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Physical Activity in Diabetes Patients at the Level of Primary Medical Healthcare: A Polish National Study

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Abstract

Background: Achieving the recommended level of Physical Activity (PA) is considered to be a priority in the area of public health and a key measure in the treatment of chronic diseases, especially type 2 diabetes. Many authors believe that the determinants of PA and the PA od adult patients with diabetes at the population level are not sufficiently described.

Objectives: This paper presents factors differentiating behaviors in the field of PA among diabetes patients at the level of primary medical healthcare a Polish.

Methods: The research was carried out on the basis of: Guided nurse interview, relative assessment of fitness and independence of the patients; anonymous questionnaire, analysis of the medical documentation. A frequency analysis was carried out using the Chi^2 test of independence. For the purpose of this work, research was carried out on 1,986 patients with diabetes from 61 randomly chosen national primary health care service units.

Results: Every fourth patient (26.5%) declared that he or she had at least 30 minutes of daily physical exercise and chooses active forms of leisure. People claiming to have regular PA and active leisure were most frequently familiar with all the analyzed health indicators ($p<0.0001$), had a better moderate awareness of the disease ($p<0.0001$), most frequently had a lower need for professional care ($p<0.0001$). Patients declaring regular physical activity and active leisure were most frequently satisfied with their life in general ($p<0.0001$).

Conclusions: Optimalisation of the physical activity in diabetic patients requires a multi-factorial intervention.

Keywords: Primary care; Physical activity; Diabetes; Health behavior; Socioeconomic factors

Introduction

Diabetes is one the leading causes of death in general population and one of the four priority non-communicable diseases [1]. WHO estimates indicate that in 2014 422 million adults over 18 worldwide had diabetes, including 64 million in the region of Europe [1]. In Poland, diabetes affects more than 2,235,000 people [2]. A major cause of premature death and disability, diabetes poses a serious threat to human health and quality of life [1]. Numerous studies demonstrate that the risk of diabetes increases as physical activity (PA) decreases [1,3]. As a staple of life, PA is necessary for preserving human health [4-6], preventing and delaying the onset of type 2 diabetes [7-11], properly treating diabetes [3,9,12] and reducing mortality [13]. Achieving the recommended level of PA is considered to be a priority in the area of public health and a key measure in the treatment of chronic diseases, especially type 2 diabetes [8,14]. In type 2 diabetes, regular moderate-intensity physical exercise (walking, cycling, running and swimming) makes it possible to improve control over the blood glucose level, reduce the cardio-vascular risk [5,15], lose weight and improve well-being [16,17]. The health benefits of regular physical exercise in type 1 diabetes include: weight loss, BMI [18] reduction, improvement of cardio-vascular efficiency and muscle strength, and insulin sensitivity [3,19]. Considering that requirements related to the management of the blood glucose level differ depending on the type of diabetes, type of activity and diabetes-related complications [20,21], recommendations regarding physical effort and exercise should be adjusted to the individual needs of each person [3,22] and the possibility of participation, determined, inter alia, by: age, gender, economic situation, social support, disease stage and diabetes-related complications [3,23]. Patients suffering from diabetes are recommended to take regular, preferably daily [24], moderate-intensity physical effort, based on pleasurable and safe exercises [9], 30 minutes a day or more at best, through most of the week (for adults with diabetes) [8,23,25-27]. Irrespective of the type of diabetes, in order to reduce insulin resistance, it is recommended to take exercise daily or at least not to have more than 2 days of break between exercise sessions [25,26]. The latest research demonstrates that all people, especially those suffering from diabetes, should reduce the duration of daily sedentary lifestyle [3,28,29]. Many authors believe that the determinants of PA [30,31] and the PA od adult patients with diabetes at the population level are not sufficiently described [32].

Aims

This paper presents factors differentiating behaviors in the field of physical activity among diabetes patients at the level of primary medical healthcare a Polish.

Research problems that prompted this work: Is there any relationship between selected factors such as: knowledge about the disease and health indicators, behavioral patterns in the field of nutrition, oral hygiene, body, feet, self-observation, behavioral patterns in self-control and modification of treatment, addiction, Body Weight (BMI), Blood Pressure (BP), glycemic stability, physical fitness, independence of patients' compliance difficulties, access to medical services, in social functioning, social support, social situation and living conditions, nursing and caring skills of the family, the need for professional care, satisfaction with: participation in treatment, participation in family life, marriage, professional, social and social life, treatment effects, life satisfaction, and physical activity of patients with diabetes?

Do the chosen factors differentiate physical activity among patients with diabetes?

Materials and Methods

The study was approved by the Ethical Committee at the Medical University of Wroclaw, Poland. For the purpose of this work, the research was carried out on the basis of [33-35]:

- Guided nurse interview, by means of which the following information was obtained: Place of living, marital status, source of income, education, psycho-somatic disturbances, social functioning, knowledge of health indicators important in diabetes treatment, knowledge of the disease, health behavior required in diabetes treatment, family situation, social and living situation.
- Relative assessment of fitness and independence of the patients.
- Anonymous questionnaire, focused on obtaining patients' opinions on: Satisfaction with life, medical treatment and participation in treatment, participation in family life, marital, social, professional and sociable life.
- Analysis of the medical documentation. This included information provided by the general practice (GP) as to: Age, sex, type of diabetes, duration of illness, treatment methods, self-control, results from tests carried out within the previous 12 months (total cholesterol, cholesterol HDL, fasting glycaemia, glycosuria, microalbuminuria or proteinuria, creatinine, glycated haemoglobin, body mass, height, BP, waist circumference, trochanters), accompanying diseases which require treatment.

A frequency analysis was carried out using the chi^2 test of independence [36]. All the tested hypotheses were verified at the level of significance of $\alpha=0.05$. Precise values of the significance level p were calculated.

For the purpose of this work, research was carried out on 1,986 patients with diabetes from 61 randomly chosen national primary health care service units, within the scope of NCSR grant no 6P05D02320, managed by the author of this work. Research materials were obtained from patients aged above 16 years, living in the area of work of a social and family nurse, and registered on the list of a local GP. The youngest patient was 17 and the oldest was 96. The majority of the tested population consisted of women (63.4%), persons aged above 65 (59%) and patients living in urban areas (57.7%). The most numerous groups of tested patients consisted of pensioners (49.5%). Slightly more than one in three patients indicated disability pension as their source of income (37.2%) and 9.3% of patients indicated a job on a farm as their source of income. The majority of persons interviewed were married (61.3%). Almost every third patient was a widow or widower (30.3%). Most of the patients took only oral drugs (56.8%), every fifth patient took only insulin (20%), and almost every fifth patient took insulin and oral drugs (18.5%), only 4.7% of the patients were on a diet. Analysis of the medical documentation shows that diabetes type 1 was found in 11.6% of the patients and diabetes type 2 was found in 51.4%, while 32.9% of the patients were treated without defining the type of diabetes. No information about diabetes type was found in the case of 4.1% of the patients. A pronounced majority of the patients were characterized by elementary or incomplete elementary education (56.2%). Vocational education was found in 15.1% of the patients, secondary school education was found in 23.8%, and higher education was found in 4% of the patients. No information about education was found in 0.9% of the patients.

Results

Every fourth patient (26.5%) declared that he or she had at least 30 minutes of daily physical exercise and chooses active forms of leisure. It was established that 9.3% of the patients had regular daily PA but passive leisure. 32.6% of the respondents reported unregular PA (2-3 times a week) and passive leisure. Nearly every third patient claimed to usually sit, lie or take excessive physical effort (31.2%). Information on PA behavioural patterns was not obtained from 0.4% of the patients. Regular PA and active forms of leisure were reported most frequently by patients living in the West Pomeranian Voivodeship (50.4%) and least frequently by patients living in the Świętokrzyskie Voivodeship (13.8%). The data is shown in Table 1.

Province	Regular activity, active recreation		Regular activity, passive recreation		Irregular activity, passive recreation		Lack of activity or excessive effort		No answer		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
West Pomeranian (zachodniopomorskie)	68	50.4%	9	6.7%	32	23.7%	26	19.3%	0	0.0%	135	6.8%
Lublin (lubelskie)	58	36.0%	29	18.0%	37	23.0%	36	22.4%	1	0.6%	161	8.1%
Łódź (łódzkie)	80	32.9%	16	6.6%	84	34.6%	63	25.9%	0	0.0%	243	12.2%
Greater Poland (wielkopolskie)	34	32.4%	20	19.0%	23	21.9%	28	26.7%	0	0.0%	105	5.3%
Pomeranian (pomorskie)	21	30.9%	7	10.3%	26	38.2%	13	19.1%	1	1.5%	68	3.4%
Lubusz (lubuskie)	14	29.2%	1	2.1%	24	50.0%	9	18.8%	0	0.0%	48	2.4%

Kuyavian-Pomeranian (kujawsko-pomorskie)	46	27.5%	18	10.8%	56	33.5%	47	28.1%	0	0.0%	167	8.4%
Silesian (śląskie)	18	25.7%	2	2.9%	25	35.7%	25	35.7%	0	0.0%	70	3.5%
Subcarpathian (podkarpackie)	14	24.6%	5	8.8%	21	36.8%	17	29.8%	0	0.0%	57	2.9%
Opole (opolskie)	37	23.7%	17	10.9%	37	23.7%	65	41.7%	0	0.0%	156	7.8%
Lesser Poland (małopolskie)	21	21.9%	18	18.8%	23	24.0%	34	35.4%	0	0.0%	96	4.9%
Podlaskie (podlaskie)	26	20.8%	11	8.8%	43	34.4%	45	36.0%	0	0.0%	125	6.3%
Masovian (mazowieckie)	22	19.8%	11	9.9%	41	36.9%	33	29.7%	4	3.6%	111	5.6%
Lower Silesian (dolnośląskie)	14	16.9%	6	7.2%	28	33.7%	34	41.0%	1	1.2%	83	4.2%
Warmian-Masurian (warmińsko-mazurskie)	34	15.7%	5	2.3%	86	39.8%	91	42.1%	0	0.0%	216	10.9%
Świętokrzyskie (świętokrzyskie)	20	13.8%	9	6.2%	62	42.8%	53	36.6%	1	0.7%	145	7.3%
Total in Poland	527	26.5%	184	9.3%	648	32.6%	619	31.2%	8	0.4%	1986	100%

Table 1: Physical activity of patients with diabetes.

Statistical analysis demonstrated that people claiming to have regular PA and active leisure were most frequently familiar with all the analyzed health indicators ($p<0.0001$), and had a better moderate awareness of the disease ($p<0.0001$). The data is shown in Table 2.

Tested feature	**Patients' physical activity**			
Total N=1978	**Regular activity, active recreation N=527, 26.6%**	**Regular activity, passive recreation N=184, 9.3%**	**Irregular activity, passive recreation N=648, 32.8%**	**Lack of activity or excessive effort N=619, 31.3%**
Knowledge of health indicators (Total cholesterol, fasting glycaemia, glycosuria, body mass, blood pressure, hypoglycaemia)	Chi^2 Pearsona: 79,5691, df=9, ($p<0.0001$)			
Knows all 6 indicators	38.23%	8.18%	30.88%	22.70%
Knows 3–5 indicators	22.91%	9.60%	33.95%	33.53%
Knows 1–2 indicators	13.46%	12.18%	30.13%	44.23%
Does not know indicators	13.89%	5.56%	36.11%	44.44%
Knowledge (level)	Chi^2 Pearsona: 84,5843, df=6, ($p<0.0001$)			
Moderate (20.0–13.5 points)	46.8%	8.9%	29.1%	15.2%
Minimal (13.0–6.5 points)	30.9%	9.0%	34.1%	26.0%
None (6–0 points)	17.8%	9.9%	31.0%	41.3%
p: level of significance; df: Number of degrees of freedom; chi^2 Pearsona: Pearson's chi-squared test				

Table 2: Patients' physical activity and knowledge about the disease and health indicators.

Patients who had regular physical exercise and active leisure most frequently declared that they followed most recommendations with respect to diet ($p<0.0001$), foot care ($p<0.0001$), everyday washing of the whole body ($p<0.0001$), everyday dental and oral hygiene ($p<0.0001$), regular tests of glycaemia without any treatment modification ($p<0.00001$), regular use of medication, doctor's appointments and medical examinations ($p<0.00001$), regular self-examination of feet and oral cavity ($p<0.00001$) and smoking ($p<0.001$). The data is shown in Table 3.

Tested feature	**Patients' physical activity**			
Total N=1978	**Regular activity, active recreation N=527, 26.6%**	**Regular activity, passive recreation N=184, 9.3%**	**Irregular activity, passive recreation N=648, 32.8%**	**Lack of activity or excessive effort N=619, 31.3%**
Addictions	Chi^2 Pearsona: 25,0516, df=9, (p<0.001)			
Non-smoker and non-drinker (no addictions)	26.85%	7.72%	32.21%	33.22%
Drinker	24.88%	14.63%	34.15%	26.34%
Smoker	27.33%	12.21%	33.72%	26.74%
Drinker and smoker	25.93%	15.74%	36.11%	22.22%
Diet	Chi^2 Pearsona: 65,2872, df=6, (p<0.0001)			
Single dietary errors (1–3)	42.92%	8.75%	25.42%	22.92%
Many dietary errors (4–7)	27.35%	9.55%	33.74%	29.37%
Numerous dietary errors (8 and above)	17.00%	9.00%	34.00%	40.00%
Patients' care of feet hygiene	Chi^2 Pearsona: 58,0190, df=6, (p<0.0001)			
Lack or single disturbances (0-2 errors)	33.73%	8.64%	32.90%	24.73%
Numerous disturbances (3-5 errors)	22.65%	9.72%	33.12%	34.51%
Very numerous disturbances (6 and above)	14.51%	10.36%	31.09%	44.04%
Behavioral patterns within the scope of body hygiene	Chi^2 Pearsona: 157,820, df=9, (p<0.0001)			
Washes the whole body every day	38.3%	9.9%	34.2%	17.7%
Washes the whole body several times a week	24.8%	7.3%	34.5%	33.5%
Washes the whole body once a week	18.6%	10.9%	30.4%	40.2%
Washes the whole body less often than once a week	2.8%	5.6%	26.8%	64.8%
Behavioral patterns within the scope of oral hygiene	Chi^2 Pearsona: 145,749, df=9, (p<0.0001)			
Cleans the teeth at least twice a day	35.7%	9.7%	32.6%	22.1%
Cleans the teeth once a day	22.9%	9.8%	35.3%	32.0%
Performs oral hygienic behaviours several times a week	17.1%	3.9%	30.9%	48.0%
Never performs any oral hygienic behaviours	8.2%	10.4%	24.0%	57.4%
Behavioral patterns within the scope of self-control and treatment modification	Chi^2 Pearsona: 43,7213, df=9, (p<0.00001)			
Modifies treatment and regularly checks blood glucose level	29.6%	11.0%	30.6%	28.9%
Does not modify treatment but regularly checks blood glucose level	37.3%	11.9%	28.7%	22.1%
Does not modify treatment and does not check blood glucose level	24.4%	8.7%	34.5%	32.4%
Does not check blood glucose level but modifies treatment	20.2%	6.9%	32.2%	40.8%
Participation in treatment	Chi^2 Pearsona: 45,5704, df=9, (p<0.00001)			
Regularly takes medications, visits a doctor and reports for tests	30.0%	8.2%	33.6%	28.2%
Regularly takes medications but irregularly visits a doctor or reports for tests	27.0%	13.1%	29.5%	30.5%

Irregularly visits a doctor and reports for tests or irregularly takes medications	16.8%	9.0%	34.7%	39.6%
Does not follow all the recommendations	18.6%	8.6%	27.1%	45.7%
Behavioral patterns within the scope of self-observation	Chi^2 Pearsona: 108,789, df=9, (p<0.00001)			
Performs regular observations of feet and oral cavity	33.5%	9.1%	34.9%	22.6%
Performs regular observations of feet and irregular observations of oral cavity	21.3%	12.3%	30.7%	35.7%
Performs irregular observations of feet and oral cavity	19.3%	8.4%	32.5%	39.8%
Does not perform self-observation of feet and oral cavity	16.1%	9.0%	24.6%	50.3%
p: level of significance; df: Number of degrees of freedom; chi^2 Pearsona: Pearson's chi-squared test				

Table 3: Physical activity and selected healthy behaviors in diabetes patients.

Statistical analysis indicated that patients claiming to have regular PA and active leisure were more frequently characterized by full physical fitness and independence (p<0.00001), and a lack of any somatic (p<0.00001), and psycho-emotional (p<0.00001), complaints. Also, they more often did not require any treatment for diabetes comorbidities (p<0.00001). Patients who had regular exercise and active leisure were most frequently found to have overweight (p<0.005), blood pressure (R/R) of 140-159/90-99 mmHg (p<0.01) and the largest number of adverse events indicating an unstable blood glucose level p<0.05). The data is shown in Table 4.

Tested feature	**Patients' physical activity**			
Total N=1978	**Regular activity, active recreation N=527, 26.6%**	**Regular activity, passive recreation N=184, 9.3%**	**Irregular activity, passive recreation N=648, 32.8%**	**Lack of activity or excessive effort N=619, 31.3%**
Physical fitness	Chi^2 Pearsona: 177,937, df=9, (p<0.00001)			
Physically fit (7 points)	37.6%	6.6%	39.1%	16.8%
Few limitations of physical ability (8–14 points)	33.7%	9.8%	33.7%	22.9%
Many limitations of physical ability (in at least one factor) (15–21 points)	17.0%	10.1%	32.2%	40.7%
Lack of physical ability in at least one factor (22–28 points)	11.6%	4.2%	14.7%	69.5%
Independence	Chi^2 Pearsona: 268,696, df=9,(p<0.00001)			
Fully independent	38.8%	12.7%	36.9%	11.5%
Insignificant limitations of independence	37.4%	9.8%	31.0%	21.9%
Marked limitations of independence (partially unable to perform at least one activity)	16.7%	8.7%	34.7%	39.9%
No independence (totally unable to perform at least one activity)	1.2%	1.2%	14.3%	83.3%
Somatic ailments	Chi^2 Pearsona: 49,1782, df=6, (p<0.00001)			
None	31.2%	8.3%	33.1%	27.4%
Single (1-2)	19.3%	11.3%	30.8%	38.6%
Many (3 and more)	16.7%	10.1%	37.7%	35.5%
Disturbances and symptoms in the psycho-emotional life	Chi^2 Pearsona: 122,895, df=9, (p<0.00001)			
No ailments	35.9%	9.6%	33.5%	21.0%
1-2 ailments	19.5%	9.0%	33.9%	37.7%

3-4 ailments	14.1%	10.8%	31.9%	43.2%
5 and more ailments	16.5%	7.9%	28.3%	47.2%
Concomitant diseases	Chi^2 Pearsona: 55,9110, df=9, (p<0.00001)			
No diagnosis of concomitant diseases	33.5%	10.7%	34.4%	21.4%
1-2 concomitant diseases	30.2%	9.4%	34.4%	26.0%
3-4 concomitant diseases	23.2%	8.3%	31.6%	36.9%
5 and more concomitant diseases	17.8%	10.0%	28.9%	43.3%
Body mass index	Chi^2 Pearsona: 23,2488, df=9, (p<0.005)			
Normal weight; M < 24.9, W < 23.9	26.2%	8.7%	34.9%	30.2%
Overweight; M = 25–29.9, W=24–29.9	30.1%	9.4%	33.3%	27.2%
Obesity; 30–40	25.1%	9.8%	32.5%	32.5%
Giant obesity; > 40	16.5%	7.4%	29.8%	46.3%
< 120–130 and < 80–85	20.60%	10.11%	29.96%	39.33%
130–139 and 85–89	27.78%	6.84%	35.90%	29.49%
140–159 and 90–99	29.67%	8.76%	32.94%	28.63%
>160–179/100–109 and ≥ 180/> 100	24.96%	10.33%	33.14%	31.56%
Glycaemia stability (within last year they required interventions due to hypoglycaemia, hyperglycaemia, hospitalisation and they needed a medical leave of absence based on diabetes)	Chi^2 Pearsona: 17,8732, df=9, (p<0.05)			
No negative events	26.59%	9.12%	34.25%	30.03%
One event	23.19%	8.53%	33.04%	35.23%
Two events	29.81%	12.45%	29.06%	28.68%
Three or more events	35.11%	6.38%	23.40%	35.11%
p: level of significance; df: Number of degrees of freedom; chi^2 Pearsona: Pearson's chi-squared test				

Table 4: Physical activity and selected health indicators in diabetes patients.

Patients reporting regular PA and active leisure most frequently claimed to have no difficulties with: Following medical recommendations required in the diabetes treatment (p<0.0001), having access to medical services (general practitioner, general nurse, diabetologist, dentist, ophthalmologist and laboratories) (p<0.005), and social functioning (in family life, marriage, professional life, social life and social organizations) (p<0.0001). They are also in a better living and housing situation (p<0.0001). It was established that patients who had daily PA active leisure most frequently functioned in families that are fully capable of providing care and nursing (p<0.05), received moderate social support (p<0.0001), and had a lower (moderate) need for professional care (p<0.0001). Patients declaring regular physical activity and active leisure were most frequently satisfied with the effects of diabetes treatment (p<0.0001), their participation in diabetes treatment (p<0.0001), participation in family life (p<0.0001), marriage (p<0.0001), professional life (p<0.0001), and social life (p<0.0001), and satisfied with their life in general (p<0.0001). The data is shown in Table 5.

Tested feature	**Patients' physical activity**			
Total N=1978	**Regular activity, active recreation N= 527, 26.6%**	**Regular activity, passive recreation N= 184, 9.3%**	**Irregular activity, passive recreation N=648, 32.8%**	**Lack of activity or excessive effort N=619, 31.3%**
Patients' difficulty in respecting of recommendations	Chi^2 Pearsona 46,1985, df=9, (p<0.0001)			
No difficulties	30.5%	10.1%	33.1%	26.3%

1-2 difficulties	20.2%	7.9%	34.5%	37.4%
3-4 difficulties	18.0%	10.2%	27.5%	44.3%
5 and more difficulties	28.3%	8.1%	31.4%	32.2%
Difficulties of patients in access to medical services (family doctor, family nurse, diabetologist, dentist, ophthalmologist, laboratory)	Chi^2 Pearsona 20,5038, df=6, (p<0.005)			
No difficulties	38.5%	4.7%	33.3%	23.4%
Problems with access to 1-3 services	26.3%	9.6%	33.2%	30.9%
Problems with access to 4 or to all the services	24.1%	8.0%	33.0%	34.8%
Social functioning (marital, family, professional, socialand personal life)	Chi^2 Pearsona 181,995, df=9, (p<0.0001)			
Participates fully in all 5 social activities (without difficulties or limitations)	43.0%	10.1%	29.1%	17.7%
Does not participate in 1-2 social activities (has difficulties or limitations)	34.3%	10.7%	33.5%	21.5%
Does not participate in 3 social activities (has many difficulties or limitations)	23.0%	8.9%	35.4%	32.7%
Does not participate in 4-5 social activities (has a lot of difficulties or limitations)	10.5%	4.7%	24.7%	60.0%
Social situation and living conditions	Chi^2 Pearsona 38,9021, df=3, (p<0.0001)			
Very good and sufficient	32.0%	8.9%	32.0%	27.0%
Insufficient and none	20.4%	9.7%	33.6%	36.2%
Nursing and care competence of family	Chi^2 Pearsona 21,7659, df=9, (p<0.05)			
Fully competent (8 points)	33.1%	7.2%	34.3%	25.4%
Slightly incompetent (9–12 points)	27.5%	11.2%	30.4%	30.8%
Considerably incompetent (13–18 points)	22.5%	9.9%	35.4%	32.2%
Incompetent (19–24 points)	26.1%	6.0%	33.5%	34.4%
Social suport (family, neighbourhood. social worker)	Chi^2 Pearsona 43,6337, df=9, (p<0.0001)			
Optimal (sufficient support in 3 environments)	23.0%	4.1%	39.2%	33.8%
Moderate (sufficient support in 2 environments)	31.2%	8.2%	33.6%	27.0%
Minimal (sufficient support in 1 environment)	23.6%	11.6%	30.9%	34.0%
None (lack of sufficient support in any of the environments)	16.3%	3.3%	38.2%	42.3%

Need for professional care	Chi^2 Pearsona 373,850, df=3, (p<0.0001)			
Moderate	55.6%	8.1%	27.4%	8.8%
High and very high	15.4%	9.8%	34.8%	40.0%
Satisfaction of patients with effects of diabetes treatment	Chi^2 Pearsona 23,9804, df=3, (p<0.0001)			
Satisfied	30.8%	8.6%	31.8%	28.9%
Deficiency or lack of satisfaction	20.1%	9.6%	36.1%	34.2%
Satisfaction of patients with participation in the treatment of diabetes	Chi^2 Pearsona 31,8426, df=3, (p<0.0001)			
Satisfied	31.1%	8.9%	32.3%	27.7%
Deficiency or lack of satisfaction	19.3%	10.1%	35.1%	35.5%
Patients' satisfaction from participation in family life	Chi^2 Pearsona 54,1248, df=3, (p<0.0001)			
Satisfied	30.7%	10.1%	32.6%	26.6%
Deficiency or lack of satisfaction	16.0%	7.6%	34.6%	41.9%
Patients' satisfaction from participation in marital life	Chi^2 Pearsona 26,7049, df=3, (p<0.0001)			
Satisfied	31.3%	10.4%	34.8%	23.5%
Deficiency or lack of satisfaction	23.1%	8.3%	31.6%	37.0%
Patients' satisfaction from participation in sociable life	Chi^2 Pearsona 38,1488, df=3, (p<0.0001)			
Deficiency or lack of satisfaction	18.5%	8.1%	33.9%	39.5%
Patients' satisfaction from participation in professional life	Chi^2 Pearsona 24,6144, df=3, (p<0.0001)			
Satisfied	34.9%	8.9%	33.3%	22.9%
Deficiency or lack of satisfaction	22.3%	7.1%	35.6%	35.0%
Patients' satisfaction from life	Chi^2 Pearsona 38,1488, df=3, (p<0.0001)			
Satisfied	31.2%	10.5%	31.7%	26.6%
Deficiency or lack of satisfaction	19.9%	7.9%	35.4%	36.7%
p: level of significance; df: Number of degrees of freedom; chi^2 Pearsona: Pearson's chi-squared test				

Table 5: Physical activity and difficulties in respecting recommendations, access to medical services, and social and family situation, social support, need for care and life satisfaction in diabetes patients.

Discussion

Apart from diet therapy and pharmacological therapy, another factor considered to have a major significance in diabetes treatment is movement therapy. All diabetic patients are recommended to try to change their lifestyle from sedentary to a more active one, bearing in mind that all forms of daily activity are helpful [37] and better than inactivity [38]. In own research, daily PA of at least 30 minutes and active leisure were identified in the statements of only 26.5% of the respondents. Regular daily PA, but passive leisure, characterized 9.3% of the patients. 32.6% of the respondents were found to have irregular PA (2-3 times a week) and passive leisure. Nearly every third patient surveyed claimed to usually sit, lie or have excessive physical effort (31.2%). The results of own research confirm that diabetic patients do not follow PA recommendations, as have been already indicated by numerous authors [39]. Considering that different methods are applied to assess physical activity and select the population for research, it is difficult to fully compare the results of own research with the results obtained by other authors [39,40]. The research demonstrates that, compared to less active patients, more active patients, who take PA also in their free time, are more often in a better health condition and have a fewer accompanying diseases and complications [15,17,32,39]. In own research, a better health condition of more active patients was indicated by: their better, lower, weight, full physical fitness and

independence, a lack of somatic and psycho-emotional complaints, a lack of necessary treatment for diabetes comorbidities, and, in a result, a lower need for professional care. The higher level of knowledge about the disease and familiarity with the health indicators that are significant in diabetes treatment among patients declaring regular PA and active leisure confirm the relation between knowledge and PA [41]. Insufficient PA due to the habit of sitting or lying and taking excessive physical effort among patients requiring treatment for 5 or more diabetes comorbidities in own research confirms the authors' opinion about the negative influence of multiple morbidities on patients' behavior in the scope of physical activity [32]. Multiple morbidities affecting diabetic patients in own research may be, however, also the result of a long-term deficiency of PA and/or excessive physical effort. Participation in all the analyzed forms of social life [42], as well as satisfaction [43,44] with life, participation in treatment, participation in family life, marriage, community life, professional life and social life, as well as satisfaction with the effects of treatment among the most active patients may result from their higher level of PA in comparison to the other groups surveyed. They also confirm the significant influence of PA on social relations, functional independence [44] and quality of life [44]. It is believed that providing community support may be an effective strategy of increasing PA among adults [45]. In own research, both the high level of community support and lack thereof were conducive to regular daily PA and active leisure. A moderate level of community support and a family that is able to provide effective support and care among patients declaring daily PA and active leisure confirm opinions about the role of family [34,46] and the significance of community support in achieving desired PA among patients [44]. The results of own research confirm the relation between PA and the patient's economic and family situation [34,40,46]. Functioning in a family able to provide effective care and in a good living and housing situation is correlated with the higher level of PA among diabetic patients. Behaviors in the field of physical activity among the patients surveyed, however, did not depend on: their marital state [46], age, gender [17,38-40,46], and type of diabetes [30]. In own research, patients who had regular PA and active leisure more often followed recommendations with respect to diet, body hygiene and oral hygiene, footcare, self-examination and participation in treatment. It may be supposed that regular PA predisposes patients to compliance also with other recommendations required in diabetes treatment. The largest number of adverse events among the most active patients indicating an unstable blood glucose level, control of blood glucose level without any treatment modification (the physical activity of patients taking insulin and/or medication stimulating the secretion of insulin may cause hypoglycaemia if the medication dosage and consumption of carbohydrates are not changed [28]), increased blood pressure, and smoking confirm the justifiability of increasing the role of doctors in ensuring safety and blood glucose level stability [39]. The increased role of doctors in care of diabetic patients at the level of primary healthcare is indicated in own research also by the unfavorable health situation of patients due to: required treatment for multiple diabetes comorbidities [32], non-compliance with recommendations necessary in diabetes treatment, excessive physical effort, the habit of sitting or lying, and high need for professional care among patients with insufficient PA. What is also of importance is the active participation of a community nurse/general nurse/primary care nurse, especially considering that doctors do not have enough time due to their workloads [5,39]. Patients who receive more attention and care are more engaged in the process of care and have a better life and health situation [39,47], a factor that is especially important in the course of chronic diseases, in which desired effects can hardly be achieved without the patient's participation [48]. This is confirmed by higher PA among patients who do not have any difficulties with access to medical services. Social and economic factors differentiating PA behavior among diabetic patients [40,45,46] in own research demonstrate that it is necessary that care be provided by an interdisciplinary team, and that also a social worker and a network of unprofessional support (family, neighbours) be involved in the process of care. A high and very high need for professional care among patients who had at least 30 minutes of activity a day but passive leisure and among those who had irregular PA or who used to sit or lie indicates the negative influence of insufficient PA and its burden for the patient and the healthcare system [5]. A lower demand for professional care reported most frequently among patients who had regular PA and active leisure implies that this group of patients is characterized by lower healthcare costs and lower disease burden [39,49]. The results of own research confirm the validity of promoting regular daily PA, also leisure time [39], among diabetic patients as a method of exerting a positive impact on the health of this group of patients and a chance for reducing the demand for professional care and, as a result, for reducing care costs.

Research Limitations

The research results come only from patients who agreed to take part in the research and healthcare units whose medical staff (doctors and nurses) agreed to take part in the research. Despite the aforementioned limitations, the research provided valuable information suggesting the necessity of carrying out observations with respect to the PA of adult patients with diabetes at the level of primary healthcare.

The research should contribute to the development of recommendations regarding PA in diabetes treatment at the level of primary healthcare.

When informed about the research results, healthcare staff should become more engaged and active in the process of establishing cooperation with families and social workers, and comprehensive management of diabetic patient care at the level of primary healthcare, with a view to promoting PA among diabetic patients.

Conclusions

- The relationship between chosen guilds such as: knowledge about the disease and health indicators, behavioral patterns in the field of nutrition, oral hygiene, body, feet, self-observation, behavioral patterns in self-control and modification of treatment, addiction, body weight (BMI)), blood pressure (BP), glycemic stability, physical fitness, independence of patients' compliance difficulties, access to medical services, in social functioning, social support, social situation and living conditions, nursing and caring skills of the family, the need for professional care, satisfaction with: participation in treatment, participation in family life, marriage, professional, social and social life, treatment effects, life satisfaction, exists physical activity among patients with diabetes.
- Increasing physical activity among diabetic patients require a multifactorial intervention.
- At the level of primary healthcare, it is necessary to increase the role of doctors and nurses in ensuring safety and blood glucose level stability for patients who have regular activity and active leisure.

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References

1. http://apps.who.int/healthinfo/statistics/mortality/causeofdeath_query/
2. http://www.diabetesatlas.org/across-the-globe.html
3. Colberg SR, Sigal RJ, Yardley JE, Riddell MC, Dunstan DW, et al. (2016) Physical activity/exercise and diabetes: A position statement of the American Diabetes Association. Diabetes Care 39: 2065-2079.
4. Fernandez-Navarro P, Aragones MT, Ley V (2018) Leisure-time physical activity and prevalence of non-communicable pathologies and prescription medication in Spain. PLoS One 13: e0191542.
5. Ekelund U, Ward HA, Norat T, Luan J, May AM, et al. (2015) Physical activity and all-cause mortality across levels of overall and abdominal adiposity in European men and women: The European Prospective Investigation into Cancer and Nutrition Study (EPIC) Am J Clin Nutr 101: 613-621.
6. Marcus BH, Dubbert PM, Forsyth LH, McKenzie TL, Stone EJ, et al. (2000) Physical activity behavior change: Issues in adoption and maintenance. Health Psychol 19: 32-41.
7. Bryan SN, Katzmarzyk PT (2011) The association between meeting physical activity guidelines and chronic diseases among canadian adults. J Phys Act Health 8: 10-17.
8. Duclos M, Oppert JM, Verges B, Coliche V, Gautier JF, et al. (2013) Physical activity and type 2 diabetes. Recommendations of the SFD (Francophone Diabetes Society) diabetes and physical activity working group. Diabetes Metab 39: 205-216.
9. American Diabetes Association (2004) Physical activity/exercise and diabetes. Diabetes Care 27: 58-62.
10. Balk EM, Earley A, Raman G, Avendano EA, Pittas AG, et al. (2015) Combined diet and physical activity promotion programs to prevent type 2 diabetes among persons at increased risk: A systematic review for the community preventive services task force. Ann Intern Med 163: 437-451.
11. Schellenberg ES, Dryden DM, Vandermeer B, Ha CH, Korownyk CH (2013) Lifestyle interventions for patients with and at risk for type 2 diabetes: A systematic review and meta-analysis. Ann Intern Med 159: 543-551.
12. Hayes C, Kriska A (2008) Role of physical activity in diabetes management and prevention. J Am Diet Assoc 108: 19-23.
13. Moy CS, Songer TJ, LaPorte RE, Dorman JS, Kriska AM, et al. (1993) Insulin-dependent diabetes mellitus, physical activity, and death. Am J Epidemiol. 137: 74-81.
14. Duclos M, Virally ML, Dejager S (2011) Exercise in the management of type 2 diabetes mellitus: What are the benefits and how does it work? Phys Sportsmed 39: 98-106.
15. Marwick TH, Hordern MD, Miller T, Chyun DA, Bertoni AG, et al. (2009) Exercise training for type 2 diabetes mellitus: Impact on cardiovascular risk: A scientific statement from the American Heart Association. Circulation 119: 3244-3262.
16. Chen L, Pei JH, Kuang J, Chen HM, Chen Z, et al. (2015) Effect of lifestyle intervention in patients with type 2 diabetes: A meta-analysis. Metabolism 64: 338-347.
17. Lin X, Zhang X, Guo J, Roberts CK, McKenzie S, et al. (2015) Effects of exercise training on cardiorespiratory fitness and biomarkers of cardiometabolic health: A systematic review and meta-analysis of randomized controlled trials. J Am Heart Assoc 4: 4.
18. Burr JF, Shephard RJ, Riddell MC (2012) Physical activity in type 1 diabetes mellitus Assessing risks for physical activity clearance and prescription. Can Fam Physician 58: 533-535.
19. Yardley JE, Hay J, Abou-Setta AM, Marks SD, McGavock J (2014) A systematic review and meta-analysis of exercise interventions in adults with type 1 diabetes. Diabetes Res Clin Pract 106: 393-400.
20. American Diabetes Association (2016) Foundations of care and comprehensive medical evaluation. Diabetes Care 39: S23-S35.
21. Colberg SR, Sigal RJ, Fernhall B, Regensteiner JG, Blissmer BJ, et al. (2010) Exercise and type 2 diabetes: The American College of Sports Medicine and the American Diabetes Association: Joint position statement. Diabetes Care 33: 147-167.
22. Koponen AM, Simonsen N, Suominen S (2017) Determinants of physical activity among patients with type 2 diabetes: The role of perceived autonomy support, autonomous motivation and self-care competence. Psychol Health Med 22: 332-344.
23. American Diabetes Association (2002) Diabetes mellitus and exercise. Diabetes Care 25: 64-68.
24. PTD-Clinical Recommendations for the Management of Patients with Diabetes (2017) Diabetologia Praktyczna 2017 3: 13-16.
25. Jelleyman C, Yates T, O'Donovan G, Gray LJ, King JA, et al. (2015) The effects of high-intensity interval training on glucose regulation and insulin resistance: A meta-analysis. Obes Rev 16: 942-961.
26. Tonoli C, Heyman E, Roelands B, Buyse L, Cheung SS, et al. (2012) Effects of different types of acute and chronic (training) exercise on glycaemic control in type 1 diabetes mellitus: A meta-analysis. Sports Med 42: 1059-1080.
27. Hawley JA, Lessard SJ (2008) Exercise training-induced improvements in insulin action. Acta Physiol 192: 127-135.
28. American Diabetes Association (2018) Lifestyle management: Standards of medical care in diabetes-2018. Diabetes Care 41: 38-50.
29. Canadian Diabetes Association (2013) Clinical practice guidelines expert committee: Physical activity and diabetes. Can J Diabetes 37: 40-44.
30. Duarte CK, Almeida JC, Merker AJ, Brauer Fde O, Rodrigues Tda C (2012) Physical activity level and exercise in patients with diabetes mellitus. Rev Assoc Med Bras 58: 215-221.
31. De Feo P, Schwarz P (2013) Is physical exercise a core therapeutical element for most patients with type 2 diabetes? Diabetes Care 36: S149-S154.
32. Loprinzi PD (2014) Accelerometer: Determined sedentary and physical activity estimates among older adults with diabetes: Considerations by demographic and comorbidity characteristics. J Aging Phys Act 22: 432-440.
33. Abramczyk A (2012) Results of specialized ambulatory diabetes care among diabetes patients at the level of primary health care in the light of nationwide research. Adv Clin Exp Med 21: 63-68.
34. Abramczyk A (2013) The family knowledge about the disease and complications risk among diabetic patients-in Poland. J Data Mining Genomics Proteomics 4: 142.
35. Abramczyk A (2013) Body mass, behaviours and social/health situation in diabetes patients at the level of primary medical healthcare: A Polish national study Kardiol Pol 71: 493-501.
36. Juszczyk S (2002) Statistics for educators. Adam Marszałek, Toruń, Poland pp: 210-224.
37. Franz MJ (2003) So many nutrition recommendations – Contradictory or compatibile? Diabetes Spectrum 16: 56-63.
38. Kodama S, Tanaka S, Heianza Y, Fujihara K, Horikawa C, et al. (2013) Association between physical activity and risk of all-cause mortality and cardiovascular disease in patients with diabetes. Diabetes Care 36: 471-479.
39. Duclos M, Dejager S, Postel-Vinay N, Di Nicola S, Quéré S, et al. (2015) Physical activity in patients with type 2 diabetes and hypertension - insights into motivations and barriers from the MOBILE study. Vascular Health and Risk Management 11: 361-371.

40. Nelson KM, Reiber G, Boyko EJ (2002) Diet and exercise among adults with type 2 diabetes. Findings from the Third National Health and Nutrition Examination Survey (NHANES III) Diabetes Care 25: 1722-1728.
41. Hui SS, Hui GP, Xie YJ (2014) Association between physical activity knowledge and levels of physical activity in Chinese adults with type 2 diabetes. PLoS One 10: e115098.
42. Stewart AL, Hays RD, Wells KB, Rogers WH, Spritzer KL, et al. (1994) Long-term functioning and well-being outcomes associated with physical activity and exercise in patients with chronic conditions in the medical outcomes study. J Clin Epidemiol 47: 719-730.
43. Baumann M, Tchicaya A, Lorentz N, Le Bihan E (2017) Life satisfaction and longitudinal changes in physical activity, diabetes and obesity among patients with cardiovascular diseases. BMC Public Health 17: 925.
44. Kawanishi CY, Greguol M (2013) Physical activity, quality of life, and functional autonomy of adults with spinal cord injuries. Adapt Phys Activ Q 30: 317-337.
45. Bungum TJ, Thompson-Robinson M, Moonie S, Lounsbery MAF (2011) Correlates of physical activity among hispanic adults. Journal of Physical Activity and Health 8: 429-435.
46. Parajuli J, Saleh F, Thapa N, Ali L (2014) Factors associated with nonadherence to diet and physical activity among nepalese type 2 diabetes patients: A cross sectional study. BMC Research Notes 7: 758.
47. Abramczyk A (2012) Pielęgniarstwo w systemie zarządzania opieką zdrowotną. Nowe wyzwania, nowe możliwości; Przedsiębiorczość i Zarządzanie; Olsztyn- Łódź: Poland, Społeczna Akademia Nauk XIII 11: 27-22.
48. http://forces4quality.org/af4q/download-document/3212/Resource-Case%20for%20Patient%20Experience_branded2.pdf
49. Bueno DR, Marucci MFN, Rosa CSDC, Fernandes RA, De Oliveira Duarte YA, et al. (2017) Objectively measured physical activity and healthcare expenditures related to arterial hypertension and diabetes mellitus in older adults: SABE study. J Aging Phys Act 25: 553-558.