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*Comparison of the metabolic control level and knowledge
of the current guidelines of Polish Diabetes Association (PDA)
in diabetic outpatients*

Management of *diabetes mellitus* is difficult for both the patient and the clinician. Different conceptions of the term "control" affect the ability of patients and physicians to communicate effectively. In practice they almost always focused entirely on managing blood glucose control (1).

Improving clinical outcomes in diabetes require patients to undertake and sustain a complex array of self-care behaviors, including taking medications, monitoring blood glucose levels, a diet, foot care, etc. Good self-management is a critical pathway to success. How best to evaluate and support patients' diabetes self-management is a critically important question (2). Knowledge of one's actual and target health outcomes is hypothesized to be a prerequisite for effective patient involvement in managing chronic diseases such as diabetes (3). Organizations such as the American Diabetes Association (ADA) and Polish Diabetes Association (PDA) have launched campaigns urging diabetic patients to be aware of their target and actual goals of treatment and to be proactive in discussing these with their doctors (3).

The current PDA recommendations relating to the good metabolic control of diabetes are: self-controlled fasting blood glucose (FBG) 70–90 mg/dl and post-prandial blood glucose (PPBG) < 135 mg/dl, glycohemoglobin A_{1C} (HbA_{1C}) ≤ 6.1%, total cholesterol level (TChol) ≤ 175 mg/dl (4).

The aim of the study was to evaluate whether the knowledge of PDA guidelines in diabetic outpatients influences their level of metabolic control.

MATERIAL AND METHODS

The studied group consisted of 104 diabetic outpatients, 62 female and 42 male aged 21–82 (mean 54.6 ± 13.3). There were 78 patients with type 2 and 26 patients with type 1 diabetes. The mean duration of diabetes was 10.4 ± 7.6 y (range 1–32 y). Among the patients 24 subjects had primary or vocational education whereas 80 subjects had secondary (54) or higher (26) education. Forty-four patients (25 F; 19 M) underwent insulinotherapy alone while 60 subjects (37 F; 23 M) were treated with oral hypoglycemic agents.

The short-term carbohydrate control was assessed by self-controlled fasting blood glucose and postprandial blood glucose (PPBG). HbA_{1C} was measured with immunoprecipitation method in DCA 2000 analyzer and total cholesterol levels were measured with commercial automated chemiluminescence immunoassay (ICL) on the ADVIA Centaur analyzer (Bayer Diagnostics).

The level of the metabolic control for the whole group of patients and separately for men and women has been evaluated. Simultaneously, the percentage of patients which obtained the PDA recommended values of the studied parameters has been assessed.

The patients' knowledge was estimated by standard anamnesis. The questionnaire was related to the knowledge of the aimed PDA recommended values of the studied parameters. In analysis of the questionnaire results, the percentage of the correct answers regarding the whole group of patients as well as women and men subgroups have been taken into account.

RESULTS

Results are presented in Tables 1–3. The mean FBG values obtained in the whole studied group as well as in women and men subgroups considerably exceeded the PDA recommended FBG level. This parameter has been characterized by the lowest level of accomplishment because only 20% of patients practically achieved FBG values in accordance with PDA recommendations, however the knowledge of this goal has been declared by nearly 50% of patients.

Table 1. The achieved levels of measured parameters in studied groups of patients (X±SD)

Parameter	Whole group	Men	Women
HbA1C(%)	7.3±1.6	7.3±1.8	7.3±1.5
range	4.7–12.8	4.7–12.8	5.3–11.6
FBG (mg/dl)	123.3±37.6	125.2±37.5	122.1±37.9
range	70.0–276.0	79.7–206.7	70.0–276.0
PPBG (mg/dl)	146.3±34.6	147.1±36.0	145.8±33.9
range	78.0–258.7	90.0–258.7	78.0–250.5
TCchol (mg/dl)	193.2±37.0	191.0±32.6	194.0±30.4
range	107.0–276.0	107.0–251.0	126.0–276.0

Table 2. The percentage of HbA1c levels in whole group and in men and women subpopulations

Group	HbA1C≤6.1%	HbA1C 6.2–7.0%	HbA1C >7.0
Whole group (%)	21.5	32.3	46.2
Men (%)	21.1	34.2	44.7
Women (%)	21.8	30.9	47.3

Table 3. The percentage comparison of patients achieving PDA recommended levels of measured parameters with subjects which gave correct answers

Parameter	Whole studied group		Men		Women	
	% of pts' achieving recommended levels	% of pts' correct answers	% of pts' achieving recommended levels	% of pts' correct answers	% of pts' achieving recommended levels	% of pts' correct answers
HbA1C	21.5	78.8	21.1	76.2	21.8	80.6
FBG	19.2	47.0	21.4	43.0	17.7	59.0
PPBG	43.3	45.2	45.2	42.8	42.0	66.8
TCchol	35.8	21.0	32.0	26.2	38.0	17.7

In all the studied groups of patients, the mean PPBG value was higher than that PDA recommended. Practically, it was achieved by nearly half of patients who also declared the knowledge of the normal PPBG value.

The aimed normal HbA1c values were known for nearly 80% of the studied patients. The mean HbA1C level for the whole group considerably exceeded the PDA recommended value and did not

substantially differ in women and men. The HbA1C level below 6.1% has been reached by nearly 21% of all the patients, however more than 50% reached the HbA1C values below 7%.

The PDA recommended blood cholesterol value was known by the lowest number of subjects. The correct answer has been given by every fifth patient and its mean values practically obtained were higher than those recommended for all the groups. In spite of inconsiderable knowledge relating to this parameter, in nearly more than 1/3 of the patients total cholesterol level below 175 mg/dl has been ascertained.

In the whole studied group, rather considerable disproportion between the declared patient knowledge of the metabolic control criteria of diabetes and the unused accomplishment of it has been found. First of all, these differences concerned the control of the short-term goals of carbohydrates (mainly FBG) and lipid disorders. High percentage of subjects knowing the aimed HbA1C value was practically connected with the achievement of this therapeutic goal by more than a half of all the patients.

DISCUSSION

Successful management of diabetes requires close teamwork and effective collaboration between patients and their health care providers. There is growing evidence that people with defined health goals were more likely to perform self-management activities and have more effective self-care behaviors (2, 3, 5, 6).

Patients who have completed chronic disease self-management training programs have improved self-efficacy and physical functioning. Chronic illness care self-efficacy is positively associated with health outcomes. It is also unclear whether knowing levels of parameters of metabolic control is indeed associated with better patient self-management, self-efficacy, or other positive health outcomes of diabetes. Accordingly, in recent years there has been an increased focus on encouraging patients to be aware of and discuss these values with their clinicians (2, 6, 7, 9).

A lot of intervention focused on education and counseling was taken to improve metabolic control in ambulatory care of adults diagnosed with *diabetes mellitus* (2, 3, 6–11). Despite the demonstrated benefits of accurate glucose and lipid control in type 1 and type 2 diabetes, their results suggest that treatment targets are not being met in a large proportion of diabetic patients (6, 7, 10).

The results of our studies confirm the existence of considerable divergences between the patient's knowledge regarding therapeutic goals and the practically achieved level of metabolic equalization in diabetes. The mean values of all estimated metabolic parameters of our patients were higher than those recommended by PDA. The percentage of subjects attaining the PDA recommended values with regard to the number of patients who gave the correct answer remained in a different manner for every single parameter. The positive influence of the PDA recommended knowledge of the parameter values in relation to HbA1C and PPBG have been observed while not regarding FBG and TChol. These data meet with approval in literature where some investigators emphasize the positive impact of self-control and the knowledge of therapeutic aims on the quality of diabetes control (2, 3, 8, 9, 11) but the others do not observe it (6, 7, 10).

Heisler et al. (3) and Skeie et al. (10) reported significantly better diabetes care understanding and assessment of their biomedical level of glycemic control in respondents who knew their HbA1C values than those who did not. These findings support the importance of providers actively discussing HbA1C test results with patients and ensuring that patients understand the meaning of their HbA1C level. Knowledge of HbA1C alone, however, was not associated with better diabetes care self-efficacy and self-management behaviors. As with other areas of diabetes knowledge, knowledge of HbA1C value appears to be useful but not sufficient for translating increased understanding of diabetes care into the increased confidence and motivation necessary to improve patients' diabetes self-

management. Strategies to provide information must be combined with other behavioral strategies to motivate and help patients effectively manage their diabetes (3, 5, 10).

A growing number of studies suggest that addressing patients' own perceptions of barriers to self-care and tapping into patients' values, motivations, and goals are more effective in improving metabolic control than seeking exclusively to increase knowledge about diabetes care (6, 7, 9, 10).

Greater patient knowledge alone does not correlate with improved glycemic control, and simply providing information more clearly is not enough to motivate patients. To enhance patients' diabetes care self-efficacy and self-management, providers need to promote patients' capacity to define the problems they are facing, make informed decisions about their diabetes management, and set realistic goals and strategies to meet those goals. Less is known, however, about the specific skills, knowledge, beliefs, and motivations that patients need to most effectively participate in their chronic disease management (5, 6, 7, 9).

The authors contend that the knowledge of the therapeutic goals does not always match the obtainment of good metabolic diabetic control whereas the therapeutic education, though extremely important, is not the sole factor conditioning its acquisition. Strategies to provide information to patients must be combined with other behavioral activity to motivate and help patients effectively manage their diabetes. In spite of the improved patients' knowledge as to the therapeutic goals defined by PTD, the percentage of patients who reached all of them is still too low even in diabetic outpatients' practice.

CONCLUSION

The dependence of the metabolic control improvement in diabetic outpatients on their good knowledge as to the therapeutic goals defined by PDA has not been found.

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SUMMARY

The education goal of patients with diabetes is improvement of their individual self-efficiency and self-management ability. The current PDA recommendations relating to the good metabolic control of diabetes are self-controlled: fasting blood glucose (FBG) 70–90 mg/dl and postprandial blood glucose (PPBG) \leq 135 mg/dl; HbA1C \leq 6.1% and total cholesterol (TChol) \leq 175 mg/dl. Objective: Does the knowledge of PDA guidelines in diabetic outpatients influence their level of metabolic control? Material and Methods: 104 (62 F; 42 M) subjects aged 21–82 (mean 54.6 \pm 13.3). Type 1 diabetes was found in 26 pts and type 2 diabetes – in 78 pts. The mean disease duration was 10.4 \pm 7.6y. The metabolic control was assessed by FBG, PPBG, HbA1C and TChol. The patient's knowledge was estimated by standard anamnesis. Results: The mean FBG for the whole group was 123.3 \pm 37.6 mg/dl. The recommended range reached only 19.2% pts (F 17.7%; M 21.4%). The knowledge of recommended FBG level has been declared by 47% (F 59%; M 43%) of pts. The mean PPBG was 146.3 \pm 34.6 mg/dl. The PPBG value \leq 135 mg/dl reached 43.3% subjects (F 42%; M 45.2%). The correct PPBG upper limit had been defined by 45.2% (F 66.8%; M 42.8%). The mean HbA1C for whole group was 7.29 \pm 1.6%. HbA1C \leq 6.1% was achieved by 21.5% (F 21.8%; M 21.1%). The recommended HbA1C value was known by 78.8% of pts (F 80.6%; M 76.2%). The mean TChol for the whole group was 193.2 \pm 37 mg/dl. TChol \leq 175 mg/dl has been reached by 35.8% (F 38%; M 32%). The correct TChol upper limit has been defined by 21% of subjects (F 17.7%; M 26.2%). Conclusion: The dependence of the metabolic control improvement in diabetic outpatients on their good knowledge as to the therapeutic goals defined by PDA has not been found.

Porównanie poziomu wyrównania metabolicznego oraz znajomości zaleceń PTD dotyczących kontroli cukrzycy wśród chorych poradni specjalistycznej

Celem edukacji terapeutycznej osób z cukrzycą jest zdobycie umiejętności i samodzielności w prowadzeniu leczenia i samokontroli. Zalecenia dotyczące dobrej kontroli metabolicznej wg PTD 2006 obejmują: samodzielnie oznaczaną glikemię na czczo (FBG) 70–90 mg/dl; glikemię poposiłkowa (PPBG) $<$ 135 mg/dl; HbA1C \leq 6,1%, całkowity cholesterol (TChol) \leq 175 mg/dl. Celem pracy było ustalenie, czy znajomość celów terapeutycznych PTD wśród chorych poradni diabetologicznej wpływa na poziom wyrównania metabolicznego cukrzycy. Zbadano 104 (62K; 42M) osoby w wieku 21–82, średnia 54,6 \pm 13,3 lat. U 78 chorych rozpoznano cukrzycę typu 2, u 26 – cukrzycę typu 1. Średni czas trwania choroby: 10,4 \pm 7,6 lat. Ocena metaboliczna obejmowała samodzielnie oznaczane FBG i PPBG oraz HbA1C i TChol. Wiedzę chorego oceniano na podstawie ankiety. Średnia FBG dla całej grupy wynosiła 123,3 \pm 37,6 (K122,1 \pm 37,9; M125,2 \pm 37,5) mg/dl. Wartości między 70 a 90 mg/dl uzyskało jedynie 19,2% (K 17,7%; M 21,4%) chorych. Zalecany przez PTD poziom FBG

znało 47% badanych (59% K i 43% M). Średnia PPBG dla całej grupy wynosiła $146,3 \pm 34,6$ (K $145,8 \pm 33,9$; M $147,1 \pm 36$) mg/dl. Wartość PPBG < 135 mg/dl osiągało 43,3% badanych (K 42%; M 45,2%). Górną granicę PPBG prawidłowo określiło 45,2% (K 66,8% i M 42,8%). Średnia HbA1C dla całej grupy wynosiła $7,29 \pm 1,6\%$ (K $7,15 \pm 1,8$; M $7,31 \pm 1,8$). HbA1c $\leq 6,1\%$ osiągało 21,5% badanych (K 21,8%; M-21,1%). Zalecaną przez PTD wartość HbA1C znało 78,8% respondentów (K 80,6%; M 76,2%). Średnia TChol dla całej badanej grupy wynosiła $193,2 \pm 37,3$ mg/dl (K $194,6 \pm 40,4$; M $191,0 \pm 32,6$). Poziom Tchol < 175 mg/dl uzyskało 35,8% badanych (K 38% i M 32%). Górną granicę TChol prawidłowo określiło 21% badanych (K 17,7%; M 26,2%). Nie stwierdzono wpływu znajomości celów terapeutycznych PTD na poziom wyrównania metabolicznego cukrzycy.