ORIGINAL ARTICLE

ANALYSIS OF THE DECLARED NUTRITIONAL BEHAVIORS IN A GROUP OF DIABETOLOGY NURSES EDUCATING PATIENTS ABOUT DIABETES DIET THERAPY

Dominika Głąbska[1], Dariusz Włodarek[1]*

[1]Chair of Dietetics, Department of Dietetics, Faculty of Human Nutrition and Consumer Sciences, Warsaw University of Life Sciences-SGGW, Warsaw, Poland

ABSTRACT

Background. The proper nutrition in diabetes is one of the crucial elements of therapy, but in practice, diet of diabetic individuals is commonly improperly balanced, that is associated with lack of nutritional knowledge. The nurses are also often characterized by insufficient knowledge about diabetes diet therapy and poor nutritional behaviors.

Objective. The aim of the study was to analyze of the declared nutritional behaviors in a group of diabetology nurses and to compare it with declared nutritional behaviors of the control group.

Material and Methods. The group of 52 nurses recruited from all the regions of Poland working with diabetic patients was analysed and compared with control group of 63 individuals – random non-diabetic patients from all the regions of Poland. They were asked about accomplishing practical recommended nutritional goals for adults in Poland and were able to indicate if they follow detailed recommended nutritional goals "always" (3 points), "sometimes" (1 point) or "never" (0 points).

Results. The diabetology nurses rarely declared fish and legumes intake (never or sometimes accomplishing goal: 87%), milk and dairy products intake (75%), as well as moderate sugar and sweets intake (69%). Nurses significantly rarer than control group declared regularity of meals (p=0.0000) and diversion of meals (p=0.0000). The lack of correlation between number of years of working with diabetic individuals and number of obtained points during assessment of nutritional behaviors was observed.

Conclusions. The nutritional behaviors of diabetology nurses are not good, even if they educate diabetic patients on daily basis. Nutritional education should be conducted not only in groups of diabetic patients, but also, in groups of diabetology nurses.

Key words: *nutritional behaviors, diabetology nurses, diabetes, nutritional education*

STRESZCZENIE

Wprowadzenie. Prawidłowe żywienie jest w cukrzycy jednym z kluczowych elementów terapii, ale w praktyce, dieta osób z cukrzycą często jest nieprawidłowo zbilansowana, co wiąże się z brakiem wiedzy żywieniowej. Badania wskazują, że pielęgniarki również często mają niedostateczną wiedzę na temat zaleceń żywieniowych w cukrzycy i nieprawidłowe nawyki żywieniowe.

Cel. Celem badań była analiza deklarowanych zachowań żywieniowych w grupie pielęgniarek diabetologicznych i porównanie ich z deklarowanymi zachowaniami grupy kontrolnej.

Materiał i Metody. Grupa 52 pielęgniarek diabetologicznych, rekrutująca się ze wszystkich regionów Polski została poddana analizie i porównaniu z grupą kontrolną 63 osób (losowo dobranych osób nieleczonych z powodu cukrzycy, rekrutowanych ze wszystkich regionów Polski). Uczestnicy byli pytani o realizację praktycznych zaleceń żywieniowych kierowanych do osób dorosłych w Polsce i mogli wskazać częstość realizacji poszczególnych zaleceń jako „zawsze" (3 punkty), „czasami" (1 punkt) lub „nigdy" (0 punktów).

Wyniki. Pielęgniarki diabetologiczne rzadko deklarowały spożywanie ryb i roślin strączkowych (odpowiedzi „nigdy" lub „czasami" na pytanie o realizację zalecenia: 87%), mleka i produktów mlecznych (75%) oraz umiarkowane spożywanie cukru i słodyczy (69%). Pielęgniarki istotnie rzadziej niż grupa kontrolna deklarowały regularne spożywanie posiłków (p=0,0000) i ich urozmaicenie (p=0,0000). Nie obserwowano zależności między liczbą lat pracy z pacjentami diabetologicznymi i liczbą uzyskanych punktów przy ocenie zachowań żywieniowych.

*Corresponding author: Dominika Głąbska, Chair of Dietetics, Department of Dietetics, Faculty of Human Nutrition and Consumer Sciences, Warsaw University of Life Sciences-SGGW, Nowoursynowska Street 159c, 02-776 Warsaw, Poland, phone: +48 22 5937126, fax: +48 22 5937018, e-mail: dominika_glabska@sggw.pl

Wnioski. Zachowania żywieniowe pielęgniarek diabetologicznych nie są poprawne, nawet jeśli na co dzień zajmują się one edukacją pacjentów. Edukacja żywieniowa powinna być prowadzona nie tylko wśród pacjentów diabetologicznych, ale również wśród pracujących z nimi pielęgniarek.

Słowa kluczowe: *zachowania żywieniowe, pielęgniarki diabetologiczne, cukrzyca, edukacja żywieniowa*

INTRODUCTION

The proper nutrition in diabetes, as well as regular physical activity, is one of the crucial elements of therapy [7]. According to the Polish clinical recommendations of diabetes care [6], the proper nutrition is essential to prevent and cure chronic complications of diabetes, as well as to improve general well-being. However, the problem arises, as the diet in a groups of Polish diabetic individuals is observed to be not properly balanced, both in own research [30], and research of other authors [16, 27]. As a consequence, the body mass index commonly indicates the overweight and obesity in Polish diabetic individuals, even if they declare reducing sugar intake [12].

The described situation is observed not only in Poland, as generally in diabetic individuals, in research conducted worldwide, despite lower carbohydrate and sugar intake, than in control ones [3], poor glycemic control is noted [31]. Moreover, even if the diet of diabetic individuals may be assessed to be better, than in case of healthy individuals, it is not associated with higher level of compliance with recommendation and such diet is still not properly balanced [5]. Simultaneously, it is stated, that diabetic individuals are following diet being not only not properly adjusted to their diabetes, but also being highly atherogenic [25].

Such not properly balanced diet is associated with lack of knowledge of diabetic individuals – 30% of Polish diabetic individuals have no knowledge about the symptoms of diabetes and when asked about the purpose of a diabetic diet, only 52% indicates preventing early and late diabetes complications [10]. However, it is observed, that properly conducted education may be an effective way to increase knowledge of diabetic individuals [2].

Taking into account the need of properly conducted education of diabetic individuals, the high level of knowledge of educators seems to be essential. However, the research of *Ahmed* et al. [1] about diabetes knowledge (including dietetic issues), revealed the considerable gaps in the knowledge of health care professionals and the fact, that from all the analyzed groups, nurses had the lowest level of knowledge about the basic diabetes issues.

In general, low level of knowledge is associated with unfavorable nutritional behaviors [21]. Also in case of nurses, very often unfavorable nutritional behaviors are observed [4; 15; 34].

The aim of the study was to analyze of the declared nutritional behaviors in a group of diabetology nurses and to compare it with declared nutritional behaviors of the control group.

MATERIALS AND METHODS

The group of 52 nurses working with diabetic patients on daily basis, was analysed. The group of nurses was recruited from all the regions of Poland and represented both large clinical hospitals and smaller ones. They were characterized by diverse age and status. The nurses were asked if they educate patients and how long they work with diabetic individuals.

The control group were 63 individuals – random non-diabetic patients from all the regions of Poland, who were not previously educated due to research participation and wanted to verify their nutritional behaviors.

Both diabetic nurses group and control group were recruited during nutrition workshops conducted for participants from all the regions of Poland. The diabetic nurses group was recruited during nutrition workshops for diabetic nurses and the exclusion criterion was not working currently with diabetic individuals. The control group was recruited during nutrition workshops conducted for patients with various diseases and the exclusion criterion was diagnosed diabetes.

Individuals from both nurses group and control group were asked about accomplishing practical recommended nutritional goals for adults in Poland according to Committee of Human Nutrition Science of Polish Academy of Sciences, National Food And Nutrition Institute and Polish Society of Nutritional Sciences. The practical recommended nutritional goals for adults in Poland are presented in Table 1. Participants were able to indicate if they follow detailed recommended nutritional goal "always", "sometimes" or "never".

The study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving human subjects were approved by the Ethic Committee of the Regional Medical Chamber in Warsaw, Poland (No 4/08; 7.02.2008).

During further analysis, of accomplishing recommended nutritional goals each answer was quantify by calculating points. For declared following nutritional recommendation "always", the number of 3 points was attributed, for declared following nutritional recom-

Table 1. Practical recommended nutritional goals for adults in Poland according to the Committee of Human Nutrition Science of Polish Academy of Sciences, National Food and Nutrition Institute and Polish Society of Nutritional Sciences

1	Eat regularly at least 3 meals a day with breakfast as the first meal everyday
2	Consume diversified animal and plant products
3	Consume everyday cereal products as well as fruits and vegetables, while vegetables are eaten raw or cooked for a short period of time
4	Consume milk, cottage cheese or low-fat yoghurt/ kefir two or better three times a day
5	Consume meat and meat products in moderation two or three times a week, while lean meat is preferred and the other days fish and legumes are chosen
6	Limit the fat intake and during meals preparation replace animal fat with oils
7	Limit the salt intake, while one teaspoon of salt in meals with more other condiments is enough
8	Have moderate sugar and sweets intake with more fruits and vegetables instead of them
9	Be physically active

mendation "sometimes", the number of 1 point was attributed, while for declared following nutritional recommendation "never", no points were attributed, so the potential maximum number of points to obtain was 27.

The statistical analysis involved comparison of declared accomplishing recommended nutritional goals between group of nurses and control group, that was conducted using chi^2 test. The comparison of total number of obtained points was conducted for mentioned groups, using U *Mann-Whitney* test, as well as for subgroups of educating nurses working with diabetic individuals ≤5 years; (5-15 years> and (15-30 years>, using *Kruskal-Wallis* ANOVA. Also the analysis of correlation between number of years of working with diabetic individuals and total number of obtained points, was conducted using Spearman rank correlation coefficient. The analysis of distribution was verified using *Shapiro-Wilk* test. The level of significance p≤0.05 was accepted. The statistical analysis was carried out, using

the Statistica software version 8.0 (StatSoft Inc) and Statgraphics software version 5.1 (Statistical Graphics Inc).

RESULTS

Table 2 presents the comparison of frequency of accomplishing the recommended goals in groups of nurses (n=52) and control group (n=63). It was observed, that the differences between groups were observed in case of regularity of meals, diversion of meals and physical activity. The control group was characterized by higher declared regularity of meals and higher diversion of meals and at the same time by lower declared physical activity level.

The comparison of total number of obtained points conducted for groups revealed similar results. The median of number of obtained points for nurses (15.0, differing from 7.0 to 27.0) was significantly lower than for control group (19.0, differing from 8.0 to 25.0) (p=0,0187, U *Mann-Whitney* test).

The analysis of correlation of number of years of working with diabetic individuals with number of obtained points conducted for nurses revealed no significant correlation between number of years and obtained points (p=0,6142, *Spearman's* rank correlation).

Table 3 presents the comparison of number of obtained points in groups of nurses declaring educating patients about diet (n=45) characterized by various number of years of working with diabetic individuals – ≤5 years (n=17), (5-15 years> (n=14) and (15-30 years> (n=14). The lack of difference in the number of obtained points in groups of educating nurses was also observed (p=0,9205, *Kruskal-Wallis* ANOVA).

DISCUSSION

The diabetology nurses are the specific type of health care professionals, as they have all the time the

Table 2. Comparison of frequency of accomplishing the recommended goals in groups of nurses and control group

	Nurses [%] n= 52			Control group [%] n= 63			p-value*
	always	sometimes	never	always	sometimes	never	
Regularity of meals	50.0	42.3	7.7	88.9	9.5	1.6	0.0000
Diversion of meals	44.2	53.8	1.9	96.8	3.2	0	0.0000
Vegetables and fruits intake	40.4	57.7	1.9	58.7	39.7	1.6	0.1458
Milk and dairy products intake	25.0	65.4	9.6	28.6	54.0	17.4	0.3637
Fish and legumes intake	13.5	75.0	11.5	11.1	79.4	9.5	0.8563
Limitation of fat intake	71.2	26.9	1.9	50.8	46.0	3.2	0.0854
Limitation of salt intake	44.2	34.6	21.2	60.3	23.8	15.9	0.2249
Moderate sugar and sweets intake	30.8	61.5	7.7	30.2	52.4	17.4	0.2851
Physical activity	46.2	53.8	0.0	42.9	42.9	14.2	0.0164

* the comparison of frequency was conducted using *Chi^2* test

Table 3. Comparison of number of obtained points in groups characterized by various number of years of working with diabetic individuals (p=0.9205 for *Kruskal-Wallis* ANOVA)

Number of years of working with diabetic individuals	Mean ± SD	Median	Min – max
≤5 years	15.82 ± 5.28	15.00	8.00 – 25.00
(5-15 years>	15.79 ± 4.82	15.50	9.00 – 27.00
(15-30 years>	16.07 ± 4.89	17.5*	7.00 – 21.00

* nonparametric distribution

direct contact with patients and have a significant role, as the consultants and educators for patients and their families, having necessary knowledge and skills. As it was previously mentioned, in the research of *Ahmed* et al. [1], the nurses from all the analysed groups of health care professionals, were characterized by the lowest level of diabetes knowledge. However, the knowledge analysed was diverse in case of various issues [1]. The insufficient and diverse level of nutritional knowledge was observed by *Findlow & McDowell* [11] – the lowest level of knowledge was noted in case of meal plan (51%), as well as diet and nutrients (68%), while higher it was in case of food requirements (83%) and food exchange (89%). However, it must be stated, that nutritional knowledge in the mentioned analysis was quite high in comparison with other issues, as the majority of participating nurses were not able to indicate properly the symptoms of hypoglycemia or association between blood glucose level and glycosuria [11]. In the research of *Trepp* et al. [28], not only knowledge, but also comfort level in dealing with diabetes was analysed and compared in case of various types of health care professionals – it was concluded, that nurses have a high comfort level, which, however, did not correlate with their knowledge, that was lower than in case of other health care professionals. On the other hand, in the research of *van Zyl & Rheeder* [29], the knowledge associated with diet in diabetes, was higher in nurses (67% of points scored), than in other health care professionals (50%), however the general poor knowledge of both nurses and physicians was concluded.

The problem of knowledge of diabetic nurses is recognized for years, as in the 1983, the research of *Scheiderich* et al. [23] was published and the observation, that each third nurse scored below 70% correct was made, while nurses who scored below 60% consistently missed items requiring use of exchange lists of food products. The education of nurses and other health care professionals is constantly indicated as a top priority [11], as the role of continuing education is essential to support nurses' knowledge of complex clinical conditions, such as diabetes [32].

Not only nutritional knowledge, but also nutritional behaviors of nurses are poor. In the research of *Zapka*

et al. [34], it was observed, that the majority of nurses were overweight and obese and some of them were not actively involved in weight management behaviors, while their self-reported diet and physical activity behaviors were poor. The similar observations were made by *Malinauskiene* et al. [15], as majority of nurses in their research were overweight and obese, while about 47% declared their leisure physical activity less than weekly. Moreover, in the research of *Blake* et al. [4], not only majority of analysed nurses reported not following physical activity recommendations for general population, but also physically inactive ones were more likely to report poor general health, poor dietary practices and less sleep, accompanied by higher cigarette smoking and alcohol consumption than their active counterparts.

The similar observations of not following recommended nutritional goals in groups of nurses were made in the presented research. Moreover, the fact, that nurses are less often following the recommendations than random non-diabetic patients from adequate regions of Poland, indicates, that their compliance with recommendations is very poor. Especially in case of regularity of meals and diversion of meals, the recommendations following in a group of nurses was worse, than in control group. Simultaneously, the lowest frequency of accomplishing always the recommended nutritional goals was observed for nurses in case of fish and legumes intake, milk and dairy products intake, as well as moderate sugar and sweets intake.

The research of *Sahu & Day* [22] indicate, that problem with regularity of meals in case of nurses may be associated not only with lack of their will to follow recommendations, but also, in case of rotating shift nurses, with the type of their work, as it was noted that night-shift nurses are characterized by lower number of meals daily and higher number of snacks daily, that was accompanied by lower eating habit satisfaction, than in case of morning-shift nurses, afternoon-shift nurses and general duty nurses. The similar observations were made by *Zverev* [35], as in his research all irregular rotating-shift nurses were characterized by irregular eating pattern, while in case of nurses who did not perform night duties, it was observed for 41% of group. However, it must be stated, that in the same research, author indicate, that rotating shifts are not only reason of irregular meals consumption observed in case of nurses [35].

The diversion of meals, that in the presented research was also stated to differ significantly between nurses and control group, may be defined as choosing products from all groups of food products, so choosing *inter alia* fish and legumes, or milk and dairy products, with moderate sugar and sweets intake is necessary, that was concluded to be rarely followed. Also in other Polish studies, conducted in groups of nurses, the im-

properly balanced food rations were observed, that was accompanied by low intake of fish and dairy products, as well as high intake of sugar and sweets [19].

In the other studies, the higher fish intake was observed, as in the Nurses' Health Study (the United States of America cohort study) the median of fish intake was 1,5 serving per week [26] and mean daily intake of milk was one glass, while total calcium intake from milk and other products (without supplementation) was 730 mg [8]. However, for sucrose and other simple carbohydrates energy intake in case of the results of Nurses' Health Study, no such positive observations were made – the share of energy in diet from sucrose varied from 10 to 13%, while additionally assessed fructose energy intake varied from 4 to 9% in subgroups, so simple carbohydrates energy intake was often higher than 20% [24].

Mentioned nutritional problems are not only diagnosed in groups of nurses. In the research of *Blake* et al. [4] it was observed, that over three-quarters did not consume five servings of fruit and vegetables per day, while two-thirds reported exceeding the recommended maximum daily alcohol intake. However, it was also not confirmed by results of Nurses' Health Study and Health Professionals' Follow-up Study combined, as the median intake of total fruits and vegetables was 5.3 servings per day in mentioned studies [13].

In the analysed group of nurses declared physical activity was more regular, than in case of control group, so the observations are more positive, than in previously mentioned research of *Blake* et al. [4], *Malinauskiene* et al. [15] and *Zapka* et al. [34]. However, even more important are the conclusions from the systematic review about physicians' and nurses' personal physical activity habits, as it was stated, that the majority of studies found that a higher personal physical activity level was associated with higher physical activity-promoting practices, and that health professionals with positive attitudes towards physical activity were more likely to promote physical activity to their patients [9].

The problem arises, as educating nurses are presenting recommendations, that they are not following themselves. If following recommendations in case of patients is more frequent, than in case of nurses, it may negatively affect patients' perception of nurses credibility, as it was observed in case of overweight or obese physicians [20]. In the Polish clinical recommendations of diabetes care, it is stated that all diabetic patients should be educated about recommended nutrition, by the entitled individuals (physician, dietician, diabetology nurse, diabetology educator) [6]. Taking it into account, it is essential not only to educate patients, but also to educate them in the way reliable for them, so good nutritional behaviors of nurses observed by patients may be not only beneficial for nurses, but also for their patients.

The lack of association between number of years of working with diabetic individuals and obtained points was in agreement with results of other studies, as Findlow & McDowell [11] concluded, that neither grade nor perceived professional experience was associated with results of diabetes basic knowledge test. On the other hand, the different observations are made in case of practical skills, that are learnt during professional work, as the results of *Yamauchi* [33] indicate, that the group of nurses with more clinical practice experience had more knowledge of physical assessment skills. Also the results of the research of *Ndosi & Newell* [17] indicate a significant correlation between experience and pharmacology knowledge, however, authors stated, that this should be interpreted with caution, as nurses with less experience were underrepresented and also significant correlation with qualifications of nurses may had interfered.

The research conducted in Polish population indicate, that individuals with diabetes, in comparison with patients with other diseases, have lower tendency to make early changes in diet and are the least convinced to early weight reduction [18]. However, the results of the studies carried out proved the efficiency and profitable influence of dietary education on changes of the nutritional habits of respondents [27]. As a consequence, it may be stated, that each intervention, conducted in groups of diabetic individuals is needed, not only if education is addressed to patients, but also, if it addressed to nurses, as their better knowledge as well as understanding of the role of proper nutritional behaviors is needed. Even if educational program do not cause the direct changes of glycemic parameters, it may significantly improve wellbeing of patients [14], that is also important.

CONCLUSIONS

1. The nutritional behaviors of diabetology nurses are not good, even if they educate diabetic patients on daily basis, as they rarely declare fish and legumes intake, milk and dairy products intake, as well as moderate sugar and sweets intake.
2. The nutritional behaviors of diabetology nurses are worse than behaviors of non-diabetic individuals, as they significantly rarer declare regularity of meals and diversion of meals.
3. The professional experience of nurses is not associated with their declared nutritional behaviors.
4. Nutritional educations should be conducted not only in groups of diabetic patients, but also, in groups of diabetology nurses.

Conflict of interest

The authors declare non conflict of interest.

REFERENCES

1. *Ahmed A., Jabbar A., Zuberi L., Islam M., Shamim K.*: Diabetes related knowledge among residents and nurses: a multicenter study in Karachi, Pakistan. BMC Endocr Disord 2012;12:18, DOI: 10.1186/1472-6823-12-18.

2. *Alves Pereira D., da Silva Campos Costa N.M., Lima Sousa A.L., Veiga Jardim P.C.B., de Oliveira Zanini C.R.*: The effect of educational intervention on the disease knowledge of diabetes mellitus patients. Rev Lat Am Enfermagem 2012;20(3):478-485.

3. *Bardenheier B.H., Cogswell M.E., Gregg E.W., Williams D.E., Zhang Z., Geiss L.S.*: Does knowing one's elevated glycemic status make a difference in macronutrient intake? Diabetes Care 2014;37(12):3143-3149.

4. *Blake H., Malik S., Mo P.K., Pisano C.*: 'Do as say, but not as I do': are next generation nurses role models for health? Perspect Public Health 2011;131(5):231-239.

5. *Castetbon K., Bonaldi C., Deschamps V., Vernay M., Malon A., Salanave B., Druet C.*: Diet in 45- to 74-year-old individuals with diagnosed diabetes: comparison to counterparts without diabetes in a nationally representative survey (Etude Nationale Nutrition Santé 2006-2007). J Acad Nutr Diet 2014;114(6):918-925.

6. *Czech A., Cypryk K., Czupryniak L., Gajewska D., Grzeszczak W., Gumprecht J, Idzior-Waluś B., Jarosz--Chobot P., Kalarus Z., Karnafel W., Kokoszka A., Koblik T., Korzon-Burakowska A., Kowalska I., Loba J., Majkowska L., Małecki M., Mamcarz A., Mirkiewicz--Sieradzka B., Młynarski W., Noczyńska A., Raczyńska K., Sieradzki J., Słowik A., Solnica B., Stankiewicz A., Strojek K., Szadkowska A., Szelachowska M., Wender--Ożegowska E., Wierusz-Wysocka B., Zozulińska-Ziół-kiewicz D.*: Zalecenie kliniczne dotyczące postępowania u chorych na cukrzycę 2015. [Clinical recommendations for diabetic individuals 2015]. Diab Klin 2015;4(suppl A):1-73 (in Polish).

7. *Evert A.B., Boucher J.L., Cypress M., Dunbar S.A., Franz M.J., Mayer-Davis E.J., Neumiller J.J., Nwankwo R., Verdi C.L., Urbanski P., Yancy W.S. Jr.*: Nutrition therapy recommendations for the management of adults with diabetes. Diabetes Care 2014;37(suppl 1):120-143.

8. *Feskanich D., Willett W.C., Colditz G.A.*: Calcium, vitamin D, milk consumption, and hip fractures: a prospective study among postmenopausal women. Am J Clin Nutr 2003;77(2):504-511.

9. *Fie S., Norman I.J., While A.E.*: The relationship between physicians' and nurses' personal physical activity habits and their health-promotion practice: A systematic review. *Health Edu J* 2013;72(1):102-119.

10. *Filip R., Lewandowska A., Szczepankiewicz M., Majda B.*: State of patients' knowledge about treatment and proceedings in type 2 diabetes. Ann Agric Environ Med 2014;21(2):359-363.

11. *Findlow L.A., McDowell J.R.S.*: Determining registered nurses'knowledge of diabetes mellitus. J Diabetes Nurs 2002;6(6):170-175.

12. *Gajda K., Sulich A., Hamułka J., Białkowska A.*: Comparing diabetic with non-diabetic overweight subjects through assessing dietary intakes and key parameters of blood biochemistry and haematology. Rocz Panstw Zakl Hig 2014;65(2):133-138.

13. *Hung H.C., Joshipura K.J., Jiang R., Hu F.B., Hunter D., Smith-Warner S.A., Colditz G.A., Rosner B., Spiegelman D., Willett W.C.*: Fruit and vegetable intake and risk of major chronic disease. J Natl Cancer Inst 2004;96(21):1577-1584.

14. *Krok-Schoen J.L., Shim R., Nagel R., Lehman J., Myers M., Lucey C., Post D.M.*: Outcomes of a Health Coaching Intervention for Older Adults With Uncontrolled Type 2 Diabetes. Gerontol Geriatr Educ 2015; DOI: 10.1080/02701960.2015.1018514

15. *Malinauskiene V., Leisyte P., Romualdas M., Kirtiklyte K.*: Associations between self-rated health and psychosocial conditions, lifestyle factors and health resources among hospital nurses in Lithuania. J Adv Nurs 2011;67(11): 2383-2393.

16. *Medrela-Kuder E.*: Prawidłowa dieta w cukrzycy typu II jako forma rehabilitacji chorych. [Proper diet in type 2 diabetes as a means of patients' rehabilitation]. Rocz Panstw Zakl Hig 2011;62(2):219-223 (in Polish).

17. *Ndosi M.E., Newell R.*: Nurses' knowledge of pharmacology behind drugs they commonly administer. J Clin Nurs 2009;18(4):570-580.

18. *Olszanecka-Glinianowicz M., Chudek J.*: The level of health education in the Polish population. Ann Agric Environ Med 2013;20(3):559-565.

19. *Przeor M., Goluch-Koniuszy Z.*: Ocena stanu odżywienia oraz sposobu żywienia pielęgniarek będących w okresie około menopauzalnym pracujących w systemie zmianowym. Probl Hig Epidemiol 2013;94(4):797-801.

20. *Puhl R.M., Gold J.A., Luedicke J., DePierre J.A.*: The effect of physicians' body weight on patient attitudes: implications for physician selection, trust and adherence to medical advice. Int J Obes (Lond) 2013;37(11):1415-1421.

21. *Rustad C., Smith C.*: Nutrition knowledge and associated behavior changes in a holistic, short-term nutrition education intervention with low-income women. J Nutr Educ Behav 2013;45(6):490-498

22. *Sahu S., Dey M.*: Changes in food intake pattern of nurses working in rapidly rotating shift. AJMS 2011;4(1):14-22.

23. *Scheiderich S.D., FreiBaum C.N., Peterson L.M.*: Registered Nurses' Knowledge About Diabetes Mellitus. Diabetes Care 1983;6(1):157-161.

24. *Schulze M.B., Manson J.E., Ludwig D.S., Colditz G.A., Stampfer M.J., Willett W.C., Hu F.B.*: Sugar-sweetened beverages, weight gain, and incidence of type 2 diabetes in young and middle-aged women. JAMA 2004;25,292(8):927-934.

25. *Soedamah-Muthu S.S., Chaturvedi N., Fuller J.H., Toeller M.*: Do European people with type 1 diabetes consume a high atherogenic diet? 7-year follow-up of

the EURODIAB Prospective Complications Study. Eur J Nutr 2013;52(7):1701-1710.

26. *Sun Q., Ma J., Campos H., Rexrode K.M., Albert C.M., Mozaffarian D., Hu F.B.*: Blood concentrations of individual long-chain n-3 fatty acids and risk of nonfatal myocardial infarction. Am J Clin Nutr 2008;88(1):216-223.

27. *Szczepańska E., Klocek M., Kardas M., Dul L.*: Change of the nutritional habits and anthropometric measurements of type 2 diabetic patients – advantages of the nutritional education carried out. Adv Clin Exp Med 2014; 23(4):589-598.

28. *Trepp R., Wille T., Wieland T., Reinhart W.H.*: Diabetes--related knowledge among medical and nursing house staff. Swiss Med Wkly 2010;140(25-26):370-375.

29. *Van Zyl D.G., Rheeder P.*: Survey on knowledge and attitudes regarding diabetic inpatient management by medical and nursing staff at Kalafong Hospital. JEMDSA 2008;13(3):90-97.

30. *Włodarek D., Głąbska D.*: Zwyczaje żywieniowe osób chorych na cukrzycę typu 2. [The dietary habits of people with type 2 diabetes]. Diabetol Prakt 2010;11(1):17-23 (in Polish).

31. *Xu J., Eilat-Adar S., Loria C.M., Howard B.V., Fabsitz R.R., Begum M., Zephier E.M., Lee E.T.*: Macronutrient intake and glycemic control in a population-based sample of American Indians with diabetes: the Strong Heart Study. Am J Clin Nutr 2007;86(2):480-487.

32. *Yacoub M.I., Demeh W.M., Darawad M.W., Barr J.L., Saleh A.M., Saleh M.Y.*: An assessment of diabetes-related knowledge among registered nurses working in hospitals in Jordan. Int Nurs Rev 2014;61(2):255-262.

33. *Yamauchi T.*: Correlation between work experiences and physical assessment in Japan. Nurs Health Sci 2001;3(4):213-224.

34. *Zapka J.M., Lemon S.C., Magner R.P., Hale J.*: Lifestyle behaviours and weight among hospital-based nurses. J Nurs Manag 2009;17(7):853-860.

35. *Zverev Y.P.*: The impact of rotating shift work on eating patterns and self-reported health of nurses in Malawi. Malawi Med J 2005;16(2):37-39.