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Physical activity and dietary supplementation intake among postmenopausal women

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A Study Design
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C Statistical Analysis
D Data Interpretation
E Manuscript Preparation
F Literature Search
G Funds Collection

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abstract

Background: In the context of physiological changes that progress over the years and worsen the functioning of their organisms, older people's physical activity is an increasingly important topic. It is important to be aware that a healthy lifestyle, including proper nutrition, has a positive effect on old age. In general, one of the elements of a healthy lifestyle is physical activity and also the consumption of dietary supplements. The aim of the study was to determine the level of organized physical activity of postmenopausal women and their consumption of dietary supplements.

Material and methods: The study involved 100 women aged from 60 to 75 years old in good general health (no neurodegenerative diseases diagnosed, no doctor's contraindications). The women were recruited from the general population. The participants were asked to complete a self-created questionnaire about their organized physical activity (like fitness, walking, dancing, swimming and other forms) as well as intake of medicines and supplements. Based on the questionnaire, the characteristic of physical activity was made, and the participants were divided into 3 subgroups according to their physical activity depending on the number of minutes spent during the week on a given type of activity: high, medium and lack (30, 49, 21% respectively).

Results: It can be concluded that physical activity and supplementation was common among the tested group. The most frequently seniors declared physical activity a week and used preparations to assist the circulatory system, and dietary supplements. They also took those supporting the work of the intestines, assisting the urinary tract, the work of heart, preparations supporting the bacterial micro-flora and preparations to assist the memory. The decision to start of supplementation was most often taken under the influence of television advertisements, pharmacy worker as well as of friends. There were statistical differences in the presented results between the studied populations according to their age.

Conclusions: It is important to educate older people on physical activity and use of dietary supplements to make supplementation safe and to achieve distinct improvement in health.

Key words: women's exercises, elderly, physical effort, seniors, dietary supplements.

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INTRODUCTION

The aging process of the population consisting in a systematic increase in the share of older people in relation to the entire population has been observed for more than a quarter of a century. It is one of the most difficult problems of the modern world, which also applies to Poland [1]. In developed and developing countries, seniors are an increasingly large group of the society. Old age cannot be avoided, but one can age with dignity and joy. Guaranteeing such understood old age is one of the greatest tasks facing mankind in the 21st century [2].

Although the aging process is a natural process, the boundaries between physiology and pathology are increasingly blurred. It is very difficult to treat some diseases of old age, and from numerous studies it can be seen that the involutional process can be slowed down through prophylactic and pro-health measures [3].

Experts point out the benefits of a physically active lifestyle in elderly, because appropriately dosed physical activity can clearly reduce the negative impact of ageing and help to maintain physical, mental and social health [4]. It has long been pointed out that a lack of physical activity is dangerous for health. Hippocrates and Galen already talked about it, while at the same time they pointed out that physical effort in the wrong dose is unreasonable and even dangerous [5].

The development approach to aspects of human health allows us to look at the relationship of the discussed issues to aging and aging processes. During this period, physical activity becomes particularly important, thanks to all the benefits and significant risks; however, the health benefits associated with physical activity are many times greater than the risks it may carry.

People who are healthy are not chronically ill, and their death is a consequence of natural, physiological processes of aging of the body. People who are aging in this way are cheerful, optimistic people, without limitations in everyday life, mentally efficient, actively participating in everyday life. Not infrequently, they regularly engage in physical activity [6], which, skilfully dispensed, is a factor slowing down the inevitable [7].

Physical activity, health and quality of life are closely related. This correlation is of particular importance in an aging society that requires attention to health problems. Physical activity plays such an important role that it should be talked about in terms of human duties. It cannot be put on one level with other types of leisure activities, because it is impossible to balance what is necessary with what is desirable. Intense movement was an inseparable factor in human evolution, so movement and regular physical activity are necessary to avoid diseases and to function best [20]. As a result of regular physical activity, the human body undergoes morphological and functional changes that may prevent or delay the occurrence of certain diseases and improve the ability to undertake physical efforts. Thus, physical exercise is an effective tool to reduce or prevent functional problems associated with aging of the body. There is also growing evidence that physical activity can help maintain cognitive functions and have a preventive effect on depression and dementia [20]. Shephard has shown that regular participation in a physical activity program can delay normal aging processes by as many as 10–20 years [21].

Physical activity, along with proper nutrition, is a basic element of a healthy lifestyle, whose effect can be deepened through the consumption of dietary supplements to improve health. Dietary supplements are food products whose purpose is to supplement a normal diet, being a concentrated source of vitamins or minerals or other substances exhibiting a nutritional or other physiological effect, single or complex, marketed in a form enabling dosage, in the form of: capsules, tablets, drops and in other similar forms, powder sachets, ampoules with liquids, dropper bottles and other similar forms of liquids and powders intended for consumption in small, measured unit quantities [11]. Dietary supplements are usually low doses of the active substance, which makes their impact on the body underestimated [10]. Those preparations are usually sold without a prescription.

In nutritional 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) [8, 12]. Dietary supplements are also recommended to persons who would commit dietary errors in daily practice resulting sometimes from economic difficulties and a limited supply of food, but often from wrong dietary habits or insufficient nutritional knowledge [8].

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 [13, 14]. The main benefits of vitamin and mineral food supplements intake by the elderly are the fortification of nutritional deficiency, commonly associated with age. The use of nutritional supplements may be beneficial to the health of older adults; however, not all supplements are beneficial and safe. The improper use of some dietary supplements may lead to adverse health consequences [15], and there is a potential risk associated with concurrent use of medication in the elderly [16–17]. Other studies also show potential adverse health effects with the use of supplements and medications in the elderly [18–19]. According to these studies, some supplements can mimic and/or magnify the effects of drugs and may cause adverse health effects when used with certain medications. An example found in these studies is the possible interaction of the use of warfarin concurrently with Ginkgo Biloba, which could potentially lead to bleeding.

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

MATERIAL AND METHODS

The study involved 100 elderly women aged from 60 to 75 years old in good general health (no diagnosed neurodegenerative diseases, no doctor's contraindications). The women were recruited from the general population. A questionnaire method was applied in the study as well as a personal interview. The self-created questionnaire form contained 16 items (14 closed questions and 2 open questions). In the interview all questions were read to women, and the interview was also based on other questions on the subjects' age, education, place of residence, marital status and family life. One separate part of the questionnaire was associated with the questions on physical activity of

the seniors. The women were asked to declare the frequency and forms of sports activity as well as the time spent.

The participants were divided into 3 subgroups according to their physical activity depending on the number of minutes spent during the week on a given type of activity: high, medium and lack (30%, 49%, and 21%, respectively). The basis of the division was the weekly time spent on the physical activity by elderly women. More than 60 minutes per week were considered as high physical activity, and below 50 minutes per week as medium.

Table 1 presents the characteristic of the studied population, and Table 2 shows the characteristic of physical activity among seniors.

Table 1. The characteristic of the studied population

	Total (n=100)	Physical actvity		
		high (n=30)	medium (n=49)	lack of (n=21)
Higher education (%)	70	70	70	70
Residents of cities with more than 50 thousand inhabitants	55	45	60	60
Living alone for more than 5 years (single, divorced, widow)	60	70	60	50
Health conditions (%)				
Hypertension	70	50	80	80
Hypercholesterolemia	60	50	60	70
Cardiovascular disease	40	30	40	50
Overweight	50	30	60	60
Diabetes	30	30	30	30
Arthritis	20	10	30	20
Other	5	5	5	5

Table 2. The characteristic of the physical activity declared by seniors

		Total (n=100)	Physical actvity (%)		
			high (n=30)	medium (n=49)	lack of (n=21)
Frequency of physical activity	no activity	21	0	0	100
	once a week	47	40	71	0
	twice a week	15	23	17	0
	more than twice	17	37	12	0
	statistic		$\chi^2 = 22.31^*$ p<0.001		
		Total (n=79)	Physical actvity (%)		
			high (n=30)	medium (n=49)	
Forms of preferable physical activity	walk	100	100	100	
	fitness	87	87	90	
	dance	63	90	45	
	swimming	38	67	20	
	other	25	50	10	
	statistic		$\chi^2 = 43.52$ p<0.001		

*c^2 assessed for comparison of the frequency of distribution of quantity of the physical activity among the seniors with medium and high activity

The women participating in the study mostly had higher education (57%), lived in the cities with more than 50 thousand inhabitants (55%), and lived alone for more than 5 years (53%). However, generally, all subjects represented apparently good health condition, and about half of the studied population had some problems. Most often women reported the following disorders: hypertension (60%), hypercholesterolemia and cardiovascular diseases (both 35%), diabetes and arthritis (both 25%), and other (10% - chronic small pain, depression, migraine, etc.). The number of reported diseases increased with age. 25% of the subjects were overweight.

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

All participants gave their informed permission to participate in the study. The study was approved by Local Bioethics Committee 184/18 from 01 Feb. 2018.

RESULTS

The results obtained in this study are presented in Tables 3–7. Table 3 shows the frequency of physical activity among seniors. 21% of the surveyed seniors indicated a complete lack of physical activity. 47% of the respondents declared that they were physically active once a week, of which 40% were qualified for high activity and others for medium activity. 15% of the respondents answered that they were active twice a week, from this 45% group qualified for high activity and others for medium activity. 17% of the surveyed seniors indicated that they engaged in physical activity more than twice a week, of which 71% were qualified for the high activity group. Statistically significant differences ($p<0.001$) were observed in the frequency of distribution of the quantity of physical activity among the seniors with medium and high activity.

When it comes to the kind of physical activity, there were the 5 types of physical activity declared by women. All physically active women (71%), both in the group of high and medium activity, indicated that they were walking. 87% of active women indicated that they used fitness classes, including 87% of the high activity group and 90% of the medium activity group. From the general group of physically active women, 63% indicated dance as a form of movement, of which 90% in the high activity group and 45% from the group of medium physical activity. Swimming was preferred by 38% of active women, including 67% of the high activity group and 20% of the medium group. One fourth of the group of active women pointed to other forms of physical activity in addition to those listed in Table 2, of which 50% in the high group and 10% in the medium group.

The total number of medicines and supplements used by the studied women is presented in Table 4. All participants of the study declared using regularly at least one supplement or medicine. Statistically significant differences between physical activity groups were observed ($p<0.001$). In the high activity group, more than 4 preparations were used by 10% respectively, while in the no activity group – 60% of women regularly consumed daily more than 4 preparations and 50% in medium active group.

In accordance with its definition, dietary supplements can be on the market in many forms. Table 5 presents detailed information about what medicaments respondents used chronically. Because of their age and health condition, the respondents used daily more than one type of drug. The most commonly used drugs were painkillers (70%) popular on the pharmaceutical market. Almost

half of the respondents declared using antiarrhythmic medicaments (49%). The drugs using for neutralizing the excess of hydrochloric acid in the stomach were used by 38% of seniors, the antidiabetic drugs by 35%, anti-hypertensive – 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 group).

Table 3. Characteristic of physical activity among women aged 60–75 years old

	Total (n = 100)	High intensity (n = 30)	Medium intensity (n = 49)	No physical activity (n = 21)
Frequency of physical activity (mean ±SD) among seniors (times/week) (range)	1.54 ±1.56 (0–7)	2.63** ±1.83 (1–7)	1.53** ±1.12 (1–5)	0
Time spent on physical activity (mean ±SD) among seniors (min/day) (range)	27.85 ±23.27 (0–90)	52.50* ±20.71 (25–90)	24.69* ±11.34 (10–45)	0
Time spent on physical activity (mean ±SD) among seniors (min/week) (range)	50.8±62.94 (0–360)	118.83*±77.57 (60–360)	30.92* ±10.54 (15–50)	0

* – statistical significant differences at p<0.001 between high and medium intensity of physical activity
** – statistically significant differences at p<0.01 between high and medium intensity of physical activity

Table 4. The number of regular daily intake of medicines and supplements according to the seniors' physical activity

	Intensity of physical activity								
	high			medium			no activity		
Number of preparations	>4	2-3	1	>4	2-3	1	>4	2-3	1
Percentage of the population	10	50	40	50	30	20	60	30	10
Statistic	$\chi^2 = 62.27$ p<0.001								

Table 5 Groups of medicines regularly taken by seniors (% of population)

	Paremeters	Total (n = 100)	Physical activity (% of total)		
			high	medium	no activity
1.	painkillers	70	15	20	65
2.	antiarrhythmic	49	18	27	55
3.	neutralizing the excess of acids	38	18	19	63
4.	anti-diabetics	35	30	20	50
5.	anti-hypertensive	28	0	50	50
6.	improving cerebral circulation	25	5	30	65
7.	anti-osteoporosis	22	72	28	0
8.	analgesics and febrifugal	18	0	50	50
9.	antineoplastic agents	8	0	40	60
10.	antidepressants	8	0	0	100
11.	hormones	7	0	0	100
12.	anxiolytics	7	0	0	100
13.	other	5	0	0	100
		statistic	$\chi^2 = 289.9$ p<0.001		

Table 6 shows seniors' preferences in relation to the form in which they mostly take dietary supplements. It shows that pills (63%) and liquids (21%) are the most frequently consumed forms of supplements. Less frequently they reach for effervescent tablets and drops (8% each). There were no differences between groups according to the physical activity.

Table 6 also shows seniors' motivation for applying dietary supplementation and sources of information on it. 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%), complementing deficiencies of nutrients caused by chronic use of medications (23%), improving health and wellbeing (21%), improving physical appearance (12%), and generally improving good health and physical activity (17%). The motivation for applying dietary supplementation was significantly different in the physical activity groups ($p < 0.001$). In the high and medium activity group, it was shown that the most taken preparations are supplements aimed at supplementing mineral and vitamin deficiencies (35% and 26%). Supplementation of drug induced deficiency was low in the high activity groups – only 5%.

Table 6. The characteristic of the most popular forms of supplements, motivation to use and source of information about supplements (% of population)

	Total	Physical activity (% of total)		
		high activity	medium activity	no activity
Preferences for the form of applicable supplements				
pills	63	74	55	60
liquid form	21	16	27	20
drops	8	5	8	12
effervescent tablets	8	5	10	8
	statistic		N.S.	
Motivation for applying dietary supplementation				
dietary supplementation in deficits components (minerals and vitamins)	27	35	26	17
supplementation of drug induced deficiency	23	5	28	25
improvement in health and well being	21	20	16	23
improvement in physical appearance (hair, skin, nails)	12	15	8	17
general improvement in good health and physical activity	17	25	12	18
	statistic		$\chi^2 = 30.81$ $p<0.001$	
Sources of the information on dietary supplements				
TV ads	30	30	30	30
Pharmacy	20	5	20	35
Friends	20	35	15	10
Doctors, nutritionists, personal trainers	15	20	10	15
Press, internet	15	10	25	10
	statistic		$\chi^2 = 32.57$ $p<0.001$	

After analysing the sources of information about dietary supplements for the studied seniors (Table 6), it was found that TV advertisements (30%) have the greatest effectiveness of information about specific dietary supplements in the all of the physical activity groups. In the group of high physical activity, only 5% of respondents indicated that the information on preparations was received from the pharmacy staff, while up to 35% of those surveyed based information about the appropriate supplements on their friends. There were statistically significant differences ($p<0.001$).

Table 7 presents the characteristic of the supplements used by seniors. Seniors most often declared using the preparations to assist the circulatory system (45%, equally 50% in medium and no activity group; least 30% in high activity group) and dietary supplementation (43%, mostly by the high – 75%, while only 5% of the no activity group). Almost 20% of seniors declared using preparations supporting their intestine (mostly in the high activity group – 50%). In the no activity group as many as 66% of respondents indicated that they were taking preparations to assist the work of heart, while those from high and medium activity groups were only 17%. Among those highly physically active, as many as 60% indicated that they took preparations supporting the bacterial micro-flora. There were statistically significant differences between the studied group of seniors depending on their physical activity ($p<0.001$).

Table 7. The characteristic of the supplements used by seniors

		Total	Physical activity (% of total)		
			high activity	medium activity	no activity
	The type of supplements (% of total)				
1	preparations to assist the circulatory system	45	30	50	50
2	dietary supplements (general)	43	75	20	5
3	preparations supporting the work of the intestine	20	50	25	25
4	preparations to assist the urinary tract	18	27	27	46
5	preparation to assist work of the heart	15	17	17	66
6	preparations supporting the bacterial micro-flora	12	60	25	15
7	preparations to assist the memory	10	10	20	70
		statistic		$\chi^2 = 194.4$ $p<0.001$	
	The most commonly used commercial preparations (% of total)				
1	diosmin	45	10	40	50
2	vitamins and minerals	43	55	20	25
3	prebiotics and probiotics	30	70	25	5
4	glucosamine	23	20	55	25
5	herbs	22	10	15	75
6	omega-3 fatty acids	15	45	25	30
7	white mulberry	15	0	10	90
8	cranberry	10	0	33	67
9	gingko biloba	10	0	25	75
10	lecithin	10	25	25	50
		statistic		$\chi^2 = 180.0$ $p<0.001$	

Similar differences between elderly women in this study were observed depending on their physical activity in the most commonly used commercial preparations ($p<0.001$). However the seniors of the high activity group were more likely to buy prebiotics and probiotics (70%), vitamins and minerals (55%) and omega-3 fatty acids (45%), the ladies who declared no activity preferred the natural preparations (white mulberry – 90%, herbs and gingko biloba – 75%).

DISCUSSION

In the world literature, numerous studies show the beneficial effect of physical exercise as a primary and secondary prevention factor for many non-infectious diseases, while the lack of activity is said to be the so-called independent risk factor described as a risk to the population PAR (population-attributable risk) [22]. Our study may confirm this principle, because it has shown that people with high physical activity take significantly less drugs and dietary supplements. However, in the group of physical inactivity, it was shown that these people take more drugs against various diseases.

Appropriate physical activity is the most effective way of delaying aging processes and a factor of health preservation and – what seems to be the most important in the case of elderly people – of mobility and extension of functional activity in everyday life [20].

Experts convince the elderly about the benefits of a physically active lifestyle. A rich literature dealing with the medical aspects of the aging process speaks of the undeniable significance of movement for the involution processes taking place in the human body. Adequately dosed physical activity can significantly reduce the negative impact of these changes and allow maintaining physical, mental and social health for as long as possible. It has been noticed that systematic dosing of physical effort reduces the risk of many diseases such as diabetes, atherosclerosis, or ischaemic heart disease [4].

Our study showed that in the group of 79 physically active women who at least once a week additionally participated in fitness, dance or swimming classes, the average number of minutes devoted to movement was about 120 minutes per week. Seniors declared different forms of physical activity: walking, fitness exercises, swimming, dancing and other activities. The frequency of physical activity declared by the respondents in the vast majority of cases was at least once a week. Just ca. 21% of respondents showed no additional physical activity. Observations in this aspect are very optimistic; however, the frequency of even small intense activity decreased with aged, and more than half of the oldest ladies did not train, which was not reason of bad health condition.

An aging society requires increased attention to the health problem of elderly people. In modern society it is becoming more and more popular among the elderly population to use dietary supplements next to recommended drugs. Although there is little data about supplementation of the oldest group of society, some authors are of the opinion that 50–70% of adults take dietary supplements [12, 23]. In this paper we asked 100 old ladies about using dietary supplements, and all of them answered positively. This is similar to reports by other Polish authors that the supplements in Poland are over-consumed [8, 9, 13]. On the other hand, Kałużna et al. [13] showed the positive effect of vitamin and mineral supplementation on the health status of the elderly. This observation is similar to those presented by the PolSenior population study

reported by Bogusz et al. [14], who studied physical health of older people. That study showed that the health status of seniors has improved in recent years, especially of seniors between 65 and 79 years old.

The presented study found that supplementation is common among older people. The use of dietary supplements was not dependent on age, education, or the place of residence. However, the study showed that physically active women consumed far less painkillers and antiarrhythmic preparations than women declaring no activity. Also visible differences occurred when taking antidepressants, where women from the high and medium activity group declared that they did not use them at all. It can be confirmed by the fact that physical activity also has a positive effect on mental health.

In the case of dietary supplements, this study has shown that physically active women are less likely to consume preparations that support the work of the heart. The highest intake of dietary supplements, preparations supporting the work of the intestine and the bacterial micro-flora may be a sign of high awareness among the group with the highest physical activity. This is also analogously indicated by the smallest intake of heart supporting preparations.

CONCLUSIONS

In summary, the awareness of the needs and benefits of physical mobilization is essential to encourage and motivate older people to take and continue systematic physical activity. Due to the growing percentage of older people in Europe, including Poland, it is becoming more and more important to support the idea of aging in health. It is important not only to increase the participation of older people in the labour market and enable them to maintain longer activity in society, but also to improve the individual's quality of life and to reduce the burden on health and social systems.

It is impossible to completely stop the natural aging processes, but it is possible, thanks to systematic physical activity, partially to alleviate or delay them as much as possible. Therefore, making the society aware that the maintenance of adequate functional capacity, which largely depends on lifestyle, with the proper place physical activity in it in all periods of ontogenesis, as an integral part of successful, healthy aging, is our priority action [20]. Exercises for the elderly can significantly improve the quality of life of seniors and limit the consumption of not only dietary supplements but also drugs for common diseases of old age.

It can be concluded that physical activity and supplementation was common among the tested group. The seniors most frequently declared physical activity once a week and used preparations to assist the circulatory system and dietary supplements. They also took those supporting the work of the intestine, the urinary tract, the heart, preparations supporting the bacterial micro-flora and memory. Based on this study, it can be concluded that physical activity and supplementation were common among the study group. The decision to start supplementation was most often taken under the influence of television advertisements, pharmacy worker as well as friends, which may indicate that such supplementation was not necessary at all, but was only used biased under the influence of the above-mentioned external factors.

There were statistically differences in the presented results between studied populations according to their age.

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