THERAPEUTIC EDUCATION, THE PREMISE OF ADHERENCE TO THE TYPE 2 DIABETES THERAPEUTIC REGIMEN

Carlos Albuquerque[a], Carla Correia[b], Manuela Ferrreira[a], João Duarte[a]

[a] Escola Superior de Saúde de Viseu, CI&DETS, Instituto Politécnico de Viseu, Portugal

[b] Centro Hospitalar Tondela-Viseu, Portugal

Corresponding author: Carlos Albuquerque, cmalbuquerque@gmail.com

Abstract

Background: type 2 Diabetes mellitus includes changes in lifestyle in its etiology of prevention, but the evidence is clear —even when people know what to do and what they want to do, they simply do not adopt adherence behaviors. Structured education will allow improving not only metabolic control, but also the adjustment process to a new situation of disease, as well as to develop the patient's skills in order to make him the key manager of his illness.

Objectives: To determine patients' adherence to prescribed therapeutic regimens.

Methods: Quantitative, cross-sectional, non-experimental, descriptive, correlational study, with a sample of 102 people with type 2 diabetes, aged between 40 and 85 years old, mostly male (51.96 %). The evaluation protocol included social-demographic and clinical questionnaire, Diabetes Self-care Scale and a questionnaire on Diabetes' knowledge. We also used HbA1c in order to directly assess adherence.

Results: It appears that there is no statistically significant correlation between socio-demographic variables such as gender and age and adherence. Variables, such as blood glucose monitoring, specific diet compliance and knowledge, reveal a statistically significant effect on adherence ($p < 0.05$).

Conclusion: The evidence is clear on the urgent need to recognize the importance of measuring patient adherence to a diabetes treatment plan for the maintenance of glycaemic control. We suggest the reinforcement of educational programs in people with type 2 diabetes so as to improve adherence to self-care.

Keywords: insulin-dependent type 2 Diabetes; self-care; knowledge; adherence to a therapeutic regimen; therapeutic education.

Introduction:

The World Health Organization[(1)] holds that diabetes and its complications have a major economic impact not only on the patients, but also on their family members and national healthcare systems. Moreover, WHO alerts for the existence of 346 million people with diabetes in 2011 and predicts that deaths resulting from diabetes will double between 2005 and 2030. Accordingly, Portugal's situation is also of concern, due to the fact that the DM is becoming more frequent, with a prevalence

that increases with age and affects both males and females. The prevalence of diabetes in 2014 among the Portuguese population aged between 20 and 79 reached 13.1% which translates as around 1 million individuals[2].

Diabetes is consistently described as being one of the most demanding and complex chronic illnesses from the behavioural and psychological perspective. Therefore, it's of crucial importance that when the therapeutic plan is established (in addition to the biological and medical aspects) the importance of assessing the psychological processes of the individual is recognised —seen as the patient's bio psychosocial integrity is a decisive condition favouring self-care with the illness. Therapeutic adherence is a fundamental element for chronic illness control, and its absence has enormous repercussions on the incidence and prevalence of numerous chronic illnesses. The concept of adherence currently used includes the patient's active participation, collaboration and interaction in the healthcare relationship. It requires the patient's compliance with the recommendations of the healthcare professional, and that the two function as active partners in following the treatment plan[3,4], which implies the patient's voluntary participation, sharing the responsibility for the treatment with the healthcare team, and understanding there's an agreement between the parties that entails respecting each others' beliefs and desires[3]. Good adherence to treatment implies not only this entire process of involvement for deciding the therapeutic plan, but also the adoption of therapeutic behaviours and its continuation. This long-term compliance is difficult and changes the pace of everyday's life, especially with pathologies which develop asymptomatically. This difficulty in adherence is aggravated by the complexity of the treatment plans[3] which lead many patients to adopt a non-adherence attitude. Failure to adhere takes place when the patient's behaviour doesn't coincide with the health professional's recommendation, not being restricted solely to the deviations from the application of the therapeutic plan, but also including failure to follow any indications of life-style changes and health habits and to adopt health-conscious practices. According to Christensen cit. in Levensky[5] rates of non-adherence vary according to whether treatment reports are on treatment at the illnesses' severe stage, 20 to 40%, on treatment of chronic illness, 30 to 60%, and 50 to 80% in the preventive treatment regime.

Bugalho and Carneiro[3] point to different factors which may influence adherence to the therapeutic regime, such as: social, economic and cultural factors; factors

related with the care services and the healthcare professionals; factors related with the primary disease and co morbidity; factors related with the treatment; and factors related with the patient.

The low level of adherence to diabetes self-care is the result of the combination of a series of characteristics both of the illness and also of its treatment. Wagner, et al[6] point to the following as factors which predict low adherence: diabetes being a chronic illness with no immediate discomfort and no apparent risks; it having a therapeutic plan which implies life style changes; having to follow a complex, intrusive and inconvenient treatment; there being no direct supervision of behaviour; the objective of the treatment being prevention rather than cure. The absence of standardised instruments for assessing adherence and the difficulty in evaluating the extent to which the patients follow the healthcare professionals' indications about treatment makes evaluating adherence to treatment a complex process. The concept of adherence itself covers multiple behaviours relating to health and the illness, and its evaluation may be carried out by means of patient self-assessment and by questioning the patient, even though a great deal of results may be distorted.

Often, glycated hemoglobin is measured as a way of evaluating adherence to the treatment, seen as it translates the patient's degree of control of the disease and appears to currently be the best indicator of the patient's health condition. Patients who present with a good level of metabolic control are presumably adherents[7]. The glycated hemoglobin rate is thus considered the most valid indicator of therapeutic adherence[8], a low level of HbA1c is an indicator of a good health condition and presumably of a good level of adherence to the treatment, while on the other hand, a high level reflects a poor health condition suggesting there is something amiss in adherence to the treatment, even though it doesn't specify which element of adherence the patient is failing to fulfil. Thus, there's indirect evaluation of adherence through, for example, reports, interviews and questionnaires which provide valuable information on adherence behaviours to the various treatment elements.

Adherence to treatment of individuals with type 2 DM is affected, to a large extent, by the patient's level of knowledge, which includes not only what they know or not, but also erroneous beliefs and inaccurate assumptions. Knowledge of the illness is essential, as all elements in the therapeutic plan are correlated. Considering for example, food, physical exercise and medication which have a combined impact on glycaemia levels, a change in one of these parameters implies changes to all the

others. Structured and targeted education plans play a central role on the adherence level and Kalogianni[9] states that it is vital to educate patients and convince them of the benefits of the treatment and to maintain a therapeutic relationship based on communication, trust and motivation. Structured education allows for significant improvements in metabolic control, for a better adjustment to a new situation of illness, and for the development of the necessary capabilities by the patients, so they can become their illnesses' chief managers, thus reducing the long-term costs for the patient and society alike.

The International Diabetes Federation[10] mentions that education is essential for people with diabetes, in that it enables them to make informed decisions, cope with the daily routines of a complex chronic illness, change their behaviour and monitor their illness on a daily basis. Therapeutic education should be seen as an integral part of the treatment and as an instrument for aiding the diabetic to acquire new behaviours while changing their existing ones so as to maximise their health. Blair[11] states that the diabetic's education should prepare and empower them with skills and basic knowledge to monitor their glycaemia levels, and understand how their medication, food and physical activity affect their glucose levels, thus making them more independent of health professionals in managing their health.

Therapeutic education should be guided by trained healthcare professionals and include assessment, planning, implementation and evaluation of the results using sustained strategies of behavioural change. Aside from biomedical knowledge and skills, healthcare professionals also need pedagogical and relational skills[12]. These professionals have a pivotal role in therapeutic education by facilitating access and ongoing support throughout the entire process. A multi-disciplinary healthcare team skilled in educational, behavioural, communication and psychosocial strategies is fundamental for the success of the education process.

Several studies have demonstrated the importance of a customized education with a prior assessment based on information about the patient's clinical history, their age, cultural influences, knowledge and attitudes towards health, knowledge on diabetes, ability to manage their own skills, capacity for learning, levels of health literacy, physical limitations, family support and economic situation[13].

Education's effectiveness is maximised when, firstly, the healthcare professional understands the needs and expectations of each patient and establishes a realistic

target for their treatment and, secondly, transmits the message creatively and interactively while identifying potential obstacles to behaviour changes[11].

The value of therapeutic education is now widely recognised as an essential part of the treatment for diabetes, even though there are still some obstacles to its practice. The lack of qualified educators, minimal financial support or support to education together with the inability of diabetes' patients to get time off from their work to access education are merely some of the obstacles to education IDF has identified[10].

Considering the diabetic's therapeutic education from a purely economic perspective, investing in education is beneficial because it lessens this disease's socio-economic cost for society. The continuity of education and the patient's consequent adherence to the prescribed therapies are essential for capturing potential gains not only in the future health of the diabetic patient but also for society as a whole. In this manner, it will be possible to reduce direct costs, indirect costs, and also the intangible costs associated with the direct treatment of diabetes and with the treatment of the illness' subsequent complications.

Therapeutic education is considered as the cornerstone of the diabetes treatment, because each patient should be given access to acquire the skills, competency and knowledge to help them manage the symptoms and limitations they're suffering from on a daily basis. Nonetheless, according to Norris et al[14], 50 to 80% of individuals suffering from diabetes have minimal knowledge of their pathology and little capacity for applying it. This deficit of knowledge results in a deficient level of control which is translated into very high HbA1c levels, and as a result, in less than half of type 2 diabetes patients managing to achieve ideal glycaemia control. These findings confirm that education, information and the patient's empowerment are essential aspects for there to be conscious decision making and adherence to an adequate treatment regime. Education's positive effects on the control and management of diabetes are undeniable, as is the fact that education is focused on a chronic illness about which, learning skills, healthy behaviours and obtaining knowledge are essential for life and for delaying complications, as well as for reducing the patients' dependence on healthcare professionals. All of this promotes the integration of diabetes into daily living. The patient's context, their acceptance degree of the illness, their skills and knowledge affect their motivation to learn how to manage their illness.

Objectives: To determine adherence to the prescribed therapeutic scheme; to identify socio-demographic, social and psychosocial variables which impact adherence; to identify the levels of disease knowledge of insulin dependent individuals with type 2 diabetes; to understand how the illness' representations and knowledge about it can affect adherence behaviours to the prescribed therapeutic regime.

Materials and Methods

This is a quantitative, transversal, non-experimental, descriptive and correlational study. It was carried out using a non-probabilistic sample composed of 102 individuals with type 2 diabetes who attend the metabolism consult of the Diabetes Unit at the Tondela Viseu Hospital centre. The criteria for inclusion were the following: being a type 2 diabetic, having been diagnosed for over a year, administering insulin for over a year and attending the metabolism consult at the Diabetes Unit. A self-applied questionnaire was adopted because of the scale's specific language associated with the low levels of education and literacy of the sample and because of the users' difficulties reading and writing. The socio-demographic characterisation of the diabetic patient was carried out using variable format questions (open and closed). The patient's clinical characterisation included the collection of anthropometric data including the following: weight, height, body mass index, abdominal and clinical perimeter, blood pressure and HbA1c. The diabetes self-care activities were assessed using the Self-care with Diabetes scale[15], a multi-dimensional scale comprising six dimensions in which the assessment of the self-care was subjected to "days per week" parameters. The Diabetes Knowledge Questionnaire[16] was used for assessing the degree of DM knowledge. This questionnaire includes 24 items in which the potential answers for each item are Yes, No and Don´t know and with an internal consistency with Cronbach's Alpha of 0.67[16]. It covers questions on DM knowledge and aspects related with the diseases' causes, insulin and hyperglycaemia production, the illness' duration and heredity, questions related to the therapeutic plan and its effects on metabolic control, questions on false concepts and questions on the consequences of hypoglycaemia and hyperglycaemia. This was followed by stratification by cohort groups according to the average ± 1 standard deviation[17] in which the higher the

marks, the greater the subject's knowledge. It should be stressed that the HbA1c clinical parameter was used to directly evaluate adherence.

Results: The sample was composed of 102 insulin dependent individuals with type 2 diabetes, 53 (51.96%) males with an average age of 63.24 ± 10.47 years old, with a coefficient of variation (CV) of 16.56% which suggests a moderate level of dispersion. The average age of males (62.77 years) is lower than that of females (66.73 years) (Table 1).

Table 1: Statistics on age according to gender

TABLE 1

Most of the diabetic patients were married (75.5%) with a group of widowed patients (18.7%) also representative. Nearly all resided in rural areas (66.7%), and (33.3%) resided in urban areas. The application of the chi-square test allowed us to conclude that there is no statistically significant correlation between the residence area and the gender variables (x^2= 0,079; p= 0,779). Out of the entire sample, 50% lived with a spouse/companion and 1.0% lived in institutions. Regarding level of education, primary education (52.9%) was the education level of most of the diabetic patients, followed by secondary education (18.7%) and 8.8% who never went to school. Regarding employment status, almost all reported being retired (56.9%), and out of the individuals who were still professionally active (24.5%), 36.0% worked in the field of trade. The clinical profile of the sample revealed an average of 15.73 years of disease evolution period; females presented with the highest average, 16.39 years. The highest average period of insulin administering (6.74 years) was also female, with a total average for the sample of 6.03 years. The entire sample had severe chronic complications and retinopathy was the most frequent (30.06%), with 33.75% females and 26.51% males. Cardiovascular disease was reported by 24.54% of the sample with a higher incidence in females (27.50%). 1.23% had suffered an amputation.

As for the results for the characterisation of the sample regarding the HbA1c levels clinical parameter, findings show that out of the 102 respondents, 42.2% had an adequate glycaemia control (HbA1c between 0 and 7.9%), with the female gender

having a more adequate glycaemia control, 44.9%, even though the chi-square test result does not reveal significant statistical differences (x^2= 0,291; p= 0,590) (Table 2). The average HbA1c is of 8.29%, with a maximum of 11.9% and a minimum of 6.2%, with the highest average of 8.31% for the male gender.

Table 2 – Characterisation of the diabetic patient by gender and HbA1c values

TABLE 2

Regarding the impact of the gender, age, cohabitation, area of residence, education level and employment situation socio-demographic variables in adherence to the treatment, there was an absence of statistically significant associations. Nonetheless, after a more detailed analysis, findings show that females, older patients, patients living in urban areas, patients who were living with close family, patients who had an education level of the 3rd cycle or further, and retired subjects, were those with the lowest HbA1c averages, revealing greater adherence.

As for the clinical variables of disease evolution period, period of insulin administration and who administers the insulin, results confirm the absence of significant statistical correlations. However, a closer analysis found there is a tendency for diabetes patients who have been diagnosed for longest and who have been using insulin for less time, who have someone other than themselves administering insulin to most adhere to the treatment, seen as they show lower levels of HbA1c.

Regarding self-care, results show that the activity in which individuals most often involved themselves was the monitoring of glycaemia levels with an average of 5.73 days, followed by general diet (5.07 days), taking medication (6.85 days), specific diet (4.09 days) and foot care (3.85 days). Physical activity was referred to as being the self-care which patients less practice with an average of 1 day per week.

Most of the sample had a great deal of knowledge (41.2%) followed by individuals with little knowledge (40.2%). It is worth highlighting that 18% had a reasonable level of knowledge. Male individuals were those with the greatest amount of knowledge about diabetes, while the majority of female respondents (40.8%) had little knowledge about diabetes. Most male respondents (43.4%) demonstrated to have a great deal of knowledge, even though there weren’t any statistically significant

differences (X^2=,302; p=,860). Even though 41.2% of the sample had quite a lot of knowledge, knowledge deficits were found in areas concerning the illness' identity, its causes, complications and treatment. The questions the individuals found more difficult and which reflected a lesser proportion of correct responses were the following: "Eating of lots of sugar and sweet foods is one of the causes of diabetes", "Regular exercise increases the need for insulin or other diabetes' medication", "Diabetes is caused by the kidneys' difficulty keeping urine sugar-free" and "A person with diabetes should clean any wound with an iodine solution and alcohol".

Eating considerable amounts of sugar and sweets was recognised as the illness' cause by 84.3% of respondents. The role of endogenous insulin was unknown to the greater part of participants, 60.8%, whereas 15.7% of the population believed insulin to be produced by the kidneys. The means of evaluating diabetes was unknown to 53.9% of the individuals and the principal types of diabetes were unknown to 4.9% of respondents. The fact the disease is chronic was recognised by 65.7%, even though 33.3% of participants believed the false notion that diabetes is curable. Approximately 3.9% were unaware that the children of diabetic parents have a greater probability of becoming diabetics.

The sample showed deficits in knowledge regarding the severe consequences of diabetes as 36.3% still didn't recognise the signs of hyperglycaemia and 28.4% didn't know how to identify trembling and sweating as signs and symptoms of hypoglycaemia. The respondent population showed good levels of awareness of chronic complications. Medication was considered to be the most important element in the control and treatment of diabetes by 78.4% of respondents; 53.9% failed to recognise the important role of physical exercise in the treatment of the illness; and 74.5% believed the false notion that an adequate diet consists of special foods.

Analysing the relationship between knowledge and adherence, a slightly significant negative association was found (r= -0,204; p=0,040) which indicates that a higher level of knowledge corresponds to lower HbA1c levels and thus to a greater adherence to treatment.

Discussion:

Adherence to the therapeutic plan for diabetes is complex as it is not restricted solely to taking medication, but covers a range of elements including self-monitoring,

food and physical activity. To improve adherence to the treatment for Diabetes Mellitus is to improve glycaemia control and as a result, the morbidity and mortality associated with uncontrolled diabetes, thus reducing the illness' effective costs.

Comparing the younger age groups with older age groups, results show that adherence can be greater among the latter, seen as with adolescents, the lack of supervision, autonomy and social influences result in a lesser level of adherence[3]. On the basis of this premise and our research's results, we can infer that the greater the age of the diabetic patient the greater their adherence to the treatment. This study's individuals residing with a partner and children (close family) adhered more to the treatment, as the family's importance, despite the threats and contingencies of life nowadays, is evident in adherence to the treatment, seen as when there is cohesion, organization and the family's support, there's greater adherence to treatment[18]. Socioeconomic factors have been referred to as important for therapeutic adherence, while a low level of education, illiteracy, unemployment, low-income and the geographical distance from health institutions may become significant obstacles to adherence[3]. Based on our study's results we can infer that the diabetics residing in urban areas, with high/average levels of education have lower average levels of HbA1c, i.e., they adhere more to the therapeutic plan. This study shows the existence of statistically insignificant negative associations between the disease evolution period and adherence, i.e., just as expected, the longer the disease evolution period, the greater the adherence level, seen as patients with a longer disease evolution period have greater knowledge about it, a clearer understanding of the therapeutic scheme and consequently demonstrate more adherence. The act of taking medication on a daily basis and several times a day constantly remembers the person with diabetes that they suffer from a chronic illness, which could trigger a behaviour of denying the disease and the treatment with medication. Prolonged therapies specific of chronic illnesses such as diabetes, where there is no definitive improvement in results, are the object of less motivation to adhere to the treatment[19]. In line with what was previously mentioned as well as with the results of the study, we can infer that the longer the time period of administering insulin is, the lower the adherence will be. One of the important factors in adherence is autonomy for carrying out self-care activities. If the patient is not self-sufficient it is fundamental for there to be a good level of family support to contribute to the success of management and adherence to the treatment. Rossi[20] carried out a study on the

influence of family support in the care of adults with type 2 diabetes and found that the family's support in daily care is fundamental for both adherence and metabolic control. Congruent with both his results and our research's results, we can conclude that when there's another person responsible for the administering of insulin to a diabetic patient, adherence to the therapeutic plan is greater.

The daily treatment of DM requires a complex and demanding therapeutic regime with the purpose of obtaining a glycaemic profile closer to that which is considered normal. Adherence to said therapeutic regime is difficult seen as it implies a multiplicity of daily self-care behaviours. For the study of adherence to diabetes treatment it is necessary to understand that there are various important self-care activities in the treatment, such as diet, practicing physical exercise, administering medication, monitoring of glycaemia and foot care. In our study, the monitoring of glycaemia and specific diet are variables which affect adherence to the treatment ($p \leq 0.05$) i.e., the greater the individual's involvement is in the monitoring of glycaemia and in a specific diet, the greater the adherence will be. The other self-care activities including general diet, foot care, physical activity and medication do not translate into statistically significant correlations, even though they do establish negative correlations, which leads us to infer that the more the patient undertakes activities related with self-care activities, the lower his HbA1c level is, and consequently, the greater his adherence to treatment will be.

The sample revealed knowledge deficits in areas related with the illness' identity, its causes and treatment. Medication was considered the most important element in the control and treatment of diabetes by 78.4% of respondents, while 53.9% do not recognise the importance of physical exercise in the illness' treatment and 74.5% hold the false belief that an adequate diet consists of special foods. The knowledge levels were higher regarding the extent of the chronic consequences of diabetes with 100% correct responses in most items.

In the study by Sousa & McIntyre[21], found that treatment was the area where diabetic patients showed more knowledge; its causes and identity were the aspects where patients showed less knowledge.

International studies are congruent with our research, where people with diabetes show a knowledge deficit regarding their illness' different dimensions. A study carried out in India[22] which had the objective of quantifying the level of knowledge of diabetics in a range of areas such as the prevention and treatment of

complications associated with the illness, confirms that the diabetic's knowledge of the treatment and the complications of diabetes is limited, particularly regarding its prevention, which translates as a clear need to provide patients with the necessary knowledge to help obtain the maximum benefit from their treatment.

The patient's knowledge of their illness and its therapeutic regime are recognised as the factors which affect adherence to the therapeutic regime the most. In this study, greater patient knowledge about their illness was associated with a greater adherence to the treatment (p=0,040). These results show that it's vital that individuals acquire knowledge and skills to allow them to manage their illness on a daily basis, as well as their symptoms and limitations, thus improving their adherence to the therapeutic plan and metabolic control as well[22]. Our findings are in line with both international and national studies consulted, which show that greater knowledge by diabetic patients concerning their illness is associated to greater adherence to the treatment and improved glycaemic control[21, 23].

The study carried out by Chan and Molassiotis[24] which analysed the correlation between knowledge about diabetes and adherence showed a considerable gap between what patients are taught to do and what they actually do. The majority of participants have reasonable knowledge about their illness but fail when they attempt to apply this knowledge on their habits.

Conclusion:

Diabetes, due to its prevalence and correlation with co-morbidities, requires decisive action by means of adopting healthy lifestyles and treatment with medication. However, in spite of the proven effectiveness of medication, maintenance of glycaemic/metabolic control within desirable levels is still unsatisfactory. This situation is due, in part, to the lack of adherence to the therapeutic plan (the use of medication, the adoption of a balanced diet and the regular practice of physical exercise) which requires a change in lifestyle and the maintenance of those new habits. The adherence issue's relevance is unquestionable, as it is on this alone that the success of the therapeutic plan and the control of a chronic illness like diabetes depend. Nevertheless, there are gaps in the knowledge of techniques related with education/care which favour the achievement of and/or improvement in adherence. Transmitting clear and accurate information

about the illness, its treatment and control is a step towards motivating the diabetic patient to self-care and adhere to an approach shared between the healthcare professional and the patient. This will help to overcome existing gaps in the area of knowledge, still, it is essential to convey that the knowledge acquired throughout the contact with the illness, is not only helpful for reproducing the information received but also for assuming the incorporation of new attitudes and habits.

The results of both our research and the others which we presented here reveal knowledge deficits regarding certain aspects of the illness and corroborate that patients need to learn skills which will allow them to manage their illness and its symptoms and limitations on a daily basis, so they can integrate it into their life and adjust their life habits. For this to happen it is fundamental that individuals have knowledge about their illness and about the possibilities there are for its optimal control. Thus, providing information is essential, so that patients can make conscious decisions about their health/illness which will allow the maintenance of the maximum degree of autonomy from healthcare specialists.

Therapeutic education is one of the pillars of the promotion of self-care activities for type 2 DM and should be a planned activity aiming to create the conditions for producing changes in behaviour regarding health. Educating the diabetes patient is to empower him over his chronic illness and to give him the chance to recognise the importance of adhering to the therapeutic regime and of controlling the illness. The patient's life context, their degree of acceptance of the illness, their capabilities, knowledge and skills affect their motivation for learning to manage the illness. Educating the diabetes patient is to transfer responsibilities to him, with the purpose of making him more autonomous and a partner to the healthcare team in his treatment.

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Table 1: Statistics on age according to gender

Age Gender	n	Min	Max	Av.	Dp	SK/error	K/error	CV (%)
Male	53	40	84	62.77	10.16	0.07	-0.96	15.22
Female	49	41	85	63.73	10.87	-0.06	-0.38	17.06
Total	102	40	85	63.24	10.47	-0.05	-0.94	16.56

Table 2 – Characterisation of the diabetic patient by gender and HbA1c values

Gender	**Male**		**Female**		**Total**		**Residuals**	
HbA1c	n	%	n	%	n	%	Male	Female
0 – 7.9%	21	39.6	22	44.9	43	42.2	-0.5	0.5
8-15%	32	60.4	27	55.1	59	57.8	0.5	0.5
Total	53	100.0	49	100.0	102	100.0	X^2=0,291; p=0,590	