

Psychological aspects of people suffering from diabetes mellitus

Aspectos psicológicos de pessoas que padecem de diabetes mellitus

Fernando Oliveira Pereira 

Escola Superior de Educação Almeida Garrett / Universidade Lusófona de Lisboa (Lisboa). Portugal. fopereira@sapo.pt

ABSTRACT | The Human Being is a bio-psycho-social system, whose structural and functional complexity is reflected in the manifestations of disease. Diabetes mellitus is a disease that has an impact on the psychic and psychosocial functionality of the patients. **OBJECTIVE:** To study aspects of a psychological and psychosocial nature in people with diabetes mellitus. **METHOD:** Quasi-experimental research with a quantitative and comparative approach, consisting of 100 participants of both sexes: 50 subjects with diabetes mellitus in the age group 30 - 88 years and 50 subjects with identical socio-demographic characteristics, but who do not suffer from this disease. Methodological instruments used in data collection: Clinical-psychological interview; Socio-demographic questionnaire; Clinical-dynamic disease questionnaire; Self-assessment questionnaire of psychic functionality and performance in family, social and work activities. **RESULTS:** In the group of participants with diabetes mellitus, compared to the control group, there are statistically significant differences of greater expressiveness of psychological aspects, such as nervousness, irritability, anxiety, and depression, and lower in psychosocial manifestations such as work capacity, mental availability to socialize with friends and to collaborate within the family. However, although the values are also higher in the categories of anxiety and pessimism and tiredness / fatigue, the differences do not reach the statistically significant level. **CONCLUSION:** Suffering of diabetes mellitus has a negative impact on the psychic and psychosocial functionality of patients and, therefore, negative repercussions on style and quality of life; this justifies the implementation of support and psychological monitoring measures to facilitate and promote the acceptance of the disease, adherence to treatments and adaptation to the new reality of life.

KEYWORDS: Diabetes Mellitus. Psychological aspects. Psychosocial aspects.

RESUMO | O Ser humano é um sistema bio-psico-social, cuja complexidade estrutural e funcional reflete-se nas manifestações da doença. A diabetes mellitus é uma doença que se repercute na funcionalidade psíquica e psicossocial dos sujeitos portadores. **OBJETIVO:** Estudo de aspetos de natureza psicológica e psicossocial em pessoas com diabetes mellitus. **MÉTODO:** Investigação do tipo quasi-experimental com abordagem quantitativa e comparativa, constituída por 100 participantes de ambos os sexos: 50 sujeitos com diabetes mellitus do escalão etário 30 - 88 anos e 50 sujeitos com características socio-demográficas idênticas, mas que não padecem da doença. Instrumentos metodológicos utilizados na recolha de dados: Entrevista clínico-psicológica; Questionário Sócio-demográfico; Questionário clínico-dinâmico da doença; Questionário de Auto-avaliação da funcionalidade psíquica e do desempenho na actividade familiar, social e laboral. **RESULTADOS:** No grupo de participantes com diabetes mellitus, comparativamente ao grupo de controle, evidenciam-se diferenças estatisticamente significativas de maior expressividade de aspetos do foro psicológico, tais como, nervosismo, ansiedade, irritabilidade, depressividade e mais baixos nas manifestações de índole psicossocial como a capacidade de trabalho, disponibilidade mental para o convívio com amigos e para colaborar no seio da família. Contudo, embora os valores também sejam mais elevados nas categorias de ansiedade e pessimismo e cansaço/fadiga, as diferenças não alcançam o nível estatisticamente significativo. **CONCLUSÃO:** O padecimento da doença de diabetes mellitus tem impacto negativo na funcionalidade psíquica e psicossocial dos pacientes e, por conseguinte, também há repercussões negativas no estilo e qualidade de vida; justificando-se, assim, a implementação de medidas de apoio e acompanhamento psicológico para facilitar e promover a aceitação da doença, adesão aos tratamentos e adaptação à nova realidade de vida.

PALAVRAS-CHAVE: Diabetes Mellitus. Aspetos psicológicos. Aspetos psicossociais.

Introduction

The human being is a system of a high degree of complexity whose structure integrates factors of different natures, such as biological, psychological, and social; therefore, it assumes itself as a bio-psycho-social system. Each nature can represent modalities or specific levels of functionality: the biological represents the biophysical, biochemical, biological, physiological, neurophysiological modality; the psychological represents the psychophysiological, neuropsychological, psychological, psychosocial; the social represents social, cultural, environmental modalities (Lomov, 1984; Morin, 1994; Pereira, 2018).

The human being is the subject with the disease, or pathology, from which he suffers and in whose system a certain clinical-pathological picture is established and defined, in which general, specific and individual characteristics may be revealed, following the structure consolidated functional following the specificities of the sickness process, involving all the diversity of factors inherent to the system and surrounding environment.

Chronic diseases, because they are long-lasting and extend over time, and may even have a status for the rest of the life that remains, generally have a negative impact, both on psychosocial functionality and on the way they perceive, apprehend, and project life; in short, in the quality of life of the people who suffer from them (Ogden, 2004). One of the factors that generate negative psychological changes in patients, in addition to physical, psychological, and social limitations, and the suffering itself, resulting from the specificity of the clinical condition, is the unpredictability and uncertainty regarding the probability of cure, as it happens in oncological diseases (Pereira, 2013).

Diabetes mellitus, whether type 1 or 2, is one of the chronic diseases of high prevalence and impact on the quality of life, along with cardiovascular diseases (American Diabetes Association [ADA], 2020; International Diabetes Federation [IDF], 2017; World Health Organization [WHO], 2018). Based on the Guidelines of the Brazilian Diabetes Society it is estimated that there are currently 385 million people in the world with diabetes and that in 2035 it will reach 471 million (Oliveira & Vencio, 2016). However, the International Diabetes Federation [IDF] (2017)

reports that in the world population 425 million adults suffer from Diabetes Mellitus and that one in two people remains undiagnosed.

Diabetes is a metabolic syndrome of multifactorial etiology, originated by an insufficient amount of insulin and/or inability to adequately perform its functions, causing hyperglycemia, which translates into an excessive increase in the amount of sugar in the blood, with alteration of the metabolism of carbohydrates, fats, and proteins (Lourenzo, 2018; Silva, 2010).

The diagnosis of diabetes can result in an emotional shock to the patient since he is not prepared for the limitations that arise from the chronicity of the disease; therefore, the impact, in both types, 1 and 2, of diabetes, can be profoundly negative on the emotional and psychological well-being of the patient depending on their degree of acceptance, assigned meaning and understanding of the necessary self-care and motivation to adhere to and maintain the treatment (Dowling, 2018; Lourenzo, 2018; Pereira, 2010, 2013).

Type 1 diabetes mellitus is present in about 5 - 10% of all patients with this pathology, resulting from the destruction of beta-pancreatic cells and causing severe insulin deficits, the origin of which is mostly autoimmune; it usually occurs before the age of 30, predominantly in the childhood or adolescence age group, and can manifest itself in adulthood in a much more insidious way (Fraguas, Soares & Bronstein, 2009; Oliveira & Vencio, 2013). The onset of type 2 diabetes is often after the age of 40, with the peak incidence around the age of 60, representing 85 - 90% of the diabetic population, in which a large part of it does not require insulin treatment (ADA, 2020; IDF, 2017; Pickup & Williams, 1997; Silva, 2010; The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus, 2000, 2003).

With the intrusion of the disease, particularly the chronic one, it leads to disturbances in the activities and interests of the patients, on the one hand, due to the limitations imposed by the disease itself and its treatment and, on the other hand, it stems from the subject's perception of personal control reduced; factors that explain much of the variability of depressive symptoms (Pièrez-Mari et al., 2015; Silva, 2010; Talbot et al., 1999). The severity of the condition and the consequent complications increase the levels of depression; in the case of diabetic patients,

social support, resulting from the social relations networks in which the patient is involved, reduces this symptom, as well as the way of constructing and regulating life goals and the perception of self-efficacy may be factors responsible for the manifestations depressive (Benitez-Agudelo et al., 2017; Groot et al., 2001; Nouwen, 2002; Silva et al., 2015). Investigations have shown that diabetes increases the prevalence of depressive symptoms and depression itself also increases complications and mortality in this disease, with these patients with depression increasing the possibility of abandoning treatment (Qiñones et al., 2018; Souza & Silva, 2016; Van Dooren et al., 2013). Facts that prove to be important and indispensable are daily family support for therapeutic compliance, as well as social support benefits patients' psychological well-being (Koetsenruijter, Lieshout, Lionis & Portillo, 2015; Peters, Nawijn & Kesteren, 2014).

Because of the reciprocal influences between emotional stress and self-care, in patients with diabetes, the presence of stress can be seen as a major risk factor for achieving bad therapeutic results; however, obesity also proves to be a risk factor in diabetes and other pathologies (Beléndez et al., 2015; Bernabé-Ortiz et al., 2015; Oliveira & Vencio, 2016; Tareen & Tareen, 2017).

Concerning the social determinants associated with chronic non-communicable diseases, investigations have shown, in an elderly population, that those who did not suffer from chronic diseases had better results in terms of daily physical activity, mental state, and social relationship than the holders of this condition type of diseases (Huang et al., 2015). Nowadays, the role played by social support in chronic diseases is considered important, but more than the support itself, the subject's perception of this support is even more important (Beléndez et al., 2014; Creaven & Hughes, 2012). Investigations show that social support is indeed an important variable in the pathologies of hypertension and diabetes, ensuring good indicators of physical and mental health, with self-esteem, the sense of control and control of one's life positive social and individual resources to deal with stressful factors daily (Gonçalves et al., 2011). Diabetes is often associated with emotional distress; therefore, social support has a moderating role here and sociability is an important attribute of resilient people (Baek et al., 2014). Thus, the promotion and development of social skills can help people suffering

from chronic diseases to be more resilient when they have to deal with the complications arising from them. Recent studies reveal that there is a relationship between stress, resilience, and social support, showing that the existence of social support makes people stronger, more secure, and, therefore, with higher levels of resilience, making the impact of stress generated by chronic diseases, in particular hypertension and diabetes mellitus, minor, facing it with greater confidence and courage (Malagris, 2019).

Diabetes mellitus directly interferes with nutritional and hormonal factors and indirectly with psychosocial factors, and these patients often reveal emotional lack of control, irritability, and affective instability (Cartes-Velasquez & Henriquez-Tejo, 2018; Harris, 2003; Touse et al., 2016); worsening self-image, whose dissatisfaction generates low self-esteem, often related to depression and insecurity (Joseph, 2003; Sanjay et al., 2018). Therefore, the multidisciplinary perspective in the care of diabetic people requires a psychological approach, since the biopsychosocial integration of patients is an important condition to favor the care provided, ensuring a better quality of life and psychological well-being (Ferraz et al., 2000; Lima, 2015). Living with the disease for life requires specific self-care behaviors (Kuch et al., 2015; Naton, 2002); therefore, the psychological work with diabetic people has as main objective the acceptance of the disease to improve the quality of life, and individual or group interventions, especially the last one, bring benefits in terms of physical and mental health, personal development, promoting relational skills and skills training that will facilitate treatment adherence (António, 2010; Filipe, 2016; Gusmai et al., 2015). Psychological counseling facilitates and promotes the expression of positive emotions such as satisfaction, pleasure, the joy of living, reducing the tension resulting from the burden of treatments and, consequently, also good habits related to the good control of the disease (Dennick et al., 2017; Perales & Soto-Caceres, 2017). Therefore, communication with the patient adapted to their educational and cultural level is extremely important to establish a qualified doctor-patient relationship (Bailey et al., 2014), with the significant impact of the level of school education and of health education in cardio-vascular episodes and mortality in diabetic patients (Arredondo et al., 2017; Blomster et al., 2017; Liu et al., 2015).

The lifestyle of patients with diabetes, whether type 1 or 2, is one of the most important, if not determinant, factors in glycemic control, and therapy, especially in type 1, interferes greatly with lifestyle, because of rigor in terms of self-discipline and using various levels of action, from insulin therapy to dietary guidance, information on how to deal with the disease, self-administration of insulin, self-monitoring of blood glucose, to the maintenance of activity physics and social support (Cardenas et al., 2017; Goes & Vieira, 2007; Setian et al., 2003). In addition, emotional and psychological factors such as anxiety, depression, alexithymia can negatively influence the glycemic control process (Gupta et al., 2016; Marcelino & Carvalho, 2005; Melin et al., 2013). Consequently, a lifestyle based on regular physical activity, actions, and guidelines aimed at reducing stress, anxiety disorders, and depression favors and promotes effective glycemic control (Sales-Peres et al., 2016). Good planning with healthy life projects that include pleasant walks and activities such as cycling outdoors contribute to reducing the incidence of diabetes and obesity (Creatore et al., 2016). So, an important role falls on the constitution of multidisciplinary teams to promote health education for diabetic patients, providing quality of life, through a healthy diet and physical activity (Tsai et al., 2010). Particular emphasis on the promotion of quality of life in diabetics takes on psychotherapeutic and psychoeducational interventions, in order to minimize the impact of negative psychological aspects. Hence the importance of researching the specifics of the functionality of psychological aspects in diabetics.

Therefore, the investigation aims to study aspects of psychic functionality, psychosocial activity, and living conditions in patients with diabetes mellitus, before diagnosis and currently, compared to people who do not suffer from this pathology.

Method

Research typology and design

According to the established objective, a quasi-experimental type investigation was implemented, which is compatible with the quantitative approach of the data, using the comparative method between two groups: the experimental and the control (Coutinho, 2013; Pardal & Correia, 1996; Quivy & Campenhoudt, 1992). For this purpose, the parametric statistical technique of comparison between groups with equal amounts of participants was selected, based on Student's t-criterion, which operates focused on the quantities of arithmetic means and standard deviation (Pestana & Gageiro, 2014), being appropriate to the objective of revealing significant differences in altering variables related to aspects of psychic functionality between groups of participants.

The investigation resulted from the application of methodological instruments for data collection: the socio-demographic questionnaire, aiming at information on age, profession, marital status, and education; the clinical-dynamic questionnaire of the disease, to define the evolutionary dynamics of the pathology over time; the self-assessment questionnaire on psychic and psychosocial functionality to find changes in various psychological aspects and also on performance in family, social and work activities; clinical-psychological interview, aiming to obtain information that can help to interpret the data collected by the other instruments.

The participants in the experimental group were diabetes mellitus patients who had a regular clinical and therapeutic follow-up in medical offices of private clinics located in the health area of Lisbon and Vale do Tejo and those in the control group were people with an active social life who did not suffer this or other chronic pathologies.

The investigation took place individually during the year 2020 from January to July, with informed consent and verbal explanation being obtained from each participant and also from his / her attending physician; having been conducted in a way that respects the ethical and deontological principles of intervention and especially the dignity of human individuality.

The main inclusion criterion for the participants in the experimental group was the presence of the diabetes mellitus pathology and not suffering from other serious pathologies, namely psychiatric ones; in the control group, it was not suffering from diabetes, nor from other chronic diseases, nor from psychiatric.

Hypotheses

Hypothesis 0 - There are no significant differences in psychic functionality, psychosocial activity, and living conditions between people who suffer from diabetes mellitus and people who do not suffer from this pathology.

Hypothesis 1 - There are significant differences in psychic functionality, psychosocial activity, and living conditions in people who suffer from diabetes mellitus compared to the control group, whose subjects do not suffer from this pathology.

Participants

A sample consisting of 100 participants and represented by 50 people from the experimental group diagnosed with diabetes mellitus and 50 people from the control group who do not suffer from this pathology.

Socio-demographic characterization of the research participants

Table 1. Socio-demographic characteristics of the participants

Grups		Group		Control Group	
		Diabetes Mellitus			
Characteristics		Amount	%	Amount	%
Sex	Maile	27	54	20	40
	Female	23	46	30	60
Marital Status	Single	4	8	8	16
	Married	37	74	36	72
	Divorced	1	2	0	0
	Widower	8	16	6	12
Age Groups	30 - 40 years	6	12	4	8
	41 - 50 years	5	10	4	8
	51 - 60 years	6	12	6	12
	61 - 70 years	12	24	18	36
	71 - 80 years	11	22	15	30
Schooling	81 - 90 years	10	20	3	6
	Illiterate Education	6	12	0	0
	1st cycle (4 years)	20	40	24	48
	2nd cycle (2 years)	9	18	3	6
	3rd cycle (3 years)	7	14	6	12
	Secondary Education (3 years)	6	12	7	14
Higher Education (3 - 5 years)	2	4	10	20	

Table 1 describes the distribution of the sociodemographic characteristics of the participants in the investigation, verifying that as for gender, the numbers of male (54%) and female (46%) participants in the diabetes mellitus group are slightly higher than the number of females (60%) than males (40%) in the control group. Although the number of male and female participants is not the same in the diabetes mellitus group and in the control group, the differences are few, allowing to maintain the balance of the parties in the investigation. Regarding marital status, most participants are married: 74% in diabetes and 72% in the control group, corresponding approximately to $\frac{3}{4}$ of the participants in both groups. The age range of the participants is between 30 and 88 years, with $M = 64.56$ and $SD = 16.57$, in the diabetes mellitus group and between 32 and 83 years, $M = 64.40$ and $SD = 14.14$, in the control group. In both groups, pathology, and control, most of the research participants belong to the age groups above 60 years, representing a percentage between 65% and 72%. As for education, most of the research participants, in both groups, have the 1st cycle of basic education, corresponding to 4 years of training, with the 1st and 2nd cycle together being more than half, oscillating between 54% and 58%.

Methodological tools

Clinical-psychological interview

Clinical typology interview in a semi-structured format oriented to psychological aspects related to the subject's functionality in the different dimensions of his life (Leal, 2008). The use of the interview in this format has the purpose of obtaining relevant information for the investigation and to thoroughly investigate specificities of the patient's psychic functionality and also remedying some of the characteristic shortcomings of structured instruments such as questionnaires with defined response variants.

In this investigation, the data collected through the clinical-psychological interview will not be presented directly but will serve as a basis for the interpretation of the results in situations that require the contribution of qualitative specificities than the results obtained by the questionnaires, in which the questions are

previously predetermined and the answers limited to a closed range of values, are not likely to achieve the desired detail. Therefore, the information collected by the interview will be a resource that the researcher uses to complement, specify and justify the results directly exposed in the tables.

Socio-demographic questionnaire

The socio-demographic questionnaire consists of questions, whose guidance is aimed at collecting information on categories that characterize social, cultural, demographic life, and the exercise of citizenship: age, profession, marital status and education, and others. The information collected by the sociodemographic questionnaire aims to characterize the participants in this context and help to understand whether these characteristics may have any influence or be interfering factors in the clinical-psychological picture of diabetes mellitus.

Clinical-dynamic disease questionnaire

Questions of a clinical nature aimed at objectifying and specifying the type and dynamics of the disease: type of diabetes; diabetes complications; age at which diabetes was diagnosed; duration of the disease; age at which medication was started; the age of change from the 1st to the 2nd and 3rd medication; whether the disease has changed your life; what changes you had to make in your life due to illness.

Self-assessment questionnaire of psychic functionality and performance in family, social and work activities (Pereira, 2010, 2013).

Consisting of questions related to two dimensions: psychic activity and social and work activity.

The dimension related to psychic functionality aims to assess the degree of expressiveness of specific aspects such as nervousness, anxiety, irritability, depression, pessimism, tiredness/fatigue.

The dimension related to social and work activity aims to assess the degree of expressiveness of aspects of the subjects' daily life such as work capacity; the availability to interact, relate and collaborate in the family context; availability for socializing with friends.

Questionnaire previously tested in a pilot study with other chronic pathologies, having given good indications with regard to comparing populations with chronic health problems and populations, in which this psychological burden is absent.

The subject on a scale of 0 to 10 indicates the degree of expression of a given category in a given situation, circumstance, or condition according to the instruction provided.

In this concrete investigation, the methodological instrument was used in order to understand the extent to which diabetes mellitus can have an impact on the psychological functionality and social activity of participants with the disease, involving negative psychological, social, family, and work manifestations.

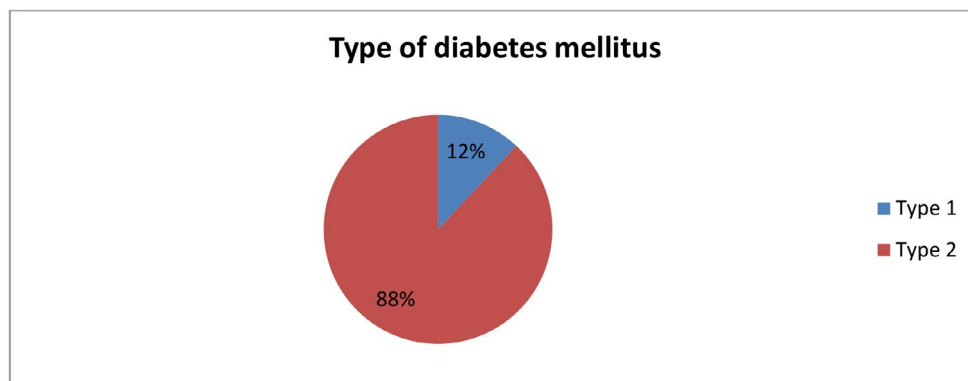
Results

Clinical characterization of the dynamics of the “diabetes mellitus” pathology

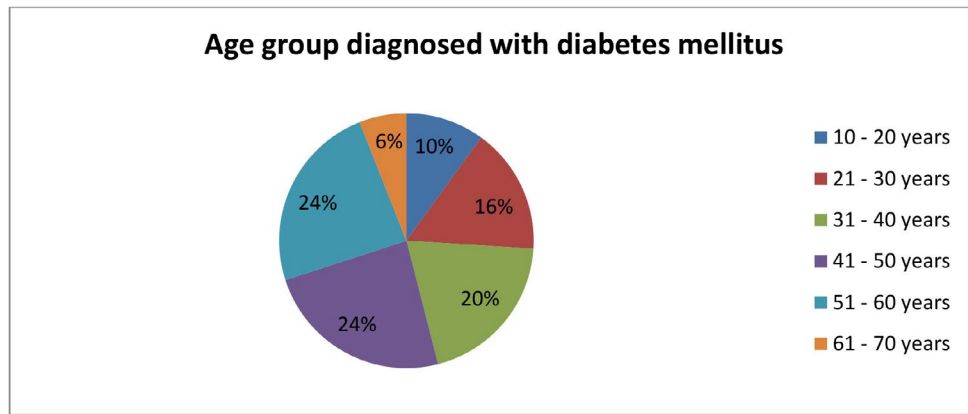
Diabetes mellitus in the onset and onset process is not the same in all patients, with each participant showing a different dynamic according to the characteristics of their clinical condition.

According to the graph below, there are 12% of participants in the experimental group with type 1 diabetes mellitus and 88% of type 2.

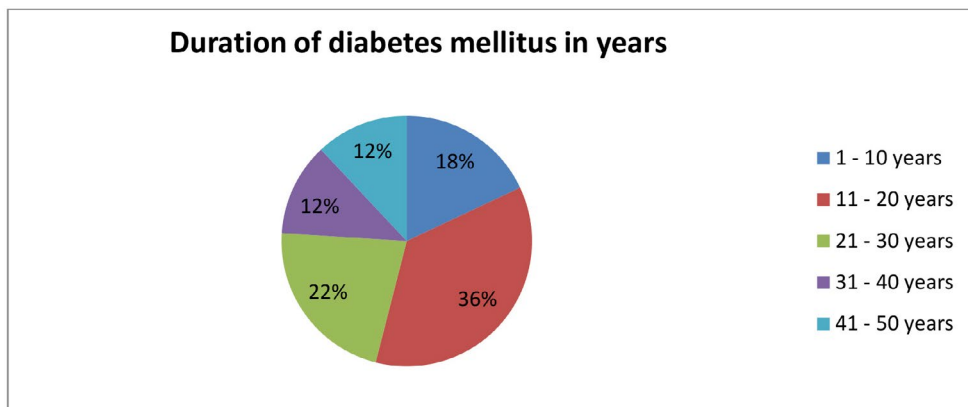
Figure 1. Distribution of participants regarding the type of diabetes mellitus



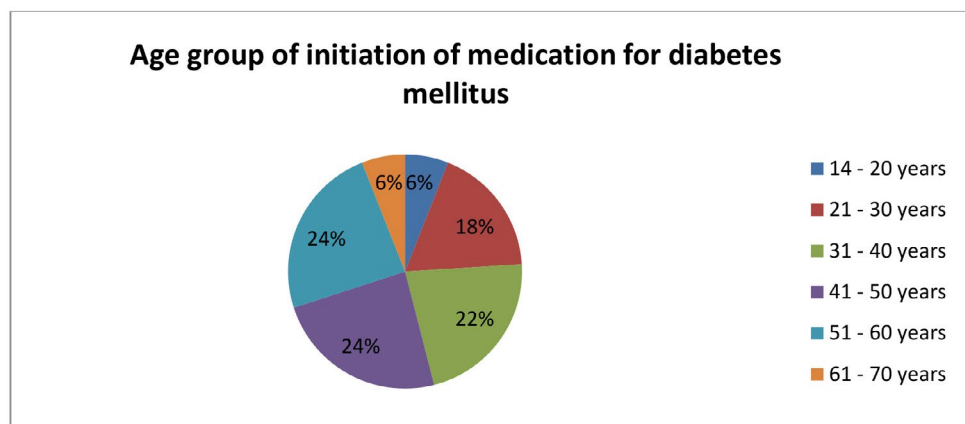
As for the age group in which diabetes mellitus was diagnosed, it appears that the diagnosis was established in the age range between 14 and 71 years, with $M = 42.00$ and $SD = 14.42$. According to the distribution in the graph in figure 2, a certain identity is observed for 10-year age groups between 30 and 60 years old, with 20 to 24% of participants in each decade. Therefore, the diagnosis in most participants coincided with the life cycles of middle age and young elderly.

Figure 2. Distribution of participants with diabetes mellitus by age group regarding the establishment of the diagnosis

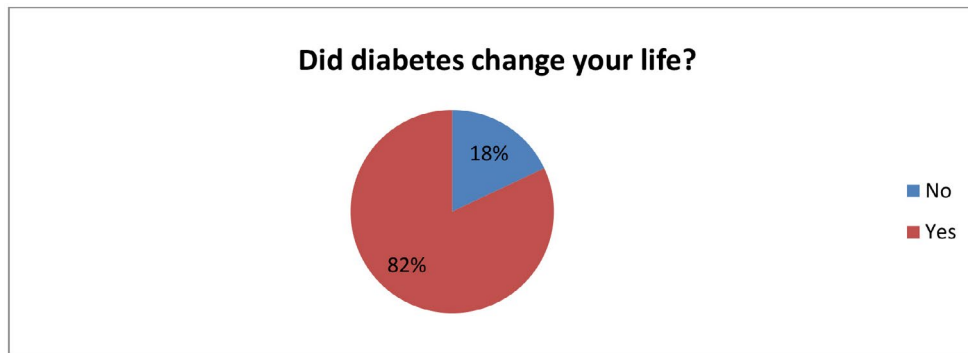
The time period in which diabetes mellitus is installed is between 11 and 30 years old, in the majority of participants, about 56%, being more expressive between 10 and 20 years old.

Figure 3. Distribution of participants with diabetes mellitus according to the years of the pathology

The period of time in which the majority of diabetes mellitus patients started the medication is between 21 and 60 years old and corresponds to 88% of the participants, varying from 18 to 24% by age group corresponding to 10 years.

Figure 4. Distribution of participants with diabetes mellitus, according to the age at which medication was initiated

As for the question whether the disease changed his life, most participants with diabetes mellitus - 82% - say yes

Figure 5. Distribution of participants with diabetes mellitus regarding the perception that the pathology has altered their living conditions

Specificities of psychic functionality and social and work activity in patients with diabetes mellitus

Table 2. Differences in psychic, family, social and work activity between people with diabetes "before knowing the diagnosis" and the "control group"

Categories	Groups				Differential	Student t-Criterion	Statistical significance level p<
	Diabetes Patients " Before diagnosis"		Group of control				
	M	SD	M	SD			
Nervousness	2,76	3,14	3,98	2,25	-1,22	-2,36	0,022
Anxiety	2,82	2,96	3,92	3,19	-1,10	-1,93	0,059
Irritability	2,50	2,94	2,60	1,95	-0,10	0,19	0,847
Depression	1,20	2,35	1,30	2,29	-0,10	-0,21	0,830
Working capacity	7,96	3,36	7,16	2,40	0,80	1,32	0,133
Tiredness / Fatigue	1,56	2,27	4,36	2,27	-2,80	-6,37	0,000
Pessimism	1,36	2,92	2,54	2,55	-1,18	-2,64	0,011
Availability to socialize with friends	6,04	3,88	6,30	1,59	-0,26	-0,43	0,665
Willingness to collaborate in the family	7,14	3,33	8,54	1,38	-1,40	-2,68	0,010

From the research results recorded in Table 2, it appears that the participants in the group with diabetes mellitus in the time period corresponding to "before knowing the diagnosis", compared to the control group, have lower mean values of nervousness, anxiety, irritability, depression, tiredness/fatigue, pessimism, availability to socialize with friends, availability to collaborate in the family and higher only in the capacity to work, even though the differences are not statistically significant concerning the manifestations of irritability, depression, work capacity and availability to socialize with friends, but is statistically significant in the remaining categories ($p < 0.05$ to 0.000).

It means that they consciously have the representation that at that time in their life they did not feel as nervous, anxious, pessimistic, tired, or fatigued as the people in the control group. However, they admit to having felt less mental availability to collaborate in tasks related to the family group and also in relation to socializing with friends.

Table 3. Differences in psychic, family, social and work activity between people with diabetes “after knowing the diagnosis” and the “control group”

Categories	Diabetes Patients “ After diagnosis”		Group of control		Differential	Student t-Criterion	Statistical significance level p<
	M	SD	M	SD			
	Nervousness	5,36	3,10	3,98			
Anxiety	4,68	2,90	3,92	3,19	0,76	1,27	0,210
Irritability	4,10	3,24	2,60	1,95	1,50	2,81	0,007
Depression	2,62	3,03	1,30	2,29	1,32	2,49	0,016
Working capacity	6,02	3,13	7,16	2,40	-1,14	-2,21	0,031
Tiredness / Fatigue	4,98	3,19	4,36	2,27	0,62	1,09	0,279
Pessimism	3,22	3,28	2,54	2,55	0,68	1,17	0,244
Availability to socialize with friends	5,02	3,35	6,30	1,59	-1,28	-2,44	0,018
Willingness to collaborate in the family	7,14	3,33	8,54	1,38	-1,40	-2,68	0,010

From the results recorded in table 3, it appears that in the time period corresponding to “after knowing the diagnosis”, the participants in the diabetes mellitus group, compared to the control group, have higher mean values of nervousness, anxiety, irritability, depression and lower levels of work capacity, mental availability to socialize with friends and to collaborate within the family, the differences being statistically significant ($p < 0.03$ to 0.007). However, although the values are also higher in the categories of anxiety and pessimism, and tiredness/fatigue, the differences do not reach the statistically significant level.

Discussion

The distribution of participants with diabetes mellitus in 12% type 1 and 88% type 2 demonstrates the high prevalence of the latter type, corresponding and being reported and corroborated by other investigations (ADA, 2020; IDF, 2017; Silva, 2010; WHO, 2018).

Regarding the age group in which diabetes mellitus was diagnosed, the distribution reveals that in 74% of the participants the diagnosis was established after the age of 30; therefore, only 26% below that age and 10% are under 20 years old. In this investigation there are 12% of patients with a confirmed type 1 diabetes mellitus diagnosis, the type that usually appears very early as a result of the family's genetic-constitutional burden, probably coincides with the 10% of the age group between 10 and 20 years. This fact is corroborated by the results published in other investigations (ADA, 2020; Fraguas et al., 2009; Oliveira & Vencio, 2013; IDF, 2017; Silva, 2010; WHO, 2018).

In general, the results of the investigation confirm that the onset of type 2 diabetes mellitus is often later, compared to type 1, in an already consolidated adult phase and as a consequence of lifestyle, mainly in terms of food, where related errors are registered with excesses, and also with a sedentary lifestyle and insufficient physical activity (ADA, 2020; IDF, 2017; WHO, 2018).

Regarding the years of diabetes duration until the moment of the investigation, it appears that in 36% of the participants the pathology lasts between 10 and 20 years, and in 58% of the participants the duration of the pathology falls within the interval of 10 to 30 years. Interestingly, there are 12% of participants, whose duration falls between 40 - 50 years; indicating that they are subjects with type 1 diabetes, because this type, according to the literature (ADA, 2020; Fraguas et al., 2009; Oliveira & Vencio, 2013; IDF, 2017; Silva, 2010; WHO, 2018), it appears very early, and may be in childhood or adolescence.

The age distribution of medication initiation for diabetic pathology shows that there were participants who started medication at an early age, some before the age of 20, perhaps in adolescence, and others a little later, but before the age of 30. It is assumed that a part of these are subjects with type 1 diabetes (Fraguas et al., 2009; Oliveira & Vencio, 2013; Souza & Silva, 2016). However, 54% of the sample participants started medication after 40 years of age. Indicator aspect of diabetes mellitus, in these cases, resulting from overeating; in which patients had a poor lifestyle with regard to containment and selection in the intake of certain foods and also the tendency towards a sedentary style in which physical activity is scarce.

Regarding the question of whether the disease changed their life, only 18% of the participants considered that it did not and 82% considered that it did, that it changed their life. The graph in figure 5 clearly shows that more than $\frac{3}{4}$ of the participants in the sample of subjects with diabetes mellitus considers that the disease had a negative impact on their lives, having caused changes of a physical, psychological and psychosocial nature, which had a negative impact, decreasing the quality of life; a fact that is corroborated by the published literature on the psychological and social impact of diabetes on people's lives (Benitez-Agudelo et al., 2017; Dowling, 2018; Lourenzo, 2018; Pièrez-Mari et al., 2015; Silva, 2010).

The results regarding the comparison of the values obtained through the mental representation that the patients have of themselves, at the time when they did not have or did not yet have a diagnosis of diabetes mellitus, and the values of the control group, show that the now diabetes patients showed

significantly lower levels of manifestation of psychic and psychosocial symptoms than those revealed in the control group. Fact that can be explained based on the presumed probability that current patients have updated in their minds the representation of what they were like in the time period corresponding to the young adult age group, in which they were still full of energy, strength, and vitality and there was no situations of a physical, psychological or psychosocial nature that could have negatively influenced their stable and balanced lifestyle. It is like an idealized representation of life in which you only mentally report what happened positive and devalue something that actually existed negative. Therefore, it is as if we are comparing the physical, psychological, and social functionality between someone young in the period of full ascension in all aspects of life and adults at ages who are already in the consolidated phase, but of descent and even more with the ailments and suffering due to time inherent to health status.

Social representations, more specifically representations of a psychosocial nature, together with the social meaning and personal meaning that objects and phenomena acquire for the subject of the action and the attitudes generated towards them, direct, guide, and guide behaviors, including the form how the inner and outer world is perceived with all its facets and perspectives (Kuch et al., 2015; Moscovici, 1984; Pereira, 2009, 2018). This is certainly what happened in the assessment that diabetes mellitus patients made of themselves and their lifestyle, in a past time period, anchored in a mental representation where positive memories are highlighted, devaluing in a certain way the negative ones that were gradually losing strength and meaning in the face of present and future life. In this case, one may be in the presence of assessments whose mental process is based on a memory bias, which is often characterized by the action of emotional states and dissonant psychosocial representations, due to the difference in contexts and their effective perception that involves the object targeted in the assessment and the moment and emotional state in which the subject's own assessment takes place; several investigations demonstrate that the information memorized in the context of a certain emotional state is more effectively reproduced when the subject is in the same emotional state or similar to that of memorization (Kuch et al., 2015; Lowe, 1982; Young, 1979).

The results obtained by comparing the group of diabetics, whose self-assessment was based on representing themselves after having knowledge of suffering from this pathology, with the control group, are different, completely reversing the tendency to value the manifestations of psychic and psychosocial functionality. These are more expressive values, with significant statistical differentiation, in the various psychic and psychosocial manifestations studied in the diabetes mellitus group.

This finding leads to the inference that there are negative implications of suffering from diabetes mellitus disease in the psychological, psychosocial, and social functionality of patients, in which the manifestations of nervousness, anxiety, irritability, depression, pessimism, feeling of tiredness and fatigue present significant levels of greater expressiveness; at the same time, they reveal less work capacity and less mental availability for socializing with friends and for collaboration and interpersonal relationships within the family. Changes that are corroborated by the results obtained in other similar investigations and the conclusions made by several authors (Harris, 2003; Baek et al., 2014; Gonçalves et al., 2011; Groot et al., 2001; Koetsenruijter et al., 2015; Henriquez-Tejo & Cartes-Velasquez, 2018; Joseph, 2003; Malagris, 2019; Nouwen, 2002; Oliveira & Vencio, 2016; Silva, 2010; Talbot et al., 1999; Van Dooren et al., 2013;).

Therefore, the results of this investigation revealed that there are negative repercussions of the suffering of the diabetes mellitus disease, on the psychic functionality and social activity of the patients, including changes in the way they perceive themselves and their lives; therefore, it is pertinent, and in accordance with most authors, to implement psychotherapeutic measures, counseling and psychological monitoring to increase the rates of adherence to compliance with the therapy, improve your inner well-being, stabilize self-esteem, accept the their current condition and readapt to new forms of life and readjust lifestyles compatible with

their current biopsychosocial reality (Antônio, 2010; Bailey et al., 2014; Blomster et al., 2017; Creatore et al., 2016; Dennick et al., 2017; Ferraz et al., 2000; Goes & Vieira, 2007; Gusmai et al., 2015; Marcelino & Carvalho, 2005; Melin et al., 2013; Lima, 2015; Liu et al., 2015; Naton, 2002; Sales-Peres et al., 2016; Setian et al., 2003; Tsai et al., 2010).

This investigation recognizes its importance for addressing a current theme due to the high prevalence of diabetes worldwide in contemporary society and with an expectation to increase. Society, governments, health policy have been increasingly concerned with issues of quality of life for citizens, although the primary focus on health issues continues to be the disease, in recent times with advances in education for health and prevention, the focus has also been extended to resources that ensure a greater quality of life. Hence the relevance of studies aimed at the psychological and psychosocial aspects involved in diabetes mellitus, in particular the specificities of changes in the psychic functionality of patients due to the impact of the disease's clinical condition. However, the study has limitations related, first, to a relatively small sample of participants given the high number of people suffering from diabetes mellitus; secondly, the methodological instruments used, despite allowing to obtain important data, are not sensitive enough to reveal specificities with greater rigor, precision, and minuteness of psychic functionality to elaborate more precise psychological interventions and rigorously focused on certain specific aspects directly linked to the quality of life of patients, namely about adherence to the therapeutic process and medication optimization. Therefore, it is suggested that in future investigations, larger samples of participants should be chosen, application of methodologies specifically focused on the nuclear object to be studied, focusing on particularities of quality of life-based not only on what involves the disease and the health of the patient, but also in what the patient himself, as a person and personality, considers significant and relevant.

Conclusions

Following the objective of the investigation, the hypothesis of a higher prevalence of type 2 diabetes mellitus is confirmed; the duration of the disease in most participants extends between 10 and 30 years; the age at which the disease predominated after 30 years of age; the age groups with the highest prevalence of patients are between 30 and 60 years old; the age of initiation to medication is after 40 years and the highest percentage of patients admit that diabetes has changed their lives. Sociodemographic aspects of the participants and the course of the disease corroborated by other similar studies.

The study also confirms the hypothesis that people with diabetes mellitus tend to have levels of nervousness, anxiety, irritability, depression, pessimism, significantly expressive feelings of tiredness and fatigue and less work capacity, mental availability for socializing with friends and for collaboration and interpersonal relationships within the family.

It is also confirmed the hypothesis that there is a negative impact of diabetes mellitus on the psychic functionality and social activity of people who suffer from this pathology, including the way they perceive themselves and their life.

The study, although current and important in the scope of the theme related to diabetes mellitus, shows limitations that relate to a small sample due to the dimension of the prevalence of the disease, the use of methodologies that reveal relevant data, but are not very sensitive to knowing specifications of greater importance, the thoroughness of patients' psychic and psychosocial functionality. It is suggested in future investigations to study particularities of quality of life-based not only on what concerns the patient's disease and health but also on what the patient himself, as a person and personality, considers significant and relevant.

Competing interests

No financial, legal or political competing interests with third parties (government, commercial, private foundation, etc.) were disclosed for any aspect of the submitted work (including but not limited to grants, data monitoring board, study design, manuscript preparation, statistical analysis, etc.).

References

- American Diabetes Association (2005). Standards of medical care in diabetes. *Diabetes care*, 28 (Suppl 1), S4-S36. <https://pubmed.ncbi.nlm.nih.gov/15618112/>
- Antônio, P. (2010). Psychology and chronic illness: group intervention in diabetes Mellitus. *Psicologia, Saúde & Doenças*, 11(1), 15-27. http://www.scielo.mec.pt/scielo.php?script=sci_arttext&pid=S1645-00862010000100002&lng=pt&tlng=pt
- Arredondo, A., Azar, A., & Recamán, A. L. (2018). Diabetes, a global public health challenge with a high epidemiological and economic burden on health systems in Latin America. *Global public health*, 13(7), 780-787. <https://doi.org/10.1080/017441692.2017.1316414>
- Baek, R. N., Tanenbaum, M. L., & Gonzalez, J. S. (2014). Diabetes burden and diabetes distress: The buffering effect of social support. *Annals of Behavioral Medicine*, 48(2), 145-155. <https://doi.org/10.1007/s12160-013-9585-4>
- Bailey, S. C., Brega, A. G., Crutchfield, T. M., Elasy, T., Herr, H., Kaphingst, K., Karter, A. J., Moreland-Russell, S., Osborn, C. Y., Pignone, M., Rothman, R., & Schillinger, D. (2014). Update on health literacy and diabetes. *The Diabetes educator*, 40(5), 581-604. <https://doi.org/10.1177/0145721714540220>
- Beléndez, M., Aguilar, M., Galindo, M., Jansá, M., Lorente, I., Maderuelo, M., Orozco, D., & Menéndez, E. (2014, 12-14 de junho). *Percepciones de pacientes y profesionales sanitarios acerca de la atención sanitaria a pacientes diabéticos: Resultados del estudio DAWN2 en España* [Perceptions of patients and health professionals about health care for diabetic patients: Results of the DAWN2 study in Spain] [Conference session]. 56 Congreso de la Sociedad Española de Endocrinología y Nutrición (SEEN), Valencia, Espanha.

- Beléndez, M. V., Lorente, I. A., & Maderuelo, M. L. (2015). Emotional distress and quality of life in people with diabetes and their families. *Gaceta Sanitaria*, 29(4), 300-303. <https://doi.org/10.1016/j.gaceta.2015.02.005>
- Benitez-Agudelo, J. C., Barceló-Martinez, E., & Gelves-Ospina, M. (2017). Psychological factors involved in metabolic control in patients with type 2 diabetes mellitus. *Anuário de Psicologia*, 47(3), 140-145. <https://doi.org/10.1016/j.ansic.2018.01.004>
- Bernabé-Ortiz, A., Carrillo-Larco, R. M., Gilman, R. H., Checkley, W., Smeeth, L., & Miranda, J. J. (2015). Contribution of modifiable risk factors for hypertension and type-2 diabetes in Peruvian resource-limited settings. *Journal of Epidemiology and Community Health*, 70(1), 49-55. <http://dx.doi.org/10.1136/jech-2015-205988>
- Blomster, J. I., Zoungas, S., Woodward, M., Neal, B., Harrap, S., Poulter, N., Marre, M., Williams, B., Chalmers, J., & Hillis, G. S. (2017). The impact of level of education on vascular events and mortality in patients with type 2 diabetes mellitus: Results from the ADVANCE study. *Diabetes research and clinical practice*, 127, 212-217. <https://doi.org/10.1016/j.diabres.2017.03.015>
- Cardenas, V., Mausbach, B. T., Sommerfeld, D., Jimenez, D., von Känel, R., Ho, J. S., Garcia, P., & Aarons, G. A. (2017). Depression is Associated with Increased Risk for Metabolic Syndrome in Latinos with Type 2 Diabetes. *The American journal of geriatric psychiatry: official journal of the American Association for Geriatric Psychiatry*, 25(6), 646-653. <https://doi.org/10.1016/j.jagp.2017.02.017>
- Coutinho, C. P. (2013). *Metodologia de investigação em ciências sociais* [Research Methodology in Social Sciences]. Almedina.
- Creatore, M., Glazier, R., Fazli, G., & Booth, G. (2016). Association of neighborhood walkability with change in overweight, obesity, and diabetes. *JAMA*, 315(20), 2211-2220. <https://doi.org/10.1001/jama.2016.5898>
- Creaven, A. M., & Hughes, B. M. (2012). Cardiovascular responses to mental activation of social support schemas. *International Journal of Psychophysiology*, 84(2), 113-119. <https://doi.org/10.1016/j.ijpsycho.2012.01.018>
- Dennick, K., Sturt, J., & Speight, J. (2017). What is diabetes distress and how can we measure it? A narrative review and conceptual model. *Journal of diabetes and its complications*, 31(5), 898-911. <https://doi.org/10.1016/j.jdiacomp.2016.12.018>
- Dowling, L. (2018, 6 de novembro). *Gerenciando o aspecto psicológico do diabetes* [Managing the psychological aspect of diabetes]. Tia Beth.com vida saudável com diabetes. <https://www.tiabeth.com/index.php/2018/11/06/gerenciando-o-aspecto-psicologico-do-diabetes/>
- Ferraz, A. E. P., Zanetti, M. L., Brandão, E. C., Romeu, L. C., Foss, M. C., Paccola, G. M. G., Paula, F. J. A., Gouveia, L. M. F., & Montenegro Jr, R. (2000). Multiprofessional care of patients with diabetes mellitus at the endocrinology outpatient clinic of the university hospital of the Ribeirão Preto school of medicine (HCFMRP-USP). *Medicina (Ribeirão Preto)*, 33(2), 170-175. <https://doi.org/10.11606/issn.2176-7262.v33i2p170-175>
- Filipe, V. M. F. (2016). *Satisfação das crianças / jovens na consulta de diabetes: influência das variáveis clínicas* [Satisfaction of children/youth in diabetes consultation: influence of clinical variables] [Dissertation, Instituto superior politécnico de Viseu]. Repositório do instituto politécnico de viseu. <https://repositorio.ipv.pt/bitstream/10400.19/3171/1/VeraMonicaFerrazFilipe%20DM.pdf>
- Fráguas, R., Soares, S. M. S. R., & Bronstein, M. D. (2009). Depression and diabetes mellitus. *Archives of Clinical Psychiatry*, 36(Suppl. 3), 93-99. <https://dx.doi.org/10.1590/S0101-60832009000900005>
- Góes, A. P. P., Vieira, M. R. R., & Liberatore Jr, R. R. (2007). Diabetes mellitus type 1 in the familiar and social context. *Revista Paulista de Pediatria*, 25(2), 124-128. <https://doi.org/10.1590/S0103-05822007000200005>
- Gonçalves, T. R., Pawlowski, J., Bandeira, D. R., & Piccinini, C. A. (2011). Social support assessment in Brazilian studies: conceptual aspects and measures. *Ciência & Saúde Coletiva*, 16(3), 1755-1769. <http://doi.org/ff62mx>
- Groot, M., Anderson, R., Freedland, K. E., Clouse, R. E., & Lustman, P. J. (2001). Association of depression and diabetes complications: a meta-analysis. *Psychosomatic medicine*, 63(4), 619-630. <https://doi.org/10.1097/00006842-200107000-00015>
- Gupta, N., Bhadada, S. K., Shah, V. N., & Mattoo, S. K. (2016). Psychological Aspects Related to Diabetes. *Journal of diabetes research*, 2016, 7276403. <https://doi.org/10.1155/2016/7276403>
- Gusmai, L. F., Novato, T. S., & Nogueira, L. S. (2015). The influence of quality of life in treatment adherence of diabetic patients: a systematic review. *Revista da Escola de Enfermagem da USP*, 49(5), 839 - 846. https://www.scielo.br/pdf/reeusp/v49n5/pt_0080-6234-reeusp-49-05-0839.pdf

- Koetsenruijter, J., van Lieshout, J., Lionis, C., Portillo, M. C., Vassilev, I., Todorova, E., Foss, C., Gil, M. S., Knutsen, I. R., Angelaki, A., Mujika, A., Roukova, P., Kennedy, A., Rogers, A., & Wensing, M. (2015). Social Support and Health in Diabetes Patients: An Observational Study in Six European Countries in an Era of Austerity. *PLoS one*, *10*(8), e0135079. <https://doi.org/10.1371/journal.pone.0135079>
- Kuch, Y. C., Morris, T., Borkoles, E., & Shee, H. (2015). Modelling of diabetes knowledge, attitudes, self-management and quality of life: a cross-sectional study with an Australian sample. *Health & Quality of Life Outcomes*, *13*, 51 – 58. <https://doi.org/10.1186/s12955-015-0303-8>
- Harris, M. D. (2003). Psychosocial aspects of diabetes with an emphasis on depression. *Current diabetes reports*, *3*(1), 49–55. <https://doi.org/10.1007/s11892-003-0053-6>
- Huang, X., Yang, H., Wang, H. H., Qiu, Y., Lai, X., Zhou, Z., & Lei, J. (2015). The association between physical activity, mental status, and social and family support with five major non-communicable chronic diseases among elderly people: A cross-sectional study of a rural population in southern China. *International Journal of Environmental Research and Public Health*, *12* (10), 13209-13223. <http://doi.org/10.3390/ijerph121013209>
- International Diabetes Federation. (2017). *IDF Diabetes Atlas*. <https://idf.org/e-library/epidemiology-research/diabetes-atlas.html>
- Joseph, J. T., Baines, L. S., Morris, M. C., & Jindal, R. M. (2003). Quality of life after kidney and pancreas transplantation: a review. *American journal of kidney diseases: the official journal of the National Kidney Foundation*, *42*(3), 431–445. [https://doi.org/10.1016/s0272-6386\(03\)00740-6](https://doi.org/10.1016/s0272-6386(03)00740-6)
- Kalra, S., Jena, B. N., & Yeravdekar, R. (2018). Emotional and Psychological Needs of People with Diabetes. *Indian journal of endocrinology and metabolism*, *22*(5), 696–704. https://doi.org/10.4103/ijem.IJEM_579_17
- Leal, I. (2008). *A entrevista psicológica: técnica, teoria e clínica* [The psychological interview: technique, theory and clinic]. Fim de Século Edições.
- Lima, S. M. (2015). Psychology's role in patient monitoring with diabetes. *Revista HUPE*, *14*(4), 72 – 76. <https://doi.org/10.12957/rhupe.2015.20062>
- Liu, Y., Han, Y., Shi, J., Li, R., Li, S., Jin, N., Gu, Y., & Guo, H. (2015). Effect of peer education on self-management and psychological status in type 2 diabetes patients with emotional disorders. *Journal of diabetes investigation*, *6*(4), 479–486. <https://doi.org/10.1111/jdi.12311>
- Lomov, B. F. (1984). *Problemas metodológicos e teóricos da psicologia* [Methodological and theoretical problems of psychology]. Ciência.
- Lourenzo, E. J. (2018, Agosto 1). *Lidando com o Diabetes - Aspectos psicológicos* [Dealing with Diabetes - Psychological Aspects]. *Revista Saúde*. <https://rsaude.com.br/bauru/materia/lidando-com-o-diabetes-aspectos-psicologicos/16576>
- Lowe, G. (1982). Alcohol and State-Dependent Learning. In H. G. Tittamar, *Advanced Concepts in Alcoholism* (pp. 115-120). International Congress On Applied Psychology, Edinburgh.
- Malagris, L. E. N. (2019). Stress, resilience and social support in individuals with hypertension and diabetes mellitus. *Revista de psicologia*, *28*(1), 56-68. <https://dx.doi.org/10.5354/0719-0581.2019.53954>
- Marcelino, D. B., & Carvalho, M. D. B. (2005). Reflections on the diabetes type 1 and its relation to the emotional aspect. *Psicologia: Reflexão e Crítica*, *18*(1), 72-77. <https://doi.org/10.1590/S0102-79722005000100010>
- Melin, E. O., Thunander, M., Svensson, R., Landin-Olsson, M., & Thulesius, H. O. (2013). Depression, obesity, and smoking were independently associated with inadequate glycemic control in patients with type 1 diabetes. *European journal of endocrinology*, *168*(6), 861–869. <https://doi.org/10.1530/EJE-13-0137>
- Morin, E. (1994). *La complexité humaine* [Human complexity]. Flammarion.
- Moscovici, S. (1984). *Psychologie sociale* [Social psychology]. PUF.
- Nouwen, A. (2002). *Understanding and assessing depression and HRQOL in diabetes: A goal systems approach. Scientific report: Training session on health-related quality of life assessment and depression in diabetes* (pp. 10-12). MAPI Research Institute.
- Ogden, J. (2004). *Psicologia da saúde* [Health Psychology] (2nd ed.). Climepsi Editores.
- Oliveira, J. E. P., & Vencio, S (Orgs.). (2014). *Diretrizes da Sociedade Brasileira de Diabetes: 2013-2014* [Brazilian Diabetes Society Guidelines: 2013-2014]. AC Farmacêutica. <https://www.diabetes.org.br/publico/images/pdf/diretrizes-sbd.pdf>
- Oliveira, J. E. P., & Vencio, S. (Orgs.). (2016). *Diretrizes da Sociedade Brasileira de Diabetes (2015 – 2016)* [Brazilian Diabetes Society Guidelines (2015-2016)]. A. C. Farmacêutica. <https://www.diabetes.org.br/profissionais/images/docs/DIRETRIZES-SBD-2015-2016.pdf>

- Pardal, L., & Correia, E. (1996). *Métodos e Técnicas de Investigação Social* [Social Research Methods and Techniques]. Areal Editores.
- Perales, B. J. C., & Soto-Caceres, V. A. (2017). Factors associated with low quality of life in patients with type 2 diabetes mellitus. *Revista Experiencia En Medicina Del Hospital Regional Lambayeque*, 3(1), 09 - 14. <http://rem.hrlamb.gob.pe/index.php/REM/article/view/75>
- Pereira, F. O. (2009). Social-psychological representations of behavioral styles in educational and teaching activities. *Cadernos de Investigação Aplicada*, 3, 35-62. https://recil.grupolusofona.pt/bitstream/10437/5145/1/cadernos3_3.pdf
- Pereira, A. F. O. A. (2010). Perception of the social characteristics and affective-emotional manifestations, itself, in cancer patients. *Eclética*, 8(15), 35-43. <https://dialnet.unirioja.es/servlet/articulo?codigo=4572465>
- Pereira, F. O. (2013). Predisposição Psicológica de Adaptação Comportamental à Patologia Oncológica [Psychological Predisposition of Behavioral Adaptation to Oncologic Pathology]. *Revista Evidências, Nº Apresentação*. <https://comum.rcaap.pt/bitstream/10400.26/10235/1/6..pdf>
- Pereira, F. O. (2018). Systemic-Integrative Theory of Human Psychism. *Revista Teoría y Crítica de la Psicología*, 10, 1 – 23. <https://dialnet.unirioja.es/descarga/articulo/6537201.pdf>
- Pestana, M. H., & Gageiro, J. N. (2014) *Análise de dados para ciências sociais: A complementaridade do SPSS* [Data Analysis for Social Sciences: The Complementarity of SPSS] (6th ed.). Edições Sílabo.
- Peters, L. W., Nawijn, L., & van Kesteren, N. M. (2014). How adolescents with diabetes experience social support from friends: two qualitative studies. *Scientifica*, 2014, 415849. <https://doi.org/10.1155/2014/415849>
- Pickup, J., & Williams, G. (1997). *Textbook of diabetes*. Blackwell Science.
- Quivy, R., & Campenhoudt, L. V. (1992). *Manual de investigação em ciências sociais* [Handbook of Social Science Research]. Gradiva.
- Pièrez-Mari, M., Gómez-Rico, I., & Montoya-Castilla, I. (2015). Type 1 Diabetes mellitus: Brief review of the main associated psychological factors. *Anales de Pediatría*, 82(1), 143 – 146. <https://doi.org/10.1016/j.anpedi.2014.04.003>
- Sales-Peres, S. H. C., Guedes, M. F. S., Sá, L. M., Negrato, C. A., & Lauris, J. R. P. (2016). Lifestyle of patients with diabetes mellitus type 1: a systematic review. *Ciência & Saúde Coletiva*, 21(4), 1197-1206. <https://doi.org/10.1590/1413-81232015214.20242015>
- Setian, N., Damiani, D., Dichtchekenian, V. & Manna, T. D. (2003). Diabetes mellito [Diabetes mellitus]. In E. Marcondes, F. A. C. Vaz, J. L. A. Ramos, & Y. Okay (Eds.), *Pediatria básica* (9th ed., pp. 382-392.). Sarvier.
- Silva, I. L. (2010). *Psicologia da Diabetes* [Psychology of Diabetes] (2nd ed.). Placebo Editora.
- Silva, L. A., Santos, I., Guerra, R. G. M., & Tavares, C. M. M. (2015). *Coexistence of people with diabetes self-care education aiming at autonomy and well-being*. *Investigação Qualitativa em Saúde*, 1, 352 – 355. <https://proceedings.ciaiq.org/index.php/ciaiq2015/article/view/82/79>
- Souza, C. S., & Silva, R. S. (2016). *Aspectos psicológicos de adolescentes com diabetes mellitus tipo 1 e suas implicações na adesão ao tratamento: um relato de experiência de estágio em psicologia da saúde* [Psychological aspects of adolescents with type 1 diabetes mellitus and their implications in treatment adherence: an experience report of an internship in health psychology]. Anais da VII Mostra de Pesquisa em Ciência e Tecnologia DeVry Brasil. Even3. <https://www.even3.com.br/anais/VIImostradevry/28346-Aspectos-psicológicos-de-adolescentes-com-diabetes-mellitus-tipo-1-e-suas-implicações-na-adesão-ao-tratamento-um->
- Qiñones, A., Ugarte, C., Chávez, C., & Mañalich, J. (2018). Psychological variables associated with adherence to treatment and complications in patients with type 2 diabetes mellitus. *Revista Médica de Chile*, 146(10), 1151 – 1158. <https://dx.doi.org/10.4067/S0034-98872018001001151>
- Talbot, F., Nouwen, A., Gingras, J., Bélanger, A., & Audet, J. (1999). Relations of diabetes intrusiveness and personal control to symptoms of depression among adults with diabetes. *Health psychology: official journal of the Division of Health Psychology*, 18(5), 537–542. <https://doi.org/10.1037/0278-6133.18.5.537>
- Tareen, R. S., & Tareen, K. (2017). Psychosocial aspects of diabetes management: dilemma of diabetes distress. *Translational pediatrics*, 6(4), 383–396. <https://doi.org/10.21037/tp.2017.10.04>

- The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. (2000). Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*, 23 Suppl 1, S4 – S19. <https://pubmed.ncbi.nlm.nih.gov/12017675/>
- The Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. (2003). Report of the Expert Committee on the Diagnosis and Classification of Diabetes Mellitus. *Diabetes Care*, 23 Suppl 1, S5 – S20. <https://doi.org/10.2337/diacare.26.2007.s5>
- Touso, M. F. S., Gonçalves, N. E. X. M., Ferraudo, A. S., & Vassimon, H. S. (2016). Emotional and psychological difficulties of individuals with Diabetes mellitus. *Revista de enfermagem UFPE on line*, 10(2), 524-525. <https://periodicos.ufpe.br/revistas/revistaenfermagem/article/view/10985>
- Tsai, J., Ford, E. S., Li, C., Zhao, G., & Balluz, L. S. (2010). Physical activity and optimal self-rated health of adults with and without diabetes. *BMC Public Health*, 10, 365. <https://doi.org/10.1186/1471-2458-10-365>
- van Dooren, F. E., Nefs, G., Schram, M. T., Verhey, F. R., Denollet, J., & Pouwer, F. (2013). Depression and risk of mortality in people with diabetes mellitus: a systematic review and meta-analysis. *PLoS one*, 8(3), e57058. <https://doi.org/10.1371/journal.pone.0057058>
- Young, L. D. (1979). Alcohol State Dependence Effects in Humans: A review and study of different task responses. *Alcohol and Alcoholism*, 14(2), 100-105. <https://doi.org/10.1093/oxfordjournals.alcalc.a044145>
- World Health Organization. (2018). *Disease burden and mortality*. <https://bit.ly/1usZl9f>