

Nursing Interventions in the Management of Gestational Diabetes in Prenatal Care Patients

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Abstract

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<p>Title of Publication.</p> <p>Nursing Interventions in the Management of Gestational Diabetes in Prenatal Care Patients.</p>		
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<p>Name, title and organization of the client</p>		
<p>Gestational diabetes mellitus (GDM) is one of the most common pregnancy complications with an increasing growing health concern with a significant public health and clinical problems. Other types of commonly known include type 1 and type 2 diabetes. Gestational diabetes mellitus (GDM) has important health implications for both the mother and child. Risks factors include family history of diabetes, advanced maternal age, ethnicity, overweight, smoking cigarette, previous history of GDM, diet and life-style factors both before and during pregnancy. GDM complications affect the mother, foetus/baby and infants. It can be short-term or long-term. This descriptive literature review discusses the various kinds of nursing interventions used in the management of gestational diabetes in prenatal care patients. The databases use for the search is PubMed and CINAHL.</p> <p>In the epilogue, the earlier the nurses intervene, the more time they will have to help the mother maintain normal blood glucose levels and create a healthier uterus leading to a better or positive outcome. Nurses inventions include; lifestyle changes for example dietary modification and increased physical activities during pregnancy, education and counseling for example impacting knowledge that leads to a healthy life for women with gestational diabetes, nutrition therapy for example controlling or selecting the food types we eat, support/encouragement and e-health for example nurses should devise means of dealing with these patients in ways that will be encourage feel comfortable and hopeful while undergoing treatments. This can also be done with use of e-health technologies. Nurses should put into consideration nationality and cultural differences when taking care of pregnant women Gestational diabetes mellitus (GDM) for an effective management.</p>		
<p>Keywords</p> <p>Gestational Diabetes Mellitus (GDM), Prenatal Care, Nursing Interventions</p>		

Tiivistelmä

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<p>Raskausdiabetes mellitus (GDM) on yksi yleisimmistä raskauden komplikaatioista, ja siihen liittyy kasvava terveysongelma, jolla on merkittäviä kansanterveydellisiä- ja klinisiä seurauksia. Muita yleisesti tunnettuja diabeteksen tyyppejä ovat tyypin 1 ja tyypin 2 diabetes. Raskausdiabetes mellituksella (GDM) on merkittäviä terveysvaikutuksia sekä äidille että lapselle. Riskitekijöitä ovat diabetes suvussa, pitkälle edennyt äidin ikä, etnisyys, ylipaino, tupakointi, aikaisempi GDM-historia, ruokavalio ja elämäntapatekijät sekä ennen raskautta että raskauden aikana. GDM-komplikaatiot vaikuttavat äitiin, sikiöön / vauvaan ja imeväisiin. Se voi olla lyhytaikaista tai pitkäaikaista. Tässä kuvailevassa kirjallisuuskatsauksessa käsitellään erilaisia hoitotyön toimenpiteitä, joita käytetään raskausdiabeteksen hoidossa synnytystä edeltävillä potilailla. Haun käyttämät tietokannat ovat PubMed ja CINAHL.</p> <p>Johtopäätöksenä todetaan että mitä aikaisemmin sairaanhoitajat puuttuvat asiaan, sitä enemmän aikaa heillä on auttaa äitiä ylläpitämään normaalia verensokeritasoa ja luomaan terveempi kohtu, mikä johtaa parempaan tai positiiviseen lopputulokseen. Sairaanhoitajien toimenpiteisiin kuuluvat: elämäntapamuutokset, esimerkiksi ruokavalion muuttaminen ja lisääntynyt fyysinen aktiivisuus raskauden aikana, koulutus ja neuvonta, esimerkiksi tiedonjako, joka johtaa terveelliseen elämään raskausdiabetesta sairastaville naisille, ravitsemusterapia esimerkiksi ruokavalion hallinta tai valinta, tuki / rohkaisu ja sähköisen terveyden keinot, esimerkiksi terveydenhoitajien tulisi suunnitella keinot hoitaa näitä potilaita tavalla, joka kannustaa tuntemaan olonsa mukavaksi ja toiveikkaaksi hoidon aikana. Tämä voidaan tehdä myös sähköisen terveydenhuollon tekniikoiden avulla. Sairaanhoitajien tulee ottaa huomioon kansallisuus ja kulttuurierot hoidettaessa raskaana olevia naisia Raskausdiabetes mellituksen (GDM) tehokkaan hoidon varmistamiseksi.</p>		
Asiasanat: Raskausdiabetes mellitus (GDM), Synnytystä edeltävä hoito, Sairaanhoitajien toimenpiteisiin.		

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1 Introduction

Diabetes is defined as a chronic health condition or a persistent disease, that influences how the body transforms food into energy (CDC 2020). Most of the food we eat is broken down into sugar (glucose) which is then released into the bloodstream. When blood sugar or glucose levels rises, it gives signals to the pancreas to release insulin which enables blood sugar to get into the body's cells and is used as energy. (CDC 2020.) If someone gets diabetes, it simply means the body does not produce enough insulin or better still the insulin the body produces cannot be used the way it should. When there is insufficient insulin or the body cells can't properly use the insulin, excess glucose is forced to stay in the bloodstream which leads to more serious health issues like kidney, heart diseases and even blindness. (CDC 2020.) The main common types of diabetes are type 1, type 2 and gestational diabetes (GDM).

According to International Diabetes Federation (2007), diabetes is one of the most dangerous and a serious health problem of the 21st century. About 6% adult population (246 million people) of the world live with diabetes (IDF, 2007). In addition to the above, about 4 million of these people will die every year because of their diabetes, and diabetes complications which includes, cardiovascular disease, neuropathy, kidney disease and retinopathy. It is for this reason that diabetes is seen as a disease that has both social and economic costs. Averagely, the life expectancy for people with diabetes type 1 can be reduced by 20 years and about 10 years for those with type 2. (Siaw, M. Y. L., Malone, D. C., Ko, Y., & Lee, J. C. 2018, 776.) An estimated cost for taking care for people with diabetes including the cost of care and a loss of productivity owing to disability and premature deaths is estimated to cost about £5.2 billion each year. A ratio of one in every twenty people with diabetes incurs social services costs. (IDF, 2007.)

Our interest in this thesis topic was influenced by the desire as aspiring nurses to acquire better understanding of existing research on gestational diabetes mellitus. This knowledge can then be used by nurses to intervene in the management of gestational diabetes mellitus (GDM) in the developing countries where there is little knowledge as regards to the topic due to non-existence or limited studies on the topic. Studies shows that gestational diabetes mellitus (GDM) prevalence has increased by ~10–100% in several race/ethnic groups in the past 20 years. A true increase in the prevalence of GDM, aside from its disadvantageous consequences for infants in the new-born period, also contribute to the current patterns of increasing diabetes and obesity. (Ferrara 2007, S141.) It is for this reason that the authors saw the need for more attention on nursing interventions in the management of

gestational diabetes mellitus. More so, for the fact that nurses are the closest caregivers to patients including patients with GDM, it is of great importance that nurses should have a good knowledge of the various nursing interventions that can be used to management of gestational diabetes mellitus in prenatal care patients.

The aim of this study is to identify the nursing interventions that can be implemented in the management of gestational diabetes in prenatal care patients. The purpose of this study is to describe the nursing interventions in the management of gestational diabetes in prenatal care patients, which is beneficial to both the patients and nurses, and the result of the thesis will be shared as widely as possible on data bases to satisfy the intellectual curiosity of the public and also the low- and middle-income countries (LMIC) where there is little knowledge as regards to the topic can also benefit from it.

2 Gestational Diabetes Mellitus (GDM)

2.1 Gestational Diabetes Mellitus (GDM) as a type of diabetes

Gestational diabetes mellitus (GDM) is a growing health concern and is said to be a common pregnancy complication which has continued to be an important public health and clinical issue (International Diabetes Federation, 2020). The main types of diabetes commonly known are type 1, type 2 and gestational diabetes (GDM).

Type 1 diabetes is usually common in children and young adults and it comes because the body doesn't produce insulin which then causes the body's immune system to attack and damages the cells found in the pancreas that produces insulin. While in type 2 diabetes, the body does not produce or use the insulin the way it should. (International Diabetes Federation, 2020.) Type 2 diabetes being the most common type of diabetes occurs mostly in older people and the middle age groups (NIH, 2017). Gestational diabetes (GDM) which is third type of diabetes has to do with the presence of high blood glucose during pregnancy and it is also connected with problems to both the mother and child. Women with GDM during pregnancy are at a higher risk of having diabetes type 2 later in their lives even though (GDM) usually disappears after pregnancy. (International Diabetes Federation, 2020.)

According to Johns Hopkins Medicine (2020), Gestational diabetes mellitus (GDM) is a situation in which the hormone produced by the placenta is preventing the body from using insulin properly. Instead for Glucose to be absorbed by the cells, it is being build up in the blood. Unlike type 1 diabetes, Gestational diabetes is not like diabetes type 1 that is caused by the absence of insulin, but it is caused by other hormones that are being produced in pregnancy that lessen insulin effectiveness which is a condition known as insulin resistance. In the United States roughly 3 to 8 percent of pregnant women are diagnosed with gestational diabetes. Gestational diabetic symptoms usually disappear after the babies have been delivered. (Buchanan et al. 2007, S106-S107.)

Theories have explained some reasons why this gestational diabetes occur even though the cause is known. Nutrients and water are usually transported to the foetus by the placenta. The placenta also creates different types of hormones that is used to uphold the pregnancy in which some of the hormones for example (cortisol, human placental lactogen and estrogen) can influence insulin in the sense that it can be blocking the insulin. This can be referred to as contra-insulin effect, which typically occur when the pregnancy is about 20 to 24 weeks. (Lindsay 2009, 29-30.)

Johns Hopkins Medicine (2020) continuous to say that, more of pregnancy hormones are being produced as the placenta is growing thereby causing the risk of insulin resistance also becoming greater. In a normal situation, the pancreas is always able to produce additional insulin to weaken insulin resistance, but if there a situation where there is insufficient production of insulin to weaken the effect of the placental hormones, it then leads to gestational diabetes.

2.2 Risks Factors, Screening and Diagnosis of Gestational Diabetes Mellitus

According to Zhang et al. (2016), there have been several risks factors of (GDM) like; Family history of diabetes, advanced maternal age, ethnicity, overweight, smoking cigarette, Previous history of GDM as well as having a macrosomia baby that have been well-documented and not forgetting diet and lifestyle factors that are also associated with (GDM) both before and during pregnancy as accumulating data from epidemiological studies indicates. Gestational Diabetes Miletus (GDM), besides being a pregnancy complication also poses as a threat for type 2 diabetes There are also observations that, not only women who smoke cigarette are of the high risks of having GDM, but also there is an increased risk of GDM from smoking parents to their daughters and not forgetting hereditary factors which were also associated in the etiology of GDM. (Zhang et al. 2016.)

In continuity, Zhang et al. (2016) also goes further to say "GDM is a progressing health concern which has been related to temporary and lengthy adverse health outcomes for both women and the children". The risk of preeclampsia for woman with (DGM) during pregnancy is very high, a higher risk of type 2 diabetes as well as increased risks of cardiovascular diseases after pregnancy (Zhang et al. 2016).

Due to the fact that insulin resistance increases during the second trimester, screening of GDM is done most of the times at 24-28 weeks. With the progression of the pregnancy, placental hormones mediate insulin resistance which leads to increase in GDM with advancement of the pregnancy. Thus, testing very early is not very helpful to the patients and testing during the third trimester limits the time metabolic intervention uses to take place. (Rani & Begum, 2016, 1-2.)

Screening for GDM is usually done using the one or two step approaches. The one step approach is usually done during weeks 24-28 of pregnancy. During this approach the fasting Oral Glucose Tolerance Test (OGTT) is being used (Leary, Pettitt, & Jovanovič 2010, 673).

On the other hand, we use both the glucose challenge test (GCT) and OGTT for the two-step approach. The two-step approach starts with the GCT (non-fasting) where plasma glucose concentration or serum is carried out 1 hour after a typical 50g oral glucose load (Virally & Laloi-Michelin 2010, 550). If the plasma glucose concentration is ≥ 7.8 mmol/l, 100g OGTT is performed on the fasting client. The various diagnostic guidelines in the determination of GDM as stipulated by different organizations can be demonstrated in table below.

Organization	Fasting Plasma Glucose	Glucose Challenge	1-h plasma glucose	2-h plasma glucose	3-h plasma glucose
World Health Organization (WHO) 1999*	≥ 7.0	75g OGTT	≥ 7.8	≥ 7.8	Not required
American Congress of Obstetricians and Gynecologists (ACOG)**	≥ 5.3	100g OGTT	≥ 10.0	≥ 8.6	≥ 7.8
Canadian Diabetes Association (CDA)***	≥ 5.3	75g OGT	≥ 10.6	≥ 8.9	Not required
International Association of Diabetes and Pregnancy Study Groups (IADPSG)****	≥ 5.1	75g OGTT	≥ 10.0	≥ 8.5	Not required

Key

*One value is sufficient for diagnosis.

** Two or more values are required for diagnosis.

*** Two or more values required for diagnosis.

**** One value is sufficient for diagnosis.

Table 1: Mostly used diagnostic guidelines for GDM (WHO 2013; ADA 2015; ACOG 2018; CDA 2008 & IADPSG 2010)

As seen in the table above, the OGTT is carried out after fasting the whole night for 8-14 hours. While at the hospital, 75g of anhydrous glucose is mixed in 250ml-300ml water and taken by a pregnant woman after 2 hours. According to the American College of Obstetricians and Gynecologists (ACOG), (2018), treatment of GDM hangs on 100g, 3-hour oral glucose tolerance test. Microvascular disease can be regulated by fasting plasma glucose rate of 7.0mmol/L with a 2hour glucose value of > 11.1 in 75g oral glucose tolerance test (Canadian Diabetes Association 2008, S2). According to the hyperglycaemia and Adverse Pregnancy Outcome (HAPO) study on pregnant women in the third trimester, it was evaluated that fasting plasma glucose ≥ 5.8 mmol/l and 2hour plasma glucose > 11.1 mmol/l produced data in relation to maternal glycaemia and particular side effects in implementing a criteria for diagnosing and categorizing GDM (Diabetes & Panel 2010, 677).

2.3 Complications

GDM complications have an effect on the mother, foetus/baby and infants. It can be temporary or lengthy as shown in the table below; Low Apgar scores (a method to quickly summarize the health of a new-born). Due to the complications listed below, the baby is admitted into the neonatal intensive care unit for a long period. The table below explains the short- and long-term complications of GDM.

Short term complications	Reference
Macrosomia (foetal size greater than 4kg), increased rate of stillbirth, birth asphyxia (deprivation of oxygen to a new-born)	Henriksen 2008, 136-137
Birth injury (shoulder dystocia, brachial plexus injuries, clavicle fractures)	Chu et al 2007, 2073
Decrease in neonatal blood glucose level (hypoglycemia)	Reece, Leguizamón, & Wiznitzer 2009, 1789
Polycythemia (high amounts of red blood cells in the blood)	Hopewell, Steiner, Ehrenkranz, Bizzarro, & Gallagher 2011, 557
Death of new-born	Reece 2010, 201
Hypocalcaemia	Hay 2012, 5

Long term complications	Reference
Delayed motor development, obesity, diabetes	Hillier, Pedula, Schmidt, Mullen, Charles & Pettitt 2007,2290. Slining, Adair, Goldman, Borja & Bentley 2010, 2
Cardiovascular alterations, hypertension	Simeoni & Barker 2009, 120
malignant neoplasm (cell that look less like the normal cell of origin), and schizophrenia	Wu, Nohr, Bech, Vestergaard & Olsen 2012, 1

Table 2. Short- and Long-Term difficulties of Gestational Diabetes.

However, GDM difficulties usually affect the mother, foetus, baby, and infants. Ladies with pre-existing GDM have a high risk of unfavourable pregnancy. This includes preterm delivery between 34 and 36 weeks, stillbirth rate, neonatal admission to intensive care unit (NICU), macrosomia, low APGAR scores, and shoulder dystocia. More so, women with pre-GDM experiences hypertensive disorders during pregnancy, induction of labour, and Caesarean section delivery. Most often, women with GDM risk giving birth to a macrosomia baby (Odds Ratio (OR): 1.6; 95% confidence interval (CI): 1.2– 2.1). However, women with pre-GDM can continue having high risk of developing complications after adjustment. They are likely to have induction of labour (OR: 1.67; CI: 1.28–2.13), to deliver by Caesarean section (OR: 1.65; CI: 1.32–2.07), and to have preterm delivery < 37 weeks (OR: 2.1; CI: 1.5–2.8). Mothers with pre-GDM risk having stillbirth (OR: 3.66;CI: 1.98–6.72),and low APGAR scores at birth (OR: 3.82; CI: 2.26–6.45), Most often they are at a danger of admission to NICU (OR: 2.21; CI: 1.5–3.27), and macrosomia (OR: 2.40; CI: 1.50–3.8). (Wahabi et al. 2017, 3.)

Maternal obesity and hyperglycaemia that usually occurs in GDM can lead to foetal macrosomia. This is caused by high insulin levels produced by the foetus in response to hyperglycaemia. It's important to control postprandial glucose in pregnancy. Most often, during childbirth, foetal macrosomia increases the dangers of shoulder dystocia, Erb's palsy, brachial plexus trauma and clavicle fracture. Foetal macrosomia increases other dangers to the baby, including hypoglycaemia and jaundice as well as poses a risk to the mother. This risk includes high rate of postpartum haemorrhage and perineal tears. Hyperglycaemia in

the first trimester can destroy the embryo and this can happen before a woman gets to find out she is pregnant. It can most likely increase the risk of spontaneous abortion, foetal anomalies, pre-eclampsia, and foetal death. (Surendran et al. 2019, 413-419.

3 Prenatal Care and Nursing Intervention

3.1 Prenatal care

Prenatal care is the health care a woman gets while pregnant (U.S DHHS. 2019). As healthy pregnancy indorses a healthy birth, having early and usual prenatal care increases the chances of a healthy pregnancy (NIH 2017). The first visit should happen at the first trimester as it may require more than one visit before pertinent issues or information can be concluded. The delivery date is estimated (DDE) by accurately calculating or by determining the last menstrual period (LMP). Accurate calculation of last mensural circle is also important for screening tests and interventions to occur on the right time as well as best management of complications. (Kirkham et al. 2005.)

Once a woman suspects that she is pregnant, a time should be scheduled to visit the hospital so as for the nurses to begin prenatal care. In this kind of visits, a physical exam is done the nurse or midwife, weight checks like body mass index measurements, urine sample is provided for test. (March of Dimes 2020.) The nurse also does blood tests and imaging tests, such as ultrasound exams depending on the stage of the pregnancy. In addition, the mother's and foetus' health may be discussed as well as any questions about the pregnancy can be asked (NIH 2017).

Early screening and diagnosis of GDM facilitate the nurses intervention. Proper care leading to a positive outcome can be achieved if the screening and diagnosis were done early enough. Many countries guidelines support early screening when pregnant. This is for possible screening for GDM and this can only be known if pregnant women are screened during antenatal visits. Screening time differs in the various guidelines. Majority of the guidelines agree early screening must be done at 24–28 weeks of gestation. (Mensah, G. P., ten Ham-Baloyi, W., van Rooyen, D., & Jardien-Baboo, S., 2020.)

More so, prenatal care is very important as it helps decrease risks during pregnancy leading to a safe and healthy delivery. Proper prenatal care will give positive results in the management of GDM. Timely and regular prenatal visits will help the nurses identify any problems or complications before they become an emergency.

Prenatal care usually starts about three months before you begin trying to get pregnant. Before trying to conceive you should practice some healthy habits, for example, stop smoking and drinking alcohol, taking folic acid supplements daily, regular discussions with your nurse about your medical conditions, dietary supplements, getting enough rest and getting proper nutrition. (healthline, 2015.)

One of the best ways for nurses to management GDM is to have a care plan for pregnant women, especially for women at high risk. To do this care plan nurses should be culturally sensitive. This plan of care should include blood pressure check-up, and dipstick urine protein every 1–2 weeks and ultrasound between 30–32 weeks of gestation. (Mensahet al., 2020.)

NIH (2017), goes further to say that, Pre-Pregnancy and prenatal care will help to prevent complications and inform women about necessary steps to take to keep their babies safe and ensure a healthy pregnancy.” When a woman follows prenatal care regularly, they can lessen the risk of complications during pregnancy in the sense that, existing conditions such as high blood pressure and diabetes can be controlled and also by following advised given by the nurse in getting exercises regularly, keeping a healthy or changing lifestyle like stopping cigarette smoking and alcohol. The use of alcohol during pregnancy increases the risk for foetal alcohol spectrum disorders, that may lead to many other health problems like the baby having abnormal facial features, poor coordination, poor memory, intellectual disabilities, heart, kidneys, or even bone problems. keeping a safe diet and also being careful of potentially harmful substance exposure like radiation can promote foetal health and its development. (NIH 2017.)

3.2 Nursing intervention

Brooks (2019), defines nursing intervention according to Medical dictionaries as “any act by a nurse that implements the nursing care plan.” It can be a direct or indirect task but only depends on what the patients need at a particular situation (Brooks 2019). Nurses’ intervention is seen as the backbone of the medical profession as it is saving patients’ lives. Anything or task a nurse does to or for a patient which can lead the patient’s outcome directly. It can also be any kind of act that a nurse performs with the intention of improving the comfort and overall health and wellbeing of their patients. (InHomeCare.com 2019.) In addition to the above, nursing interventions, Nurseslabs, (2021), emphasizes on the fact that nurses should advice and rationale and record dietary pattern and caloric intake using a 24-hour recall during care of pregnant women with GDM. This will go a long way in evaluating GDM patients and compliance to a strict dietary rehabilitation. Teaching the client by the nurses, glucometer usage at home for serum glucose monitoring, and the need to record readings at least 2-4 times/day will allow the client to see how diet and exercise impact her serum blood glucose levels for a closely control of sugar levels. Nurses should explain to

pregnant women with GDM the difference between normal and abnormal weight gain during pregnancy not forgetting the fact that some caloric restrictions may cause foetal damage.

4 The aim, purpose, and research question of the thesis

The theses aim at identifying the nursing interventions that can be implemented when managing gestational diabetes in prenatal care patients.

Similarly, the purpose of this thesis is describing how nurses can intervene in the management of gestational diabetes in prenatal care patients, which is beneficial to both the patients and nurses. The result of this thesis will be disseminated such that individuals and the low- and middle-income countries (LMIC) who have little knowledge as regards to the topic can benefit from it.

Research question: What kind of nursing interventions are used in the management of gestational diabetes in prenatal care patients?

5 Methodology

5.1 Literature review as a research method

A literature review can be defined as an article, a lecture, or a part of a thesis, which is analysed to review a particular phenomenon or research question. It can also be a detailed synopsis and an evaluative analysis of the pertinent available research and research literature on a particular research topic (Cronin, Ryan and Coughlan 2008.)

Literature reviews are often classified in to four as will be mentioned in the following sentences. This consist of descriptive literature reviews which is to describes the selected phenomenon in theoretical or contextual point of view and can also be named a traditional, narrative, or qualitative literature review, Systematic literature reviews which has a clear outlined protocol that is normalize and reproducible, meta-analysis which is considered quantitative studies with quantitative methods and meta-synthesis which is qualitative studies with qualitative methods. (Cronin, Ryan and Coughlan 2008.)

In this thesis the authors used a descriptive literature review to find out various nursing interventions used in managing gestational diabetes in prenatal care patients. Descriptive literature review has four main steps; forming a research question, selecting databases and other search tools to find sources that are relevant to the topic, reading and evaluating the sources as well as determining their suitability to the understanding of the topic at hand. It also includes analysing, interpreting, and discussing the findings and conclusions of the sources chose. (Machi et al. 2016).

5.2 Database search

The data search to answer the research question was executed between 1st of April 2021 and the 10th of May 2021. The databases used for the search is PubMed and CINAHL. This is done by using relevant subheadings of key words to get exact or closely related facts. Some different search words will be used in order not to miss out on vital information or findings. The keywords that will be used for this search along with their synonyms are gestational diabetes mellitus (pregnancy diabetes/maternal diabetes), nursing, how to manage gestational diabetes and prenatal care (antenatal care). The Boolean operator “AND” was applied to connect the keywords to get data/articles containing all the keywords used in the search. The exclusion and inclusion criteria used in the search is illustrated below. (See the table 3 below)

Exclusion	Inclusion
<ul style="list-style-type: none"> ➤ Full text not available ➤ Free full text not available ➤ Abstract not available. ➤ Publication year not within 2005 - 2021 ➤ Not Peer Reviewed ➤ Article not in English language 	<ul style="list-style-type: none"> ➤ Full text ➤ Free full text available ➤ Abstract available ➤ Publication year 2005 - 2021 ➤ Peer Reviewed ➤ Article in English language ➤ Reference available

Table 3. Bases for data extraction.

The results were sorted in accordance to how relevant it is to answer the research question. Authors managed to sort out all the results. The first selection is the total number of articles retrieved from the data base search at the initial stage. The second face which is the chosen number of articles to be used in answering the research question is based on the full text exhaustion and exhaustive reading. The data search table (Table 4) below shows the total number of articles retrieved from the various data bases at the initial search and the total number of articles applicable to the research question.

Search Terms	Data-base	Total number of articles	Chosen number of articles
Gestational Diabetes AND Prenatal Care AND Management	PubMed	25	3
	CINAHL	3	2
Nursing AND Gestational Diabetes AND Prenatal Care	PubMed	7	0
	CINAHL	2	1
Nursing AND Pregnancy Diabetes AND Prenatal Care	PubMed	10	0
	CINAHL	2	0

Nursing AND Maternal Diabetes AND Prenatal Care	PubMed	8	0
	CINAHL	0	0
Nursing AND Gestational Diabetes AND Antenatal Care	PubMed	8	0
	CINAHL	2	0
Nursing AND Gestational Diabetes	PubMed	67	2
	CINAHL	6	0
Total	PubMed	117	5
	CINAHL	15	3
		132	8

Table 4. Number of retrieved articles and chosen number of articles to answer the research question.

5.3 Data Analysis

Data analysis is the process whereby information is collected and organized to draw meaningful conclusions from it. It is done by using analytical and logical reasoning to gain information from the data. (Hardy et al. 2009.) The main aim of data analysis is bringing out some meaning from the data so that the knowledge gotten can be used to make informed decisions (Flick 2013, 4-10).

Content analysis with themes for the data analysis is what the authors have decided to use in this thesis. This is the most common method for summarizing and synthesizing data of descriptive literature review. More specifically a descriptive analysis which is descriptive data analysis looks at past data on related topics to answer the thesis question. (Friesse 2019).

During the Data analysis process, 8 articles were welcomed from the literature search. These articles were examined closely such that the data was sorted and organized systematically. Within the organizing process, distinctively constructed sentences gotten from the articles were allocated to each piece of raw data that gave 10 codes. In due course, 4 sub

themes with approved titles were generated from the 10 codes. The subthemes were scrutinized to form themes ending the analysis process. A main theme was sorted, that is, nursing interventions in GDM. The classifying and assembling of data are shown in figure 1 below that is, thematic analysis illustration of nursing interventions in the management of GDM in prenatal care and also in appendix 1 which includes the raw data.

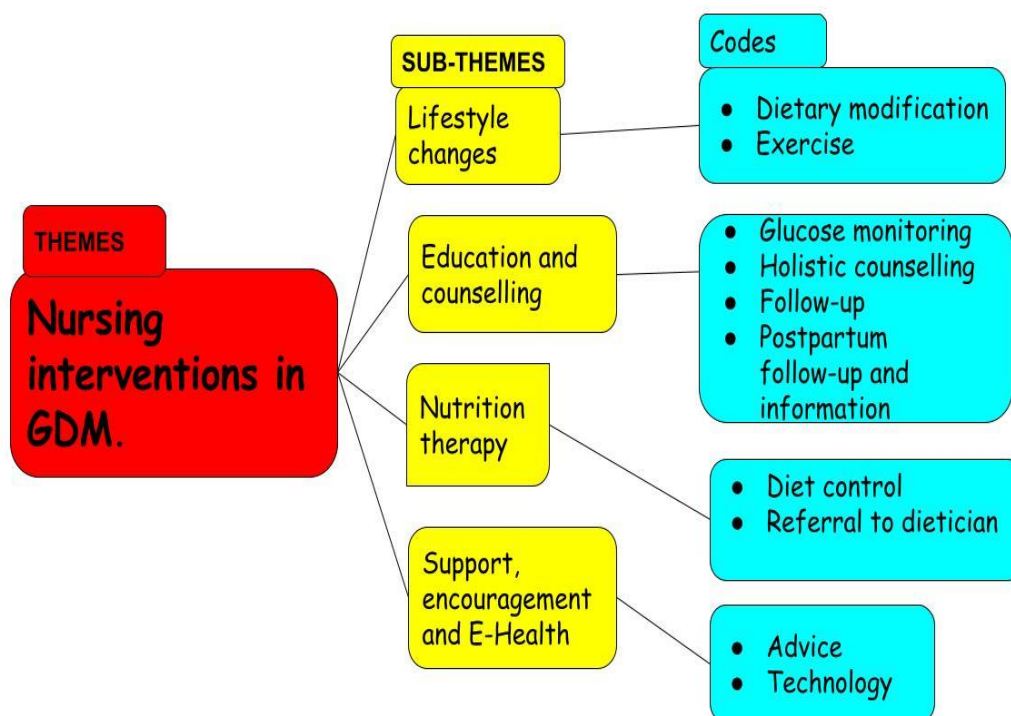


Figure 1. Thematic analysis illustration of nursing interventions in the management of GDM in prenatal care

6 Finding

The purpose of this thesis is to describe how nurses can intervene in the management of gestational diabetes in prenatal care patients. Below are types of nursing interventions that are used in the treatment of gestational diabetes in prenatal care patients.

6.1 Lifestyle changes

Lifestyle changes remain the first line recommendation essential for checking and controlling gestational diabetes. These changes include dietary modification and increased physical exercises.

Dietary modification

Changes in lifestyle such as dietary modification attempts to achieve healthy glycaemic states have been proven effective in about 70% to 80% of prenatal mothers with GDM . Nurses have the responsibility to cause this intervention to be put in place, thereby limiting weight in pregnancy and achieving glycaemic balance. The result of lifestyle modification will lead to less gestational weight, decrease risk of macrosomia and other complications, but no influence on pre-eclampsia. With the help of nurses and health care providers, most women can be able to manage this disease with behavioural adaptation of lifestyles and dietary supplements like probiotics and vitamins. (Mitric, C., Desilets, J., & Brown, R. N. 2019, 3.)

Physical exercises

Physical exercise is described as an important nursing intervention use in the management of GDM. The skeletal muscle of our bodies requires much glucose to function well. During exercises much glucose is used up by the muscles, and has consequence lowering the glucose level of the blood. For this reason, nurses can play a major role here by getting GDM mothers into more physical activities. (Rugge, B., King, V., Davis, E., Schechtel, M., & Hickam, D. 2009.) As concerns physical exercise, nurses taking care of pregnant women with GDM can teach the patients to carry out the following suggested physical exercises.

Quadruped arm/ leg: On your hand and knees with a flat back, arms, and legs at with apart, with pelvic tilted underneath with back in alignment. Opposite arm/leg: While the body is resting on one leg and one arm opposite each other, tilt the opposite ones up slowly to shoulder and hip height. Ball exercise posterior pelvic tilt: While sitting on a ball spread legs apart with centre of gravity evenly distributed on the ball, with hand on the hips.

Standing wall stretch: Stand up straight against a wall while stretching your feet out from the wall with bended knees. Bring arms up and to the side with elbow at 90 degree. Butterfly stretch: Sit on the floor, bend both knees so that the soles of the feet face each other. Walking Around: Walk half a kilometre or more each day.

6.2 Education and counselling

Education and counselling as a nursing intervention in the treatment or handling of (GDM) in prenatal care patients involves nurses impacting knowledge that leads to a healthy life for pregnant women with gestational diabetes. Teaching these women to do all to sustain a steady blood glucose level will be of more help than pharmacotherapy. (Farabi, S. S., & Hernandez, T. L. 2019, 6-7.) Some of such methods include the following: Glucose monitoring, holistic counselling, follow up, post-partum follow-up and information.

Glucose Monitoring

To monitor glucose level for GDM women, nurses should carry out a finger stick blood testing at dawn, and after each meal (Fink JLW 2006). Research have proven that close to 85% of patients have attained the target with glucose levels of 80-95mg/dl before meal and less than 120mg/dl at two hours post prandial. Achieving a good glycaemic control can be reached with less carbohydrate's restrictive nutrition therapy. (Farabi et al 2019.) Professional organizations such as the American College of Obstetricians and Gynaecologist, the Endocrine Society recommends that carbohydrate restrictions is a good remedy for nutrition therapy to GDM patients. Nurses and health care workers should encourage their patients to follow this by educating them on how to monitor glucose levels by themselves. (Abayomi, J., Wood, L., Spelman, S., Morrison, G., & Purewal, T. 2013, 237-240.)

Holistic Counselling

Holistic counselling also stands as an important tool that nurses use in the management of GDM in prenatal care patients that will ensure safety for the life of a GDM mother and unborn child at a short or long term. This is so because GDM mothers are thrice more prone to grow other diabetic complications than pregnant women with normal glucose tolerance. (Scollan-Koliopoulos, M., Guadagno, S., & Walker, E. A. 2006,18.) Nurses must ensure that GDM mothers get consistent updates with good evidence from health team in charge, so that no missing link in information and planning should occur between the medical care workers and patient (Abayomi et al. 2013).

Abayomi et al. 2013, also proposed the following for counselling that nurses may put in use to manage GDM in prenatal care patients. Educating and advising patients to make sure their blood glucose is below 5.6mm/l before meals, and above 7.8mm/l two hours after meals. Patients should keep away from alcoholism and smoking. Patients should eat healthily and balanced diet. Advising patients to take folic acid for supplementation of 5mg/day. Patients are advised to do retina checks for signs of retinopathy. Blood pressure checks are very obligatory.

Follow Up

Nurses are to make the patients understand that if these interventions fail, they will suffer insulin injections and frequent hospital visits (Koliopoulos et al. 2006, 16). The need to space meals or place meals three or four times daily, supplemented by intervals of snacks, three to four times daily. These meals be taken in accordance with body weight or mass index. For instance, A pregnant woman with body mass of 20-25 BMI should consume 30kcal/kg/day. Emaciated patients with less than 20BMI should consume 35-38kcal/kg/day. Meanwhile overweight patients should control their diets as much as possible as to 20-25kcal/kg/day.

Nurses should follow their patient up, educate and advise them to avoid preferred diets, keep away from alcoholism and smoking and keep regular appointments with their doctors (Fink JLW 2006, 28). Abayomi et al. 2013, proposed that nurses carry out postpartum intervention where GDM women with undiagnosed type 2 diabetes should undergo fasting oral glucose tolerance test (OGTT) six weeks after birth.

Post-Partum follow up and information

Mindful of the fact that GDM mothers are prone to diabetes together with their child, testing and follow up are very necessary. There is much emphasizes on the fact that post-partum follow up is important to assess the future risk of diabetes and curbing the risk. For this reason, fasting glucose levels of women should be checked before hospital discharge to sort or identify those with high glucose level, then treated. The rest of the women with low glycemia will be checked even at outpatient. (Fink JLW. 2006, 30.) ADA recommends that women at six weeks after birth should undergo a two hour, 75gm GTT check-up. Patients diagnosed of high glucose level in blood be subdued to lifestyle changes with annual testing controls, while those with normal glucose level, controls be done once in three years.

6.3 Nutrition Therapy

Nutritional therapy stands out to be a very important intervention that nurses use for the management of GDM in prenatal care patients. Glucose that gets into the body enters as food nutrients. Therefore, controlling or selecting the food types pregnant women with Gestational diabetes eat will help manage the situation. Nutrition therapy as a nursing intervention in the management of Gestational diabetes in prenatal care patients consist of diet control and referral to dietician. Some nutritive interventions from across the globe suggest it is very much beneficial for pregnant women with Gestational diabetes to eat conventional foods high in complex carbohydrates and fibre, with lower GI which are low in fat. (Hernandez, T. L., Mande, A., & Barbour, L. A. 2018, 3-5). In the following paragraph we can see traditional foods from respective regions that fit for less confined GDM nutrition therapy approach.

In North America, we have food like whole grain breads, pasta, brown or parboiled rice, oats, vegetables, fruits, beans, lentils, Low-fat dairy, lean poultry, fish, occasional meats, cheese, and nuts. In Latin America, some contemporary food includes whole grains like amaranth, maize, quinoa, brown rice, vegetables, fruits, beans, lean poultry, fish, low-fat dairy, occasional meats, nuts, and cheese. Moving to the Mediterranean region, we have food like whole grain, bread/pasta, brown rice, couscous, vegetables, fruits, beans, lentils, white fish, lean poultry, low-fat dairy, occasional nuts, cheese, meats, and shellfish.

Moving on to Africa, we have traditional food like whole grains like millets, sorghum, teff, parboiled rice, vegetables, fruits, roots, tubers, beans, Fish, eggs, poultry, occasional meats and dairy. In South Asia traditional food include whole wheat, millets, barley, rye, buckwheat, parboiled rice, wheat rotis, vegetables, roots, tubers, fruits, Beans, lentils, dals, low-fat dairy, lean poultry, fish, occasional meats, nuts and cottage cheese (paneer). Lastly in East Asia we have contemporary foods like noodles and brown rice, soybeans, fish, seafood, vegetables, wild plants, seaweed, mushrooms, occasional lean meats, shellfish, dairy. (Hernandez et al. 2018, 20.)

Diet Control

With the help of an expert nutritionist capable of managing ladies with diabetes in pregnancy, prenatal occurrences of diabetes can be managed (Buchanan et al. 2015, 10). Even though nutritional needs for pregnant women with or without GDM are the same, some modifications can be of help in the case of pregnant women with GDM that can bring down glucose level more effectively. For instance, a reduction in the intake of calories for women

suffering overweight and obesity to about approximately 25kcal/kg of body mass, a reduction in the intake of carbohydrates of about 35 to 40% of total calories. (Buchanan et al. 2015, 5.)

According to Fink JLW, 2006, when these interventions like diet control is done on time, it will help the mother to attain a normal blood glucose level, thereby enabling a healthy stay of the foetus in the uterus. Balanced diet should contain carbohydrates, proteins, fats, vitamins. Much fibres in the diet reduces post prandial glycemia because high fibre diets contain low carbohydrates. Therefore, nurses should encourage patients to take high fibres foods like vegetables. (Buchanan et al. 2015, 3.)

Referral to dietician

Cristina et al emphasize the facts put forth by most obstetrical association for immediate referral of any case diagnosed of GDM to a competent dietician nurse for diet changes and physical activities. Nurses should do everything possible to immediately refer any patient diagnosed with GDM to a dietician because it is said that, if disease is detected earlier and appropriate referrals done, cases will be better managed. (Rugge et al. 2009,2.)

6.4 Support, encouragement, and e-health

Following the fact that gestational women are first burden by the load and distress that come with pregnancy, much support and advice and encouragements are needed from many areas to keep them from losing hope, especially those diagnosed of GDM. Nurses should devise means of dealing with these patients in ways that will encourage them. (Fink JLW. 2006, 30). This can be possible through advice and the use of e-health technologies.

Advice

Support from nurses and multidisciplinary team (MDT) come most often in the form of advice to women who are already affected with type 2 diabetes, to help them plan conception and pregnancy in a way that will reduce risk and complications of the baby and mother due to glycaemic levels in blood. Nurses should intervene by advising GDM patients that to support consistent blood glucose levels, she should split their daily intake into three main meals supplemented by three or four snacks. (Abayomi et al. 2013). Some of such advice will be on; Encouraging patients to carryout regular exercises that will help lower blood glucose level, letting patients to be able to identify the signals and symptoms of low blood sugar such as sweating, anxiety, quavering, weakness, extreme hunger, slight nausea, light-headedness, headache, blurred vision and to avoid quick sugar foods. Nurses should

encourage their GDM patients to contact dietitian to help her develop a practical and culturally appropriate eating plan. Encourage GDM patients to work out often, knowing that even moderate exercises will lower her blood glucose levels. Advise GDM patients to seek advice from their physician, who can ascertain how much exercise she needs without increasing her risk of preterm contractions. Support is very important in nursing interventions. Giving a listening ear to your patient's worries and showing your interest to help can help reducing the anxiety and fear that comes from diagnosis of gestational diabetes. The nurses should evaluate the patients stress level to ascertain what support systems are suitable for her. (Fink JWL 2006, 29-30.)

E-Health

This is the use of information technology as well as web to link with and educate GDM women by nurses and other health care workers. Here special APPs are created on cell phones carrying upload of capillary blood glucose measurements from where nurses can manage cases of hyperglycaemia in pregnancy with their patients over long distances with few contact medical visits. The use of E- health in the management of gestational diabetes has produced satisfactory results, both for patients and health care personnel. The use of information technology by nurses as a tool to intervene in the management of GDM for pregnant women suffering from diabetes is improving worldwide. Some of which include, web uploads of capillary blood glucose measurements on cell phone apps, lifestyle and dietary counselling apps used by dietitians and physiotherapists. E-Health technologies allows easy and prompt intervention management of GDM over long distances with very few contact visits. The outcome is met with high patients/nurses safety and satisfaction. Even though this is costly, but it is not detrimental, so e-health technologies have gone a long way to help nurses intervene, manage, follow up as well as care for their patients with GDM from a distance thereby reducing face to face meetings. (Mitric et al 2019, 2-4.)

7 Discussion

This thesis aimed at identifying the nursing interventions that can be implemented when managing gestational diabetes in prenatal patients. This aim has been achieved because the various methods and interventions which are appropriate tools for nurses to make good use of in managing cases of GDM have been examined. We acknowledge the fact that this result may not carry all that may be needed in this intervention, but what is most relevant has been mentioned.

The following points are a briefs summary of the finding for nursing interventions. Lifestyle changes of GDM patients. Education and counselling of patients. Nutrition therapy. Diet control and referrals. Advice, support, and encouragement. Technological involvement through E-health.

These findings are in accordance with, and in support of previous knowledge of this thesis. Mensah et al;2020 quoted earlier in this work says that the best way for nurses to manage GDM patients is to have a care plan for prenatal women, especially those at risk. What else could be included in this plan other than the results of the finding of this work? for instance, education and counselling plan for glucose monitoring, lifestyle changes plan for physical exercise and dietary control, may be set up weekly or monthly depending on the state of health of the patient.

In the area of counselling and education, Mensah et al suggest that nurses carry put education on early screening and diagnosis of GDM, 24-28 Weeks. This will help nurses identify trouble areas and emerging complications before it become acute. Moreover, educating pregnant women to carryout regular hospital visitations once tested positive for pregnancy, do weight checks, urine test, body mass index tests, avoiding smoking, alcoholism by nurses is very important (March of Dimes 2020)

Quoting, Brooks 2019, definition of nursing intervention “any act by a nurse that implement the nursing care plan”, makes us understand that all the results of nursing interventions proposed in this work are relevant. For instance, for a nurse to put up a support plan in the form of advice to women already affected by type 2 diabetes, to help them plan for pregnancy and delivery in a way that will reduce risk and complications to mother and child due to high glucose in blood is laudable (Abayomi et al 2013). Most often it requires time and patience on the part of nurses to educate DGM mother on the use of the glucometer at home for blood glucose monitoring and recording of readings 2-4 times daily, to see the effects on diet and physical exercise on blood sugar levels (In HomeCare.com 2019).

From close examination and evaluation of the nursing interventions used in the treatment of gestational diabetes in prenatal care patients, it is important to intervene early so that you have more time to help the mother maintain normal blood glucose levels and create a healthier intrauterine environment leading to a better or positive outcome. Due to increasing prevalence and complications of Gestational Diabetes Mellitus (GDM), it has become a disease of public health concern. For this reason, health care practitioners especially nurses who are the closest caregivers to pregnant women must be strictly involved in the fight against and the management of GDM. Gestational diabetes mellitus (GDM) is amongst others one of the medical complications in pregnancy. Some of the risk factors of this disease include family history, obesity, and insulin resistance. From data analysis, one can deduce that the absence of knowledge among pregnant women with GDM on self-care management in their daily lives as well as pregnancy depression, stress, anxiety and eating disorders have posed a serious threat to the progress Of GDM pregnancies. It is for this reason that the role of nurses is required in the education, training, and care for the management of GDM in prenatal care patient. According to international diabetes foundation (IDF 2015) GDM accounts for over 90-95% for diabetic cases occurring during pregnancy. The burden of the disease on health care systems, governments, and families cannot be undermined. Huge sums of moneys are spent yearly for diet treatment and insulin intakes worldwide on GDM complications like caesarean section, and neonatal admissions for intensive care due to GDM.

In Africa, Asia, and South America where health systems are still developing, and where ignorance of the complications of GDM still largely prevails, many horrific complications due to GDM are occurring. There are still primitive communities where traditional birth attendance still conduct deliveries at home, mothers still give birth after nine months without any prenatal clinic or screening. It is therefore necessary to involve the intensive role of nurses in the education and management of GDM. The authors wished that the ideas of this work will reach even the most enslaved crevices of our universe. Authors also wish that governments, health systems, NGOs and other humanitarian agencies see the need for this knowledge to put in to action to manage, and prevent complications occurring in pregnancies to mothers and babies due to GDM.

Figureheads in the domains of diabetes in pregnancy had seen that excessive growth in foetus is frequently observed in diabetic pregnancies. Research shows that 25-40% of young women in the world are obsessed and this accounts for the largest number of pregnancies that lead to overgrown babies. (Hernandez et al. 2019.) This is because along the first- and second-decades growth in a young female, some factors like metabolism and

behaviour bring about insulin resistance (IR) and glucose intolerance that finally manifest during pregnancy.

Nursing interventions in this study strictly keeps out the use of insulin and other medications in the management of GDM, but is focused on prevention, case management and control, especially with diet and exercise. Koliopoulos et al., 2006 states that when diet and exercise fail to achieve the required goal in maintaining euglycemia, exogenous insulin is used.

GDM women who are advised on diet and blood glucose monitoring alongside insulin adjusted to normal glucose level show better quality of life as compared to those on insulin alone. Women who use insulin, report more stress than those on diet treatment. (Koliopoulos et al. 2006.) Nurses carry out important role in counselling, education and providing adequate information to GDM mothers as prescribed by clinicians and dieticians. More training and capacity building workshops need to be carried out to equip nurses for this important task, to keep their nursing expertise up to date.

7.1 Discussion of findings

GDM of recent have become a health concern in many countries of the world, accounting for over 90-95% of all cases of diabetes in women. Gestational diabetes has become one of the most discussed topics in obstetric medicine (Mitric et al., 2019). Increase in the standards of living, obesity, genetic predisposition, maternal age and poverty are the risk factors that had caused such a tremendous increase in disease prevalence.

This glucose intolerance disease has caused many health hazards to mothers and their babies around the world, so much so that nurses need to pay keen attention during screening at weeks 24-28 of prenatal hospital visits. Because of the complications caused by this disease and increase in its prevalence, the need for more screenings has been widely accepted. In the year 2016, the Society of Obstetricians and Gynaecology of Canada (SOGC) signed a twostep screening method to start with a 50-g glucose challenge test (GCT) for all pregnant women.

The first is a simple 1hour glucose test to identify women with low risk of hypoglycaemia of clinical importance. The sample size here needs to be large. The second is a 2hours or 3hours glucose tolerance test given to women at risk to know the onset of GDM. (Metric et al 2019.)

All the eight reviewed articles carry information about various interventions of health care personnel on the management of GDM. This research aims to answer the question “What kind of nursing intervention is used in the management of gestational diabetes in prenatal care patients?” One can deduct from findings that there are four main themes that nurses can make use of in this intervention. These are lifestyle changes, education and counselling, nutrition therapy and e-Health/support and encouragement. These are interrelated so that it becomes difficult to discuss them in isolation. Education and counselling remain the main tool through which nurses can pass on the ideas in these four categories of findings. Through education women will receive reliable information from all members of the nursing teams in charge of prenatal care (Abayomi et al 2013).

Nurses also must adapt to various cultural settings where they work, understanding some essential facts on how this disease is handled locally, traditional names of the various herbs used for treating this disease within that given locality, as well as knowing the traditional diets in the vicinity that can be eaten by GDM patients. Nurses also need to learn and know to an extent the local languages of the communities in which they are serving. This will help in communication because in some villages people do not understand any other language apart from their native tongue.

GDM women can implement changes (dietary modification and exercise), through information gotten from health care facilities in the form of books, brochures, counselling, pregnancy apps, health talks, campaigns, using e-health on phones. E-health is an emerging field in medical information, public health, and business, it is of great use for nurses to implement this in the dissemination of important information, dietary changes, and other health tips to their GDM patients. E-Health brings increase, efficiency in health care, reducing cost, while giving sure information on diagnostic and therapeutic intervention. It also enhances good communication between health care facilities and patients. E-health equally enhance quality by allowing comparison between different providers, giving patients the ability to choose the best and quality health provider. (Mitric et al., 2009.)

E-health is also used alongside traditional offline (non-digital) approaches for the passing of information from the nurse to the patient. This means that e- health can be used even in low-income countries where access to quality internet services is rare in tracing patients, providing procedures and consultations for patients by direct linkage to urban based specialist.

Research have also shown that lifestyle changes are not practiced by some pregnant women because during pregnancy they find it hard to carry out physical exercise and taking

balance diet because of tiredness, shortness of breath(dyspnoea), nausea, heartburns, cramps on the legs, body soreness. Diet change becomes hard to follow especially in advanced pregnancy. (Hernandez et al 2019.) To help overcome and make lifestyle changes a reality even in the mist of these obstacles, nutritional counselling by nurses be strongly encouraged (Fink JLW, 2006). Poor compliance to nutrition therapy remains a serious challenge to GDM mothers (Hernandez et al 2019).

Also support and encouragement is needed from family members and nurses to help GDM mothers overcome, if not so many will be much stressed up that may lead to anxiety and fear. Some women aware of the complication of the poor diet on their unborn child, such as macrosomia may to increase intake of carbohydrates restricted diet, much fats, with the hope that it will improve the health of their babies. (Hernandez et al., 2019)

Hernandez et al further explains that protein intake being excess or less should also be monitored because protein intake leads to low birth weight for babies. Carbohydrate intake also should be closely monitored. Simple carbohydrates raise blood while complex carbohydrates (Polysaccharides and starch) may lead to post prandial glucose rise.

With adequate carbohydrate intake, low fats, nutritional changes will take normal glycaemic targets, bringing about stability in maternal weight and that of the foetus, supporting a good condition for foetal growth and finally keeps mother away from medication and frequent visits to the doctor for foetal surveillance. (Hernandez et al 2019.) As suggested in nutrition therapy which is the best remedy for every woman diagnose of GDM, less restrictive higher quality carbohydrates, low fat intake is best for mother and child.

7.2 Ethical considerations and Trustworthiness

Ethics refers to that general principles, guidelines, or values that govern an individual or a group of people. Every study investigation deals with human subjects, careful consideration should be taken as concerns ethical issues that may arise when planning, overseeing, and reporting the study. (Emanuel et al. 2008, 53.) It is, therefore, important that the principles of ethical research and how this might affect the thesis process be understood. This is especially important as the thesis involves the critical evaluation of the summary of another research. It is in this light that the authors are guided with the objective of research by bearing proper data with truth and staying away from mistakes. Data collected from research should build on trust, mutual respect, accountability, and fairness. (Akaranga et al. 2016, 1-9.)

For the fact that this thesis topic has been extensively discussed in health care the authors choose a descriptive literature review of various previous studies. Due to this, the authors have ensured that the content, and all the data is well understood and processed so that there is no misinterpretation, misrepresentation or misjudgement of the information provided by the sources used in the thesis. With a closer look to this thesis, authors and researchers were acknowledged with reference at the end of each sentence or ideas. This is sure to proof that plagiarism was avoided at all levels.

Relevant materials were sorted as we read through the 8 articles to answer the research question. Copyrights was avoided as authors manage to identify and rejected articles with duplicates, triplicates, and quadruplicates. References are clearly written down according to thesis guidelines book of Lab University of applied sciences.

Trustworthiness in thesis writing or a research has to do with the level of confidence put in data collection, explanation and ways used to guarantee the quality of a study (Connelly (2016). These also include the integrity of the study, or the credence in the truth of the study and therefore the discovery is the most important standard (Connelly (2016). This thesis is credible in the sense that is unbiased and is backed up with a lot of evidence as seen in the findings. Authors uses and cite credible sources. Transferability is established in this thesis as authors have provided readers with proof that the research study's findings could be relevant to other circumstances, situations, times, and populations. Findings has been evaluated, interpreted, and recommended for study such as all are supported by the data gotten from the 8 articles confirmed for the findings. Confirmability is attained as this thesis has been confirmed by the thesis guidance teacher. Both authors come to conclude that the topic is very important and more should be done in educating the nurses on how to manage patients with GDM. Both authors think that many women are unaware of GDM especially until there are many weeks pregnant. The topic looked simple but somehow difficult getting direct information on nursing interventions in managing patients with GDM. There was mainly general information with very few focussing on the nursing interventions in particular. The search words made it a bit difficult to get articles especially (Interventions) which is in the research question. Due to this, authors decided to use just (Nursing) instead of (Nursing interventions). More so, due to complexity of the topic with very few articles directly related to the research question, the Authors decided to make use of also books and guide which had important data in relation to the research topic. Some of the chosen articles, books and guide had also medical interventions but authors focus mostly on those interventions with directly connection to the nurses and patients with GDM as seen in the findings.

7.3 Recommendations, limitations, and conclusions

We recall that the aim of this thesis is to assess nursing interventions in the management of gestational diabetes in prenatal women. The research results on nursing intervention on GDM mothers has got lots benefits for nurses involved in this discipline.

Firstly, because knowledge about nursing interventions in the management of GDM patients is still a developing field, nurses will benefit from this new finding which will equip them for good performance. Also, skills in planning and managements of GDM patients will greatly benefit nurses. Because this is a new finding, new specialties in nursing can be developed. With the increasing prevalence of gestational diabetes, more diabetic treatment centres need to be opened. This will create employment opportunities for nurses especially in the implementation of theses research findings.

Most important, the purpose of saving the lives of babies, their mothers and preventing disabilities, is of paramount benefit and satisfaction to the nursing vocation. Some suggestions for further research include; research to monitor and evaluate the outcomes and effectiveness of this intervention program proposed in this work over time, research should be carried out to limit or stop the progression of gestational diabetes to type 2 diabetes even at post-natal, prevalence and risk factors of gestational diabetes in some poor communities in Central Africa, nursing interventions: how relevant ?, research should be intensified on the genetic predisposition to GDM.

From findings, the authors recommend that refresher courses and training be organized for nurses on the management of GDM in prenatal care. Also, campaigns for free screening be organized in all health areas to screen pregnant women for this disease annually. Health teams and nurses should penetrate the hinterland for sensitization and screening for GDM. Moreover, diabetic treatment centres should be opened in all health districts with trained nurses on GDM management skills as needed. Aspects of language and culture be considered during education classes for GDM in prenatal care. Also from reviewed articles, it shows that not much research on GDM had been carried in African countries. Authors recommends that research on GDM should also be focused also on the African continent.

Though the objectives of the thesis were achieved, some limitations were noticed as deficiencies are unavoidable to humans. The exclusion and inclusion criteria were somehow tight such that some important information may have been left out such as articles in other languages than English, articles published before 2005, articles not reviewed and just to name a few. There was very little information directly concerning nursing intervention in the

management of Gestational diabetes in prenatal care patients, hence more research is recommended to fortify the results of this thesis or other thesis related to this topic.

In conclusion, proper management, control, and reduction in GDM prevalence should be a goal for nurses and health care practitioners. This can be done through lifestyle changes (dietary modification, physical exercises), Education and counselling, nutrition therapy and support. Nurses require additional training to gain general knowledge on management and prevention on GDM, and to guide GDM women to do the right thing to save life. For this research finding to attain its goal, strategies need to be put in place so that low- and middle-class income nations of the world plagued by ignorance and poverty will benefit. This can be through; publication in medical journals, included in the curriculum for training of medical personnel and nursing institutions, included in the health sectoral strategy plan for public health services of nations and other health services, and presented to health care NGOs such as "SANTE DIABETE" founded in 2001 to respond to the lack of access to health care for people with diabetes in Africa. For sixteen years this NGO has been acting to save lives through better prevention, education, and management of diabetic cases to improve quality of life for people affected by this disease.

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Appendix 1. Data analysis process form

RAW DATA	CODES	SUB-THEMES	MAIN THEMES
<ul style="list-style-type: none"> • The first intervention for women with gestational diabetes is to modify diet. • In GDM, restriction of carbohydrate, particularly simple carbohydrate, reduces postprandial hyperglycemia and decreases fetal glucose exposure, reducing fetal overgrowth • These findings highlight that fiber intake in the context of any dietary CHO composition may impart an influence on maternal and infant outcomes • The preponderance of data suggest that low-GI diets may improve fasting/postprandial glucose and reduce infant birth weight in pregnancies complicated by GDM, particularly with increased fiber intake • Lifestyle changes represent the first-line approach to therapy in gestational diabetes and include dietary modification and physical activity with the aim of limiting gestational weight gain and improving glycaemic control. • To help make lifestyle changes a reality, your GDM patient will need to receive nutritional counseling from a registered dietitian. While the optimal diet hasn't been determined, patients are generally advised to limit their carbohydrate intake to 35% - 40% of their total daily calories. 	Dietary modification/	Lifestyle changes	Nursing interventions in GDM

and increase exercise.	Exercise		
<ul style="list-style-type: none"> • The use of continuous glucose monitors in pregnancy has been gaining popularity. • Women with T2D and GDM will require individualised advice regarding blood glucose targets and monitoring. • Individuals who receive diet advice and blood glucose monitoring, along with an insulin dose adjusted to glucose levels, have been shown to have an improved quality of life when compared with women in a conventional treatment group • To maintain tight control, a woman with GDM needs to eat a balanced diet, increase her physical activity, • and closely monitor her glucose levels, typically testing her blood by fingerstick immediately after waking in the morning and after each meal. About 85% of patients can achieve the targets—before-meal levels of 80 -95 mg/dL and two-hour post-prandial levels of <120 mg/dL—with lifestyle changes alone 	Glucose monitoring	Education and counselling	
<ul style="list-style-type: none"> • Nurse practitioners who care for patients with gestational diabetes can offer holistic counselling that considers the short and long-term health of women and their infants. 	Holistic counselling		
<ul style="list-style-type: none"> • Women must learn to use a glucometer, change their diet and follow a rigid CHO restriction, interpret food labels and count CHO grams, avoid habitual preferred foods, attend more doctor visits, and importantly, they are told that if they “fail” nutrition therapy, insulin injections and increased fetal surveillance will be required. • Additional education regarding insulin management is needed, as many will be commencing insulin for the first time and 	follow-up		

<p>insulin doses change throughout pregnancy. Women taking insulin will require detailed advice regarding preventing and managing hypoglycaemia, particularly if newly commencing insulin, plus detecting and managing ketoacidosis. Both conditions can be more prevalent in diabetic pregnancy and can occur with less warning because of metabolic changes in pregnancy (Rayburn et al 1986).</p> <ul style="list-style-type: none"> • Teach your patient that to sustain steady blood glucose levels, she should divide her daily intake into three main meals supplemented by three or four snacks. 			
<ul style="list-style-type: none"> • It is possible that some women with GDM may have undiagnosed T2D. Therefore, all women with GDM should have an OGTT performed 6 weeks postpartum to clarify this. 	Postpartum follow-up and information		
<ul style="list-style-type: none"> • Because GDM is a risk factor for diabetes for both mother and child, follow-up testing is essential. The ADA recommends that women undergo a two-hour, 75 gm GTT at their six-week postpartum check-up. A patient whose results show impaired glucose tolerance needs to be reminded of the importance of continuing the life-style changes she made while pregnant and undergoing annual testing. If her levels at six weeks are normal, she should be tested once every three years. 			
<ul style="list-style-type: none"> • Nutrition therapy is instituted only once gestational diabetes mellitus (GDM) has been diagnosed. • A less restrictive nutritional approach may ease anxiety associated with the diagnosis and plan for therapy • A less restrictive approach to nutrition therapy in GDM could increase self-confidence, compliance, and avoid compensatory higher fat intake. Overall, these trials 	Diet control	Nutrition therapy	

<p>underscore that women with GDM achieved good glycaemic control with a less carbohydrate-restrictive approach to nutrition therapy.</p> <ul style="list-style-type: none"> Overall, findings from these studies highlight that the achievement of good glycaemic control is possible with both restrictive and less CHO-restrictive nutrition therapy 			
<ul style="list-style-type: none"> Early referral to a dietitian Most international obstetrical associations advocate for an immediate referral to a certified dietitian and increased physical activity at the time of diagnosis of GDM 	Referral to dietitian		
<p>Encourage your patient to exercise regularly, too, and point out that even moderate exercise will lower her blood glucose levels." Make sure your patient can recognize the signs and symptoms of low blood sugar—sweating, nervousness, shakiness, weakness, extreme hunger, slight nausea, dizziness, headache, and blurred vision—and tell her to keep low-fat milk, fruit juice, candy, or other quick-sugar foods readily available.</p>	Advice	Support, encouragement, and E-health	
<p>Telemedicine allows for prompt management of care across distances with fewer face-to-face medical visits and has been associated with high patient satisfaction</p>	Technology		

Appendix 2. Articles use in the findings.

Au- thors/Year	Title	type of study/in- formation	Aim	Conclusion
Rugge, B., King, V., Davis, E., Schechtel, M., & Hickam, D. 2009.	Gestational Diabetes Caring for Women During and After Pregnancy	Clinician's Guide	Is to bring forth evidence guide about prenatal treatment and delivery management for women with gestational diabetes and evidence follow up for the development of type 2 diabetes among women who have had gestational diabetes.	Women with gestational diabetes who have a higher pre-pregnancy body mass index (BMI) or who gain more weight during pregnancy are more likely to develop type 2 diabetes following pregnancy. Women diagnosed with gestational diabetes earlier in pregnancy are more likely to develop type 2 diabetes than those diagnosed later in pregnancy
Mitric, C., Desilets, J., & Brown, R. N. 2019.	Recent advances in the antepartum management of diabetes	Article	Advances in the management of diabetes in pregnancy.	This review illustrates some encouraging advances, including the use of oral hypoglycaemic agents, in particular, metformin and insulin analogues.
Hernandez, T. L., Mande, A., & Barbour, L. A. 2018.	Nutrition therapy within and beyond gestational diabetes.	Article	To rigidly limit all types of carbohydrate for pregnant women	Nutrition therapy is the single treatment component that will reach every woman with GDM across diagnostic criteria
Farabi, S. S., & Hernandez, T. L. 2019.	Low-carbohydrate diets for gestational diabetes.	Article	To assess the effects of both low- and higher CHO nutrition approaches in GDM.	The prevailing gestalt of the evidence demonstrates that the restriction of CHO results in improved maternal glycemia.

Abayomi, J., Wood, L., Spelman, S., Morrison, G., & Purewal, T. 2013.	The multidisciplinary management of type 2 and gestational diabetes in pregnancy	Journal	To presents an overview of the multidisciplinary management of T2D and GDM in pregnancy and identifies areas where care may be lacking for these women.	Specialist care prior to conception, during pregnancy and in the postpartum period not only helps to reduce complications of diabetes in pregnancy but may also encourage women to make changes to their diet and lifestyle, improving health in the long term.
Scollan-Koliopoulos, M., Guadagno, S., & Walker, E. A. 2006.	Gestational Diabetes Management: Guidelines to a Healthy Pregnancy	Article	To provide the nurse practitioner with a review of the cause, risks, complications, and management of gestational diabetes.	20% to 50% of women with gestational diabetes may develop type 2 diabetes, and that the use of insulin as an effective means of obtaining euglycemia in type 2 diabetes is advocated, gestational diabetes may be an opportunity for patients to explore perceptions of insulin treatment
Fink JLW. 2006. Vol. 69, No. 5	Diabetes in pregnancy and beyond	Book	How to keep short- and long-term problems at bay	Early intervention will help the mother maintain normal blood glucose levels and create a healthier intrauterine environment.
Buchanan, T. A., Xiang, A., Kjos, S. L., & Watanabe, R. 2007.	What is gestational diabetes? Diabetes care	Article	To explain what Gestational Diabetes is about	GDM can be viewed largely as diabetes in evolution that provides important research and clinical care opportunities. Regarding research, GDM offers a strong opportunity to study the early biology of diabetes.