely applicable overview of the intrinsic biological characteristics and clinical behavior of tumors, adding important information to other significant and at least partly time dependent prognostic factors, such as tumor size and LN status [9].

CONCLUSIONS

The Nottingham Grading System, when adequately carried out, provides a simple, inexpensive, accurate, and validated method for assessing patient prognosis. Consensus criteria for histological grading and recommendations for good practice have been published and should be followed. The Nottingham Grading System is a validated alternative to molecular tests in parts of the world where access to new molecular technology is not currently available. Assessment of histological grade is an important determinant of breast cancer prognostication and should be incorporated in algorithms to define therapy for patients with breast cancer.

REFERENCES

1. Elston C.W., Ellis I.O., 1991, Pathological prognostic factors in breast cancer. The value of histological grade in breast cancer: experience from a large study with long-term follow-up. *Histopathology*; 19:403
2. Tavassoli F.A., Devilee P., 2003, World Health Organization classification of tumours Pathology and Genetics Tumours of the Breast and Female Genital Organs. IARC Press; 19-23
3. Ellis I.O., Elston C.W., 2006, Histologic Grade, In: O'Malley FP, Pinder SE, Breast Pathology, Elsevier Inc, 225-233
4. Leyland-Jones B.R., Ambrosone C.B., Bartlett J., et al. 2008, Recommendations for collection and handling of specimens from group breast cancer clinical trials. *Journal of Clinical Oncology*, 26: 5638-44

5. Walker R.A., 2003, Prognostic and predictive factors in breast cancer, 1st ed. Informa Health Care
6. Henson D.E., Ries L., Freedman L.S., Carriaga M., 1991, Relationship among outcome, stage of disease, and histologic grade for 22,616 cases of breast cancer. The basis for a prognostic index. *Cancer*, 68: 2142-2149
7. Ellis M.J., Tao Y., Luo J., , et al., 2008, Outcome prediction for estrogen receptor-positive breast cancer based on postneoadjuvant endocrine therapy tumor characteristics. *Journal of the National Cancer Institute*, 100: 1380-1388
8. Desmedt C., Haibe-Kains B., Wirapati P., et al. 2008, Biological processes associated with breast cancer clinical outcome depend on the molecular subtypes. *Clinical Cancer Research*, 14: 5158-5165
9. Rakha E.A., El-Sayed M.E., Powe D.G., et al., Invasive lobular carcinoma of the breast: Response to hormonal therapy and outcomes. *European Journal of Cancer*, 44: 73-83

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PATHOLOGIST'S ROLE IN BREAST CANCER MANAGEMENT

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REZUMAT

Evaluarea unor factori prognostici și predictivi a devenit o atribuție importantă a patologului în ceea ce privește rolul său în orientarea piesei și redactarea buletinului histopatologic în cazul carcinomului mamar invaziv. Doar dispunând de aceste informații, echipa de clinicieni poate selecta tratamentul cel mai adecvat; astfel, pacientele ce au un prognostic excelent pot evita un tratament adjuvant inutil, în timp ce pacientele cu prognostic rezervat pot beneficia de terapii mult mai agresive. În plus, patologul poate cuantifica biomarkeri care contribuie la identificarea pacienților ce pot raspunde sau nu la o terapie specifică, și care includ receptorii estrogenici, receptorii progesteronici și receptorul 2 pentru factorul uman de creștere epidermală, predicționând astfel răspunsul la agenți hormonal, respectiv la trastuzumab. Nu în ultimul rând, examinarea clasică, la microscopul optic a lamelor colorate uzual cu hematoxină și eozină poate furniza o serie de date morfologice importante din punct de vedere prognostic. În acest articol prezentăm pe scurt cei mai importanți factori ce au implicație prognostică și predictivă în cancerului mamar.

Cuvinte cheie: factori prognostici, factori predictivi, cancer mamar

ABSTRACT

The assessment of prognostic and predictive factors has become an essential part of the histopathologist's role in the processing, evaluation and reporting of invasive breast carcinomas specimens. Only with this information available, can the clinical team select the most appropriate treatment for the management of patients: those with an excellent prognosis can avoid unnecessary adjuvant treatment, and women with a very poor prognosis can receive more aggressive therapies. In addition, factors (biomarkers) which assist in the identification of patients who may respond or be resistant to specific therapies can be identified by the pathologist; these include estrogen receptor, progesterone receptor and human epidermal growth factor receptor 2 for prediction of response to hormone agents and trastuzumab, respectively. Nevertheless, a large variety of robust and important prognostic features can be assessed using traditional hematoxylin and eosin light microscopy. In this article we present briefly the most important factors which have prognostic and predictive implications for breast cancer patients.

Keywords: prognostic factors, predictive factors, breast cancer

INTRODUCTION

It is well recognized that breast cancer is a heterogenous disease, with variation in clinical behavior, and that the biological nature of the disease and clinical outcome are closely interlinked. Management of the breast cancer patient is now a carefully planned using a variety of factors which are associated with longer or shorter survival (prognostic factors), and/or can aid selection of relevant systemic therapy (predictive factors).

The role of the pathologist in breast cancer diagnosis is rarely directly discussed; however, treatment and management decisions rely upon the pathologist's accurate, thorough, and timely diagnosis. The pathology report that is generated is a very important part of the patient's medical record, as it drives treatment and management decision for breast cancer patients. This report contains the diagnosis, information necessary to determine extent of disease and biological potential of the cancer, forecast the probable course or outcome for the patient, establish that the cancer is completely removed, and assist other doctors in determining choice of therapy and predicting the effectiveness of a particular therapy. The increasing practice of breast conservation, neoadjuvant chemotherapy, and novel prognostic and predictive factors have added necessary complexity to pathology reports.

An unequivocal understanding of the pathology report is important and the responsibility of communicating the information in the pathology report is that of the treating physician. It is therefore important that the surgeon, oncologist, or radiation oncologist seek clarification from the pathologist and even review the report in detail with the pathologist. Consultation, collaboration and active participation as a member of multidisciplinary team caring for breast cancer patients are arguably the pathologist's most important roles. Finding,

diagnosing, and treating breast cancer at an early stage positively impacts survival. Misunderstandings of the pathology report should not play any part in delay of or suboptimal care.

TRADITIONAL MORPHOLOGICAL FACTORS

Tumor Size

Tumor size is one of the most important prognostic factors a pathology report can provide because it decides the T (tumor) staging in the TNM staging of a tumor [1].

The clinical evaluation of tumor size is inaccurate, clinical-pathological agreement is seen in only 54% of cases. Radiological assessment, particularly magnetic resonance imaging and ultrasonography, which are both more accurate than mammographic estimate of tumor size, is more precise than the clinical determination, but breast carcinomas should always be measured histopathologically. A macroscopic measurement can be performed for large lesions in three planes in the fresh state and then confirmed after fixation; but, in particular, for small and in situ lesions, the maximum size should be determined microscopically. It is important to stress that only the size of invasive carcinoma should be used for the pathologic staging (pT), not a size that includes both invasive and in situ carcinomas. When multiple separate invasive tumor foci are present, the size should be recorded individually in the pathology report and only the largest focus is used for staging. It is not recommended to add different tumor sizes together [2].

The prognostic importance of tumor size is well recognized; patients with larger invasive breast carcinomas have a poorer outcome than those with smaller lesions. Rosen et al. examined the relationship between tumor size and 20-year recurrence-

free survival and found a significant association, with a 20-year recurrence-free survival of 88% for tumors ≤ 1 cm, 72% for tumors 1.1 cm to 3 cm, and 59% for tumors between 3.1 cm and 5 cm. Furthermore, median time to the development of metastatic disease also shortens as tumor size increases [3].

Smaller tumors are less frequently node-positive than larger lesions, but there is a risk of metastatic lymph node disease even for lesions < 10 mm in size; Carter et al. reported nodal metastases in approximately 20% of patients with breast cancers < 10 mm [4].

For node-negative patients, tumor size is the most powerful prognostic factor and is routinely used to make adjuvant treatment decisions. In general, patients with a tumor size of > 1 -2 cm warrant consideration of adjuvant therapy since they may have a distant recurrence risk of $\geq 20\%$ [4].

Tumor Histological Type

Many breast carcinoma types have been described, the most common being that of ductal no special type (NST), which was previously known as ductal. However, over 18 different morphological types can be applied; clearly, it is not appropriate to describe the diagnostic features of each here. In order to improve reproducibility of typing, stricter criteria for classification have been described. When no or $< 50\%$ of the tumor shows special type characteristics the lesion is regarded as NST (ductal). When another morphological pattern is also present (between 50% and 90% of the tumor) the lesion is categorized as of mixed type. When a special type component constitutes $\geq 90\%$ of the carcinoma, it is regarded as being of pure special type [5]. Some tumors of so-called special type are seen with increased frequency as a result of mammographic breast screening, for example, tubular, invasive cribriform and mucinous subtypes. These have a good prognosis. Summarizing, the prognostic

groups according to histological tumor type are: excellent group ($> 80\%$ 10-year survival) - tubular, invasive cribriform, mucinous, tubulolobular; good group (60–80% 10-year survival) - tubular mixed, alveolar lobular, mixed ductal no special type (NST) and special type; moderate group (50–60% 10-year survival) - medullary, atypical medullary, invasive papillary, classical lobular; poor group ($< 50\%$ 10-year survival) - mixed lobular, solid lobular, ductal NST, mixed ductal NST/lobular [6].

Tumor Histological Grade

In many series, lymph node stage is the most important factor in predicting survival of patients with breast cancer but, in some centers, multivariate analyses have shown that histological grade is of similar weight. Indeed, histological grading has been repeatedly shown to predict for overall survival and disease-free survival (DFS) [7]. In an attempt to improve interobserver variability multiple grading systems have been proposed, with the most widely accepted being the Scarff-Bloom-Richardson (SBR) classification. Mitotic index, differentiation and pleomorphism are scored from 1 to 3 and the scores from each category are totaled. Tumors with scores from 3 to 5 are well differentiated (grade 1), from 6 to 7 are moderately differentiated (grade 2), and 8 to 9 are poorly differentiated (grade 3). A correlation between histologic grade as determined by SBR and 5-year DFS has been demonstrated in a study of 1262 women: patients with an SBR score of 3 had a relative risk of recurrence of 4.4 compared with those with an SBR of 1. In conclusion, tumor grade does have prognostic significance and is primarily used to make decisions for lymph node-negative patients with borderline tumor sizes [7,8].

Lymph Node Status

The most significant prognostic indicator for patients with early-stage breast cancer is the presence or absence of lymph node

involvement. The average 10-year survival is 75% for node-negative patients compared to 25–30% for those with nodal disease. Five-year survival rates for patients with node-negative disease have been documented to range from 98% (<0.5 cm) to 82% (>5.0 cm). Furthermore, there is a direct relationship between the number of involved axillary nodes and the risk for distant recurrence. For simplicity, however, most clinical trials stratify patients based on four nodal groups that are based on National Surgical Adjuvant Breast and Bowel Project data: negative nodes, 1-3 positive nodes, 4-9 positive nodes, and 10 or more positive nodes. The 5 year survival for patients with node-negative disease is 82.8% compared with 73% for 1- 3 positive nodes, 45.7% for 4-12 positive nodes, and 28.4% for ≥ 13 positive nodes. These data demonstrate that the risk of recurrence is significant enough with lymph node positive disease to warrant adjuvant systemic therapy since, generally, a future risk of distant recurrence of 20% or greater is regarded significant enough to consider the risks of therapy. For lower-risk patients, especially those who are node negative, an individualized assessment utilizing other prognostic factors must be performed [4].

Traditionally, the status of the axilla has been assessed by a standard axillary dissection in which level I and level II lymph nodes were removed. Pathology reports should state clearly the number of positive lymph nodes as it denotes the N staging in the tumor TNM staging. The size of the largest tumor deposit in the positive lymph node, and the presence or absence of extranodal extension should also be recorded because it affects management decision. The prognostic significance of extranodal extension of metastatic deposits is somewhat controversial, but there is reported to be an increased rate of recurrence when this feature is seen. In addition, it is well recognized that the level within the axilla of the involved nodes is of prognostic value: those women with

metastatic disease at the apex have a significantly poorer behavior [2].

Recently, the use of sentinel node (SN) biopsy has become more common. SN biopsy was first used to stage malignant melanoma. The initial study of this technique in breast cancer was reported by Giuliano et al. using the blue dye method. SN were identified in 65% of patients and accurately staged the axilla in 96% of those patients. More recent studies using a combination of blue dye and radiolabeled colloid have achieved detection rates of greater than 95%. Sentinel lymph node biopsy has become the standard of practice since early 1990s to replace the complete axillary lymph node dissection with low morbidity rate. Although it is common for pathologists to use step sections and immunohistochemistry to evaluate sentinel lymph nodes, it is not a required recommendation [2,4,9].

Isolated tumor cells (ITCs) is defined as single cells or small clusters of cells < 0.2 mm in size detected by immunohistochemistry or H&E-stained sections. The patient is staged as pN0 (i+). Micrometastasis is defined as tumor focus >0.2 mm but none >2.0 mm in the lymph node. The clinical significance of micrometastases and isolated tumor cells in the nodes, particularly those identified exclusively by immunohistochemistry, remains a matter of debate [2,10].

In conclusion, axillary node status is the most consistent prognostic factor used in adjuvant therapy decision making. It is standard practice to administer adjuvant therapy to patients with lymph nodes that are positive using H&E staining. Patients with lymph nodes that are positive using H&E staining are offered adjuvant therapy. Therapy for patients that have SN positive by IHC only is a more complex decision, and other factors, such as tumor size, grade, hormone receptor status, and age become more influential [4].

Lymphovascular Invasion

Lymphovascular invasion (LVI) has been shown to have an adverse effect on clinical outcome. The major value of LVI is to identify patients with increased risk of axillary lymph node involvement. More recently, it has been shown in a large series of lymph node-negative patients that the assessment of lymphovascular invasion is of independent prognostic significance along with histological grade and tumor size, and it has been suggested that this feature should be considered in decisions about adjuvant treatment in this group of node-negative women. Finally, in rare cases where no lymph nodes have been excised and examined, the presence of vascular invasion can be used as a surrogate for lymph node stage. LVI must be distinguished from retraction artifacts of the stroma around tumor cell nests. Immunohistochemical assessment may prove helpful in those cases that show artefactual/shrinkage from true vascular invasion by the positive immunoreactivity of the endothelial cell lining in the latter with, for example, CD31 antibody [11].

MISCELLANEOUS FACTORS

Perineural Invasion

Perineural invasion has not been shown to be an independent prognostic factor. It may be included in pathology reports if observed in the tumor [2,10].

Tumor Margins

When a breast excision specimen (lumpectomy or mastectomy) is received in pathology, the surgical excision margins (the outer surface of the specimen) are inked. A lumpectomy specimen is usually inked with different colors to indicate superior, inferior, anterior, posterior, medial and lateral margins; a mastectomy specimen is usually inked at its posterior surface to indicate the deep margin. Then the pathologist then examines the specimen grossly and microscopically to document the distance of tumor (invasive carcinoma and

ductal carcinoma in-situ) to different margins. An adequate tumor clearance distance is important to ensure complete tumor removal and to decrease the local recurrence rate. Re-excision of positive or close margins may be necessary [2,10].

Extent of Ductal Carcinoma In Situ

Extensive ductal carcinoma in situ (comprising >25% of the lesion) occurring with invasive carcinoma is associated with high local recurrence in patients treated with breast conservation surgery and therefore should be noted in the pathology report [2,10].

Involvement of Skin and Nipple

Paget's disease of the nipple is seen in 1–4% of patients with breast cancer. It presents as an eczematous lesion in the area of nipple/areola. The majority of Paget's disease (>95%) is associated with an underlying high-grade ductal carcinoma in situ with or without invasive carcinoma. Those associated with limited single duct involvement may be treated with breast conservation surgery; but most disease is often widespread. Paget's disease in itself does not have increased prognostic significance. It is staged as pTis-Paget's [2,10].

Sometimes, the breast skin presents with erythema, edema, warmth, tenderness, and puckering (so called "peau d'orange"), a breast skin biopsy shows extensive tumor emboli involving dermal lymphatic channels. This form of locally advanced breast cancer is called "inflammatory carcinoma" and is staged clinically as T4d [1].

MOLECULAR MARKERS IN BREAST CANCER

A panel of molecular markers is always performed on invasive breast carcinomas to guide therapy and predict prognosis. These include estrogen receptor (ER), progesterone receptor (PR), Her-2/neu, Ki-

67 and p53. All markers are determined by standardized immunohistochemistry (IHC) assays in pathology laboratories with validated methods and strict quality control.

Estrogen/progesterone receptors (ER/PR)

ER/PR are nuclear transcription factors involved in breast development, growth, and differentiation. They are strong predictors of response to hormonal therapies, such as tamoxifen, other selective estrogen receptor modulators (SERM), and aromatase inhibitors. About 70% of breast cancers are ER positive. The cut-off to define a positive ER varies; there is convincing data now to support that even 1% ER positive tumor respond to hormone therapy. Almost all well differentiated and most moderately differentiated breast cancers are positive for ER and PR [4,12].

Human epidermal growth factor receptor 2 (Her-2/neu)

Her-2/neu belongs to the human epidermal growth factor receptor family and is a transmembrane tyrosine kinase receptor that is involved in the regulatory pathways of breast proliferation. Her-2/neu is associated with poor prognosis, but predicts response to trastuzumab which targets the tyrosine kinase receptor. The two commonly used methods to measure Her-2/neu are fluorescent in situ hybridization (FISH) for gene amplification and IHC for protein overexpression. In general, equivocal IHC results should be verified by FISH [4,12].

Ki-67

Ki-67 is a marker of proliferative activity of cells and is detected by MIB-1 antibody. Tumors with high Ki-67 proliferation index behave more aggressively. The cut-off to define a high proliferation index is not established [4,12].

p53

p53 is a tumor suppressor gene that encodes a nuclear phosphoprotein involved in the regulation of cell cycle, DNA repair and apoptosis. In the lab, immunohistochemical stain detects mutated non-functional p53 protein in the tumor. About one third or more breast cancers have muted p53. Loss of p53 is associated with poor clinical outcome. The p53 gene as a breast cancer marker appears more prognostic in node-negative as compared with node-positive breast cancer patients. In addition to prognostic value, p53 data may help identify patients likely to respond to chemo- or radiotherapy [4,12].

CONCLUSIONS

At present, the histological features of greatest weight in predicting the behavior of primary

breast carcinomas are lymph node stage, histological grade and tumor size, and the presence of lymphovascular invasion. When combined, with each other and with clinical data, they can be used as a basis for selection of the most appropriate treatments, both surgical and systemic. Additional “predictive” markers provide invaluable information in the choice of the optimum treatment for patients with breast cancer who require adjuvant therapy. The assessment of ER status is essential in avoiding a time delay for patients who are unlikely to respond to hormone treatments, and patients with tumors that are HER2 negative will not benefit from trastuzumab. In summary, the pathologist has a major role to play, not only in the diagnosis of breast cancer but in forming a part of the multidisciplinary management team, and providing vital prognostic and predictive data to enable the patient to receive the optimum treatment.

REFERENCES

1. ***, American Joint Committee on Cancer, 2010, Breast, In:

Cancer staging manual, 7th ed.
Springer, 217-233

2. Lester S.C., 2010, Breast. In: Manual of surgical pathology, 3th ed., Elsevier, 262-287
3. Rosen P.P., Groshen S., Kinne D.W. et al., 1993, Factors influencing prognosis in node-negative breast carcinoma: analysis of 767 T1N0M0/T2N0M0 patients with long-term follow-up. *Journal of Clinical Oncology*; 11: 2090-2100
4. Abeloff M.D., Wolff A.C., Wood W.C., et al. 2008, Cancer of the breast. In: Abeloff MD, Armitage JO, Niederhuber JE, et al: *Clinical Oncology*, 4rd ed. Philadelphia: Churchill Livingstone, 2379–2395
5. ***, National Coordinating Group for Breast Screening Pathology. Pathology Reporting of Breast Disease, 2005, National Health Service Breast Screening Programme Publication No 58. Sheffield: NHS Cancer Screening Programmes and The Royal College of Pathologists
6. Pereira H., Pinder S.E., Sibbering D.M. et al., 1995, Pathological prognostic factors in breast cancer. Should you be a typer or grader? A comparative study of two prognostic variables in operable breast cancer. *Histopathology* 1995; 27: 219–226
7. Bloom H.J., Richardson W.W., 1957, Histological grading and prognosis in breast cancer: a study of 1409 cases of which 359 have been followed for 15 years. *British Journal of Cancer*; 11: 359-377
8. Le Doussal V., Tubiana-Hulin M., Friedman S et al., 1989, Prognostic value of histologic grade nuclear components of Scarff-Bloom-Richardson (SBR). An improved score modification based on a multivariate analysis of 1262 invasive ductal breast carcinomas. *Cancer*; 64: 1914-1921
9. Schwartz G.F., Giuliano A.E., Veronesi U., 2002, Proceedings of the consensus conference on the role of sentinel lymph node biopsy in carcinoma of the breast, April 19–22, 2001, Philadelphia, Pennsylvania. *Cancer* 94: 2542–2551
10. Derek C.A., 2006, Breast Carcinoma, In: *Histopathology Reporting. Guidelines for Surgical Cancer*, 2nd ed., Springer, 214-235
11. Mohammed R.A., Martin S.G., Gill M.S. et al., 2007, Improved methods of detection of lymphovascular invasion demonstrate that it is the predominant method of vascular invasion in breast cancer and has important clinical consequences. *American Journal of Surgical Pathology*, 31: 1825–1833
12. Harris L., Fritsche H., Mennel R. et al., 2007, American Society of Clinical Oncology 2007 update of recommendations for the use of tumor markers in breast cancer. *Journal of Clinical Oncology*, 25: 1–26

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MAGNESIUM AND CALCIUM LEVELS, NUTRITION AND NUTRITIONAL STATUS IN A GROUP OF ADULTS (40-65 YEARS) WITH CARDIOVASCULAR DISEASES

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REZUMAT

Calciul și magneziul sunt două elemente care, deși acționează diferit, formează o echipă, între ele trebuind să existe un echilibru. Pentru aceasta, nutriția are un rol important. Obiectivele au fost de a compara nivelurile de calciu și magneziu, obiceiurile alimentare și statusul nutrițional la un grup de oameni cu boli cardiovasculare și la un grup martor și de a investiga relațiile dintre cei doi cationi și parametrii nutriționali. Cele două grupuri au fost selectate de la doi medici de familie din Iași. S-a aplicat un chestionar și s-au determinat magneziu, calciu, câțiva parametri biochimici și IMC. Studiul a evidențiat niveluri reduse ale magneziului și crescute ale calciului la subiecți precum și unele diferențe în obiceiurile alimentare și statusul nutrițional între cele două grupuri. În grupul de studiu, nivelurile de magneziu sau calciu s-au asociat sau corelat cu consumul unor alimente sau nutrienți. Aceste rezultate pot sta la baza unor recomandări nutriționale pentru prevenirea sau tratamentul bolilor cardiovasculare.

Cuvinte cheie: magneziu, calciu, nutriție, boli cardiovasculare

ABSTRACT

Calcium and magnesium are two elements that, although functioning differently, work as a team, making necessary a balance between them. For this aspect, nutrition has an important role. The objectives were to compare the calcium and magnesium levels, eating habits and nutritional status in a group of people with cardiovascular diseases and in a control group and to investigate the relationships between the two cations and the nutritional parameters. The two groups were selected from the consulting rooms of two general practitioner physicians from Iași. A questionnaire was applied, magnesium, calcium, some biochemical parameters and BMI were determined. The study emphasized low levels of magnesium and high levels of calcium in subjects and some differences of eating habits and

nutritional status between the two groups. In the study group, magnesium or calcium levels associated or correlated with some food or nutrient consumption. These results may be the reason for some nutritional recommendations for the prevention and the treatment of cardiovascular diseases.

Keywords: *magnesium, calcium, nutrition, cardiovascular diseases*

INTRODUCTION

Magnesium is essential for the optimal functioning of the entire cardiovascular system. About 27 % of the body's magnesium is in muscle tissues, including heart, and the muscles of blood vessels' wall. Animal and clinical studies have shown that chronic magnesium deficiency has direct consequences on the heart and blood vessels [1-3] but also indirect effects on blood pressure due to its involvement in keeping the electrolytical balance [4]. Magnesium is also needed for the normal structure and function of the blood vessels endothelium [5] and for the decrease of C-reactive protein, thus contributing to the avoidance of the cardiovascular risk [6]. Many people don't have enough magnesium primarily due to the modern processed food diets. Food which provide magnesium are: green vegetable, some dried vegetables (beans, peas), nuts, seeds, whole unrefined grains, cocoa, bananas. The water considered „hard water” may also be a good source of magnesium (good absorption, high bioavailability), having a protective role [2]. On the other hand, excessive or chronic intake of alcohol, too much coffee, soda and salt are all known to cause magnesium deficit, as well. The lower rates of cardiovascular diseases in the East rather than in the West was deemed attributable in part to higher mg/kg/day magnesium intakes in the Orient (from diets comprised largely of fresh fruits and vegetables, soy products) than in Occidental countries (where the refined, fat-rich and highly processed foods are prevalent). Cooking may substantially diminish the magnesium content of foods. For example, boiling the vegetables causes a loss of 50 % of the magnesium [7].

Calcium is an essential nutrient which is a structural component of bones and teeth. It

functions and reacts very differently comparing with magnesium. Nevertheless, the two elements function as a team [5]. For example:

- Calcium exists mainly outside of cells, whereas almost all magnesium is found inside cells.
- Calcium regulates neuromuscular excitability together with magnesium, having antagonic roles: calcium excites nerves, magnesium calms them down.
- Calcium (with potassium) is necessary for smooth and knurled muscles contraction, whereas magnesium is necessary to relax the muscle. If the amount of magnesium in cell falls, calcium ions flow into the cell and put the cell into a hyperactive state.
- Calcium interferes in blood-clotting reaction, whereas magnesium keeps the blood flowing freely and prevents abnormal coagulation.
- Calcium is mostly found in bones and teeth giving them hardness, whereas magnesium is found mainly in soft structure. The soft structure within bone contains proteins and magnesium and gives the bone some flexibility and resistance.

Food which provide calcium are: dairy produces, yellow egg, cabbage, broccoli, sessami seeds, salmon.

Calcium must be controlled and balanced by adequate magnesium. Magnesium is needed for calcium absorption. So that, taken in proper dosages, it can solve the problem of calcium deficiency [8]. Without enough magnesium, calcium can be collected in the soft tissues.

Highly calcium intakes related to those of magnesium can intensify the problems caused by the low magnesium content of the diets, especially making people more

vulnerable to heart diseases. The recommended rate calcium/magnesium varies between 2.5 and 4 depending on sex and age. It should be 2-2.5 in persons with low magnesium.

A problem is modern stress (chemical, environmental and mental) that depletes magnesium reserves faster than the calcium ones, often causing a magnesium deficiency.

Recommended Dietary Allowance (RDA) for magnesium ranged between 310 and 420 mg/day in adults depending on sex and age and RDA for calcium is 1200 mg/day [9].

The objectives of our study were: 1) to compare the magnesium and calcium levels, eating habits and nutritional status in a group of people with cardiovascular

diseases including high blood pressure and in a control group and 2) to investigate the relationships between the two cations and eating habits and nutritional parameters in each of the two groups.

SUBJECTS AND METHODS

The two groups of subjects (with cardiovascular diseases including high blood pressure and the control one) were selected from the consulting rooms of two general practitioners from Iasi city. Their health status was recorded from their register cards. All the investigated persons (subjects or controls) had no diabetes mellitus, endocrine, gastric and renal diseases at the investigation time. They were not taking magnesium or calcium supplements.

Table 1. Characteristics of the investigated persons

		Subjects	Controls	Chi squared	p
Number		51	50		
Women (%)		72	63		
Age (years)		57.7 ± 6.0	57.3 ± 6.6		
Income (%)	low	51.0	30.0	5.1	0.07
	medium	35.3	56.0		
	good	13.7	14.0		
Education (%)	elementary	31.4	12.0	5.5	0.06
	medium	43.1	54.0		
	high	25.5	34.0		
Marital status (%)	married	76.5	80.0	0.9	0.80
	divorced	9.8	8.0		
	widow (er)	13.7	12.0		
Employment (%)	employed	23.5	46.0	5.8	0.12
	pensioner	68.6	48.0		
	unemployed	3.9	4.0		
	pensioner and employed	3.9	2.0		
Physical exercise (%)	not at all	12	4	2.8	0.40
	walks(≤2km/d)	40	50		
	>2 km/d walks or sport	30	36		
	daily physical work	14	10		

The two groups had a similar structure from age, sex, social and economical point of view (Table 1). The income and educational level were better in controls but non significantly.

Serum and erythrocyte magnesium were determined by colorimetric method with xylydyl blue (normal range: 1.8 – 2.7 mg/dl and 4.5 – 6.0 mg/dl respectively). Serum total calcium was assessed using colorimetric method with Arsenazo III (normal range: 8.5 – 11 mg/dl). Serum ionic calcium was calculated (normal range: 40 – 50 mg/dl).

Eating habits were investigated by applying a questionnaire including weekly frequency of food consumption and 24 h recall of food

intake. The quantitative daily intake of bread was also evaluated. Total energy and the main nutrients intakes were estimated.

Nutritional status was reflected by Body Mass Index (BMI) and some biochemical parameters. The relationships between the two cations and the investigated nutritional parameters were followed using “t” test, „chi square” test, Pearson correlation index, and one way Anova test (Epi Info software).

RESULTS

Serum and erythrocyte magnesium levels were significantly lower and serum total calcium was higher in the group with cardiovascular diseases comparing with the controls (Table 2).

Table 2. Magnesium and calcium mean values (mg/dl)

	Subjects	Controls	„t” test	p
Serum magnesium	1.87 +/- 0.12	1.99 +/- 0.19	3.79	< 0.001
Erythrocyte magnesium	4.68 +/- 0.32	4.85 +/- 0.28	2.82	< 0.01
Total serum calcium	9.74 +/- 0.54	9.51 +/- 0.57	2.05	< 0.05
Ionic calcium	3.85 +/- 0.22	3.78 +/- 0.24	1.50	>0.05

According with the upper data, the deficit frequencies for serum and erythrocyte magnesium were significantly higher in

subjects comparing with the controls (Table 3). Calcium deficit frequencies did not significantly differ between the two groups.

Table 3. Deficit frequencies

	Subjects (%)	Controls (%)	Chi squared	p
Serum magnesium < 1.80 mg/dl	33.3	2.0	16.9	0.000
Erythrocyte magnesium < 4.60 mg/dl	31.4	4.1	12.9	0.000
Total serum calcium < 8.5 mg/dl	5.9	10.0	0.59	0.443
Ionic calcium < 40 mg/dl	66.7	74.0	0.71	0.190

The investigated groups consumed with almost same frequency meat, dairy products, eggs, fish, potatoes, fresh vegetables, dried

vegetables (beans, peas), fruits, sweets, pasta, animal fats and alcohol (Table 4).

Table 4. Comparison of the frequencies of food consumption in the two groups

Food	Chi square	p
Meat and poultry	2.76	0.251
Dairy products	3.67	0.159
Eggs	0.05	0.975
Fish	1.64	0.439
Potatoes	0.06	0.972
Fresh vegetables	1.37	0.505
Dried vegetables	1.79	0.409
Fruits	1.74	0.419
Sweets	3.69	0.297
Pasta	0.27	0.965
Vegetal fats	7.49	0.024
Animal fats	2.96	0.398
Alcohol	0.20	0.656
Coffee	5.20	0.023

The groups differed concerning the consumption of vegetal fats and coffee. The subjects and controls consumed almost the same quantity of bread (206.4 +/- 141.0 g/day and 205.0 +/- 102.6 g/day

respectively). As 24 h recall showed, energy and the main nutrients consumption did not significantly differ between the two groups (Table 5).

Table 5. Energy and main nutrients intake

	Subjects	Controls	“t” test	p
Energy (kcal)	1749.9 ± 830.6	1816.6 ± 574.0	0.46	>0.05
Total proteins (g)	62.6 ± 29.7	65.2 ± 25.4	0.47	>0.05
Animal proteins (g)	37.6 ± 25.0	36.2 ± 22.6	0.28	>0.05
Total fats (g)	73.8 ± 53.0	70.7 ± 30.1	0.36	>0.05
Animal fats (g)	33.6 ± 23.0	37.2 ± 24.2	0.73	>0.05
Carbohydrates (g)	197.2 ± 96.8	217.0 ± 86.2	1.08	>0.05

BMI was higher in the group with cardiovascular diseases versus controls: 30.36 +/- 5.6 kg/m² and 27.6 +/- 4.3 kg/m² respectively (t=2.77; p<0.01).

Concerning the biochemical parameters, we found that total proteins, albumin, total

cholesterol and LDL-cholesterol did not significantly differ between the two groups but serum glucose was higher in subjects versus controls (Table 6). Triglycerides were also higher in subjects versus controls while HDL-cholesterol was significantly lower.

Table 6. Mean values of biochemical parameters

Parameter	Subjects	Controls	t	p
Glucose(mg/dl)	89.6 26.4	81.0 11.2	2.12	< 0.05
Total proteins (g/l)	84.5 ± 4.1	83.8 ± 4.3	0.84	> 0.05
Albumin (g/l)	47.7 ± 4.6	47.0 ± 4.4	0.78	> 0.05
Total cholesterol (mg/dl)	227.4 ± 35.7	231.4 ± 33.0	0.58	> 0.05
HDL- cholesterol(mg/dl)	52.7 14.0	58.2 11.8	2.06	< 0.05
LDL-cholesterol(mg/dl)	145.7 ± 40.7	150.2 ± 37.1	0.56	> 0.05
Triglycerides (mg/dl)	143.1 57.8	118.8 44.8	2.36	< 0.02

In the group of subjects, serum and erythrocyte magnesium levels were inversely associated with the consumption of vegetal fats (Table 7). Erythrocyte magnesium was directly associated with the

consumption of dried vegetables. Ionic calcium inversely associated with coffee consumption and directly associated with excessive bread intake.

Table 7. Associations of magnesium and calcium levels with the frequencies of some foods consumption (subjects group)

	Association	The test	p
Serum magnesium – vegetable fats	inverse	$\chi^2 = 5.99$	0.014
Erythrocyte magnesium - vegetable fats	inverse	$\chi^2 = 7.47$	0.000
Erythrocyte magnesium – dried vegetables	direct	t = 2.63	0.011
Ionic calcium - coffee	inverse	$\chi^2 = 5.82$	0.015
Ionic calcium – bread in excess	direct	$\chi^2 = 4.64$	0.031

In the control group, erythrocyte magnesium level was inversely associated with the dairy products consumption (f statistic = 3.48; p = 0.037).

DISCUSSION

The study of a group of adults with cardiovascular diseases regarding magnesium and calcium levels, nutrition and nutritional status, showed significantly lower levels of serum and erythrocyte magnesium and higher levels of serum total calcium comparing with a control group (Table 2). The difference was more significant in the case of serum magnesium, parameter less stable than erythrocyte

magnesium, being easier influenced by different factors.

Concerning the consumption of different foods, we found differences relating on vegetal fats (Table 4). This means that subjects consumed more vegetal fats (especially margarine which contain only 5 mg magnesium/100g). Also, the coffee consumption was significant lower in subjects, given his action to elevate blood pressure.

Although the ingestion of different nutrients did not differ, BMI was higher in subjects with cardiovascular diseases, possibly due to the metabolic disturbances. The same cause

probably determined higher values of triglycerides and glucose and lower levels of HDL-cholesterol (Table 6). The inverse association of serum and erythrocyte magnesium with the consumption of vegetal fats (Table 7) may be explained by the fact that vegetal oils and margarine contain 1-5 mg magnesium/100g, which is a very low magnesium content comparing to bananas, for example, which contain 33 mg/100 g and are considered a good source for dietetic magnesium. These results suggest that subjects did not follow a properly diet, with less fats and carbohydrates and, possibly, a prescribed medicine treatment, as well.

Dried vegetables (among which dried beans is rich in magnesium – about 140 mg/100 g) were relatively often consumed by individuals from subject group, where majority of them had low income, although per total the incomes did not significantly differ (Table 1). That is why we consider that their consumption directly associated with erythrocyte magnesium level. Coffee raises the urinary calcium elimination; maybe that was the reason for the lower ionic calcium of those which used to drink coffee. On the other hand, calcium content of bread is from 20 to about 110 mg magnesium/100 g and those who excessively consumed bread presented a direct association with ionic calcium level.

Positive correlation of serum magnesium with the ingested animal proteins (Table 8) may not so much due to the magnesium content of the animal products (for example meat and poultry contain 10-30 mg magnesium /100 g, eggs – about 15 mg magnesium /100 g and dairy products – 10-50 mg magnesium /100 g) but to the fact that the adequate protein intake is necessary for optimal magnesium retention [5]. The patient's protein status is also important because extra cellular magnesium is protein bound.

Correlation ionic calcium – carbohydrates in our investigated groups may due to the fact that carbohydrates are firstly represented by

bread which may contain much calcium amount (between 20 and 110 mg magnesium/100 g).

There is an inverse association erythrocyte magnesium – dairy products in the control group because, among others, these products contain much more calcium comparing with magnesium (for example milk calcium/magnesium ratio = 8/1) and a high calcium intake decreases body magnesium level.

In this context, we remind the concept of "calcium toxicity". The problem is serious as the doctors and the media do not give proper attention to the magnesium although the two minerals work in tandem and magnesium deficiency is much more spread than the calcium one. For example, one study shows that over 70 % of American adults are magnesium deficient [10] and other experts put the number even over 80 % [4]. On the other hand, the magnesium deficiency is a particular one: there is no "specific appetite" for magnesium as for the most mineral deficiency.

The current promotion of calcium rich foods and supplements in order to prevent osteoporosis especially in menopausal women encourages the consumption of this element. Thus, it can reach unhealthy levels in the body and leads to calcium deposits such as gallstones, kidney stones, calcium deposits in joints [11]. It has been stated that all of these disorders disappear after taking extra magnesium, especially the drinking form. This fact happens because highly intake of calcium supplements can lead to magnesium deficiency. Therefore, if calcium supplementation is needed, the proper ratio should be taken as the two minerals work together.

Another aspect must also be mentioned. Doctors routinely prescribe calcium-channel-blocking drugs to forestall the

abnormal movement of calcium into cells because of the dangerous effect of it for

heart and blood vessels. Magnesium is a natural calcium-channel blocker.

In our study, the lack of some relationships in both groups, under the condition of comparable values of parameters and of a similar level of food consumption, may due to the presence of comorbidities and associated medication and, possibly, to some nutritional supplements as well.

The paper aimed to draw attention upon the calcium-magnesium balance highly depending on nutrition in the patients with a very frequent pathology as cardiovascular diseases, and also upon the special importance of magnesium in the etiology of these diseases .

REFERENCES

1. Murray M., 1998, Encyclopedia of Natural Medicine, 2nd ed. Rocklin, CA: Prima Publishing
2. Durlach J., 1985, Le magnesium en pratique cliniques, Ed. Medicales Internationales, JB Bailliere, Paris, France
3. Chiuve S.E., Korngold E.C., Januzzi J.L. Jr, Gantzer M.L., Albert C.M., 2011, Plasma and dietary magnesium and risk of sudden cardiac death in women, *Am J Clin Nutr*, 93(2): 253-60
4. Evers H.R., 2002, Magnesium linked to aging mystery & calcifications, Available from: [http:// www.mgwater.com/](http://www.mgwater.com/) , Accessed 4.05.2010
5. Seelig M.S., Rosanoff A., 2003, The magnesium factor, Avery Publishing Group Penguin Group (USA), New York, ISBN 1-58333-156-5
6. King D.E., Mainous AG III, Geesey ME et al, 2005, Dietary magnesium and C-reactive protein levels, *J Am Coll Nutr*, 24(3):166-171
7. Boomsma D., 2008, The magic of magnesium, *Int J Pharm Compound*, 12(4):306-9
8. Fuchs N.K., 2002, Magnesium: A key to calcium absorption, Available from: <http://www.mgwater.com/>, Accessed 11.08.2011
9. ***, National Research Council, 1989, Recommended Dietary Allowances, 10th Ed, National Academy Press, Washington DC
10. Jaffe R., 2005, How to know if you are magnesium deficient-75 % of Americans are, Available at:

CONCLUSIONS

Magnesium levels were significantly lower and total serum calcium was higher in persons with cardiovascular diseases comparing with controls.

Some differences of eating habits and nutritional status were found between the two groups, the results suggesting that the subjects did not follow the properly diet and prescribed medicine treatment.

In the group with cardiovascular diseases, magnesium or calcium levels associated or correlated with some food or nutrient consumption.

These results may be the reason for some nutritional recommendations in case of prevention and treatment of cardiovascular diseases.

www.inovativehealing.com.
Accessed Aug 9, 2011

11.*** Calcium toxicity, Available from:
<http://coldcure.com/html/dep>

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PERENNIAL HUMAN NEEDS, NEW TERMS AND CONCEPTS: HEALTH, WORKPLACE AND WELLBEING

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REZUMAT

Sănătatea, resursă necesară activității umane zilnice și caracteristică a stării de bine, se definește actual ca abilitatea individului de a se adapta și contracara provocările sociale, fizice și emoționale. În acest context, pentru a accesa determinanții socio-economici, programele de promovare a sănătății trebuie orientate la nivel populațional. Locul de muncă asigură o intrare rapidă, un cadru organizat, o multiplicare rapidă a educației sanitare, facilitând adoptarea stilului de viață sănătos și folosirea serviciilor preventive și curative sanitare de către populație. Adicional obligațiilor legale referitoare la medicina muncii, interesul social crescut a determinat marile întreprinderi să introducă programe de promovare a sănătății la locul de muncă. Aceste programe se amplifică continuu, urmărind prevenirea și tratarea bolilor infecțioase și bolilor cronice în rândul muncitorilor, familiilor și comunităților înconjurătoare, fiind ghidate actual de către OMS prin conceptul locul de muncă sănătos. Îmbunătățirea stării de sănătate în condițiile asigurării protecției sociale va contribui la diminuarea sărăciei, dezvoltarea economică și securitatea umană, și la îmbunătățirea stării de bine a populației.

Cuvintecheie: sănătatea, locul de muncă, bunăstarea

ABSTRACT

Health, as a resource for the daily human functioning and a characteristic of the wellbeing, is defined currently as the ability of the individual to adapt and counteract the social, physical and emotional challenges. In order to address the socio-economic determinants of health, the promotion should be applied at populational level. The formal workplace (enterprise) provides a rapid entry in the community, an organized structure for the multiplication of information hence facilitates the adoption of healthy behaviours and utilization of preventive and curative health services by the population. Additional to the legal obligations regarding the occupational health and safety, due to the growing social interest, the large companies have introduced health workplace programs. These programs address increasingly infectious and non-communicable diseases within the workers and community, being currently guided by the WHO framework for Healthy Workplace. The enhanced health

status in the context of the improved social protection will contribute to the poverty reduction, economic growth, human security and ultimately to the wellbeing of the population.

Keywords: health, workplace, wellbeing

THE NEW CONCEPT OF HEALTH

Currently there is a new understanding of the health concept [1], as compared to the 1948 World Health Organisation definition as "a state of complete physical, mental and emotional wellbeing and not merely the absence of the disease". In the current complex context of the emergence of chronic diseases and related risk factors, improved knowledge in the field of disease etiology and treatment is becoming increasingly clear that this state can not be attained by the absolute majority of the people. According to this definition, "most people would be sick most of the time" [2] and the society would be unwantedly increasingly medicalised. The socio-economic progress contributes to the increased life expectancy and aged population is characterised by various chronic diseases or disabilities. The 1984 WHO health definition does not take in account the human capacity to adapt to different internal or external conditions. The new definition of health as "the individual's ability to adapt and counter the negative stimuli or social challenges, physical and emotional" [1], takes in account the human individual's ability to function even in the presence of a chronic disease or disability by preserved wellbeing.

METHODS OF PROMOTING AND MAINTAINING HEALTH AT INDIVIDUAL AND POPULATION

Methods of promoting and maintaining health have as well undergone a profound transformation.

Considering the determinants of health (biological, environmental, behavioural, social and economical) the emphasis was

put on influencing individual behaviour [3] anticipating adoption of healthy lifestyles and increased use of medical services [4]. Previous health promotion programs aimed to reduce risky behaviors (such as smoking, excessive alcohol consumption, concurrent multiple sexual partners) were based on different theories of individual behavior modification, such as

- The Health Belief Model: a person preoccupied by own health status is presumed to be able to reduce the risk behaviour. The model is based on individual perceptions (susceptibility to, severity of the disease, benefit derived from quitting risk behaviour, barriers to changing the behaviour), cues of action, individual psychologic, socio-demographics and self-efficacy, but disregards economic, environmental factors, social norms and peer influence,

- The AIDS Risk Reduction Model: incorporates Health Belief Model, emotional influences and interpersonal processes, but no of the three stages of behaviour change (recognition of own behaviour as risky, determination to reduce the risk and taking action) address socio-cultural problems that influence and even limit the possibility of the individual to act in the desired direction,

- The Stages of Change: implies a linear process of behavioural change (pre-contemplation, contemplation, action/change and maintenance of the new behaviour) in contradiction with the cyclic process of the behavioral change in the cultural and structural context which determines the ability of the individual to act,

- Theory of Reasoned Action : implies that the human being is rational and the human behavior is self-controlled, hence the knowledge and attitude in the context of the predominant norms are influencing the intention and the behaviour; again

disregards the role of the social and structural factors, and envisaged at individual level increased awareness, motivation and self-efficacy but did not take in consideration the role of social and cultural factors in adapting the desired behaviour.

Therefore, although the application of these behavioural change models was marked by a relative success in reducing risky behavior (vis-à-vis smoking, physical activity, obesity) it was as well recorded the tendency to blame the individuals for their health problems, inferring that health problems are solely caused by individual's wrong decisions in terms of reducing health risk behaviors (lack of exercise, wrong food). This inference overlooks the fact that individual decisions may actually be due to reasons outside of its sphere of influence, such as economic, social or cultural (eg dietary products are higher priced, lack of adequate time to prepare nutritious food, etc).

Various studies have demonstrated the decisive role of social, economic and environmental factors [5] and not necessarily of the factors related to health systems or individual behavior in determining the health status. The poor (individuals, families or communities) suffer more often from physical, social or mental problems as compared to the rich [6]. Therefore, the recent structural interventions apply the social-ecological theory [7], address social and environmental factors relevant in determining individual behavior (the presence of a particular product can facilitate or block a particular type behavior) and changing social norms (repeated promotional messages by means of mass media) [8,9] involving multisectoral collaboration (i.e. education, justice, housing, employment, transport). The health promotion addresses therefore the wider determinants of disease trying to prevent the occurrence of diseases and accidents and disease complications [10]. There are

numerous examples in which various indicators of morbidity and mortality were reduced by reducing the economic and social inequalities in the population (eg food distribution to poor pregnant reduced the prevalence of low weight babies) [11]. In this way the health system is the only initiator and collaborator in promoting health at a population level by contributing to political concerted action of various sectors determined to improve the wellbeing of the population.

In this regard, the Ottawa Charter for Health Promotion (World Health Organization 1986), significantly changed the health education and health promotion in the world. This document highlights the predominant role of society on individual responsibility in terms of health, and supports the active role of people in determining priorities, making decisions, planning and implementing activities to improve community health. Important to note is the fact that the Ottawa document defines health as not an end in itself but as a resource for conducting daily life, personal features consisting of physical, social and environmental.

Hence, health improvement takes place in a broader framework than that of the curative healthcare system and is due not only to improved individual capacity but also the health system re-orientation towards promoting health, improving health policy, creating an enabling environment and active participation of communities in such programs [12]. In terms of community involvement in health promotion the most commonly used entry points are the workplace [13] or residences.

THE WORKPLACE - EFFECTIVE ENTRY POINT FOR HEALTH PROMOTION AND HEALTH SERVICES

The formal workplace (enterprise) provides a rapid entry in the community, an

organized structure for the multiplication of information hence facilitates the adoption of healthy behaviours and utilization of preventive and curative health services by the workers, their families and surrounding communities [14].

Historically, at the workplace was envisaged the protection of the workers from the harmful effects of the work process. A number of conventions have been promulgated in order to prevent and treat injuries and diseases caused by work [14-19].

Under the auspices of WHO and ILO (WHO Collaborating Centres in Occupational Health) these conventions have supported the policy development in occupational health and safety and the global implementation of the needed measures.

In addition to the prevention and treatment of work-related diseases and accidents and as a result of increased social interest of multinational companies and large national companies a series of programs addressing the health of workers and surrounding populations have been developed worldwide. Some programs include measures to offset possible negative of the particular economic activity on the communities [20-22].

These programs are guided by the Directive ISO SR of the International Organization for Standardization [23].

Increasingly enterprises implement workplace programs to address prevention and treatment of infectious diseases (specially HIV/AIDS, TB, malaria) among workers and surrounding population.

The International Labour Organization (ILO) recommends as theoretical basis for implementing these workplace programs the ecological model of human behavior as health status be effectively improved by changing social and legal context. In this regard, the enterprises must adopt an internal policy on

occupational health in particular and on comprehensive health (including psychosocial problems) in general and to educate employees to make them recognize and prevent these problems. The ILO recommendation corresponds to the results of studies showing that interventions in occupational health that involve the management and imply active participation of employees are effective [24].

Gradually, the health promotion programs at workplace are becoming more comprehensive and governments are becoming more involved in supporting their inception and implementation, Canada being one the most relevant example. A recent development is the WHO initiative called "healthy workplace" [25]. Which aims to guide and standardize global workplace programs in four areas: physical environment (risks related to the work), environment psycho-social (organizational context), personal health resources for employees (health services and health promotion), and relations with the population in the area of health, environment, promotion of healthy behavior among others. This initiative aims to improve the wellbeing of the population as a determining factor in ensuring a lasting economic development locally, nationally and globally.

For the implementation of such comprehensive workplace programs development private public partnerships between governments, development agencies and the private sector are initiated, based on the experience of the HIV/AIDS control programs in low and middle income countries.

The emerging non-communicable disease (cardiovascular disease, diabetes, cancer, chronic lung disease) are now doubling the burden of disease in LIC and MIC [26,27] and threatening the economic development. As proposed by the international community, represented by the Lancet NCD

Action Group and the NCD Alliance, the implementation of effective interventions for prevention of these diseases and reduction of the related risk factors [28-32] in the context of concerted international action (treatment, monitoring, international cooperation and leadership) [32] will help reduce obstacles to achieving the Millennium Development Goals [33] and contribute to achieving poverty alleviation,

equity in health, economic development and human security.

Global partnerships and multi-sectoral programs (including social protection, population wide prevention programs, effective health care services) are needed to improve the wellbeing of the population as a determining factor in ensuring long-term economic and human development at local, national and global level.

REFERENCES

- 1.***, <http://www.bmj.com/content/343/bmj.d4817.full> BMJ 2011
2. Smith R., BMJ blog, <http://bit.ly/ngzpes>
- 3.***, 1974, New Perspective on the Health of Canadians, Lalonde
- 4.***, Behavior Change, A Summary of Four Major Theories, Behavioral Research Unit (BRU), Family Health International/AIDSCAP, <http://www2.fhi.org/en/aids/aidschap/aidspubs/behres/-bcr4theo.html>
5. Evans et al., 1994, Health Education Partners for program evaluation and corporate health promotion (www.healthedpartners.org)
6. Smith et al., 1996, Wilkinson 1996; World Health Organization 1988
7. Kok G., Schaalma H., Ruiter R., et al., 2004, Intervention mapping: A protocol for applying Health Psychol theory to prevention programmes. J Health Psychol, 9:85-89
- 8.***, Preventive Medicine 30, 146–154 (2000), doi:10.1006/pmed.1999.0609, <http://www.idealibrary.com>, A Structural Model of Health Behavior: A Pragmatic Approach to Explain and Influence Health Behaviors at the Population Level, D.A. Cohen et al
9. Bandura A., 1986, Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice–Hall
10. Hamilton and Bhatti, 1996
- 11.*** <http://www.longwoods.com/content/16763>, The Expanded Chronic Care Model: An Integration of Concepts and Strategies from Population Health Promotion and the Chronic Care Model by Victoria J. Barr et al
- 12.***, Achieving Health for All: A Framework for Health Promotion, Ottawa Charter http://www.who.int/hpr/NPH/docs/ottawa_charter_hp.pdf
13. Chau J., 2009, Evidence module: Workplace physical activity and nutrition interventions. Physical Activity Nutrition and Obesity Research Group, University of Sydney
- 14.***, 1994, World Health Organization, Declaration of occupational health for all http://www.who.int/occupational_health/publications/declaration/-en/index.html
- 15.***, 1981, International Labour Organization. C155 Convention concerning Occupational Safety and Health and the Working Environment <http://www.ilo.org/ilolex/english/convdisp1.htm>

16. ***, 1985, International Labour Organization. C161 Convention concerning Occupational Health Services <http://www.ilo.org/ilolex/english/-convdisp1.htm>.
17. ***, 1986, Ottawa Charter for health promotion. First international conference on health promotion, Ottawa 21 November 1986, WHO/HPR/HEP/95.1
18. ***, 1995, World Health Organization, Global strategy on occupational health for all., http://www.who.int/occupational_health/publications/-globstrategy/en/index.
- 19.***http://www.who.int/occupational_health/publications/globstrategy/en/index1.html
- 20.***,http://www.economist.com/node/4008642?Story_ID=4008642 Business and society, The biggest contract, Ian Davis, May 26 2005
21. Wood D., 1991, Corporate Social Performance Revisited, 16(4) The Academy of Management Review
22. Saether K.T., Aguilera R.V., 2008, Corporate Social Responsibility in a Comparative Perspective. In Crane, A., et al. (PDF). The Oxford Handbook of Corporate Social Responsibility. Oxford: Oxford University Press. ISBN 0199211590
<http://www.business.uiuc.edu/aguilera/pdf/Williams%20Aguilera%20OUPfinal%20dec%202006.pdf>
23. ***, The International Organization for Standardization
24. ***, Journal of Occupational Health Psychology, 2008, Vol. 13, No. 1, 32–42, DOI: 10.1037/1076-8998.13.1.32, A Preliminary Evaluation of SOLVE: Addressing Psychosocial Problems at Work, Tahira M. Probst Washington State University Vancouver, David Gold and Joannah Caborn International Labour Organization.
- 25.***http://www.who.int/occupational_health/healthy_workplaces/en/index.html
- 26.***http://apps.who.int/gb/ebwha/pdf_files/WHA64/A64_R9-en.pdfWHA64.9, Sustainable health financing structures and universal coverage
27. *** 2005, Preventing chronic diseases: a vital investment. Geneva, World Health Organization
28. O'Donnell M.J., Xavier D., Liu L., et al., 2010, Risk factors for ischemic and intracerebral-haemorrhagic stroke in 22 countries (the INTERSTROKE study): A case-control study. Lancet 2010; DOI:10.1016/S0140-6736(10)60834-3. Available at: <http://www.thelancet.com>
29. Tu J.V., 2010, Reducing the global burden of stroke: interstroke. Lancet; DOI:10.1016/S0140-6736(10)60975-0. Available at: <http://www.thelancet.com>.
30. ***, 2008, Preventing non-communicable diseases in the workplace through diet and physical activity: WHO/World Economic Forum report of a joint event. 1.Chronic disease - prevention and control. 2.Occupational health. 3.Workplace. I.World Health Organization. II.World Economic Forum, ISBN 978 92 4 159632 9 World Health Organization/World Economic Forum
31. ***, The NCD Alliance, Non-Communicable Diseases: The Silent Killer,

- <http://www.ncdalliance.org/thesilentkiller>,
<http://www.ncdalliance.org/global/epidemic>
32. ***, 2011, Priority actions for the non-communicable disease crisis Lancet 2011; 377: 1438–47, Published Online, April 6, 2011 DOI:10.1016/S0140-6736(11)60393-0
33. ***, 2000, United Nations Millennium Declaration, 18 Sept, 2000, A/RES/55/2, <http://www.un.org/millennium/declaration/ares552e.htm>

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THE ASSESSMENT OF THE RELATION BETWEEN THE MATERNAL EDUCATIONAL LEVEL AND NUTRITION OF A LOT OF TEENAGERS FROM "D. CANTEMIR" HIGH SCHOOL, IASI

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REZUMAT

Nutriția este un factor extern foarte important, care ajută la menținerea stării de sănătate a copiilor și tinerilor. Obiective: cunoașterea obiceiurilor nutriționale ale adolescenților și evaluarea lor în funcție de nivelul educațional matern. Material și metodă: studiul a fost efectuat pe un grup de 165 de adolescenți cu vârste cuprinse între 16 și 18 ani. Ei au completat un chestionar de frecvență a consumului de alimente și unul legat de nivelul educațional al părinților lor. Rezultate și discuții: grupul de studiu este dominat de mamele cu studii medii (46,1%), urmate de cele cu studii universitare (35,1%). Laptele este consumat de 2-3 ori pe săptămână (38,8%) de către cei mai mulți adolescenți, brânza de 2-3 ori pe săptămână (38,8%), ca și carnea de pui (43,6%). Legumele și fructele sunt consumate mai ales de 4-7 ori pe săptămână. Pentru toate aceste produse, diferențele în domeniul educației materne sunt nesemnificative statistic. Concluzii: obiceiurile alimentare sunt foarte puțin diferite la adolescenți, deși informațiile mamelor lor sunt diferite.

Cuvinte cheie: nutriție, nivelul de educație al mamei, consumul de produse alimentare

ABSTRACT

Nutrition is a very important external factor that helps keep the health of children and youth. Objectives: Knowledge of the nutritional habits of teenagers and assess whether they change in relation to maternal educational level. Material and method: The study was conducted on a group of 165 teenagers aged between 16 and 18. They completed a questionnaire of frequency of food consumption and one linked to the educational level of their parents. Results and discussions: The study group is dominated by mothers with secondary education (46.1%), followed by those with university education (35.1%). Milk is

mostly consumed 2-3 times per week (38.8%), cheese 2-3 times per week (38.8%), chicken as well (43.6%). Vegetables and fruits are mostly consumed 4-7 times per week. To all these products, the differences in maternal education are statistically insignificant. Conclusions: The dietary habits change very little, although maternal information on this is different.

Keywords: nutrition, maternal education level, food consumption

INTRODUCTION

Growth and development of children and young people is influenced by a number of internal factors (hereditary) and environmental (external). Among the external factors, nutrition has a central role [1,8]. An unbalanced diet can lead to serious health problems, from malnutrition (insufficient food), to obesity (food in excess) [2,3]. Currently we insist on the risk of obesity, neglecting the other aspect of malnutrition. In the last 20-30 years, there has been a change, a transition between the image of "fat and beautiful" to an ideal that has become "skinny" [4]. To be suitable for the requirements, teenagers try to loose weight. This excessive weight loss may be an element of risk for their health. Although, these methods are less effective because beauty requires sacrifices [6].

OBJECTIVES

Knowledge of the dietary habits of teenagers in the group of study. Assess whether they are influenced by maternal educational level.

MATERIAL AND METHODS

The study was conducted on a group of 165 teenagers from 16 to 18 years old, in the tenth and eleventh grade, from "Dimitrie Cantemir" High School. They completed a questionnaire of frequency of food

consumption and one regarding their family situation (parental occupation, age, education, employment). The questionnaire allows to assess the consumption of each product from a predetermined list. This method is used to show the ordinary, not the actual consumption [5,7]. Statistical processing of the results was done using the Pearson test.

RESULTS AND DISCUSSIONS

The first thing studied was the maternal education level. There are dominant the families where the mother graduated high school (46.1%), followed by those with university education (35.1%). Within this group there were families where the mother has a secondary level education or graduated vocational school.

The second aspect studied represents the weekly consumption frequency of milk, cheese, chicken, vegetables and fruits.

Milk is a product with a high biological value, given by a wealth of proteins, fats, carbohydrates and minerals. It has a low quantity of calories (so it is recommended even for those who want to control their weight). However, the dominant consumption is only 2-3 times per week (38.8%), quite low compared to the needs (Figure 1).

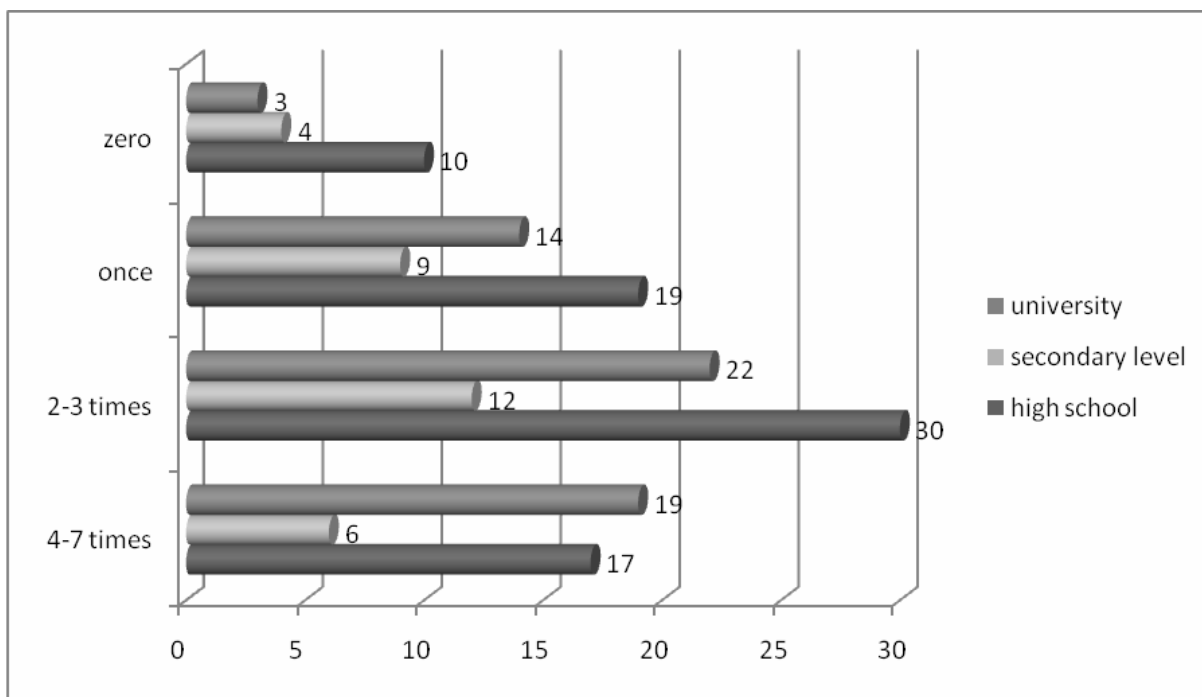


Figure 1. Milk intake

We are concerned of 10.3% students who scored zero, which indicates no consumption of milk. The differences are statistically insignificant ($p > 0.05$ χ^2 -4.42) and indicate similar dietary habits. Although mothers have university education and adequate informations about food, they make the same mistakes as those who don't have adequate informations in this area. Basically, mothers are tributary to family

traditions and have few concerns that come to change them.

Cheese is another product that has great nutritional value and it is important for the normal growth and development of children and youth. However, the intake of cheese is, in most cases, 2-3 times per week (38.8%) (Table 1).

Table 1. Cheese consumption

Maternal education	Food intake			
	zero	Once a week	2-3 times a week	4-7 times a week
University	6 – 10.3%	16 – 27.6%	23 – 39.7%	13 – 22.4%
Secondary level	5 – 16.1%	8 – 25.8%	12 – 38.7%	6 – 19.4%
High school	10 – 13.2%	25 – 32.9%	29 – 38.2%	12 – 15.8%
Total	21 – 12.7%	49 – 29.7%	64 – 38.8%	31 – 18.8%

The results are alarming because 12.7% marked zero and in 29.7% cases the first alternative date. Practically, 40% of the investigated teenagers do not eat cheese or eat in very small quantities. These errors occur in all families, regardless or maternal

education, so the differences are statistically insignificant ($p > 0.05$ χ^2 -6.79).

Chicken is mostly consumed 2-3 times per week (43.6%) or 4-7 times (36.9%). There are 1.8% cases with negative answers and

17.6% students who eat only once a week (Figure 2).

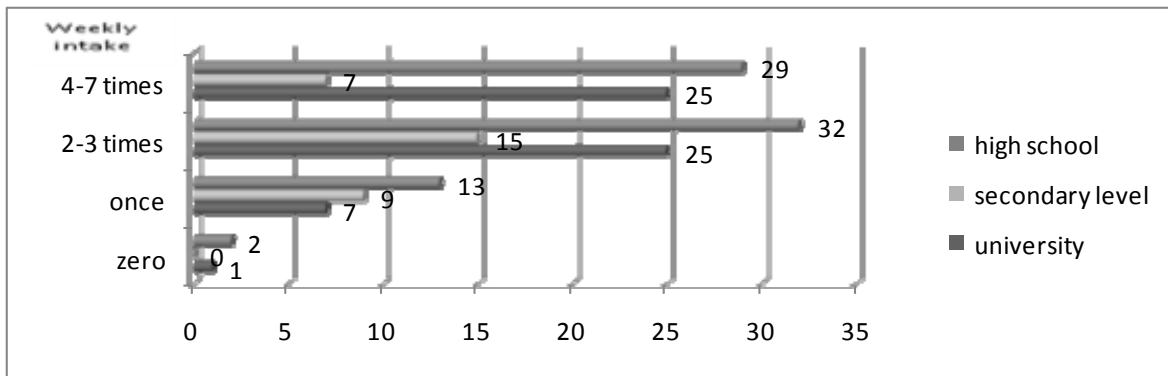


Figure 2. Chicken intake

An important aspect is the distribution of cases according to the low or nonconsumption of chicken. The differences are statistically insignificant ($p > 0.05$ χ^2 -6.79) and lead to similar dietary habits in which maternal education has very little importance.

Fruits and vegetables are included in this questionnaire. These products are rich in vitamins, minerals and carbohydrates, but provides a low energetic intake. The

vegetables are mostly consumed 4-7 times per week (59.4%), and also fruits (75.8%). Unfortunately, there are cases in which the consumption of vegetables is very low (once a week—12.7%) or absent (2.4%). Such situations occur at all the levels of maternal education and the differences are statistically insignificant ($p > 0.05$ χ^2 -1.4) (Table 2).

Table 2. Vegetable intake

Maternal education	Food intake			
	zero	Once a week	2-3 times a week	4-7 times a week
University	2 – 3.4%	7 – 12.1%	14 – 24.1%	35 – 60.3%
Secondary level	0	5 – 16.1%	8 – 25.8%	18 – 58.1%
High school	2 – 2.6%	9 – 11.8%	20 – 26.3%	45 – 59.2%
Total	4 – 2.4	21 – 12.7	42 – 25.5%	98 – 75.8%

Basically speaking, the same mistakes are made in all teenagers families. These mistakes are still curious, given that people in our country usually consume more vegetables. However, since vegetables must be cooked and mothers don't have much time, this could explain the low

consumption that occurs in some families. In this group of study, fruit intake is not a problem. Fruits are consumed very often, sometimes daily. Nobody answered "I never eat fruits", but there are situations with insufficient consumption (once a week – 5.5%).

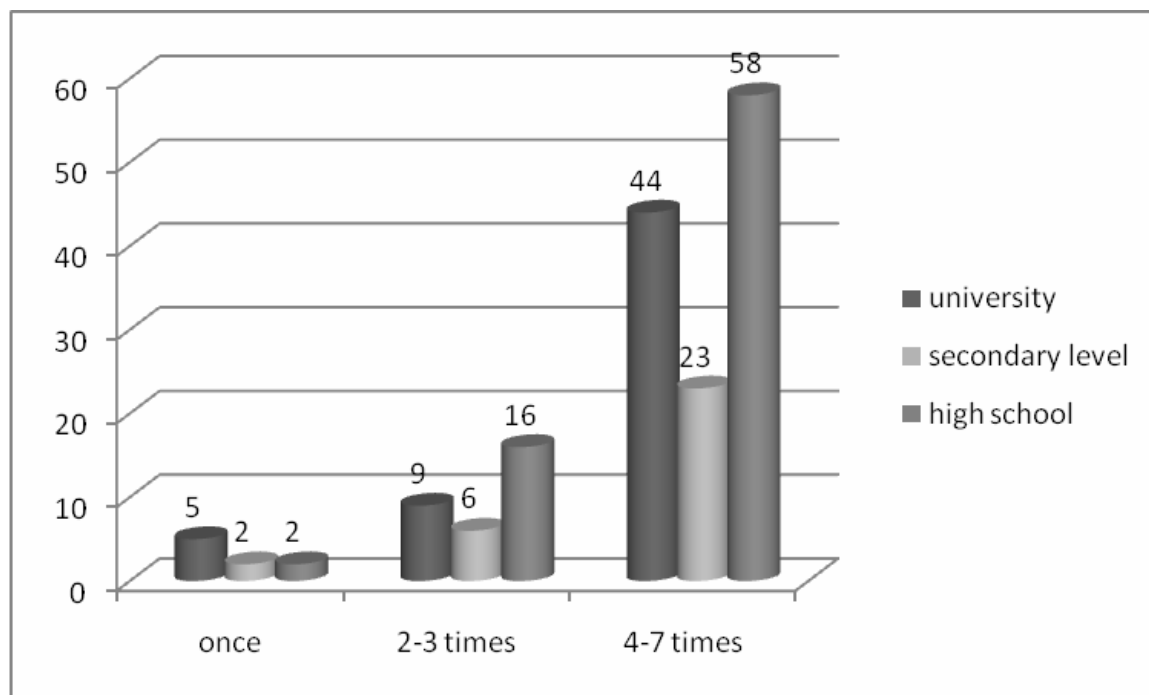


Figure 3. Weekly fruit consumption

The differences are statistically insignificant ($p > 0.05$, $\chi^2 = 2.6$) and guide to similar food habits. The fruit intake problem occurs only in 5.5% cases, so it is not necessary to initiate national project for fruits supplement. Making such programs should be based on the reality from each geographic area and even every village. Providing fruits to those teenagers who already consume this product is quite unnecessary.

REFERENCES

- Berger K., 1986, The developing person through childhood and adolescence, New York: Worth Publishers, Inc.
- Biesalski H.K., Grimm P., 2004, Atlas de poche de nutrition, Paris: Éditions Maloine
- Chevallier L., 2005, Nutrition: principes et conseils, Paris: Éditions Masson
- Craggs-Hinton C., 2006, Tulburările alimentare și silueta, Ed. ANTET XX PRESS
- Jacotot J., Campillo B., 2003, Nutrition humaine, Paris: Éditions Masson
- Papalia D., Olds S., 1990, A child's world, New York, Toronto: McGraw-Hill Publishing Company
- Webster-Gandy J., Madden A., 2006, Oxford handbook of nutrition and dietetics, New York: Oxford University Press
- Whaley L., Wong D., 1987, Nursing care of infants and children, St. Louis, Washington DC,

CONCLUSION

Dominant are the mothers who graduated high school and university. Insufficient intake of milk and cheese. Fruit and vegetable intake is adequate in most cases. The differences obtained in maternal education are statistically insignificant in all cases and show similar dietary habits and habits dependence.

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IN MEMORIAM DORIN PETRIȘOR



The Directing Council of the Hygiene and Public Health Society in Romania, together with the Department of Hygiene, Environmental Health, Faculty of Medicine, of the Craiova University of Medicine and Pharmacy, sadly announce that, on the 13th of January 2012, Assistant Professor Dorin Petrișor, MD, PhD, passed away.

Born on the 14th of May 1946 in Oradea, Dorin Petrișor attended the courses of the General School no. 1 in Oradea during the period 1953-1960, followed by high school courses in the „Emaonil Gojdu” Medium School no. 1 in Oradea from 1960 to 1964. In 1965 he was admitted to the Faculty of General Medicine of the Institute of Medicine in Timisoara which he graduated in 1971 by passing the Exam for medical diploma.

During the period 1971-1976 he was a medical general practitioner in Dolj County, and between the years 1976-1992 – university assistant in the Department of Hygiene and Occupational Medicine, Faculty of Medicine of the Craiova University. Starting with 1976, he also worked as part time integrated personnel in the Dolj County Direction of Public Health. In 1980 he became specialist in Hygiene, and in 1991 – consultant in the same speciality. In 1992 he passed the exam for the position of University Lecturer which he held for six years. In 1998 he obtained the title of „Doctor in Medicine” awarded by the „Carol Davila” University of Medicine and Pharmacy Bucharest with the Doctorate thesis „Environmental and Behavioural Risk Factors for Broncho-pulmonary Cancer”; in the same year he became Assistant Professor and Head of the Department of Hygiene, Faculty of Medicine of the Craiova University of Medicine and Pharmacy, positions which he held to his retirement in 2011.

Assistant Professor Dorin Petrisor, MD, PhD, was a member of the Hygiene and Public Health Society in Romania, member of the Directing Council of the Society and Executive Editor of the Journal of Hygiene and Public Health. He acted as president/member in examination boards for the title of specialist or consultant in Hygiene, for obtaining competencies in School medicine, for obtaining teaching or Hygiene specialist positions, specialist referent in boards for the analysis and presentation of doctorate theses for awarding the scientific title of „Doctor in Medicine”. He coordinated the activity of residents as part of the Programme of Residency in Hygiene in the Craiova University Centre. He authored/co-

authored published university courses, practical works manuals and articles in prestigious journals, he participated with communications in many national and international scientific events.

With his entire activity, Assistant Professor Dorin Petrișor, MD, PhD, will remain in our memory as a prominent personality of the Romanian preventive medicine.

INSTRUCTIONS FOR AUTHORS

(adapted from „Rules for Preparation and Submission of Manuscripts to Medical Journals”, the Vancouver Convention)

Authors are invited to consult the addressed instructions which are enclosed in the Journal of Hygiene and Public Health. These offer a general and rational structure for the preparation of manuscripts and reflect the process of scientific research.

Authors are invited to consult and fill in the acceptance form for publishing and copyright transfer to the Romanian Society of Hygiene and Public Health (RSHPH).

An article is published only after a review performed by two scientific referents.

The editorial board reserves the right to modify the expression and size of an article, if so needed. Major changes are decided together with the main author.

INSTRUCTIONS FOR MANUSCRIPT PREPARATION

GENERAL PRINCIPLES

The material will be formatted as follows: 12 pt Times New Roman fonts; line spacing at 1 ½ page A4 with 2.5 cm left and right borders, maximum content of 15,000 characters, in English.

The manuscript of an original article must include the following sections: introduction, material and methods, results, discussions, conclusions, references.

TITLE PAGE

The title page must include the following informations:

- title of the article
- names and institutional affiliation of the authors
- author whom correspondence should be addressed to: name and surname, post address, phone and fax, e-mail address.

ABSTRACT AND KEY-WORDS

The abstract including maximum 150 words will be written in both Romanian and English, at the beginning of the article (British or American English, not a combination of the two). The abstract will describe the context and purpose of the study, the material and method of study, main results and conclusions. New and important aspects of the study will be emphasized.

A number of 3-5 key-words will be given.

INTRODUCTION

Show the importance of the approached theme. Clearly state the aim, objective or research hypothesis. Only make strictly pertinent statements and do not include data or conclusions of the presented paper.

MATERIAL AND METHOD

Selection and description of participants. Clearly describe the selection modality of the participating subjects, including eligibility and exclusion criteria and a brief description of the source-population.

Technical information. Identify the methods, equipments and procedures offering sufficient details to allow other researchers to reproduce the results. Cite reference sources for the used methods by arabic figures between square brackets. Describe new or substantially changed methods, indicating the reasons for using them and assessing their limitations.

Statistics. Describe statistical methods using sufficient details for an informed reader who has access to original data to be able to verify the presented results. Whenever possible, quantify the results and present them accompanied by appropriated indicators for the error or uncertainty of measurement. Specify the used programme for statistical analysis.

RESULTS

Present the obtained results with a logical sequence in the text, with tables and figures. Do not repeat in the text all data presented in tables and figures; only stress upon and synthesize important observations. Additional materials and technical details may be placed in an appendix where they may be accessed without interrupting the fluidity of the text. Use figures not only as relative (percent) values but also as absolute values from which relative ones have been calculated. Restrict only to necessary tables and figures. Use graphs as an alternative to tables with numerous data. Do not present the same data twice in tables and graphs.

DISCUSSIONS

Stress upon new and important aspects of the study. Do not repeat detailed data from previous sections. Establish the limitations of the study and analyze the implications of the discovered aspects for future research.

CONCLUSIONS

State the conclusions which emerge from the study. Show the connection between the conclusions and the aims of the study. Avoid unqualified statements and conclusions which are not adequately supported by the presented data. You may issue new hypothesis whenever justified but clearly describe them as such.

REFERENCES

References are consecutively numbered according to their first citation in the text.

Identify references in the text, tables, legends by arabic figures between brackets [...].

Avoid citation of abstracts as references.

Reference list format: authors (name, surname initial), year, title, editor, number of pages.

Exemple:

Păunescu C., 1994, Agresivitatea și condiția umană, Editura Tehnică, București, p.15-18

Reference list format: authors (name, surname initial), year, title, journal, volume, page numbers.

Use journal title abbreviations according to the Index Medicus style.

TABLES

Generate tables in Word.

Number tables with arabic figures, consecutively, according to the first citation and give them short titles (Table 1.....); number and title situated at the upper margin and outside the table.

Explaining material is placed in a footnote.

Insert tables in the text.

Make sure every table is cited in the text.

ILLUSTRATIONS (FIGURES, PHOTOS)

Create black and white graphs, editable in Excel or Microsoft Word.

In case of microphotographs, send clearly published materials, shiny, black and white, with good photographic quality, with internal scale indicators and specifying the printing method and characteristics (resolution.....).

Show numbers in arabic figures, consecutively, according to the first citation, and give them short titles (Figure 1.....); number and title below and outside the figure. Explaining material is placed in a footnote.

Insert graphs and microphotographs in the text and also in a separate electronic jpg file. Make sure every illustration is cited in the text.

UNITS OF MEASUREMENT

Report measurement units using the international system, IS, or the local non-IS system, if required.

ABBREVIATIONS AND SYMBOLS

Only use standard abbreviations. The full term for which an abbreviation is used must precede its first abbreviated use. Avoid the use of abbreviations in the title.

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