

# A Systematic Review of Fatigue in Type 2 Diabetes

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Systematic Review

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## A Systematic Review of Fatigue in Type 2 Diabetes

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### ABSTRACT

**Introduction:** Fatigue is often found in people with type 2 diabetes and it is known as Diabetes Fatigue Syndrome. Fatigue is a widespread clinical complaint among people with type 2 diabetes (T2DM). It has been directly related to poor self-reported health and it is likely a key barrier to the successful self-management of diabetes. The aim of this study was to identify fatigue in type 2 diabetes.

**Methods:** The databases used to identify suitable articles were Scopus, Science Direct and PubMed limited articles published between 2012 and 2019 in English with the full text available. The search utilized the keywords of "diabetes, fatigue, diabetes fatigue syndrome, and type 2 diabetes". Searching for the articles also used "AND".

**Results:** Following the search, 7 articles met the inclusion criteria. The studies were classified into 3 groups based on the causes of fatigue. The causes of fatigue involve physiological factors, psychological factors and lifestyle factors.

**Conclusion:** Diabetes fatigue syndrome is defined as a multifactor syndrome of fatigue or easy fatigability occurring in persons with diabetes caused by a variety of lifestyle, nutritional, medical, psychological, glycemia/diabetes-related, endocrine, and iatrogenic factors.

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### INTRODUCTION

Diabetes mellitus is a chronic illness that requires continuing medical care and ongoing patient self-management, education, and support to prevent acute complications and to reduce the risk of long-term complications (American Diabetes Association, 2013). Type 2 diabetes (T2DM) is associated with several long-term complications and symptoms, many of which are debilitating that compromise the physical and mental health of those affected (Park, Park, Quinn, & Fritschi, 2015). The most prevalent symptoms are acute and chronic pain, depression and fatigue (Sudore et al., 2012).

Fatigue is a general, frequently seen complaint experienced by everyone in their daily life. Fatigue is a word used very frequently in everyday conversations that has varied subjective meanings. Words like fatigue, tiredness, lacking energy and exhaustion are commonly used interchangeably (Singh, Teel, Sabus, McGinnis, &

Kluding, 2016). Although it is a universal symptom that occurs in all physical and mental diseases to varying degrees, it is quite difficult to define and it has been defined differently by many healthcare disciplines. Fatigue is used in the same sense as weakness, lassitude, a lack of energy, and debility. It can be defined as a state of physical and mental exhaustion to include, in a sense, all of the above (Yönt, H., Akin Korhan, E. & Çiray Gündüzog˘lu, 2012).

Fatigue is a widespread clinical complaint among patient with type 2 diabetes (T2DM) and it has been directly related to poor self-reported health. It is likely to be a key barrier to the successful self-management of diabetes (C. Fritschi & Fink, 2012). The presence of short- and long-term complications of diabetes and their symptoms including the symptoms of hypo or hyperglycemia, cardiac disease, neuropathy, or retinopathy, has also been associated with increased fatigue (Singh & Kluding, 2013).

Fatigue has also been associated with decreased physical functioning and a decreased ability to

manage routine daily activities (12) (Lijrolder, van der Windt, & van der Horst, 2008). Fatigue is one of the most common somatic symptoms associated with depression. Fatigue in diabetes may be associated with physiological phenomena such as hypoglycemia or hyperglycemia or wide swings between the two (Cynthia Fritschi & Quinn, 2010). Furthermore, in order to identify the features of the related variables, a comprehensive review of fatigue in diabetes should be performed. This study aims to contribute to the study of fatigue (14) in relation to type 2 diabetes by performing a systematic review of the literature concerning fatigue in type 2 diabetes.

**MATERIALS AND METHODS**

**Strategy for searching for studies**

Articles published in English were searched for among the Scopus, ScienceDirect, and PubMed databases. The relevant literature was searched from January 18th to February 27th 2020. The publication

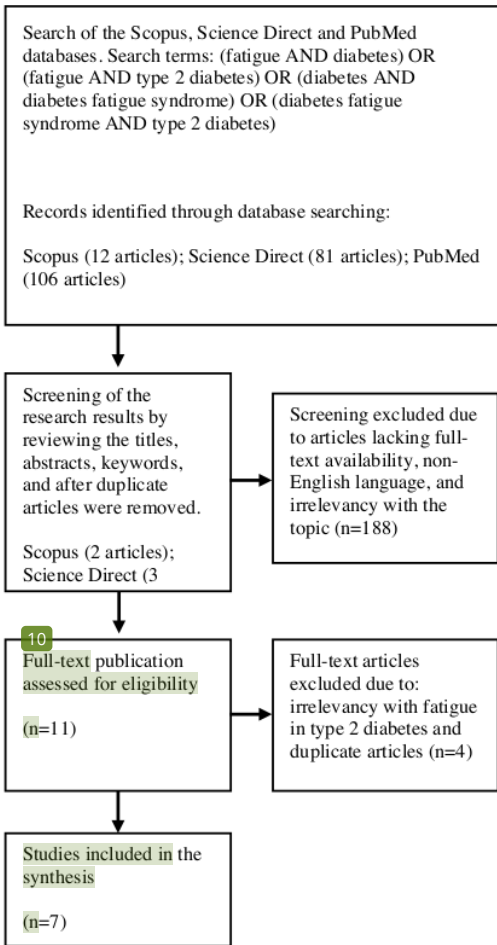


Figure 1 – Articles selection process

time was limited to between 2012 and 2019. The search terms used were “diabetes”, “fatigue”, “diabetes fatigue syndrome” and “type 2 diabetes”.

**Study selection**

All of the studies found related to the fatigue of patients with type 2 diabetes only. The search focused on the title, abstract and keywords. The inclusion criteria were as follows: (1) document type was an original article; (2) sourced from a journals; (3) article was in English and (4) article available in full text. The age of the subject in the items was not specified in order to fully capture fatigue related to type 2 diabetes mellitus (T2DM). The publication time limit was between 2012 and 2019 (Figure 1).

The researcher set the inclusion and exclusion criteria. The researcher consulted with experts in the field of nursing studies and their supervisor in order to determine the final results of the articles that were obtained for the final analysis. A meeting between the researchers and investigators was used to reduce and overcome any existing disagreements. The research process followed the Cochrane guidelines. Finally, 7 articles were found and included in the final analysis. The specific flow diagram used has been shown in Fig 1 following identification, screening, eligibility, and inclusion. The table analysis can be seen in Table 2.

The ethical issues encountered when preparing the manuscript of the systematic reviews were as follows: 1) avoiding redundant articles or duplicates; 2) avoiding plagiarism; 3) the transparency of the screening of the article, process analysis, and evaluation; 4) ensuring accuracy, and 5) flagging suspected plagiarism or fraudulent research.

**RESULTS**

**General features and type of studies**

Based on the 7 articles that have been analyzed (Table 1) and upon looking at the types of research design, there were 6 (85.7%) cross-sectional articles.

**General features and study types**

The results obtained by the researchers from the 7 articles that have been analyzed show that all of the articles show the final result that fatigue is common in patient with type 2 diabetes. This is likely affected

Table 1. General characteristics of the selected studies (n=7)

Category	n	%
Year of publishing		
2012	2	28.6
2013	1	14.3
2014	1	14.3
2015	2	28.6
2016	1	14.3
Type of Study		
Cross-sectional	6	85.7
Descriptive	1	14.3

by a combination of physiological, psychological and lifestyle-related phenomena, especially the presence and severity of the diabetes symptoms, depressive symptoms, and a high BMI. There were correlations between fatigue, A1C, depression, diabetes symptoms and diabetes distress in the articles (Chyntia Fritschi et al., 2012; Park et al., 2015).

Although fatigue is a common complaint among patients with type 2 diabetes, few studies have directly tested the presence and severity of fatigue in people with type 2 diabetes (Singh & Kluding, 2013). Fatigue was significantly higher among the female patients, the older patients and those with a longer expected disease duration (Seo, Hahm, Kim, & Choi, 2014).

## DISCUSSION

Patients with type 2 diabetes often experience fatigue. This impacts their self-care and quality of life (C. Fritschi & Fink, 2012). Fatigue is defined as a decrease in the capacity to perform physical and/or mental tasks. Uncontrolled blood glucose levels are indicated to be indirectly associated with fatigue in patient (Zhao, Suhonen, Katajisto, & Leino-Kilpi, 2018). Fatigue might be experienced as tiredness at rest, a lack of endurance or a loss of vigor (Segerstedt, Lunqvist, & Eliasson, 2015).

Fatigue is defined as physical and/or mental exhaustion that can be triggered by stress, medication, overwork, or mental and physical illness or disease. Fatigability is a term used to assess how fast someone gets exhausted. Easy fatigability implies the occurrence of physical and/or mental exhaustion at a level of work or stress that should ordinarily not cause exhaustion. Fatigue impairs physical as well as mental functioning, and it reduces quality of life. Thus, a person presenting with complaints of fatigue deserves a focused endocrine and medical check-up (Kalra & Sahay, 2018).

Fatigue in type 2 diabetes can result from 3 factors. The physiological factors include it being due to acute or chronic hypoglycemia or hyperglycemia, the variability of the patient's blood glucose and diabetes symptom distress. The psychological factors include depression or emotional distress related to the diagnosis or progress of diabetes, sleep disturbance, and restless legs syndrome. The lifestyle factors, for example, include sedentary behavior, weight control issues or obese sarcopenia. The severity of the fatigue symptoms is influenced by the variety of physical and pathological indicators. These etiologies contribute to the physical limitations present and functional independence. The decrease in muscle strength and quality leads to muscle fatigue and a consequent reduction in work capacity. Long term and chronic fatigue will cause an inability for the diabetes to exercise self-care, resulting in physical disability, emotional distress and insomnia (C. Fritschi & Fink, 2012; Kalra & Sahay, 2018; Lien, Hwang, & Jiang, 2018).

## Etiology of fatigue in type 2 diabetes

Fatigue in type 2 diabetes can be caused by 2 factors, namely endocrine and non-endocrine factors. Non-endocrine factors include decreased physical condition, poor sleep patterns, the consumption of alcohol and caffeine and the consumption of drugs (lifestyle). An unhealthy diet can cause macronutrient or micronutrient malnutrition or starvation ketosis, meaning that people with diabetes lack energy (nutrition) and have general medical conditions such as anemia, electrolysis, and multiple vitamin deficiencies. These conditions are characterized by fatigue (medical conditions) and psychological disorders can worsen fatigue in type 2 diabetes (psychological). The endocrine causes of fatigue in type 2 diabetes include poor glycemic control, diabetes complications, and concomitant endocrinopathy (diabetes). Diseases such as hypothyroidism, Addison's disease, Cushing's syndrome and hypothyroidism, if left unrecognized and / or untreated, can exacerbate the fatigue of type 2 diabetes patients (endocrine). Drugs such as corticosteroids, beta blockers, diuretics, and statins can also cause fatigue (iatrogenic) (Kalra & Sahay, 2018).

## Therapy of fatigue type 2 diabetes

Therapy to overcome fatigue in diabetics can be classified as either pharmacological and behavioral therapy. Pharmacological therapy aims to reduce the level of fatigue, depression and high levels of proinflammatory cytokines. Antirheumatic drugs that modify the disease, including etanercept, the TNF- $\alpha$  receptor fusion protein, have been shown to reduce fatigue and improve the patient's physical and psychological functioning. Behavioral therapy to overcome fatigue in type 2 diabetes includes weight reduction, changes in diet and changes in sleep pattern (C. Fritschi & Fink, 2012).

## CONCLUSION

The systematic review of the research conducted by the researchers in the form 7 articles based on the inclusion criteria shows that people with type 2 diabetes appear to have greater levels of fatigue. A number of complications resulting from diabetes may be related to this fatigue. Fatigue is caused by several factors including physiological, psychological or lifestyle factors. Future researchers are expected to use this systematic review study as a reference related to fatigue in type 2 diabetes.

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## APPENDIX

Table 2. Summary of the selected studies

3	Title & Author	Design	Sample	Variables	Results
	Relationship between social support and fatigue in patients with type 2 diabetes mellitus in the east of turkey [Aylaz, et al., 2015]	Descriptive	312 respondents	Social support, Fatigue, Type 2 Diabetes.	Social support reduced the level of fatigue in a number of patients with type 2 diabetes.
	Fatigue in Women with Type 2 Diabetes [Fritschi C. et al., 2012]	Cross-sectional	83 respondents	Physiological, Psychological, Lifestyle, Fatigue, Type 2 Diabetes.	Physiology, psychology and lifestyle are associated with fatigue in women with type 2 diabetes.
11	Fatigue and Related factors in People With Type 2 Diabetes [Singh & Kluding, 2013]	Cross-sectional	40 respondents	Fatigue symptoms, Systemic inflammation, Type 2 diabetes.	This study findings indicate that systemic low-grade inflammation relates to fatigue symptoms in patients with type 2 diabetes. This suggests the involvement of inflammatory processes in the pathophysiology of diabetes-related fatigue.
2	Fatigue symptoms relate to systemic inflammation in patients with type 2 diabetes [Lasselin, et al., 2012]	Cross-sectional	155 respondents	Glucose control, Fatigue, Diabetes symptoms, Diabetes distress, Type 2 diabetes.	This study findings suggest that fatigue is indirectly related to glucose control.
2	Glucose control and fatigue in type 2 diabetes: the mediating roles of diabetes symptoms and distress [Park, et al., 2015]	Cross-sectional	180 respondents	Factors affecting diabetes, Fatigue, Type 2 diabetes.	Hypoglycemia symptoms were confirmed to be a predictor of fatigue.
	Fatigue in Type 2 Diabetes: Impact on Quality of Life and Predictors [Singh, et al., 2016]	Cross-sectional	70 respondents	Fatigue, Related factor of fatigue, Type 2 diabetes.	Higher levels of fatigue were noted in people with type 2 diabetes compared to the healthy age-matched control.
	Factors Affecting Fatigue in Patients with Type II Diabetes Mellitus in Korea [Seo, et al., 2014]	Cross-sectional	48 respondents	Fatigue, Quality of life (QoL), Type 2 diabetes.	Fatigue affects the quality of life (QoL) of patient with type 2 diabetes.

T2DM: Type 2 Diabetes Mellitus; QoL: Quality of Life;

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