

Health behaviours of peri- and post-menopausal women performing intellectual work vs. cognitive functions

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Abstract

The objective of the study was analysis of health behaviours of women during the peri- and postmenopausal periods, and their relationship with cognitive functions.

The criteria of inclusion into the study was age 45–60 and intellectual work. At the first stage of the study, a brief MoCA test was performed in order to include into the study women who did not show any features of dementia. The research

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instruments used in the study were: 1) Computer tests CNS VS (Polish version) for the assessment of cognitive functions; 2) Health Behaviours Inventory; 3) a questionnaire designed by the authors. The respondents had FSH evaluated. The results were statistically analyzed. The study covered 300 women aged 53.1 ± 4.8 .

The general indicator of health behaviours of the examined women remained within the range of average results. In individual categories, the women in the study obtained low results. The women obtained the best results with respect to the category 'prophylactic behaviours', while the worst concerning 'health practices'. Two significant positive correlations were found: between the intensity of the indicator of prophylactic behaviours and Processing Speed, and between the intensity of correct nutritional habits and Reaction Time.

Introduction

Among Polish women, menopause occurs at the age of 50, on average. Thus, nearly one-third of women's lives falls within the period after the cessation of menstrual cycles. At present, this is not considered as the decline of life, but its subsequent stage. During this period an increase is observed in the risk of contracting various diseases, such as: coronary disease, breast and colorectal cancer, depression, and many others. There occur problems with concentration and memory which, considering the prolonged occupational and social activity of women requires, attention by both researchers and practitioners engaged in prophylaxis, diagnostics, treatment and rehabilitation of cognitive disorders.

During the perimenopausal period the management should be complex, and concern the change of life style, including different nutrition, higher physical activity, discontinuation of smoking, or losing weight in the case of overweight. Hence, the activities in the field of public health play a very important role in the prevention of acceleration of the negative health effects of menopause.

Physical effort exerts a documented effect on many symptoms related with menopause. According to many reports it decreases hot flushes and night sweats. Physical activity is an especially beneficial method for maintaining normal body weight and prevention of osteoporosis. The study conducted by the researchers from Pennsylvania State University confirmed that walks and practicing yoga helps to

maintain the good psychological condition of women during the period of menopause [1]. According to the researchers, walking may inhibit or slow down memory loss in persons with mild cognitive disorders, those with Alzheimer's disease, and healthy adults. The researchers are convinced that walking a distance of approximately 8 kilometres weekly protects the brain structures responsible for learning and memorizing for the period of 5–10 years. The brain volume of the study participants was tested using magnetic resonance. A positive relationship was observed between physical activity, brain volume and MMSE results. Persons with mild cognitive disorders, in order to maintain high brain volume and slow down memory loss, had to walk the distance of about 8 kilometres weekly, while those healthy should walk at least 9.5 kilometres for this purpose. After 5 years of the experiment, the results of MMSE test decreased by 5 scores, on average, in those persons with cognitive disorders who were not sufficiently active physically, whereas by 1 score, on average, in those who practiced walking [2].

A diet adequately balanced from the quantitative and qualitative aspects is an extremely important element of health promoting behaviours. Rational diet during the perimenopausal period may alleviate the complaints of the menopausal syndrome, reduce the risk of nutrition-related diseases and, according to the latest reports, may protect against the risk of mild cognitive disorders and dementia. According to the researchers, apart from intellectual activity, diet may play a very important role in the prevention

of dementia. Earlier studies showed that the Mediterranean diet – abundant in fish, vegetables, fruits and unsaturated fatty acids, while low in dairy products, meat, and saturated fatty acids-decreases the risk of the development of Alzheimer's disease. The researchers calculated that persons who strictly observe the Mediterranean diet are by 28% at lower risk of the development of these disorders than those who do not comply with its recommendations, whereas among those who moderately observe this diet are by 17% at risk lower. In addition, the researchers confirmed that the observance of the diet reduces the risk of mild cognitive disorders to severe dementia by 45–48% [3]. The subsequent studies by these authors confirmed the beneficial effect of diet in the prevention of the development of dementia [4].

The researchers from Temple University in the USA, in one of their previous studies, discovered that mice fed with a diet high in methionine (amino acid of the exogenous group) were at a higher risk of the development of Alzheimer's disease. Methionine is present in, among others, red meat, fish, beans, eggs, garlic, lentil, onions, yogurt and seeds. The researchers proved on the animal model that changing the diet to a more healthy one meant reversing of cognitive disorders which had developed during three months of eating food abundant in methionine. This improvement was related with a lower amount of senile plaques in the brains of the animals. After two months of the more healthy diet the animals were able to function normally [5].

During the perimenopausal period an optimum energetic value of daily food portions should be individualized, because the supply which exceeds the demand by 100 kcal results in an increase in body weight by 5 kg annually. The diet should contain indispensable micro- and macro-components. During this period of life, own nutritional habits should be corrected by: 1) the elimination of dietetic errors; 2) introduction of changes in the technology of the preparation of meals; 3) reduction of the excess of carbohydrates and fats containing saturated fatty acids in the daily food portion [6].

Physical effort in combination with adequate diet and other health promoting behaviours, i.e. lack of

habits, coping with stress, appropriate amount of sleep, may prevent many problems related with the menopause or minimize these problems. Reaching middle age favours an increased women's interest in own health and is a stronger incentive for making favourable changes in the life style than in youth.

Objective

The objective of the study was analysis of health behaviours of women during the peri- and postmenopausal periods, and their relationship with cognitive functions.

Material and method

The study was conducted among women aged 46–66 at the Institute of Rural Health in Lublin, and covered 300 women who performed intellectual work in various institutions. The criteria of inclusion into the study was age 45–60 and intellectual work. At the first stage of the study, a brief MoCA test was performed [7] in order to include into the study women who did not show any features of dementia. The maximum number of scores in this test is 30; and the result of 26 or more scores is considered as normal. The examined women who were enrolled into further stages of the study had to obtain 26 or more scores in the MoCA test.

The examined women had blood collected for determination of the concentration of FSH. This test was performed in the accredited laboratory ALAB.

The research instruments used in the study were: 1) Computer tests CNS VS (Polish version) for the assessment of cognitive functions; 2) Health Behaviours Inventory; 3) a questionnaire designed by the authors.

The examined women were divided into three groups according to their reproductive status:

1. 100 women at an early perimenopausal period, having menstruations, with FSH below 20 mIU/ml.
2. 43 women at late perimenopausal period, having menstruations, with FSH 20 mIU/ml and higher.

3. 157 after menopause: who had not had periods for at least 12 months.

Neurocognitive tests

Cognitive functions were assessed by means of the diagnostic instrument – Central Nervous System – Vital Signs (*CNS-VS*) (Polish version) [8] with CNS software (CNS Vital Signs, 1829 East Franklin Street, Bldg 500, Chapel Hill [NC] 27514, 919-933-0932). The instrument in the form of a battery of computer tests is standardized, and was subjected to the full validation procedure. For the purpose of the study, the following elements of the *CNS-VS* were applied: Verbal Memory Test, Motor Function Test-Finger Tapping Test, Symbol Digit Modalities Test-SDMT, Stroop Test-ST, Shifting Attention Test, and the Continuous Performance Test. Cognitive functions were assessed as domains: Composite Memory, Verbal Memory, Visual Memory, Psychomotor Speed, Reaction Time, Complex Attention, Cognitive Flexibility, Processing Speed, Executive, Simple Attention, and Motor Speed.

Mean standardized results obtained in the tests were used for calculations. The standardized results are calculated in such a way to qualify into intervals described as follows: 5. above average (>109); 4. average (90–109); 3. below average (80–89); 2. poor (70–79); 1. very poor (<70).

Report from the *CNS VS* tests provides the value of Neurocognition Index, which is computer calculated in an integrated way based on 5 domains: Memory, Psychomotor Speed, Reaction Time, Attention, and Cognitive Flexibility.

Health Behaviours Inventory

The Health Behaviours Inventory [9] contains 24 statements describing various types of health-related behaviours. The respondent marks how often he/she performed the provided activities during the last year, according to the 5-point scale. The sum of numerical values marked by the respondent gives the general indicator of intensity of health behaviours, which assumes the values from 24–120 scores. The higher the result, the higher intensity of the declared health behaviours. The general indicator of intensity

of health behaviours is converted into stens, which are then assessed within 3 intervals of results: low, average, and high.

The intensity of 4 categories of health behaviours is calculated separately: nutritional habits, prophylactic behaviours, positive psychological attitude, and health practices. Their indicators are mean numbers of scores obtained from the respondent's answers to individual statements, according to the 5-degree scale, where 1 means 'almost never', 2 – 'rarely', 3 – 'from time to time', 4 – 'often', and 5 – 'almost always'.

Statistical analysis of the collected data was performed using the statistical computer package STATISTICA. The p values $p < 0.05$ were considered statistically significant. The χ^2 test for stochastic independence was applied to compare the levels of education of women between the 3 groups of reproductive age. The F test for one-way analysis of variance was used to compare age, intensity of health behaviours, and results of cognitive functions between women in three groups of reproductive age. The Pearson's correlation coefficient (r) was applied to investigate correlations between the intensity of health behaviours and the results of cognitive functions.

Results

The examined women were aged from 44–66 years, mean age 53.1 ± 4.8 . The age of women in the study significantly differed in the 3 periods of reproductive life considered ($F = 194.211$; $p < 0.001$). The examined women at an early perimenopausal period were aged from 44–56, mean age 48.6 ± 2.7 . Those who were at the late perimenopausal period were aged from 46–60, mean age 51.6 ± 3.3 . Respondents in the postmenopausal period were aged 46–66, mean age 56.4 ± 3.4 .

The structure of education levels of the examined women in an early and late perimenopausal periods was similar. Approximately $\frac{3}{4}$ of them had university education (76.00% and 74.42%, respectively), every fifth – secondary school education (20.00% and 20.93%, respectively), and primary vocational education (4.00% and 4.65%, respectively); among the

respondents there were no women with primary education level. The examined women at postmenopausal age had a lower education level than those in the perimenopausal period ($\chi^2=16.811$; $p=0.010$). A lower percentage of respondents in the postmenopausal period had university education (54.78%), while a higher percentage had secondary school education (41.40%), compared to the women in the perimenopausal period. A similar percentage of respondents in postmenopausal and perimenopausal periods had primary vocational education (3.18%). One woman in the postmenopausal period had primary education level.

The general indicator of intensity of health behaviours in women was 84.72 ± 12.35 , on average, and was close to the indicator for the general population of women (84.03 ± 14.16 , on average), and menopausal women (85.98 ± 12.70 , on average) (Tab. 1).

The general indicator of intensity of health behaviours shows that nearly a half of the women in the study (46%) obtained average results of the intensity of health behaviours in general, 28% of the examined women obtained high results, and 26% – low results.

The examined women obtained the highest results with respect to 'prophylactic behaviours' (3.73 ± 0.68 , on average), followed by 'positive psychological attitudes' (3.60 ± 0.64 , on average), and with respect to 'correct nutritional habits' (3.49 ± 0.73 , on average), whereas the lowest results – with respect to 'health practices' (3.45 ± 0.61 , on average). These results are close to the results for the general population of women at menopausal age, and indicate that the frequency of performance by women of activities within these 4 categories, on average, was between 'from time-to-time' and 'frequently'.

Table 1.

Intensity of health behaviours (Health Behaviours Inventory) in the women examined

Intensity of health behaviours	Parameter	Early perimenopausal period	Late perimenopausal period	Postmenopausal period	Total	Comparison between groups
General indicator	min	45.00	63.00	33.00	33.00	F=0.982 p=0.376
	max	115.00	102.00	110.00	115.00	
	M	83.35	84.86	85.56	84.72	
	SD	13.51	10.09	12.12	12.35	
Correct nutritional habits	min	1.33	1.67	1.00	1.00	F=0.101 p=0.904
	max	5.00	4.67	5.00	5.00	
	M	3.47	3.48	3.51	3.49	
	SD	0.76	0.70	0.73	0.73	
Prophylactic behaviours	min	1.50	2.67	1.17	1.17	F=0.629 p=0.534
	max	5.00	4.83	5.00	5.00	
	M	3.67	3.78	3.76	3.73	
	SD	0.69	0.59	0.69	0.68	
Positive psychological attitudes	min	1.83	2.83	1.17	1.17	F=1.243 p=0.290
	max	4.83	4.83	5.00	5.00	
	M	3.53	3.60	3.65	3.60	
	SD	0.63	0.52	0.67	0.64	
Health practices	min	1.67	2.50	1.67	1.67	F=0.665 p=0.515
	max	5.00	4.50	4.83	5.00	
	M	3.40	3.48	3.48	3.45	
	SD	0.70	0.48	0.59	0.61	

M – arithmetic mean; SD – standard deviation; F – test for one-way analysis of variance; p – level of significance

Cognitive functions of the examined women were investigated using the computer CNS VS test (Tab. 2; Tab. 3).

The Neurocognition Index in the women in the study was from 28–114 scores, mean 92.62 ± 13.05 scores, which indicate an average evaluation. The majority of the examined women (63.67%) obtained an average evaluation in the NCI, 18% – an evaluation below average, 10.33% – poor, 4.33% – very poor, and 3.67% – above average.

The women in the study obtained the best results with respect to Simple Attention (100.76 ± 11.82 scores, on average), while the worst results concerning the Reaction Time (88.73 ± 17.04 scores, on average). Between these results were the results obtained in the remaining 9 cognitive functions (from 92–96 scores on average).

The great majority of the examined women (92.33%) had Simple Attention at an average level. No women in the study had attention at the level higher than average, 7.66% of respondents had Simple Attention: below average (2.33%), poor (3.33%), or very poor (2.00%).

Nearly a half of the women examined (47%) had Reaction Time at an average level; 7.67% of the respondents had the Reaction Time above average; 45.34% had reaction Time-below average (19.67%), poor (14%) or very poor (11.67%).

The distributions of the results with respect to Composite Memory, Verbal Memory and Visual Memory among the examined women were similar. Approximately a half of the respondents had these 3 cognitive functions on an average level, more than 10% – on the level above or below average, and several percent – on the poor or very poor level.

The distributions of Psychomotor Speed and Processing Speed were similar in the examined women. Nearly a half of the women in the study obtained average results with respect to these 2 speeds (48% and 51%, respectively), above average – about 10% each, and below average – 27% and 23%, respectively; poor – 8% and 9%, respectively, and very poor – 6% and 8%, respectively.

Nearly a half of the examined women (47.67%) obtained average results with respect to Motor Speed,

19% – evaluations above average, 21% – below average, 7% – poor, and 5% very poor.

The distributions of evaluations of Complex Attention, Cognitive Flexibility, and Executive Function in the examined women were similar. Approximately 20% of them obtained evaluations of these 3 cognitive functions above average, less than a half of the respondents – average evaluations (48%, 45% and 44%, respectively). From 13–15% of the examined women obtained average evaluations of Complex Attention, Cognitive Flexibility, and Executive Function. Poor results of Complex Attention were obtained by 6% of the women in the study, 10% – of Cognitive Flexibility, and 7% – of Executive Function. Very poor results of Complex Attention were obtained by 10% of respondents, 13% – of Cognitive Flexibility, and 14% – of executive Function.

Two significant positive correlations were observed between cognitive functions and intensity of health behaviours among the examined women: between the intensity of indicator of prophylactic behaviours and Processing Speed, and between the intensity of indicator of correct nutritional behaviours and Reaction Time, however, it should be mentioned that these relationships were very weak (Tab. 4). The higher the intensification of health behaviours of the examined women, the higher the results obtained with respect to Processing Speed and Reaction Time. No significant correlations were observed between the remaining cognitive functions and intensity of the remaining health behaviours.

Discussion

The general indicator of intensity of health behaviours in the examined women was similar to that for the general population of women and the population of menopausal women. Despite the fact that the general indicator of intensity of health behaviours remained within the range of average results, in individual categories the women in the study obtained low results.

In all the analyzed peri- and postmenopausal periods the women obtained the best results with respect

Table 2.

Numerical standardized results of cognitive functions of the examined women

Cognitive functions	Parameter	Early perimenopausal period	Late perimenopausal period	Postmenopausal period	Total	Comparison between groups
NCI	min	40.00	75.00	28.00	28.00	F=1.968 p=0.142
	max	113.00	114.00	114.00	114.00	
	M	93.56	95.28	91.30	92.62	
	SD	12.96	9.29	13.87	13.05	
Composite Memory	min	57.00	59.00	52.00	52.00	F=0.920 p=0.400
	max	133.00	135.00	128.00	135.00	
	M	97.50	94.53	95.13	95.83	
	SD	14.30	16.50	15.50	15.25	
Verbal Memory	min	61.00	55.00	49.00	49.00	F=1.562 p=0.211
	max	122.00	125.00	127.00	127.00	
	M	98.97	95.47	95.86	96.84	
	SD	12.45	17.10	15.52	14.84	
Visual Memory	min	46.00	62.00	58.00	46.00	F=0.119 p=0.888
	max	131.00	131.00	131.00	131.00	
	M	97.25	96.00	96.63	96.75	
	SD	15.16	15.64	14.15	14.67	
Psychomotor Speed	min	40.00	32.00	51.00	32.00	F=1.827 p=0.163
	max	127.00	123.00	132.00	132.00	
	M	95.01	92.56	91.45	92.80	
	SD	14.73	15.13	14.31	14.61	
Reaction Time	min	42.00	67.00	20.00	20.00	F=2.938 p=0.054
	max	119.00	119.00	117.00	119.00	
	M	89.78	93.47	86.76	88.73	
	SD	16.92	11.38	18.15	17.04	
Complex Attention	min	22.00	27.00	19.00	19.00	F=0.049 p=0.388
	max	120.00	121.00	118.00	121.00	
	M	93.54	98.23	93.18	94.02	
	SD	21.28	18.96	22.70	21.73	
Cognitive Flexibility	min	36.00	32.00	24.00	24.00	F=0.993 p=0.372
	max	124.00	126.00	122.00	126.00	
	M	92.64	95.98	91.02	92.27	
	SD	20.48	18.68	21.33	20.69	
Processing Speed	min	57.00	64.00	45.00	45.00	F=0.952 p=0.387
	max	132.00	125.00	128.00	132.00	
	M	92.44	93.42	90.52	91.57	
	SD	12.71	13.72	15.62	14.44	
Executive Function	min	36.00	30.00	26.00	26.00	F=0.823 p=0.440
	max	124.00	125.00	121.00	125.00	
	M	93.04	96.40	91.90	92.92	
	SD	20.41	18.52	20.88	20.39	
Simple Attention	min	19.00	77.00	24.00	19.00	F=0.496 p=0.610
	max	107.00	107.00	108.00	108.00	
	M	101.68	100.74	100.17	100.76	
	SD	11.05	9.15	12.91	11.82	
Motor Speed	min	46.00	68.00	40.00	40.00	F=1.968 p=0.142
	max	136.00	123.00	128.00	136.00	
	M	98.10	96.33	94.39	95.91	
	SD	15.19	12.98	14.77	14.72	

NCI – Neurocognition Index; M – arithmetic mean; SD – standard deviation; F – test for one-way analysis of variance; p – level of significance

Table 3.

Evaluation of cognitive functions in the examined women

Cognitive function	Evaluation	Early perimenopausal period		Late perimenopausal period		Postmenopausal period		Total	
		n	%	n	%	n	%	n	%
NCI	very poor	5	5.00	0	0.00	8	5.10	13	4.33
	poor	10	10.00	3	6.98	18	11.46	31	10.33
	below average	13	13.00	8	18.60	33	21.02	54	18.00
	average	69	69.00	30	69.77	92	58.60	191	63.67
	above average	3	3.00	2	4.65	6	3.82	11	3.67
Composite Memory	very poor	4	4.00	3	6.98	13	8.28	20	6.67
	poor	5	5.00	6	13.95	14	8.92	25	8.33
	below average	15	15.00	8	18.60	26	16.56	49	16.33
	average	55	55.00	18	41.86	76	48.41	149	49.67
	above average	21	21.00	8	18.60	28	17.83	57	19.00
Verbal memory	very poor	2	2.00	4	9.30	12	7.64	18	6.00
	poor	3	3.00	4	9.30	13	8.28	20	6.67
	below average	21	21.00	5	11.63	19	12.10	45	15.00
	average	58	58.00	21	48.84	88	56.05	167	55.67
	above average	16	16.00	9	20.93	25	15.92	50	16.67
Visual Memory	very poor	4	4.00	4	9.30	5	3.18	13	4.33
	poor	6	6.00	1	2.33	15	9.55	22	7.33
	below average	23	23.00	9	20.93	23	14.65	55	18.33
	average	44	44.00	23	53.49	88	56.05	155	51.67
	above average	23	23.00	6	13.95	26	16.56	55	18.33
Psychomotor Speed	very poor	4	4.00	2	4.65	13	8.28	19	6.33
	poor	6	6.00	2	4.65	16	10.19	24	8.00
	below average	26	26.00	14	32.56	42	26.75	82	27.33
	average	50	50.00	21	48.84	73	46.50	144	48.00
	above average	14	14.00	4	9.30	13	8.28	31	10.33
Reaction Time	very poor	13	13.00	1	2.33	21	13.38	35	11.67
	poor	14	14.00	3	6.98	25	15.92	42	14.00
	below average	16	16.00	13	30.23	30	19.11	59	19.67
	average	48	48.00	22	51.16	71	45.22	141	47.00
	above average	9	9.00	4	9.30	10	6.37	23	7.67

n – number of respondents

Table 4.

Correlations between cognitive functions and health behaviours of the examined women

Cognitive functions	General indicator of health behaviours		Correct nutritional habits		Prophylactic behaviours		Positive psychological attitudes		Health practices	
	r	p	r	P	r	p	r	p	r	p
NCI	0.070	0.226	0.060	0.298	0.046	0.424	0.042	0.470	0.083	0.152
Composite Memory	0.025	0.671	0.029	0.612	0.026	0.657	0.034	0.560	-0.013	0.818
Verbal Memory	0.015	0.799	-0.014	0.813	0.009	0.876	0.021	0.721	0.034	0.564
Visual memory	0.018	0.753	0.047	0.417	0.033	0.570	0.031	0.593	-0.056	0.334
Psychomotor Speed	0.057	0.325	0.012	0.842	0.076	0.191	0.022	0.702	0.093	0.108
Reaction Time	0.099	0.088	0.144	0.012	0.031	0.592	0.029	0.616	0.106	0.066
Complex Attention	0.028	0.629	-0.006	0.913	0.016	0.779	0.032	0.584	0.055	0.340
Cognitive Flexibility	0.012	0.831	0.003	0.955	0.003	0.953	-0.001	0.989	0.038	0.510
Processing Speed	0.086	0.137	0.088	0.127	0.131	0.024	0.014	0.804	0.052	0.373
Executive Function	0.014	0.809	0.009	0.874	0.003	0.961	-0.003	0.966	0.038	0.508
Simple Attention	0.033	0.572	0.025	0.661	0.018	0.761	0.021	0.718	0.059	0.306
Motor Speed	0.048	0.411	-0.009	0.882	0.043	0.460	0.050	0.387	0.082	0.156

Bold – statistically significant relationship

to 'prophylactic behaviours, followed by 'positive psychological attitudes' and 'correct nutritional habits', whereas the lowest results with respect to 'health practices'. The examined women paid attention to the avoidance of colds, regularly reported for medical examinations, observed doctor's recommendations concerning their health, tried to acquire medical knowledge concerning health and illness (statements contributing to the category 'prophylactic behaviours'); however, at the same time, they very poorly controlled their weight, worked a lot and did not rest enough, had an insufficient amount of sleep, did not avoid great physical effort and tobacco smoking (statements within the category of 'health practices'). Based on the obtained results an important effect may be observed of health information obtained from the competent medical staff, which proves a high level of trust of the society in physicians and health care facilities [10].

Nevertheless, it is an alarming fact that despite the need for possessing knowledge concerning health

and disease, the level of health practices, including an adequate amount of sleep and avoidance of smoking, is low.

Within the category of health practices it only seems beneficial that the women did not avoid excessive physical effort; however, in this case it should be considered to what extent this effort is beneficial, or is an excessive burden for health. Moderate physical activity prevents cardiovascular diseases, is conducive to the reduction of the level of cholesterol and stabilization of lipid metabolism, which leads to the decreased risk of the development of atherosclerosis, and reduces arterial pressure [11,12]. Scottish researchers confirmed the relationship between physical activity and psychological condition of man. Studies which covered nearly 20,000 people showed that even a light effort (housework, gardening or a short walk) significantly reduces the level of stress and anxiety [13]. Studies show a positive correlation between moderate physical activity and positive health habits. Those who practice sports more often

pay attention to adequate nutrition, avoidance of stimulants, regular rest, and active forms of spending leisure time [14,15].

In own material, the results in the categories 'positive psychological attitudes' and 'correct nutritional habits' remained in-between 'prophylactic behaviours' and 'health practices', and considering the average results of 3.6 and 3.5, they are not satisfactory with respect to the maintenance of a good state of health of women during this period of life. Both a positive psychological attitude and correctly balanced diet are of great importance for psychological and physical health [6,16].

In own studies, based on the computer CNS VS test, the examined women obtained the best results with respect to Simple Attention, while the worst – concerning the Reaction Time. Between these results were the results concerning the remaining 9 cognitive functions (from 92–96 scores, on average). The majority of the women in the study had Simple Attention on the average level. In nearly a half of the women in the study, the remaining cognitive functions also occupied positions within the range of average values. No differences were found between the analyzed groups of women. The researchers from the University of California observed that the speed of information processing declines in the early and late perimenopausal periods, nevertheless, according to these researchers a decrease is also noted with respect to Verbal Memory [17]. Current own studies, as well as previous studies by Bojar et al. [18], confirmed the results of other researchers who indicate a decline in neurocognitive functions during the perimenopausal period and after menopause.

At present, there is a comprehensive literature concerning the relationship between cognitive functions and certain health behaviours. Simple guidelines may be found concerning what to do in order to maintain cognitive functions on a high level until late old age [19]. However, these are not standards of management which would cover this comprehensive scope of problems.

In the presented study, 2 significant positive correlations were observed: between the intensity of the indicator of prophylactic behaviours and processing

speed, and between the intensification of correct nutritional habits and Reaction Time. The higher the intensification of these health behaviours in the women examined, the higher the results obtained with respect to Processing Speed and Reaction Time. Considering the fact that according to the majority of studies processing speed decreases with age [20], and taking into account the lowest results obtained by the examined women with respect to the Reaction Time, attention should be focused on these 2 categories of health behaviours (prophylactic behaviours and correct nutritional habits) as most important for the maintenance of cognitive skills.

Summing up

1. The general indicator of health behaviours of the examined women remained within the range of average results. In individual categories, the women in the study obtained low results.
2. The women obtained the best results with respect to the category 'prophylactic behaviours', while the worst concerning 'health practices'.
3. Two significant positive correlations were found: between the intensity of the indicator of prophylactic behaviours and Processing Speed, and between the intensity of correct nutritional habits and Reaction Time.

Disclosure

Authors report no conflict of interest.

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