REVIEW

Working conditions and self-management of diabetes mellitus type II: exploratory systematic review

Condiciones de trabajo y automanejo de diabetes mellitus tipo II: revisión sistemática exploratoria

Condições de trabalho e autogestão do diabetes mellitus tipo II: revisão sistemática exploratória

Wendy Janeth Chávez-Ramos [1]
https://orcid.org/0000-0003-4737-001X

Esther Carlota Gallegos-Cabriales [2*]
https://orcid.org/0000-0003-3619-2596

1. Master's Degree in Nursing Sciences. Student of PhD in Nursing Sciences. Nursing School, Universidad Autónoma de Nuevo León. Monterrey, Nuevo León, Mexico.
2. Doctor of Philosophy. Research Professor. Nursing School, Universidad Autónoma de Nuevo León. Monterrey, Nuevo León, Mexico.

*Correspondence author: esther.gallegosc@gmail.com

Abstract

Introduction: The self-management of diabetes mellitus implies a set of activities that people have to perform in order to meet therapeutic, pharmacological, and dietary and personal hygiene measures recommended. There are factors of the labor environment that increases the risk to develop the illness; however, its relationship with self-management of those who already have the illness is not very clear yet. **Objective:** Explore available evidence about the subject of working conditions and self-management of diabetes mellitus type II. **Methodology:** Exploratory systematic revision in databases such as PubMed, Scopus, Web of Science, Scielo, and Citation Index, eligibility criteria, quantitative and qualitative studies in human beings, opinions of experts and conference reports, using the concepts of diabetes mellitus type 2, working conditions and self-management. Preferred Reporting Items for Systematic reviews and Meta-

Analyses were used; five phases of study were used, obtaining a final sample of six articles. **Results:** Of the articles, 1840 workers from 20 to 65 years of age were reported; from this amount 56% were male. The working conditions included shift and working hours, psychosocial stress, work load and control, social activities, non-scheduled work, illness self-report, satisfaction with work and type of occupation. For the self-management of the illness the metabolic control, glucose control, health status, diet, exercise, and essential practices in diabetes were included. **Conclusions:** The absence of conceptual definitions, the difference between operational definitions and empiric indicators and the scares information available made difficult the comparison of results and the establishment of the relation between the study variables.

Key words: Self-management; Diabetes mellitus type 2; Working conditions (DeCS).

Resumen

Introducción: El automanejo de la diabetes mellitus implica un conjunto de actividades que las personas deben realizar para cumplir con las medidas terapéuticas, farmacológicas e higiénico dietéticas recomendadas. Existen factores del entorno laboral que incrementan el riesgo a desarrollar la enfermedad, sin embargo, su relación con el automanejo de quienes ya la padecen no está claro. **Objetivo:** Explorar la evidencia disponible sobre la temática de condiciones de trabajo y automanejo de diabetes mellitus tipo II. **Metodología:** Revisión sistemática exploratoria, en bases de datos PubMed, Scopus, Web of Science, Scielo y Citation Index, criterios de elegibilidad, estudios cuantitativos, cualitativos en humanos, opiniones de expertos y reportes de conferencias, empleando los conceptos: diabetes mellitus tipo 2, condiciones de trabajo y automanejo. Se empleo la declaración Preferred Reporting Items for Systematic reviews and Meta-Analyses se siguieron cinco fases de estudio, obteniendo un muestra final de seis artículos. **Resultados:** De los artículos, se reportan 1840 trabajadores de 20 a 65 años, 56% eran del sexo masculino. Las condiciones de trabajo incluyeron turno y horas de trabajo, estrés psicosocial, carga y control de trabajo, actividades sociales, trabajo no programado, auto-reporte de enfermedad, conformidad con trabajo y tipo de ocupación. Para automanejo de la enfermedad se incluyó control metabólico, control glicémico, estado de salud, dieta, ejercicio y prácticas esenciales en diabetes. **Conclusiones:** La ausencia de definiciones conceptuales, la diferencia entre definiciones operacionales e indicadores empíricos y la escasa información disponible dificultó la comparación de resultados y el establecimiento de relación entre las variables de estudio.

Palabras clave: Automanejo; Diabetes mellitus tipo 2; Condiciones de trabajo (DeCS).

Abstrato

Introdução: O autogerenciamento do diabetes mellitus implica em um conjunto de atividades que as pessoas devem realizar para atender às medidas terapêuticas, farmacológicas, dietéticas e de higiene pessoal preconizadas. Existem fatores do ambiente laboral que aumentam o risco de desenvolver a doença; entretanto, sua relação com o autogerenciamento de quem já tem a doença ainda não está muito clara. **Objetivo:** Explorar as evidências disponíveis sobre o tema condições de trabalho e autogestão do diabetes mellitus tipo II. **Metodologia**: Revisão sistemática exploratória em bases de dados como PubMed, Scopus, Web of Science, Scielo e Citation Index, critérios de elegibilidade, estudos quantitativos e qualitativos em seres humanos, opiniões de especialistas e relatórios de congressos, utilizando os conceitos de diabetes mellitus tipo 2, condições de trabalho e autogestão. Foram utilizados os itens de relatório preferidos para revisões sistemáticas e meta-análises; foram utilizadas cinco fases de estudo, obtendo-se uma amostra final de seis artigos. **Resultados:** Dos artigos, foram relatados 1.840 trabalhadores de 20 a 65 anos; deste

montante 56% eram do sexo masculino. As condições de trabalho incluíram turno e jornada de trabalho, estresse psicossocial, carga e controle de trabalho, atividades sociais, trabalho não programado, autorrelato de doença, satisfação com o trabalho e tipo de ocupação. Para o autogerenciamento da doença foram incluídos o controle metabólico, controle glicêmico, estado de saúde, dieta, exercício e práticas essenciais em diabetes. **Conclusões:** A ausência de definições conceituais, a diferença entre definições operacionais e indicadores empíricos e as informações de sustos disponíveis dificultaram a comparação dos resultados e o estabelecimento da relação entre as variáveis do estudo.

Palavras-chave: Autogestão; Diabetes melitus tipo 2; Condições de trabalho (DeCS).

Introduction

Currently, Diabetes Mellitus Type 2 (DMT2) affects 463 million people, projecting that for the year 2045, there will be 700 million people with this illness. Inhabitants of low and middle income are the most susceptible to develop the illness [1]. The etiology of DMT2 is of genetic and environmental type; among environmental factors obesity and non-healthy life styles are the one most frequently associated to the development of this illness [2]. Take care of DMT2 represents high economic and social costs both for the individuals, families and the health system itself, as consequence of the micro- and macro-vascular complications. During 2019 the expenses to treat the illness and its complications worldwide was 760,000 million dollars [1].

The target of DMT2 treatment is to prevent or reduce the probability to develop complications, keeping glucose and lipids amounts within normal parameters, or as close as possible to them, by adhering to the typical treatment which consists in a balanced diet with calories control, increase of physical activity, consumption of medically prescribed drugs, and monitoring the own effects of the illness mainly in the lower limbs, sight, skin status, and kidney dysfunctions [3].

Self-management of DMT2 is understood as the group of activities that people with DMTW should perform in order to meet pharmacological and non-pharmacological therapeutic measures. A proper self-management of the illness is reflected in the glucose or metabolic control of the patient [4]. Self-management is responsibility of the individual, thus, it is necessary that the ill person develops specialized skills under the

guidance and monitoring of a multidisciplinary health team [3]. Research evidence [4-6] has reported that an affective self-management in people with DMT2 (diet, physical activity, self-monitoring) predicts a good metabolic control in individuals with good socio-economical level, highly educated and self-efficacy; this behavior is seen mainly in women. Recently, variables such as the work environment (working conditions) have been described as increasing the risk to develop the illness, such as working different shifts including night shift and long working hours, every day and/or weekly (>55 hr. per week) [7-9]. However, as far as it has been investigated, it is not clear if the variables of the working environment influence the self-management of those who already have the illness. With anticipation to the possible impact that this relationship will have, a scientific revision took place in order to explore the evidence available regarding the subject of working conditions and self-management of the DMT2. The results of this revision can be of great help for future health research or professional interventions in the first care level, that is, in the place where people perform their working activities.

Methodology

Exploratory systematic review to manage relevant literature in the area of interest [10] was performed through five phases, namely, identification of the research question, identification of relevant studies, selection of studies, data tracing and comparison, summary and presentation of results [11].

Phase one, research question. What is known about the working conditions and self-management of DMT2? To answer this question the patient, exposure and outcome (PEO) methodology was used, in the following manner, a) P: people with confirmed diagnosis of DMT2; b) E: terms related to working conditions (working environment, employment, shifts, working hours, and occupational health); and c) O: self-management of the illness (self-care, physical activity, healthy diet, glucose self-monitoring, glucose and metabolic control). The databases used were PubMed, Scopus, Web of Science and Scielo Citation Index.

Phase two, relevant studies. The eligibility of criteria were quantitative and qualitative carried out in humans, expert opinions, reports of conferences and literature reviews. The results in all languages and all publication

dates were included. The descriptors were DMT2, working conditions, and DMT2 Self-Management. Boolean operators OR and AND were used. Search criteria were Title/Summary.
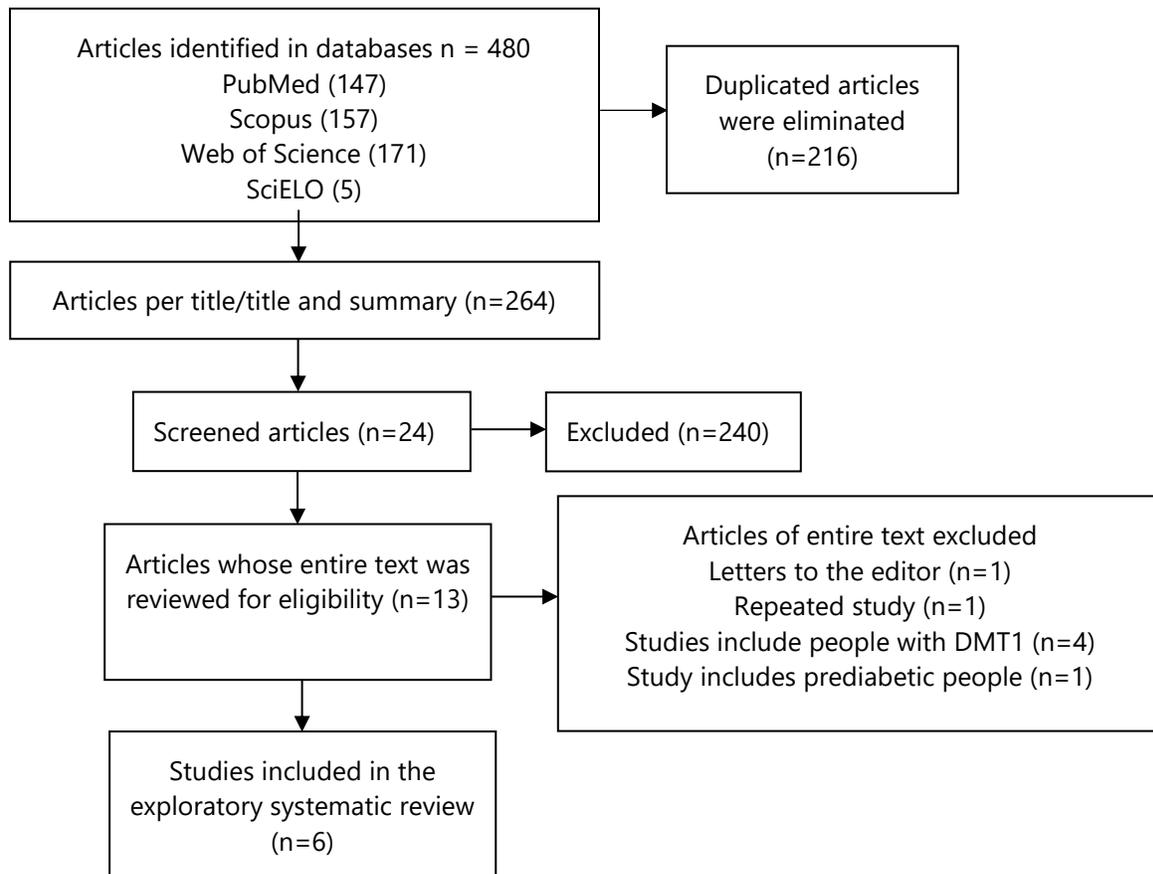
The search strategy used for PubMed was; ("diabetes mellitus, type 2" OR "diabetes mellitus type 2" OR "glucose intolerance" OR "glucose intolerance" OR "hyperglycemia" OR "hyperglycemia") AND ("employment" OR "employment" OR "precarious work" OR "work environment" OR "work conditions" OR "shift work" OR "work schedule tolerance" OR "work schedule tolerance" OR "working hours" OR "occupational health" OR "occupational health" OR "occupational diseases" OR "occupational diseases") AND ("self-management" OR "self-management" OR "self care" OR "self care" OR "glycemic control" OR "metabolic control" OR "patient compliance" OR "patient compliance" OR "healthy diet" OR "healthy diet" OR "physical activity" OR "blood glucose self monitoring" OR "diabetes management"). The search yielded a total of 480 articles. The search period ranged from February 3 to March 20, 2020.

Phase three, selection of studies. The references located were imported to the Endnote web bibliographical administrator for the selection of studies. Duplicate references were eliminated (n= 216); a screening by title / title and summary (m=264) was performed according to the eligibility criteria in order to select only 24 studies.

Phase four, data tracing and comparison. Thirteen (13) complete text articles were recovered in order to evaluate the risk of bias and methodological quality using the tool Strengthening the reporting of observational studies in epidemiology (STROBE), list of verification which consists in 22 points to determine the quality of observational studies. Number 1 represents that the criterion was fulfilled, 0 means that the criterion is not clear and X represents absence of criterion [14]. The final sample was comprised by six articles that were included in the review. Figure 1 shows the flow diagram of the declaration Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) for the process [12].

Figure 1. Process of selection of articles included in the review

| Articles identified in databases n = 480
PubMed (147)
Scopus (157)
Web of Science (171)
SciELO (5) | → | Duplicated articles
were eliminated
(n=216) |

↓

Articles per title/title and summary (n=264)

↓

| Screened articles (n=24) | → | Excluded (n=240) |

↓

| Articles whose entire text was
reviewed for eligibility (n=13) | → | Articles of entire text excluded
Letters to the editor (n=1)
Repeated study (n=1)
Studies include people with DMT1 (n=4)
Study includes prediabetic people (n=1) |

↓

Studies included in the
exploratory systematic review
(n=6)

Source: Own development

Phase five, summary and presentation of results. Data summaries and presentation of results in a narrative form, that is, in a qualitative manner, were prepared. The information obtained from the analysis was summarized under the following elements: (a) author, year of publication, place of study; (b) study design, objectives, population, sample size and methodology; (c) attributes and measurement of variables; and (d) results.

The ethical criteria that were met in this review were the one established in the ethics requirements for documentary research when copyrights are protected using the adequate cite for each analyzed article [13].

Results

The studies selected were performed in the United States and Japan (33% respectively) as well as in Brazil and Thailand with 16.7% each one: these were published between 2008 and 2019.

The evaluation that was obtained regarding the quality of the studies was average, 15.5 points. Articles 1 [20] and 3 [16] were the ones with the best quality and [14] was the one with the best score. The aspects that showed the lowest score in methodology was the size of the study and in results it was other analysis, (Table 1).

Table 1. Evaluation of the quality of the studies, (n=6)

Element		Articles					
		1	2	3	4	5	6
Introduction	Title and summary	1	1	1	1	0	1
	Background	1	1	1	1	0	1
	Objectives	1	1	1	1	1	0
Methods	Study design	1	1	1	0	1	1
	Place and period of time	0	1	1	1	X	1
	Participants	1	1	1	1	0	0
	Variables	0	1	0	1	1	1
	Measurements	1	1	0	1	1	1
	Bias	1	X	1	0	1	1
	Study size	0	0	X	1	X	X
	Quantitative variables	1	1	0	1	0	1
	Statistic methods	1	1	1	1	1	1
Results	Description of the participants	1	0	1	1	0	0
	Descriptive statistics	1	1	1	1	1	0
	Results of data	1	1	1	1	1	0
	Main results	1	1	1	0	0	0
	Other analyzes	0	1	0	X	X	0
Discussion	Key results	1	1	1	1	1	1
	Limitations	1	0	1	1	1	1
	Interpretation	1	1	1	1	1	0
	Generalization	1	1	0	1	1	0
	Financing	0	1	1	1	1	X

Source: Own development

The objectives of the studies were focused in evaluating the relationship between working conditions and health status of people with DMT2. Regarding the methodology, in 33.4% of the articles secondary data regarding clinical registers or national polls [17, 19] were assessed; and in 66.6% they corresponded to primary studies [15, 16, 18, 20]. With respect to the study design, a 66.6% were sectional [15, 16, 18, 19], 16.7% cohort [17] and prospective [20], respectively. The size of the sample varied ranged between 95 to 537 participants. The sampling was for convenience in 66.6% of the studies [15-17, 20], and 33.4% was at random sampling [18, 19]. The total of the participants was 1840 workers whose age ranged from 20 60 65 years; the sex was reported only in 1,640 individuals, were 56% was male.

Working conditions described in the studies included shift and hours of work per week, psychosocial stress related to work, work load, control over work, social activities after work, non-scheduled work, self-report of the illness, satisfaction with work and type of occupation [15, 20]. For hours of work per week, ranges were established of: (a) ≤ 20 and (b) ≥ 40 hours [19] and (a) ≤35, (b) >35 and <60, y (c) ≥60 hours.[20] For the psychosocial stress related with work, four dimensions were included: (a) authority in decision making, (b) work demands, (c) peer support, and (d) supervisor support; to measure the psychosocial stress, four subscales of the Midlife Questionnaire designed to measure the psychosocial stress related with work in the United States [17] were used.

The factors work load, work control, social activities after work and non-scheduled work were identified from the content of the qualitative interviews applied to workers; from these subjects questionnaires were prepared to measure each factor. The self-report of the illness and the satisfaction with work was evaluated with questions prepared by the authors [16]. For the type of occupation, the classification of occupations of the US National Health and Nutrition Examination Survey was taken, where 40 groups of the main occupation in the country [18] are included.

For DMT2 self-management, terms such as metabolic control, glycemic control, health status, diet, exercise, and essential practices in people with DMT2 [15, 20] were used. The metabolic control was evaluated with

blood pressure, anthropometric measures, lipid profile, glycosylated hemoglobin (HbA1c) and serum creatinine [15]. For the glycemic control, indicators such as BMI, HbA1c and signs of retinopathy [17, 20] were used. The BMI was classified as obesity BMI ≥ 30 kg/m^2, overweight BMI ≥ 25 kg/m^2 and regular weight BMI < 25 kg/m^2. The results of HbA1c were classified in suboptimal glycemic control HbA1c≥7% and good glycemic control HbA1c<7%. To evaluate retinopathy signs, the clinical files of the participants [15] were reviewed. In other study only HbA1c was used, estimating the average of the lab results of four previous years, without using cohort points to classify them [16]. Other authors evaluated them with a biochemical measurement with the following classification: normal HbA1c<7%, suboptimal HbA1c≥7% and poor control HbA1c≥9% [19]. For the result of serum creatinine no normal ranges used [15] were specified.

For the health status, the records of fasting serum blood glucose, BMI and blood pressure of the previous six months registered in databases where the clinical records were included. The average of serum glucose was classified as a good glycemic control ≤ 130 mg/dl, the average of normal blood pressure < 130/80 mmHg and the BMI normal ≤ 25 kg/m^2 [18]. The diet, exercise and essential practices in people with DMT2 were measured with the Summary of Diabetes Self Care Activities Questionnaire with four items for diet and two items for exercise. The responses were evaluated using a frequency adherence scale for each activity of self-care in the last seven days, with a scale from 0 a 7 [16].

The studies that evaluated the work shift reported that a significant statistical relationship was found when working in the night shift with glycemic control and with the diet [18,16].

Likewise, the research that included working hours per week showed that working >40 hours [19] and >60 hours [20] was associated to a higher risk of suboptimal glycemic control.

In the research, the relationship between the labor environment and glycemic control was not clear. The studies that considered labor stress, the self-report of the illness and the satisfaction with work, only one showed a significant association between the self-report and the satisfaction with the diet [16], (Table 2).

Table 2. Summary of studies included in the review, (n = 6)

Author, country and year	Design and objectives	Population	Attributes and measurement of variables	Results
Rodrígues, Canani. 2008 Brasil [15]	Cross-sectional. Assess relationship between work shift and metabolic control	95 hospital workers. 74% women. Average age= 47	Metabolic control: T/A, anthropometric measures, lipid profile, serum glucose, HbA1c, serum creatinine Work shift: day/night	No significant association was found
Sato, Yamazaki. 2012 Japón [16]	Cross-sectional. Examine the influence of factors related to the self-care and psychological health related to work	121 adults from 30 to 65 years of age. 75% men. Mean age=52	Self-care: Adherence to diet and exercise Factors related to work: work load, work control, activities outside the work schedule, non-scheduled work, work shift (day/night), illness self-report and satisfaction with work	Significant association with adherence to diet for the night shift (p=.018), illness self-report (p=.026) and satisfaction with the work place (p=.030)
Annor, et al., 2015 Estados Unidos [17]	Cohort Examine association between HbA1c and psychological stress related to work	537 adults from 25 to 59 years of age. 58% women. Mean age= 49.7	Glycemic control: Average of HbA1c of four years, psychological stress related to work: Authority in decision making, work demands, peer support, and supervisor support	No significant association was found
Chalernva-Nichakorn, et al., 2011 Tailandia [18]	Cross-sectional. Compare health of people with DMT2 per work shift	240 workers (120 day, 120 night) in treatment for DMT2	Health status: Hypoglycemia symptoms, fasting serum glucose, T/A and BMI Work shift: day/rotating shift	Significant association with rotating shift for glycemic control (p< 0.02) and hypoglycemia symptoms (p<0.01)
Davila, et al., 2011 Estados Unidos [19]	Cross-sectional. Investigate association of number of work hours and type of occupation with glycemic control	369 workers ≥20 years of age. 60.7% men. Mean age=53	Glycemic control: HbA1c Work factors: Working > 40 hours per week and type of work	Higher risk of glycemic control in those who work >40 hours (OR=2.54; IC 95% [1.24-5.22]) and in the agriculture (OR=22.10; IC 95% [2.41-202.11]

| Azami, et al., 2019 Japón [20] | Prospective. Evaluate association between work control and glycemic control | 478 young workers (352 men), between 20 and 40 years of age | Glycemic control: BMI, HbA1c, retinopathy and nephropathy Working conditions: Hours of work per week, type of occupation, job status and work shift | Higher risk of suboptimal glycemic control in men who work >60 hours per week (OR=2.92; IC 95% [1.16-7.40]) |

Source: Own development
T/A= blood pressure, HbA1c = glycated hemoglobin, BMI = body mass index.

Discussion

The purpose of this exploratory systematic review was to explore the evidence available regarding the subject of working conditions and self-management of DMT2. For this purpose, six studies published between 2008 and 2019 were studied; this evidences the scarce scientific literature that backups the variables considered in the study, DMT2 self-management and work conditions when the incidence and prevalence of the illness increases significantly [21] and the adults in economically productive age spend in their work places between 50 and 60% of the time awake, per day [22]. This information suggests an urgent need to increase relevant research.

Main findings of this review show the absence of theoretical referential framework that sustain the variables and empirical indicators used to assess the factors that can influence on the health care of adults diagnosed with DMT2. The most used variables for working conditions were centered on the shifts [15, 16, 18, 20] and hours of work [19, 20]. However, the International Labor Office acknowledged in 1984 the importance of identify, evaluate, and prevent psychosocial risk factors in the work place as a strategy for the prevention of the workers' health [23]. Some authors [16, 17] of articles included in the review evaluated factors related to work, but used instruments that are not valid; nonetheless, currently for the measurement of these factors, the Copenhagen Psychosocial Questionnaire (COPSOQ) based on Karasek's demand-control-social support model can be used, which has been translated into 25 languages, which allows carrying out comparisons of results at international level [24].

Regarding DMT2 self-management, the most used variable was the glycemic control [16, 17, 19], with measurement of serum glucose or HbA1c; in this respect the American Diabetes Association [3] mentions that DMT2 self-management is determined with the metabolic control through the following parameters: MBI between 18.5 and 25 kg/m^2, abdominal girth <94 cm for men and <90 cm for women, HbA1c <7%, evaluation of retinopathy, kidney function with glomerular filtration rate and presence of microalbuminuria [25], blood pressure <130/80 mmHg [26] and lipid profile with triglycerides ≤150 mg/dl and/or high density lipids >40 mg/dl in men and >50 mg/dl in women [3].

The differences in the definition and measurement of variables limit the comparison between studies, and, therefore, it is difficult to reach conclusions with respect to the influence of work condition in DMT2 self-management. The variables that showed a significant relationship with DMT2 self-management were work hours [19, 20] and shifts [16, 18] and occupation type [20]. The findings about working in the night shift are consistent with the information reported by Knutsson and Kempe [27], who mention that the night shift is a risk factor to develop the illness. The same thing happens with long hours of work where Kivimäki et al [28] identified that the higher amount of working hours, the higher the risk of developing complications due to the illness.

Methodologically, the formal process of the extensive search strategy was followed in various databases and the selection of studies that adhered to the described eligibility criteria. Thus, it is assured that this systematic exploratory review provides a coherent summary of the evidence available at the moment with respect to the working conditions and DMT2 self-management.

There is evidence of systematic reviews and meta-analysis that are focused in determining the relationship of working conditions with the risk of developing DMT2 [27,28]. However, this is the first review focused on the illness self-management. The results of this review confirm the need to perform more research in this respect taking care of the definition and the empirical indicators, both for working conditions and DMT2 self-management, with the purpose of searching a more thorough explanation for this health problem and,

in the future, serve as basis to make interventions in the work place. This is an area of opportunity to influence the self-management of the illness due to the fact that the work place is where the person spends most part of the day.

Conclusions

With the exploratory systematic review it was possible to answer the question now being asked, that is, what is known about the working conditions and DMT2 self-management? The main finding was the absence of conceptual definitions and the difference between working definitions and empirical indicators used for each variable of study. The scarce information available to describe or explain the influence of the working conditions in the DMT2 self-management, along to the use of several indicators which make it difficult reaching a conclusion with respect to the relationship between these variables. Therefore, it is suggested to continue with research in this respect, since it is considered an area of opportunity that can explain the problem of illness self-management.

Conflicts of interests

The authors declare that there is no conflict of interest.

Financing

The authors declare that there was no funding of any kind.

Bibliographic References

1. International Diabetes Federation. Diabetes atlas ninth edition [Internet]. 2019 [cited Dec 10, 2019]. Available at: https://www.diabetesatlas.org/es/resources/
2. Lara OL, Martínez de Santelices CA, Lardoeyt FR, Lemus VM. Interacción genoma-ambiente en la diabetes mellitus tipo 2. Acta Médica del Centro [Internet]. 2018 [cited 09 dec 2019];12(4):429-439. Available at: http://www.revactamedicacentro.sld.cu/index.php/amc/article/view/948/1200
3. American Diabetes Association. Standards of medical care in diabetes [Internet]. 2021 [cited 13 sep 2020]. Available at: https://care.diabetesjournals.org/content/diacare/suppl/2020/12/09/44.Supplement_1.DC1/DC_44_S1_final_copyright_stamped.pdf

4. Campo GN, Portillo MC. El automanejo de los pacientes con diabetes tipo 2: una revisión narrativa. Anales del Sistema Sanitario de Navarra [Internet]. 2013 [cited 20 dec 2019];35(3):489-504. Available at: http://scielo.isciii.es/scielo.php?script=sci_arttext&pid=S1137-66272013000300014

5. Jones V, Crowe M. How people from ethnic minorities describe their experiences of managing type-2 diabetes mellitus: a qualitative meta-synthesis. International Journal of Nursing Studies [Internet]. 2017 [cited 09 nov 2019];76:78-91. Available at: https://doi.org/10.1016/j.ijnurstu.2017.08.016

6. Luo X, Liu T, Yuan X, Ge S, Yang J, Li C, et al. Factors influencing self-management in Chinese adults with type 2 diabetes: a systematic review and meta-analysis. International journal of environmental research and public health [Internet]. 2015 [cited 15 nov 2019];12(9):11304-11327. Available at: https://www.mdpi.com/1660-4601/12/9/11304

7. Vetter C, Dashti H, Lane J, Anderson S, Schernhammer E, Rutter M, et al. Night shift work, genetic risk, an type 2 diabetes in the UK biobank. Diabetes Care [Internet]. 2018 [cited 03 nov 2019];41:762-769. Available at: https://doi.org/10.2337/dc17-1933

8. Kivimäki M, Virtanen M, Kawachi I, Nyberg S, Alfredsson L, Batty G, et al. Long working hours, socioeconomic status, and the risk of incident type 2 diabetes: a meta-analysis of published and unpublished data from 222120 individuals. Lancet Diabetes & Endocrinology [Internet]. 2015 [cited 05 nov 2019];3:27-34. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4286814/

9. Knutsson A, Kempe A. Shift work and diabetes – a systematic review. Chronobiology International [Internet]. 2014 [cited 18 nov 2019];31(10):1146-1151. Available at: https://pubmed.ncbi.nlm.nih.gov/25290038/

10. Munn Z, Peters M, Stern C, Tufanaru C, McArthur A, Aromataris E. Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC medical research methodology [Internet]. 2018 [cited 11 dec 2019];18(1):143. Available at: https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/s12874-018-0611-x

11. Arksey H, O´Malley L. Scoping studies: towards a methodological framework. International journal of social research methodology [Internet]. 2005 [cited 20 dec 2019];8(1):19-32. Available at: https://doi.org/10.1080/1364557032000119616

12. Urrútia G, Bonfill X. Declaración PRISMA: una propuesta para mejorar la publicación de revisiones sitemáticas y metaanálisis. Medicina clínica [Internet]. 2010 [cited 15 dec 2019];135(11):507-511. Available at: https://doi.org/10.1016/j.medcli.2010.01.015

13. International Committee of Medical Journal Editors. Recommendations for the Conduct, Reporting, Editing and Publication of Scholarly Work in Medical Journals [Internet]. 2015 [cited 15 nov 2020]. Available at: http://www.icmje.org/

14. Strengthening the reporting of observational studies in epidemiology. STROBE Checklist: cohort, case-control, and cross-sectional studies (combined). [Internet]. 2020 [cited 15 nov 2020]. Available at: https://www.strobe-statement.org/

15. Rodrigues T, Canani L. A influência do turno de trabalho em pacientes com diabetes mellitus tipo 2. Revista da Associação Médica Brasileira [Internet]. 2008 [cited 05 nov 2019];54(2):160-162. Available at: https://doi.org/10.1590/S0104-42302008000200021

16. Sato M, Yamazaki Y. Work-related factors associated with self-care and psychological health among people with type 2 diabetes in Japan. Nursing & health sciences [Internet]. 2012 [cited 20 nov 2019];14(4):520-527. Available at: https://doi.org/10.1111/j.1442-2018.2012.00729.x

17. Annor F, Roblin D, Okosun S, Goodman M. Work-related psychosocial stress and glycemic control among working adults with diabetes mellitus. Diabetes & Metabolic Syndrome: Clinical Research & Reviews [Internet]. 2015 [cited 15 dec 2019];9(2):85-90. Available at: https://doi.org/10.1016/j.dsx.2015.02.003

18. Chalernvanichakorn T, Sithisarankul P, Hiransuthikul N. Shift work and type 2 diabetic patients' health. Journal of the Medical Association of Thailand [Internet]. 2011 [cited 20 dec 2019];91(7):1093. Available at: http://www.jmatonline.com/index.php/jmat/article/view/610

19. Davila E, Florez H, Trepka M, Fleming L, Niyonsenga, T, Lee D, et al. Long work hours is associated with suboptimal glycemic control among US workers with diabetes. American journal of industrial medicine [Internet]. 2011 [cited 08 nov 2019];54(5):375-383. Available at: https://doi.org/10.1002/ajim.20923

20. Azami Y, Funakoshi M, Matsumoto H, Ikota A, Ito K, Okimoto H, et al. Long working hours and skipping breakfast concomitant with late evening meals are associated with suboptimal glycemic control among young male Japanese patients with type 2 diabetes. Journal of diabetes investigation [Internet]. 2019 [cited 10 nov 2019];10(1):73-83. Available at: https://dx.doi.org/10.1111%2Fjdi.12852

21. International Diabetes Federation. Diabetes Atlas Ninth Edition. [Internet]. 2019 [cited Nov 15, 2019]. Available at: http://www.diabetesatlas.org/

22. Durán, MA. Tiempo de vida y tiempo de trabajo. 1ª. ed. España: Fundación BBVA; 2010.

23. Oficina Internacional del Trabajo. Factores psicosociales en el trabajo: naturaleza, incidencia y prevención. [Internet]. Ginebra; 1984 [cited 25 nov 2020]. Available at: http://www.factorespsicosociales.com/wp-content/uploads/2019/02/FPS-OIT-OMS.pdf http://www.factorespsicosociales.com/wp-content/uploads/2019/02/FPS-OIT-OMS.pdf

24. Burr H, Berhelsen H, Moncada S, Nübling M, Dupret D, Demiral Y, et al. The third version of the Copenhagen psychosocial questionnaire. safety and health at work [Internet]. 2019 [cited 20 dec 2019];10(4):483-503. Available at: https://doi.org/10.1016/j.shaw.2019.10.002

25. Asociación Latinoamericana de Diabetes. Guías asociación latinoamericana de diabetes 2019 [Internet]. 2019 [cited 02 jan 2020]. Available at: https://www.revistaalad.com/guias/5600AX191_guias_alad_2019.pdf

26. National Kidney Foundation. Hypertension in CKD. Professional education resource center [Internet]. 2019 [cited 11 jan 2020]. Available at: https://education.kidney.org/

27. Knutsson A, Kempe A. Shift work and diabetes- a systematic review. Chronobiology international [Internet]. 2014 [cited 15 jan 2020];31(10):1146-1151. Available at: https://doi.org/10.3109/07420528.2014.957308

28. Kivimäki M, Jokela M, Nyberg S, Singh-Manoux A, Fransson E, Alfredsson L, et al. Long working hours and risk of coronary heart disease and stroke: a systematic review and meta-analysis of published and unpublished data for 603 838 individuals. The Lancet [Internet]. 2015 [cited 02 jan 2020];386(10005):1739-1746. Available at: https://doi.org/10.1016/s0140-6736(15)60295-1