



## Social Determinants Influencing Treatment Adherence In Patients With Type I Diabetes Mellitus. The importance of nursing education: A Systematic Review

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### ABSTRACT

In this systematic review, the aim was to describe the social determinants that influence adherence to treatment in patients diagnosed with Diabetes Mellitus 1 (DM1).

A systematic bibliographic search was carried out in the databases: Mendeley, PubMed, Web of Science and Cuiden. Descriptive, observational, and intervention studies were selected that met the criteria of the PRISMA statement. Data on authors, objectives, results and conclusions of works that included variables such as: social determinants of health, adherence to treatment, patients with type 1 diabetes mellitus were collected. 341 articles were found, to which 32 additional references were added. through the free search, for a total of 373 elements. After filtering using the PRISMA flowchart, 32 articles met all the criteria and of these, 18 were finally selected according to the study variables. It was possible to conclude that: The knowledge acquired about the disease through the education given by endocrinologists and nurses, family support, being a woman, high socioeconomic level and having technological control and treatment devices, are the social determinants that most influence the adherence.

**Keywords:** *Social Determinants of Health, Diabetes Mellitus 1, Patients, Adherence, Treatment, Systematic Review.*

### INTRODUCTION

Diabetes, a public health problem

In recognition of the growing burden of diabetes, the World Health Assembly in 2021 urged Member States to: "Intensify, where appropriate, efforts to address the prevention and control of diabetes as a public health problem, emphasizing the importance of prevention from an early age."<sup>(1)</sup>

The World Health Organization (WHO) Global Diabetes Compact (LDC) was created as a

global initiative to improve diabetes prevention and care and to contribute to global targets to reduce premature mortality from noncommunicable diseases by one-third by 2030. According to the(1) WHO , from 1980 to 2014 the number of adults with DM in the world almost quadrupled from 108 to 422 million cases.(2) Diabetes is a chronic metabolic disease characterized by elevated blood glucose levels, which over time leads to serious damage to the heart, blood vessels, eyes, kidneys, and nerves.

The latest update guidance from the American Diabetes Association (ADA) maintains the etiologic classification of diabetes into four types of diabetes mellitus: (1)

DM1.

DM2.

Gestational diabetes.

Specific types of diabetes due to other causes.(3)

DM1 appears in childhood and youth and is characterized by deficient insulin production and requires daily administration. Its cause or the means to prevent it are not known, previously this type of diabetes was called insulin-dependent. (1)

From the epidemiological point of view and according to the national report of statistics on diabetes of the Centers for Disease Control and Prevention (CDC), in the period 2002-2015, the overall incidence of type 1 diabetes was significantly reduced, during the period 2002-2010, Hispanic children and youth showed significant increases in the incidence of type 1 diabetes and during the period 2011-2015, and non-Hispanic Siatic and Pacific Islanders showed mostly significant increases in the incidence of type 1 diabetes(4).

People with DM1 have to inject insulin to be able to live, perform their glucometric controls before meals and complementarily follow an exercise regime and balanced diet low in sugars and carbohydrates.

The American BloodIndex Association (ALAD) states that the objectives ofDM1 treatment are:

Promote the normal development of the patient's life, maintain growth and development according to genetic patterns.

Prevent complications togudas.

Preventor postpone chronic complications.

Detect and treat associated diseases.

Treatment should be individualized based on the administration of multiple doses of insulin (>3 doses daily) or continuous subcutaneous insulin infusion systems. However, insulin needs are not constant throughout the day, hence the need to administer multiple daily doses, or if a

subcutaneous insulin infuser is used, program different stretches of insulin that are closer to the physiological secretion of said hormone. Frequent monitoring of capillary glycaemia is necessary to achieve a good dose adjustment. This implies the realization of 7 or 8 capillary glycemics daily or the use of a continuous glucose monitoring system through different devices (5). (6)

DM, as a chronicdisease that appears from childhood and affects the patient's quality of life (3, 15).(3)(7) In the case of DM1, changes in family habits and lifestyles, uncertainty about the future from childhood, myths and thoughts about acute and chronic complications, generate differentpsychosocial problems in diagnosed patients and their close environment (4),(16).(4)

Certainly, the greatest current advances in the treatment of DM1 come from the use of technology, together with regulated/structured and continuous diabetes education, this being a fundamental piece to improve control, adherence to treatment and quality of life of patients.(6)

TheWHO defines social determinants of health (SDH) as "the circumstances in which people are born, grow, work, live and age, including the broader set of forces and systems that influence the conditions of daily life". (14)

The Model of Social Determinants of Health recommended by PAHO/WHO for its approach, which divides them into two large groups: structural health inequalities and intermediate health inequalities.(15)

## MATERIALS AND METHODS

A systematic review of scientific articles in the databases: Mendeley, PubMed, Web of Science, and Cuiden was carried out between June 2 and July 24, 2022, related to the social determinants that influence adherence to treatment in patients with DM1, up to the age of 24 years (young adults). The MeSH terms and cla v wordsused were: Type I Diabetes Mellitus, Patients, Compliance and Adherence to Treatment, Therapeutics, Social Determinants of Health and Systematic Review.

**Inclusion criteria:** Descriptive, observational and intervention studies, including variables such as: Social determinants of health, social actors, adherence to treatment, patients diagnosed with type 1 diabetes mellitus, published from all countries between 06/1/2012- 06/30/2021 in English, Portuguese or Spanish.

**Exclusion criteria:** Studies that did not meet the criteria of the PRISMA declaration and experimental studies were discarded.

The bibliographic references used were processed through the bibliographic manager Mendeley, which allowed to eliminate duplications. Articles that did not meet inclusion criteria were eliminated and those that did were

selected for full reading. The data extracted from each article were: objective, type of study, participants and results obtained.

## RESULTS

The search strategy identified 373 articles, which were reduced to 321 by eliminating duplicates. After conducting a full-text screening, 18 were chosen. The search strategy followed the Prism flowchart.

The results obtained in the review carried out (n = 18) are analyzed to respond to the objectives formulated. Table (Table 1) is added with the summary of the most relevant data of each selected research:

**TABLE 1:** Main data from the studies reviewed.

Author, year	Objective	Synthesis of Results
Camacho, L. et al., year 2013 (16)	To know the factors that affect adherence to treatment from the perspective of patients with type 1 diabetes.	Incident factors were found in treatment adherence associated with all treatment pillars, including psychosocial and self-monitoring aspects.  The positive effect of the support received from their families, friends and the health team was highlighted.
Ortiz, M., et al. Year 2005 (17)	To determine whether psychological, demographic and behavioral factors are associated with adherence to treatment in a sample of Chilean type 1 diabetic patients.	The greater the knowledge about your disease and its treatment, the greater the sense of self-efficacy and adherence to treatment. Patients of higher socioeconomic status may have greater adherence to treatment than those of the middle and lower stratum. The use of the intensified regimen in the treatment favors adherence to treatment.
Novales, To., et al. Year 2015 (18)	To characterize the therapeutic adherence of patients with type 1 diabetes mellitus, attended at a Provincial Teaching Hospital "PepePortilla", in Pinar del Río	- 80% of patients partially adhere to the treatment, the rest are fully adhered to. Those fully adhered to the treatment have strong family and social support, claim to know the disease, the health repercussions of a bad follow-up of medical indications and have personal resources (intrinsic motivation),
Patel, MR, et al. Year 2020 (19)	To evaluate the effectiveness of CareAvenue in detecting unsatisfied social risk factors in order to inform and activate people to take action and self-care.	The high financial burden that these patients represent for health services, coupled with poor care by health personnel and unmet social risk factors, constitute a barrier to adherence to treatment
Brewster, S., et al. Year 2020 (20)	To establish the characteristics associated with non-attendance at medical check-ups in patients with DM1 and the impact on health outcomes.	Unemployment, paternity (especially being a single father), socioeconomic pressures, smoking, alcohol consumption, disadvantage the adherence of patients to treatment. Geographical location does not influence adherence. Some ethnic minorities such as Indians and Malays demonstrated low adherence to disease care

Lacomba, L. et al. Year 2017 (21)	To assess the presence of stress, anxiety and depression in 100 main caregivers of patients with DM1	The adequate control of DM1 requires a great effort on the part of the caregiver and the patient from childhood, which can generate in a large number of cases of stress, depression and anxiety. These factors can influence patients' adherence to treatment and metabolic control, increasing the likelihood of serious complications in both the short and long term.
Ortiz, M. Year 2004 (22)	To determine rates of adherence to treatment of T1DM and related psychological and social factors	50.8% presented poor adherence to treatment. The variables associated with adherence were knowledge about the disease, the perception of self-efficacy and the use of the integrated treatment scheme. Those patients belonging to the high socioeconomic level presented better adherence to treatment than the participants of lower stratum.
Alvarez, M. et al. Year 2020 (6)	To analyse quality of life and adherence to treatment in patients with DM1 Andalusia	The use of continuous real-time glucose monitoring system integrated with continuous insulin infusion systems was positively related to 'treatment adherence' and disease-related concerns. S and observed an inverse relationship between age and adherence. No significant relationship was found between treatment adherence and quality of life.
Matthias, C. et al. Year 2019 (23)	To determine the relationship between self-esteem, family dynamics and the level of adherence to treatment in a group of patients diagnosed with DM1	Women had greater adherence to treatment compared to men. Various factors such as sex, family functioning, high self-esteem, and health support favor adherence to diabetes mellitus treatment in adolescents and young adults. Patients with low adherence reported high socioeconomic status.
Londoño, K. et al., year 2020 (24)	To determine the behavior of adherence to treatment of patients in the diabetes program of a health service provider institution in the municipality of Jamundí (Valle), Colombia	The main causes of non-adherence to treatment are related to economic factors, difficulty in accessing health services, unhealthy lifestyle, ignorance of the disease they suffer and polymedication
Garcia, R. et al., year 2006 (25)	To evaluate the effect of 10 years of follow-up in interactive consultation on understanding and adherence to treatment, as well as on clinical, biochemical and therapeutic changes obtained in a group of type 1 diabetics.	The educational process followed in the interactive consultation, especially of endocrinologists and nurses of the program, turns out to be more effective than the traditional consultation. Promotes the development of knowledge, skills and motivations for adherence to the treatment of DM1
Henríquez-Tejo, R et al., year 2018 (7)	To analyze the main aspects related to the psychosocial impact on patients with type 1 diabetes mellitus and their families.	Having adequate psychosocial support allows you to build knowledge and confidence, which leads to greater adherence to treatment. The behaviors and serious and complex psychological challenges that patients face from childhood, especially during adolescence and early adulthood, can lead them to present depressive symptoms, poor adherence to insulin therapy and thus reach poor metabolic control. The response of services and professionals in relation to psychological issues has an effect on strengthening adherence to treatment and self-control
Salas, R. Year 2022	To analyze the impact that certain sociodemographic, diabetes and	No statistically significant differences were found between men and women

(26)	subjective perception of resource possession variables have on levels of health-related quality of life, diabetes-related stress and adherence to treatment in adult patients with DM1	<p>People with variable incomes had lower adherence to treatment.</p> <p>People with an automatic insulin pump had higher levels of adherence to treatment, compared to people who had a multi-dose insulin treatment</p> <p>The greater the family and social support and the better the health-patient relationship, especially of the nursing staff, the higher the levels of adherence to treatment.</p> <p>The higher the levels of emotional problems, the lower the adherence to treatment.</p>
Matías, C. et al. Year 2019 (27)	To determine the relationship between self-esteem, family dynamics and the level of treatment adherence in a group of patients diagnosed with DM1 of the Diabetes Association.	Respondents with a high level of adherence had good family function. The high level of adherence corresponds to the female sex. Patients with low adherence reported high socioeconomic status
Lizarzaburu, J. et al. Year 2020 (28)	Describe the management and evolution of the last 5 years and highlight the importance of new technologies, such as continuous glucose monitoring, as well as factors such as adherence to treatment and family support.	Family commitment, permanent communication, technological support through smartphones and continuous glucose monitoring, the development of a cultural activity (dance), keep the patient motivated, mitigate anxiety and stress, and can contribute to greater adherence to treatment, if used from childhood.
Calderon, C et al. Year 2018 (29)	Generate a scale to measure health beliefs in Mexican adolescents and young people with DM1 to determine the degree to which they affect adherence to treatment and be able to develop more effective social marketing campaigns	Personal factors such as perceived self-efficacy to follow the indications of health personnel (doctors and nurses) and the patient's environment and social environment were significant in explaining adherence to treatment.
Peña, And. year 2021 (30)	To explore the role of attachment bonding in dyads (mother-child) on DM1 and its treatment	<p>The support of parents (especially of the mother in childhood), the role of endocrinologists and nursing staff who perform controls on patients are the aspects that most influence the process of adherence to the treatment of DM1</p> <p>Psychological support, taking into account the preferences of treatment schemes of young people, the availability of continuous insulin infusion equipment, continuing education for patients and their families and comprehensive health care favor adherence</p>
Carvalhêdo, L et al. Year 2019 (31)	Describe patients' experiences in managing diabetes mellitus, on self-care	From childhood, the accompaniment of parents in the medical consultation, and health professionals (especially nursing) are fundamental pillars in the development of self-care of health. Therapeutic listening, educational assistance by the health team, supported self-care, individualized, comprehensive and humanized care, empower the patient and favor adherence to treatment in adulthood

## DISCUSSION

### *Main findings*

It is mostly reported that one of the social determinants that most influences adherence to treatment is education, (17),(18),(25),(31), provided interactively by endocrinology specialists and nursing professionals, resulting in a more effective than traditional consultation. This way of educating develops skills and intrinsic motivation for adherence to treatment (18),(22),(29),(31).

Another influential determinant is related is strong family support, especially from the mother in childhood(9). (23) Accompanying them to consultations, listening to them and supporting them in carrying out cultural and recreational activities favors the motivation to self-monitoring (41,43), in addition to mitigating anxiety and stress, (53). Relationships with extended family, friends, and fellow students have a positive effect on maintaining high self-esteem (48, 54). Therapeutic listening, supported self-care, individualized, comprehensive and humanized care by nursing staff empower the patient and favor adherence (29). (23)

Regarding the individual determinants, the female sex presents greater adherence (48, 52) in contrast to the study carried out by Salas, R. in 2022 (51) where no statistically significant differences were found between men and women. The older the age, the less adherence (15),(7) and the higher the socioeconomic level, the greater the adherence. Contrary to what was reported by Brewster, S. and Londoño, K, who stated that patients with low level of adherence reported high socioeconomic level (9),(14),(8)(26)

It was also evidenced (7),(15),(23),(29,) the favorable impact exerted by the use of the intensified regimen in the treatment, the continuous monitoring of glucose in real time, integrated with continuous insulin infusion systems, which are positively related to adherence to treatment. In contrast, one study suggests (19) that this represents a high financial burden for health services.

Another factor that can negatively influence treatment adherence and metabolic control

in adolescent and young adult patients is parental burnout, increasing the likelihood of serious short- and long-term complications (29, .(23)

A study (20) considered that unemployment, single parents, socioeconomic pressures, smoking, alcohol consumption, disfavor the adherence of patients to treatment. The geographical location does not influence the adherence, but yes, the beliefs and customs of the different cultures.

The panorama shown in the various studies analyzed suggest the importance of continuing to provide health care, especially by nurses who are in permanent contact with patients, in an integral, individualized and humanized way to patients with DM1 and their families to strengthen the individual and family determinants favoring adherence . It is necessary to strengthen the structural determinants of health as a prevailing strategy of the health authorities and the scientific community, but they must join forces for the development of new technologies and treatment schemes available to all socioeconomic strata, which facilitate adherence to the treatment of this chronic pathologist, reduce complications and improve their quality of life.

Knowing the social determinants that influence adherence to DM1 treatment is very useful to guide the direction and management of health authorities and especially nursing professionals, through the approach of comprehensive actions and new lines of research that provide new knowledge that improves the care of these patients.

## LIMITATIONS

Being diabetes a disease declared by the WHO as a public health problem and when four robust databases such as Mendeley, PubMed, Web of Science and Cuiden were used, there was no abundance of research on the subject, hence the need to perform free search in order to achieve a significant sample. In addition, information was taken over a 10-year window in order to cover more studies with results relevant to this systematic review.

## CONCLUSIONS

The results of research publications on social factors that affect adherence to DM1 treatment in health databases mostly agree.

Knowing the social determinants that influence adherence to DM1 treatment is very useful to guide the direction and management of the health authorities and especially of the nursing professionals involved in the care of these patients, through the approach of comprehensive actions that favor it.

The determinants that most influence adherence to DM1 treatment, according to the WHO classification, are:

With regard to lifestyles and health conditions: Knowledge of the disease, its treatment and possible complications, having a high socioeconomic status and acceptance of lifestyle change. As for the environment: family support (especially from the mother). From human biology a strong determinant is to be a woman and in those who refer to access to health care services, they focused: having psychological support that maintains the intrinsic motivation for self-control and having availability of technological devices for control and treatment.

Being children of single parents, being a parent head of household, alcohol and tobacco consumption, unemployment and low socioeconomic status are disadvantaged by adherence.

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## CONFLICT OF INTEREST

None

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**Key points**

What Is Known About The Subject	What This Study Brings
<ul style="list-style-type: none"> <li>Diabetes is a chronic metabolic disease characterized by elevated blood glucose levels, leading to severe damage to the heart, blood vessels, eyes, kidneys and nerves.</li> <li>The World Health Assembly in 2021 urged intensified efforts to address the prevention and control of diabetes as a public health problem.</li> <li>DM1 appears in childhood and youth and is characterized by deficient insulin production and requires daily administration, affects the quality of life of adolescent children and their families</li> </ul>	<ul style="list-style-type: none"> <li>Knowing the social determinants that influence adherence to DM1 treatment will allow the approach of comprehensive actions and new lines of research that provide new knowledge in improving the care of these patients.</li> <li>The interactive education provided by endocrinologists and nursing professionals and family support are the determinants that most influence the adherence of patients with DM1.</li> <li>Being female, of high socioeconomic stratum and having technological support for the administration of treatment and glycemic control, favor adherence to treatment</li> </ul>

**Outline of studies**

**Search strategy according to PRISMA flowchart adaptation**

