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Running head: MANAGEMENT OF HYPERTENSION IN WOMEN OF CHILDBEARING AGE

Management of Hypertension in Women of Childbearing Age

By

Victor T. Davis

An independent study submitted to

the faculty of the College of Nursing and the University

of North Dakota in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN NURSING

in

Family Nurse Practitioner

Jana Zwilling, MS, RN, FNP-BC

Grand Forks, North Dakota.

MANAGEMENT OF HYPERTENSION

PERMISSION

Title Clinical Guidelines: Management of Hypertension in Women of Childbearing Age

Department Nursing

Degree Master of Science

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Management of Hypertension in Women of Childbearing Age

Abstract

This literature review was based on a successful completion of an Objective Structured Clinical Examination (OSCE) and oral defense. A case report was analyzed, and the topic, “Management of hypertension in women of childbearing age,” was developed. Research was done using databases such as CINAHL, PubMed, and Cochrane. Keywords used included “Management,” “hypertension,” and “childbearing women,” filtered by publication date range from 2001 to 2016. Recommendations from the 2014 Eighth Joint National Committee (JNC8), the United States Preventive Service Task Force (USPSTF), the American Society of Hypertension (ASH), and the International Society of Hypertension (ISH) were reviewed. The literature used in these articles and guidelines was consistent with respect to the definition of hypertension, treatment, and management both for women of childbearing age and pregnant women. ASH and ISH, however, have issued clinical practice guidelines for the management of hypertension that differ in some areas from JNC8 panel’s recent clinical guidelines. In a Cochrane review of clinical guidelines related to pharmacological management of hypertension in women of childbearing age, the following observations were made:

- Women may require different hypertensive regimes in association to differences in the progression of hypertension.
- Pre-menopausal women often require different medication regimes due to the potential for pregnancy, being pregnant, and breastfeeding.
- The use of contraceptive and hormones replacement therapy also complicates the disease and its management. Some of the hypertensive medications do have adverse effects, many are particularly problematic to women (Dubrey, 2013).

Key words: Hypertension, Management, women of childbearing age.

Background and Rationale

Hypertension is defined as consistent blood pressure (BP) greater or equal to 140/90mm Hg, regardless of gender differences or race; this standard is used in classification of hypertension considering the epidemiological relationship between increased blood pressure and cardiovascular disease (Magee, 2001). Blood pressures have various stages for men, women, and different races. Stage 1 hypertension is BP > 140/90mm Hg, stage 2 is a BP >160/100mm Hg, and severe BP is defined as systolic pressure > 180mm Hg and/or diastolic BP >110mm Hg. (Dubrey, 2013). These stages correlate with the treatment regimen ultimately prescribed. For example, in pre-hypertensive stage, lifestyle modification is strongly recommended, whereas pharmacologic treatment is required for patients diagnosed with stage 2 or severe hypertension (Nguyen, Dominguez, Nguyen, and Gullapalli, 2010).

Despite the increased proportion of women worldwide (approximately 25% in 1975–1980 to about 40% in 2000–2005), few studies or clinical trials focus attention on women subjects (Ljungman, Mortensen, Kahan, and Manhem, 2009). Women of childbearing age warrant a special attention from clinicians due to possible reproductive goals and potential risks of exposing unborn fetus to harmful side effects of pharmacologic treatments. In general, a diagnosis of hypertension increases an individual's risk of cardiovascular disease, such as stroke and renal failure. For women of childbearing age, hormonal changes, hormone-based contraception, replacement therapy, and pregnancy contribute to the different impact of hypertension on women that calls for differential modification and management strategies. It is important, for example, for a clinician to be aware of a woman's method of birth control when

having patients of this age group and gender because some contraceptives are known to elevate BP levels (Magee, et. al, 2010).

Risk of an unplanned pregnancy is another reason to monitor women of childbearing age carefully. According to McGee (2001), 50% of pregnancies are unplanned, and inadvertent early exposure to antihypertensive agents, capable of acting as teratogens, may lead to birth defects. ACE inhibitors and angiotensin receptor antagonists are examples of teratogenic agents that women who are pregnant or plan to become pregnant, should avoid. The dilemma for patients, doctors, and clinicians is that these medications are useful for maintaining health for some women of childbearing age with essential hypertension. In such circumstances, clinicians should strongly encourage women to seek alternative methods of BP management before and during pregnancy and while breastfeeding (formula feeding may have to be prescribed if a mother must resume therapy soon after delivery). Treatment goals of hypertension in women of childbearing age should necessarily aim to decrease cardiovascular risk as well as prevent pre-eclampsia and eclampsia and improve maternal and fetal outcomes for pregnant women; this is effective with absolute control of blood pressure levels, as well as a reduction of the risk of hypertension-related damage to target organs (Brown & Garovic, 2014).

In addition to presenting a case report of the clinical assessment of a woman with hypertension, this report will attempt to use the literature to answer the following questions:

1. What is the prevalence of hypertension among women of childbearing age?
2. What are the risk factors and co-morbidities at stake?
3. What are the practice guidelines for managing the hypertension of women of childbearing age?

4. What does the clinical or pharmacological literature suggest about appropriate ways of managing hypertension of women of childbearing age?

The paper concludes by summarizing the clinical significance of studying women of childbearing age, defined as women ranging from age 15 to 44, who may or may not become pregnant, and the major learning points for the clinician presented with the responsibility of managing hypertension for women of this age group.

Prevalence and Incidence

In a review article, Moodley warned that the “incidence of hypertension in young women is likely to increase in the near future because of the rising rates of the metabolic syndrome, obesity and dyslipidaemia worldwide. Consequently, more women will be on antihypertensive agents, which have the potential for teratogenicity” (Moodley, 2011, p.330). A US study reports that the prevalence of hypertension among women of childbearing age, 20-44years, is 7.7% (Dubrey, 2013). One to six percent of women aged 18 to 44 years have hypertension, though there is variation of hypertension among different ethnic groups. Women of African-American descent have a higher prevalence of high blood pressure than any other race, with incidence starting at younger age and being more severe (Dubrey, 2013). Furthermore, according to Dubrey, hypertension is one of the most complicated medical conditions that affect about 10%-15% of pregnant women. Complications of hypertension in pregnant women, which includes pre-eclampsia, eclampsia, cardiovascular problems, and maternal and fetal complications occur in about 3%-5% of pregnancies (Dubrey, 2013). Young women or premenopausal women tend to have low blood pressure, and as a result, are at low risk of cardiovascular disease and are less in need of being placed on anti-hypertensive medications (Dubrey, 2013).

Risks Factors

Many risk factors predispose women of childbearing age to high blood pressure; these include obesity, family history, and unhealthy lifestyle. The most significant contribution to hypertension in women is obesity, and there is an increased relationship of BP and BMI >25 (Dubrey, 2013). Other contributing factors are lack of exercise, (with only 24% of women exercising for the recommended 30 minutes a day), and the impact of increased salt intake on high BP. Another risk factor is diabetes, which can coexist or exacerbate hypertension (Dubrey, 2013).

Case Report

This segment describes a clinical assessment of a woman in her late forties, who has been diagnosed with hypertension and treated with ACE inhibitor to control her blood pressure. During the “clinical visit” in question, the patient reported excessive and nagging cough which began after she started a prescribed medication, lisinopril, for her BP. She routinely did home-bound monitoring of blood pressure and noted it was consistently high. During the encounter, she was diagnosed with ACE inhibitor-induced cough, and treatment modalities were initiated. The details of her assessment appointment cover, the history of her illness, past medical history, family and social history, system review, the results of her physical examination and the recommended care plan following diagnosis.

Patient Description and History of Present Illness (HPI)

On February 5, 2016, this student-clinician evaluated a 48-year old Black American female “patient” whose chief complaint was a “nagging cough” that has lasted for two weeks. During routine questioning, this student-clinician discovered the patient has a family history of

hypertension and a recently diagnosed high blood pressure—she reported being diagnosed with high blood pressure about 6 weeks ago. The patient described how she was randomly checking her blood pressure at home with her father-in-law’s BP-monitoring machine when she noticed that her BP was elevated. She subsequently went to the clinic to have it checked, and it was indeed elevated. After initial lifestyle modification regimen failed to yield desired BP levels, she was prescribed Lisinopril, 20 mg daily. Patient came to the “clinic” for additional assessment of February 5th because she had been having nagging dry coughs, day and night, since she started taking the medication: “I have this nagging cough for 2 weeks now,” she stated. She also reported that nothing made it better or worse; coughing was continuous, woke her up from sleep, and interfered with her daily activities. Patient stated that the pharmacist told her the cough was a possible side effect of the BP medication, and patient wondered if that could be the cause of her cough. Further review of her of medical chart revealed the following details:

Past Medical History:**Medical:** Hypertension**Surgical:**

1. Cholecystectomy
2. Tubal Ligation

Medications:

1. Lisinopril 20 mg daily
2. Tylenol as needed
3. Women’s MTV daily

Allergies: NKDA

Family History:

1. **Father:** Type 2 diabetes, high blood pressure, high cholesterol and heart stent.
2. **Mother:** Osteoporosis and high blood pressure
3. **Brother:** High cholesterol and high blood pressure
4. **Sister:** Breast Cancer

Socio-economic History: Patient does not exercise regularly. She does desk work. She denies smoking or using illicit drugs, although she drinks 1 to 2 glasses of wine most evening.

Screening:

1. Pap Smear: 3 years ago
2. Mammogram every year

Review of System:

1. **General:** Denies fever, malaise or unexplained weight changes.
2. **HEENT:** Denies headaches or recent head injury
3. **Cardiovascular:** Denies chest pain or heart palpitations. No history of heart murmurs.
4. **Respiratory:** Denies dyspnea, no chest tightness.
5. **Gastrointestinal:** Denies nausea, vomiting, and constipation
6. **Neurologic:** Denies headaches, syncope or seizures.

Physical Examination Results, Assessment, and Plan of Care**Physical Examination:**

A complete examination on the day of her appointment with this student clinician revealed the following physical conditions:

1. **General:** Alert and oriented x4. Good historian and answer questions appropriately.
Good hygiene.
2. **Vitals:** BP 142/78: P 72: R14: BMI 27 kg/m²
3. **HEENT:** Atraumatic, no glasses, PEARL, EOMs intact Ears symmetrical, no tenderness or discharge.
4. **Respirations:** Lungs sound clear all fields; no crackles or wheezing
5. **Cardiovascular:** Regular heart rate with no murmurs. No peripheral edema.
6. **Neurological:** Cranial nerve I-XII grossly intact.
7. **Differential Diagnosis:**
 - a. Upper respiratory infection
 - b. Asthma
 - c. ACE induced cough.
8. **Labs/Imaging:**

Basic Metabolic Panel (BNP) and Complete blood Count (CBC). WNL

 - a. **BMP:** BUN 28 mg/dL, Na 140 mmol/L, K 3.9 mmol/L, Cl 105 mmol/L, CO₂ 27 mmol/L, Glucose (non fasting) 120 mg/dL, Creatine 0.9 mg/dL, calcium 8.8 mg/dL, MDRD eGFR >60
 - b. **WBC:** (K/MCL) 9.0, RBC (M/MCL) 48, Platelet (K/MCL) 163, Hgb (G/DL) 12.5, Hct (%) 45, MCV (FL) 88, MCHC (G/DL) 34, MCH (PG) 32.

Assessment:

1. ACE inhibitor-induced cough;

2. Patient's symptoms result most likely from the side effects from Lisinopril ACE inhibitor. Patient's symptoms started after she begins taking the medications. Her blood pressure is somewhat reduced but likely not tolerating the medication.

Care Plan:

1. Discontinue Lisinopril 20 mg PO daily.
2. Start Losartan 50 mg PO daily for hypertension
3. Encourage patient to:
 - a. exercise daily to mitigate against the effects of a sedentary desk job
 - b. Monitor blood pressure at home
 - c. Report any side effect of medication
 - d. Call if symptoms persist
 - e. Report back to the clinic within 2 weeks.

Literature review

The main emphasis of this literature review is to examine evidenced-based recommendations for the management of hypertension in women of childbearing age. In addition to early or routine screening, the two main interventions for the control and management of high blood pressure in women of childbearing age are lifestyle modification and drug therapy.

Early Screening

Early or routine is designed to identify pre-hypertensive problems before they become magnified. Hypertension disorder in pregnancy is a major cause of maternal, fetus, and neonatal morbidity and mortality. Women should be assessed and evaluated for their blood pressure status before conception, and for hypertensive women planning to become pregnant, it may be advised

before conception to change their antihypertensive medications which are known to be safe during pregnancy (Dubrey, 2013).

The USPSTF (2011) recommends screening for blood pressure in adults age 18 and over. Strategies include ambulatory blood pressure monitoring and homebound blood pressure monitoring. Ambulatory monitoring measures blood pressure every 20-30 minutes over the course of 24 to 48 hours of normal activities. The 2014 Eighth Joint National Committee (JNC8) has specific recommendations regarding effective methods of measuring blood pressure. These include appropriate cuff size, patient position, and multiple readings (JNC8, 2014). White coat hypertension, which may be noted in some women at earlier stages of pregnancy, can be mistaken for gestational hypertension (Brown & Garovic, 2014). Proper recording of blood pressure helps to identify women with white coat hypertension.

Lifestyle Modification Therapy

Once a diagnosis has been made, the primary goals for blood pressure intervention are to help patients maintain blood pressure control with lifestyle modifications (fostering self-management skills) and through drug therapy (Hannah & Hyeoun, 2016). According to the 2014 Evidence-Based Guidelines adopted in 2014 by the Joint National committee (JNC8) for the management of high blood pressure in adults 18 years and older, lifestyle modification should be recommended as the first line of management of high blood pressure. The second step is setting a blood pressure target based on patient's age, co-morbidities such as diabetes mellitus, and chronic renal status, and obtaining this therapeutic target through drugs management.

Lifestyle modification is worth considering because it helps reduce BP, improve the effectiveness of anti-hypertensive medications or eliminate the need for medication altogether. (Magee, 2001). Lifestyle modifications that must be adhered to are smoking cessation,

decreased salt intake, exercise, bodyweight reduction, and moderation in alcohol consumption (Magee, 2001).

Since obesity triples the risk of developing hypertension in women, patients who are obese should be asked about their diet and exercise pattern and offered education and written guidance. Increase consumption of fruit and vegetables and reduction in fat content can improve the patient's diet and impact risk factors for hypertension (charlotte, 2013).

Reduction in sodium consumption can decrease the risk of hypertension. Patients are encouraged to reduce their sodium intake or follow a cardiac diet. Smoking cessation is of utmost importance. Tobacco use can cause vascular disease and contribute to hypertension. Clinicians should advise cessation and offer treatment (Easton, 2006). These recommendations have proven to be therapeutic in reducing high blood pressure in young women.

Lifestyle modifications are also used to help address cardiovascular risk factors. According to Magee (2001), smoking cessation, moderate alcohol use, and reduction in BMI would help lower blood pressure, eliminate or decrease use of anti-hypertensive medications, and enhance effectiveness of anti-hypertensive medications (Magee, 2001).

Pharmacology Therapy

Various factors are considered before initiating medications therapy for patient who needs anti-hypertensive treatments. Women of childbearing age require modification to hypertensive drugs therapy at different stages of their lives because of concomitant therapies, including contraceptive, hormonal therapies, and other women-related issues (Dubrey, 2013).

Clinicians should consider the cost of medications, patient preference, history of adverse effects, potential interactions with other medication the patient is taking, pregnancy, and other

co-morbidities (Magee, 2001). The choice of therapy should be based upon efficacy, safety, cost, convenience, and other patient-related factors such as dosing regimen and delivery.

The 2014 National Joint Committee (JNC8) recommended diuretics, calcium channel blockers (CCBs), angiotensin-converting enzyme (ACE) inhibitors, or angiotensin receptor blocker (ARB) as first line of treatment, especially when there are associations with other diseases. Some patients may need two or more anti-hypertension medication for lowering blood pressure. However, women of childbearing age, or those planning to become pregnant, are advised to avoid ACE inhibitors and angiotensin II receptor blockers (ARB) due to potential fetal effects. Beta- blockers should be used in premenopausal women as alternative to CCBs, ACE inhibitors, or ARBs (Nguyen et al, 2010). According to the study by Simon Dubrey, the percentage of women who developed ACE-induced cough is higher in women than men, with some other studies indicating that women are twice as affected as men (Dubrey, 2013).

Diuretics

Diuretics are widely used among premenopausal or non-pregnant women mostly because of their low cost and availability, and it is considered effective with major cardiovascular problems. Diuretics can be divided into three groups: Thiazide, loop, and potassium-sparing diuretics. Diuretics reduce blood pressure by promoting natriuresis and reducing intravascular volume. Thiazides act to inhibit the absorption of sodium and chloride in the distal convoluted tubule. Thiazides are particularly beneficial for stroke, heart failure, and coronary artery disease (CAD) patients. Diuretics are shown to be effective for black women and in combination with beta-blocker or ACE inhibitors. The side effect of diuretics is hypokalemia, and impaired glucose tolerance can be reduced with medication dosage management, such as using low doses not more than 25 mg of hydrochlorothiazide (Magee, 2001). According to Magee (2001), early

studies reported concerns that thiazide diuretics may cause neonatal thrombocytopenia, but no evidence of increase of this problem of neonatal exposed to thiazides diuretics were found.

Despite early concern of neonatal effect, Nguyen et al., (2010) found no negative effect on fetal growth as early believed.

Beta-Blockers

Like diuretics, beta-blocker are inexpensive, readily available and frequently used for the treatment of hypertension in nonpregnant women. Magee's (2001) study has shown that these class of medication are effective in decreasing cardiovascular risk problem, renal sympathetic output, rennin production and sodium excretion, and cardiac output as a result of reducing heart rate. Beta- blockers are not effective for the management of hypertension in black race because of low rennin hypertension (Magee, 2001). Atenolol is another popular beta-blocker that is widely used because it is effective with cardiovascular-risk patient. Some of the side effects of beta-blockers are bronchospasm and lethargy; some patient may experience poor sleep (Magee, 2001).

ACE inhibitors

ACE inhibitors are effective in lowering blood pressure by inhibiting the conversion of the inactive angiotensin I to the active angiotensin II, and as a result decreasing the production of angiotensin II and aldosterone, to produce vasodilation and increase bradykinins and prostaglandins (Nguyen et al., 2010). ACE inhibitors are widely tolerated medications and are now popularly used for women of childbearing age. ACE inhibitors are also a preferred choice to ARB due to cost effectiveness; ARB should be used in place of ACE only if there are intolerance with ACE inhibitors, such as cough and angioedema (Nguyen et al., 2010). ACE inhibitors have some adverse effects, including dry cough—it may cause renal failure in some patient with

kidney disease (Magee, 2001). It is not recommended that ACE inhibitors be used during second and third trimester of pregnancy due to their association with fetopathy. Studies have shown use of this medication may cause fetal distress, fetal death, oligohydramnios. They may also cause such neonatal issues as renal failure, pulmonary hypoplasia, joint contractures, and intrauterine growth restriction. Long-term use of ACE inhibitors increases the risk of fetal physiology and ACE inhibitors and angiotensin receptor antagonist in association should be stopped during pregnancy (Magee, 2001).

Calcium Channel blockers

Calcium channel blockers (CCBs) are anti-hypertensive medications used to lower blood pressure; they are widely used for non-pregnant women, though nifedipine has been prescribed in later pregnancy. Calcium channel blockers act by preventing calcium from entry into vascular smooth muscles, leading to vasodilation and reduction in vascular contractility. The literature has shown calcium channel blockers are first-line of drugs and are effective when used in combination with other anti-hypertensive medications. It is as well-tolerated, especially when combined with ACE inhibitors, but less effective when combined with diuretics because both have natriuretic effects (Nguyen et al., 2010). JNC7 recommends CCB as first line drug for use for high-risk cardiovascular patients and diabetes (JNC8, 2014).

Angiotensin Receptor Blockers

Angiotensin receptor blockers (ARBs) act by blocking angiotensin II from binding to its receptors, as a result inhibiting it from causing vasoconstriction and fluid retention. ARBs are more costly than ACE inhibitors but have similar blood pressure effects. Cost-effectiveness analysis shows ARB proving to be more expensive to initiate than ACE. ARB can be initiated if there is intolerance with ACE inhibitors (Nguyen et al., 2010).

Combination Therapy

Patients with uncontrolled blood pressure may benefit from combination therapy; this should be initiated when the target blood pressure goal is not achieved with mono therapy and when BP is above 20/10 mm Hg. Each anti-hypertensive medication has a different mechanism of action; using two or more anti-hypertension medications allows for applying complementary mechanisms to lowering blood pressure effectively. Some of the benefits for fixed combination therapy include faster response, fewer side effects from medications, and better compliance (Nguyen et al., 2010). ACE inhibitors or ARBs combined with diuretics have shown to be effective in lowering blood pressure and with fewer side effects in all genders. Also, the combination therapy of CCB with ACE inhibitors is effective, but the combination of ACE inhibitors and ARB is not preferred because it results in increased risk of side effects. Nguyen et al., (2010) further cite studies reporting that the combination of ACE and ARB potentiates risks of hypotension syncope, renal problem, and hyperkalemia (Nguyen et al., 2010).

Resistant Hypertension

Resistant hypertension is the failure of three anti-hypertensive medications to control a patient's blood pressure effectively, including a tolerated dose of diuretic. The most effective way to manage anti-hypertensive treatment failure is to reevaluate conditions that may be responsible for lack of blood pressure control and to develop an aggressive anti-hypertensive treatments plan with well-tolerated doses. Some factors that may contribute to treatments failure are BP measurement technique; white coat effect; poor compliance and inappropriate dosing; use of non-prescribed medications, such decongestants; excessive use of alcohol; increased dietary sodium intake; obesity; and diabetes mellitus (Nguyen et al., 2010). It is recommended that a fourth anti-hypertensive agent be added to the treatments regimen if blood pressure is still not

achieved. An evidence-based study has shown that adding spironolactone may be effective in lowering BP. Patient who are obese or have sleep apnea may benefit from spironolactone and should be considered using because of association with aldosterone excess (Nguyen et al., 2010).

Clinical Significance of Literature Review and Major Learning Points

Several researchers, (Dubrey, 2013, Yoder, Thornburg, and Bisognano, 2009, and Magee et. al., 2001), have made clear the clinical significance for studying women of childbearing age. The literature shows consensus that this group poses a unique challenge for clinicians with respect to monitoring and managing hypertension. As Yoder et. al put it: “Women of childbearing age with hypertension represent an interesting and challenging population. As a general rule, women tend to have lower blood pressure than men. There is an age delay in the development of hypertension such that most women do not require hypertensive therapy during their childbearing years. However, the increasing prevalence of obesity and metabolic syndrome can herald increased numbers of younger women presenting with hypertension.”

Clinical Significance

A listing provided by Yoder et. al. (2009, p. 891) further illustrates the consensus found in the literature about clinical significance (the take-away message for clinicians):

- Hypertension goals for women of childbearing age are the same as for other groups.
- Physicians should consider reproductive goals when selecting medications.

- Hypertension during pregnancy is often a symptom of an underlying syndrome with significant maternal and fetal morbidity and mortality.
- Early recognition and prompt treatment of hypertensive disorders during pregnancy are necessary to avoid deleterious outcomes.
- Hypertensive disorders of pregnancy likely portend future cardiovascular disease.

Major Learning Points

According to Dubrey, (2013), while the guidelines for the management of hypertension are similar in both genders, the clinical management may require considerable modification for women of childbearing age. Therefore, careful considerations regarding hypertension treatment goal, choice of medication for young women who are or might become pregnant, and women of childbearing age using contraceptive or replacement therapy should always be in the clinician's mind.

- The goal of hypertension treatment in women of childbearing age is to reduce blood pressure to 140/90mm. Drug therapy is initiated if lifestyle modification cannot adequately bring blood pressure to goal.
- Lifestyle assessment and potential modification are the first step in hypertension management. Education should focus on risk factors associated with hypertension, including sedentary lifestyle, overweight, smoking, high alcohol consumption, and salt intake.
- In pregnancy-related hypertension, the risk to mother and fetus must be considered against any potential for serious drug induced side effect. Clinician should

discontinue ACE inhibitors and ARBs within 2 days of notification of pregnancy and start alternatives substitutes.

- Hypertension disorder is the most common medical complications in pregnancy.
- Women of childbearing age require modification to hypertensive treatment related to their 'phase' of life, concomitant therapies; including hormonal therapies (Dubrey, 2013).

Conclusion

This paper posed four clinical research questions about women of childbearing age. The literature review has shown that women of childbearing age warrant special attention of the clinician due to possible reproductive goals and potential risks of exposing unborn fetus to harmful effects of pharmacologic treatment. The review has also identified lifestyle modification therapy and pharmacologic guidelines for managing hypertension in women of childbearing age.

The benefits of lifestyle changes are enormous, regardless of the use of anti-hypertensive agents. The main issue with lifestyle changes is consistency; many people do not continue to comply with recommended changes over time. This problem must be addressed to sustain most treatment benefits (Lindsay, 2013). Effective lifestyle changes may benefit young women by preventing or delaying onset of hypertension, preventing the need for medical treatment in those with stage 1 hypertension, and contributing to a reduction in blood pressure in patients already taking anti-hypertensive medication (Lindsay, 2013). Young women of childbearing age who are not pregnant with mild-to-moderate hypertension should be encouraged to initiate lifestyle modifications; anti-hypertensive medications may not be necessary because of low cardiovascular risk.

With respect to pharmacologic treatment options, women of childbearing age with severe hypertension should immediately commence anti-hypertension therapy to decrease the likely risk of cardiovascular problems. Appropriate medication dosing is required to avoid potential ischemia of maternal organs or the placenta and fetus should the women become pregnant (Magee, 2001). If anti-hypertensive medication is required, ACE inhibitors and ARBs are contraindicated during pregnancy. All anti-hypertensive medications have been proven not to be teratogenic if inadvertent exposure occurs in early pregnancy. Teratogenicity may be indicated for mid and late trimesters. There is not enough evidence to support treating non-severe hypertension during pregnancy, though various choices of anti-hypertensive medications for managing severe hypertension during pregnancy, Methyldopa and Beta-blockers, other than Atenolol, are mostly used (Magee, et al 2011). Therapy initiated for severe hypertension (160/110 mm Hg) during pregnancy should be done to avoid maternal stroke, possible eclampsia or direct morbidity and mortality associated with hypertension—intracerebral hemorrhage and stroke (Yoder et al. (2009, p. 895).

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