

Caffeine & Women's Health

International Food Information Council Foundation

Association of Women's Health, Obstetric, and Neonatal Nurses

Introduction

Foods and beverages containing caffeine have been enjoyed for thousands of years, yet questions persist about its potential effects on women's health. But according to leading medical and scientific experts, caffeine in moderation usually can be safely consumed by healthy individuals.

From reproduction to osteoporosis, scientists worldwide have investigated the effects of caffeine on women's health. This brochure provides background information on caffeine and reviews the latest research on caffeine and women's health, summarizing the major findings.

History of Caffeine

People have enjoyed caffeinated beverages since ancient times. As long ago as 2,700 B.C. the Chinese Emperor Shen Nung sipped hot brewed tea. Coffee's origins date back to 575 A.D. when in Africa beans were used as money and consumed as food.

Caffeine is naturally occurring in the leaves, seeds or fruits of more than 63 plant species worldwide. The most commonly known sources of caffeine are coffee and cocoa beans, cola nuts and tea leaves. The amount of caffeine in food products varies depending on the serving size, the type of product and preparation method. With teas and coffees, the plant variety also affects caffeine content. The reason caffeine is added to some soft drinks is for its flavor characteristics. The level of caffeine is regulated and its presence clearly labeled when added.

Various food consumption surveys show caffeine consumption patterns have not changed significantly over the last decade. A 1996 survey by Barone and Roberts found that caffeine consumption averages around 200 mg per day, and pregnant women tend to consume less caffeine than the general population. A

moderate amount of caffeine is about 300 mg of caffeine per day (about 3 cups of coffee or around 60 ounces of caffeinated cola).

Physiological Effects

Depending on the amount consumed, caffeine can be a mild central nervous and cardiovascular system stimulant. Caffeine does not accumulate in the body over the course of time since it is usually and normally metabolized and eliminated within several hours of consumption. Thus, the pharmacological effects of caffeine are usually brief, passing within hours.

People differ greatly in their sensitivity to caffeine and this may change with advancing age. With regular use, tolerance develops to many of the effects of

considered to be about 300 mg., which is equal to around 3 cups of coffee. Overall, individuals tend to find their own acceptable level of caffeine. Those who feel unwanted effects, such as insomnia and jitteriness, tend to ease off their caffeine consumption. If the effects remain, a healthcare provider may be consulted. Although significant attention has been paid to caffeine and insomnia, in practice, the person who experiences effects such as sleeplessness learns not to consume caffeine before bedtime.

Caffeine is a mild diuretic, but the urinary output effects attributed to caffeine have frequently been exaggerated. Recent research has found that the minimal diuretic effects of caffeine do not compromise overall body hydration status in healthy women.

Some women experience urinary incontinence as they age. Although caffeine does not cause this condition, women with this condition may experience a greater degree of "urgency" for a short time after consuming a caffeinated beverage. Women may benefit from discussing their beverage consumption and caffeine intake with their health care provider. Learning methods of managing their symptoms such as performing pelvic and bladder muscle training exercises may also reduce incontinent episodes.



caffeine. For example, a person who consumes caffeine on a regular basis may drink several cups of coffee in a few hours and notice little effect, whereas a person who isn't a regular coffee drinker may feel some stimulant effect after just one serving. Some people may experience feelings of nervousness if they consume more caffeine than they are accustomed to. When regular caffeine consumption is abruptly stopped, some people experience symptoms, such as headaches, fatigue or drowsiness. These effects are typically temporary, lasting for a few days, and may be avoided if caffeine cessation is gradual.

Moderate caffeine consumption is

Caffeine and Pregnancy — Is it Safe?

Today, with increased attention to maternal nutrition, many women wonder if it's safe to consume caffeine-containing foods or beverages during pregnancy. While some studies have shown conflicting results, health professional organizations such as the American College of Obstetricians and Gynecologists recommend that pregnant women limit consumption to the caffeine equivalent of 1 to 2 cups of coffee. Use of caffeine in pregnancy should be discussed with health care providers.

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Caffeine and Pregnancy — Is it Safe?

Fertility

Since many women are delaying pregnancy, more research has focused on identifying the factors that may affect fertility, including caffeine. One small study in 1988 suggested that caffeine, equivalent to the amount consumed in 1 to 2-cups of coffee daily, might decrease female fertility. However, the researchers acknowledged that delayed conception could be due to other factors they did not consider, such as exercise, stress or other dietary habits. Since then, larger, well-designed studies have failed to support the 1988 findings.

In 1990, researchers at the Centers for Disease Control and Prevention and Harvard University examined the association between the length of time to conceive and consumption of caffeinated beverages. The study involved more than 2,800 women who had recently given birth and 1,800 women with the medical diagnosis of primary infertility. Each group was interviewed concerning caffeine consumption, medical history and lifestyle habits. The researchers found that caffeine consumption had little or no effect on the reported time to conceive in those women who had given birth. Caffeine consumption also was not a risk factor for infertility.

Supporting those findings, a 1991 study of 11,000 Danish women examined the relationship among number of months to conceive, cigarette smoking, and coffee and tea consumption. Although smokers who consumed eight or more cups of coffee per day experienced delayed conception, nonsmokers did not, regardless of caffeine consumption.

A study of 210 women, published in the *American Journal of Public Health* in 1998, examined the differences in fertility associated with consumption of different caffeinated beverages. This study, prompted by an inconsistency in previously reported findings, did not find a significant association between total caffeine consumption and reduced fertility. In fact, the researchers found that women who drank more than one-half cup of tea per day had a significant increase in fertility. This was particularly true with caffeine consumption in the early stages of a woman's attempt at conception. The caffeinated tea and fertility correlation was supported by a 1994 study; however, those women had significantly higher consumption levels.

Miscarriages

The association between caffeine and miscarriages continues to be researched. Recently, researchers from McGill University in Montreal published a study showing a relationship between caffeine intake and miscarriage. While caffeine intake before and during pregnancy appeared to be associated with increased fetal loss, the authors failed to account for a number of factors that could result in a false association, including effects of morning sickness or nausea, the number of cigarettes smoked and amount of alcohol consumed.

THE Nausea Factor

For some women, nausea — “morning sickness” — is a common experience during early pregnancy. Though this phenomenon is unpleasant, researchers believe it's a normal and common aspect of early pregnancy.

During a normal pregnancy, hormone levels are high, increasing the likelihood of becoming nauseated. If nauseated, pregnant women may not desire certain foods and beverages, including those that contain caffeine. Healthcare professionals often advise pregnant women who experience nausea to choose bland foods and beverages such as crackers and water.

Just prior to the McGill study, a research team from the U.S. National Institute of Child Health and Human Development conducted a study of 431 women. The researchers monitored the women and the amount of caffeine they consumed from conception to birth. After accounting for nausea, smoking, alcohol use, and maternal age, the researchers found no relationship between caffeine consumption of up to 300 mg per day and adverse pregnancy outcomes, including miscarriage.

Earlier, in 1992, researchers analyzed the effects of cigarettes, alcohol and coffee consumption on pregnancy outcome in more than 40,000 Canadian women. Although alcohol consumption and smoking tended to have adverse effects on pregnancy outcome, moderate caffeine consumption was not associated with low birthweight or miscarriages. Further, the relationship of caffeine consumption to spontaneous abortion was investigated in a study of 5,342 pregnant women in 1997 in which researchers concluded that there was no increased risk for spontaneous abortion associated with moderate caffeine consumption. Another very comprehensive study, done in Uppsala, Sweden, and reported in December 2000, concluded reducing caffeine intake during early pregnancy may be prudent.

Birth Defects and Low Birthweight

Studies published during the 1980s also support the conclusion that moderate caffeine consumption during pregnancy is not associated with early birth or low birth-weight babies. A review of more than 20 studies conducted since 1980 found no evidence that caffeine consumption at moderate levels has any discernible adverse effect on pregnancy outcome.

A seven-year study published in 1991 of 1,500 women examined caffeine use during pregnancy and subsequent child development. Caffeine consumption, equivalent to about 1½ - 2 cups of coffee per day had no effect on birthweight, birth length or head circumference. Follow-up examinations at ages eight months, four years, and seven years also revealed no effects of caffeine consumption on a child's motor development or intelligence.

In the early 1980s, the U.S. Food and Drug Administration (FDA) conducted a study in which rats were force-fed very high doses of caffeine through a stomach tube. While the results prompted an advisory to pregnant women to avoid caffeine, the study was criticized as not being representative of the way humans consume caffeine. Then, in 1986, FDA researchers carried out another study, in which rats consumed high doses of caffeine in their drinking water. At the conclusion of the second study, the FDA found no adverse effects in the offspring, contradicting the agency's earlier findings.

A recent study published in 2001 examined the effect of maternal caffeine consumption throughout pregnancy on fetal growth and found evidence that caffeine consumption during pregnancy has no adverse effect on fetal growth. Additionally, a 2002 study entitled “Effect of caffeine exposure during pregnancy on birthweight and gestational age,” in the *American Journal of Epidemiology* found no association between moderate caffeine consumption and reduced birthweight, gestational age or fetal growth.

Major studies over the last decade have shown no association between birth defects and caffeine consumption. FDA has evaluated this scientific evidence and concluded that caffeine does not adversely affect reproduction in humans. However, as with other dietary habits, the agency continues to advise pregnant women to consume caffeine in moderation.

Drinking plenty of fluids is important during pregnancy. Though consuming moderate amounts of caffeine is fine, health professionals also remind pregnant women to drink a variety of non-alcoholic beverages daily.

WHAT PRODUCTS CONTAIN CAFFEINE AND HOW MUCH?

The table below shows the approximate caffeine content of various foods and beverages:

ITEM	MILLIGRAMS OF CAFFEINE	
	TYPICAL	RANGE*
Coffee (8 fl. oz. cup)		
Brewed, drip method	85	65 - 120
Brewed, percolator	75	60 - 85
Decaffeinated, brewed.....	3	2 - 4
Espresso (1 fl. oz. serving).....	40	30 - 50
Teas (8 fl. oz. cup)		
Brewed	40	20 - 90
Instant	28	24 - 31
Iced (8 fl. oz. glass).....	25	9 - 50
Some soft drinks (8 fl. oz.).....	24	20 - 40
“Energy drinks”	80	0 - 80
Cocoa beverage (8 fl. oz.)	6	3 - 32
Chocolate milk beverage (8 fl. oz.)	5	2 - 7
Milk chocolate (1 oz.)	6	1 - 15
Dark chocolate, semi-sweet (1 oz.).....	20	5 - 35
Baker’s chocolate (1 oz.).....	26	26
Chocolate-flavored syrup (1 fl. oz.).....	4	4

*For the coffee and tea products, the range varies due to brewing method, plant variety, brand of product, etc.

SOURCE: U.S. FOOD AND DRUG ADMINISTRATION AND NATIONAL SOFT DRINK ASSOCIATION

Many reports in the scientific literature consider 300 mg of caffeine a moderate amount. Health professional organizations often advise women who are pregnant to limit caffeine consumption to the caffeine equivalent of 1 to 2 cups of coffee a day. A variety of caffeine-free beverages are available for women who wish to limit or avoid caffeine during pregnancy.

Breastfeeding

Women should also take note of what they eat while breastfeeding to ensure healthy milk production. The American Academy of Pediatrics Committee on Drugs has reviewed the effects of caffeine on breastfeeding and reported that minimal caffeine consumption has no effect on breastfeeding. Though dietary caffeine can permeate into breast milk, nursing mothers can safely consume small amounts of caffeine without passing on a significant amount of caffeine to the baby. Higher caffeine amounts could potentially be associated with increased wakefulness and poor feeding in the baby, so limiting caffeine intake is important. Health professional organizations such as the American Academy of Pediatrics recommend that nursing women limit consumption to the caffeine equivalent of 1 to 3 cups of coffee per day.

Fibrocystic Breast Changes

Caffeine was first discussed in relation to breast disease in the late 1970s. An informal study suggested that abstinence of caffeine might alleviate the symptoms of fibrocystic breast change, a condition of benign fibrous lumps in the breast. Though caffeine was not linked to development of the changes, some subjects reported feeling less breast tenderness when they eliminated caffeine from their diets. However, the findings were based on anecdotal reports from a small number of women, rather than clinical testing, so results may not be applicable to all women with fibrocystic breast changes. A larger study conducted by the National Cancer Institute (NCI) involved more than 3,000 women. This 1986 study showed no evidence of an association between caffeine intake and benign tumors, fibrocystic breast changes or breast tenderness.

Both the NCI and the American Medical Association’s (AMA) Council on Scientific Affairs have stated there is no association between caffeine intake and fibrocystic breast changes.

The Cancer Question

The concern raised about caffeine and fibrocystic breast disease led to a concern about possible association between caffeine consumption and breast cancer. However, extensive research conducted to date has shown no association between caffeine consumption and the development of any cancer.

Breast Cancer

In 1990 researchers reviewed scientific data investigating caffeine and malignant breast tumors. Out of 11 studies reviewed, none established a significant link between caffeine intake and breast cancer incidence.

Specifically, three separate studies performed in Israel, the United States and France, analyzed the relationship of coffee consumption to breast cancer development. Each study respectively accounted for dietary intake, medical and reproductive history and frequency of coffee intake. The results of each investigation established no association between coffee consumption and breast cancer.

Furthermore, the 1986 NCI study on breast disease found no association between caffeine consumption and breast cancer. Interestingly, the NCI researchers noted that coffee drinkers had a slightly lower incidence of breast cancer. Patients with questions are advised to consult their health care provider.

Ovarian Cancer

In a thorough review of the research on caffeine’s relationship to ovarian cancer, no evidence indicated that caffeine consumption is a risk factor for ovarian cancer when known factors are taken into account. In fact, the International Agency for Research on Cancer (IARC) found there is inadequate evidence to suggest coffee drinking causes ovarian cancer.

Overall, the universal scientific research does not support a relationship between caffeine consumption and cancer. As a result, both the American Cancer Society and the National Academy of Sciences’ National Research Council report there is no convincing evidence relating caffeine to any type of cancer.

Osteoporosis — Boning up on Health

Given the recent awareness about the incidence of osteoporosis in post-menopausal women, the relationship between caffeine and bone health is a relatively new area of investigation. It has been shown that caffeine consumption causes a slight and temporary rise in the level of calcium excretion leading to speculation that the use of caffeine could compromise bone health. Yet studies show that adequate calcium consumption offsets the potential effect of caffeine on bone density.

This is illustrated in a recent study that examined the lifetime intake of caffeinated coffee in 980 postmenopausal women. The researchers found no association between lifetime caffeinated coffee intake (equivalent to two cups per day) and reduced bone mineral density among women who drank at least one cup of milk a day during their adult lives.

Other studies conducted at The Pennsylvania State University’s College of Medicine and the Mayo Clinic have found that while caffeine intake slightly increases urinary calcium excretion, caffeine was not an important risk factor for osteoporosis. A study on the effect of carbonated soft drinks on calcium excretion, done at Creighton University Osteoporosis Research Center, came to the same conclusion: “The net effect of carbonated beverage constituents (including caffeine) in calcium economy is negligible.”

Given the current evidence, an adequate calcium intake — especially during adolescent years — is the best nutritional insurance for healthy and strong bones. Women of childbearing age should consume at least three servings a day of calcium-rich foods, such as low-fat milk or yogurt in addition to the other foods and beverages in their diet.

Caffeine and Heart Disease – Matters of the Heart

Caffeine and heart disease is another area that has been extensively examined, and no causal relationship between caffeine consumption and heart disease, high blood pressure or irregular heartbeat has been shown.

While most studies investigating heart disease in large populations involve men, two studies have included women. Researchers of the recent Scottish Heart Health Study conducted a study of 10,359 men and women aged 40-59. Their analysis showed no relationship between coffee consumption and heart disease.

Additionally, the well-respected Framingham Study analyzed the relationship between coffee consumption and incidence of heart disease in 2,648 men and 3,566 women. After examining all possible links between coffee intake and heart disease, the researchers reported that no harmful effect of coffee consumption was found and that there was no association between coffee intake and recurring heart attack episodes.

The effects of caffeine on blood pressure and irregular heartbeat have also been topics of scientific investigation. The American Heart Association lists caffeine, along with other substances, as a possible contributor to an irregular heart beat. Women with such symptoms should check with their health care providers.

The U.S. Surgeon General's report, *Nutrition and Health*, states that a number of studies have shown that any rise in blood pressure due to caffeine consumption is less than the elevation produced by normal, daily activities, such as climbing stairs, and is just as fleeting. A recent Johns Hopkins University School of Medicine study published in the *Archives of Internal Medicine* found that coffee drinking is associated with small increases in blood pressure, but appears to play a small role in the development of hypertension. The National Heart, Lung, and Blood Institute's *Guide to Lowering High Blood Pressure* advises,

"Caffeine in coffee as well as in other drinks, such as tea and sodas, only raises blood pressure temporarily. So you should be able to continue to have drinks that contain caffeine, unless you are sensitive to it or have heart disease and your doctor tells you not to have any." Under some circumstances, health care providers may advise people with hypertension to limit caffeine.

What's Next?

As long as there are questions regarding the safety of food and food ingredients, researchers will continue to look for answers and, indeed, there are many studies in progress. Yet there is no shortage of research on the health effects of caffeine. The overwhelming scientific evidence on this ingredient shows that moderate caffeine consumption (around 300 mg) is considered safe. Health professional organizations such as the American College of Obstetricians and Gynecologists and the March of Dimes recommend that pregnant women limit consumption to the caffeine equivalent of 1 to 2 cups of coffee.



For additional information, contact:
International Food Information Council Foundation
1100 Connecticut Avenue, N.W. • Suite 430
Washington, D.C. 20036
<http://ific.org>



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