Agata Bronisz[1], Joanna Nieziemska[1], Małgorzata Pufal[1], Marek Bronisz[2], Małgorzata Sobiś-Zmudzińska[1], Roman Junik[1]

ORIGINAL

[1]Katedra i Klinika Endokrynologii i Diabetologii Collegium Medicum im. Ludwika Rydygiera w Bydgoszczy, Uniwersytet Mikołaja Kopernika w Toruniu, [2]Oddział Kardiologiczny, PS ZOZ w Inowrocławiu

Nutrition habits and compliance with dietary recommendations by diabetic patients

Abstract

Background. Compliance with dietary recommendations is indispensable in diabetes treatment and conditions reaching normoglycaemia. The presented study was aimed with compare nutrition habits before the diagnosis of disease with diabetic patients' compliance with dietary recommendations after appropriate education.

Material and methods. The study group included 70 patients with diabetes mellitus (5 patients with type 1 and 65 patients with type 2 diabetes). The patients filled in a two-part questionnaire. The first part included patient personal data, the second one — 37 questions on nutrition habits before the diagnosis of disease, participation in dietetic trainings and compliance with dietary recommendations.

Results and conclusions. Nutrition habits prior to diabetes diagnosis were improper in majority of patients (83%), and their diet significantly exceeded energy requirements, as reflected by high BMI values. Among patients who claimed to follow a low fat and low calorie diet formerly, 60% were overweight or obese. Those who stated that their previous meals were fat and calorie rich, were overweight in 52.7% or obese in 30.9% cases. The lack of BMI decrease and its increase in many patients, despite the declared change of nutrition habits after diabetes diagnosis, demonstrate patients' inadequate knowledge on diabetic diet or lack of compliance with dietary recommendations. Too low consumption of vegetables, consistent intake of monosaccharides and ignoring the importance of protein origin were observed the most often. Unsatisfactory results of patient education urge to revise the current educational system and to introduce verification of the diabetics' knowledge of the subject.

key words: nutrition habits, compliance with dietary recommendations, diabetes mellitus

Introduction

Diet plays an important role in management of diabetes mellitus (DM). Before the discovery of insulin, it was the only method of life support in diabetic patients. After introducting the drug, diet still remained a significant part of a therapeutic plan. The modification of patient nutrition habits should always be the first step in treatment of type 2 DM, before medical therapy is introduced [1]. In patients with other types of DM, compliance with appropriate dietary recommendations is a crucial element of therapy, which conditions reaching the desired normoglycaemia [2, 3]. The presented study was aimed to compare nutrition habits before the disease diagnosis with diabetic patients' compliance with dietary recommendations after appropriate dietetic education.

Address for correspondence: dr med. Agata Bronisz
Katedra i Klinika Endokrynologii i Diabetologii
Collegium Medicum im. L. Rydygiera w Bydgoszczy
ul. Skłodowskiej-Curie 9, 85–094 Bydgoszcz
Tel (+48 52) 585 40 20; tel/fax (+48 52) 585 40 41
e-mail: agabrr@poczta.onet.pl

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Material and methods

The study group included 70 diabetic patients of with the mean age of 57.0 ± 13.4 years, who were admitted to the Chair and Department of Endocrinology and Diabetology of the Ludwik Rydygier Collegium Medicum in Bydgoszcz or treated at the Diabetologic Outpatient Clinic or in the Specialist Diabetologic Clinic in Toruń. Patient characteristics are presented in Table 1.

Only two patients (2.8%) followed exclusively dietary treatment, whereas 68 persons (97.2%) declared taking at least one pharmaceutical agent. Insulin was administered in 45 (64.3%) patients, in 11 of whom (24.5%) insulin therapy was combined with oral antidiabetic drugs. The latter agents were administered in 34 patients (48.6%) in the whole study group.

Table 1. Patient characteristics (n = 70)

	Parameter (unit)	Number and percent of patients
Type of diabetes mellitus	Type 1	5 (7.1%)
	Type 2	65 (92.9%)
Sex	Female	43 (61.4%)
	Male	27 (38.6%)
Age (years)	≤ 45 years	13 (18.6%)
	46–65 years	39 (55.7%)
	> 65 years	18 (25.7%)
Duration of diabetes (years)	Less than one year	9 (12.8%)
	2–10 years	34 (48.6%)
	10–20 years	19 (27.2%)
	> 20 years	8 (11.4%)
Body mass index [kg/m^2]	20–25	14 (20%)
	25.1–30	28 (40%)
	> 30	28 (40%)
Domicile	Rural area	9 (12.8%)
	Town/city	61 (87.2%)
Education	Primary	12 (17.1%)
	Vocational secondary	19 (27.1%)
	Secondary	31 (44.4%)
	Higher	8 (11.4%)

The main research tool was the questionnaire developed by the study authors. It consisted of two parts: the first one included patient personal data, and the second one — 37 questions on nutrition habits before the diagnosis of disease, participation in dietetic trainings and compliance with dietary recommendations. Questionnaires were available in healthcare institutions and their patients answered the questions voluntarily.

The authors of the following study obtained permission from the heads of participating institutions as well as from the Bioethics Committee of the Ludwik Rydygier *Collegium Medicum* in Bydgoszcz (no KB/341/2002).

The collected data was submitted to statistical analysis. Kolmogarov's test was used to verify distribution of the entire data. In cases of near normal data distribution, Student's t-test was used; for the samples significantly different from normal distribution, Mann-Whitney rank test was used, and for correlated pairs — the Wilcoxon one. The accepted level of statistical significance was $P < 0.05$.

Results

Results are presented in two tables and eight figures.

Nearly 83% patients described their former diet as calorie and fat rich, and 17.1% of subjects claimed eating low calorie and low fat meals before learning the diagnosis of DM. All the patients consumed excessive amounts of proteins, exceeding the dietary recommendations. Over 70% of patients claimed eating more meat and over 30% of patients — more proteins than recommended. A significant percentage of study participants before the disease used to eat more carbohydrates, of which the major source was bread (Figure 1).

Table 2 presents patients' body mass index (BMI) values prior to the disease in view of their declared nutrition habits. The analysis was performed only in patients with type 2 DM, since in patients with type 1 DM diagnosed in childhood BMI values were difficult to determine. Among the questioned patients who admitted that their former diet was low-calorie and low-fat, 40% of patients had a normal body mass before the diagnosis of the disease, 40% were overweight, and 20% obese. More than a half a (52.7%) patients, who admitted eating meals rich in fat and calories before DM diagnosis, were obese, and 30.9% overweight. Despite high calorie intake of 16.3% respondents kept their body mass on the desired level.

Over 81% of patients admitted changing their diet after learning the diagnosis of DM, 12 patients (17.3%) made only minor modifications, and one patient (1.4%) made no dietary changes. In the group of patients who previously obeyed a low calorie diet, 66.7% admitted still making changes, 25% of participants modified their diet slightly, and one patient changed none of his nutrition habits. On the other hand, all the patients, who described their former diet as rich in calories, changed their habits; 84.5% made major, and 15.5% only minor appropriate dietary modifications (Figure 2).

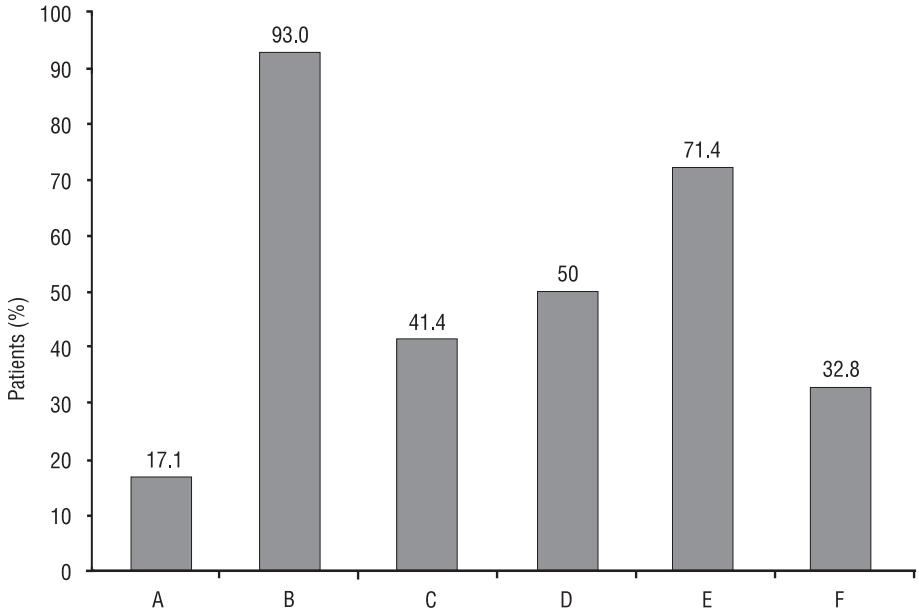

Figure 1. Type of diet before the diagnosis of diabetes (A — low-calorie, low-fat; B — high-calorie, high-fat; C — including more carbohydrates; D — including more bread; E — including more meat; F — including more dairy products)

Table 2. Body mass index values before the diagnosis of diabetes in view of the declared diet

Type of diet before diabetes mellitus diagnosis	Body mass index value before diabetes mellitus diagnosis [kg/m^2]*		
	20–24.9	**25–30**	**> 30**
Low-calorie, low-fat	4 (40%)	4 (40%)	2 (20%)
High-calorie, high-fat	9 (16.3%)	17 (30.9%)	29 (52.7%)

*Concerns only type 2 diabetes mellitus

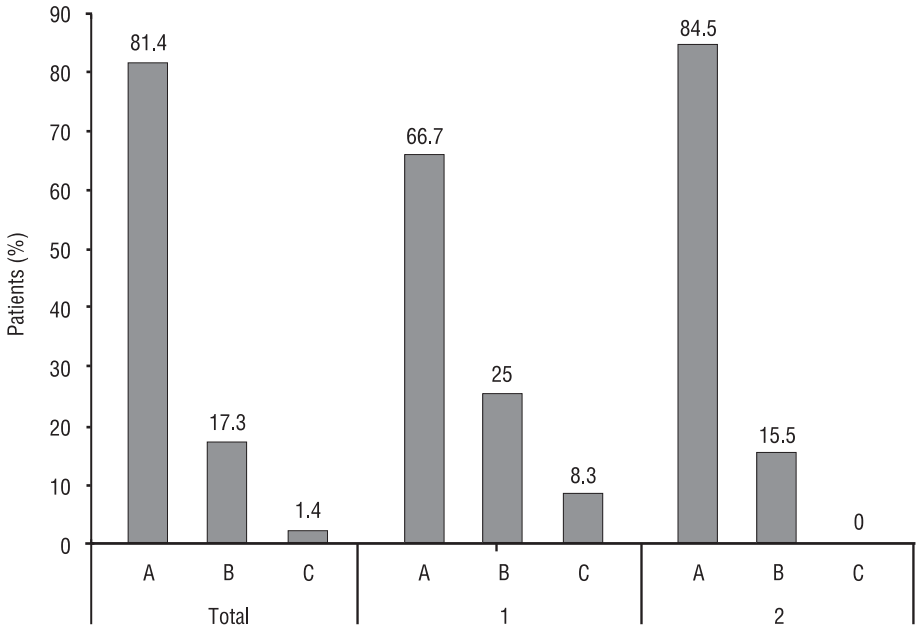

Figure 2. Diet modification after the diagnosis of diabetes (A — yes; B — moderate; C — no. 1. Previous diet — low-calorie, low-fat. 2. Previous diet — high-calorie, high-fat)

Patients were asked over 10 questions concerning eating particular ingredients. Twelve percent of respondents admitted eating monosaccharides, and 71% patients sons used to eat them sporadically. Total abstinence from sweets was declared by 17% of patients (Figure 3).

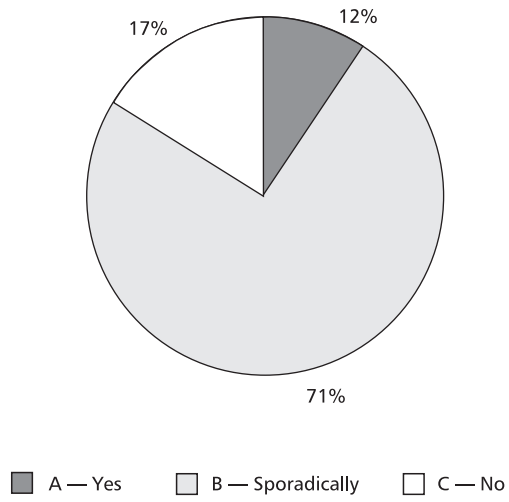

Figure 3. Consumption of sweets

Figure 4 presents the answers concerning the restriction of dietary fat intake. Over 80% patients cut down on dietary fat intake, 12.8% did it only sporadically, and 4.3% of patients had never thought about it. The second part of the same figure concerns the consumption of the low fat dairy products. They were included in the diet of over 70% of respondents, another 14.3% of patients paid less attention to this problem, and 10% did not care about this restriction at all. Figure 5 presents the frequency of vegetable consumption. More than a half of patients ate them 2–3 times daily, whereas 30% did it not earlier than once each day. Only 7.1% of patients claimed eating vegetables 4–5 times, and even fewer patients did it more than 5 times daily.

Table 3 presents the answers of type 2 DM patients to the question concerning their changes in nutrition habits in view of BMI values after the onset of the disease. Following the diagnosis of DM, 66.7% of patients who previously obeyed a low calorie diet modified their eating habits but the BMI value increased in majority of them (83.3%) ever since. Only one patient (8.3%) stuck to the former diet and experienced BMI reduction. Majority (84.5%) of 58 patients with high calorie intake before the disease onset changed then their meal selection

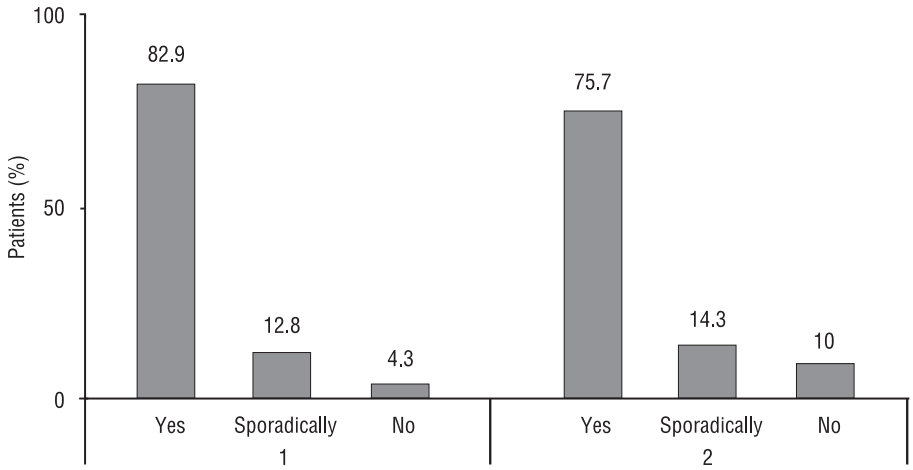

Figure 4. Reduction of dietary fat. 1. Reduction of total dietary fat. 2. Consumption of skimmed dairy products

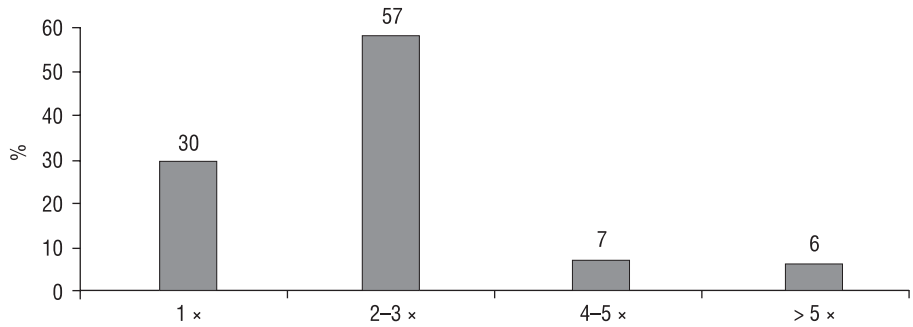

Figure 5. Frequency of vegetable product consumption per day

Table 3. Change of body mass index values in patients with type 2 diabetes in view of their nutrition habits modification

Type of diet before diabetes mellitus diagnosis	Diet modification after diabetes mellitus diagnosis	Total	Body mass index change*		
			Decrease	No change	Increase
Low-calorie	Yes	8 (66.7%)	–	1 (16.6%)	5 (83.3%)
	Moderate	3 (25%)	1 (33.3%)	–	2 (66.7%)
	No	1 (8.3%)	1 (100%)	–	–
High-calorie	Yes	49 (84.5%)	27 (57.4%)	4 (8.5%)	16 (34.1%)
	Moderate	9 (15.5%)	2 (25%)	1 (12.5%)	5 (62.5%)

and preparation drastically, which was then reflected in body mass reduction and BMI decrease in 57.4% of them. However, 16 respondents in this group (34.1%) had constant body mass, and their BMI even increased. Nine patients (15.5%) of the group with high calorie intake only slightly modified their eating habits. They included 5 patients (62.5%) in whom BMI values increased following these changes. All the persons, who used to eat high calorie meals previously, claimed changing their nutrition habits.

More than 1/3 of respondents (33%) never participated in educational dietetic trainings, and the remaining 67% did it at least once (Figure 6). Only 27.1% of patients claimed consulting their diet with specialists. Majority of the study participants (44.4%) admitted asking dietary advice only initially after DM diagnosis, and 28.5% did not do it at all (Figure 7).

Discussion

Diet is of crucial importance in therapy of all the types of diabetes mellitus. It is aimed to supply patients with normal and physiological meals, with full energy coverage and meal composition adjustment according to individual needs [4, 5]. According to the American Diabetes Association, the diet of each diabetic should serve the following purposes: maintaining blood glycaemia as close to normal as possible, obtaining optimal serum lipid levels and supplying adequate caloric intake in order to keep or reach the desired body mass, and to enable children's normal growth and development. This supply should cover body needs during pregnancy and lactation periods as well completely as during recovery from diseases with increased tissue catabolism. Moreover, appropriate nutrition policy should include prophylaxis and management of acute and chronic complications of diabetes, thus contributing to improvement of the patient general condition [6].

Nutrition of each diabetic in practice should reflect the knowledge and skills conveyed to patients and their families during educational activities. The nutrition plan, recommendations and recipes should be prepared on an individual basis and adjusted to patient's capabilities and needs. They are influenced by patient age, sex, education, profession, the type of the experienced medical problems, the method of applied hypoglycaemic therapy, diabetic complications and his or her financial status [7–9]. Therapy requirements should be adjusted to each patient's lifestyle. These problems should be subjects of educational and practising acti-

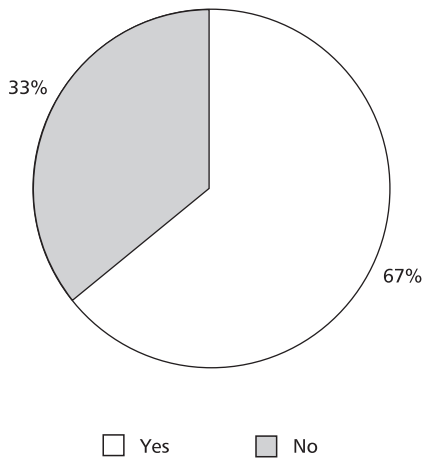

Figure 6. Participation in dietetic trainings

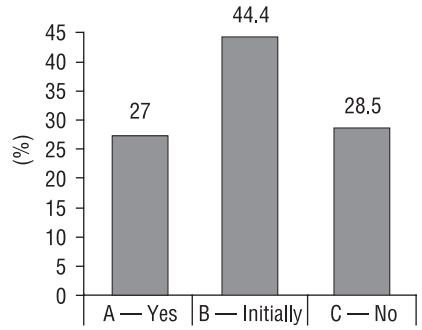

Figure 7. Dietetic consultations in specialist diabetologic outpatient clinics

vities as well as of systematic dietician consultations, organised in an ambulatory and during patient's stay in hospital or sanatorium [5, 7, 10–13].

The authors found that as many as 1/3 questioned patients never took part in any dietetic trainings or asked such a consultation, and half of the patients who asked dietetic advice, did it only shortly after learning the diagnosis of DM. The possible explanation of such a low training frequency is inadequate patient awareness of utility of this therapeutic method or wrong motivation. Dietary education was offered to all the patients admitted for the first time because of DM. Dietary treatment necessitates learning a lot of new information by the patient, therefore dietetic education should be a constant process and repeated systematically as to stimulate patient activity. This aim was not reached, as reflected by the results of the presented study [11, 14].

The analysis of patients' nutrition habits and compliance with dietary recommendations revealed that before the diagnosis of the disease majority of the participants followed calorie and fat rich diets, and only 1/5 of the group admitted eating low calorie meals. High BMI values reflect too high caloric dietetic supply for patients' needs. Among the patients declaring consumption of calorie rich meals before DM diagnosis, over a half of patients were obese, 1/3 were overweight, and only 16% had normal body mass. After learning the diagnosis of diabetes, all the patients claimed changing drastically or partially their eating habits but their attempts did not have the desired results. Despite the declared reduction of calorie intake, BMI values in 1/3 patients increased, and remained constant in one per each 10 patients. However, more than 60% of patients who only slightly modified their diets gained weight!

Contrary to the authors' expectations, not more than 40% of respondents declaring low calorie meal consumption were of normal body mass, another 40% were overweight, and the remaining 20% were obese. Such answers may reflect the lack of patients' own appropriate dietary judgement. What should also be noted, dietetic modifications were also admitted by the patients who obeyed low calorie diets before the diagnosis of DM. In this group, only one patient remained faithful to his diet after the diseases onset. That and another patient, who modified his diet adequately, were the only persons who experienced body mass reduction. In majority of other patients, the increase in body mass could be observed after some changes in their low calorie eating habits! The authors believe that the increase in the number of daily meals (to 5–6/day), according to the dietary recommendations, associated with inadequate calorie reduction could be one of the causes of patients' failure to lose weight.

High BMI values despite the declared low calorie intake before the diagnosis of DM, as well as a high percentage of body mass increase despite nutrition changes and modifications according to recommendations in DM, point out to dietary mistakes made by patients. This fact might be caused by inadequate education, and such observation is supported by the answers given by the patients. They reported consuming more meat before the diagnosis of DM, fewer patients admitted eating more carbohydrates, mainly bread. These observations are comparable to the monographs from the Research Unit on the Nutrition Economics in the Institute of Food and Nutrition fro the beginning of the 90s, which showed prevalent consumption of meat and its products over the amount of cereal products in the daily menu [14].

Only 17% of respondents claimed eating no monosaccharides at all, whereas the remaining 83% of the study group included them in their menus, and 10% among them made no restrictions at all. These results demonstrate educational shortages concerning adequate diet plans and their consequences as well as the resultant lack of motivation. Majority of patients (83%) cut down on fat dietary intake and paid attention to their origin — over 80% of patients chose plant fats, and 70% of patients preferred skimmed dairy products. Therefore, it can be concluded that the diets of the questionnaire respondents had adequate amounts of good quality fats. Such a proportion may reflect the widespread information concerning fats and their role in development of atherosclerosis present in the media.

The patients ate too few vegetables, and only one per seven persons ate them more than four times a day. More than a half of patients ate vegetables 2–3 times daily as addition to main courses, and as many as 1/3 patients ate vegetables only once a day. Vegetables were perceived by the patients as a meal supplement of no major value, since it could not satiate their appetites as the meat or flour containing products did. These observations lead to the conclusion of ineffectiveness of the educational trainings, possibly resulting from lack of patient or personnel engagement.

The authors believe that patients are poorly motivated by the treating team to participation in trainings and to the usage of the acquired knowledge. Low effectiveness of educational activities may be caused by their inappropriate arrangement. The patients may be confronted there with too much information, which they cannot absorb. To obtain satisfactory results of therapeutic education, frequent repetition of dietary trainings is necessary as well as the verification of patients' knowledge and upgrading of educational programs and of the instructors' skills [10, 14].

Conclusions

1. Nutrition habits of the majority of patients before the diagnosis of DM were improper. Their daily energy intake exceeded their needs, as reflected by the high BMI values in majority of the respondents.
2. The lack of desired effects, including BMI reduction (and its increase in many patients), despite the declared change of nutrition habits after DM diagnosis, demonstrates patients' inadequate knowledge on diabetic diet or lack of compliance with dietary recommendations.
3. The following dietetic recommendations were not obeyed: too low consumption of vegetables, consistent intake of monosaccharides and ignoring the importance of dietary protein origin.
4. Unsatisfactory results of patient education urge to revise the current educational system and to introduce verification of the diabetics' knowledge of the subject.

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