

Prevention of type 2 diabetes in nursing

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<p>Abstract</p> <p>The number of people with type 2 diabetes has sharply increased all over the world, especially in China. Nurses use several methods in order to prevent type 2 diabetes in patients with risk factors, but also in general population. The aim of this thesis was to offer nurses knowledge that they can use towards preventing type 2 diabetes in adults. The research purpose was geared towards developing early care intervention to prevent type 2 diabetes in adults.</p> <p>This study was implemented as a literature review. Data analysis was carried out using inductive content analysis. The emergent results showed that early interventions for prevention of type 2 diabetes in adults could be implemented through counselling, screening and the use of medications. In the counselling part, nurses could use evidence-based knowledge to teach patients how to keep a good weight and regular exercise regimes by organizing group education sessions and individual counselling. From a nursing perspective, screening would entail recognizing those patients who are at risk through various physical and chemical tests. Finally, the third intervention would be administration of medications such as vitamin D and Metformin that are prescribed by a doctor.</p>		
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1 Introduction

Type 2 diabetes is one of the most common diseases all over the world. In the past three decades, the incidence of this disease has risen from 4.7% to 8.5%. In China, the diabetes rate has risen significantly from 9.7% to 15.5% for persons over 20 years old. (WHO 2018)

Weight management and physical activity play important role on type 2 diabetes prevention, which emphasizes on the preventive nursing interventions (WHO 2018). Preventive nursing interventions employ nursing human resource planning, personnel managers, evidence-based practice, education and monitoring (WHO 2011). The individuals must have basic knowledge in relation to prevention of diabetes. This entails a healthy diet, proper body weight and physical activity. (WHO 2018). Following for example high fiber and low carbohydrate diet is effective in prevention and even management of diabetes. Also, vitamin D was found to have a role in reducing the risk of diabetes (Spritzler 2017).

This study uses literature review and analysis method. The aim is to offer nurses knowledge that they can use towards preventing type 2 diabetes in adults. The research purpose is geared towards developing early care intervention to prevent type 2 diabetes in adults.

2 Type 2 diabetes trend in China

The number of people with diabetes has increased dramatically in the past few decades. China is a populous country with an estimated 109.6 million adults living with diabetes.(Xu & Weiping 2014) The prevalence of diabetes was reported to be less than 1% in 1980, 5.5% in 2001, 9.7% in 2008, and 10.9% in 2013, according to the newly published national survey (Figure 1). According to the 2013 survey, 4% of adults had been diagnosed with diabetes; 6.9% of patients received a new diagnosis based on the 2010 American diabetes association criteria, 0.5% higher than those in 1997 whose HbA1c level more than 6.5% was not used as a diagnostic criterion for diabetes.

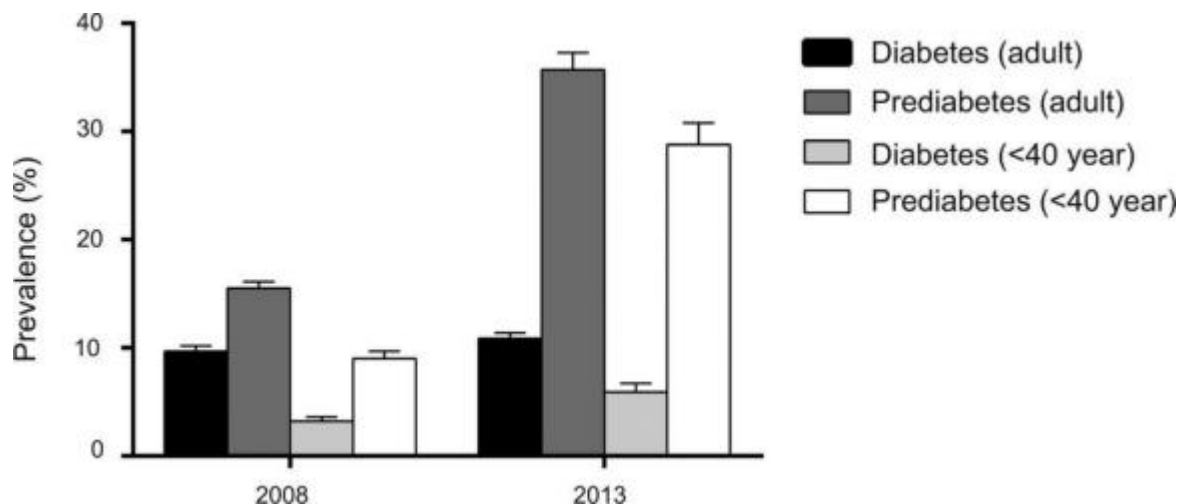


Figure 1. Prevalence of diabetes and prediabetes among Chinese adults or individuals <40 years of age, according to the 2008 and 2013 nationwide survey. (Hu & Wei ping 2018)

Diabetes includes both previously diagnosed and previously undiagnosed diabetes. Prediabetes is defined as impaired fasting glucose or impaired glucose tolerance. If the incidence and prevalence of type 2 diabetes increase in young adult, it can

increase the burden of society. Moreover, the increase of type 2 diabetes has significant trend. (American diabetes association 2000)

In recent research data, it has been found that type 2 diabetes risk demographic has changed from obese middle-aged population to young people. Asian ethnicity is an independent risk factor for gestational diabetes mellitus, which is associated with the increased diabetes rates in China. Diabetes mellitus may have long-term effects on the metabolic profile and can also increase the genetic burden of future generations. (Xu, Yin, Zhang, Leslie, Ware & Owen 2006)

3 Nursing intervention in type 2 diabetes

3.1 Definition of diabetes

Type 2 diabetes is diagnosed usually after the age of 35. Diagnosing requires that one or more of the following criteria is met. One criterion is the fasting blood glucose level 7 or above. Fasting glucose means the situation when the patient has not been eating for 12 hours before the blood sugar sample is taken. Another criterion is elevated glucose level of at least 11 mmol/l in the 2-hour oral glucose tolerance test. In the glucose tolerance test is performed after night fasting. During the test patient receives glucose solution orally, and patient's blood glucose level are tested. If the patient has symptoms of hyperglycemia, a single measurement of > 11 mmol/l is sufficient for diagnosing diabetes. (Yki-Jarvinen & Tuomi, 2018.)

Type 2 diabetes can be treated with tablet medication or insulin, or both, depending on individual situation and glycemic balance. The main aim in type 2 diabetes treatment is to maintain glycemic balance and thus to prevent organ damage caused

by high blood sugar. Glycemic balance is defined as blood sugar levels that remain constantly close to the aim. (Yki-Jarvinen & Tuomi 2018)

3.2 Importance of preventive nursing in type 2 diabetes

The Nursing Interventions Classification (NIC) is a care classification system which describes the activities that nurses perform as a part of the planning phase of the nursing process associated with the creation of a nursing care plan.

The concept of nursing intervention is used by nurses in the process of making clinical judgement with individuals, families and enhancing health literacy skills that improve their health. Enhancing their ability to cope with own health and to promote their quality of life. Nurses face challenges in prevention of type 2 diabetes, thus nurses need to be trained in diabetes basic knowledge and the care of diabetic patients. (RÊGO 2008)

The prevalence of diabetes in China has increased substantially over recent decades, with more than 100 million people estimated to be affected by the disease presently. (American diabetes association 2000). A study done by Pelullo (2019), showed that nurses can evaluate the knowledge and perception of the risk of developing diabetes. It was found that in total, 97.3% of participants had heard about diabetes, but only 16.7% knew the main risk and protective factors. This knowledge was statistically significantly higher in those who had close relatives with diabetes. Moreover, those who had middle school or lower and high school education, compared with those who had a college degree or higher, were less knowledgeable. Hence it was revealed that nurses had a responsibility towards sensitization of diabetes and preventive interventions. (Pelullo 2019)

According to WHO, simple lifestyle change have some good effect on prevention or delay the type 2 diabetes onset, such as avoid tobacco, monitor the weight on time, have a healthy diet and take part in physical exercise actively.(WHO 2018). Simple lifestyle change can improve the glycemic control in patient with isolated impaired fasting glucose. Nurses can help improve patient's lifestyle; the clinical trial of lifestyle intervention was carried out by clinical nurses. There were significant differences in fasting blood glucose, body weight, BMI, blood lipid between the intervention group and the normal group.

Further clinical nurses were found to be effective in improving patients' lifestyle. (Yang 2019). A study carried out using vascular risk assessment program for a target population of young adults. Aimed at establishing those at risk through a scoring system. The scores were based on measures such as height, weight, medications, age, family history, smoking, blood pressure, cholesterol and glucose levels. Those who were identified as being at risk of kidney disease underwent further blood and urine tests. Intervention by nurses were then based on the patient's level of risk. (Gillibrand et al.,2019)

Risk factors for diabetes include family history of diabetes, smoking, abnormal blood pressure and a high BMI. Nurses role has been established to include professional counselling and other interventions. That would help in reducing these risk factors and maintaining a healthy lifestyle. (Phillips 2014)

Drawing from the above findings, nursing interventions have been found to be pivotal, towards the prevention of type 2 diabetes. In the reviewed research, it has been established that the population at risk for type 2 diabetes has shifted from obese middle-aged to younger adults. Asian nationality is an independent risk factor for gestational diabetes, which is related to the increase of diabetes in China.

Metabolic syndrome may have a long-term impact on the metabolic status of offspring and the risk of diabetes in the future. (Yonghai et al. 2016)

4 Aim and purpose

The aim of the thesis was to gather information about nursing methods used in the prevention of type 2 diabetes of adults, with the means of literature review of original scientific articles. The purpose of the literature review was to provide relevant information that could be utilized within nursing in prevention of type 2 diabetes.

Research question: What kind of nursing intervention can be used to prevent type 2 diabetes in adults

5 Research methodology

5.1 Literature review

The research has been executed as a literature review. Through this research approach synthesis of relevant existent data is carried out. Literature review seeks through reading published research, findings that are related to the topic of interest. Literature review often reviews gaps in the current knowledge. Using current data, the researcher can also get an insight about how to execute their research and what approaches have been used by other researches. While finding answers to the research question, it is especially important, to read previous relevant research articles several times and from their results established answers to solve our research question. (Neill 2019)

Literature review needs constantly search for new literature and findings to maintain the evidence base and knowledge, ensuring the most up-to-date, effective care is delivered and decisions can be rational. (Rowson 2019)

Once the research question has been decided, keywords were obtained. Relevant research data was found based on the keywords. Literature review is an appropriate method for this thesis, because it allows exploring the methods for preventive nursing of diabetes type 2.

5.2 Literature search

The data for this literature review was collected from the databases PubMed, CINAHL and Joanna Briggs. Different combinations of relevant key words were tested in the beginning of the data search. The following search terms were used for the

literature search: Diabetes type 2 AND prevention AND nurses. The synonyms that were used for diabetes type 2 were: diabetes mellitus type 2 and diabetes 2.

In relation to prevention, the synonyms were intervention. In relation to nurses, the synonyms were nurse, nursing and nurs articles we chosen based on the inclusion and exclusion criteria shown in Table 1.

Inclusion criteria	Exclusion criteria
Study in English or Chinese	Duplicate studies
Scientific publication	Does not answer the research questions
Peer-reviewed articles	
Published between 2009-2019	
Full text access for JAMK students	
Studies the experiences of prevention of diabetes	

Table 1. Inclusion and exclusion criteria

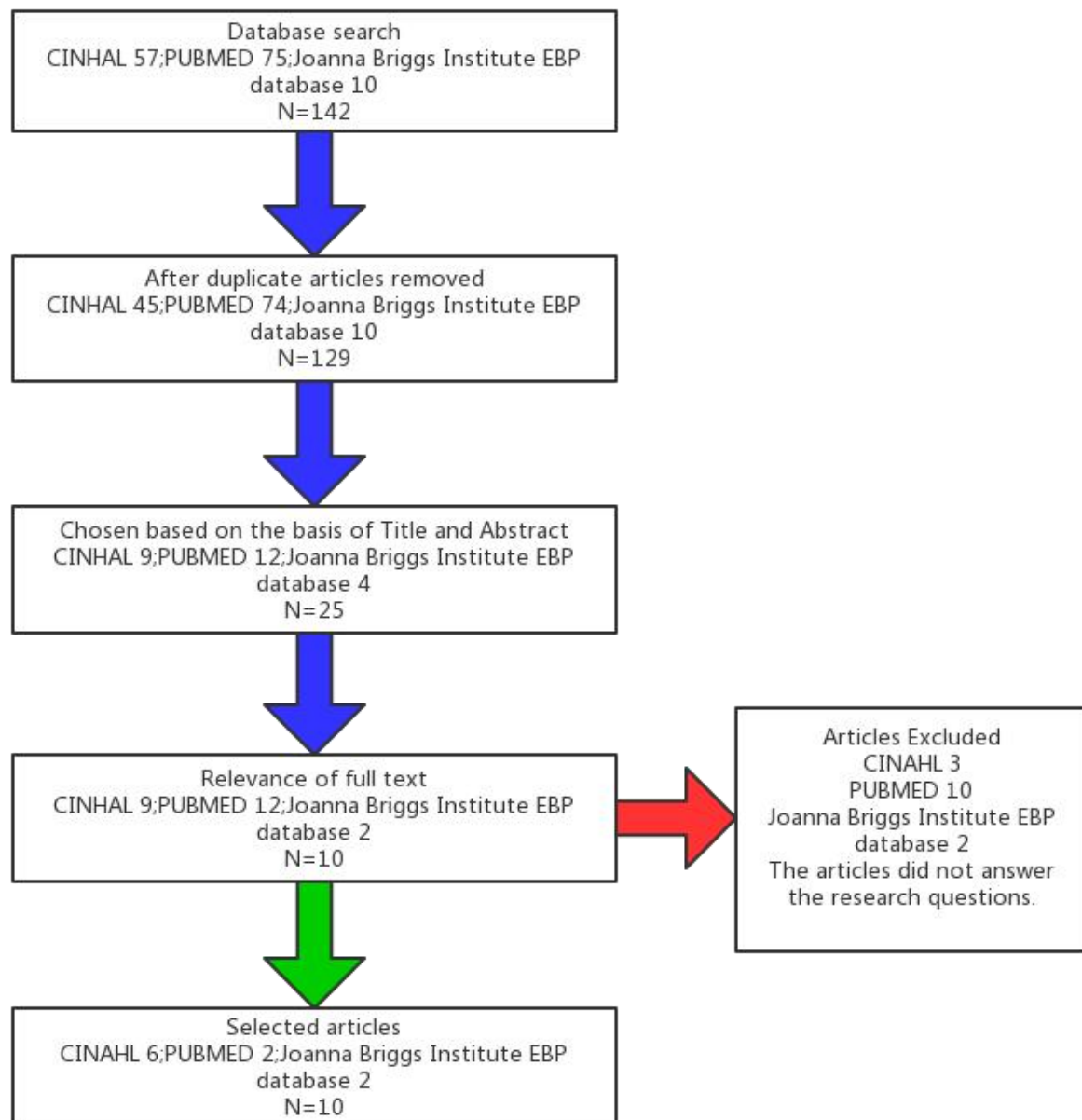


Figure 2. The detailed research processes

The process of research based on the keywords brought in total 142 articles. After duplicate were removed a total of 129 articles were left. These articles were

screened first by title and abstract which give a number of 25 relevant articles. Finally, a number of 10 articles was selected.

The selected articles include also reviews. Due to this, further scrutiny was performed on the selected articles to ensure that the empirical studies are not part of the review studies

5.3 Data analysis

The selected and evaluated data was analyzed by using content analysis. Content analysis is a conventional tool for analyzing data. With content analysis it is possible to analyze by interpreting qualitative data through analysis and indemnification of themes. (Karanikola 2019.) With the help of content analysis data was analyzed in order to gain information on nursing methods that can help prevent type 2 diabetes. (Mertes 2018). The articles obtained in the literature search were read several times for achieving deeper understanding. The different nursing interventions were summarized into a table. In this thesis inductive content analysis was used to do the analysis. (Karanikola 2019, Thomas 2006)

The data analysis begun by reading carefully through all the chosen studies, testing the idea on the research questions of this literature review. The analysis to the questions was marked to the studies using words as similar as possible to the original text. Single word or combinations of few words was used as analytical units in the reducing phase. A result table was made in the final (see Appendix 3).

6 Results

Based on the research question, data analysis was performed and tabulated (Appendix 1). Three main themes and six subthemes emerged from the data analysis. The results of the data analysis are shown in the figure below (Figure

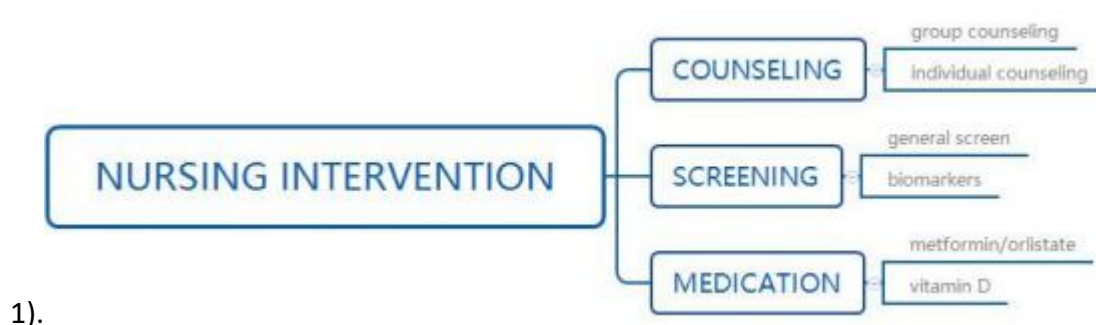


Figure 3. Nursing interventions in prevention of diabetes type 2.

6.1 Counselling

One main theme was related to counseling. Counseling means nurses used their own knowledge in type 2 diabetes and told patient how to do in lifestyle change and physical exercise. This is a simple and convenient way to let patients know how to prevent type 2 diabetes. Two sub-themes emerged within counseling. These were group counseling and individual counseling.

The group counseling referred to nurses gave education to risk groups. Participants who aged at 53 years can receive a certified health educator advice for 2 hours, taught about healthy diet, lifestyle changes, nutrition, blood pressure, various forms of physical exercise and the comprehensive basic lecture of type 2 diabetes. Group counseling consisted of 6-10 patient and the patient have written materials (monthly newsletters) on lifestyle change and physical exercise. Most of the group counseling

covered lifestyle modification, focusing on improving diet, increasing physical activity, and smoking cessation. (Shrestha et al. 2017)

Group counseling had good contribute to non-engagement in lifestyle change which emphasis on structured advice and education about diagnosis of pre-diabetes. In order to provide effective intervention, the patient need to understand what nursing intervention patient had and the progress of nursing intervention. (Youngs et.al. 2016)

The individual counseling referred to nurses spreading the knowledge better and easier, letting people know how to do and what signs occur it can be suspected type 2 diabetes. So, it will delay the time of people had type 2 diabetes. It could reduce the workload of nurses. In this part, nurses knew the patient need, nurses made an individual care plan for people. Patient should have basic knowledge of type 2 diabetes and know how to do a good self-care. The knowledge of proper meals and snacks patient should have. It was important to let the patient notice what food they choose when their blood glucose dropped. (Olsen et.al. 2012)

When nurses communicate with patient, nurses gave them a motivational educate, in this way nurses found people what are the risk factors they had, and nurses could help them a lot. It could have so many parts: lifestyle changes and behavioral support. In lifestyle changes, nurses helped people have a good sleep quality and quantity accordance with studies, it could delay people have type 2 diabetes. (Ley et al. 2016)

In behavioral support part, it could contain dietary intake, nurse supported people food have high fiber, especially fiber from cereal products and greater whole grain intake; weight loss, nurses educated patient how to measure BMI and gave some advice to people how they did some physical exercise and told them the advantages

to do more activities; setting goals, nurses helped patient set a short-term or long-term health goals and formulate how to implement their health. (Fong 2018)

Most of the individual counselling focus on diet, physical exercise, stress management, smoking cessation, consume alcohol in moderation and measure weight that may cause weight gain. (Shrestha et al. 2017)

6.2 Screening

One main theme was related to screening for people suspected have type 2 diabetes. Two elevated fasting glucose levels (6.1-6.9 mmol/l) were diagnosed as impaired glucose tolerance. Screening issues are put forward to develop a national screening in UK. In this way can reduce the burden of country by detecting of people at high risk for type 2 diabetes. Therefore, consistent and repetitive health promotion messages for individuals are consistent with diabetes prevention strategies. (Reed 2010) Two sub-themes emerged within screening. These were general screen and biomarkers.

The general screen referred to nurses do test among general public people. The aim is to integrate this information into primary care in time during health screening/vascular screening programme. In screening programmes, it was essential to provide clear written information to anyone who wishes to understand the risks of screening, and health professionals engaged in screening should provide clear, concise information and carefully address any issues to reduce the psychological impact. (Phillips 2014). We did a CANRISK questionnaire before nurses give patient screening. CANRISK is an effective way to identify the risk of developing type 2 diabetes in a cheap and convenience way. CANRISK questionnaire developed from FINDRISC, which was used in Finland to test the risk for developing type 2 diabetes. (OTERO et al. 2011)

There have 2 situations. The first situation is if the patient were in high risk who overweight, smoking and subhealth lifestyle, the result could be false, the result shows negative, the patient could not know is he/she at risk of developing of type 2 diabetes, nurses should gave them advice on lifestyle change at first. The second situation is if the patient result shows positive, the further examination should be need. (Otero et al. 2011)

Biomarkers referred to nurses did a pre-diagnosis for patients. It was a new way to do the pre-diabetes exam. There were two different classes of biomarker factors, the first type is biomarkers related to cytokines, adipokines we insulin-like factors, nurses could test high levels of pro-inflammatory biomarkers, including tumor necrosis factor- α , interleukin-6, interleukin-18, and c-reactive protein. They were associated with a higher risk of type 2 diabetes. Nurses could choose biomarkers of endothelial dysfunction, such as e-selectin and intercellular adhesion molecule 1, they also associated with type 2 diabetes risk. High levels of adiponectin, an anti-inflammatory adipokine, were associated with a lower risk of type 2 diabetes. The ratio of high molecular weight to total adiponectin was also associated with lower risk but not with total adiponectin. A glycoprotein secreted by the liver higher fetuin-A was associated with high risk in type 2 diabetes. The second type is biomarkers related to bioactive substances in the diet, such as polyphenol that can get from vegetables, fruits and corns. High level of polyphenol was related to high risk in type 2 diabetes. Before the test, the nurse needed to let the patient know what substances was mainly detected in the body and understand the patient's intention. (Ley et al. 2017)

6.3 Medication

One main theme was related to medication. Two sub-themes emerged within medication. These were metformin/orlistate and vitamin D.

Metformin/Orlistate referred to patient use of metformin or orlistate along with lifestyle change. Results from studies conducted by Phillips (2014) and Fong (2018) studies showed that metformin could be used as an intervention for delaying the onset of type 2 diabetes. Nurses could be noticed the dose of metformin doctors give, it recommended that treatment should be started with metformin at 500 mg once a day after impaired glucose tolerance was detected and renal function was examined, and that treatment should be titrated to 1500-2000 mg if tolerated, and that hemoglobin a1c should be monitored every 3 months. If there is no change in HbA1c after 6 months, metformin should be discontinued. (Phillips 2014)

It had big effects on prevention of type 2 diabetes in people with impaired glucose tolerance or impaired fasting glucose. (Fong 2018) Impaired glucose tolerance meant people early insulin deficiency and increased liver glucose input, it often occurs in men with middle age. Impaired fasting glucose meant patient have severe muscle insulin resistant and reduce sensitivity of normal liver to insulin. (de Vasconcelos et al. 2018)

Vitamin D referred to patient use suitable vitamin D that have effect in all insulin-responsive tissues and pancreatic cells which in turn stimulates insulin-mediated glucose transport. According to Madhava study, people intake 500 international units (IU)/ day, less than 200 IU/day. After the vitamin D intervention, there was no significant decrease in fasting glucose levels compared with the control group which not use vitamin D, but there was a significant decrease in fasting glucose levels in subjects with vitamin D levels between 20 and 30 ng/ml. (Madhava 2018)

7 Discussion

7.1 Ethical consideration, validity and reliability

Ethics is the moral principle to guide and decide the behavior of nurses, and the criterion to standardize the behavior of nurses. Moral principle refers to the judgment made from social, professional and philosophical aspects. (Ingham-Broomfield 2017). In my studies, all of articles published on the website, the results, method and procedures of articles are reality. All the author's articles ethical considered to ensure general ethics was performed appropriately. I respect the authors statements, articles and data are allowed.

For literature review, the accuracy and safety are the most important item of ethics. The main message for nurses and nurse researchers in the analysis was that life, work and research should be ethical and follow the "good life" in which all people thrive physically, emotionally, psychologically, morally, socially and socially. (Atkins, Britton& de Lacey 2014).

Ethical assessments improve the quality of research. However, there is no doubt that the traditional ethical evaluation contributes to improving the overall research quality and methodology of ethics in terms of institutional evaluation. However, ethical issues change over time and place, and their scope and context are so wide that it seems challenging to find a universal, internationally accepted standard for ethical classification. (Vergnes et al. 2010) So for this thesis, authors considered ethical considerations.

Validity and reliability refer to the thesis uses the research results with ethical basis and could be effectively used in the work of nurses. The purpose of this study is to clarify the relationship between type 2 diabetes and nursing. The prevention of type 2 diabetes was an important concept and an effective research object in nursing.

The research articles selected for this study were obtained from three database: PubMed, CINAHL and Joanna Briggs Institute EBP. Databases provide reliable, scientific and peer-reviewed information. The three databases were chosen because of their reliability and accessibility.

Limitation means that the research results of the paper are limited for some reason. The limitations of any study were related to potential weaknesses, which were usually beyond the control of the researcher and were not controlled by the researcher. (Theofanidis & Antigoni 2018.) These articles come from three different databases, which limits the materials available for this study. In this thesis the materials came from 1 continent; Continental Europe and 3 countries; USA, UK& Ireland. The results of the study were collected from a collection of articles from different countries and cultures. As a result, the findings were not limited to an ethnic or geographical group. However, articles written only in English are searched during the article search, thus generalizability might be limited.

This study conducted the research in prevention in type 2 diabetes. Although other healthcare professionals were excluded from the data search process, the findings of this study can be considered beneficial for any healthcare professional to help prevent type 2 diabetes, just like nurses.

7.2 Discussion of results

In this literature review and data analysis, we found the nursing intervention in prevention of 2 diabetes. Type 2 diabetes is also a big risk disease in China, so we used all this method in China. In China, there had so many populations, so we did a group education is a good way. I studied from articles, most of the method they used is individual counselling. This method nurses could through our work to change people attitude and had a good effective on them.

Expect for nurse's work, nurses could use some technologies to help people, in modern life it was a good method it reduced nurses' pressure. Mobile phone and some application could be used based on the internet. It could instead face to face learning of sending their short message call, it used interactive voice response automated telephone. The tele-health technologies used include a video conferencing system and a tele-health monitor (a phone-sized device with a screen, buttons and a speaker connected to a fixed-line phone in the participant's home).

The intervention provided through television USES a combination of video-on-demand television programs or video-on-demand television programs and web-based applications. (Joiner, Nam, Whittemore 2017). Nursing ability and knowledge to use the technology and to apply prevention methods for diabetes through this technology.

In the counseling section, when people go to the hospital, we could tell them how to prevent type 2 diabetes. For people with a family history of type 2 diabetes, nurses gave them individual consultation according to the situation of patients. Nurses made a table, such as how to have a good healthy diet and how to control their weight. (Reed 2010)

In the screening process, the role of nurses was to communicate with people and told them what adverse effects caused by screening. Before screening, nurses told patient how this method can help. For the screening of biomarkers, nurses told patient what kind of substances will be tested. In the screening process, respect is the most important thing. The process of examination should be given to examiner. (Shrestha et.al. 2018)

In terms of drug treatment, nurses should not give patient medication without doctor permission. Nurses duty of care was to communicate with patients about the adverse effects of medication and how it could be helped to delay the onset of type 2 diabetes and how it can be used. For vitamin D, nurses saw from the research that it also has a good effect.

In further research, nurses should study how to prevent type 2 diabetes in China. Type 2 diabetes is developing rapidly in China, which endangers the health of many people. From the results of the study, I thought Chinese people are more recognized for health care products, so nurses needed to study the use of vitamin D, and colleagues and nurses needed to know how to give health education to the public and how to use vitamin D normally. In more in-depth research, we can study what kind of technical support could effectively prevent type 2 diabetes and found out the responsibilities of nurses.

8 Conclusion

Type 2 diabetes is a chronic disease, has become a major disease to threat the human health. So, for nurses or nursing students, it is especially important to know how to prevent type 2 diabetes. From the results of the study, nurses saw organizing

health education, using scanning technology and drug prevention. Organizing health education could be improved people's awareness of disease, and it is also the most convenient and fast way.

The results show that there were many ways for nurses to teach patients to prevent type 2 diabetes. The communication between nurses and patients was helpful to prevent type 2 diabetes, and it could effectively provide basic information of type 2 diabetes, such as weight control, physical exercise and a good diet. Interaction with patients in a positive and thoughtful way could promote the recognition of patients and achieve the desired results

In further research, the screening parts should be considered. Screening showed the risk factors in patients more accurately. For the prevention of type 2 diabetes, it was more convenient to evaluate the status of patients and propose interventions. The current screening method was to detect some specific factors in the body and some substances in the food. Nurses need to study more precisely how these elements affect the human function, the size of the influencing factors on type 2 diabetes and whether there were other potential factors affecting the patients with type 2 diabetes. Studying these aspects can better and effectively reduce the probability of type 2 diabetes.

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Appendices

Appendix 1. The result of literature review

Author(s)	Publishing year and country	Title	Research methods	Main findings
Ley SH., Ardisson Korat AV. Qi Sun, Tobias, DK., Cuilin Zhang, Lu Qi, Willett WC., Manson JE. & Hu, FB.	2016 USA	Contribution of the Nurses' Health Studies to Uncovering Risk Factors for Type 2 Diabetes: Diet, Lifestyle, Biomarkers, and Genetics	Literature review in NHS and NHS II from 1976 to 2016	Ways of preventing type 2 diabetes, the main idea is to change lifestyle and know how the genetic affect diabetes.
Phillips A.	2014 UK& Ireland	Capturing opportunities: pre- diabetes and public awareness	Literature review	It shows that people do more exercise and change their lifestyle can reduce the risks in type 2 diabetes as well give more educate in obesity family also can help them.
Youngs W., Gillibrand W.& Phillips S.	2016 UK& Ireland	The impact of pre-diabetes diagnosis on behavior change: an integrative literature review	Literature review	Importance of motivate and education people who at risk to change their way of life.
Shrestha A., Karmacharya BM.	2018 USA	Dietary interventions to prevent and manage diabetes in worksite	Meta-analysis	Importance of worksite health promotion in change lifestyle in diet and

		settings: a meta-analysis		exercise.
Reed A.	2010 UK& Ireland	Recognizing pre-diabetes	Literature review	To recognize follow-up and change lifestyle is a good way to avoid diabetes and can do a good pre-diabetes
Fong E.	2018	Type 2 Diabetes (Primary and Secondary Prevention): Lifestyle Interventions	Literature review	It has a deep analysis in how lifestyle intervention delays the type 2 diabetes, it also study use medical can have some help.
Madhava SS.	2018	Vitamin D: Prevention and Control of Diabetes Mellitus (Type 2)	Meta-analysis	To study how vitamin D can prevent type 2 diabetes.
Olsen M, Granath A, Wharén P, Blom T, Leksell J.	2012 Continental Europe	Perceived knowledge about diabetes among personnel in municipal care: a qualitative focus group interview study	A qualitative study	The study focuses on group interview, through their study, nurses found patient lack of knowledge, so nurses should give educate and trains to patient, keep a safe and good education way.

de Vasconcelos, HCA., Lira Neto JCG, de Araújo MFM., Carvalho GCN., de Souza Teixeira CR., de Freitas RWJF. & Damasceno MMC.	2018 UK& Ireland	Telecoaching program for type 2 diabetes control: a randomized clinical trial.	A pilot study	The study shows that telecoaching program is an effective way to control diabetes. Measurement of Abdominal circumference, systolic and diastolic blood pressure and body mass index were measured. Variables associated with glycemic control (FBG and HbA1c); And HDL levels.
Otero LM., Fong M., Papineau D., Thorne S., Zanetti ML.	2011 UK& Ireland	Testing a prediabetes screening approach for a Latin American population in Vancouver, Canada.	A quantitative study	The study find CANRISK Diabetes Risk Assessment tool can be an effective screening program to identify the risk for developing type 2 diabetes.

Appendix 2. The conclusion of results

Nursing intervention	Group counselling	Individual counselling	General screen	Biomarkers	Medication	Vitamin D
The number of articles	1	5	4	1	3	1
Title	-Dietary interventions to prevent and manage diabetes in worksite settings: a meta-analysis -Perceived knowledge about diabetes among personnel in municipal care: a	-Contribution of the Nurses 'Health Studies to Uncovering Risk Factors for Type 2 Diabetes: Diet, Lifestyle, Biomarkers, and Genetics -Capturing opportunities: pre-diabetes and	-Dietary interventions to prevent and manage diabetes in worksite settings: a meta-analysis -Recognizing pre-diabetes -Capturing opportunities: pre-diabetes and	Contribution of the Nurses' Health Studies to Uncovering Risk Factors for Type 2 Diabetes: Diet, Lifestyle, Biomarkers, and Genetics	-Recognizing pre-diabetes -Type 2 Diabetes (Primary and Secondary Prevention): Lifestyle Interventions -Capturing opportunities: pre-diabetes and public awareness.	Vitamin D: Prevention and Control of Diabetes Mellitus (Type 2)

	qualitative focus group interview study.	public awareness -The impact of pre- diabetes diagnosis on behavior change: an integrative literature review -Recognizing pre-diabetes -Type 2 Diabetes (Primary and Secondary Prevention): Lifestyle Interventions	public awareness -Testing a prediabetes screening approach for a Latin American population in Vancouver, Canada.		- Telecoaching program for type 2 diabetes control: a randomized clinical trial.	
Author(s)	-Shrestha A., Karmacharya BM., Khudyakov P., Weber MB. & Spiegelman D. -Olsen M, Granath A, Wharén P, Blom	-Ley SH., Ardisson Korat AV., Qi Sun, Tobias DK., Cuilin Zhang, Lu Qi, Willett WC., Manson JE. & Hu, FB.	-Shrestha A., Karmacharya BM., Khudyakov P., Weber MB. & Spiegelman D. -Reed A. -Phillips A.	Ley SH., Ardisson Korat AV., Qi Sun, Tobias DK., Cuilin Zhang, Lu Qi, Willett WC., Manson JE. & Hu, FB.	-Reed A. -Fong E. -Phillips A. - de Vasconcelos, HCA., Lira Neto JCG, de Araújo MFM., Carvalho	Madhava SS.

	T, Leksell J.	-Phillips A. -Youngs W., Gillibrand W., Phillips S. -Reed A. -Fong E.	- Otero LM., Fong M., Papineau D., Thorne S., Zanetti ML.		GCN., de Souza Teixeira CR., de Freitas RWJF. & Damasceno MMC.	
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Appendix 3. Sample of content analysis process

Original data	Analytical Unit	Subcategory	Main category
Participant receive a 2-hour education by certified educator. Main lessons are physical exercise, weight management, lifestyle change.	Recommendations to patient with professional lifestyle adjustments can effectively prevent type 2 diabetes.	Group counselling	Counselling
CANRISK questionnaire was used as a potential component of prediabetes risk screening for population. Laboratory test combine with CANDISK test, such as fasting plasma glucose and oral glucose tolerance test.	Questionnaire and laboratory tests were used to screen population for type 2 diabetes risk.	General screen	Screening
Through screening patient can reduce the risk of type 2 diabetes. In this study it shows the evaluated criteria of screening issues	Screening can help in preventing type 2 diabetes.	General screen	Screening
Measure the risk of type 2	Screening with biomarkers can be	Biomarker	Screening

diabetes in patients by tracking specific substances in the body and to obtain the risk of disease according to the evaluation criteria.	of great help in preventing type 2 diabetes		
A certain dose of vitamin D can effectively prevent type 2 diabetes. The study also introduces the dosage of vitamin D and the mechanism of vitamin D in the body.	Vitamin D can help in preventing type 2 diabetes.	Vitamin D	Medication