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The characteristic of dietary supplementation among elderly women

Rafał W. Wójciak¹, Angelika Cisek-Woźniak^{2, a}, Ewa Tomczak²

¹ Department of Clinical Psychology, Poznan University of Medical Sciences, Poland

² Chair of Dietetics, Faculty of Physical Culture in Gorzow Wlkp., Poznan University of Physical Education, Poland

^a  <https://orcid.org/0000-0002-6345-1795>

^a  <https://orcid.org/0000-0001-8194-7500>

ABSTRACT

Aim. There is a growing awareness in Polish society, that a healthy lifestyle and proper nutrition have positively affected in old age. This effect influences the increasing consumption of dietary supplements to improve the health, however sometimes in an uncontrolled way. Taking above together the aim of this preliminary study was to assess the prevalence of the use of dietary supplements in elderly women.

Material and Methods. The study was conducted on 95 elderly women aged 65 to 89 years. The participants were asked to complete a questionnaire about their physical activity as well as medicines and supplements intake.

Results. Based on the questionnaire, it can be concluded that supplementation was common among the tested group. The most frequently seniors used preparations to assist the circulatory system and diet supplements. They also took this, supporting the work of the intestine, to assist urinary tract and the work of heart. The decision to start of supplementation was most often taken under the influence of television advertisements, pharmacy worker as well as from friends. There were statistically differences in presented results between studying populations according to their age.

Conclusions. Important and essential is education of older people, concerning the appropriate use of dietary supplements, to make supplementation safe and distinct improvement in health.

Keywords: women, elderly, supplementation, physical activity.

Introduction

Dietary supplements are substances that task is to enrich the normal diet with those components to be undernourished. These are concentrated foods which can be a source of vitamins and minerals or other substances, showing the effect of nutrient or other physiological [1, 2]. They are placed on the market in specific doses and in various forms such as tablets, dragees, capsules, drops, sachets of powder and liquid ampoules [1–4]. Dietary supplements are usually low doses of the active substance, what makes their impact on the body is underestimated [3]. Those preparations are usually sells without a prescription.

Seniors have used supplements in order to: improve the nutrition of the body, enhance vitality, improve concentration, condition hair, skin and nails, delay the aging process, reduce the risk of certain chronic diseases and to increase its resistance. The application of vitamin supplementation has a lot of positive reviews in the literature [5–7].

In nutrition practice there are a number of indications for dietary supplementation by persons in old age. The use of supplements is recommended to persons with impaired absorption of nutrients, because of diseases or the use of certain medicines (antibiotics, diuretics) [1, 8]. Dietary supplements are also recommended to persons would

commit in daily practice dietary errors resulting sometimes with economic difficulties and a limited supply of food, but often for the wrong dietary habits or nutritional knowledge is insufficient [1].

There is a common opinion that dietary supplements consumed by seniors have confirmed the beneficial effect on their health and general condition, as well as cognitive status and beauty [6, 9]. There is no unambiguous evidence for this, and the research seems to be unclear and contradictory [10, 11]. The mainly benefits of vitamin and mineral food supplements intake by the elderly are the fortification of the nutritional deficiency, commonly associated with age. On the other hand, it should be noted that there are also dangers arising from uncontrolled use of supplements. Name here you need to egg. interactions between nutrient supplements and drugs, chronic adopted by this group of people, interactions with food and very importantly – the ability to overdose of supplementing substances.

Although some data suggests that the diet supplementation affects more than 50% of adults [8], even 75% [10], there is no data on it in the elderly.

In the presented preliminary study the quality and quantity of medicines and supplements used by elderly women were evaluated, as well as declarative motivation for applying diet supplements and the sources of the information about its. Additionally, the frequency and preferable form of physical activity among seniors in different aging groups were examined, as a marker of general health status of their.

Material and Methods

The study was involved 95 elderly women aged from 65 to 89 years old. The participants were divided into 3 aged depended subgroups: 65–70 years 71–80 years 81–89 years (42, 32, 26%, respectively).

The questionnaire method was applied in the study as well as personal interview. The questionnaire form has contained 16 items (14 closed questions and 2 open questions). In the interview all questions were read to women and interview was also based on the other questions on the age, education, place of residence, marital status and family life. **Table 1** presents the characteristic of studying population. The women participated in the study were mostly in higher education (57%), lived in the cities with more than 50 thousand inhabitants (55%), and live alone more than 5 years (53%). However, the totally all subjects represented apparently good health condition, about half of studying population had some problems. Most often women reported the following disorders: hypertension (60%), hypercholesterolemia and cardiovascular (both 35%), diabetes and arthritis (both 25%), and other (10% – chronic small pain, depression, migraine etc.). The number of reported diseases increases with age. The 25% of the subjects was overweight. All participants were asked about permission to participate to the study and gave it.

To assess the frequency distribution of data between groups according to the age the chi-square test was applied.

Table 1. The characteristic of studying population

	Total (n = 95)	Age groups		
		65–70 (n = 40)	71–80 (n = 30)	81–89 (n = 25)
High education (%)	57	55	50	65
Residents of cities with more than 50 thousand inhabitants	55	45	60	60
Living alone more than 5 years (singles, divorces, widows)	53	55	60	40
Health conditions (%)				
Hypertension	60	50	65	65
Hypercholesterolemia	35	30	35	35
Cardiovascular disease	35	20	30	50
Diabetes	25	25	20	25
Arthritis	25	15	30	30
Other	10	5	10	15
Overweight	25	30	25	20

Results

The results obtained in this study are presented in Tables 2–6. **Table 2** shows the frequency of physical activity among seniors. In the vast majority of respondents (79%) declared one of the forms of physical activity: walking, fitness, swimming, dancing or any other form such as: exercise at the gym, playing team sports games or practicing martial arts. There were observed the statistically significant differences ($p < 0,001$) between women in different age in the frequency of physical activity. About 50% of the oldest ladies declared no activity, thus 20% the youngest. More than twice a week the 70% of the youngest ladies train a sport, thus no the oldest.

When it comes to the kind of physical activity, there were the 5 types of physical activity declared by women. The largest number of seniors has granted to walks – 65% of total active seniors (most popular in groups of women above 71 years old – 40 and 40%, respectively), various kinds of fitness exercise reported 35% of respondents (50% of the youngest ladies), 26% of respondents spoke about the dance, 12% swimming, and 8% had other forms of activity (declared only by youngest women).

Table 3 presents the detail information about what medicaments respondents used chronically. Because of his age and condition of health, respondents have used daily for more than one type of drug. The most commonly used drugs were popular on the pharmaceutical market pain

medication (70%). Almost half of the respondents declared antiarrhythmic medicaments used (49%). The drugs using for neutralizing the excess of hydrochloric acid in the stomach were used by 38% of seniors, the antidiabetics drugs by 35%, antihypertensives – 28%, drugs that improve cerebral circulation – 25% and medicines against osteoporosis – 22%. The smallest group of respondents used antidepressants, anxiolytic and hormones (5–7%). There were significant differences between the groups of seniors according to the age. In general, there was an increase in the use of drugs in the oldest group, apart from hormonal drugs (most popular in the youngest).

The total number of medicines and supplements used by studying women is presented in **Table 4**. All participants of the study declared using at least one supplement. The statistically significant differences between age groups were observed ($p < 0,001$). In the youngest ladies, more than 4 preparations were used by 35 and 40% respectively, while in the oldest – 70% of women regularly consumed daily more than 4 preparations.

In accordance with its definition, dietary supplements can be on the market in many forms. **Table 5** shows the preferences of seniors in relation to the form in which most take dietary supplements. It shows that the most frequently adopted the form of the supplements are pills (63%) and liquid form (21%). Less frequently while they reach for effervescent tablets and drops (8%, each). There were no differences between groups according to the age.

Table 2. Physical activity among seniors according to the age

		Total (n = 95)	Age groups (% of total)		
			65–70 (n = 40)	71–80 (n = 30)	81–89 (n = 25)
Frequency of physical activity	No activity	21	20	30	50
	Once a week	47	20	65	15
	Twice a week	16	40	30	30
	More than twice	16	70	30	0
Statistics			$\chi^2 = 49,1; p < 0,001$		
		Total (n = 75)	Age groups (% of total)		
			65–70 (n = 36)	71–80 (n = 24)	81–89 (n = 15)
Forms of preferable physical activity	Walk	65	20	40	40
	Fitness	35	50	25	25
	Dance	26	50	40	10
	Swimming	12	40	50	10
	Other	8	100	0	0
Statistics			$\chi^2 = 52,3; p < 0,001$		

Table 3. Groups of medicines lengthily applied by seniors (% of population) according to the age

	Parameters	Total (n = 95)	Age groups (% of total)		
			65–70	71–80	81–89
1.	Painkillers	70	25	30	45
2.	Antiarrhythmic	49	20	35	45
3.	Neutralizing the excess of acids	38	30	45	25
4.	Anti-diabetics	35	10	25	65
5.	Anti-hypertensive	28	35	35	30
6.	Improving cerebral circulation	25	35	35	30
7.	Anti-osteoporosis	22	40	35	25
8.	Analgesics and febrifugal	18	30	35	35
9.	Antineoplastic agents	8	5	25	70
10.	Antidepressants	8	10	70	20
11.	Hormones	7	70	20	10
12.	Anxiolytics	7	10	50	40
13.	Other	5	70	15	15
Statistic			$\chi^2 = 128,7; p < 0,001$		

Table 4. The number of regular daily intake of the medicines and supplement according to the age of seniors

	Age groups								
	65–70 (n = 40)			71–80 (n = 30)			81–89 (n = 25)		
Number of preparations	> 4	2–3	1	> 4	2–3	1	> 4	2–3	1
Percentage of population	35	25	40	40	30	30	70	20	10
Statistic	$\chi^2 = 34,3; p < 0,001$								

Table 5 shows also the motivation of seniors for applying diet supplementation and sources of information on its. The five purposes for which older people use supplements in their diet appropriate pharmaceuticals were highlighted. These were: dietary supplementation in minerals and vitamins (27%), complement deficiencies of nutrients caused by chronic use of medications (23%), to improve the health and wellbeing (21%), to improve the external appearance (12%), and general improvement of the good condition (17%). The motivation for applying diet supplementation was significantly different in the aging groups ($p < 0,001$). Although the youngest women also pay attention to such reason as filling the mineral and vitamin deficits or filling up the deficits caused by drugs, it is also important for them to look after their beauty. This reason is poorly represented in the group of the oldest women (5%).

After the analysis of the sources of information about dietary supplements in studying seniors (**Table 5**), it was found that the greatest effectiveness of the information about specific dietary supplements is TV advertisements (30%). The same

group of respondents obtain needed information from pharmacists and friends (including) (20%), doctors and press (15%). A worrying situation is the fact that none of the interviewees did not provide that information on the necessary and appropriate for the body's dietary supplements received during consultation with a nutritionist. The oldest ladies as a source of information about supplements declared TV advertisements (45%) and pharmacy workers (30%), while the youngest mostly based on the information from friends (25%). There were statistically significant differences ($p < 0,001$).

Table 6 presents the characteristic of the supplements used by seniors. Seniors most often declared using the preparations to assist the circulatory system (45%, mostly by the oldest women – 45% and 30% the youngest) and diet supplementation (43%, mostly by the youngest women – 50%, while only 20% of the oldest). Almost 20% of seniors declared using the preparations supporting their intestine (mostly women over 71 years old – 80%). There were statistically significant differences between studying group of women depend on their age ($p < 0,001$).

Similar differences between elderly women depend on their age in the most commonly used commercial preparations were observed in this study ($p < 0,001$). However the youngest women

were more likely to buy vitamins and minerals (70%), pro- and prebiotics (55%), the oldest ladies put on the natural preparations (ginkgo biloba – 55%, cranberry – 45%).

Table 5. The characteristic of the most popular forms of the supplements, motivation to use and source of information about supplements (% of population)

	Total (n = 95)	Age groups (% of group)		
		65–70	71–80	81–89
Preferences for the form of applicable supplements				
Pills	63	65	60	65
Liquid form	21	18	24	20
Drops	8	10	6	7
Effervescent tablets	8	7	10	8
Statistic		n.S.		
Motivation for applying diet supplementation				
Dietary supplementation in deficits components (minerals and vitamins)	27	30	25	26
Supplementation of drug induced deficiency	23	25	15	30
Improvement in the health and well being	21	5	33	22
Improvement to the external appearance (hair, skin, nails)	12	20	12	5
General improvement of good health and physical activity	17	20	15	17
Statistic		$\chi^2 = 35,3; p < 0,001$		
Sources of the information on dietary supplements				
TV advertisements	30	25	20	45
Pharmacy	20	10	20	30
Friends	20	30	25	5
Doctors	15	15	15	15
Press, internet	15	20	20	5
Statistic		$\chi^2 = 49,2; p < 0,001$		

Table 6. The characteristic of the supplements used by seniors

Parameters	Total (n = 95)	Age groups (% of total)		
		65–70	71–80	81–89
The type of supplements				
1. Preparations to assist the circulatory system	45	30	25	45
2. Diets supplements	43	50	30	20
3. Preparations supporting the work of the intestine	20	20	50	30
4. Preparations to assist urinary tract	18	30	35	35
5. Preparation to assist the work of heart	15	25	25	50
6. Preparations supporting the bacterial micro-flora	12	30	40	30
7. Preparations to assist the memory	10	20	30	50
Statistic		$\chi^2 = 45,4; p < 0,001$		
The most commonly used commercial preparations				
1. Diosmin	45	40	35	35
2. Vitamins and minerals	43	70	15	15
3. Prebiotics and probiotics	30	55	25	20
4. Glucosamine	23	35	40	25
5. Herbs	22	30	35	35
6. Omega-3 fatty acids	15	40	40	20
7. White mulberry	15	45	40	15
8. Cranberry	10	10	45	45
9. Ginkgo biloba	10	25	20	55
10. Lecithin	10	20	55	25
Statistic		$\chi^2 = 165,9; p < 0,001$		

Discussion

In recent times there has been a significant development of civilization and has evolved to medicine. This has contributed to the extension of the life of society [5, 9]. In modern times it is observed considerable diversity of older people in conditions of health, cultural characteristics, socio-demographic and economic [9, 12]. The western society is ageing. The increasing number of the older people in the population is starting to be seen as problematic and has an effect on the occurrence of unfavourable attitudes towards that group. Despite this state of affairs are taken action to change so negative perception of older people. Makes to society, that aging is a natural turn things and is the next phase of life [1, 13].

An aging society requires increase attention to the health problem of elderly people. In modern society more and more popular to use dietary supplements next to recommended drugs is becoming more and more popular among the elderly population. Although there is few data about supplementation of the oldest group of society, some of the authors are in the opinion that 50 – 70% adults take dietary supplements [8, 10]. In this paper we asked almost 100 old ladies about using the dietary supplements, and all of them answer positive. There is similar as reported by other Polish authors that the supplements in Poland are over-consumed [1, 6, 14]. On the other hand Kałużna et al. [6] showed the positive effect on the condition of health of the elderly the vitamin and mineral supplementation. This observation is similar to the those presented by PolSenior population study reported by Bogusz et al [9] who were made a study of physical health of older people. This study shows that the health status of seniors has improved in recent years, especially in seniors between 65 and 79 years old.

Kaczmarczyk and Trafiałek [15] are in the opinion that physical activity of seniors is not greater, although they have more free time than younger. It focuses mainly on helping in the daily chores, children and grandchildren. The process of activation of elderly is slow, but it should be considered to be incremental. This is confirmed by the results presented in this paper. Seniors declared a different forms of physical activity: walking, fitness exercises, swimming, dancing and other activities. Frequency of physical activity declared

by the respondents in the vast majority of at least once a week. Just ca. 21% of respondents showed no additional physical activity. Observation in this aspect are very optimistic, however frequency of even small intensive activity was decreased with aged, and more than half of the oldest ladies have not trained, what was not reason of bad health condition. This results are correspond with worldwide general observation about low physical activity of seniors, especially women [12, 15].

The presented study found that supplementation is common among older people. The use of dietary supplements was not dependent on age, education, or place of residents. Brzozowska et al. [1] were found that at the turn of the years in the US has changed only the percentage of people using dietary supplementation in vitamin-mineral substances, but all the time interest in the supplementation exists. Currently, both women and men use dietary supplements.

Interviewed people from a research group not noted for visits to a nutritionist or a doctor to determine the level of vitamins and minerals in their body. Motivation to use a dietary supplement was overwhelmingly catchy TV commercial. This situation is quite dangerous and worrying, since inappropriate use of vitamin-mineral can cause the opposite effect intended and affect the health of the elderly. This can be a reason of increase number of preparations with age. Similarly, Kałuża et al. [6] have established that often use vitamin preparations by the elderly was improper. It was suggested to increase the level of education of older people in terms of the rules of application of supplementation. To similar conclusions reached Sygnowska and Waśkiewicz [7]. Based on this research claimed that dietary supplementation by vitamins and minerals can impact favourably on the body of elderly but without consulting your doctor or nutritionist its activity can cause severe side effects (including overdose of vitamins and mineral substances). More than 70% of European adults use different dietary supplements [10], however this number can be enlarged with age [8, 10, 16]. The using of the medicines are also larger in elderly than in younger population [8, 12, 17] what is associated with chronic disease in this population. In presented study the women aged above 80 years consumed more than four different drugs and

supplements a day, mostly painkillers and minerals, and vitamins. On the other hand it was not observed extremely large number of diseases in this sub-group than in younger women (below 80 years old). It could suggest that the over-consumption of preparations in this age is not caused by currently diseases.

Another problem in this work was to determine the source of the benefit of knowledge about dietary supplements and motivation, which follow the seniors when choosing a specific parapharmacy products. It was found that by far the best source of knowledge about dietary supplements for respondents are TV commercials, followed by pharmacists and the least significant is the press. Very few only sought on this issue applies to a doctor. Confirmation of such results it has been found in the work of Ulatowskiej-Szostak [18]. This author carried out a study on the effect of advertising on purchase of parapharmacy products and vitamin preparations. Confirmed that a significant proportion of patients purchase dietary supplements under the influence of the ads, and only a small group of patients looking for additional information on their purchase. Subsequent researchers Saran and Duda [14] have shown that the main source of knowledge about the dietary supplements are television commercials, and only after them in order: press, doctors, and only at the end of the pharmacists. Wojciak et al. [4] compared the nutritional knowledge of elderly with their nutritional status and depression symptoms. They found that seniors were characterized by low nutritional knowledge what was evidently associated with their health presented by nutritional status (including iron deficiency anemia). The worldwide authors presents similar observations [3, 8, 14]. The aggressive advertisement, TV, press, leaflets, are everywhere and promise good health and long life.

In this work, as the cause of the dietary supplementation was administered a desire to supplement diets in vitamins and minerals, and supplement the shortages incurred as a result of chronic use of drugs. These statements were consistent with the experiences carried out in other universities in Poland. Study of Saran and Duda [2] confirmed obtained in studies tend on the reasons for the use of dietary supplements.

The last evaluation parameter was the impact of dietary supplement on the condition of health

of the respondents. According to more than half of the surveyed, supplementation did not bring the economic changes in their well-being. Just about 30% of seniors observed beneficial effects of supplementation on their health. Brzozowska et al. [1] in his work found that the results of research on the use of dietary supplements and their positive or negative action on the body of an older person were ambiguous and, therefore, it was suggested to continue research on this topic among people in this age. As an important note the need for nutrition education of older people, also by professionally dealing with this subject specialists in the field as dietetics and human nutrition. Knowledge about the dietary supplementation and all sorts of nutrients should be updated continuously, and the way in which the older people adjusted adapted to each senior in accordance with his perception [4, 14].

At the end seniors were asked about the impact of used dietary supplements in their current condition of health. It turned out that more than half of the surveyed (51%) did not find any difference in health condition after applying dietary supplement. 38% of respondents noted that the vast health and beneficial effect of supplementation. Other respondents felt that the effect of nutritional supplementation on their condition of health was only halftime (not fully met expectations of tested older person in relation to nutritional supplements). So, what for the elderly people over-consume the supplements, this is the question.

Conclusions

To sum up, the presented work surveys can draw the following conclusions about dietary supplementation among old ladies in Poland. The use of dietary supplements is widespread and all subjects used it, even every day. The process of activation of ageing is slow, but it should be considered for growth. For the vast majority of respondents frequency of different forms of physical activity was not less than 1 time per week. However is independent on the health status. Insufficient knowledge about the actual condition of their own health and the necessity of taking dietary supplements may cause their effects on the body of an elderly person it is imperceptible

for itself. Disturbing is the fact that most elderly people decide to purchase dietary supplements without consulting with professionals, so doctors and nutritionists, and the desire and need to buy a specific parapharmacy products is caused mainly by advertising on television. It should be suggested increasing the education level of older people in the principles of supplementation.

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Conflict of interest statement

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References

1. Brzozowska A. Enriching food and supplementing the diet with nutrients – benefits and risk. *Żywność* 2001;4(29):16–28.
2. Saran A, Duda G. The influence of selected factors for the purchases and use of vitamin and mineral supplements by the elderly. *Żywność. Nauka. Technologia. Jakość*. 2009;4(65):271–277.
3. Cameron DJ, Kurrle SE, Uy C, Lockwood KA, Au L, Schaafsma FG. Effectiveness of oral nutritional supplementation for older women after a fracture: rationale, design and study of the feasibility of a randomized controlled study. *BMC Geriatrics*. 2011;11:32–37.
4. Wojciak RW, Mojs E, Staniek H, Marcinek K, Krol E, Suliburska J, Krejpcio Z. Depression in seniors vs. their nutritional status and nutritional knowledge. *J Med Sci*. 2016;85(2):83–88.
5. Shibata A, Paganini-Hill A, Ross RK, Henderson BE. Intake of vegetables, fruits, beta-carotene, vitamin C and vitamin supplements and cancer incidence among the elderly: a prospective study. *Br J Cancer*. 1992;66:673–679.
6. Kałuża J, Bagan A, Brzozowska A. The evaluation of the share of vitamins and minerals from supplements in the diet of older people. *Roczn PZH*. 2004;55(1): 51–61.
7. Sygnowska E, Waśkiewicz A. The role of supplementation in replenishing the deficiencies of vitamins and minerals in the diet of Poles covered by WOBASZ. *Bromat Chem Toksykol*. 2008;41(3):389–394.
8. Blumberg JB, Frei B, Fulgoni VL, Weaver CM, Zesel SH. Contribution of dietary supplements to nutritional adequacy in various adult age groups. *Nutrients*. 2017;9:1325–1334.
9. Bogusz R, Charzyńska-Gula M, Szkuat M, Kocka K. Functional fitness of people over 70 years of age in rural areas and needs for care. *MONZ*. 2013;19(4):517–522.
10. Burnett AJ, Livingstone KM, Woods JL, McNaughton S. Dietary supplement use among Australian adults: findings from the 2011–2012 National Nutrition and Physical Activity Survey. *Nutrients*. 2017;9:1248–1259.
11. Locquet M, Honvo G, Rabenda V, van Hees T, Petermans J, Reginster JY, Bruyere O. Adverse health events related to self-medication practices among elderly: a systematic review. *Drugs Ageing*. 2017;34(5):359–365.
12. Kim J, Lee JS, Shin A, Kang MH, Shin DS, Chung HR, Kim WK. Sociodemographic and lifestyle factors are associated with the use of dietary supplements in a Korean population. *J Epidemiol*. 2010;20(3):197–203.
13. Marona H, Gunia A, Pękala E. Retinoids – a role in pharmacotherapy in the aspect of the cellular mechanism of action. *Farmacja Polska*. 2010;66(3):187–192.
14. Saran A, Duda G. The assessment of knowledge of older people regarding vitamins and minerals. *Brom Chem Toksykol*. 2010;43(1):60–65.
15. Kaczmarczyk M, Trafiałek E. Activation of older people as a chance for successful aging. *Gerontologia Polska*. 2007;15(4):116–118.
16. Brończyk-Puzoń A, Bieniek J. Nutrition of the elderly on the basis of an amendment to the nutrition standards of the Institute of Food and Nutrition for the Polish population from 2012. *Nowa Medycyna*. 2013;4:151–255.
17. Park HA. Top 10 dietary supplements of Korean adults from the 4th Korea National Health and Nutrition Examination Survey. *Korean J Farm Med*. 2011;32:263–266.
18. Ulatowska-Szostak E. The impact of advertising on the purchase of drugs, parapharmaceuticals and vitamin preparations in the opinions of pharmacy customers – comparison of 2002 and 2007. *Probl Hig Epidemiol*. 2008;89(3):441–444.

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Correspondence address:

Rafał W. Wójciak
Department of Clinical Psychology
Poznan University of Medical Sciences
70 Bukowska Street, 60-812 Poznań, Poland
phone/fax: +48618547274
email: rafwoj@ump.edu.pl