

Gynaecologic and Obstetrics Department, District Hospital in Nowa Dęba
Department of Reproductive Medicine and Andrology, Skubiszewski Medical University of Lublin

ANDRZEJ KACZMAREK, DOROTA ROBAK-CHOŁUBEK,
GRZEGORZ JAKIEL

*Consumption of some selected trace elements (Fe, Zn and Cu)
and reproductive health of women from the Podkarpackie province*

Proper nutrition, and thus supplying the organism with adequate nutrients, is one of the fundamental factors influencing human development and health (4). Adequate nutrition enables us to make optimal use of both physical and psychological potentials of the human organism. Rational supply with trace elements also plays its vital role. And this role, which depends on the concentration level of these trace elements in different tissues, is still a subject of the research studies (7).

We attempted to estimate the average daily consumption of some selected trace elements (Fe, Zn and Cu) by women of reproductive age and we tried to connect it to some aspects of health-oriented behaviour.

MATERIAL AND METHODS

The study group included 107 women of reproductive age coming from the Podkarpackie Province. The average age was 30.07 years (from 19 to 43 years). The studies were conducted from July to December 2002. The intake of Cu, Zn and Fe in a diet was converted for every woman. The data for this study were obtained in questionnaire investigations of consumption of some selected products during the past year. Each product and dish were assigned an average portion. The respondents were to determine the amount of usually eaten portion in comparison to the amount proposed in the questionnaire. The concentration of mineral elements in every product and dish was calculated on the basis of their composition table developed by the Food and Nutrition Institute in 1998 (2). The mineral elements (Fe, Zn and Cu) content in food rations was calculated with the use of 'Dieta 2' computer programme which was also developed by the Food and Nutrition Institute. The mineral elements content in products and food rations was reduced by the volumes of unavoidable technological loss connected with food processing and plate residue (3). The consumption of analyzed mineral elements in a usual diet was converted individually for every questionnaire per day with the use of specially developed calculation sheet in Exel 2000. In case of seasonal products and meals the length of season, when they were eaten, was also taken into consideration. The obtained results were individually compared to the standard of the indicated consumption level (5), taking into consideration the age of every examined woman, and then they were statistically analyzed.

The t-Student test was used to reveal the significant differences among the analyzed groups when two unrelated groups were concerned or a variation analysis was employed when more than two groups were compared. The normal distribution of examined parameters was checked with the use of

W Shapiro-Wilk test and the variance homogeneity was verified with the use of F Fisher test. We accepted 5% inference error and $p < 0.05$ level of significance in order to determine whether there are statistically significant differences.

RESULTS

The average consumption of the examined elements (mg, per person per day) in the study group was for iron – 14.6; copper – 1.66; and zinc – 13.55 (Table 1). While comparing the average daily

Table 1. Average value of Fe, Zn and Cu with standard deviation

	Average	Minimum	Maximum	Standard deviation
Fe	14.61	3.35	29.30	5.04
Zn	13.55	3.32	28.69	4.49
Cu	1.66	0.44	4.14	0.67

consumption of the examined elements it was found that the study group revealed deficiency of copper and iron in their meals, when compared to the recommended nutrition standards (so-called Recommended Daily Allowances), and the amount of zinc requirement was fully covered in the diet. The percentage values are as follows: Cu – 66.51% of the recommended daily allowance, Fe – 81.19% and zinc – 104.23% (Table 2).

Table 2. Average value of iron, zinc and copper versus recommended daily allowance

	Recommended daily allowance	Average value	Standard (%)
Fe	18	14.61	81.79
Zn	13	13.55	104.23
Cu	2.5	1.66	66.51

No connection was found between smoking and the average amount of consumed trace elements, likewise, no connection was found between the consumption of trace elements in daily food rations and the administered contraceptive pills.

Patients under 30 years of age consumed more examined trace elements (Fe, Zn i Cu) in their daily food rations than patients over 30 years of age. Taking into consideration “age” as the dividing line the difference was statistically significant for Fe ($p = 0.02$) and Cu ($p = 0.03$), and the difference in the levels of zinc was ($p = 0.06$) which makes the result close to the statistical significance (Table 3). No connection was found between the consumption of the examined metal elements in daily food rations and the past gynecological history concerning the number of pregnancies and labours, miscarriages and the number of live childbirths.

Table 3. Consumption of the examined trace elements (Fe, Zn i Cu) depending on age

	Number of examined	Average	Minimum	Maximum	Standard deviation
Under 30 years of age	62 (57.94%)				
Fe	62	15.61	4.47	29.30	5.19
Zn	62	14.26	3.32	28.69	4.89
Cu	62	1.78	0.49	4.14	0.72
Over 30 years of age	45 (42.06%)				
Fe	45	13.25	3.35	24.77	4.53
Zn	45	12.58	4.20	19.31	3.70
Cu	45	1.50	0.44	2.64	0.55

DISCUSSION

The available literature includes no results from the studies determining 24-hour intake of copper, zinc and iron by women of reproductive age. The assessment of consumption of some selected trace elements in a group of women from the Podkarpackie province reveals the full (100%) intake of recommended daily allowance of zinc and insufficient supply of copper which was consumed, in this case, at the level one third lower than the recommended daily allowance (RDA). Less deficient intake of iron amounted to about 20%. We found no relation between the consumption of the studied trace elements and the health-oriented behaviour and gynecological history of the examined population of women. It was revealed that the age factor was a significant one and thus patients under 30 years of age consumed more iron and copper than those who were over 30 years of age and the difference was statistically significant, and they consumed more zinc and the difference was close to the statistical significance.

Assuming that the nutrition habits of the study group have not changed for the past several years, it is clear that the differences in trace elements intake have no influence on female fertility. The evaluation of health-oriented behavioural patterns, such as non-smoking habits connected with daily consumption of the examined trace elements, indicates no relation between the intentions of "proper" living and nutrition and differences in daily supply of the examined elements.

The deficiency of copper and iron is still a significant problem. And it becomes even more important when it appears that the deficit increases along with the age of the study group. When our results are combined with those obtained by Szponar and Rychlik (6), they point to commutation of daily deficits of those elements in food rations. In spite of some differences in the study group selection, as in our case the questionnaire investigations included only women who were selected at random without differentiation of their residence area, it was shown that daily intake of copper decreases with age. In our study, women below 30 years of age reported their copper intake of 1.66 mg/day, which constitutes 71.2% of the recommended daily allowance, and the women over 30 years of age reported the copper intake of 1.5 mg/day (60% of RDA); while in the study of Szponar and Rychlik (6), older rural women (aged 60 and over) consumed only 39.6% of the recommended daily allowance and it was 43.2% for older women living in towns and cities.

The situation was similar in case of iron deficiency. And in our studies it was respectively 15.61 mg/day in the group of women below 30 years of age (86.72%) and 13.25 mg/day in the group aged 30 and over (73.61%); and the results for the other studies were respectively 53.89% in case of older rural women and 56.11% for older women living in urban areas. Some other authors also indicated considerable deficits of the examined elements in food rations of the elderly people (1).

Szponar and Rychlik (6) also noticed some lower zinc intake in all the examined groups. It was about 62% to 89% but our studies did not confirm those results. Our respondents reported their zinc intake at the level of 100% of the recommended daily allowance. In this case the younger age of the study group seems to be important.

The above-presented results may be connected with the increased risk of women susceptibility to certain vascular and cancer diseases, when they become older (4). The obtained results need some more verification in further studies.

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SUMMARY

The objective of the present research study was to estimate the average daily consumption of some selected trace elements (Fe, Zn and Cu) by women of reproductive age and connect it to some aspects of health-oriented behaviour in the Podkarpackie province. We noticed that patients under 30 years of age consumed more examined trace elements (Fe, Zn i Cu) in their daily food rations than patients over 30 years of age.

Spożycie wybranych pierwiastków (Fe, Zn i Cu) a zdrowie reprodukcyjne kobiet
z województwa podkarpackiego

Celem pracy była próba oceny średniego dobowego spożycia wybranych pierwiastków śladowych (Fe, Zn oraz Cu) przez kobiety w wieku rozrodczym w powiązaniu z niektórymi zachowaniami prozdrowotnymi. Stwierdzono, że pacjentki poniżej 30 roku życia spożywały dziennie więcej badanych pierwiastków śladowych (Fe, Zn, Cu) niż kobiety powyżej 30 roku życia.