Nursing Guidance in Gestational Diabetes Mellitus: A literature Review

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Laurea University of Applied Sciences **Abstract**
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Gestational Diabetes Mellitus is one of the most common metabolic disorders of pregnancy. The prevalence of GDM is increasing worldwide in higher ranges every year. The complication in pregnancy has become one of the concerns in world since lot of pregnant women do not have proper guidance during their pregnancy. This has caused many complications for both mother and fetus preventing to live healthier life. Therefore, nursing guidance is one of the most important aspects since this guidance reduces maternal and infant mortality rate as well as helps pregnant women to prevent the complication and adapt healthy behaviour that proves to be beneficial for both mother and fetus.

The purpose of the thesis study is to describe what kind of nursing health care guidance are given to the pregnant women about gestational diabetes mellitus. The aim of the thesis is to provide comprehensive understanding about the nursing health care guidance to the pregnant women with gestational diabetes mellitus. The research question for our thesis is "What kind of nursing guidance is given to pregnant women with gestational diabetes?".

The method used in this thesis to answer the research question is descriptive literature review. The articles were retrieved from two databases Laurea Finna and PubMed. Total of 12 articles were finalized through inductive content analysis.

Findings were concise into eight subthemes: Nutrition, Physical Activity, Insulin, Oral Hypoglycaemic agent, Healthcare professional Education, Patient Education, Family Support and Nursing/Counselling Support. Further, subthemes were divided into four main themes: Self Care, Medication, Education and Training, Social Support. These findings summarized guidance to pregnant women from first week of pregnancy until the childbirth.

Findings has highlighted both physical guidance and mental/social aspect. Therefore, this nursing guidance are effective in reducing complication in pregnancy and has positive impact of adaptation of healthier behaviours. It would be more beneficial in future if this nursing guidance are practiced and emphasized more through different E-health technologies as well.

Keywords: Gestational Diabetes Mellitus, Nursing Guidance, Antenatal Care

Contents

1 Introduction

Gestational diabetes is also known as GDM. This is firstly recognized during pregnancy due to glucose intolerance which results to hyperglycaemia (Gautier 2016). GDM is one of the most common metabolic disorders of pregnancy with 1 to 24% depending on the people races and ethnics and has a risk of adverse perinatal outcomes like macrosomia, induction of labor and caesarean section (Nursing in Practice 2022).

The prevalence of gestational diabetes mellitus varies worldwide. Region- specific data reveals middle East and North Africa have highest rate of 15.2%, followed by 15% in South-East Asia, 11.2% in South & Central America, 10.8% in Sub- Saharan Africa, 10.3% in Western Pacific, 7% North America and Caribbean, 6.1% in Europe (David et at.2019, 4). Comparatively, South Asian countries women have more GDM compared to other countries worldwide. Highest rate is in Malaysia 18.3%, followed by India, Bangladesh, and Sri Lanka with 13.6%, 9.7%, 8.1% respectively (Yeyi & Cuilin 2016). In USA it affects 2-10% (Quintanilla & Mahdy 2019). In European regions, Northern Europe records highest cases with 44.4% followed by Southern, Western and Eastern Europe with 27.1%, 24.1%, 4.5% respectively (Marilia et al. 2021).

According to International Diabetes Federation 2019, women between 20-79 years, 223 million are living with diabetes and is estimated to reach 343 million in 2045 worldwide. 16% which is nearly about 20 million children had hyperglycaemia during live birth among which 84% were estimated from gestational diabetes and 1 in 6 childbirths have been affected by GDM. And most of the affected women were from developing countries. (International Diabetes Association 2020). Middle East and North Africa had the highest prevalence of GDM with range of 8.4-24.5% whereas Europe had the lowest prevalence ranging from 1.8-22.3%. Other continents like Southeast Asia, America, Africa had middle ranges of prevalence between 6.5-23.5% (Zhang & Zhu 2016).

Previous studies have stated that lack of standardized consensus and consistency of data collection created challenges to compare the worldwide prevalence of GDM (David et at.2019). Research have revealed that acculturations are high risk factor to increase number of women to suffer with GDM in Asia in compares to other part of world. Women adopt different practices, attitude, or follow behaviour and value through the social process like sedentary lifestyle with low exercise, social-cultural follow along with environmental factors (Liwei et al. 2019). From the nursing perspectives, this unhealthy behaviour of women has direct threats in the health of women. It rises risk to macrosomia, cardiometabolic changes, increase of women blood pressure, poor development or overgrowth of fetal. After birth the child is exposed to many diseases like child obesity, smaller head circumference and neurological impairment (Sylvia et al. 2018). Nutritional factors increase risk in southeast Asian countries for GDM like poor dietary intake, and also different challenges to address about GDM to women like pre-conceptual

screening, maternal weight gain, poor emphasis of MNT (medical nutritional therapy), poor governmental guidance about GDM to pregnant women (Maria et al.2021). In African countries factors like obesity, chronic hypertension, diabetes type 2, history of stillbirth, GDM, miscarriage, abortion and macrocosmic children lead high prevalence of GDM (Achenef et al. 2019).

Even though many guidelines and guidance on the management of GDM are found most of them are intended for medical practitioners and there are very few studies that reviewed the best practice guidelines concerning the nursing management of GDM (Gwendolyn, Baloyi, Baboo, 2019). Also, those guidelines that were found on nursing management of gestational diabetes were not always comprehensive and even differed in recommended practices and consistency of those guidelines on management of GDM is very much variable which needed improvement (Zhang et al. 2019). For instance, nursing guidelines that are given does not focus on all the area such as diet, physical activity or exercise, monitoring and treatment or lifestyle moderations separately. These all phases are covered as general in one term as general recommendations focusing on what should be done rather than emphasize how to do. Research does not focus on nursing guidance of GDM but rather on diagnosis and test (Gwendolyn et.al. 2019, 78-90).

Along with that nursing guidance given to pregnant women are area specific and only a few articles are found with worldwide perspective. Therefore, this thesis is going to be delivered by using a method of descriptive literature review to fill a research gap and find out what kind of nursing guidance is given for pregnant women with GDM.

2 Theoretical Background

2.1 Gestational Diabetes Mellitus

Diabetes mellitus is one of the metabolic diseases which occurred when the body of an individual is unable to produce the adequate amount of insulin needed for the regulation of blood glucose or the body's cells does not react to insulin and experience symptoms like polyuria, polydipsia, and polyphagia (Lal 2016; THL 2022). Diabetes is categorized into Type 1, Type 2 and Gestational Diabetes.

GDM is the abnormal glucose metabolism that happen during pregnancy were women with or without previous history of diabetes or GDM are likely to get (Stanley et al. 2018). Basically, placenta supplies all the necessaries nutrition, water to the foetus and maintains different hormones (oestrogen, cortisol and human placental lactogen) during pregnancy. These hormones mostly human placental lactogen hormone can block the insulin called contra-insulin (JOHNS HOKIS MEDICINE 2022). Daily increase of placenta hormones increases the risk of insulin resistance. Insulin resistances are overcome with insulin produced from pancreas. But insufficient production of insulin by pancreas results high placental hormones leading to cause

gestational diabetes (Cara 2021). This usually begins in 20 to 24 weeks of pregnancy (JOHNS HOKIS MEDICINE 2022) and is peak at 24-28 weeks (Kijmanawat et al. 2019).
Gestational diabetes mellitus occurs during the pregnancy and normally goes away after childbirth and women with the history of diabetes are at higher risk (Jasmine et al.2018). It is regarded as one of the most common health complications causing severe adverse effect on both mother and child during and after the childbirth (Fadhil 2015).

2.1.1 Risk factors

The aim, purpose, and research question of the thesis Multiples factors are associated of developing of gestational Diabetes Mellitus. Age is one of the leading risk factors. Mainly women above 25 years are at higher risk of developing GDM. Obesity is another contributing risk factors. Women with body mass index (BMI) equal or greater than 25kg/ m^2 and obese women BMI equal or greater than 30kg/ m^2 are at risk of developing GDM (Shanshan et al. 2013). In comparison to healthy women, obese and severely obese before pregnancy have 4 to 8 times higher risk of developing GDM (Kim, Sharma, & Callaghan 2015). Obesity increases the insulin resistance, rises the blood pressure, and causes hypertriglyceridemia (high triglycerides in blood). This leads to risk of getting gestational diabetes mellitus (Yen et al. 2019).
Unhealthy eating habits and smoking are also risks developing GDM. "Western Diet" which contain larger portion of processed meal no/less vegetables significantly rises GDM risk as they have high calories (Monika et al. 2020). Secondly, Smoking is dangerous during the pregnancy and have positive effect to prenatal babies. Studies have shown women smoking 25 pieces of cigarettes can have 98% risk of getting GDM (Bao et al. 2016).
Some ethnic women like native American, Hispanic, African or African American and Asian women are greater risk as compared to non-Hispanic women. Polycystic ovary disease also known as polycystic ovary syndrome or PCOS, high blood pressure, still childbirth and multiple childbirth have greater risk of GDM (C. Zhang & Y. Ning 2011). In addition, family history of diabetes, mother own history of gestational diabetes, high blood pressure, high cholesterol level, cardiovascular/hear problem, polycystic ovary syndrome (PCOS), having had miscarriage, still birth, childbirth defects or overweight childbirth during previous pregnancy have high risk to develop GDM (Michael 2021).

2.1.2 Screening and Diagnosis of Gestational Diabetes

GDM is diagnosed usually between the weeks of 24-28. Although there is no specific test for GDM and still debate is ongoing between the best screening and diagnostic approach two methods are used worldwide for the screening of GDM (Fuller & Borgida 2014). International Association of the Diabetes recommends using one step approach where glucose- tolerance test with blood glucose level is obtained after the oral administration of 74-g glucose is loaded in the fasting state (Barbieri 2021). Whereas in two-step approach test recommended by American College of Obstetrician and Gynecologist glucose challenge test with blood glucose level is

obtained after the oral administration on 50-g glucose in the non-fasting state. If 50-g glucose test comes positive, then 100-g. 3-hour oral glucose tolerance test (OGTT) is done (Fuller & Borgida 2014).

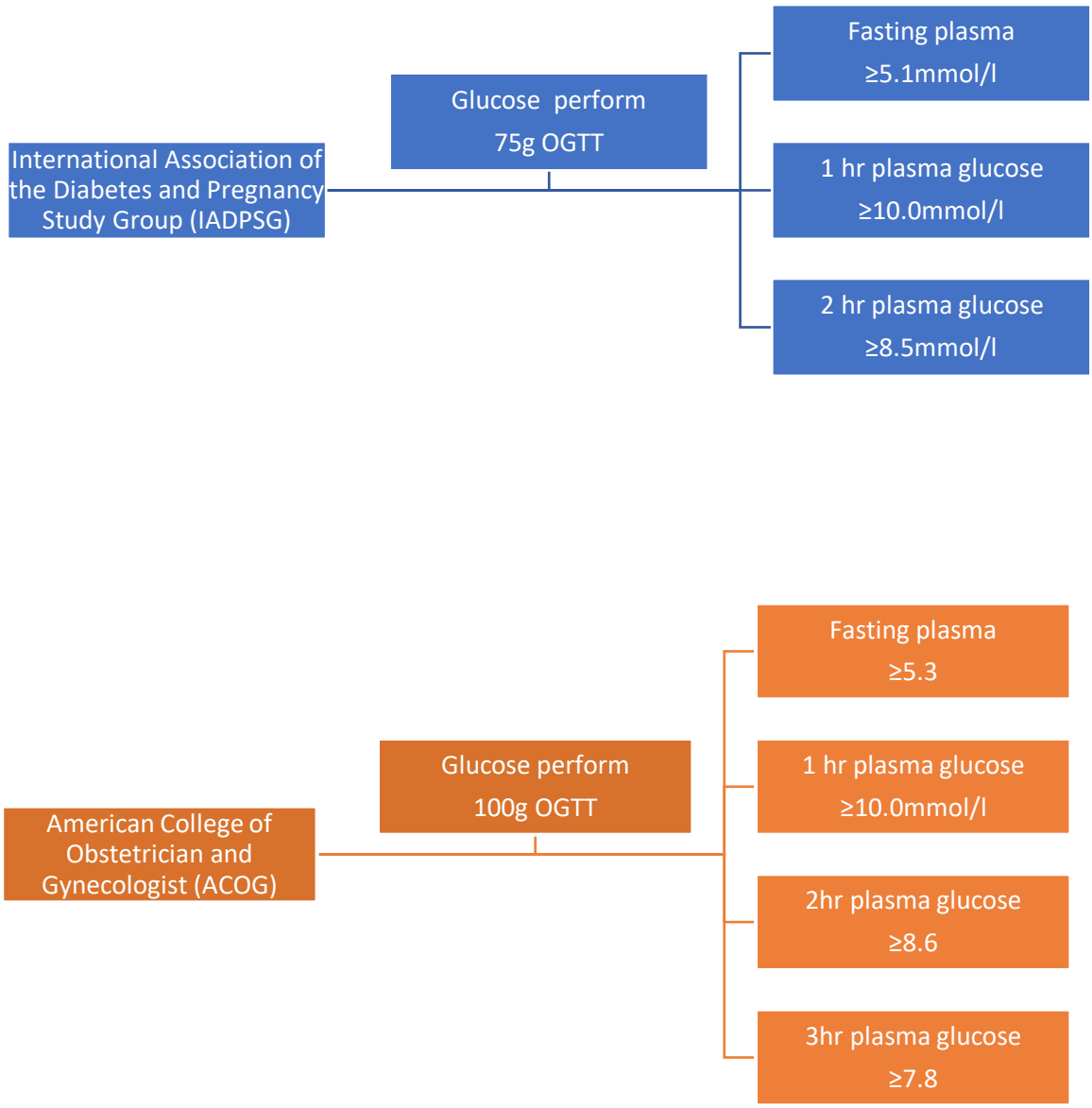


Fig 1. Two different mostly used diagnostic guidelines for GDM (ACOG 2018; IADPSG 2010, Modified from American Diabetes Association, 2014)

According to figure above in International Association of the Diabetes, an overnight fasting which is about 8 to 14 hours is mandatory for the patient who comes for blood test. As soon as the patient arrives for the blood test 75 g liquid that contains glucose is asked to administer orally to the patient but before that blood is drawn once and then after each one hour after the liquid is administered. If one or more of the plasma glucoses values that is fasting plasma

or one- or two-hour plasma are exceeded, then gestational diabetes is diagnosed in that pregnant mother. (IADPSG 2010; Medline Plus 2020.) In the case of American College of Obstetrician and Gynecologist which is two-step process if from the 50 g glucose test comes positive then 100g OGTT is performed similar as one step approach process but with 100g OGTT and three hours plasma glucose and if the glucose value is equal or exceed the normal range then gestational diabetes is diagnosed. (ACOG 2018; Medline Plus 2020.)

2.1.3 Complications

GDM can have serious effects on mother and child during and after the pregnancy for short and long term. During delivery child obstetric risk is more common (David et al. 2017, 3). Child is likely to be born overweight. Macrosomia (abnormal health condition where child born longer than normal) can occur, and this can lead to increased risk of dystocia (difficult childbirth). (David et al. 2019.) Other complication like hypoglycemia (reduce of blood glucose), jaundice, chances of bacterial infections, asphyxia (oxygen deprived), neonatal respiratory distress syndrome (NRDS) and Childbirth trauma of brachial plexus are likely to happen (Emilyn et al. 2020).

Research have stated that physiological child complication of shoulder dystocia (childbirth injury) has result intensive neonatal care (Thomas et al. 2012) and mother is likely to loses her child before or after birth “stillbirth” (Jasmine et al.2018). Before childbirth mother is possible to have amniotic fluid pollution problem with premature rupture of membranes (amniotic sac. Postpartum hemorrhages with pregnancy induced hypertension) can occur during child delivery (Wenzhen et al.2020). After childbirth, mother is at risk of long-term health complication like development of diabetes type 2 and cardiovascular diseases. Around 10% of women have possibilities of getting diabetes immediately after the childbirth while 20-60% can develop withing 5 to 10 years after the childbirth (Thomas et al. 2012). 60% women with GDM can develop type 2 diabetes latter in their lifetime (Jasmine et al. 2018). On the other hand, 63% women with GDM can have heart and blood vessels related issues after childbirth (Jasmine et al. 2018).

Like mother, after birth child is also expose to multiple health complications. Long term complication of type 2 diabetes and obesity are the most common implication of GDM (David et al.2017, p.4). Child can be obese at infant or at adulthood period. Their BMI tend to increase and exposes to risk of developing Diabetes Mellitus (Thomas et al. 2012). Child born at GDM have double risk of being obese than children born from non-diabetes mother (Jasmine et al., 2018). Similarly, children have risk of developing cardiovascular disease, and metabolic syndrome (Ulla et al. 2015). Some current researchers have found that child can have wheeze and asthma risk during their childhood (Marian 2022). They also can have abnormal brain development and poor cognitive processing with attention deficit in adulthood (Monika et al.2020).

Nurses have very important role to manage GDM complications. They can provide all the necessaries information about disease, help to identify the sign of hyperglycaemia,

hypoglycaemia and ways to maintain normoglycemia (normal blood sugar level). They educate, teach about self-monitoring of blood glucose from fingers and safe administration of insulin doses with schedule doses. They can do the prenatal screening between 24 and 28 weeks of pregnancy, evaluate mother, fetal situation. Additionally, teach women to identify different signs like confusion, urination times, over sweating, visual state, and monitor women vital sign, fetal heartrate and contraction time of uterine. In regards, nurses teach to manage stress, find alternative way to relaxation for better health of women and healthy growth of fetal (Paul 2022).

2.2 Insulin resistance

Insulin is the peptide hormone secreted by B cells of pancreatic islet of Langerhans. In simpler form pancreas made the hormones called insulin which helps glucose that is in the blood enter to the cells in our muscle, fat, liver where it is used as energy. (Rev 2005.) Liver also produce glucose but mostly glucose is generated from the food we eat. Insulin sustains normal blood glucose level and helps in promoting cell division and growth through mitogenic effects (Caprio 2013).

Insulin resistance is defined as abnormal level of insulin in the body because of excessive amount of blood glucose that affects cell's function. It interferes the cells function such as absorption and utilization of blood sugar to convert into energy (Adam 2021).

Carbohydrates presents in the food are broken down to the form of glucose in the blood and insulin act as a channel to transfer glucose to the cells through blood. Over the time, hyperglycaemia also known as reduce in pancreas efficiency to produce insulin leads increase in glucose amount in the blood vessels inside the body (IDF 2020). As a result, excessive rise glucose levels in blood leads to damage of blood vessel and causes significant side effects to the body (THL 2022).

One of the common side effects of insulin resistance is fetal macrosomia (new-born baby larger than average). In post-prandial period (period after meal), high amount of insulin is produced by ß-cell also known as ß-cell hyperplasia. This allows body for efficient utilization of glucose. During third trimester too much placental hormone release leads insulin resistance and increases risk of fetal macrosomia. (Choudhury & Rajeswari 2021.)

2.3 Nursing Guidance

Nursing guidance is the combination of art and science with the role of delegating appropriate guidance, advocating practices in a holistic way. It has encompassed the patient overall health background of physical, social, cultural, spiritual, emotional, psychological guidance based on available experiential and research-based evidence practice. Nursing guidance aims on patient

getting benefit which promotes in such a way that they get optimal health satisfaction with safety (Nursing and Midwifery Board of Ireland 2022). Medical guidance mostly focuses after patient is diagnosed with GDM and with its treatment medication whereas nursing guidance is given throughout the pregnancy journey and not only focus on medicines but rather than lifestyle intervention that includes diet, exercise, education.

In the context of different country, each have their own nursing guidance to aware women. Nepal Diabetes Association (NDA) encompasses education and advocacy campaign to its general populations with joint work of Ministry of Health and population with different organizations, clubs (Rotary clubs). They prepare leaflets, educational posters, booklets, articles etc which covers basic life intervention to mental support guidance (NEPAL DIABETES ASSOCIATION 2022). India has been following WHO guidance including MNT (Medical Nutrition Therapy) immediately started when GDM is diagnosed with carbohydrate-controlled meal planned to achieve normoglycemia, fatal good health. Nutrition assessment individualised base on women BMI Saturated fat like ghee, butter, coconut oil, organ and red meat, full cream, palm oil limited less than 10% suggested daily intake (Ministry of Health and Family Welfare Government of India 2014). Similar to many countries UK also have listed nursing guidance covering diet (switching from high to low glycaemic food), exercise, medication, physical and mental support before and after the childbirth (NICE 2020).

When taking about successful nursing guidance, it is only possible with the proper nursing process. For the first time nursing process was initiated by Ida Jean Orlando in 1958 and is still followed in current nursing care plan. It is the systematic approach of caring the patient following the fundamental principles. It includes critical thinking formulating patient-centred plan and applying evidence-based knowledge in order to give quality of care within holistic approach and scientific facts and belief (Tammy et al. 2021).

Nurses are often considered as first line health care professionals in many parts of the developing and developed countries as well where there are very different situations where availability of doctors are difficult either due to geographical location or other factors. In such places trained nurses can assist the women with nutritional therapy, educate about the role of healthy lifestyle, monitoring the blood glucose level during and after pregnancy for long term health benefit (Gwendolyn et al. 2020). Nursing advice from the trained professional nurses about daily care and information is beneficial during GDM care and can make women more educated about GDM. They can teach women to blood glucose measurement, administrating of insulin and daily well-being evaluation of both mother and fetal can improve mother and fetal well-being (Paul 2022).

Nursing guidance about care and education about GDM to women during pregnancy can be possible with the nursing intervention where nurses can plan and act accordingly to need of women. This helps to effectively achieve the set plan because in nursing intervention quality of standardized evidence-based majors are used (Phoebe et al. 2011). So, nursing guidance is possible through successful distinctive 5 nursing intervention process for client-centred care. It encompasses assessment means gathering of necessary information. Secondly, nursing diagnosis

to interpret collected data critically to find strength and weakness about client troubles. Similarly, Planning is done to assess client information to come up with diagnosis statement to produce nursing intervention. Proceeds implementation, the action phase through which nurses uses cognitive, technical with interpersonal skills to execute short- or long-term plans. Lastly, evaluation phase done together with client to measure how successfully plans are meet (Hengameh 2011). Figure below shows complete nursing process.

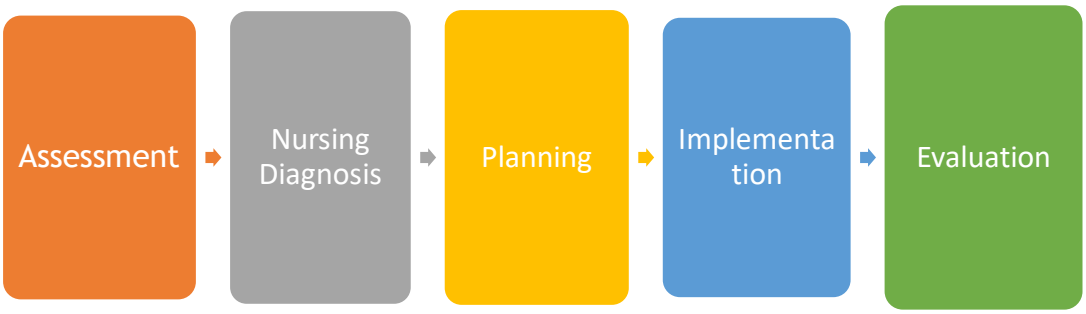


Fig 3: Nursing process (Hengameh Karimi 2011, Modified picture from SciVerse ScienceDirect p.564).

2.3.1 Antenatal Care

Antenatal care is the care that is provided to pregnant women throughout their pregnancy by healthcare professionals. It basically includes risk factors, screening, prevention, and management of pregnancy related disease along with health guidance and promotion (Ali, Elbarazi, Alabboud, Maskari,Loney & Ahmed 2020). According to World Health Organization (WHO) 2016, ANC health care should be started from the very early phase of pregnancy i.e., within the first trimester. Along with that WHO also recommends contacting the health care as soon as pregnancy is known or at least 12 weeks of gestation second visit is at 20th week, third visit at 26th week, fourth visit at 30th week, fifth visit at 34th week, sixth visit at 38th week and last visit at 40th weeks of pregnancy. During these antenatal visits different laboratory examination, ultrasound, Body Mass Index, and fetus growth are evaluated. (March of Dimes 2011.)

Along with that administration of medication and vaccination that are needed in pregnancy phases are also discussed. (World Health Organization,2016.) Frequent visit to the hospital during the pregnancy period prevent the unwanted complications as well as maternal and child mortality rate. The discussions during the visit and health guidance given by health care professionals adds to the health promotion required. (Olarewaju 2022.)

Whitehouse (2010) has described that each pregnant women with first child has 10 routines antenatal care whereas with those who already has child before has altogether 7 visits.

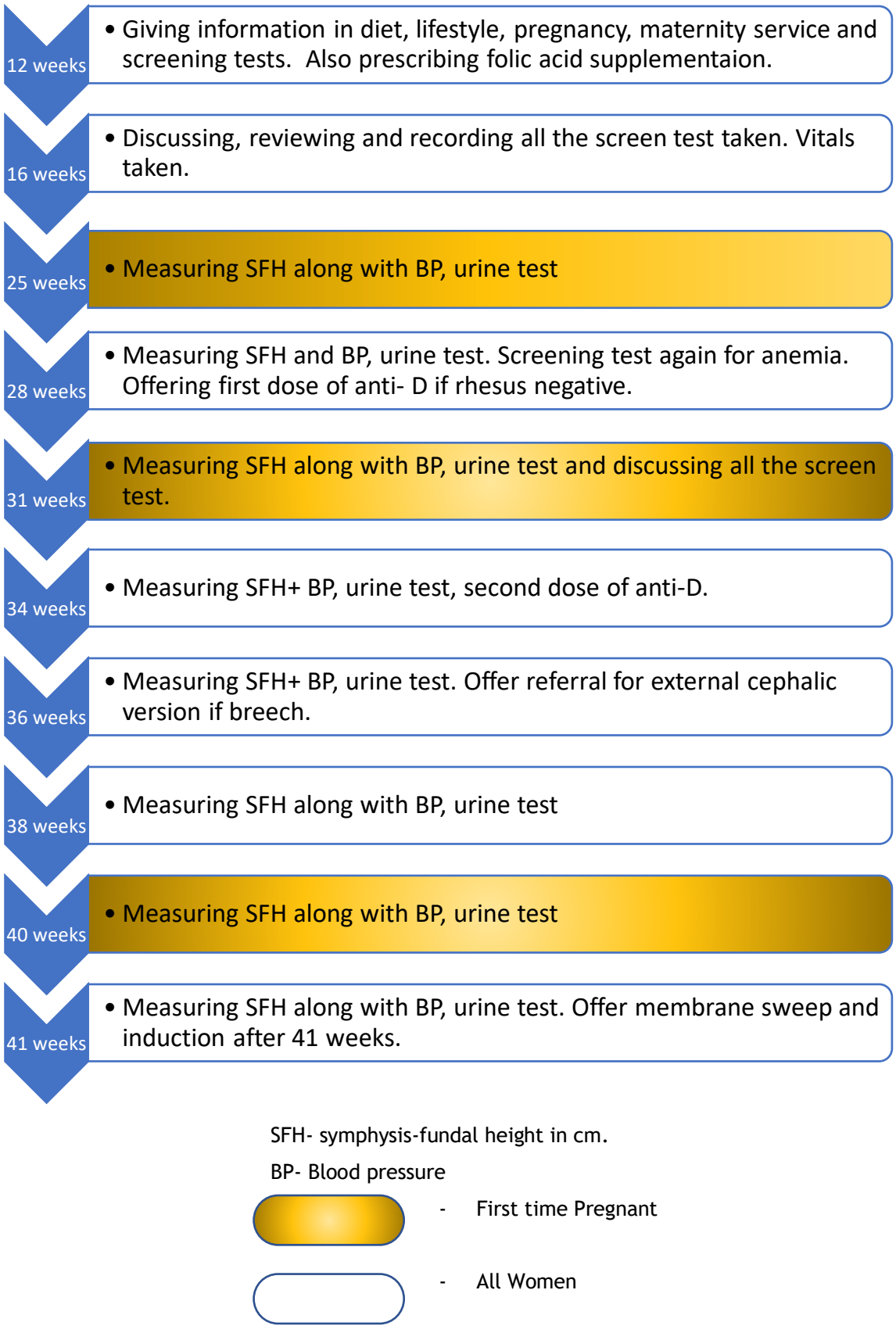


Fig 2. The routine of antenatal care visit from first visit to delivery. Modified. (Whitehouse 2010 Retrieved from the Oxford handbook of general practice 3rd edition)

2.3.2 Lifestyle intervention

Lifestyle intervention is a key for the control of GDM and improves the feto-maternal outcome. Nursing intervention for mother's weight control, regular physical activity, dietary changes (healthy diet intake) or these combinations can help in managing GDM (David et al. 2017, 74). In additions, educating mother about GDM (cause, risk and consequences), Self-care training, proper management of glycaemic control education, medical education about blood glucose test and insulin therapy, health promoting lifestyle changes, breathing exercises to manage depression and anxiety can be beneficial during GDM (Kim &Jung, 2021). Nurses can assist and support women along her families through psychological health educations counselling. This can be beneficial to remove negative thoughts, manage pregnancy induced stresses, emotions to gather confidence in mother during pregnancy before and after being diagnosed with GDM (Zou & Huang 2021).

Worldwide, different countries have their own lifestyle intervention recommendation to control GDM. In Finland, country recommends mother to familiarise with special attention to regular rhythm of eating habits with small portion meal with fat quality, good fibre rich food and less carbohydrate. They encourage people take whole grain products, liquid dairy products, berries and fruits with at least 30 minutes regular exercise and advise to do home blood monitoring on regular basis (Family support 2022). American Diabetes Association for GDM control have also own general guidance including meal planning limiting caffeine intake, regular comprehensive nutrition assessment with regular moderate exercise, adequate sleep, maintaining of health weight, regular medical health check-up, intake of daily folic acid supplement 400 microgram, glucose monitoring and glycaemic control (American Diabetes Association 2022). South Asian countries have more GDM compared to other Asian nations so especially women have been recommended to achieve ideal BMI (body weight), breastfeeding recommended for 6 month with self-blood glucose monitoring, MNT assessment (Mini Nutrition Therapy), pregnancy gap between children birth, taking antenatal classes (Rima et al. 2021).

Lastly, nursing care plan in lifestyle intervention includes providing information about the disease condition, educating about medication administration, how to maintain the glucose level as well. Along with that nurse can also teach about signs, symptoms and differences between hypo and hyperglycaemia, type of insulin, dosage and schedule. Not only physically but mentally also nurses can help patients by discussing about fear and anxiety patient is having. Nurses can appoint psychologist or appoint psychosocial support to ease the patient (Paul 2022).

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

Purpose: The purpose of the thesis is to describe what kind of nursing health care guidance are given to the pregnant women about gestational diabetes mellitus.
Aim: The aim of the thesis is to provide comprehensive understanding about the nursing health care guidance to the pregnant women with gestational diabetes mellitus.
The research question for our thesis is "What kind of nursing guidance is given to pregnant women with gestational diabetes?".

4 Methodology

4.1 Literature review as a research method

Elen Aveyard (2019) defines literature review as "comprehensive study and interpretation of literature that relates to a particular question" (Elen Aveyard 2007, 2). It is the procedure of critically assessing and summarizing the particular literature (Coughlan, Cronin & Ryan 2013, 2). Generally, in literature review books, scholarly articles, any sources that are relevant to particular topics or area are surveyed and description, summary and critical evaluation of those works are delivered in relation to the topics that are being researched. Literature reviews provide the overview of the sources that have been explored while doing the research in a particular topic and exhibit the readers how the research fits within the chosen field of study. (Arlene 2014.)
There are four types of literature review. Among them one of the types is descriptive literature review which is also called as traditional narrative review (Coughlan, Cronin & Ryan 2013, 14). The main aim of the descriptive literature review is analyzing and summarizing the body of a literature which can be accomplished by evaluating the background of literature, highlighting new research streams, and identifying the gaps which helps in refining and focusing as well as answering the research questions that helps in developing theoretical and conceptual frameworks (Coughlan et al. 2007). Hence, the research method selected for this thesis is descriptive literature review.

4.2 Database search

The database search for this research question was accomplished between 21st of January 2022 to 28th of May 2022. PubMed and in Laurea Finna (CINAHL and ProQuest Central) were used as database search. Laurea Finna is retrieval source of an information that searches printed and electronic materials such as articles and journals that has access to CINAHL with full text (EBSCO), ProQuest Central. PubMed is another search engine where biomedical and life sciences journal articles and other related content can be extracted. Different search terms were used so as to gather as much as articles as needed. The first phase of selection was done based on key words of our thesis i.e., Nursing health care guidance and gestational diabetes. The second

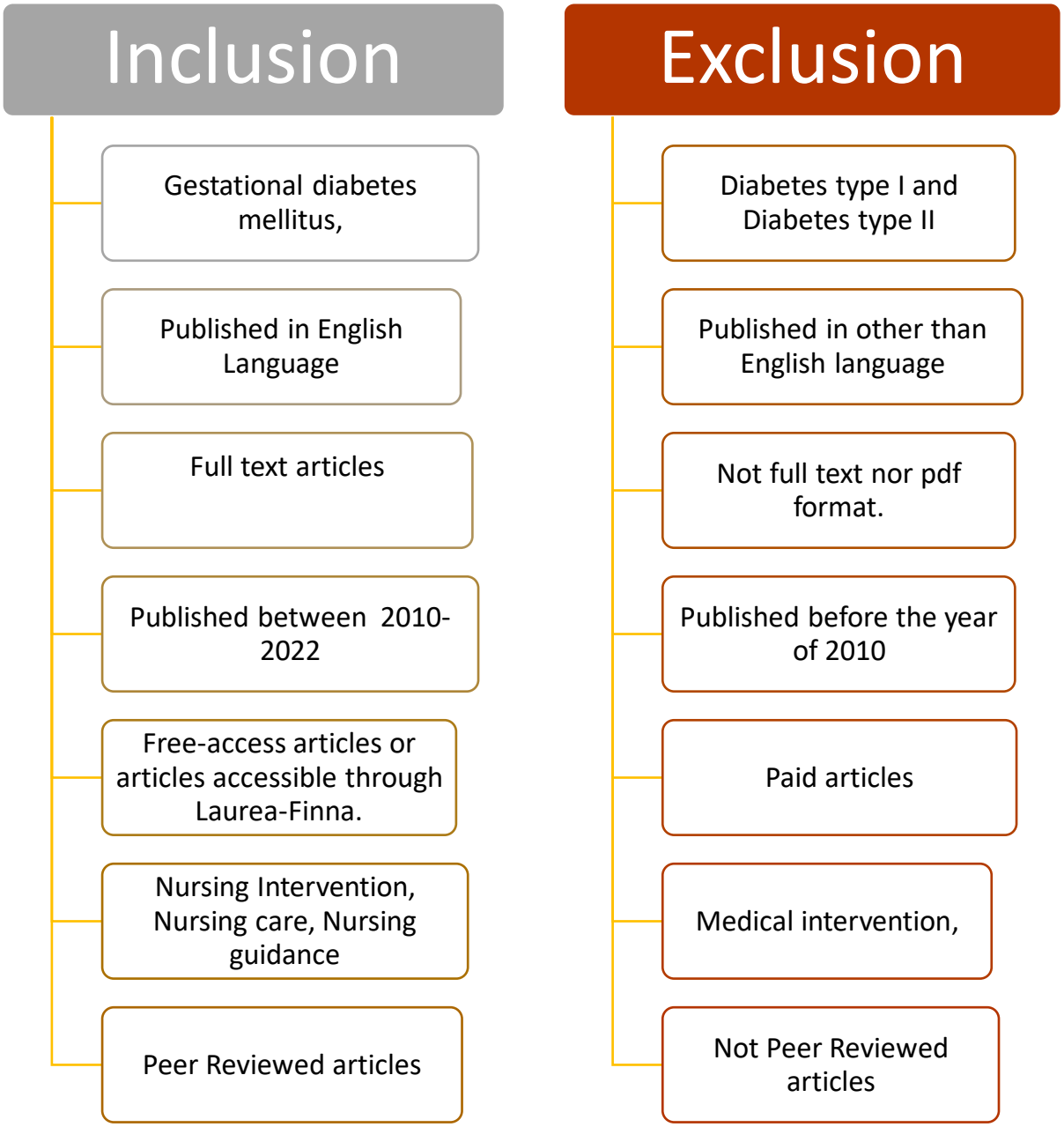
phase was selected by applying inclusion-exclusion criteria by filtering unwanted articles. And the third selection was done based on findings of articles that were of excellent quality, were relevant for thesis and has appropriate information as needed to answer the research question.

Search Term	Database	Total number of articles	1st Selection Stage	2nd Selection Stage	3rd Selection Stage (final selected)
Nursing guidance AND gestational diabetes	PubMed	12	2	2	1
	CINAHL	89	8	3	0
	ProQuest Central	1864	27	12	0
Nursing Intervention AND gestational diabetes management	PubMed	137	11	5	2
	CINAHL	20	3	1	1
	ProQuest Central	3434	82	6	0
Gestational diabetes AND prenatal care AND management	PubMed	207	7	4	2
	CINAHL	168	2	0	0
	ProQuest Central	8175	64	16	1
Gestational diabetes AND nursing management	PubMed	264	34	20	1
	CINAHL	56	9	2	1
	ProQuest Central	4263	56	6	0
Diabetes in pregnancy AND nursing management	PubMed	126	19	14	2
	CINAHL	65	6	0	0
	ProQuest Central	9171	104	23	1
Total	PubMed	746	73	45	8
	CINAHL	398	28	6	2
	ProQuest Central	26907	333	63	2
		28051	434	114	12

Table 1: Table with number of retrieved articles during literature search and selection in different stages.

4.3 Inclusion and Exclusion Criteria

The research article search term were conducted to full text articles with peer reviewed. Search parameter for all published article between the years 2010 to present (2022) were selected with English language only. Only journal articles were chosen. The inclusion and exclusion criteria were used to filter the unwanted articles.



4.4 Data Appraisal

Critical Appraisal is the systematical process of examination of research articles carefully to find out its values and judge the level of trustworthiness. It aims for reducing the biasness, increase the accuracy level of evidence-based information and helps to distinguish between the useful and flawed studies done (Umesh et al.2016).

Johns Hopkins Nursing Evidence-Based Practice Model was used as the critical data appraisal method for the selected articles. According to the model, it consists of five levels scale marked from level I to level V base on the evidence level finding. Strongest evidence has been marked as level V and weakest as level I (Dang & Dearholt 2018).

Further, Johns Hopkins Nursing Evidence-Based Practice Model categorise each level from I to V into A, B and C group based on the quality guides in order to determine each articles quality. A category is ranked as High quality, B as good quality and C as Low quality/major flaws. Quality determination criteria are listed in table below.

Level	Quality	Criterias
I,II,III	A (High Quality)	Consistent, generalizable results; sample size sufficient for study design; adequate control; definitive conclusions; consistent recommendation based on comprehensive literature review that includes through reference to scientific evidence.
	B (Good Quality)	Results reasonable consistent; sample size sufficient for study design; some control, fair definitive conclusions; reasonable consistent on the basis of fairly comprehensive literature review which includes some scientific evidence references.
	C (Low Quality or major flaws)	Inconsistent results with little evidence; for the study design insufficient sample size; conclusion cannot be drawn.
IV	A (High Quality)	Material sponsored officially by a professional, public, private organization, or government agency; documentation of a systematic literature search strategy; consistent results with sufficient numbers of well- designed studies; Criteria-based evaluation of overall scientific strength and quality of included studies and definitive conclusion; national expertise is clearly evident; developed or revised within the last 5 years.

	B (Good Quality)	Material officially sponsored by a professional, public private organization, or government agency; reasonably thorough and appropriate systematic literature search strategy; reasonably consistent results, sufficient numbers of well-designed studies; evaluation of strengths and limitations of included studies with fairly definitive conclusions; national expertise is clearly evident; developed or revised within the last 5 years.
	C (Low Quality or major flaws)	Material not sponsored by an official organization or agency; undefined, poorly defined or limited literature search strategy; no evaluation of strengths and limitations of included studies, insufficient results, conclusions cannot be drawn; not revised within the last 5 years.
V	A (High Quality)	Clear aims and objectives; consistent results across multiple settings; formal quality improvement, financial or program evaluation methods used; definitive conclusions; consistent recommendations with through reference to scientific evidence
	B (Good Quality)	Clear aims and objectives, consistent results in a single setting; formal quality improvement or financial or program evaluation methods used; reasonably consistent recommendations with some reference to scientific evidence.
	C (Low Quality or major flaws)	Unclear or missing aims and objectives; inconsistent results; poorly defined quality improvement, financial or program evaluation methods; recommendations cannot be made.

Table 2. Johns Hopkins Nursing Evidence-Based Practice quality guidance for level I-V

During data appraisal, both the authors have systematically followed the Johns Hopkins Nursing Evidence-Based practice model and categorized the articles into different level with quality. First authors individually have studied the articles thoroughly and listed out the methods, samples size, data analysis techniques used for each articles in order to level the articles from I-IV. Then both authors have compare the information, matched then with each other, if confused undergone together through the articles to maintain reliability and validity of information. Only then the articles have been levelled and further following the quality analysis criteria with consistency of information, evaluation of data etc both author jointly categories into three levels. The motive behind using this model is due it its systematic step by step procedures which helps to evaluate each article in depth making this study more reliable.

In general, total of 12 articles data are used for appraisal based on Johns Hopkins Nursing Evidence-Based Practice. Under the given criteria for level of evidence and quality, three articles for quality A and two articles for quality B with level I, one articles each for quality A and B with level II, three articles for quality B with level III, 1 with quality B for level IV and one with quality A for level V were categorised. No article were found with quality C which shows the articles used for analysis were good qualities. In detail table below shows the selection criteria for each article that both authors have used.

Articles	Authors/publication year	Level/Quality	Level/Quality categorization criteria
Insulin aspart in patients with gestational diabetes mellitus and pregestational diabetes mellitus.	M.C. Deepaklal, Kurian Joseph, Kurian Rekha, Thakkar Nandita, 2015	Level III Quality B	-Observational study, non-randomized open-label comparative study conducted in India. -Total 276 women with GDM selected. -Statistically data analysed expressing into number and percentage with students t-test and chi-square test, well presented data in tables.
An overview of evidence on diet and physical activity-based interventions for gestational diabetes weight management.	Sarab J Martin, Alexandra MS Duxbury, Hora Soltani, 2014	Level I Quality B	-Systematic review study. -Medline data base used for retrieval of articles. -12 systematic review article used. -NICE guidance followed. -In depth analysis of each review articles, synthesis of result of trials. - standard scale used for evaluations.
Effects of nutritional nursing intervention based on glycemic load for patient with gestational diabetes mellitus	Shaofang Lv, Shanlan Yu, Rongxiang Chi, Dongmei Wang, 2019	Level I Quality A	-134 GDM women chosen from March 2015-March 2017, divided to each 67 into two group. -Personalized information given to each women and glycemic load (GL) evaluated with statical methods. -Comparison of result with table for fasting blood glucose and 2hours postprandial glucose.
Physical Activity programs during Pregnancy Are Effective for the Control of Gestational Diabetes Mellitus.	José Alberto Laredo-Aguilera, Maria Gallardo-Bravo, Joseba Aingerun Rabanales-Sotos,	Level II Quality A	-Systematic Review study -Data base were Cochrane, Superior Council of Scientific Investigation (CSIC), Web of Science (WOS), EBSCOhost, PubMed, Scopus, ProQuest used.

	Ana Isabel CObo-Cuenca, Juan Manuel Carmona-Torres, 2020		-Bibliographic search done between September-December 2019. -Six-randomized controlled study with one case-control study carried, total 7 articles with 782 sample women participation. -PEDRO scale used for RCTs. -PICO criteria table presentation with proper structure keywords selections. -
Exercise for pregnant women with gestational diabetes for improving maternal and fetal outcomes	Julie Brown, Gilles Ceysens, Michel Boulvain, 2017	Level II Quality B	-11 Randomised controlled trials (RCT)included involving 638 women, comparison done for exercise and standard care. -Quasi-randomised and cross-over study done. -Information searched from Childbirth groups trial register and Cochrane Pregnancy on August 27, 2016, and from WHO International Clinical Trial Registry Platform (ICTRP), Clinical Trials.gov on August 18, 2016. -Statistical presentation of finding for risk ratio of pre-eclampsia, hypertensive disorder. -Possible recommendation to modify the contradicted health condition.
The Effect of Health Education Combined with Personalized Psychological Nursing Intervention on Pregnancy Outcome of Pregnant Women with Gestational Diabetes Mellitus	Rubi He, Qiong Lei, Haibin Hu, Hui Li, Dongmei Tian, Zhicun Lai 2021	Level I Quality B	-170 GDM women selected from January 2018-December 2018 from Guangdong Women and Children Hospital. -Conventional measure method used. -Two group formed with 85 women each. -Data analysed statically by statistical software. -Psychological study done before and after general information given. -Statistical result compared, interpretated.
Intermittent Fasting, Dietary Modifications, and Exercise for the Control of Gestational Diabetes and Maternal Mood Dysregulation	Amira Mohammed Ali, Hiroshi Kunugi, 2020	Level V Quality A	-A review and case report -Retrieval of data, review and -Pathophysiology, mood dysregulation, dietary intervention presented about GDM. -36 years women case presented with fetal screening with overall changes over the weeks.

			-Numeric presentation in fetal growth changes when women modified the life stye intervention.
Treatments for women with gestational diabetes mellitus: an overview of Cochrane systematic reviews.	Ruth Martis, Caroline A Crowther, Emily Shepherd, Janw Alsweiler, Michelle R Downie, Julie Brown, 2018	Level I Quality A	-Cochrane Handbook of Systematic Review of Interventions was used as methodology. -Two authors individually reviewed and extracted data. -Only Cochrane systematic review published information randomised controlled trails (RCT) used. -Evidence from study ranged from low to high. -comprehensively explained every intervention.
Guidelines for the nursing management of gestational diabetes mellitus: An integrative literature review	Gwendolyn Patience Mensah, Wilma ten Ham-Baloyi, Dalena (R.M) van Rooyen, Sihaam Jardien-Baboo, 2019	Level IV Quality B	-Integrative literature review method used with content analysis for data extraction and analysing. -18 article selected from BioMed Central, EBSCOhost, PUBMED CENTRAL, SAGA, google Scholar, Science direct, Wiley Online Library, Scopus. -Review conducted in June 2018, article searched from available guidance using reporting guidance of Whittemore and Knafl 2005. -Data appraisal done independently by two authors using AGREE II tool. -Each articles finding presented by table with theme.
Monitoring and managing mothers with gestational diabetes mellitus: a nursing perspective.	Diane C Berry, Quinetta B Johnson, Alison M Stuebe2, 2010	Level III Quality B	-Nursing perspective review of GDM. -GDM diagnosis criteria, relation of MNT, weight management BMI to GDM. -Medical nutrition therapy and self-blood glucose monitoring techniques.
Psychosocial support interventions for women with gestational diabetes mellitus: a systematic review	Seulgi Jung, Yoojin Kim, Jeongok Park, Miyoung Choi, Sue Kim, 2021	Level III Quality B	-Systematic Review Study with Meta-Analyses, PRISMA 2020, RCT and non-RCT both used for study design -12 articles selected -Two author individually reviewed/choose articles with no time limitation and with inclusion/Exclusion criteria.

			-Database used: KoreaMed, NDSL, CINAHL, Ovid-MEDLINE, Ovid-Embase, Cochorane Library, PsycoINFO. -Research performed by face to face, online intervention method to contact participants. -Clear colourful chart presented and compared finding, easily understandable.
Selfcare Education Needs in Gestational Diabetes Tailored to the Iranian Culture: A Qualitative Content Analysis	Mitra Kolivand, Afsaneh Keramat, MehrAli Rahimi, Zahra Motaghi, Mohammad Shariati, Mohammad Hassan Emamian, 2018	Level I Quality A	-Qualitative content analysis study by interviewing 13 diabetic pregnant women and 10 care givers through semi-structured questionnaires method. -Data analysed using conventional content analysis technique. -Sampling carried in Kermanshah University of Medical Science inside Diabetes clinic in June and July 2016. -Personal opinion (positive and negative) of family support collected from each participant, some listed in article.

Table 3: Total articles appraisal based on Johns Hopkins Nursing Evidence-Based Practice.

4.5 Data Extraction and Data Analysis

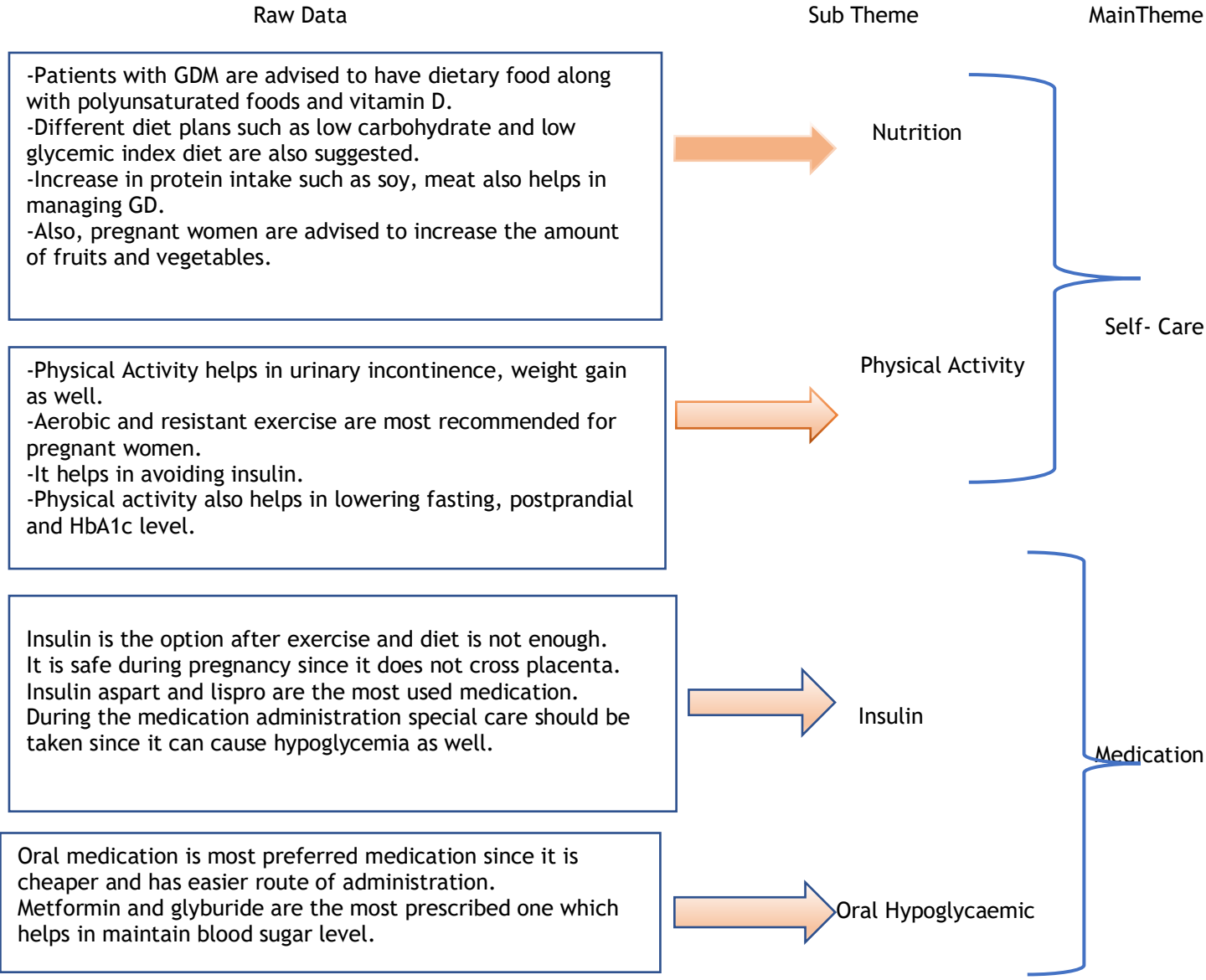
Data extraction is defined as a systematic process of reviewing the articles/scientific data during analyzation of data to obtain necessary information efficiently to reduce error and bias risk. It helps to increase quality of data once the process has been completed systematically (Taylor et al., 2020). Data are extracted depending on multiple factors such as from only the selected article, with inclusion and exclusion criteria meet, answers the research questions, risk /bias analyzed (Siddhartha et al. 2015).

During the data extraction phase both the authors individually went through each article selected and extracted the necessary information based on allocated inclusion and exclusion criteria, purpose, aim and formulated research question. Then both authors discussed together and in detail describe in chart in Appendix.

Once the data extraction phase was complete data was analyzed. Data analysis has been defined as a process that starts from selection, analyzation, collection, organization and synthesizing of data using folders to summarize to draw meaningful findings (Sara & Ruth2018, 74-85). The main aim of data analysis is to identify and organize the similar information from the article selected keeping into consideration about the strength and limitations to answer the research question (A. Helen 2019, 134-152). It is a research technique method in empirical social science applied for analysis of the published articles in a structural way (Stefan & Stefan 2012, 544-555).

For the data analysis, qualitative content data analysis method was applied. It's a type of data analysis method technique to identify pattern of recorded information and systematic presentation in a form of written or visual form. Then is further done by categorizing in code, word, or in theme form to draw the result (Amy 2021). Here the author will apply the inductive qualitative content analysis method to analyse selected articles. Inductive qualitative content analysis is a research technique to analyse both verbal or the written raw form of information by setting code base on similarities of information to manage data. Then theme is developed through repeated examination and comparison of information to draw result (Chron 2021

Overall data



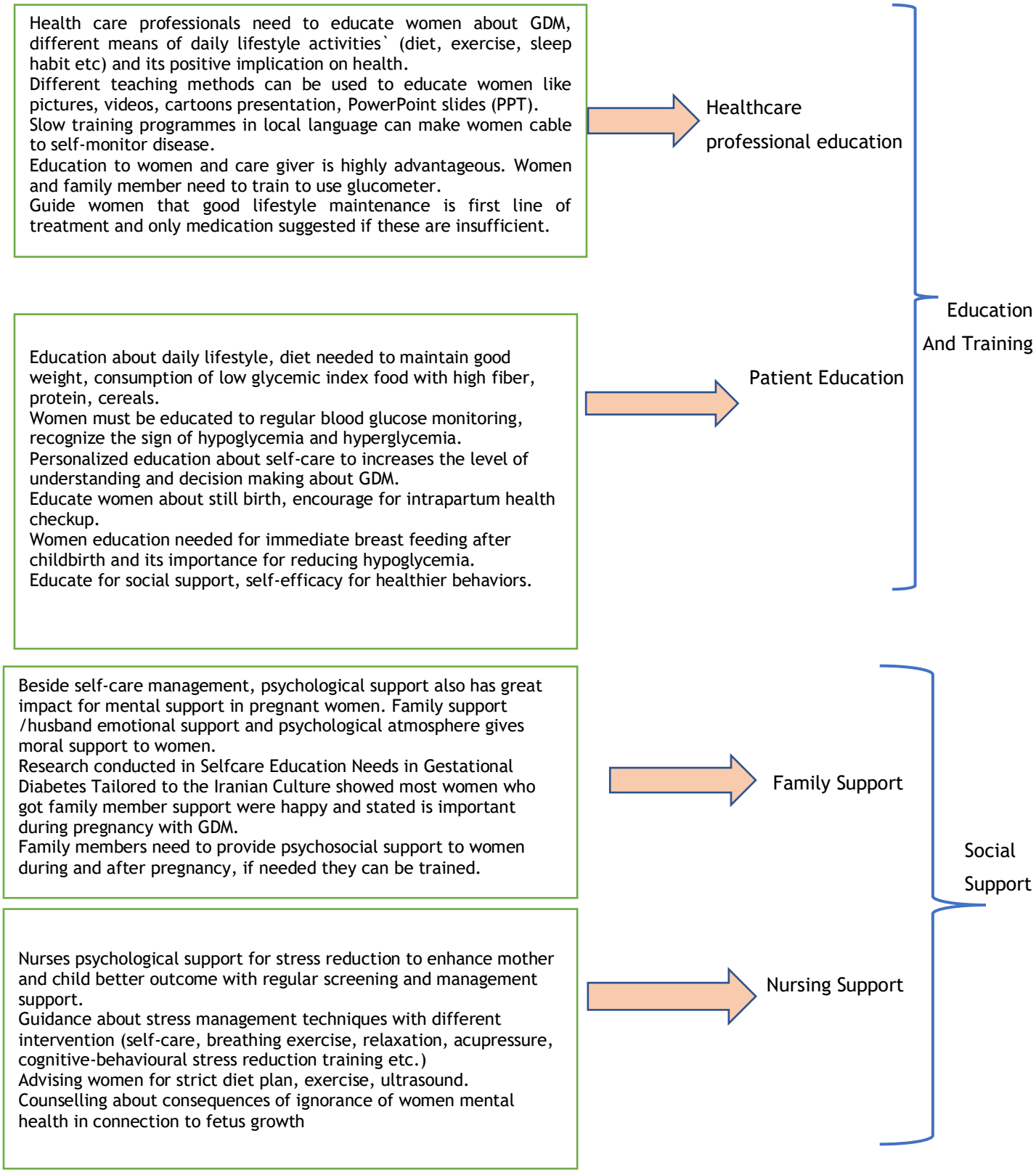


Fig: Raw data summarization from main theme to raw theme following inductive content analysis process.

5 Finding

5.1 Self -Care

5.1.1 Nutrition

Although genetic and environmental factors are considered to be the causes of gestational diabetes, maternal obesity and deficiencies of nutrition are the key contributors. Suboptimal lifestyle and low nutrition results to maternal obesity and metabolic diseases (Ali et al. 2020). Maternal obesity and excessive weight gain results in adverse maternal and neonatal outcomes as wells as miscarriage, macrosomia, postpartum hemorrhage, and traumatic birth. (Martin et al. 2014).

Consumption of dietary food during pregnancy helps in maintaining preterm birth, obesity-related complication along with preeclampsia. Nutritious diet includes vegetables, fruits, nuts, legumes, fish, oils, low fatty red meat as well as avoiding processed foods, saturated fats. Diet therapy and physical exercise are the first line treatment options for gestational diabetes mellitus. Polyunsaturated fatty acids and vitamin D are used to control GDM. Different dietary patterns such as low carbohydrate diet or low glycaemic index diet are found to help in controlling GDM. Low glycaemic index diet includes the food that releases glucose in slow pace that adds in maintaining blood glucose level. Fiber rich foods and unrefined carbohydrates such as whole grains and grain bran are included in low glycemic index diet (Ali, Kunugi 2020).) Also, it helps in lowering cholesterol, heart diseases as well as possibility if having diabetes type 2 after pregnancy also (Martin, Duxbury, Hora 2014). Dietary fibers also play role regulation of glucose metabolism and especially leafy vegetables support the growth of healthy bacteria in the guts. Protein intake such as soy, peas, fish, egg and yoghurt are also associated with improved insulin sensitivity.

One of the research projects done in China in Effects of nutritional nursing intervention based on glycaemic load for patient with gestational diabetes mellitus found that nutritional nursing intervention based on Glycaemic load method where calories consumed, glycaemic index and carbohydrate intake were calculated was much more effective than traditional based method that led to improved insulin resistance, perinatal outcome, better blood glucose level, as well as reducing pregnancy complications. (LV, YU, Chi, Wang 2019.)

Along with that increasing the consumption of fruits, vegetables to 40% and 30% and reducing energy intake up to 30% has shown results in slowing down of gestational weight gain. Micronutrients such as folate, iron, calcium, omega fatty acid are more important for the growth of fetus rather than gestational weight gain. It is recommended to use such supplement from 2 to 3 months before conception until one month after delivery. (Martin, Duxbury, Hora 2014).

5.1.2 Physical Activity

Due to the biochemical changes in pregnancy, insulin sensitivity is decreased which causes increase in insulin production that leads to use of pharmacological medication such as insulin.

Physical exercise can avoid the use of insulin. Nurses and midwives are responsible for carrying out diagnostic test and for indication of physical activity (Aguilera et al. 2020).

Physical activity for pregnant women who does not have history of diabetes is found to be beneficial without harming fetus and eventually leading to long-term health benefit. Talking about the advantage of physical activity it prevents the stress of urinary incontinence, lumbar pain prevention, helps to control the weight gain as well (Brown et al. 2017).

Brown et al. explained ACOG have stated that during an uncomplicated pregnancy safe and simple physical activities such as walking, swimming, low-impact aerobics, modified pilates, jogging are considered to be safe and has higher benefits. However, before strength training and jogging it is better to consult with doctor.

Research conducted in Physical Activity Programs during Pregnancy Are Effective for the Control of Gestational Diabetes Mellitus concluded that performing exercise with moderate intensity for 40 to 60 minute a week reduces fasting glucose in pregnant women who are diagnosed with GDM (Aguilera et al. 2020).

Physical activity also improves the nursing guidance as support measure for pregnant patients as implementing these programs from the very start of journey will aid in maintenance of good health of patient so that future risk can be somehow controlled. Physical activity does not only help in physical well-being but also aids to psychological benefits as well. Study have shown that moderate to vigorous physical activity for about 100 min in week reduces the risk of gestational diabetes by 9%. Aerobic exercise and resistance exercise or combination of both for about 20-50 min at least two times a week are mostly recommended physical activity during pregnancy (Aguilera et al. 2020).

5.2 Medication

5.2.1 Insulin

Approximately 20% of women with GDM need diabetic medication during the pregnancy (Berry et al.2015). When nutritional therapy and exercise is not enough for lowering the glucose level, medications are prescribed, and insulin and oral medications are the first choice of treatment. (Martis et al.2018)

Insulin is considered to be safe during pregnancy as it does not cross placenta. Before using insulin nurses provide basic information on timing, correct injection technique, what diet are to be taken. Since there will be chance of hypoglycemia during administration of insulin all the instruction are given to prevent it as well.

Insulin Lispro and aspart are rapid onset insulin analogs and are used as mealtime insulin. Their onset of action is 15 minutes and reaches peak in thirty to ninety minutes whereas they work for 3 to 5 hours. They are categorized as B group drug in terms of safety (Berry et al. 2015).

An observational study to assess the effectiveness and safety of insulin aspart in patients with GDM revealed that insulin apart maintained the targeted glycemic control and concluded that

macrosomia incident was lesser. Insulin aspart was discovered to be safe and no major hypoglycemia were reported during the span of study (Berry et al. 2015).
Women who have been diagnosed with gestational diabetes must interact with health care providers to have safe pregnancy outcomes. Nurses should collaborate with women and work on all these nutritional therapy, exercise, and medication as well to decrease fasting and postprandial hyperglycaemia. They should be motivated in intervention like losing weight in case of overweight or obesity or taking medication regularly to prevent the development of type 2 diabetes (Berry et al.2015).

5.2.2 Oral Hypoglycemic agent

When diet and exercise does not help to maintain the blood sugar level pharmacological treatment are considered. Although insulin is considered to be the first choice for the treatment of gestational diabetes oral agent has been increasingly deliberated to be the alternatives. Oral medications are considered to be cheap, has easier administration route, and also women prefer it more in comparison to insulin. Metformin and glyburide used as an adjunct therapy in GDM are considered by several guidelines as well. (Martis et al. 2018.)

Metformin stimulates the glucose in the liver and compress glucose output. Metformin is categorized in pregnancy class B and study also suggest that it does not increase the perinatal problems (Berry et al. 2015). Metformin when compared to insulin as well as glyburide study has shown that it results in less maternal weight gain, lower rate of neonatal hypoglycemia.
Glyburide whereas increases insulin output from pancreatic beta cells which is broken down by the liver. It is taken half or one hour before the meal and study also shows it does not have any perinatal complication and leads to safer pregnancy (Martis et al. 2018).
Nursing guidance is very important in medication administration is very important since these types of intervention are effective in reducing complication in pregnancy time than as usual care (Martis et al.2018).

5.3 Education and Training

5.3.1 Healthcare professional Education

Health care professional can used different method to empower women about GDM. Mass teaching forms like uses of pictures, short videos creation, presentation of information through attractive cartoons, PowerPoint slides (PPT) can be informative to many women. Health care education teams can directly contact women through group we-chat, telephone calls which could solve many patients' questions quickly and acknowledge them (Rubi et al., 2021). Additionally, designed prescription listing health education, including knowledge of GDM, exercise, diet, good sleep habits, safe blood glucose control, proper insulin therapy administration or medication administration techniques, means to cope with mental issues, stress management, postpartum information can educate women (Jung et al. 2021).

Next, mother need to be well trained along with education in order to cope with GDM so that each women becomes capable to meet her own needs. This helps to self-monitor whether disease is under control or not. In the research conducted in Iranian society, finding showed that sometime slow training programmes and use of local language were effective to train women (Mitra et al. 2018).

Along with mothers, general need of education is highly advantageous to the families' members and training was much required from health care professional's nurses to both women and families. This has higher compliance throughout the treatment. So, education given at the same time to both women and caregivers gives better complete knowledge for self-care (Mitra et al., 2018). Along with this woman, family members also need to be trained to use glucometer, important of regular women follow up and different basic principles which are beneficial to long term management of GDM (Mensah et al.2019).

Women has to be taught that better lifestyle modification is first line of treatment and pharmacological treatment of metformin, glyburide is recommended if only lifestyle modification are insufficient (Mensah et al.2019).

5.3.2 Patient Education

Education is one of key element for treatment of GDM. Within education, self-care education is one of the essential components for GDM care and immediately provided when women are diagnosed (Mitra et al. 2018) as well as should be provided during stage of pregnancy, in intra, and postpartum phase (Mensah et al. 2019). In addition, this must be given to all the women who seem to be a greater risk of GDM by nurses (Mensah et al. 2019).

Women must be educated about the important of daily lifestyle impact for maintaining better health like effectiveness of physical exercises and dietary intakes such as low glycemic index diet for maintaining good level of blood glucose. They must be taught that proper diet and exercise reduces the need of insulin injections, maintains maternal good weight, reduces occurrence of macrosomia, controls the glucose level during postprandial time (Jung et al., 2021). Women need to educate to modify their lifestyle mainly in diet that contain high protein, fiber like fruits, cereals with composition of 1600-1800kcal/day diet that contain about 35%-45% carbohydrate (Mensah et al.2019).

Education regarding recognition of different GDM signs especially hypoglycemia is very important. They must be taught to possible treatment of hypoglycemia and blood sugar level control i.e., glycaemia control (Gwendolyn et al., 2019). But education about hyperglycemia and risk of further post subsequent GDM is also equally needed to teach to women to increase awareness. According to Mensah et al. (2019), regular blood glucose monitoring during and after pregnancy and women counselling helps in modification of lifestyle and reduces further risk of getting diabetes type 2.

Research have revealed that, patient education about self-care have change women thinking, increases awareness, have empowerment to women with better decision making (Mitra et al., 2018). Especially personalized education of health increases patients' level of understanding and have positive awareness about GDM (Rubi et al., 2021). Women must be educated to aware implication of GDM to their health and to the fetal (Mensah et al. 2019).

Nurses should educate women for regular check-up to reduce risk of stillbirth, intrapartum check to risk of neonatal hypoglycaemia. Ask women for breastfeeding immediately and continue to 3-4 month and longer to prevent hypoglycaemia in child. Acknowledge women that along with physical activity and diet social support and self -efficacy has greater impact for healthier behaviour adaptation during GDM (Mensah et al. 2019).

5.4 Social Support

5.4.1 Family Support

Women with GDM undergoes with different psychological changes and become very weak to self-management. With other underline factors lack social support like support from close ones is one which makes women difficult to cope to self-management. Some research also has been conducted and they have more coverage on the self-care management like diet and exercise.

But psychological support for women with GDM has the high impact to mental support during pregnancy (Jung et al. 2021).

Family role is the vital role for the pregnant women, and it encompasses the husband's unique role and psychological atmosphere given by close family member of the home. Mostly the emotional attachment from husband provides moral support to manage GDM for women. Research conducted in Selfcare Education Needs in Gestational Diabetes Tailored to the Iranian Culture stated many women were very happy to get husbands support physically and mentally for example during clinic visit and were in positive though as its very important during pregnancy phase with GDM (Mitra et al. 2018).

In the research carried by Mitra et at., 2018, some participants have stated getting support from husband while some not. A Respondent response state that: "My husband helps me physically and mentally a lot. For example, when I go to the clinic, he takes a day off and accompanies me there. This kind of behaviour is very important for me."

But some have sadly expressed their pain of not getting husband supports. A statement of another participant has stated: "Sometimes, our problems are related to the husbands of pregnant women. Sometimes their husbands say that they give birth to defective children due to many insulin injections and sometimes, they tell their wives to have abortions because they are unwanted children."

Additionally, the family member has to understand that they have to provide the psychosocial support to the mother, make her feel comfortable and peace in home to get psychologically peaceful and stress free. This can have healthy grow of fetus in mother womb. Bustling home environment with no family support led mother to suffer from high stress. It hampers mother health like can raise blood sugar rise (Afsaneh et at., 2018). Psychosocial stress can lead mother to suffer from anxiety, depression and self-efficacy (self-management and self-control) (Seulgi et al.2021). So, the care provider believes that the family members should be trained (Afsaneh et at.2018).

Family members need to educate women not only during labour but also after postdelivery (Mensah et al., 2019). However, in some societies, socio economic condition and cultural factors can cause barrier to implement nursing guideline ((Mensah et al., 2019).

5.4.2 Nursing/Counselling Support

Nurses can directly or indirectly have huge role to support women with GDM. They can be a better counselor as well as mentally and psychologically support women to reduce stress by teaching stress reduction techniques. They can interact with women, listen to them (Mitra et al., 2018). Personalized psychological nursing support to women, control their general health condition and enhances the better health outcome of both mother and child (Rubi et al., 2021). Regular screening, following management methods can support women especially in remote areas where other medical cares are unavailable (Gwendolyn et al. 2019).

Nurses should educate women for psychosocial support intervention such as self-efficacy, selfcare, diaphragmatic breathing exercise, deep breathing exercise, yoga, “taekyo” Korean traditional method to interact with foetus for prenatal bonding technique, cognitive-behavioural stress reduction training, acupressure for anxiety reduction, self-management motivation, relaxation, emotion support, encouragement for positive expression (Jung et al.2021).

Nurses can support Women with GDM through nutrition counselling, recommend them to follow strict diet plan, ask to counsel with dietician if required. During counselling include important of exercise like moderate exercise of 30 minutes’ walk after meal, education about armchair exercise. Request regular vital science monitoring, do urine protein test every 1-2 weeks, and ultrasound during 30-32 weeks of pregnancy or every 4 weeks in between 28-36weeks of pregnancy to monitor foetal weight (Mensah et al.2019).

According to Jung et al., 2021 in some societies time lack and childcare has made difficult women to practice self-management towards GDM and women mental conditions like psychological distress, stress, anxiety, depression, emotional, is always ignored. As a consequences women diagnosed with GDM undergo different physiological change, lacks social support and could find difficult to exercise self-management practices. So, women have to be provided with social support, psychosocial support, take account of complex situation as it helps healthy growth of foetuses and boost women health.

In conclusion, sociocultural factor and psychosocial support need to be properly utilized in accordance with sociocultural countries background. (Jung et al. 2021.)

6 Discussion

The purpose of the thesis study is to describe what kind of nursing health care guidance are given to the pregnant women about gestational diabetes mellitus. The aim of the thesis is to provide comprehensive understanding about the nursing health care guidance to the pregnant women with gestational diabetes mellitus.

Gestational diabetes mellitus one of the most common metabolic disorder prevalence varies worldwide. There are multiple risk factors associated with pregnant women suffering from gestational diabetes such as age, obesity, high blood pressure etc. These factors result in various complication like macrosomia, bacterial infections and even lead to maternal and fetal mortality rate. Although there are different ways to screen and diagnose gestational diabetes and even can be prevented many pregnant women are unaware about it. Nursing guidance hence is given throughout the pregnancy journey so that they get optimal health satisfaction with safety so that even if they are diagnosed with gestational diabetes, they can continue the journey with minimal risk. This thesis thus filled the research gap and answered the research question about finding the nursing guidance to pregnant women with gestational diabetes.

The results indicate the different nursing guidance such as “nutrition”, “physical activity”, “insulin”, “oral hypoglycaemic agent”, “health care professional education”, “patient education”, “family support” and “nursing support”.

Firstly, self-care in nutrition such as taking balanced diet with appropriate amount of carbohydrate, protein along with fruits, vegetables and nuts aids in preventing pregnancy complications and preterm births (Ali, Kunugi 2020). Physical activity like walking, swimming, joggings are safe and has advantages of maintaining weight which further helps in preventing complications. Also, the nursing guidance of physical activity as well as nutrition helps women to implement it from the very first trimester which can control gestational diabetes in future (Brown, Ceysens, Boulvain, 2017).

When physical activity and dietary food is not sufficient for preventing gestational diabetes then it is advised to take medication. Nursing guidance include teaching pregnant women how to, when to administer it and if during the phase of administration, they be hypoglycaemic what precaution to use and all. Insulin and oral medication such as metformin is the first line of treatment during drug administration. Those who are diagnosed with gestational diabetes must interact and have regular communication with nurses so that no complications arouse.

Next, health care professional needs to educate women and their family. They can use different informative easy means such as videos, short power point slides, or even through cartoons. If needed answer through quick WeChat or telephone to answer all women questions (Rubi et al.2021). Education intervention includes role of nutritious food with low fat, high fibres, physical wellbeing with regular maternal exercise, intra and postpartum management, relaxation important, correct way to self-insulin injection, gestational glucose level range i.e., pre-prandial, and postprandial blood glucose (Rubi et al. 2021). And also teach them to used glucometer and sign to monitor hypoglycaemia and hyperglycaemia and its home preventive method (Mensah et al. 2019).

Mostly people focus for nutrition, exercise, medication, whereas women psychological or psychosocial aspect are ignored. Some studies revealed that GDM diagnosed pregnant women undergoes with stress because of psychological changes and has difficult to control blood glucose level, feels pressured to control GDM leading anxiety, depression, stress, and postpartum complications. On other hand lack of social support makes further difficult to cope daily activities (Jung et al. 2021). In such stage, family and husband support not only supports women but also helps women to gather confident, positives energies. Research has showed that women were very much satisfied and happy throughout the pregnancy time when got support from their family and relatives (Mitra et al. 2018). In addition, some studies recommended to apply different form of exercise, breathing techniques, yoga, acupressure are beneficial to boost women mental well-being and make them mentally and emotionally stronger Jung et al.2021).

While previous research has focused mostly on medical intervention of gestational diabetes this thesis contributes a clearer understanding in nursing guidance. Medical interventions are provided only after the patient is diagnosed from gestational diabetes, but nursing guidance is given throughout the pregnancy journey. Along with that available research article in nursing

guidance are mostly focused in only one of the particular guidance such as just diet or just mental support. This thesis supports those existing theory of nursing guidance however the finding is not just focus in one specific area such as diet or just physical activity but has tried to include all the scope where nursing guidance can be given from physical support to psychological support, health education. The finding thus goes through up-to-date evidence-based research and acknowledge nursing care guidance for pregnant women.
In conclusion, nurses have a significant role to overcome challenges of GDM complications and risk through proper physical, mental and psychological intervention.

6.1 Trustworthiness, reliability and validity

Qualitative data analysis method has two process inductive content data analysis process and deductive data analysis process to systematically analyse the data. In nursing science field of study, inductive content is widely used, and it provides the systematic process to group the data making easier for the researcher to find out the answer to the research question (Elo et al. 2014). It enlists the open codes/sub theme which further listed to main codes/main theme base on concept or similarities of information (Andrea 2022).

In inductive content data analysis process, trustworthiness is most considered as it gives a clear indication of overall study. It is defined as a confidence in information/data, way it is interpreted, and used of systematic method to guarantee quality of the study (Pilot, Beck 2014). This is done by initiating protocols and processes need for the study along to be considered by the readers (Amankwaa,2016). Credibility, confirmability, dependability, transferability and authenticity are the criteria focus on procedure in study which increases trustworthiness (Guba & Lincoln 1994). While writing this thesis, in order to maintain trustworthiness both the authors have followed step by step procedures and well followed the thesis writing guidance provided by the university. Thesis contains background information, purpose, aim, research questions with systematic methodology during information collection from selected articles. Throughout the process of writing supervising tutors' feedback and guidance were followed.

Similarly, along with trustworthiness, reliability and validity are also most important concept in research to evaluate the quality and specify how accurately the method or technique measures the specific work. Reliability measures the consistency while validity explain the accuracy of research (Flona 2022). According to Martyn and Lyndsay reliability has been defined as “degree of consistency of measurement which gives same repeated result under same conditions”. On other hand, validity means “how correctly the selected method measures what is intended to measure and high validity of research information produces the result that correspond to real properties, characteristics and variations”. Validity has four categorization: construct validity means how well the test measures the concept that is intended for, next is content validity means whether the data fulfil the aim of study or not, next the face validity

mean whether the content is suitable for aim or not and lastly criterion validity mean whether result produces the concrete outcome or not. Both authors ensures all the four categorization of validity are meet as finding fully answers the research question, fulfil the aim of study and content listed accurately produces the meaningful guidance of GDM.

In order to maintain reliability and validity of information, in methodology inductive content analysis as a systematic data analysis method following Johns Hopkins Nursing Evidence-Based Practice Model level as data appraisal is used to prevent researchers bias and authors subjectivity. Raw data and notes collected from articles were multiple times by both authors to avoid authors subjectivity, biasness. To maintain the reliability of data for this literature review reliable sources of articles from Cinahl, ProQuest and PubMed are selected. Further, keywords "nursing intervention", "gestational diabetes", nursing intervention", "nursing management", "prenatal care" with AND (Boolean operators) were used during article retrieval. Once the search was completed, all 12 articles selected were considered only after they were thoroughly studied by both authors focusing on each articles background, qualities and accepted as they contain good information for GDM management. Still reliability of this thesis may suffer from lack of objectivity even though it has been written by two authors.

Both authors ensures that all finding do meet this thesis purpose, answers research questions and contains reliable information.

6.2 Ethical Considerations

Ethics is defined as a general process which covers all the ethical points and evaluations what are interrelated with science and research. The National Advisory Board on Social Welfare and Health Care Ethics (ETENE), The National Committee on Medical Research Ethics (TUKIJA) and the Advisory Board on Biotechnology (BTNK) are some of the boards who follows their own ethical norms and offer and suggest in professional ethics in detail. (Varantalo, Launis, Helin, Spoof & Jäppinen 2013).

For this thesis all the principles of research community i.e., integrity, accuracy as well as presenting and evaluating the research results were followed. Data acquisition method were done under the scientific criteria during planning and conducting the research and ethically sustainable. All the other researchers work were respected by citing their publications. The research permit and conducting the ethical review that is needed will be acquired. During the research conduction all the aspects such as conflicts of interests, other commitments were well discussed with all the members of the work. Plagiarisms were avoided (Varantalo et al. 2013). References were written following Laurea thesis guidelines (laurea.fi).

Any ethical issues in this thesis were discussed with supervisors. Any problems of bias will be mentioned under the section of discussion, trustworthiness, reliability section.

7 Limitations and recommendations

With the aim of finding different nursing intervention to answer research question, we both authors were able to search sufficient results from selected articles beneficial to GDM mothers and all nurses who are guiding women to care GDM. But still finding was limited as limited articles were selected for descriptive literature review in spite the study was conducted systematically.

Firstly, data showed the high prevalence of GDM in South Asian countries and African countries. But during the article search it was quite difficult to find research carried in those countries. Some useful articles were found but only abstract were in English language or were written in other languages, and some needs financial payment to access articles which couldn't meet the thesis inclusion criteria. Secondly, article found partly includes our sub-theme. Mainly articles included self-care and medication or education and training and social support. None of the articles contain all sub-theme in a single article.

Secondly, though the GDM has been so much common currently throughout the world, most of research were done from the prospective of medical care or were designed for the medical practioners/educators' purpose only. Not enough studies have been done from the nurses' perspective exploring or summarizing nursing interventions guideline (Gwendolyn, Baloyi, Baboo, 2019).

Both authors suggest that this thesis will help to many women and health care professional to guide GDM women in correct path to care health of women and child as finding includes all basic cares like diet, exercise to mental and psychological support. All the information this thesis contains can be broadly used by public health care nurses/frontline public health workers, community health workers like community health representatives or community health advisors, clinicians, health counsellors, social service supporter working for GDM awareness.

Only very few studies are done to find nursing guidance worldwide. The authors suggest that there is further need of evidence base research of nursing guidance globally and not certain specific zone and area. And it will also be helpful if nursing guidance studies are not just focus on medical intervention and include all other interventions as well.

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Figures

Tables

Appendix 1: Data Extraction Form

Authors,	Year	Title	Aim	Finding/Conclusion
M.C. Deepaklal, Kurian Joseph, Kurian Rekha, Thakkar Nandita	2015	Insulin aspart in patients with gestational diabetes mellitus and pregestational diabetes mellitus.	Aim was to assess insulin's both safety and effectiveness in women with gestational and pregestational diabetes.	Insulin is safe to take during pregnancy and no minor or major episode of hypoglycaemia reported. When achieved glycemia control, it improves perinatal outcome, reduces risk of macrosomia, complications during baby birth. Both GDM and pre-GDM women have similar type of maternal and fetal complications. Identical management, health monitor and management needed for both GDM and pre-GDM women. Insulin helps improving GDM and pre-GDM clinical outcomes.
Sarab J Martin, Alexandra MS Duxbury, Hora Soltani,	2014	An overview of evidence on diet and physical activity-based interventions for gestational diabetes weight management.	Aim is to provide systematic evidence of effective diet or physical exercise intervention to weight management and improve pregnancy and childbirth outcome.	Diet and lifestyle interventions are more effective to reduce gestational weight, reduces gestational hypertension and diabetes, shoulder dystocia. Intake of more fruits and vegetables, follow of healthy eating habit improves women health and benefits to child. Glycaemic index (GI) systematically ranks carbohydrates rich food which is used as dietary intervention. This helps healthy placenta growth, reduce gestational weight and helps to lowers child weight before birth.

Shaofang Lv, Shanlan Yu, Rongxiang Chi, Dongmei Wang	2019	Effects of nutritional nursing intervention based on glycemic load for patient with gestational diabetes mellitus.	Aim was to find out nutritional nursing intervention effects base on glycemic load (GL) in GDM women.	In comparison to traditional nutritional nursing, glycemic load-based nursing intervention is more effective to gestational diabetes women. GL control blood glucose level by improving insulin resistance, reduces pregnancy complication and improves perinatal outcomes.
José Alberto Laredo-Aguilera, Maria Gallardo-Bravo, Joseba Aingerun Rabanales-Sotos, Ana Isabel CObo-Cuenca, Juan Manuel Carmona-Torres	2020	Physical Activity Programs during Pregnancy Are Effective for the Control of Gestational Diabetes Mellitus.	Aim was to establish and analyse benefits of physical activities to pregnant women with GDM and to control GDM.	Positive relationship between physical exercise for controlling GDM, any type of physical activity recommended to women. Aerobic exercise and resistance or both combinations are effective means to insulin, glucose control and HbcA1 control. Not particular types of exercises recommended as it depends on individual women conditions. Pregnant women with GDM have to exercise at moderate intensity at least 2 times for 20-50 minutes.
Julie Brown, Gilles Ceysens, Michel Boulvain	2017	Exercise for pregnant women with gestational diabetes for improving	Aim was to study how maternal and fetal outcome is improved in pregnant	Different exercise intervention reduces both postprandial and fasting blood glucose. No clear evidence found for effect of exercise for pre-eclampsia, caesarean section, neonatal mortality and morbidity.

		maternal and fetal outcomes.	women with GDM with exercise interventions.	Verities of exercises improves both short term and long-term mother/infant/child health benefits like blood pressure control, reduces diabetes type 2 risk, reduces overweight risk of childbirth, pre-eclampsia risk, perineal trauma.
Diane C Berry, Quinetta B Johnson, Alison M Stuebe2	2021	The Effect of Health Education Combined with Personalized Psychological Nursing Intervention on Pregnancy Outcome of Pregnant Women with Gestational Diabetes Mellitus	Aim was to study in pregnancy outcome effect when both health education with personalized psychological nursing intervention are given to pregnant women having GDM.	Awareness about disease and adjustment of self-psychological were higher after intervention. Health education, personalized psychological helped weight control, blood glucose index. Women were highly aware of disease, were self-adjusting psychological mood and had positive awareness about GDM. WeChat groups, telephones were effective to quick respond to solve women questions. Both intervention (education, personalized psychological nursing) leads better pregnancy and widespread information to promotion.
Amira Mohammed Ali, Hiroshi Kunugi	2020	Intermittent Fasting, Dietary Modifications, and Exercise for the Control of Gestational Diabetes and Maternal Mood Dysregulation	To explore different mechanism like exercise effects, intermittent fasting (IF) and dietary modification to GDM control.	Both maternal body composition and psychological state of women is affected by insulin resistance during pregnancy. Insulin resistance may slightly rise blood glucose of mother and affect fetal growth. Dietary control like caloric restriction, intermittent fasting (IF) and exercise can decrease body fat, increase insulin sensitive in pregnant women body. Dietary control can cause fetal growth abnormalities associated to hyperglycaemia.

Ruth Martis, Caroline A Crowther, Emily Shepherd, Janw Alsweiler, Michelle R Downie, Julie Brown	2018	Treatments for women with gestational diabetes mellitus: an overview of Cochrane systematic reviews.	Aim was to thoroughly review both benefits and harms in connection with intervention to treat GDM for both women and their babies.	Lifestyle change like eating healthy food, physical activities, self-blood glucose monitoring showed women and babies health improvement. Insulin intake in compared to oral therapy showed rise of hypertensive disorder. Exercise, relaxation, yoga, breathing exercises, done during pregnancy improves paternal and fetal outcome despite of having GDM.
Gwendolyn Patience Mensah, Wilma ten Ham-Baloyi, Dalena (R.M) van Rooyen, Sihaam Jardien-Baboo	2019	Guidelines for the nursing management of gestational diabetes mellitus: An integrative literature review	Aim was to extract, and synthesized information form selected, appraised articles for nursing management of gestational diabetes mellitus.	Health education to recognise and treatment sign of hypoglycaemia, family education to use glucometers should be provided. Nutrition counselling recommended to pregnant women. Weight check according to women BMI. Consume healthy diet, intake minimum 1,600-1,800 kcal/day ,35%-45% carbohydrate intake recommended. Mother blood glucose must be control and maintain between 4.0 mM to 7.0mM. Women suggested to have moderate exercise after meal (30minutes) walk or 1 hour walk daily. Do armchair exercise. Postpartum healthy lifestyle and continuity promotes good women health.

Diane C Berry, Quinetta B Johnson, Alison M Stuebe2	2010	Monitoring and managing mothers with gestational diabetes mellitus: a nursing perspective.	To manage and monitor women health diagnosed with GDM during pregnancy for improving fetus and women health.	The institute of medicine recommends to gain women with less BMI <18.5 kg/m^2 to gain 28–40 pounds and 1 pound a week in the second and third trimesters. The ACOG suggest for 30 minutes of exercise every day but should not do heavy sport like hocky, football, rock climbing, skiing, gymnastic. Women must check fasting blood glucose and after1-2 hours glucose level eating lunch, breakfast and dinner glucose level. Women must follow MNT (medical nutrition therapy) base on individual women health to maintain normoglycemia.
Seulgi Jung, Yoojin Kim, Jeongok Park, Miyoung Choi, Sue Kim	2021	Psychosocial support interventions for women with gestational diabetes mellitus: a systematic review	Aim was to analyse how effective is psychosocial support intervention for those women who have gestational diabetes mellitus (GDM)	Depression symptoms 3.78 times more is found in pregnant women with GDM than normal pregnant women. Anxiety increases risk of diabetes mellitus (DM). High psychological stresses have a negative effect to emotional changes. Family member support can help GDM women promote self-management. Psychosocial supportive intervention provides have positive effect on women which helps to develop self-efficacy to self-control and manage GDM.

				Nurses plays pivotal role to help women with psychosocial intervention for lifestyle change during GDM pregnancy.
Mitra Kolivand, Afsaneh Keramat, MehrAli Rahimi, Zahra Motaghi, Mohammad Shariati, Mohammad Hassan Emamian	2018	Selfcare Education Needs in Gestational Diabetes Tailored to the Iranian Culture: A Qualitative Content Analysis	Aim was to determine women needs, to formulates guidance for self-care in Iranian culture.	Both mother and care givers need knowledge, skills, for self-care from informative sources. Women must have diabetes knowledge, trained to blood glucose, injection of insulin and plan nutritious diet. Counsel women to support mental health. Husband must have supportive role and family members must provide good psychological home environment.