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ORIGINAL ARTICLE

Patient versus general practitioner perception of problems with treatment adherence in type 2 diabetes: From adherence to concordance

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Abstract

Objectives: To determine the prevalence of problems with treatment adherence among type-2 diabetic patients with regards to medication, dietary advice, and physical activity; to identify the associated clinical and psychosocial factors; and to investigate the degree of agreement between patient-perceived and GP-perceived adherence. *Methods*: Consecutive patients were solicited during visits to 39 GPs. In total, 521 patients self-reported on treatment adherence, anxiety and depression, and disease perception. The GPs reported clinical and laboratory data and patients' adherence. A multivariate analysis identified the factors associated with adherence problems. *Results*: Problems of adherence to medication, dietary advice, and physical activity recommendations were reported by 17%, 62%, and 47% of the patients, respectively. Six independent factors were found associated with adherence problems: young age, body-mass index (BMI) > 30 kg/m^2, glycosylated haemoglobin (HbA$_{1c}$) > 8%, single life, depression, and perception of medication as a constraint. Agreement between patients' and GPs' assessments of treatment problems reached 70%. *Conclusion:* In type 2 diabetes, problems with dietary advice or physical activity are far more frequent than problems with medication, and not all physicians are fully aware of patients' problems. More active listening and shared decision-making should enhance adherence and improve outcomes.

Key words: *Type 2 diabetes mellitus, patient non-adherence, doctor–patient relationship, primary healthcare, concordance*

Introduction

Increasing treatment adherence is considered a major challenge for medical intervention in order to alleviate the burden of diabetes [1,2]. However, such interventions have not succeeded in reducing diabetes-related morbidity or mortality [3], even though strategies targeting lifestyle changes have been shown to be efficient and cost-effective in primary and secondary prevention in patients with impaired glucose tolerance and type 2 diabetes [4,5]. General practitioners should be fully convinced their role is important in reducing the incidence of type 2 diabetes, by targeting specific interventions towards patients with impaired glucose tolerance [6]. The success of such interventions depends on treatment adherence [1,2].

The World Health Organization (WHO) has defined adherence as "the extent to which a person's behaviour-taking medication, following a diet, and/ or executing lifestyle changes, corresponds with

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agreed recommendations from a health care provider" [1]. In a "patient centred approach", a "concordance model" was designed to improve the involvement of both patient and healthcare professional in reaching "an agreement that respects the beliefs and wishes of the patient" [7]. In Europe, three treatment components are variably associated according to different countries: medication, physical activity, and dietary advice [8]. This calls for monitoring of three areas of patient adherence.

In recent decades, the first studies on medication adherence have been enabled by the developments of electronic monitoring technologies [2]. These studies reported that the prevalence of problems with medication adherence ranged from 15% to 33%—as derived from adherence rates ranging from 67% to 85% [9]. According to very few studies, the prevalence of poor adherence to physical activity ranged from 48% to 74% and that of poor adherence to dietary advice ranged from 30% to 63% [1]. Given the significant differences between expected and observed adherence, a number of psychosocial factors such as depression, negative self-image, and lack of social support call for greater attention [1,10].

In the field of impaired glucose tolerance, general practitioners (GPs) have shown good knowledge of the clinical entity but little awareness of its clinical significance and were uncertain about patient management and follow-up [6]. On the other hand, GPs' knowledge of adherence to the various components of treatment seems to be limited, and, to our knowledge, there are as yet no reports on the agreement between GPs' and patients' assessments of adherence to the components of the treatment.

We thus conducted a cross-sectional study to measure the prevalence of adherence problems, to identify the associated medical and psychosocial factors, and to measure patient–GP agreement on adherence. This aimed to help participant GPs gain awareness and develop skills in their communication styles with their diabetic patients and emphasize the importance of adherence to all components of diabetes treatment, especially lifestyle advice.

Patients and methods

Participant GPs and patients

The study was proposed to 336 GPs from a network of internship directors and general practice professors from the Departments of General Practice at the universities of Lyon and Grenoble (France). Of these, 74 GPs attended the information meetings and agreed to participate and recruit at least five consecutive type-2 diabetic patients. Later, 26 GPs gave up and nine failed to recruit adequately. This left 39 participant

GPs: 30 men and nine women, aged 40 to 55 years (mean age 49 years), with 11 to 30 years' experience in general practice (mean 21 years). Among participant GPs, 26 were practising in an urban setting.

Patient inclusion criteria were: age under 80 years, a previous follow-up duration of at least 1 year, and informed consent given after oral and written information. The exclusion criteria were chronic pancreatitis, inability to understand or respond to self-administered questionnaires, and refusal to participate. Between 15 February and 15 July 2003, 589 patients were invited to participate, of whom only two refused and 66 did not return their questionnaires. This led to an 89% response rate, i.e., 521 patients aged 34 to 80 years (median 67, mean 65 years).

Questionnaires and outcome measures

The main outcome measure was patient and GP self-perception of problems with adherence to each component of type 2 diabetes treatment. The questionnaires stemmed from previous focus groups conducted during the "Eurobstacles Study" [11]; the final versions were set after a pilot study conducted in November 2002.

The self-administered GP questionnaire included medical information on the patient's diabetes, prescribed drugs, results of biological monitoring, and the question "Do you think your patient experiences problems with adherence to at least one of the following: medication, physical activity, or dietary advice?" with two response alternatives: yes or no.

The self-administered patient questionnaire collected seven personal, clinical, lifestyle, psychosocial, and adherence variables. The questionnaire investigated perceived adherence problems through the following questions: "Do you experience problems taking your medication? Following physical activity advice? Following dietary advice?" The response choices to each question were: "frequently" (several times per week), "occasionally" (several times per month), or "never". Three categories were derived from the latter answers: "no problem" in case of three "never" answers, "moderate problems" in case of at least one "occasionally" answer and no "frequently" answer, and "severe problems" in case of at least one "frequently" answer. Later, to compare patient and GP perceptions, the categories moderate and severe were combined under a single label, "problems with adherence" (versus "no problem with adherence").

The Hospital Anxiety and Depression (HAD) scale was used to investigate the presence of anxiety and depression [12]. Other questions focused on diabetes perceived as a disease, as serious, as an injustice, as inherited, on medication perceived as a constraint, on perceived benefits of taking action,

and on experiencing diabetes-related stress or feeling diabetes-related guilt. Additional qualitative questions were about self-esteem, support from family members, trust in the GP, forgetting or changing medication regimens, and need for more information about the disease.

All the questionnaires were previously coded to ensure anonymization and patient–GP pairing. After separate completions, GPs' and patients' questionnaires were separately sent to the coordinating centre, where they were paired and the data double-entered into a computer and analysed using SAS software version 8.2 (SAS Institute Inc., Cary, NC, USA). Data acquisition and processing were reported to the French Commission Nationale de l'Informatique et des Libertés and approved by the relevant authorities.

Statistical analysis

Differences between responder and non-responder characteristics were first explored through comparisons using Student's *t* tests or Wilcoxon tests for continuous variables and chi-square tests for categorical variables.

A multivariate logistic regression analysis was carried out to identify the independent factors related to adherence problems (as binary outcome "no problem with adherence" and "problems with adherence"). The variables included in the model were: age, sex, and those variables found significant in the previous univariate analysis (significance level of $p < 0.20$). Unadjusted estimates of the risk factors were expressed as odds ratios (OR) with 95% confidence intervals (CI). The Hosmer-Lemeshow goodness-of-fit test was used to compare various models and to choose the one most fitted to the data. Area under the receiver operating characteristic (ROC) curve was used to show the discriminatory ability of the model.

Kohen's kappa [13] and Landis and Koch's table [14] were used for calculation and interpretation of agreement between GPs' and patients' perceptions.

Results

The 66 non-responders did not differ from the responders by any socio-demographic or clinical characteristic, but the level of glycosylated haemoglobin (HbA_{1c}) was significantly higher in non-responders than in responders (7.9% vs 7.3%, $p = 0.003$).

The responders' socio-demographic and clinical characteristics are presented in Table I. Overall, 71% of them reported adherence problems (372/521). These were severe in 41% (212 cases) and moderate in 30% (160 cases).

Table I. Characteristics of the 521 participating patients (mean age: 65 years).

Patient characteristic	*n* (%)
Males	284 (55%)
Marital status	
Single	117 (23%)
Partnership	397 (77%)
Households with children living at home	123 (25%)
Employment situation	
Working	106 (21%)
Unemployed	17 (3%)
Retired	349 (68%)
Other	43 (8%)
Level of education	
No education or primary schooling (up to 11 years old)	311 (63%)
Up to 14 years old	99 (20%)
Up to 17 years old	45 (9%)
University degrees	40 (8%)
Body-mass index (BMI), kg/m^2	
< 25	72 (14%)
25 to < 30	241 (47%)
≥ 30	204 (39 %)
Diabetes onset of more than 10 years	228 (44%)
Presence of at least one micro- or macrovascular complication	229 (44%)
HAD anxiety score	
Certain (11–21)	136 (26%)
Doubtful (8–10)	110 (22%)
No symptoms (0–7)	262 (52%)
HAD depression score	
Certain (11–21)	53 (10%)
Doubtful (8–10)	96 (19%)
No symptoms (0–7)	361 (71%)
Glycosylated haemoglobin (HbA_{1c}) level	
< 7%	257 (49%)
7 to 8%	143 (27%)
≥ 8%	121 (23%)
Low-density lipoprotein (LDL) cholesterol > 1.3 g/l	233 (46%)
Medication	
Oral antidiabetic drugs	436 (84%)
Insulin and oral antidiabetic drugs	61 (12%)

Figure 1 shows that problems with dietary advice (frequently, 27%; occasionally, 35%) and physical activity (frequently, 29%; occasionally, 18%) were far more important than problems with medication (frequently, 5%; occasionally, 12%). Fifteen patients (3%) declared having "frequently" adherence problems with all three treatment components.

According to the HAD questionnaire, patients with depression or anxiety represented 10% and 26% of patients, respectively. Ninety per cent of the patients expected more information about diabetes and 98% trusted their GPs.

The factors independently associated with adherence problems were socio-demographic (young age and single life), clinical (body-mass index [BMI] > 30 kg/m^2, HbA_{1c} > 8%), and psychological (depression or taking medication perceived as a constraint) (Table II).
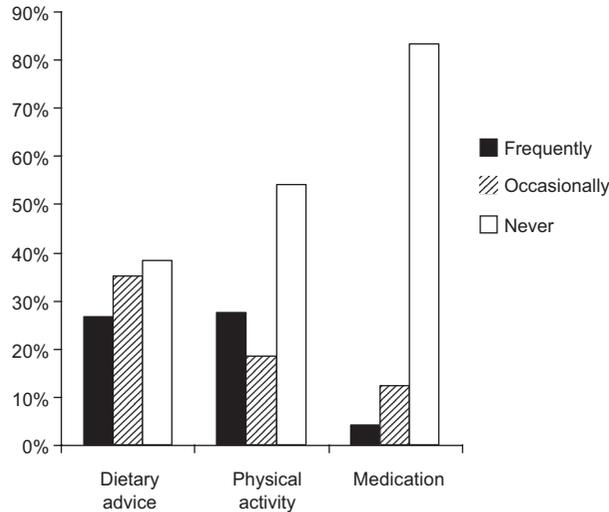
Figure 1. Percentages of self-reported adherence problems with each of the three components of type 2 diabetes treatment (521 patients).

Finally, the extent of the agreement between the GPs' and patients' perception of adherence reached 70% of the paired perceptions (365/521): 57% on presence of problems and 13% on absence of problems (Table III). In nearly 16% of patient–GP pairs, the GP was unaware of the patient's problems. The value of Cohen's kappa (0.27) indicated just a "fair agreement" between GPs' and patients' perceptions.

Discussion

Problems with treatment adherence were reported in 71% of our study population, of which 41% were considered severe. That prevalence might have been underestimated because of significantly higher HbA_{1c} levels in the non-responders. Regardless, these are rather high percentages that should draw the attention of GPs and other prescribers to problems with

Table II. Factors significantly associated with adherence problem (multivariate analysis, Hosmer-Lemeshow test, $\chi^2 = 12.1$, $p = 0.15$; area under ROC curve = 0.73).

Variable	OR	95% CI	p value
Age (per 1 year younger)	1.04	1.02–1.06	0.0014
Marital status (single vs other situations)	1.86	1.08–3.21	0.0261
Obesity BMI (> 30 vs < 30 kg/m²)	3.48	1.84–6.58	0.0001
HbA1c (≥ 8% vs < 8%)	3.39	1.73–6.63	0.0004
Depression (presence vs absence)	2.54	1.02–6.33	0.0450
Medication perceived as a constraint (yes vs no)	1.57	1.02–2.42	0.0402

OR: odds ratio; 95% CI: 95% confidence interval; BMI: body-mass index; HbA_{1c}: glycosylated haemoglobin.

Table III. Patients' versus GPs' perceptions concerning presence of problems with treatment adherence (521 paired answers).

		GPs' perceptions	
		Yes	No
Patients' perceptions	Yes	299	73
	No	83	66

dietary advice and physical activity, which were shown to be five to six times more frequent than problems with medication adherence.

One difficulty of the current study is that, in the absence of validated questionnaires in French and a gold standard to assess content validity, we had to develop, refine, and examine the face validity of a questionnaire elaborated in focus groups. The questionnaires assessed patients' and GPs' subjective overall perceptions of problems with adherence to the three components of the treatment. Another difficulty is that, because no exact definitions of "occasionally" and "frequently" were given to the responders, it is likely that patients differed in their interpretation of these options. However, we believe this lack of precision was somewhat counterbalanced by the rigorous way in which the final perception was formed: three "never" answers were needed for a "no problem" perception.

The study enrolled volunteer GPs used to medical research in the general practice setting; this ensured a valid patient recruitment and an adequate data collection. That collection, from two important French regions, ensured a representative patient sample that shared similar characteristics with other French study populations, i.e., sex, age, BMI, disease duration, and prevalence of retinopathy [15,16]. By design, enrolling consecutive patients restricted the results to the type of patients visiting the study centres within the study period and may have excluded those who are less adherent. However, this is consistent with the study scope, aimed at diabetes 2 patients attending general practice and not at all eligible patients in the general population.

The WHO report on poor adherence to the long-term treatment of type 2 diabetes [1] stated that medication adherence (75%) was more frequent than adherence to diet or physical activity recommendations, that elderly patients with type 2 diabetes manage their disease better than young patients, and that adherence of patients with type 1 diabetes decreases with time [1]. This is confirmed by one of the present study results. However, the scientific literature provides no clear opinion regarding the association between problems of adherence and high HbA_{1c} levels we found. A comparison between data from pharmacies and pill counts has shown

an inverse correlation between adherence to drug treatment and HbA$_{1c}$ levels [17], whereas the results of self-administered questionnaires have not shown such a correlation [10]. This study was supported by the Collège Lyonnais des Généralistes Enseignants, C/O Dr Lainé, 14 rue Etienne Dolet, 69600 Oullins, France.

The present study shows once more that depression is associated with adherence problems. The prevalence of depression was reported to be twofold higher in patients with diabetes than in the general population [18]. Findings from a meta-analysis indicated that depression is significantly associated with high blood glucose levels [19]. Major depression was also linked to a reduction of physical activity, imbalanced diet, and poor adherence to drug treatments [20]. In fact, symptoms of depression seem to deter the patient's ability to adhere to treatment, entailing more complications because of poor blood glucose control [21]. The Cross-National Diabetes Attitudes, Wishes and Needs (DAWN) study confirmed that low levels of adherence and psychosocial problems were linked in 41% of patients, whereas only 10% received psychological support [22]. Explanations included insufficient time, external resources, or poor management by untrained healthcare workers. Moreover, obesity was found to be associated with problems in following dietary and physical activity recommendations. Obesity entails psychosocial problems, including social stigmatization, emotional disturbances, depression, binge-eating disorders, and negative body image [23]. Thus, lack of adherence in obese patients may be related to such psychosocial disorders. Overall, the links between obesity, high HbA$_{1c}$, lack of adherence to physical activity and dietary advice, and other factors are somehow inextricably linked, and the fact that obesity was found to be independently associated with adherence problems should not constitute an argument to consider obese people as especially prone to adherence problems.

The current study found that perception of medication as a constraint was predictive of adherence problems. Several studies have already identified the most important psychological reasons for adherence problems: dissatisfaction with or lack of faith in the treatment, emotional issues, perception of failure, constraint, and despair [24,25]. The patient's beliefs and perceptions are modelled by "the perceived benefits of taking action" of the "health belief model", the "internal locus of control" concept, and "self-efficacy" [1,10]. Social support is also an important factor to help follow dietary advice; Hispanic patients living in the United States with strong family support

systems did not experience difficulty following dietary recommendations [26].

Using two questionnaires, we investigated the extent to which GPs and patients were aware of the gap between their subjective perceptions of adherence. The agreement on same perception of adherence was 70%. This allows two interpretations: fortunately, 70% of GP–patient pairs communicate well but, unfortunately, 30% of them communicate less well or even poorly. This should raise awareness of a communication gap and promote clear exchange and shared decision-making. A qualitative study suggested that healthcare professionals tend to address their patients' experience of type 2 diabetes (patients' agenda) and financial issues. Creating "a space where the expertise of both patients and health professionals" are united to set up "mutually agreed goals" allows progress from adherence to a concordance model [27]. This model is a part of the "patient centred approach", with its five conceptual dimensions: biopsychosocial perspective, patient's perspective (health belief, preference, expectation), shared decision-making, therapeutic alliance, and realistic doctor's perspective [28].

Conclusion

The current study shows that problems of adherence to dietary advice or physical activity were five to six times more frequent than problems with medication adherence, and that agreement between physicians' and patients' was rather good but far from perfect. GPs involved in type 2 diabetes mellitus management now face the challenge of actively listening to patients with one or more of the following risk factors for adherence problems: young age, single life, HbA$_{1c}$ > 8%, BMI > 30 kg/m^2, depression, or perceiving medication as a constraint. GPs are invited to make a real and sustained effort towards concordance. A strategy of active listening and shared decision-making "in which the beliefs and preferences of the patient are taken into consideration" should enhance adherence and improve outcomes.

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Conflicts of interest

None

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Related reports

Parts of data analyses were presented as preliminary reports during the following workshops:

- DIfficulties of ADherence among type 2 Diabetic patients in primary care (DIAD study). Moreau A, Aroles V, Zerbib Y. EGPRN Research on Diabetes in General Practice. Tartu, Estonia, 2005.
- DIfficultés d'Observance des patients Diabétiques de type 2 En Médecine générale (étude DIODEM) Moreau A, Aroles V, Imbert P, Esturillo G. Collège National des Généralistes Enseignants. Paris, France, 2005.
- DIfficulties of ADherence among type 2 diabetes in general practice (DIAD study): from compliance to concordance. Moreau A, Souweine G, Aroles V. WONCA. Paris, France, 2007.

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