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Anna Wistrom-Thesing

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Effects of Alcohol on Blood Pressure in Women with Hypertension

Anna Wistrom-Thesing

University of North Dakota

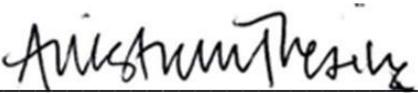
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Degree Master of Science

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Date March 7, 2016

Abstract

Hypertension is a disease of the cardiovascular system that is characterized by increased systolic and/or diastolic blood pressure. It is estimated that hypertension affects more than one-third of the adult population in the United States, and an additional one-third are at risk of developing hypertension. If left untreated, hypertension may lead to stroke, kidney failure, and chronic heart failure, among other conditions. Data shows approximately seven out of ten adults in the United States with hypertension take medication for their disease, but it is also researched and documented that lifestyle factors play an important role in hypertension risk and treatment (Centers for Disease Control and Prevention [CDC], 2015). In addition to weight loss, physical activity, and a reduced-sodium diet, the American Society of Hypertension (ASH) and International Society of Hypertension (ISH) recommend specific limitations on alcohol consumption in men and women with hypertension (Weber et al., 2014).

The Objective Structured Clinical Examination (OSCE) case describes a 48-year old female with a history of hypertension who reported consuming moderate-to-high amounts of alcohol. The literature review was conducted to further investigate the effects of moderate alcohol consumption on blood pressure control in women with a diagnosis of hypertension. A literature search revealed there is very limited data on this specific question, although data has shown light and moderate amounts of alcohol consumption may reduce a woman's overall risk of developing hypertension.

Background

The case study involved a 48-year old female with a chief complaint of a cough. The patient had been diagnosed with hypertension four weeks prior at an emergency department visit and was started on lisinopril. The patient reported drinking four to eight glasses of red wine per week, with each glass being eight ounces. According to the U.S. Department of Agriculture (USDA) and U.S. Department of Health and Human Services (HHS) (2010), moderate alcohol use for women is defined as four to seven standard drinks per week, with a standard drink containing 14 grams of alcohol. This is approximately five ounces of wine. In addition, heavy alcohol use for women is defined as greater than seven standard drinks per week (USDA & HHS, 2010). Converting the patient's alcohol use to standard drink sizes, she reported drinking 4.8 – 9.6 standard glasses of wine per week, placing her in either the moderate or heavy alcohol use categories depending on amount of alcohol consumed that week. Based upon national recommendations by the USDA and HHS, the patient was educated on the standard drink size and to not consume more than one drink per day.

Hypertension is defined as a systolic blood pressure [SBP] \geq 140 mmHg, or a diastolic blood pressure [DBP] \geq 90 mmHg (Mozaffarian et al., 2015). It is estimated that hypertension affects more than one-third of the adult population in in the United States, and an additional one-third are at risk of developing hypertension. Although hypertension is usually an asymptomatic disease, the effects of uncontrolled hypertension are serious and include stroke, kidney failure, and chronic heart failure. Subsequently, direct and indirect costs of hypertension in the United States alone were estimated at \$46 billion in 2011, and the annual cost is projected to be \$274 billion by 2030 (Mozaffarian et al., 2015). The ASH/ISH (Webster et al., 2014) and the Eighth

Joint National Committee ([JNC 8] James et al., 2014) guidelines both recommend lifestyle changes as the first-line treatment for hypertension. However, only the ASH/ISH guideline provides specific recommendations regarding limiting alcohol consumption as part of these lifestyle changes. Knowing that approximately 50% of adults in the United States are considered regular drinkers (USDA & HHS, 2010), statistics suggest there is a similar percentage of people with hypertension that consume alcohol. Given the prevalence of hypertension among adults in the United States and the common lifestyle factor of consuming alcohol, this report sought to investigate if moderate alcohol consumption has an effect on blood pressure in women with pre-existing hypertension.

Case Report

Patient Profile:

Initials: S._

DOB: 01/01/1968

Gender: Female

Date of Visit: 02/05/2016

Provider/s: Anna Wistrom-Thesing, FNP-S

Chief Complaint: “I have a cough.”

History of Present Illness: Patient is a 48-year old African-American female who presents to the clinic for a scheduled 4-week follow up on hypertension, but her chief complaint is a cough that she has. Patient states she was diagnosed with hypertension four weeks ago when she presented to the ER after doing a home BP check and it was found to be 160/82. She states by the time she presented to the ER her systolic BP was in the 180s. It was recommended that she start lisinopril 20mg once daily and was discharged with the recommendation to follow up four weeks later. Patient states she has been checking her BP at home daily, although the time of day isn't consistent. Per her recall, she notes systolic BP readings have ranged from 140-148 and diastolic readings have been ranging from 74-80s. Patient states she has not had any difficulty remembering to take her medication, she takes it at noon so has not yet taken it today. Patient notes that since she started the lisinopril she has noticed a dry, non-productive cough. Cough is most pronounced in the late morning and evening. It does not wake her up during the night. She has not tried any treatments for her cough, and hasn't noticed if anything worsens or alleviates her symptoms. In reviewing family history, the patient expressed concern that she may have high cholesterol or type 2 diabetes like other family members.

Current Medications:

lisinopril 20mg one tab by mouth one time a day. For hypertension.

Tylenol PRN

Women's multivitamin one tab by mouth one time a day.

No other herbals or supplements

Allergies: No known drug allergies.

Past Medical History: Positive only for hypertension. No history serious illnesses or hospitalizations. No psychiatric history.

Past Surgical History: Cholecystectomy and tubal ligation.

Family History: Father alive, 80 years old, has Type II DM, HTN, and hyperlipidemia. Mother alive, 74, has HTN and osteoporosis. One sister, 40 years, alive with breast cancer (diagnosed at age 35). One brother with hyperlipidemia.

Social History: Patient denies a history or current use of tobacco products. Patient states she drinks wine four nights per week and drinks one or two eight-ounce glasses per night. Patient denies history of or current drug use. She works as an occupational therapist in a clinic. She states since she was diagnosed with hypertension she has been following a Dietary Approach to Stop Hypertension (DASH) diet and started exercising (running and yoga) for one hour three days per week.

Review of Systems:

Constitutional: Negative for fever, body aches, or chills.

HEENT: Negative for sore throat, sinus congestion, or headaches.

Respiratory: Positive for dry cough. Negative for shortness of breath.

Cardiac: Negative for chest pain, pressure, or fluttering.

Peripheral Vascular: Negative for lower extremity swelling.

Musculoskeletal: Negative for joint or muscle pain.

Neuro: Negative for numbness or tingling in feet.

Physical Examination:

Vitals: HR 72, R 14, BP 142/78, BMI: 27

General Appearance: Seated in exam chair, alert, smiling frequently, appears to converse easily and answers questions appropriately and completely.

HEENT: Normocephalic, atraumatic. Eyes: non-injected.

Neck: Carotid pulses +3 bilaterally, no bruit upon auscultation.

Chest: Respirations even and unlabored, lung sounds clear to auscultation.

Cardiac: Regular rate and rhythm, S1 and S2 appreciated. No murmur, gallop, or rub appreciated.

Extremities: Bilateral lower extremities without edema. Dorsalis pedis and post tibial pulses +3 bilaterally. Toes warm and pink and brisk capillary refill.

Skin: Skin on bilateral lower extremities intact.

Neuro: Monofilament unavailable, used cotton ball to various areas of both feet and patient was able to identify touch correctly on all sides of each foot and all toes.

Laboratory Tests/Diagnostic Tests:**CBC**

WBC	9.0 k/mcl	(4.5-11.0)
RBC	4.8 k/mcl	(3.8-5.3)
Plt	163 k/mcl	(150-440)
Hgb	12.5 g/dL	(11.7-15.2)
Hct	45%	(39-50)
MCV	88 FL	(80-100)
MCHC	34 g/dL	(32-36)
MCH	32 PG	(27-35)

*automated differential WNL

Basic Metabolic Panel

BUN	28 mg/dL	(8-22)
Na	140 mmol/L	(137-147)
K	3.9 mmol/L	(3.4-5.3)
Cl	105 mmol/L	(99-108)
CO2	27 mmol/L	(22-29)
Glucose	120 mg/dL	(60-99)
Creatinine	0.9 mg/dL	(0.75-1.25)
MDRD eGFR	>60mL/min	

Assessment/Plan

1. Cough – Considering the timing of the patient’s cough was shortly after she started the lisinopril, there is a high suspicion the cough is a side effect of the medication. The patient is informed this is the most likely etiology of her symptom at this time. It was recommended that the patient change her antihypertensive medication and monitor her cough and for resolution. A request was made for the patient to follow up in the clinic for further evaluation if her cough doesn’t resolve within a few weeks of changing her medication.
2. Hypertension – The patient was instructed to discontinue her lisinopril. Initially, it was considered to change the patient to losartan, but in accordance with the JNC8 guidelines for African Americans with hypertension, it was decided that the patient should start hydrochlorothiazide instead. The patient was provided with a prescription for hydrochlorothiazide 12.5mg once daily to be taken in the morning. A future order was placed for a basic metabolic panel in 2-3 weeks and the patient was requested to return at that time for a lab visit and blood pressure recheck. The patient was congratulated and encouraged on her new physical activity habits and to continue with her efforts with a goal of 30 minutes five days per week.
3. Encounter for Vaccine: The patient has not received an influenza vaccine yet this season. This was recommended and she was offered to receive a vaccine today. The patient declined and was informed she may return at any time for a nurse only visit to receive an influenza vaccine if she desired.
4. Health Maintenance: Patient stated she has a primary care provider (PCP) in Grand Forks but cannot recall the name. She states she has had a mammography screening annually since she turned 40 and has not had an abnormal one. She does not do self-breast exams and this was briefly discussed and information was provided. Patient also stated she believes she is up to

- date on her pap smears, but those records are not available for verification purposes. The patient was encouraged to see her PCP on at least an annual basis for those screenings. Will try to obtain name of PCP at next visit so we can ensure these records are sent to him or her.
5. Alcohol Use: Education was provided regarding the standard serving size of wine being five ounces, and that women are recommended to have no greater than seven servings per week. The patient was very receptive to decreasing alcohol use to within guideline amount or less, and feels that this is something that she can easily do. She states she just wasn't aware of recommendations.
 6. Screening for hyperlipidemia: Provided the patient has a concern regarding family history of hyperlipidemia, it certainly would be appropriate for her to have a lipid panel done. Reviewed this with patient and offered to have order placed for when she has her other follow up lab in the next week or two.

Literature Review

As previously stated, hypertension is a very common chronic disease that is estimated to affect over one-third of the adult population in the United States (CDC, 2015), including the patient presented in the case study. In addition, Guidelines recommend women who have hypertension should not exceed a moderate amount of alcohol (Weber et al., 2014). In follow up to these recommendations, a search for supporting literature and data specifying the effects of moderate alcohol consumption on blood pressure control in women with hypertension was performed. In brief, what was found during this search was a substantial amount of research that shows women who consume heavy amounts of alcohol per week have an increased risk of developing hypertension (Batty, Lewars, Emslie, Gale, & Hunt, 2009; Halanych et al., 2009; Matsumoto, Miedema, Ofman, Gaziano, & Sesso, 2014). In addition, recommendations from two governmental agencies (USDA & HHS, 2010) and one professional organization (Weber et al., 2014) all concur that women should not consume more than one standard alcohol drink per day. Despite findings that showed moderate alcohol use increased one's risk for developing hypertension, it was difficult to ascertain the effects of moderate alcohol consumption on blood pressure in women who already had a diagnosis of hypertension.

Literature search process

Article searches were performed on multiple databases, all of which were accessed through the University of North Dakota's Harley E. French Library website. A research librarian was also consulted for search suggestions. Filters were applied to all initial searches on each database in order to exclude articles over ten years old and articles in languages other than English. The first search was conducted on the CINAHL database using the following terms in various combinations: hypertension, blood pressure, alcohol, moderate alcohol, women, effects of alcohol on hypertension. A filter was applied to view articles that included female subjects but it did not change the number of results. Multiple articles were retained from these searches for further review. Articles that studied transient effects of alcohol on blood pressure were excluded. A search using the PubMed database was also performed using the following MeSH terms in various combinations: hypertension, alcohol drinking, women, and female. Seven articles were retained from the PubMed searches for further review. Scopus was the third database that was searched using the keywords moderate alcohol, women, and hypertension. There were one-hundred and ten articles resulted, but only three articles were pertinent and saved. Multiple articles were also identified by reviewing the references cited in other studies.

A search of the Cochrane Library database was conducted using the browse by subject feature on the website. There was one pertinent result, but upon further review, this article was discarded as it was an abstract for a future study and thus did not contain findings. Reference pages of articles were also reviewed and an additional six articles were identified.

Low and/or Moderate Alcohol Consumption Lowers Individual's Risk of Hypertension

There were multiple resources throughout this review that noted light and moderate amounts of alcohol consumption actually decreased hypertension risk in women. A study by Djoussé, Lee, Buring, and Gaziano (2009) included over 26,000 women who were followed over

twelve years. The purpose of the study was to examine if there was a correlation between alcohol consumption and cardiovascular disease (CVD), but data regarding blood pressure control was also obtained and analyzed as a risk factor for CVD. At the end of the study, women who reported moderate amounts of alcohol consumption were found to have lower rates of hypertension as well as a slightly decreased risk for CVD when compared to other groups who reported less and greater amounts of alcohol use. Interestingly, the group of female subjects who reported moderate alcohol consumption also had the lowest overall percentage who reported having a diagnosis of hypertension (10.1%). Similarly, a study by Halanych et al. (2014) also found that European-American women who reported light to moderate amounts of alcohol consumption had a lower risk of incident hypertension when compared to women of the same ethnicity who consumed less and greater amounts of alcohol. Both Djoussé et al. and Halanych et al. included patients with and without hypertension at baseline in their studies, although, Halanych et al. defined incident hypertension as elevated blood pressure readings or a diagnosis that occurred after the baseline assessment in previously normotensive patients.

Further literature reinforcing that light to moderate amounts of alcohol consumption decrease the risk of hypertension was included in a review by O'Keefe, Bhatti, Bajwa, DiNicolantonio, and Lavie (2014). Also, a meta-analysis of prospective cohort studies (Taylor et al., 2009) found that women who had light to moderate alcohol use over time had lower rates of hypertension when compared to women who consumed more alcohol. In addition, an analysis of data from the Women's Health Study was conducted by Sesso, Cook, Buring, Manson, and Gaziano (2008) to evaluate the effects of alcohol on normotensive women over an approximate ten-year timespan. Based on their findings, Sesso et al. determined that women who consumed one standard drink per month to one standard drink per day, which equal light to moderate

amounts, had an 8-21% reduction in risk of developing hypertension. In contrast, findings by Matsumoto et al. (2014) revealed only light amounts of alcohol consumption, which is less than ten grams per day, were shown to reduce blood pressure in women.

Moderate Alcohol Consumption Increases Hypertension Risk

In a study by Matsumoto et al. (2014), women who consumed between 10-49 grams of alcohol per day, which overlaps between moderate and heavy alcohol use, were found to have an increased risk for hypertension with a risk ratio (RR) of 1.10. The study by Matsumoto et al. was the only study in this review that correlated moderate alcohol consumption with an increased risk of hypertension in women specifically. In this study, risk of hypertension increased further with higher alcohol consumption amounts of 50 grams per day (RR 1.81) and 100 grams per day (RR 2.81).

Heavy alcohol consumption increases risk of hypertension

The USDA and HHS (2010) define heavy alcohol consumption as more than seven standard drinks per week for women and more than fourteen standard drinks per week for men. The potential complications of on-going heavy alcohol consumption are well-documented and include injuries, violence, seizures, cirrhosis, cancers, and increased risk of cardiovascular diseases (O'Keefe et al., 2014). When treating conditions such as hypertension, many advanced practice providers and physicians turn to evidence-based guidelines as trusted and authoritative sources for treatment recommendations. The current ASH/ISH guideline for management of hypertension (Weber et al., 2014) asserts that consumption of heavy amounts of alcohol can raise blood pressure in women, though it was not noted to what extent and if this was in women with or without pre-existing hypertension. The ASH/ISH guideline recommends women not consume more than one standard alcohol drink per day to prevent elevated blood pressure.

In addition to the ASH/ISH guideline, research has shown that exceeding moderate alcohol consumption increases a woman's risk of developing hypertension. In a study by Batty et al. (2009), researchers examined the impact of exceeding alcohol consumption guidelines established by the United Kingdom (UK) government. Trained nurses conducted interviews with 1,259 subjects and asked subjects to recall their alcohol consumption in the previous seven days. Blood pressure measurements and weight were also obtained. Between three and four years later, subjects were reassessed. At the time of this study, the UK government recommended that women should not exceed fourteen units of alcohol in one week. This amount is equivalent to eight standard drinks in the United States, which just minimally exceeds the US recommendations and would be classified as heavy alcohol consumption. The results concluded that subjects who exceeded the UK alcohol consumption guideline had increased risks of hypertension, as demonstrated by an odds ratio of 1.20. In regards to the effects of alcohol on women specifically, the researchers did not separate findings between female and male subjects in this study. While this data supports the hypothesis that consuming heavy amounts of alcohol over time increases hypertension risk, the researchers did not analyze the effects of moderate alcohol on blood pressure, nor did they separate data for patients who were normotensive or had hypertension at baseline.

Additional literature findings that supported a correlation between heavy amounts of alcohol consumption and risks of developing hypertension included a study by Matsumoto et al. (2014). Results of this study found women who chronically consumed more than one alcohol drink per day had an increased risk of developing hypertension. O'Keefe et al. (2014) reviewed research on the various health-related outcomes attributed to alcohol consumption. A specific finding by O'Keefe et al. was for every drink beyond one per day, there was an average increase

in blood pressure by 1.5mm Hg in both men and women. The findings in the review by O'Keefe et al. also found that heavy amounts of alcohol increased blood pressure in women.

The final study that supports the finding of an increased risk of hypertension in subjects with heavy alcohol consumption is an analysis of data from the Women's Health Study conducted by Sesso et al. (2008). The purpose of this research was to evaluate the effects of alcohol on normotensive women over an approximate ten-year timespan. Over the course of the ten-year study, a total of 8,680 women, or 30.01% of all female subjects enrolled, developed hypertension. These researchers concluded there was a statistically significant increased risk of hypertension due to alcohol consumption when women consumed four or more standard drinks per day. Although it was a statistically significant finding, it is interesting to note that only 0.4% of all female subjects reported consuming four or greater standard drinks per day. In addition, although the study only included women without a diagnosis of hypertension or elevated blood pressure at baseline, it still provides information on the effects of alcohol on blood pressure in a broader sense.

Additional findings of alcohol consumption and hypertension risk in women

A study by Halanych et al. (2010) revealed rather surprising findings that highlight the inconsistencies among literature on alcohol consumption and risk for hypertension. The purpose of the study was to assess alcohol use and incident hypertension and included over 4,000 male and female subjects who were followed over 20 years. The results of the study concluded the group with the lowest risk of developing hypertension during the study period was European-American women who reported drinking more than seven standard drinks per week, which is quantified as heavy alcohol use. This contradicts previously referenced literature (Batty et al., 2009; Matsumoto et al., 2014; O'Keefe et al., 2014) that determined heavy amounts of alcohol

consumption resulted in increased risks of hypertension in women. Further, alcohol of any amount was not associated with development of hypertension in African-American women in this study. This study provides an example of the inconsistencies in recent literature regarding the effects of alcohol on hypertension risk in women, and identifies areas of opportunity for future research.

Barriers and Limitations in Literature Findings

As stated previously, there were a number of barriers that were encountered while completing the search and while reviewing literature findings. One in particular was that most of the research published within the past ten years studied the effects of alcohol on CVD risk and mortality. In addition, a majority of the articles that appeared pertinent to the topic were found to be published greater than ten years ago and most were excluded based on that premise. It was also difficult to find literature specifically evaluating moderate amounts of alcohol consumption, and to identify studies that separated data for men and women. It is important to note, not one study was identified that studied the effects of alcohol on blood pressure only in women who already had a diagnosis of hypertension and that was published within the past eight years. Finally, there was inconsistency among study findings pertaining to moderate alcohol consumption and effects on risk for hypertension in women.

In addition to difficulty finding articles, there were consistent research limitations among some of the different articles that were reviewed. One particular limitation in research methods was the lack of randomized controlled trials [RCT] that studied alcohol consumption and the effects on blood pressure. Chen, Smith, Harbord, and Lewis (2008) noted the primary reason for lack of RCTs was due to ethical reasons of randomizing alcohol consumption for participants, including the possibility of harmful effects of alcohol. Another potential limitation noted by

multiple studies was subjects may underestimate the amount of alcohol they consume (Batty et al., 2009; Djoussé et al., 2009; Halanych et al., 2009; Taylor et al., 2009). If subjects were not reporting accurate amounts of alcohol intake, that could affect which alcohol consumption category the subject would be categorized to, and possibly alter the end results of the overall relationship of alcohol consumption and blood pressure. It was also observed that few articles focused on women or separated results between men and women.

One final and rather interesting observation was regarding the hypertension management guideline published by the Eighth Joint National Committee (JNC 8). In this guideline (James et al., 2014), lifestyle changes are recommended as the first line treatment for hypertension but alcohol use is not specified. Further, James et al. referred to publication by the American Heart Association (AHA) on lifestyle modifications (Eckel et al., 2014). In the AHA guideline, the authors noted alcohol use related to lifestyle changes and cardiovascular risk was not addressed due to, “time and resource constraints” (Eckel et al., 2014, p. 8). The fact that two of the largest professional bodies in the fields of cardiovascular and hypertension care and research deferred to make a recommendation regarding alcohol consumption supports that further research is needed in this area. In addition, research regarding the gender-specific effects of alcohol on blood pressure is also needed in order to have strong evidence to support specific recommendations regarding alcohol consumption in women with a diagnosis of hypertension.

Learning Points

- The primary purpose of this paper was to examine if or how moderate amounts of alcohol consumption affected blood pressure control in women with hypertension. It was found that very little direct literature on this topic was available. However, what was identified by many studies was that low to moderate amounts of alcohol consumption may result in a decreased

risk for women to develop hypertension (Djoussé et al., 2009; Halanych et al., 2014; O’Keefe et al., 2014; Taylor et al., 2009; Sesso et al., 2008).

- Researchers cautioned against providers recommending light-to-moderate alcohol consumption to women as a way to decrease risk of hypertension (Matsumoto et al., 2014 & O’Keefe et al., 2014)
- Literature findings found that women who consumed heavy amounts of alcohol had a greater risk of developing hypertension (O’Keefe et al., 2014; Weber et al., 2014; Batty et al., 2009; Matsumoto et al., 2014; Sesso et al., 2008). This supports the recommendations by the USDA and HHS (2010) for women not to exceed moderate consumption of alcohol, or greater than one standard drink per day, due to possible harmful effects, which include risk for hypertension.
- Further research is needed to study the specific effects moderate alcohol consumption has on women with hypertension.

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