CORRELATES OF UTERINE FIBROID GROWTH AMONG PATIENTS IN MURTALA MUHAMMAD SPECIALIST HOSPITAL, KANO, NIGERIA.

BY

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SPS/12/PHE/00001

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SUPERVISOR: PROFESSOR LASUN EMIOLA

March 2017

DECLARATION

I hereby declare that this work is the product of my own research efforts undertaken under the supervision of Prof. Lasun Emiola and that it has not been presented and will not be presented elsewhere for the award of a degree or certificate. All sources have been duly acknowledged.

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CERTIFICATION

This is to certify that the research work for this thesis and the subsequent preparation of the thesis by Hauwa Umar Usman (SPS/12/PHE/00001) was carried out under my supervision.

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DEDICATION

This work is dedicated to my son Ameer Adam Lele and to the memory of my late father and brother, Alhaji Umaru Usman and Danladi Umar Usman.

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ABSTRACT

This study investigated correlates of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano, Nigeria. The subjects of the study comprised 100 respondents who were both in and out patients with uterine fibroid and drawn using purposive sampling. The instrument for data collection was a self-developed questionnaire, the instrument was validated by experts in the department of physical and health education and a reliability coefficient r=0.65 was obtained. Descriptive statistics of frequency counts and percentage were used to describe the bio data information, inferential statistic of Chi Square was used to test the formulated hypothesesand ANOVA was used to test differences among the correlates, at 0.05 level of significance. The Results of the study revealed that,chi square χ^2calculated value for Age was 38.800 at df 3 and p=0.001 while χ^2tab = 7.82, Level of Obesity χ^2 cal =94.040 at df 3 p= 0.001 while χ^2tab = 7.82,χ^2 cal of patient's Blood Pressure was 31.760 at df 3 p=0.001 while χ^2tab = 7.s82, Physical Activity level χ^2 cal was 58.640 at df 3 p= 0.001 while χ^2tab =7.82, Diet χ^2 cal was 57.620 at df 3 p =0.001 while χ^2tab = 7.82 and Stress χ^2 cal was 34.160 while χ^2tab = 7.82 family history of uterine fibroid χ^2cal was1.960 df 1 p=0.162 while χ^2 tab = 3.8. fibroid correlate difference was F_{tab} = 3.07 df 6,93 $p< 0.05$ It was concluded thatyoung age, obesity , high blood pressure, physical inactivity, high caloric diet and high stress level are all correlates of uterine fibroid growth while family history is not a correlate of uterine fibroid growth. The difference that exist between blood pressure and physical inactivity was most significant than that of diet, stress, obesity level and age. It was recommended among others that, in order for uterine fibroid growth to be controlled or prevented, women should try to maintain a normal blood pressure, reduce stress by controlling their emotional problems and an ideal weight through engaging in active physical activities like brisk walking, jogging and other forms of physical activities including domestic (home) activities.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Uterine fibroids are common noncancerous tumors that usually develop among women who are within the reproductive age and its increases economic burden, these benign tumors are a significant health concern for women,the incidence is about thirty to seventy percent (30% to 70%)among women globally and uterine fibroid also represent the principal cause for hysterectomies and lead to such specific symptoms as heavy menstrual bleeding, pelvic pressure, infertility and pregnancy loss. (Stewart, 2001; Cramer & Patel, 1990). Fibroid are benign tumors of the uterus that grow in various locations on and within the uterine wall itself or in the uterine cavity;fibroidare made from hard, white, gristly tissue that has a whorl-like pattern and less than 0.1 percent of all fibroid are malignant and they occur in up to fifty percent (50%) of women before or over forty (40) years of age (Robin & Shea, 2001). According to Brindles and Winnie(2016),fibroidsare abnormal growths that develop in or on a woman's uterus. Sometimes, these tumors become quite large and cause severe abdominal pain and heavy periods,in other cases, they cause no signs or symptoms at all;the growths are typically benign (noncancerous) and the cause of fibroids is unknown

The uterus (womb) is about the size and shape of a pear turned upside-down;the uterus sits quite low in the abdomen and is held there lightly by muscles which are joined to the vagina by the cervix or neck of the womb (The Cancer Society, 2011).

According to Okolo (2008), uterine fibroid, also known as uterine leiomyomas, are among the most frequently diagnosed benign diseases of the uterus. The exact cause of fibroid is unknown but research does suggest that fibroid are caused by a combination of genetic, lifestyle

and hormonal factors and those most at risk of developing fibroids are, black women, those who are overweight, women in reproductive age (particularly women who are 25-45 years old), those with a family history of fibroid and women who haven't given birth.Uterine fibroids are the primary indication for hysterectomy or myomectomy. Thus, uterine fibroid are a very common gynecological disease and also a great socio-economic burden (Wise, Edward, Palmer, Cozier, Tandon, Patterson, Radin, Lynn & David, 2012).

Emembolu (1987), in a study on presentation and management of fibroid in northern Nigeria, stated that, fibroids are of various types and can be located in various parts of the uterus. He further listed these three primary types of uterine fibroid as:-

Intramural fibroid which develop within the uterine wall and expand, making the uterus feel larger than normal. This is the most common fibroid; this can result in heavier menstrual flows and pelvic pain or pressure.

Subserosal fibroid, which develop under the outside covering of the uterus and expand outward through the wall. They typically do not affect a woman's menstrual flow, but can become uncomfortable because of the size and the pressure caused.

Submucosal fibroid occur deep within the uterus, just under the lining of the uterine cavity. This is the least common fibroid, but often causes symptoms, including very heavy and prolonged periods.

In Kano, according to Yakasai, Bappa, Ibrahim, and Abubakar (2011), large uterine fibroid are common among patients that visit the Obstetrics and Gynaecology unit of Aminu Kano Teaching Hospital, in which a patient was discovered with a recurrent uterine fibroid equivalent to 38 weeks pregnancyandit is the largest reported uterine fibroid in Nigeria. In a review of uterine fibroid from south western Nigeria by Okogbo, Ezechi and Loto (2011), out of

the one thousand two hundred and fifty nine cases of uterine fibroid, only 4% presented with a uterine size of greater than 20 weeks pregnancy.

Abiodun and Francis (2012), in a retrospective analysis of 105 cases of uterine fibroid that was managed between 1st January 2003 and 31st December 2007 at the Aminu Kano Teaching Hospital, Kano, to determine the influence of age and parity on the surgical management of uterine fibroid,it was discovered that uterine fibroid occurred most often in the third decade of life.Majority of the patients were of high parity because of early girl marriage and childbearing in Kano and uterine fibroid was associated more with secondary infertility, which explains why hysterectomy rate was twice as much as that of myomectomy in the study.

Faerstein, Szklo and Rosenshein (2001), suggest that hypertension represents a proatherogenic state that enhances risk for fibroid development and growth in uterine smooth muscle in a manner analogous to atherosclerotic changes in arterial smooth muscle. Elevated blood pressure may cause smooth muscle cell injury and cytokine release and thereby increase the risk of uterine fibroid onset or growth, in a process analogous to atherosclerosis.

The study of Baird, David, Michael, Cousins and Joel (2006), on the association of physical activity with development of uterine leiomyomas, found out that, when looking at the factors that correlate to incidence of fibroid and trying to understand what preventative steps women can take, exercise seems like a logical factor to explore for two main reasons;firstly, being overweight increases risk of developing fibroids, so a woman can reduce her risk by maintaining a healthy weight through exercise. Secondly, fibroidgrowth is a hormonal condition with estrogen and progesterone playing a role in their development. When we look at similar hormonal conditions that have been widely studied, such as breast and endometrial cancer, exercise has been shown to be beneficial and this is thought to be because exercise has a number

of effects on our hormones which ultimately lead to a reduction in the level of hormones circulating in our body (Baird, David, Michael, Cousins & Joel, 2006).

A study published in 2013 by Peking University in China looked into the association between physical activity and fibroid.The university found that women who participated in moderately intense occupational activity (physical activity at work) had a significantly lower risk of developing fibroid andconcluded that college athletes had a 40% lower prevalence of fibroid compared with non-athletes(Wyshak, Frisch, Albright & Albright, 1986).

According to Atkinson (2008), research has shown that stress can have a negative effect on all kinds of diseases. Physiologically, stress increases the cortisone output from the adrenal glands, which impairs immune functions,when this happens, blood pressure, heart rate and hormonal balances can escalate and this can upset the estrogen balance in women consequently triggering excessive output of adrenal stress hormones; this results in the body being unable to limit the scarring and swelling caused by the endometrial implants, resulting in fibroid tumors growing during times of stress andfor a woman, stress can come from a number of things, such as financial issues, relationship problems, family, friends, and job/work load, along with a variety of her daily problems. The pain and stress of dealing with fibroids can be difficult for any woman,uterine fibroidcan cause infertility and a woman trying to conceive but unable to do so, may become stressed, also uterine fibroid have been known to cause pain during intercourse for some women, which can disrupt their sexual relationship (Atkinson, 2008).

Jump, Clarke, Thelon, Liimatta, Ren and Badin (1997), in a study on dietary fat, genes and human health, discovered that obesity is associated with the development of fibroid most likely through increasing endogenous hormone levels, decreasing serum hormone-binding globulin, altering estrogen metabolism under premenopausal conditions and changing

myometrial cell signaling controls such as insulin receptors, insulin-like growth factors and peroxisome proliferator-activated receptors.The study on Fibroid growth, by Davis, Haneke, Miner, Kowalik, Carl, Peddada and Baird (2009), measured fibroid over a 1-year period using magnetic resonance imaging (MRI) and found that size and location were significant in influencing the change in volume of fibroid.They alsonoted that the rate of tumor growth was similar among women of different races or ethnicity, and did not differ among women that selected surgery,scores for bleeding, pain, and discomfort were higher in presurgical patients than nonsurgical and postsurgical patients. Davis concluded that the data indicate a difference between the groups.

1.2Statement of the Problem

The uterus is one organ in a complex system that composes the structures common to the internal genitalia of a woman. The uterus is a hollow, pear-shaped organ of reproduction in which the fertilized egg is implanted and the fetus develops. However, the uterus, which is composed of the cervix, body, and fundus, can experience stress beyond its role in pregnancy. One such uterine anomaly is the formation of fibrous or fully developed connective tissue, resulting in abnormal muscle cells, referred to as a uterine fibroid or myoma. A myoma is a benign neoplasm, affecting twenty to thirty percent (20-30%) of all women by the age of forty (40) and more than fifty percent (50%) of women overall. Uterine fibroid are much more common among Africans than other races, although the reason for this is not clearly understood. Uterine fibroid is however, not associated with an increased risk of uterine cancer and almost never develop into cancer (Okolo, 2008).

A fibroid can form on the interior muscular wall, as well as the exterior of the uterus. Fibroidsare spherical, firm lumps that most often occur in groups. Symptoms of uterine fibroid

and their impact on general health include abnormally heavy menstrual periods with the likelihood of anemia, shortened menstrual cycles less than twenty eight (28) days, metrorraghia (unexplained uterine bleeding), fatigue, increased vaginal discharge, painful sexual intercourse, painful defecation, urinary frequency or retention and, in some cases, infertility and pain or pressure in the bowel or bladder anddepending on the location of the fibroid, during pregnancy they may also be the cause of miscarriage, bleeding, premature labor, or interference with the position of the fetus(Aradhana & Lumsden, 2008).

The researcher observedthat most women in Kanoare battling with rapidly developing abdomen that is mostly mistaken for pregnancy, but when asked, if they are pregnant? The reply has always been; it is fibroid which has caused a number of still births, miscarriages, heavy bleeding, myomectomy, loss of feminine shape and this women's lifestyle is mostly sedentary in nature.Women also perceive uterine fibroid as a spiritual problem that is caused by relatives or a co- wife for her to bleed frequently or have a sleeping pregnancy due to abdominal growth or movement felt. Uterine fibroid has also been a problem that the researcher's relatives and friends deal with everyday.Therefore it is against this context the researcher investigated the correlates of uterine fibroid growth among women attending Murtala Muhammad Specialist Hospital, Kano (MMSH) for treatment.

The following research questions were therefore formulated to guide the conduct of the study:-

1. Is age a correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano?
2. Is level of obesity a correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano?

3. Is high blood pressure a correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano?
4. Is family history a correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano?
5. Is physical activity level a correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano?
6. Is diet a correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano?
7. Is stress level a correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano?

1.3 Hypotheses

The following hypotheses were formulated to guide the conduct of the study:

Major Hypothesis

There is no significant correlate of uterine fibroid growth among patients in Murtala Muhammad specialist hospital, Kano.

Sub Hypotheses

1. Age is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.
2. Level of obesity is not a significant correlate of uterine fibroid in Murtala Muhammad Specialist Hospital, Kano.

3. High Blood pressure is not a significant correlate of uterine fibroid size among patients in Murtala Muhammad Specialist Hospital, Kano.
4. Family history is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.
5. Physical activity level is not a significant correlate of uterine fibroid size among patients in Murtala Muhammad Kano.
6. Stress level is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.Specialist Hospital, Kano.
7. Diet is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital Kano.
8. There is no significant difference among the correlates of uterine fibroid growth.

1.4 Purpose of the Study

Thisstudy investigated the correlates of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital Kano, to find out if these correlates have a potential effect on fibroids growth and development since the pathogenesis of uterine fibroid is still not well understood, so thatthe identification of the correlates will help in the prevention or control of uterine fibroid growth.

1.5 Significance of the Study

It is hoped that the outcome of this study will be of benefit in the following ways:

1.The study will create awareness to women in general on the risk factors that predispose women to uterine fibroid growth.

2. The study will serve as a guide to governmental and non governmental agencies that deal with maternal health in the state and beyond and also enhance their knowledge on possible correlate of uterine fibroid which is also a maternal health problem, since they always visit Murtala Muhammad Specialist Hospital Kano. They will be able to provide better advice to their clients.

3. The study will also assist Health Educators and clinical practioners in understanding some of the possible risk factors that are associated to uterine fibroid, so as to be better able to advise patients on preventive or control measures against uterine fibroid growth.

4.The study will also serve as a reference, for future researchers who may be interested in finding out more about uterine fibroid.

1.6 Delimitation of the Study

The study was delimited to correlates of uterine fibroid growth among patients attending Murtala Muhammad Specialist Hospital, Kano, which includeage, level of obesity,blood pressure level, physical activity level, diet and stress level. It was also delimited only to patients with only one uterinefibroid irrespective of the location, who have not had any myomectomy, are not pregnant, not lactating and not menstruating at the time of data collection.

1.7 Limitation of the Study

The limitation faced was that data collection was supposed to take eight weeks, but instead, sixteen weeks was spent due to uncooperative nature of some patients.However this has not affected the outcome of the study in anyway.

1.8 Operational Definition of Terms

Cases: - In and out patients with fibroid, that visit the gynecological unit of

MurtalaMuhammad Specialist Hospital, Kano.

Correlate:-Factors that are associated to the development or growth of uterine fibroid. In this study they include, diets, physical activity level, stress level, age, obesity level and blood pressure.

Obesity level:- The calculated body max index of patients

Hysterectomy:- Is when the uterus and the fibroid in it is removed though surgery

Myomectomy:- A myomectomy typically removes the largest fibroid. It is anoption for fibroid patients who still want to have children.

Myomas:- Another name for uterine fibroid.

Ultrasound scan:- This is a scan that uses sound waves to get an image of internal organs. This can help determine if the lumps are fibroids or another type of tumour. It can also provide more detailed information about the size and location of fibroids.

Uterine fibroid:- Tumors that grow in the uterus and cause excessive bleeding and miscarriages in womenof reproductive aged.

Growth: -The progressive development of the fibroid in the uterus (various sizes).

Patients: - Women that attend Murtala Muhammed Specialist Hospital Kano,for the treatment of uterine fibroid

CHAPTER TWO
REVIEW OF RELATED LITERATURE

2.0 Introduction

The study investigated correlates of uterine fibroid growth in Murtala Muhammad specialist hospital, Kano. This chapter reviews literature considered relevant to the research title under the following sub headings:-

2.1 Overview of Uterine Fibroid

2.2Theoretical Framework

2.3 Etiology/pathogenesis of uterine fibroid

2.4 Types of uterine fibroid

2.5 Prevalence of uterine fibroid

2.6 Correlates of uterine fibroidgrowth

2.7 Fibroid and reproductive health of women

2.8 Psychological effects of uterine fibroid.

2.9 Symptoms,Management and Treatment options for uterine fibroid

2.10 Preventive measures against uterine fibroid

2.11 Summary

2.1 Overview ofUterine Fibroid

In a layman's term fibroids are known by many names: growth, lump, tumor or swelling. It can be white, pink or light brown in color. Fibroids are more solid than the muscles of the uterine walls; fibroids usually consist of layers of muscle fibre and connective tissue. Their hard outer shell clearly defines them from their environment and blood vessels are found throughout a fibroid, these blood vessels supply the fibroid with nutrients. Fibroids are lumps that grow on

the inside and outside walls of a woman's uterus. They are called many things from tumors, to myomas, to leiomyomas. They are non-cancerous, but they have been known to cause a great deal of problems. Most women go through their lives unaware that they actually have fibroids, until they become a problem (Peter, 2011).

According to Peter (2011), fibroids are considered the most common pelvic tumors that affect one in five women of childbearing age. Fibroids usually affect women over the age of 30; however, they can also affect women in their 20's. Fibroids are known to be more common in African American women than Caucasian women. Fibroids can be so tiny that one needs a microscope to see them. Some fibroids are known to have grown even larger than a grapefruit. Fibroids can grow as a single tumor or multiple tumors.

Uterine fibroids are the most common genital tumors in women, yet their behaviour is poorly understood. For example, it is not clear why fibroids in some women remain small, isolated and slow growing, but in others are large, multiple and rapidly growing. There is anecdotal evidence to suggest that close female relatives of women with fibroids often present with the condition. Women from families in which two first-degree relatives have fibroids have a two-fold increased risk of developing uterine fibroids (Alam, Bevan, Churchman, Barclay, Barker, Jaeger, Nelson, Healy, Pembroke, & Friedman, 2001).

Uterine leiomyomata (sometimes called uterine fibroids) are benign tumors resulting from the neoplastic transformation of a single smooth muscle cell (Townsend, Sparkes, Baluda & McClelland, 1970).

Myomata may arise throughout the body (e.g., from smooth muscle cells in arterioles found in lung or other organs), but most commonly present in the uterus, ranging in size from several millimeters to more than 20 centimeters. Although the mechanisms controlling

leiomyoma growth are not fully understood, their growth does appear to be regulated by steroid hormones (estrogen and progesterone), peptide growth factors (such as epidermal growth factor) and the availability of adequate vascular perfusion (Buttram & Reiter, 1981).

Uterine myomata are generally asymptomatic, with studies estimating that between 60 and 90% of such tumors fail to cause any symptoms; those that do produce symptoms typically do so during the late reproductive years to the perimenopausal period. Size and location may play a role in determining which myomata will become symptomatic, but these two factors alone do not explain the variation in symptomatology seen in clinical practice (ACOG, 1994).

Uterin fibroids are often discovered on pelvic examination, where the uterus feels larger than expected with hard round lumps arising from the surface. Ultrasound scan can tell where the fibroids are located and give an idea of their size. Sometimes they are detected on laparoscopy (looking into the abdomen with a small telescope) or hysteroscopy (looking into the uterus with a fine telescope). Hysteroscopy is particularly useful for seeing the submucous fibroids and assessing how much of the uterine cavity is involved (ACOG, 1994).

2.2 Theoretical Framework

Rimer and Glanz (2005) viewed behavior change as a progression through a series of five stages: precontemplation, contemplation, preparation, action and maintenance,this model recognizes that people have specific informational needs at each stage of behavioral change and is able to offer the most effective intervention strategies at each of these stages, self efficacy and balanced decision making are central to theory.

Health Belief Model of Change

The underlying concept of the original HBM is that health behavior is determined by personal belief or perception about a disease as in the case of uterine fibroid and the strategies available to decrease its occurrence or improve its treatment (Glanz & Bishop, 2010). Personal perception is influenced by a whole range of intrapersonal factors affecting health behavior. The health belief model addresses four major components for compliance with recommended health action perceived seriousness, perceived susceptibility, perceived benefits and perceived barriers of recommended health action.

Perceived seriousness

A woman suffering from uterine fibroid can perceive the seriousness or severity of the disease, only if she is well informed or knowledgeable about the difficulties uterine fibroid would create in her life generally (Mc Cormack, 1999). Because uterine fibroid dose not really pose a threat directly to life, women tend not to perceive it to be a serious disease until it leads to hysterectomy.

Perceived susceptibility

Women who are knowledgeable about susceptibility to uterine fibroid growth are prompt to adopt healthier behaviors especially in the case of heredity, because the greater the perceived risk of developing uterine fibroid, the greater the likelihood of engaging in behavior to decrease the risk.

Perceived benefits

The construct of perceived benefits is a person's opinion of the value of a new life style; Women will control their diet, stressors and exercise regularly only if they perceive the benefits or usefulness of a new behavior or lifestyle in decreasing the risk or controlling the growth of uterine fibroid. It also plays an important role in the adoption of secondary prevention behavior such as medical screening to detect early signs of uterine fibroid.

Perceived barriers

This is an individual's own evaluation of the obstacles in the way of her adopting a new behavior, perceived barriers are the most significant in determining behavior change (Jane & Becker, 1984).In order for a new behavior to be adopted, uterine fibroid patients need to believe in the benefits of the new behaviorand weigh the consequences of continuing the old behavior (centre for disease control and prevention, 2004). In other words, the health belief model,theorize that people are not likely to take action for their health unless:

- They are susceptible to the disease in question
- They believe that the disease would have serious effects on their lives
- They are aware of certain action that can be taken and believe that these actions may likely reduce severity of illness.
- They believe the threat to them of taking the action is not as great as the threat of the disease itself and
- They believe that they possess the ability to do things on their own.

This theory was helpful in introducing uterine fibroid to patients on how they can control or prevent the growth of fibroid through behavior change by dieting, moderating stressors and exercising regularly and also have a positive behavior towards uterine fibroid growth e.g. accepting they are sick and needs medical attention. Therefore this theoretical framework was adopted to investigate the correlates of uterine fibroid growth among patients attending Murtala Muhammad specialist hospital, Kano.

2.3 Etiology/Pathogenesis of Uterine Fibroid

Although the precise causes of uterine fibroid or myomas are unknown, advances have been made in the understanding of the hormonal factors, genetic factors, growth factor, and molecular biology of these benign tumors, this factors possibly responsible for the initiation of acquired genetic changes found in myomas include intrinsic abnormalities of the myometrium, congenitally elevated estrogen receptors in the myometrium, hormonal changes, or a response to ischemic injury at the time of menses. Once established, these genetic changes are influenced by promoters (hormones) and effectors (growth factors)(Flake, Andersen & Dixon, 2003).

What really causes fibroids? Fibroid relief.org (2008), listed the following factors as to what might lead to fibroid growth.

Hormones: Fibroids are associated with increased estrogen production. They are rare in women less than twenty (20) years of age as well as in postmenopausal women. Estrogen levels vary with menstruation, with menopause, and with some medications.

Environment: Alcohol consumption and a sedentary lifestyle have been associated with fibroids. Researchers are investigating how environmental toxins affect gene activity in the uterus.

BMI: Women who are overweight or obese, based on their BMI (body-mass index), have a slightly higher risk of developing fibroids.

Pregnancy: Women who have given birth seem to have a lower risk of developing uterine fibroids. Recent information indicates that pregnancy may protect against fibroids – one theory is that fibroids are lost during the uterine changes (involution) in the weeks following childbirth.

Ethnicity: Not only are African-American women more likely to develop fibroids, their fibroids occur at a younger age and are often larger and more numerous than in other ethnic groups. Asian women have a lower incidence of symptomatic fibroids.

To Evans and Brunsell (2007),leiomyomas are the most common female reproductive tract tumors. They are probably of unicellular origin, and their growth rate is influenced by estrogen, growth hormone, and progesterone. Although studies have not clarified the exact process, uterine fibroid tumors arise during the reproductive years and tend to enlarge during pregnancy and regress after menopause. The use of estrogen agonists is associated with an increased incidence of fibroid tumors and growth hormone appears to act synergistically with estradiol in affecting the growth of fibroid tumors. Conversely, progesterone appears to inhibit their growth. Several studies have documented an increased incidence of uterine fibroid tumors in black women; some evidence also indicates that black women are more likely than white women to have larger and more symptomatic tumors at the time of treatment. Lists factors associated with the development of fibroid tumors. Recent evidence suggests that women with hypertension have a higher risk of fibroid tumors, possibly through smooth muscle injury or cytokine release (Evans & Brunsell,2007).

2.3.1 The Signs and Symptoms of Uterine Fibroid Tumors

Signs and symptoms of fibroids are dependent on the size, number and location of the tumors. Many women complain of menstrual problems like heavy periods, with extended days of flow, cramps and clots. However, they have absolutely no symptoms at all. The following symptoms are known (but not limited) to be associated with fibroids and will increase in severity based on size and number of tumors:-heavy bleeding or increased flow, clotting, cramps, abdominal pressure, irregular and painful periods, bloating, indigestion, urinary frequency, constipation, painful intercourse, back pain, pressure in the legs and Fatigue (Womenhealth.gov2015).

2.3.2 Natural History of Uterine Fibroid (Myomas)

Few longitudinal studies of myoma growth have been conducted. One study evaluated sixty four (64) asymptomatic premenopausal women using saline-infusion sonograms performed at baseline (average age: 41) and 2.5 years later Eleven women (16%) had myomas at baseline (mean diameter: 19 mm) and 17 (27%) had myoma diagnosed at the follow-up evaluation (mean diameter: 27 mm). The rate of growth varied from _0.9 cm to þ6.8 cm. Nine women were found to have new myomas after 2.5 years (DeWaay, Syrop, Nygaard, Davis & Van Voorhis, 2002)

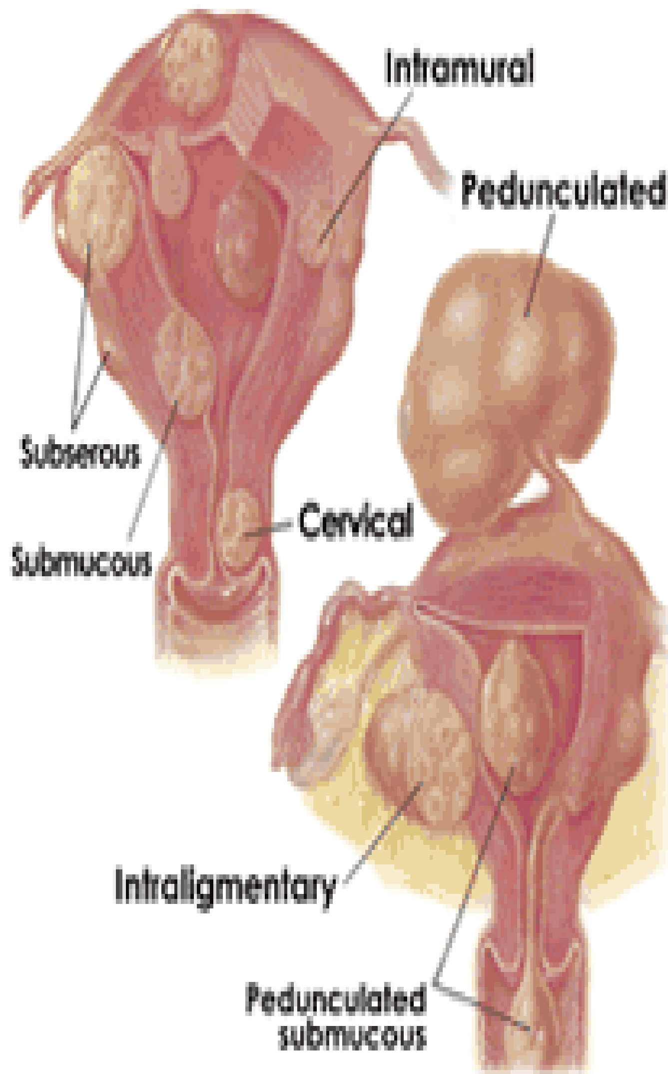
Davis and Davis (2007), said a study of myoma growth followed 120 women with four magnetic resonance imagining (MRI) examinations over 1 year. A computer-aided image analysis program evaluated 1076 volumes of myomas classified as small (<7 cm3), medium (7 to 50 cm3), or large (>50cm3). It is interesting that 1 year later all myomas were noted to be larger. Large and medium myomas grew more than small myomas and intramural myomas grew more

than subserous or submucosal myomas. Measured rates of growth were similar for different races and ethnic groups.

2.4 Types of Uterine Fibroid

Fibroids come in all sizes and shapes and usually occur as multiple tumors, although each fibroid is discrete. Most discernible fibroids are between the size of a walnut and the size of an orange, but unusual tumors have been reported up to 100 pounds, classification of fibroids is according to their locationthey are either submucosal (just under the endometrium), intramural (within the uterine muscle wall), or subserosal (from the outer wall of the uterus),they can also be intraligamentous (in the cervix between the two layers of the broad ligament) or pedunculated and dangling from a stalk into the uterine cavity (pedunculated submucous) or pedunculated on the outside of the uterine wall (pedunculated subserous),the pedunculated submucous fibroids can, on occasion protrude through the cervix and appear in the vagina and other pedunculated fibroids on a long stalk outside the uterus, can be mistaken for an ovarian mass or attached to the bowel(Peter, 2011).

The images below show how fibroids tumors appear in the uterus



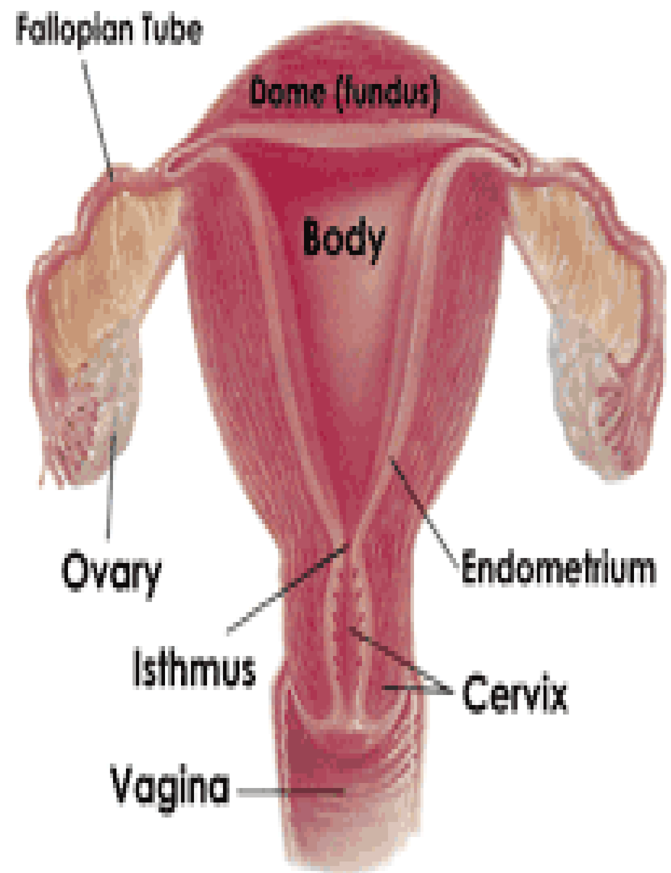


Figure 1. Front/ interior view with fibroid and a front view of a healthy uterus. Source: (Peter, 2011).

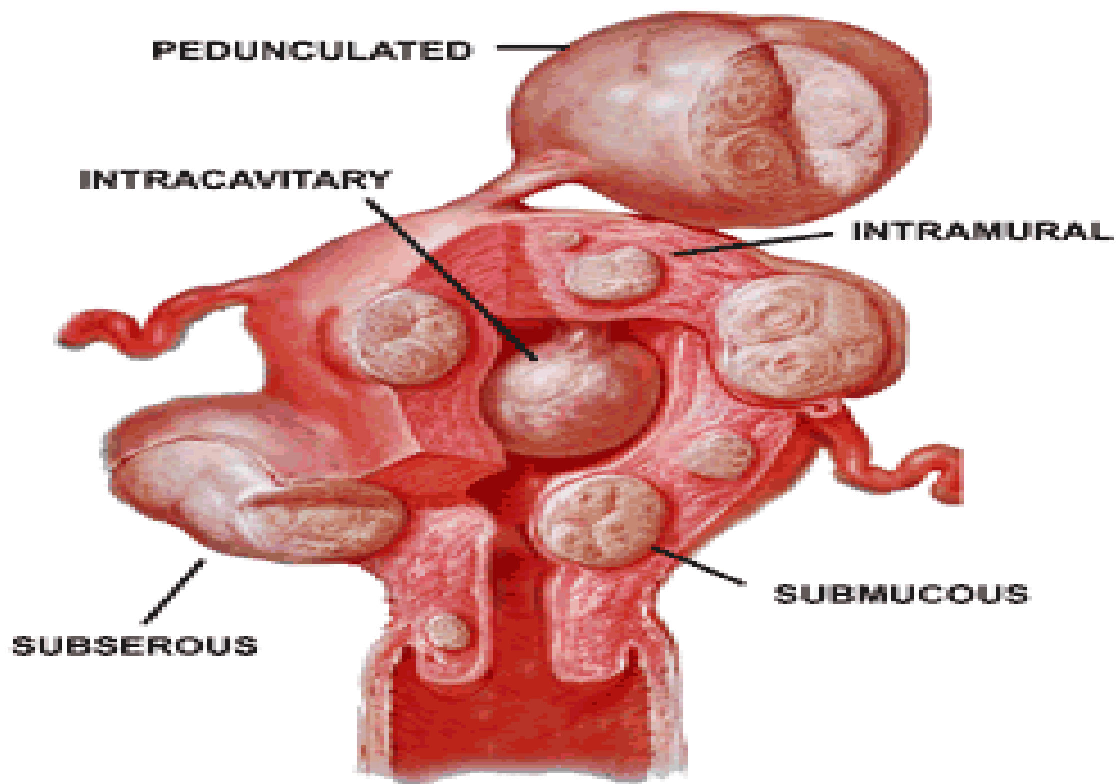


Figure 2. Various locations of fibroid.

Source:(Mohammad, 2013).

Mohammad (2013) stated that fibroid as various classifications:-

Myomas can be classified based on the affected location and uterine layers.

1. Location

- Cervical (2,6%), generally grow towards the vagina causing infections
- Isthmica (7,2%), frequently cause pain and urinary tract disturbances
- Corporal (9,1%), the most common affected location, and frequently asymptomatic.

2. Uterine layer

The uterine myoma located on the corpus region, is classified in to the 3 following types based on anatomical site.

- Sub mucosal uterine myoma

Sub mucosal uterine myomas are clinically more significant compared to the remaining types. Although sub serosal or intramural uterine myomas are enlarged, these types are frequently asymtomatic. Likewise although sub mucosal myomas are small sized, it is frequently characterized by vaginal bleeding. The bleeding is frequently difficult to stop, eventually resulting in a hysterectomy.

- Sub serosal uterine myomas. This type is located adjacently to the uterine

corpus subserous layer usually presented as a simple bump or as a single mass connected to the uterus with a rod. Growth may be laterally directed towards the latum ligament known as an intraligamenter myoma.

- Intramural uterine myomas

Also known as intraepithelial myomas. This type is usually multiple, causing no effects on uterine shape when presented as a small group, but would result in an irregular uterine shape if enlarged, consequently causing an increased uterine size and shape. This type is frequently asymptomatic except for minor signs that include mild lower abdominal discomfort. Occasionally they grow to form subserousal myomas and less frequently into sub mucosal myomas,

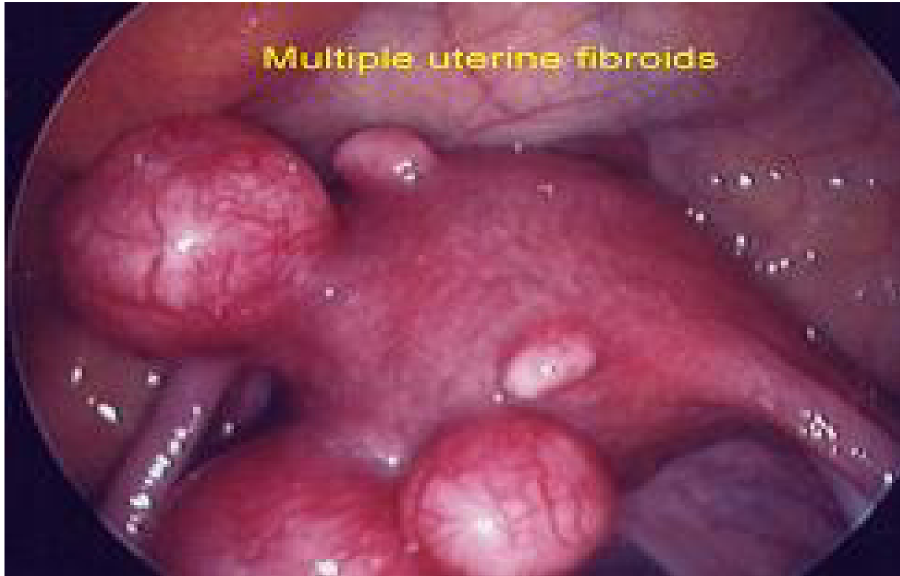


Figure three (3) multiple uterine fibroid (Stewart, 2001).

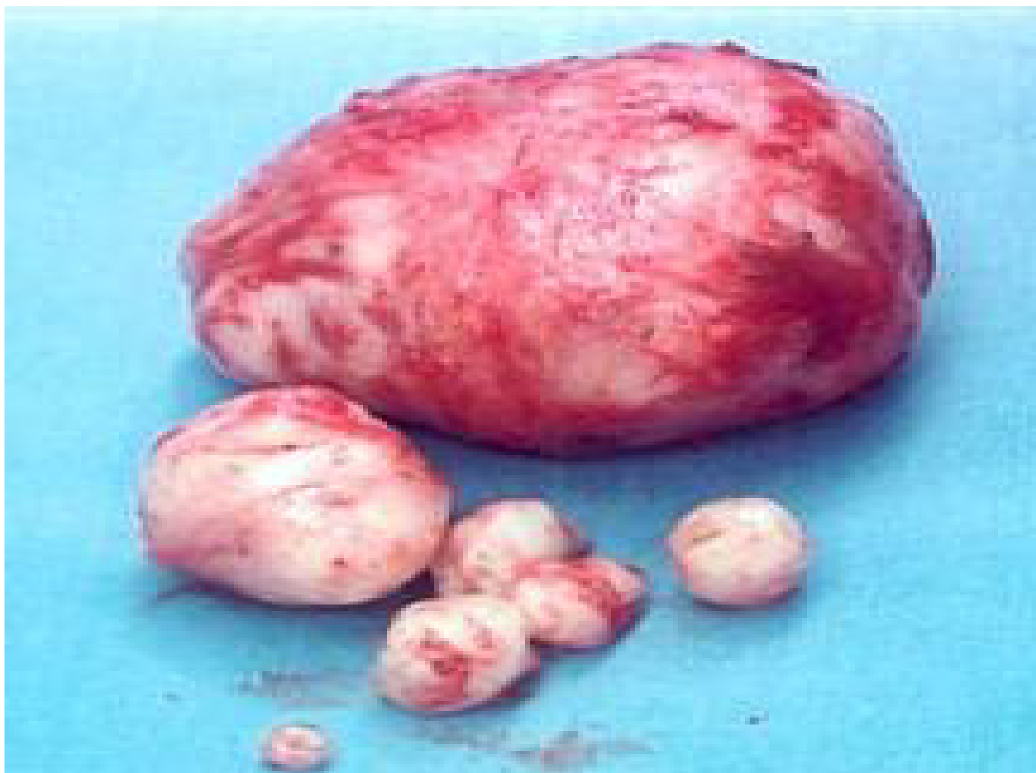


Figure 4. Various sizes of uterine fibriod.

Source: (Stewart, 2001).

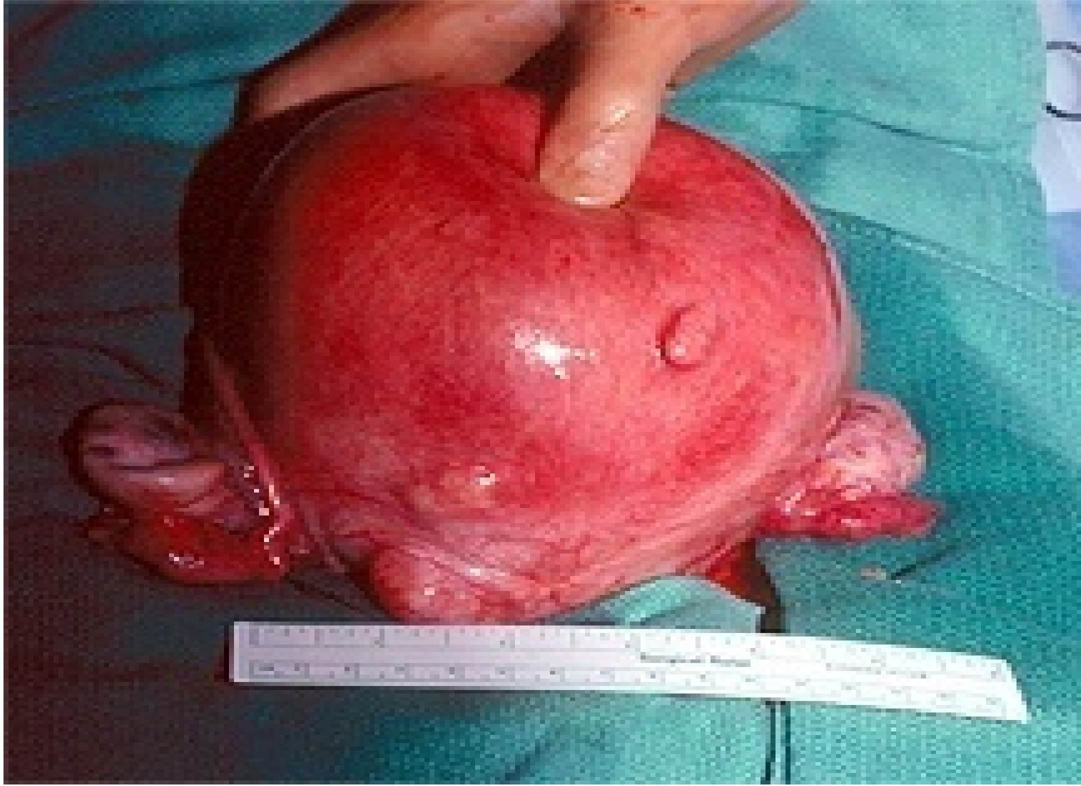


Figure 5. An intramural uterine fibroid removed from a South African woman.

Source: (Radin et at 2010)

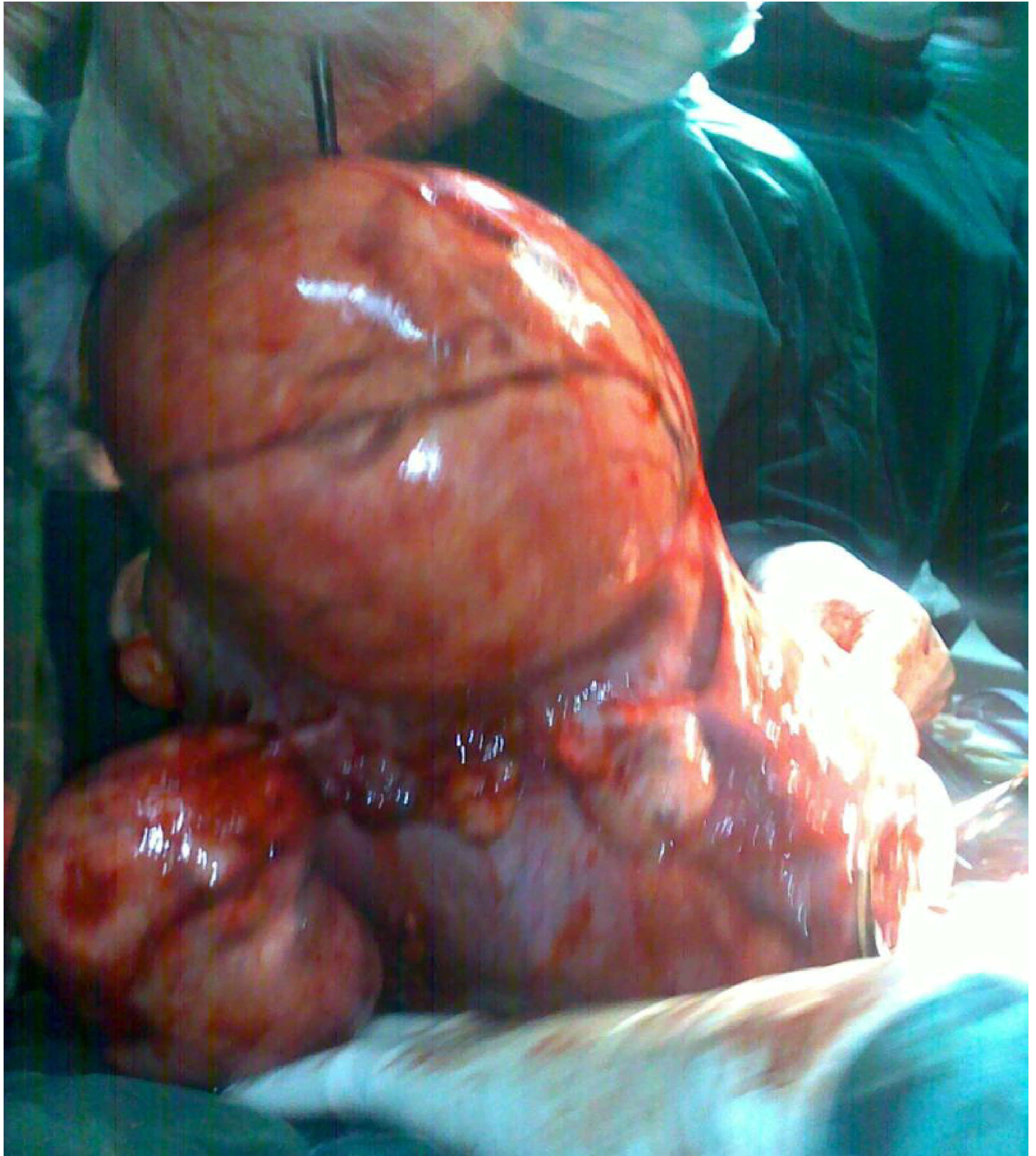


Figure 6. Largest documented fibroid in Nigeria in Aminu Kano Teaching Hospital, Kano State Nigeria .
Source: (Yakasai, et al 2011).

Fibroids that change the shape of the uterine cavity (submucous) or are within the cavity (intracavitary) decrease fertility by about seventy percent (70%) and removal of these fibroids increases fertility byseventy percent(70%). Other types of fibroids, those that are within the wall (intramural) but do not change the shape of the cavity, or those that bulge outside the wall (subserosal) do not decrease fertility, and removal of these types of fibroids does not increase fertility (Mohammad, 2013).

2.4 Prevalence of Uterine Fibroid

Globally, gynecological issues have remained an important health concern especially uterine fibroid, which has been reported to be the commonest benign-type tumor that develops in the muscular wall of the uterus with an estimated incidence rate of twenty to forty five percent (20% - 45%) among women above the age of 30 years (Akinyemi, Adewoye, & Fakoya, 2004).

2.4.1 Race and the Occurrence of Fibroids

Epidemiological studies in the United States of America (USA) indicated that there are consistent differences between women of different cultures and races regarding the occurrence of the fibroid uterus. African-American women in the USA are three times more likely to develop fibroids. The fibroids are most commonly benign tumours and occur particularly in women of African descent (Meniru, Washahl, Onura, Hecht & Hopkins, 2001). African-American women are diagnosed more frequently than Caucasian women and undergo hysterectomy and myomectomy three times more than women of other races (Crowe & Reider, 1998; Ligon & Morton, 2001; Office of Research on Women's Health 2003;Williams & Clark, 2000). These women have more and larger fibroids than other women (Marshall, Spiegelman & Barbieri, 1997). African-American women are more likely to be affected by fibroids on the outside, inside or within the walls of the uterus (Crowe & Reider, 1998). Regarding the variation in the

incidence of uterine fibroids in pre-menopausal women by age and race, Marshall, et al. (1997), found consistent differences between African-American, Caucasian, Hispanic (Latino), and Asian-American women.

The risk factors that account for the ethnic differences in the natural history of fibroids are largely unknown. Vitamin D, which has been shown to be protective for breast cancer, is one proposed risk factor that is being evaluated for fibroids. When correlating women with defined sufficient Vitamin D levels to development of fibroids, a reduced incidence of thirty percent (30%) was observed in both black and white women, which suggests that adequate Vitamin D levels may be important in preventing fibroids (Halder, Goodwin & Al-Hendy, 2011).

2.4.3 Uterine Fibroid and Pregnancy

Joong, Errol and Shaw (2010), concluded that diagnosis of fibroids in pregnancy is neither simple nor straight forward. Only forty two percent (42%) of large fibroids (5 cm) and 12.5 percent of smaller fibroids (3-5 cm) can be diagnosed on physical examination and the ability of ultrasound to detect fibroids in pregnancy is even more limited (1.4%-2.7%) primarily due to the difficulty of differentiating fibroids from physiologic thickening of the myometrium. The prevalence of uterine fibroids during pregnancy is therefore likely underestimated**.**

Adam (2012), listed risks of uterine Fibroids as:

- Most common in women between ages 30 and 50
- Race factors: African-American2-3 fold greater incidence than in Caucasians Larger, more numerous and grow more quickly, with symptoms present four to five years earlier
- Obesity
- High Blood Pressure
- Alcohol Use (in women who drink > 7 beers/week)

- Smoking
- Pelvic Infection
- Stress
- Uterine Injury

2.4.4 Fibroid Tumor Recurrence Rates

Current research appears to support a wide range of fibroid recurrence, 12-60+%, following most traditional myomectomy (fibroid removal) procedures. The reason for this wide variance is based on several factors. One is the chronological and hormonal age of the patient. Women that are in their 20s and 30s have many years to reach menopause and therefore have a greater amount of time for the tumors to regrow. Second is the amount of estrogen being produced by the ovaries, younger women have higher and more consistent levels, older women, those 40 years and beyond are beginning to experience dwindling hormonal levels that will not be able to support fibroid growth. Hence, older women tend to have a reduce chance of the tumors recurring (Abiodun & Frances, 2012).

According to Abiodun and Frances (2012), more problematic however is the fact that most recurrence rates are not attributed to actual re-growth of fibroids, but due to the sad reality that many fibroids are not removed during the initial surgery. The larger the tumors, the more in number and the deeper in the uterus can result in extensive bleeding during the procedure. Gynecologists do not have extensive experience handling potential hemorrhage crises during surgery. Therefore, many will take the tumors that are most accessible on the outer myometrium but knowingly leave larger or deeper tumors due to the concern of extensive uncontrollable bleeding. From patient reports, many women have been told that their procedure was a success

only to have recurrent symptoms within 6 months to a few short years. These patients did not have a regrowth of fibroids..instead they had an incomplete myomectomy. Any physican that advocates a hysterectomy to resolve fibroid tumor disease is probably concerned about the possibilty of not getting all the tumors and ultimately subjecting the patient to future untoward symptoms and the need for another major surgical procedure.

Most patients have difficulty finding a surgeon who is willing to operate on any women with a potentially difficult case without forcing the patient to “sign a consent for possible hysterectomy”. This leaves many women with a very unsettled emotional concern going into surgery: they do not know if they will come out of the procedure with or without their uterus (Abiodun & Frances, 2012).

2.5 Correlates of Uterine FibroidGrowth

Correlates in this study meansFactors that are associated to the development or growth of uterine fibroid, in this review, they include diets, physical activity level, stress level, age, obesity and blood pressure.

2.5.1 Diet and Fibroids

Peter(2011), is of the opinion that, a women’s diet can also be a contributing factor in her developing fibroids. Women, who consume a diet of fried food, red meat and food laced with harmful chemicals, can put themselves at risk of getting fibroids. Some African-American women are notorious for having bad diets. They are less likely to seek help for obesity. A bad diet topped with stress can be a contributing factor to fibroids. African American women had been known to lack the discipline to alter their diets. Contributing factors such as, kids, work, family, and stress make it difficult for most women to watch what they put into their bodies.

Maintaining a good diet requires time and commitment, which most women even today don’t have. Working moms tend to grab whatever they can eat on the go; too busy to take note until it affects their health. Fibroids don’t just grow overnight; they can be the result of years of bad health, diets, and stress.

Bani, Hasanpour, Jalali, Ebrahimi and Mamaghani (2013), in a study on leiomyoma and Nutrition, used 200 leiomyomato persons in case group and 200 persons without leiomyoma in control group that were matched in age and parity. Results showed that the mean scores of the two groups in terms of nutrition were not significantly different. There was no relationship between fat, soy or high-fiber diet and uterine myoma but alcohol increased the risk of myoma. However, the study couldn't emphasize enough on the role of nutrients in preventing myoma. But in comparing women with and without uterine myoma, the mean score of nutrition in healthy persons is more than the mean score of women with myoma. This may be related to high income of this healthy people. So women were encouraged to modify their diet.

According to D'Aloisio, Baird, DeRoo and Sandler (2012), black women had an increased risk of early-onset fibroids in association with early-life factors, such as in utero gestational diabetes. In utero exposure to diabetes influences later risk of fibroids pertaining to the genes that regulate fibroid pathogenesis (D'Aloisio, Baird, DeRoo, & Sandler, 2010). Blacks in the United States have greater rates of type 2 and gestational diabetes and are more likely to have in utero exposure to hyperinsulinemia and hyperglycemia (Savitz, Janevic, Engel, Kaufman & Herring, 2008). Thus, in-utero exposure to maternal diabetes may contribute to the elevated fibroid burden among U.S. black women. Long-term consumption of excess simple carbohydrates may lead to prolonged hyperinsulinemia and insulin resistance in the liver, muscle and fat tissues. Studies of blood samples from nondiabetic adults show that high concentrations

of insulin correlate with increased free circulating concentrations of IGF-I and decreased SHBGs, thereby increasing estradiol levels (Radin, Palmer, Rosenberg, Kumanyika & Wise, 2010).Many authors identified various risks associated with fibroids. The glycemic index (GI), an indicator of a food's insulin demand, quantifies the capacity of food to raise postprandial (after a meal) blood glucose concentrations (Radin, et al., 2010). Glycemic load (GL), the product of food's GI multiplied by grams of carbohydrate in a serving, provides a more complete measure of the portion's effect on postprandial blood glucose. Positive associations of GI were observed with fibroid risk overall and of GL with fibroids in younger women (Radin, et al., 2010). It was observed that females who were fed soy formula at infancy had longer menstrual bleeding and greater pain when menstruating both of which are symptoms of fibroids (Strom, Schinnar, Ziegler, Barnhart, Sammel, Macones & Hanson, 2001). Soy formula might influence later risk of fibroids because of the high concentration of estrogenic isoflavones they contain (D'Aloisio, et al., 2010). The risk of fibroids was positively associated with current consumption of alcohol, particularly beer (Wise, Palmer, Harlow, Spiegelman, Stewart, Adams Campbell, & Rosenberg, 2004). High dairy intake was inversely associated with fibroid risk among black symptomatic women (Wise, Radin, Palmer, Kumanyika & Rosenberg, 2010).

Nagata, Nakamura, Oba, Hayashi, Takeda and Yasuda (2009), carried out a study on association of intakes of fat, dietary fiber, soya isoflavones and alcohol with uterine fibroids in Japanese women. They discovered that alcohol intake showed a significant positive association with uterine fibroids; alcohol may have an oestrogenic action on the uterine myometrium. However, an increase of soya in diet does not necessarily negate the possibility of a positive association between soya isoflavone intake and the risk of fibroids. The study failed to find significant associations between fibroids and intakes of fats and dietary fibre.

Yuan, Qiang, Shengyong, Liqiang, Guowei and Peiyu (2013) examined the effect of fruits and vegetables in combined and found a strong link of it with fibroids. They also stated that the protective effect of a high intake of vegetables and fruits could be related to fibers and other undetermined active constituent substances, such as phytoestrogens and lycopenes, through different mechanisms. Dietary fiber can influence sex hormone and bile acid metabolism mainly though partially interrupting enterohepatic circulation, altering intestinal metabolism and increasing the fecal excretion of these compounds. Recent evidence suggests a relationship between alcohol and caffeine intake with a risk of developing fibroids, especially with evidence gathered from the Black Women's Health Study(Wise, et al., 2004). Current drinkers had significantly higher risks than women who had never consumed alcohol, and there appears to be a dose response for both duration of alcohol consumption and number of drinks per day. With regards to caffeine, among women,35 years of age, the highest categories of caffeinated coffee (3 cups/day) and caffeine intake (500 mg/day) were both associated with increased fibroid risk (Laughlin, Schroeder & Baird, 2010).

2.5.2Stress and Fibroid

How our brain and body process stress is key to our health. Stress can cause all types of things to manifest in a human's body. How we keep our minds is the key to better health, unfortunately, people tend to focus on the bad rather than rejoice in the good.

Lark (1986), said many of the fibroid and endometriosis patients she sees in her medical practice complain of major stress along with their physical symptoms. She also said that her personal impression as a physician who has worked with women patients for close to 20 years is that stress is a significant component of many recurrent and chronic health problems, including fibroids and endometriosis. To discount the effects of lifestyle stress on illness is a grave

mistake. If the physician ignores stress as a contributing factor, the patient never receives the tools or insight necessary to modify her habits and behavior to better support good health and well-being.

Stress can have a negative effect on all kinds of diseases. Physiologically, stress increases the cortisone output from the adrenal glands, which impairs immune functions. When this happens, blood pressure, heart rate and hormonal balances can escalate. This can upset the estrogen balance in women consequently triggering excessive output of adrenal stress hormones. The result is that the body is unable to limit the scarring and swelling caused by the endometrial implants, resulting in fibroids tumors growing during times of stress (Lark, 1986).

She explained that, for a woman stress can come from a number of things, such as financial issues, relationship problems, family, friends, and job/work load, along with a variety of other daily problems. The pain and stress of dealing with fibroids can be difficult for any woman. Fibroids can cause infertility and a woman trying to conceive and unable to do so, this can create unwanted stress. Fibroids have been known to cause pain during intercourse for some women, which can disrupt their sexual relationship.

Lark, (1986) recommends some techniques on how to relief stress:

Exercise for Relaxation: Exercise can help women deal with emotional stresses, especially dealing with fibroid symptoms. The key for women is to chose exercises that they enjoy and do them on a regular bases. Books, tapes, even gyms are a great means to exercise and stress reduction. Exercise is known to improve one’s physical health. It can also calm the mind a key factor in restoring a body’s normal condition.

Focusing: Fibroids or menstruation cramps can be painful. So, focusing; clearing your mind and breathing deeply can be a helpful exercise. Focusing can bring a sense of calm and peace to anyone. It is also great for relieving any anxiety one has.

Peaceful Meditation: Stress can lower your pain threshold, by increasing discomfort and muscle tension. For women suffering with fibroids, stress can cause them even more pain. Meditation the simple act of emptying one's mind, can give a woman peace and rest. Meditation can calm your mood and improve a woman's ability to handle everyday stress more effectively.

Healing Meditation: This type of meditation is helpful by focusing on a series of peaceful and beautiful images thus producing a positive state during menstrual pain. Visualizing beautiful scenes in one's mind can help one's body heal and produce positive chemical and hormonal changes. Healing meditation can reduce pain, irritability and discomfort.

Discovering Muscle Tension: Lower back and abdominal pain is part of discomfort women have to deal with when it comes to fibroids. Most of this pain stems from tense muscles which decrease blood circulation and oxygenation. Pain causes one's muscles to tighten, thus creating even more stress on the body. Women who deals with menstrual pain tend to tighten their pelvic area the most. Muscles tension can affect a woman's mood. One method of relieving this tension is to loosen the muscles and relax. When the muscles are loosen and relaxed, it places a woman in a better mood, diminishing anxiety and subduing pain.

Progressive Muscle Relaxation: Learning to relax by lying in a comfortable position, then inhaling and exhaling slowly and deeply, can relax muscles.

Affirmations: Affirmations are positive statements that a woman can give herself to ease tension and pain associated with menstrual or fibroid pain. A woman's state of health is determined by her state of mind. Putting one's self in a positive state of mind can heal one's body or enable it to

manage whatever pain it might be experiencing. If a woman tells her body it is sick, it will remain sick, but if she tells her body it can heal and it will be fine, then it will do so.

Visualizations: Visualization exercises can help a woman maintain her mental and physical health. Positive thoughts bring positive results. Thinking positive produces good chemical and hormonal output in a person's body.

The reason why fibroids grow is because there is an imbalance in a woman's system. So, the lingering question is, does stress really cause fibroids to grow? Some professionals seem to think that managing pressure is a critical key in shrinking fibroids.

Atkinson (2008), said, modern reports have indicated a strong hyperlink among substantial stress amounts, the worsening of signs and symptoms and the true development of fibroids. When combined with other potent elements, that causes toxin to build up, an insufficient diet regime, insulin resistance and anxiety can make fibroids considerably worse.

Pressure is known to increase blood sugar, muscle's contractions and elevated blood pressure. When people stress, they can experience more muscle soreness as tissues become tense. In women with fibroids, this can cause harm.

While stress is not a direct and primary cause of fibroids, it can contribute to them and their symptoms. Controlling stress levels by using any form of relaxing techniques can be effective in managing fibroids.

2.5.3Age and Uterine fibroid

Age related prevalence of uterine fibroids in south-southern Nigeria, in a retrospective study byOlotu, Osunwoke, Ugboma and Odu (2008), showed that in eight years (2000-2007), 896 patients presented with uterine fibroids, of this number, 31 were in the 16 – 25 years age group, 465 in the 26 – 35 years age group and 400 in the 36 – 45 years age group. A comparative

analysis of the percentage incidence of uterine fibroid within the study period showed that occurrence of fibroid increased from 1.8% in 2004 to 3.5% in 2007 for the 16–25 years age group, 48.8% in 2004 to 51.9% in 2007 for the 26–35 age group and a decrease of 49.4% in 2003 to 44.6% in 2007 for the 36–45 years age group. The study indicated that age group 16 - 25 years had higher prevalent rate of fibroid 3.5% in 2007 and a decrease for age group 36 – 45 yrs from 49.4% in 2004 to 44.6% in 2007.

Digna, Velex, Baird & Hartmann (2013), in study of association of age at menarche with increasing number of fibroids in a cohort of women who underwent standardized ultrasound assessment, observed an association between early age at menarche and fibroid presence and number and the association did not differ by race. Results showed that age at menarche ≤11 years is associated with an increased risk of fibroids when compared with the mean age at menarche (12–13 years) and that age at menarche >13 years is associated with reduced risk. Furthermore, individuals with the earliest age at menarche (≤11 years) were most at risk of developing multiple fibroids compared with those with a mean age at menarche of 12–13 years.

In a 5 years retrospective analysis, on the incidence and age distributions of uterine fibroid among reproductive age women presenting at the gynecology department of Irrua Specialist Teaching Hospital (ISTH), in Edo state, Nigeria, from January 2008 to December 2012.Overall, 4536 case files were reviewed among which 896 were positive for uterine fibroid; giving a prevalence of 19.75%. Specifically, the year 2012 recorded the highest incidence of uterine fibroid (23.59%), followed by the year 2008 (23.36%), 2009 (19.78%), 2011 (18.91%) and 2010 (14.56%) respectively. Women within 26 – 35 years were significantly affected in all the years under study, with an incident rate of 66.96%, while older women (>35) and those younger (<26),

presented an incident rate of 29.58% and 3.46% respectively. It was concluded that the high incidence of uterine fibroid among women within the 26-35 age range might be related to the high exposure to other risk factors such as reproductive tract infections and abortion considering their involvement in risky social behaviors.(Elugwaraonu, Okojie, Okhia & Oyadoghan, 2013).

Marshall, et al., (1997), Shelton, Lees, and Groff (2001), found that African-American women are diagnosed with uterine fibroids much earlier in their developmental stage than White women. In addition, there is a higher prevalence of hysterectomy under the age of forty years in South America than in North America. The researcher found little literature available on the effects of age or menopausal status of women on the risk or benefit of treatment for symptomatic fibroid uterus. Fibroid uterus is present in the muscular wall of the uterus between the ages of twenty five and thirty years (Cabot, 1990; Office of Research on Women's Health, 2003).

Eighty percent of Black women and approximately seventy percent of White women develop fibroids before they reach menopause (Office of Research on Women's Health, 2003). Fibroids do not present clinical problems before puberty and do not grow after menopause (Marivate & Siebert, 2007). Crowe and Reider (1998) and Marivate and Siebert (2007) found that between five and twenty percent of women over the age of thirty-five are diagnosed with fibroids, and the peak incidence of fibroids uterus in women is between thirty-five and forty-five years of age. In the USA, the highest incidence of hysterectomy is between the ages of thirty and forty-nine year age group (Augustus, 2002; Shelton, et al., 2001). In Australia, hysterectomy and myomectomy was a fairly common occurrence among middle aged women, even at the reproductive age of forty years (Dennerstein, Shelley, Smit & Ryan, 1994). In East Africa, Otieno, Parker and Thagana (2004), found that laparoscopic-assisted vaginal hysterectomy for benign uterine pathology is the second most frequently performed major surgical procedure amongst women of

reproductive age. They maintained it is time to change this situation. Amongst the Danish communities, cases have been reported of women below the fifty year age category undergoing hysterectomy procedures. In France, women in the perimenopausal stage were found to have developed the fibroid uterus condition, and had opted for undergoing the hysterectomy procedure. After the caesarean section, hysterectomy is the second most frequently performed major surgical procedure amongst women of reproductive age (Otieno, et al., 2004; Pokras & Hufnegal, 1998).

2.5.4 Fibroid and Obesity

Obesity may be a result of genetic susceptibility, increased availability of high energy foods or reduction in physical activity, especially in modern society, obesity has been found to play an important role in the elevation of oestrogen levels through the aromatization of androgens in adipose cells (Peter, 2000).

According to Eric, Asante, William, Jerry, Edmund, Klenam, Vincent and Addo (2012), showed that obesity is a major risk factor for leiomyomas. In a study on relationship between obesity and leiomyomas among Ghanaian women, out of the 216 patients confirmed with fibroid, 37.0 % (80) and 45.4% (98) were overweight and obese respectively. Although the mechanism of obesity development is not fully understood, there is supporting evidence that unhealthy eating habits such as, excessive sugar and high fat intake, increased portion sizes coupled with physical inactivity have been playing major roles in the rising rates. It was also revealed that ovarian hormones, oestrogen and progesterone have been associated with the promotion of the growth of fibroid and they also have a strong linkage with obesity. Eric et al, (2012), are of the opinion that, these factors may contribute to the higher prevalence of

overweight and obesity recorded among women with uterine fibroids, BMI and weight gain in adulthood was associated with risk of uterine leiomyomata.

Babah, Oluwole and Afolabi (2014), carried out a retrospective study on 169 women to determine the relationship between obesity and development of uterine leiomyomata in Lagos, it showed that the diagnosis of uterine fibroids increases with age through the reproductive years, with lower incidence in extremes of reproductive life. It was also discovered that obesity does not appear to influence growth of uterine leiomyomata but it was however found that obesity is a risk factor to the development of post operative complications, in which 83.78% of those who developed post operative complications were obese.

2.5.5Family History and Uterine Fibroid

Evidence for a genetic predisposition to uterine leiomyoma development comes from epidemiological studies including familial aggregation, (Winkler & Hoffmann, 1938) Faerstein et al. (2001). According to Treloar (1992), from genetic linkage studies in families with uterine leiomyomata there are associated heritable syndromes. Alam, et al. (2001) and Tomlinson (2002) Literature describing familial clustering of uterine leiomyomas first appeared in 1938, when a German group reported that uterine leiomyomas were 4.2 times more frequent among first-degree relatives of affected probands than among first-degree relatives of unaffected probands. According to Alam, et al. (2001) In the late 1980s, a series of Russian studies provided further evidence for familial aggregation of uterine leiomyomas: sisters, daughters, and mothers of affected probands had a 2.3-, 2.0, and 1.6-fold increased risk for uterine leiomyomas, respectively, over the general population.Schwartz (2000), found that the odds ratio for uterine leiomyomas among first-degree relatives of affected probands, compared with relatives of

unaffected probands, was 2.5,this odds ratio increased to 5.7 after stratifying cases by age of proband (younger than age 45 years) and of relatives (younger than age 40 years).

Additional evidence for the heritability of uterine leiomyomas can be inferred from hysterectomy data in the Australian twin registry. A 1992 analysis of this data revealed that the twin-pair correlation for hysterectomy in monozygous twins (r = 0.65 ± 0.05) was twice that of dizygous twins (r = 0.32 ± 0.09), wholly consistent with the expected rates for a genetically influenced trait (Treloar, 1992). Although conditions other than uterine leiomyomas may contribute to hysterectomy, this finding in twins strongly suggests a genetic liability for uterine leiomyomas, because these tumors are the most common indication for hysterectomy. These data were supported by a Finnish twin cohort study, which found that case-wise concordance for being hospitalized for uterine leiomyomas was higher in monozygous twins (0.31; 95% confidence interval [CI]: 0.24–0.37) than dizygous twins (0.18; 95% CI: 0.14–0.22). Luoto (2000), concluded that overall, heritability for uterine leiomyomas has been estimated to be 0.26, 0.69, and 0.79 for populations in Finland, United Kingdom, and Russia, respectively.

Kurbanova, Koroleva and Sergeev (1989), are of the opinion that there are several syndromes of genetic interest associated with uterine leiomyomas. Two of such inherited disorders are Reed syndrome, characterized by uterine leiomyomas in association with multiple cutaneous leiomyomata, hereditary leiomyomatosis and renal cell cancer (HLRCC) a cancer syndrome characterized by uterine leiomyomas and papillary renal cell carcinoma.

In a study by Stewart, Glenn, Stratton, Goldstein, Merino, Tucker, Linehan and Toro (2008),0n Association of Germline Mutations in the Fumarate Hydratase Gene and Uterine Fibroids in Women With Hereditary Leiomyomatosis and Renal Cell Cancer, the results shows that Regardless of uterine fibroid status, 75 women were *FHmut* positive; 60 of them had clinical

features of HLRCC, and the other 15 had no clinical evidence of HLRCC. None of 30 women without germline mutations in *FH* had cutaneous leiomyomas or HLRCC-associated RCC. Of 60 women clinically affected with HLRCC, 59 had cutaneous leiomyomas (9 of whom also had HLRCC-associated RCC), and 1 had HLRCC-associated RCC but no cutaneous leiomyomas. Forty-five women (median age, 42.5 years), including all 30 *FHmut*-negative women, were clinically unaffected with cutaneous leiomyomas or RCC. Of 105 women, 77 reported a history of uterine fibroids, and 28 did not. The diagnosis of uterine fibroids was confirmed in 97.4% (75 of 77) by medical records and in 89.6% (69 of 77) by pathologic review of slides obtained after hysterectomy or myomectomy; the study concluded that *FHmut*-positive women had a significantly increased risk of uterine fibroids compared with *FHmut*-negative women.

Okolo, Gentry, Perrett and Maclean (2005),indicatedthat familial prevalence of uterine fibroids is associated with a different pattern of clinical features and VEGF-A expression when compared with fibroids that occur sporadically in families. The 15 percent incidence of familiarity in the multi-ethnic population used is lower than the 24.7 percent incidence because only first-degree relatives, was used not both first- and second-degree relatives and a robust criterion was employed for ascertaining fibroid prevalence by seeking confirmation of diagnosis in relatives. Okolo, et al, (2005), concluded that it is also possible that heritability of uterine fibroids may be modulated by nongenetic factors and so result in varying incidence of familiality in different environments. Thus, a recent Finnish twin-pairs study has demonstrated that reproductive and anthropometric factors may play as significant a role in fibroid pathogenesis as genetic factors (Luoto, et al., 2000).

2.5.6 Physical Activities and Uterine Fibroid

The study of Baird, David, Michael, Cousins and Joel, (2006), on the association of physical activity with development of uterine leiomyoma, showed decreased development of uterine fibroids in both African-American women and White women who were in the upper third of the physical activity distribution (estimated to be equivalent to at least 4 hours of vigorous activity per week). With analyses controlled for BMI, which was an important risk factor for African-American women but not white women. The use of a multistate Bayesian analysis indicated that exercise was associated with tumor onset more strongly than with tumor growth. When data for women who reported major fibroid-related symptoms were excluded, results remained essentially unchanged, suggesting that the observed association could not be attributed to reverse causation (fibroids preventing exercise), that is the association observed could arise because symptomatic fibroids limit exercise and it was concluded that regular exercise might help women prevent fibroids.

Wyshak, Frisch, Albright, Albright and Schiff, (1986), found a reduced risk of self reported fibroids among women who had been college athletes compared with college-educated women who did not participate in collegiate athletics.

Yuan, et al. (2013), in a study published by Peking University in China, looked into the association between physical activity and fibroids. They found that women who participated in moderately intense occupational activity (physical activity at work) had a significantly lower risk of developing fibroids. They observed a non-significant trend toward increased risk among women who were in the category ofhigh non-occupational physical activity time, which might be explained by the observation that women with fibroid condition were more likely to exercise or seek other healthy lifestyles. Besides, the recreational exercise of women in China being

substantially low relative to other countries, might also explain why the same protective effect was not shown between non-occupational activity and uterine fibroids.

2.5.7 Blood Pressure and Fibroid

Hypertension is a public health problem and a term used to describe High Blood Pressure (HBP). It is a condition that occurs as a result of repeatedly elevated blood pressure exceeding 140 over 90 mmHg, whereby a systolic pressure is above 140 with a diastolic pressure above 90. However, normal blood pressure is below 120/80 while readings between 120/80 and 139/89 is called pre-hypertension(Boynton, Edwards, Malspeis, Missmer & Wright, 2005).

Boynton, Edwards, Malspeis, Missmer and Wright, (2005), did a prospective study of hypertension and risk of uterine leiomyomata, considering relation among diastolic (and systolic) blood pressure, antihypertensive medication use and risk for clinically symptomatic uterine fibroid tumors. The prospective data demonstrated a dose-response relation between diastolic blood pressure and fibroid incidence, with higher blood pressure associated with increased fibroid risk. For each 10-mmHg increase in blood pressure, the multivariate relative risk was elevated 8 percent (range: 5–11 percent) and 10 percent (range: 7–13 percent) among antihypertensive medication nonusers and users, respectively, indicating a sizeable association with blood pressure that is independent of body mass index, oral contraceptive use and reproductive history. Hypertensive women were 24 percent (range: 11–41 percent) more likely to report fibroids compared with normotensive women. Finally, risk for fibroids increased with duration of hypertension and these data supported the idea that atherogenesis is a significant component of a multifactorial etiology of uterine fibroid development and/or growth.

Boynton, et al. (2005), opinioned that overproduction of extracellular matrix, a central component of uterine leiomyomata pathophysiology, may also be related to elevated blood

pressure. Where by the transforming growth factor is up regulated in response to tissue injury. However, the prospective evidence provided by this study suggests that elevated blood pressure precedes confirmatory diagnoses of uterine leiomyomata. Furthermore, fibroid risk increases with increasing time since diagnosis of hypertension. Although, because many fibroids are asymptomatic, it was impossible in this study to establish conclusively that the elevated blood pressure preceded the development of the fibroid, but result showed that elevated blood pressure has an independent, positive association with risk for clinically detected uterine leiomyomata among premenopausal women.

2.6. Uterine Fibroid and Reproductive Health of Women

Fibroids that bulge into the uterine cavity (submucous) or are within the cavity (intracavitary) may sometimes cause miscarriages. The fertilized egg comes down the fallopian tube and takes hold in the lining of the uterus. If a submucosal fibroid happens to be nearby, it can thin out the lining and decrease the blood supply to the developing embryo. The fibroid may also cause some inflammation in the lining directly above it. The fetus cannot develop properly and miscarriage may result. However, with the next pregnancy, it is possible that the egg will settle in another location and pregnancy may proceed without problems. However, if one does have a miscarriage and a fibroid is found bulging into the uterine cavity, it is advisable to have it removed (Muhammad, 2013).

2.6.1. Fibroids, Pregnancy and Infertility

Although several studies have assessed the correlation between uterine myomas and infertility, the mechanism in which uterine myomas adversely affect reproductive functions still remains unknown. Fibroids are known to occur more frequently in women with a history of infertility. Whilst these benign tumors are associated with subfertility in 5–10% of cases, when

all other causes of reproductive dysfunction are excluded, fibroids may be responsible for only 2–3% of cases. Despite the existence of many studies assessing the correlation between uterine myomas and infertility, the mechanisms by which fibroids have a detrimental effect on reproductive function remain largely unknown(Buttram & Reiter, 1981).

Fibroids that grow inside the uterine cavity can impact reproductive function and may cause infertility or miscarriage. Fibroids are known to change the shape of the uterine cavity, resulting in a decrease in a woman's fertility up to 70 percent. The removal of fibroids can increase fertility by 70 percent. One good thing is that fibroids outside the uterine walls do not affect fertility (Buttram & Reiter, 1981).

Aradhana and Lumsden (2008) in a study on impact of fibroids on reproductive function analyzed mechanisms by which fibroids may adversely affect fertility as:

- Displacement of the cervix
- Enlargement or deformity of the uterine cavity
- Obstruction of the fallopian tubes
- Altered tubo-ovarian anatomy
- Disordered uterine contractility
- Disruption, atrophy or inflammation of endometrium over or opposite a submucous myoma
- Impaired endometrial blood flow
- Diminished ovarian blood flow

2.6.2. Effect of Pregnancy on Fibroid Growth

The effect of pregnancy on fibroid growth depends on a woman's genetics; it regulates the fibroid, the type and amount of growth factors that are present in the blood. Williams (2007),

in an obstetrical and gynecological survey, reported that an ultrasound study of pregnant women with fibroids found that 69 percent of the women had no increase in the size of fibroids throughout the pregnancy. In the 31 percent of women who had an increase in size, it usually happened before the third month. Almost always, fibroids shrink after delivery. Only 2 percent of pregnant women are found to have fibroids when examined with ultrasound. Most fibroids do not increase in size during pregnancy, so it is hard to predict the effect it has on fibroids.

During pregnancy, the placenta makes large amounts of female hormones that can cause fibroids to grow. On rare occasions, fibroids may grow too rapidly and the blood vessels supplying them may not be able to get enough oxygen to the tissue and degeneration of the fibroid cells can then occur. The degeneration process can cause pain for a short time without treatment and without harm to the baby. Women may have mild contractions during this time, but it is rare for premature labor to actually start. Physicians normally advise pregnant women with fibroids experiencing pain or contractions to be on bed rest. Most women who do have fibroids usually do not have any problems during pregnancy; some are able to carry healthy babies full-term with no complications. There are no differences in the risk of premature delivery, fetal growth problems, fetal abnormalities, or heavy bleeding after delivery. When it comes to delivery, a caesarean section tends to be more common among women who do have fibroids. If a fibroid grows near the cervix during pregnancy and it is large enough, that it is preventing the baby from coming through the birth canal, a caesarean is then performed. There are times when this problem is discovered during labor, because the baby cannot come down the birth canal (Williams 2007).

2.6.3 Fibroids and their Impact on Antenatal Complications of Pregnancy and Labour.

The prevalence of uterine fibroids in pregnant women ranges from 0.1 to 3.9% (Aradhana & Lumsden 2008). It is likely, however, that this will increase with time as women continue to delay having a family until later in life and the use of antenatal uterine imaging increases. Despite the frequency with which fibroids are encountered in pregnancy, there is still considerable controversy regarding their effects on the antenatal period, labour and post partum.

During pregnancy, these benign tumours have been linked to a number of complications, including early pregnancy bleeding, first- and second-trimester miscarriage, pelvic pain, intra-uterine growth restriction, premature rupture of membranes, placental abruption and preterm labour. Myomas have also been linked with problems in labour such as fetal malpresentation, dystocia of labour, operative vaginal delivery, caesarean section, postpartum haemorrhage, retained placenta and puerperal infection (Qidwai, Caughey & Jacoby, 2006).

The size and location of a fibroid has also been shown to influence obstetric outcome, with myomas >3 cm in diameter being associated with increased rates of pelvic pain, placental abruption, preterm labour, fetal malpresentation and caesarean section delivery. Qidwai, et al. (2006), found that fibroids were significantly associated with placenta praevia and preterm delivery, but were not significantly associated with premature rupture of membranes or placental abruption. In contrast, Coronado, Marshall and Schwartz (2000), demonstrated increased rates of placental abruption, observing a nearly four-fold increase in placental abruption among women with fibroids compared with controls. Both Coronado, et al. (2000) and Rice, Kay and Mahony (1989), found that leiomyomas in a retroplacental location were more likely to be associated with abruption. Data regarding the association between fibroids and premature rupture of membranes tend to be inconsistent. However, the positive association between the presence of fibroids and

placental praevia, malpresentations such as breech presentation, operative delivery and caesarean section has been demonstrated repeatedly. Qidwai, et al. (2006) observed that whilst women with fibroids greater than 10 cm had slightly higher rates of caesarean section delivery compared with women with smaller myomas, 70 percent of women with a fibroid of 10 cm who were deemed suitable for a trial of vaginal delivery achieved a vaginal birth. According to Qidwai, et al. (2006), the exact mechanisms by which fibroids are associated with obstetric complications remain uncertain. However, it is highly likely that these benign tumors physically interfere with pregnancy and labor via mechanical obstruction. It has also been hypothesized that they interfere with uterine contractility, but this association with obstetric complications is less clear.

Women should always be counselled about the risk of uterine rupture following myomectomy. During pregnancy and labor, this complication is generally thought to occur rarely. It is, however, difficult to determine which characteristics of a fibroid (e.g. size, location and number) increase the likelihood of uterine rupture and which method of myomectomy predisposes to an increased risk of this complication. Nonetheless, adhering to well-established surgical principles during myomectomy (regardless of the method) and using oxytoxics in labour with consideration and caution, assist in reduction of this risk during pregnancy and labour (Aradhana & Lumsden, 2008).

Unkels (2012), itemized some complications of fibroids during pregnancy and delivery to include:

• Necrosis.

• Torsion of a pedunculated subserous fibroid.

• Mechanical problems impacting the uterus in the pouch of Douglas early in pregnancy or leading to obstructed labor.

• Spontaneous abortion.

• Premature labor and delivery.

• Abruption of placenta.

• Post-partum hemorrhage.

2.6.4:Effects of Uterine Fibroid, Based on Amount, Site, and Size on Fertility

In the view of Muhammad (2013), in 95 percent of cases with corpus localized myomas, several knots are usually present. Presence of a myoma is associated with fertility issues. Several studies have been conducted to determine the correlation between fibroids and infertility. Unfortunately, a definitive conclusion concerning this matter is yet to be made; also, the myoma's anatomical site is considered an important element to determine the degree of infertility. Different impacts caused by sub mucosal, intramural and sub serosal myomas on fertility seem to be somewhat confusing. Muhammad (2013), stated that sub-mucosal fibroid is always involved with a local inflammatory process which may cause ulcerations due to the presence of slime that could eventually alter intrauterine biochemical characteristics, producing an inappropriate environment for spermatozoas. In addition to this fact, sub mucosal fibroids may interrupt endometrial blood supply, consequently affecting the embryonal implantation process. Findings show that women with a sub-mucosal fibroid, compared to infertile women without fibroid, are presented with a significantly decreased pregnancy rate, implantation rate and ongoing pregnancy/ live birth rate, with a significantly increased abortion rate and sub mucosal myomas seem to reduce fertility rates.

Muhammad (2013), also revealed that no significant difference was observed for each myoma measurement after comparing a group of women with sub serosal myomas with women without myoma. On the contrary women with intra mural myomas are usually presented with a

significantly lower pregnancy rate, implantation rate, and ongoing pregnancy rate/ life birth rate with a significantly higher spontaneous abortion rate. After conducting a limited analysis on this study, using a high quality method to access the uterine cavity space, only implantation rates prevailed statistical significant.

2.8 Psychological Effects of Uterine Fibroid on Women

Unfortunately, not only do fibroids present physical challenges, many women also experience significant lifestyle changes that can affect emotional and psychological well being. According to Bijan, Wanda, Bradley and Stewart (2013), many women begin to feel very “trapped” without a way to escape this disease. As fibroid tumors grow, many patients find they now have to coordinate their lives around their monthly cycles. Often, women need multiple changes of clothes for a single day and many results to wearing black or dark colors for most of the month. They cannot schedule important events around “that time of the month” and pain and prolonged bleeding with fatigue destroys intimacy and the pleasures of sexual intercourse. Most women feel that the disease has ‘just taken over their life”. It is at this point that many women seek treatment. Bijan, et al. (2013), are of the opinion that once fibroids are diagnosed, many women can have a sense of relief, because they finally have an answer as to what has been disrupting their life. The next step to resolution is treatment. Sadly, this can be another step towards insecurity and disbelief. Depending on the gynecologist’s training and philosophy, most patients experience one of two recommendations: the “wait and see” philosophy or hysterectomy.The first does nothing to solve the current signs and symptoms and only allows the fibroids to get worse with time. The second is often an unwanted surprise and a complete shock, since many women have no idea they have fibroids until they have a visit with the gynecologist, when results return, as mentioned above, many have a sense of relief that a reason for their daily

struggles has been identified. However, all too often, the relief of a discovered diagnosis can turn into a shocking and emotionally devastating reality when the recommended treatment is hysterectomy. Even when fertility is no longer a consideration, women often are not psychologically prepared to part with their uterus (Bijan, et al., 2013).

Voogt, De Vries, Willem, Paul, and Peter (2008),determined the effects of Uterine artery embolisation (UAE) on sexual and psychological well-being and on clinical symptoms before and three (3) months after UAE. Theyfound a statistically significant improvement in sexual functioning, psychological well-being and physical symptoms 3 months after UAE in women with symptomatic fibroids. Better sexual well-being was also associated with better psychological well-being. They however, do not have an explanation for this minor improvement, but do know that sexual well-being is influenced by many factors. The improvement might be due to a decrease in physical symptoms (i.e., menorrhagia, fatigue caused by anemia, and pain). But improvementin psychological factors (i.e., body-image and depression) are likely to be influential as well. Voogt, et al. (2008), suggested that the uterus plays a role in the physiology of the vaginal orgasm and thus hysterectomy might have a negative effect on orgasm by eliminating the uterine contribution. Also, after hysterectomy the local nerve supply and anatomical relations of the pelvic organs are considered to be disrupted.

In literature summarized by Williams, Jones, Mauskopf, Spalding and DuChane (2006), describing the impact of uterine fibroids on health-related quality of life (HRQOL), usingthree electronic databases (MEDLINE, Embase, and Current Contents) and 40 papers questionnaire were used, which was on leiomyoma or uterine fibroids and (health-related) quality of life (HRQOL). Studies including women with benign gynecological conditions other than uterine fibroids were also reviewed.

Results shows related generic measures are used to assess HRQOL in women with diverse gynecological conditions, including uterine fibroids. The Uterine Fibroid Symptom and Quality of Life (UFS-QOL), a condition- specific measure, provides scores on symptom severity and six HRQOL dimensions. All instruments consistently demonstrate that HRQOL is considerably impaired in women with symptomatic uterine fibroids and that appropriate treatment can lead to improved quality of life (QOL).

Williams, et al.(2006), concluded thatthe published data on HRQOL associated with uterine fibroids report significantly lower HRQOL scores for women with fibroids than for women without this disorder and additional research is needed to confirm these findings and provide greater detail describing the specific domains most affected by uterine fibroids.

The survey of Mayo Clinic (2013), assessed diagnosis, information-seeking behaviors, attitudes about fertility, impact on work and treatment preferences among women living with uterine fibroids for an average of nearly nine years. The researcher found that women delayed seeking treatment an average of 3.6 years, with 32 percent of women waiting more than five years. Most women reported fears associated with their fibroids, including being afraid that the fibroids will grow (79%) and that they will need a hysterectomy (55%), as well as fears regarding relationships, sexual function, body image, loss of control and hopelessness. Almost two-thirds (66 %) of women were concerned about missed days from work due to their symptoms, and 24 percent of employed respondents felt that their symptoms prevented them from reaching their career potential. The vast majority said they prefer a minimally invasive treatment option that preserves the uterus, having better treatment options was particularly important to African-

American women respondents, who experience the impacts on fertility earlier in their lives and reported that fibroids interfered with physical activities and relationships.

2.9 Management and Treatment Options for Uterine Fibroid

There are a number of treatment options available for Fibroids. They can be surgically removed, the entire uterus can be removed, medical drugs can be taken to shrink them, or the blood supply can be cut off to get rid of fibroids. These choices of course depend on a woman's need to preserve her fertility. Uterine fibroids can be harmless, showing no symptoms and will shrink with menopause. Unfortunately some fibroids come with pains, excess bleeding and they can cause pregnancy problems.

2.9.1 Treatment Options for Fibroids

Treatment options for fibroids vary according to Taylor and Phyllis (2012), as well as the severity of the symptoms, size, location of the fibroid lesions and the patient's desire to maintain fertility, but the ultimate goal of therapy is the relief of the symptoms. This medical therapy can be classified as follows:-

- Therapies to control bleeding: Oral contraceptive pills / Progesterone pills Progesterone secreting intrauterine device.
- Therapies to decrease estrogen: GnRH agonists (lupron) or antagonists Aromatase inhibitors SERMs (raloxifene)
- Therapies to decrease progesterone Anti-progesterone agents (mifepristone) Androgens (danazol)

Gonadotropin-Releasing Hormone Analogue for Managing Fibroid

An option for shrinking fibroids short time is a hormone therapy called gonadotropin-releasing hormone analogue (GnRH-a). It puts the body in a state like menopause (Fibroids naturally shrink after menopause). This is known to shrink both the uterus and the fibroids. Fibroids are known to grow back after GnRH-a therapy. GnRH-a therapy is good for shrinking fibroids before surgery. It also lowers a woman's risk of heavy blood loss and scar tissue from surgery. GnRH-a therapy should only be used for a few months as it can weaken the bones. It can also cause unpleasant menopausal symptoms like hot flashes, vaginal dryness and bone demineralization. This therapy is best suited for women in the perimenopausal or preoperative periods (Coddington, Collins, Shawker, Anderson, Loriaux & Winkel, 1986).

Hormone Therapy

Hormone therapy with cyclic or noncyclic estrogen–progestin combinations appears to be ineffective in alleviating the symptoms of fibroid tumors and limiting tumor growth. According to Myers, Barber, Gustilo-Ashby, Couchman, Matcher and McCrory (2002), studies have found no evidence that low-dose contraceptives cause the growth of uterine fibroid tumors; thus, these tumors are not a contraindication to the use of these contraceptives.

A small study found significant improvement in bleeding after treatment with depot medroxy progesterone acetate (Depo-Provera) in 20 African women with menorrhagia attributed to uterine fibroid tumors (Venkatachalam, Bagratee, & Moodley, 2004).

A review of six clinical trials with a total of 166 women, demonstrated that treatment with mifepristone (Mifeprex) resulted in reduced tumor size and improvement in symptoms (Steinauer, Pritts, Jackson & Jacoby, 2004).

Surgical Treatment Options

Surgical treatment options currently include abdominal myomectomy; laparoscopic myomectomy; hysteroscopic myomectomy; endometrial ablation; and abdominal, vaginal, and laparoscopic hysterectomy.

Hysterectomy

This is the commonest treatment for fibroids which cause symptoms. This involves removal of the womb, cervix and ovaries, if necessary. This can be done either by making a bikini incision (cut) in the lower abdomen or if the fibroids are small enough, the uterus can be removed through the vagina. Another option will be laparoscopic assisted hysterectomy (keyhole surgery) if the size of the fibroids are not large. A hysterectomy may be a good option for women who have completed their family because once a woman has a hysterectomy she can no longer have children. Performing a hysterectomy for uterine fibroids in the past was based on uterine size. Once the uterus reached the size around the 12th week of pregnancy a hysterectomy was highly recommended. The decision is then based mainly on the fact that fibroids of such volume could shield the presence of uterine cancer (Womenshealth.gov 2015).

According to a study conducted on Correlates of Hysterectomy among African-American Women by Palmer, Rao, Adams-Campbell and Lynn (1999), the prevalence of hysterectomy increased from 1.9 percent among women aged 30-34 years to 38.9 percent among women aged 45-49 years. Of those who had had hysterectomies, the proportions who reported having both ovaries removed, one ovary removed, and no ovaries removed were similar across age strata. Approximately 30 percent had had both ovaries removed and 15 percent had had only one ovary removed. It was concluded that uterine leiomyoma was by farthe most common indication for hysterectomy, accounting for 75 percent of all hysterectomies.

Myomectomy

This is a possible alternative, especially in women who may wish to have children in the future. In this operation the fibroids are removed and the uterus is left behind. This operation can be done through an incision in the abdomen or via keyhole surgery. A myomectomy, the surgical removal of fibroid is the only treatment that can improve a woman's chance of having a baby. It is recommend that a woman get pregnant as soon as possible after a myomectomy, because fibroids can and will grow back (Parker, 2007).

Uterine artery embolisation

Ravina, Herbreteau, Ciraru-vigneron, Bouret, Houdat, Aymard and Merland (1995), stated that uterine artery embolisation, is a fairly new technique used to treat fibroids tumors. The procedure is performed by an interventional radiologist trained in the use of X-rays to guide cleanly invasive interventions within the arteries. During the procedure, the radiologist makes a small nick in the skin in the groin and inserts a catheter (a thin tube, the size of a strand of spaghetti, which can be seen with X-rays) into an artery. The catheter is guided to the arteries that bring blood to the uterus and very small particles are injected through the catheter to obstruct the blood supply to the fibroid tumor. This causes the fibroid to shrinkAccording to Howard, (2009), this procedure causes the fibroids to degenerate and shrink while leaving the uterus intact; UAE strips the fibroids of their blood supply.The three main benefits of a UAE procedure are: A) the recovery time is shorter (a week). B) There is virtually no risk of transfusion (as there would be in a surgical procedure). C) Many women can have the procedure done and go home the same day. With UAE, there is a long-term patient satisfaction and recent studies show that tumors will

not grow back. Compared to a myomectomy (the surgical removal of the fibroid tumor but not the uterus), UAE treats the fibroids in the entire uterus (Howard, 2009).

Myolysis

Myolysis (i.e., delivering energy to tumors to desicrate them directly or disrupt their blood supply) is most often performed with the neodymium-doped yttrium aluminum garnet (Nd:YAG) laser or bipolar needles. Combination treatment with myolysis and endometrial ablation may reduce the need for subsequent
procedures in patients with persistent bleeding (Goldfarb, 2000).

Focused Ultrasound

Focused Ultrasound uses magnetic resonance image guided focused ultrasound (MRgFUS) Focused ultrasound requires no incisions or general anesthesia, only mild sedation, and the results are minimal discomfort and few complications. The recovery time is rapid, allowing the surgery to be performed on an outpatient basis. Focused ultrasound destroys fibroid tumors, without incisions or harm to other organs.

Focused Ultrasound works by concentrating up to 1000 intersecting beams of ultrasound energy with extreme precision on a target deep in the body as small as 1 mm in diameter. It is like a magnifying glass focusing multiple beams of light on a single point. Each individual beam of focused ultrasound passes through the tissue, it has no side effect. But where the beams converge on the target, they have an effect, just as the converging beams of light will burn a hole in a leaf. The beam burns away tumors effectively. This kind of magnetic resonance imaging allows physicians to identify and target the exact tumors that need treatment, which is immediate and is

very effective for patients (Rabinovici, Inbar, Revel, Zalel, Gomori, Itzchak, Schiff & Yagel, 2007).

2.9.3 Detoxing Treatment for Fibroids

Therapists believe that one of the common results of fibroids is a buildup of toxins in the liver. These toxins tend to imitate that of estrogen. Cleansing or detoxifying is a highly recommend effective method to stop fibroids from growing. When a woman's body produces extra estrogen, it can cause fibroids to grow. The problem with preventing estrogen is that it can be very difficult. Estrogen is found in many foods, beauty products, even plastic food containers and wraps that can allow it migrate into foods. Estrogen is used as a growth hormone especially in cattle. Fighting estrogens intake for any woman can be challenging, since it is in almost all the products that a woman uses (Ife, 2014).

New Health Guide (2014) analyzed estrogen in women as follows:

Estrogen is a potent hormone and produced in the ovaries in females. A smaller amount is present in males as well. Estrogen appears to be an underlying factor relating to uterine fibroid growth. The more estrogen a woman's body produces the more likely she will get fibroids. Estrogen has far-reaching effects on a variety of vital functions in the woman's body. Estrogen drives the developmental process and reproductive abilities of all women and has a profound impact on mood. Estrogen levels fluctuate widely based on the age and current phase of the menstrual cycle. It is difficult to state exactly what level is normal. Pregnancy and menopause also influence estrogen and other hormone levels. For these reasons, a "normal" level can range from 50 to 400 pg/ml (picograms/milliliter).

1. Normal estrogen levels

The range of normal varies widely depending on a person's age. For those between 20-29, the average is 149 pg/ml and will increase to 210 pg/ml for females 30-39. The level falls back to 152 pg/ml for women over 40 who are not yet in menopause. These levels are generalizations as the exact level varies on a daily basis and is closely tied to the various phases of the menstrual cycle.

2. Low estrogen levels

Severe deficiency of estrogen can result in levels as low as 10-20 pg/ml and produce a variety of symptoms including fatigue, night sweats, vaginal dryness, and memory impairment. Some women will experience irritability, mood swings and feel drained and exhausted. Estrogen deficiency can result from eating disorders such as anorexia, menopause, surgical removal of the ovaries and congenital conditions. Turner syndrome and congenital adrenal hyperplasia are two such congenital disorders that result in profound hormonal abnormalities as well as unique physical characteristics.

3. High estrogen levels

Excess estrogen levels are typically noted when estrogen is in excess of 200 pg/ml. Causes include obesity, exogenous intake (medications), stress, cardiovascular disease and lifestyle. Excessive alcohol intake also influences estrogen levels. Common symptoms include mood swings, anxiety, depression and insomnia. Excess estrogen exposure is clearly linked to an increase in breast and uterine cancer.

New Health Guide (2014), further explained how to increase estrogen levels:

If symptoms of estrogen deficiency are suspected, a visit to doctor can confirm this by a simple blood test. After that, lifestyle and dietary modifications are an important first step to correcting an estrogen deficiency.

i. Lifestyle changes

This should be the first step in any plan to improve the quality of ones life and health.

- **Quit smoking.** Tobacco smoke inhibits the production of estrogen and those that do so will have abnormal estrogen levels circulating in the blood stream.
- **Exercise.** Exercise is important for overall health, but also improves the level of estrogen. By maintaining a healthy body weight, the estrogen levels can remain within a more healthy range.

ii. Herbal remedies

Herbs have been used for thousands of years to treat a variety of health issues. Some herbs are known to be phytoestrogenic and can act as substitutes for estrogen in the body. Herbs known to possess this property include: black cohosh, sage, licorice, dong quai and oregano. Soy also contains substances known as phytoestrogens and can stimulate or act like estrogen in the body.

iii. Dietary changes

Dietary changes can stimulate the production of estrogen in the woman's body.

- **Fruits.** Try eating dates, cherries, apples, plums, papaya and pomegranate.
- **Vegetables.** Besides their potent antioxidant properties, vegetables can help regulate and increase hormone production. Choose a variety of options including: carrots, celery, eggplant, beans and lentils, peas, potatoes, tomatoes and yams.

In a study conducted by Emmanuel, Henry, Muchiri, Christine and Dominic (2002), on progesterone, estradiol and their receptors in leiomyomata and the adjacent normal myometria of

black Kenyan women, it was found that leiomyomata contains higher receptor concentration than the adjacent normal myometria, they higher level of Estrogen Receptor (ER) and Progesterone Receptor (PR) in the fibroid could explain the occurrence of these tumours during the childbearing period of life and their increase in size during pregnancy, since these are the physiological states in which circulating levels of sex hormones are relative higher. From the study it was concluded that the relatively proportions of steroid hormones and their receptors in the individual patients uterine tissue may be important in the pathogenesis of fibroids among blacks.

Walker (2002), used the Eker rat, which has been developed as an in-vivo/in-vitroanimal model system for fibroid tumors, to study the impact of hormones on uterine leiomyomas. Spontaneous leiomyomas arise in intact Eker rats with a high frequency and leiomyoma-derived cell lines from these animals maintain the biochemical and physiological characteristics of the tumors from which they were obtained. Using this animal model system, it has been established that tumor development is absolutely dependent on steroid hormones and that sensitivity responsiveness to estrogen is enhanced in tumors and tumor-derived cell lines. Modulation of hormonal milieu, such as that which naturally occurs during pregnancy, can effectively inhibit tumor development.

The hormone responsiveness of these tumors makes them good candidates for hormonal therapy. Selective estrogen receptor modulators (SERMs) tamoxifen and raloxifene hold promise as potential therapeutic agents for this disease. SERMs inhibit proliferation of leiomyoma-derived cell lines in vitro, repress the growth of these lines in nude mice and when administered over a 2- to 4-month course of treatment to Eker rats, reduce tumor incidence by more than 50%. In addition to endogenous hormones, xenoestrogens in our environment (e.g., phytoestrogens,

organochlorine pesticides, pharmacologic compounds) are of potential concern with regards to their impact on this disease. These environmental estrogens have been shown to promote the growth of leiomyoma cells in vitro and in vivo.

In a case-control study on association of hyperglycemia, hyperlipemia with the risk of uterine leiomyomata, estrogens are considered as promoters of uterine leiomyoma growth, by binding to ER-α and E receptor-β (ER-β), estrogen elicit its physiological effects on the target cells. Protein and mRNA expression levels of ER-α and ER-β are higher in leiomyoma compared with normal myometrial. Estrogens and its receptors play a significant role in myometrial physiology and in uterine leiomyoma growth (Kong, Hou Xia, Ying, Xu & Qing, 2014).

Fibroids flourish on excess estrogens, so women need to eliminate or reduce their intake of animal fats in their diet. There are many foods and environmental substances that have estrogens that the body can absorb and is unable to fight off. Cleansing is a good means to restore damaged cells and fortify healthy rejuvenated cells to the vital organs like the liver and the kidneys. Women living in extremely stressful situations over a long period of time can contribute to fibroids growth. The more the stress placed on the body, the greater the risk of getting fibroids. Stress is known as a contributing factor for fibroids. Stress often leads to bad eating habits for most women. Food for most people provides emotional comfort and distraction from the stress in our lives. Cleansing body can eliminate poorly ingested foods and permit the body to better manufacture the needed elements to fight stress naturally, thus avoiding fibroids (Ife, 2014).

Administering a natural detox diet can help the body flush out excess fats and hormones that can cause fibroids to grow. Detoxing can lead to weight loss, a good thing for most women who are struggling with their weight. To combat fibroid growth, it is good for a woman to have a naturally healthy balanced diet. Cleansing the body can also help organs rejuvenate. Cleansing

naturally is a safe alternative to harsh drugs or chemicals to detox the body. A natural cleans is a gentle solution to eliminate toxins from the body. Juice fasting (a process of taking only juice for some period) and taking natural herbs such as liverwort, artichoke and milk thistle are great remedies (Fang, Zhang, Wang, Lin, Yang & Rao, 2001).

According to an article in webmd by Zelman, (2013), on Health & Balance, stated that, the good news is that our body has its own natural detoxifying process that works quite well. The liver and kidneys do a good job of processing chemicals and eliminating them in sweat, urine, and feces. For example, the colon's natural bacteria, detoxifies food wastes and its mucus membranes prevent bacteria and toxins from reentering the body. The liver combines its own chemicals with other chemicals, making water-soluble compounds that your kidneys can excrete in urine.

2.10 Preventive measures against uterine fibroid

The exact cause or how fibroids develop is unknown, as are the methods to prevent them from forming. However, experts have been able to identify certain risk factors, treatments, and complications that may aid in the understanding of uterine fibroids. Some possible measures of preventing the disease include:-

Parity

Epidemiologic studies show that parous women are at lower risk of fibroids due to long-term reduction in hormones (including prolactin) associated with myoma growth (Baird & Duson 2010). Similarly, The Black Women’s Health Study and the Nurses’ Health Study found that parity appeared to protect against uterine fibroids (Marshall, et al., 1997).

Vitamin D

The study by Baird, Hill, Schectman and Hollis, (2013), included more than 1,000 women, aged 35 to 49, living in the Washington, D.C. area, from 1996 to 1999. Blood samples taken from the

women were analyzed for vitamin D levels. Those with sufficient amounts of vitamin D were 32 percent less likely to develop uterine fibroids than those with insufficient vitamin D levels. The researchers also found that women who spent more than an hour outside per day had a 40 percent decreased risk of fibroids. The body makes vitamin D when the skin is exposed to sunlight. Vitamin D also comes from food and supplements and the study found that fewer black women than white women had sufficient vitamin D levels, but the reduction in the risk of fibroids was about the same for both white and black women with sufficient vitamin D levels.

Flake (2003), described various things that women should know about fibroid:

1 Know the risk factors of developing uterine fibroids.

- As a woman ages, the risk of developing uterine fibroids increases.
- A family history of fibroids can increase a woman's risk of developing fibroids up to 3 times above average.
- Women of African descent are 3 times more likely to develop fibroids than Caucasian women. They also tend to develop them earlier and more severely.
- Women who are overweight are more likely to develop fibroids.

2. Exercise regularly. Studies indicate that the more a woman exercises, the more likely she will not develop uterine fibroids.

3. Control your weight. Studies also indicate that obesity can increase one’s risk by 2 to 3 times more than the average for developing uterine fibroids. Keep your weight at the recommended level based upon your height and body type. Calculate your Body Mass Index (BMI), which is weight in kilograms divided by height in meters squared, or weight in lb divided by height in inches squared, then multiply by 703. A healthy BMI is between 18.5 and 25. If one’s BMI is above 25, one should take steps to reduce one’s weight.

4. Understand that pregnancy and childbirth may have protective effects against developing uterine fibroids.

5. Take oral contraceptives, as they may lower the risk of uterine fibroids.

6. Reduce red meat consumption. Studies indicate that consuming large amounts of beef and ham can contribute to a higher risk of developing fibroids.

- Eating fish such as salmon, mackerel, and tuna may reduce the inflamed tissues of uterine fibroids.

7. Eat green vegetables. Studies indicate that a diet high in green vegetables may protect a woman from developing fibroids.

2.11 Summary

All over the world, medical professionals are trying to find the causes, suitable treatment as well as preventive measures for uterine fibroid.

It is evident from literature that uterine fibroid can be linked to clinical and environmental factors; clinical causes include estrogen, genetics, age, blood pressure while environmental factors which involve lifestyle engagements (physical activities, obesity, diet and stress).

Uterine fibroid is the major cause of most gynecological visits to hospitals by most women of reproductive age and it is increasing at an alarming rate. Most cases are presented very late to the hospital, so hysterectomy becomes the only option where women lose their uterus or myomectomy. In cases where fertility is still a concern, other treatment options like the uterine artery embolization or the focus magnactive resonance image are explored. These are still new and manytimes not available in this part of the world. Uterine fibroid also affects women psychologically making them feel the disease has taken over their life due to the pain and

prolonged bleeding with fatigue which destroys intimacy and pleasure of sexual intercourse. Uterine fibroid can be prevented through parity, which causes a reduction in hormones, sufficient amount of vitamin D in a woman's the blood can also reduce her risk of developing fibroid, exercising regularly to maintain a healthy weight, reduced red meat consumption and increase green vegetables consumption, can all help prevent uterine fibroid growth.

CHAPTER THREE:

METHODOLOGY

3.1 Introduction

The study investigated theCorrelates of uterine fibroid among patients in Murtala Muhammad specialist hospital Kano. This chapter describes research design, population, sample and sampling procedure, data collection instrument, procedure for data collection, validation of research instrument, reliability of instrumentand data analysis that will be used for this study.

3.2 Research Design

Descriptive survey research design was used for this study. This is because the entire respondents are homogeneous in characteristics (are all patients with same condition, all female and are all attending same hospital). Pilot and Beck, (2004), said that the purpose of descriptive survey design is to observe, describe and document aspects of situations as they naturally occur in a given population. Njodi and Bwale, (2007), reported that descriptive survey is aimed at describing the nature of an existing condition or identifying the standard with which existing condition can be compared, or determining the association that exists between specific events. Kerlinger,(1973),also explained that a survey design is that, in which the researcher selects and studies sample incidence, distribution and interrelationship of sociological and psychological variables. Therefore, descriptive survey was found to be suitable for the current study.

3.3 Population of the Study

The population for this study comprised the entire 255 in and out uterine fibroid patients attending Murtala Muhammad Specialist Hospital, Kano, for a period offive months, between

July to November2015 (Gynecology Unit Record of Murtala Muhammad Specialist Hospital, Kano 2015).

3.4 Sample and Sampling Technique

Out of the total population of 255 cases (patients),purposive sampling technique was used to select one hundred (100) patients. The criteria for the selection were: patients with only one uterine fibroid, who have not had any myomectomy, are not pregnant, not lactating, not menstruating at the time of data collection andconsented to participate as subjectsfor this study. The sample was drawn from both in and out patient units of Murtala Muhammad Specialist Hospital, Kano.

3.5 Data Collection Instrument

The instruments that were used for this research work were:-

- A WHO Global Physical Activity Questionnaire (2007), wasmodified and adopted
- Researcher developed questionnaireon stress and diet, was used to test both stress level and diet level.
- The questionnaire used for this study also has a section for bio data where questions on age and family history of uterine fibroid were asked.
- The Uterine fibroid patients were confirmed by ultrasound diagnosis at the hospital diagnostic centre to detect patients with only one fibroid type.
- Portable weighing scale (model: Supreme, Make: Germany) for measuring body weight

- Stadiometar/tape to measure height (International Society for the Advancement of Kinanthropometry ISAK)
- Digital sphygmomanometer to measure Blood pressure (model: Omron digital BP monitor, model HEM-403 C. Make: Tokyo Japan)
- **Obesity Level:** was determined through Body Mass Index (BMI) and derived from ratio of participant's body mass divided by height in meter squared (M2). Subjects with BMI of less than 18.5 were deemed under weight (were in group one), a BMI of 18.6 and 24.9 indicates normal healthy weight (were in group two), a BMI of 25 and 29.9 were deemed overweight (were in group three), while a BMI of 30 or greater, indicates obesity (were in group four).
- **Blood Pressure**: blood pressure was measured through the use of a sphygmomanometer and recorded in mmHg (millimeters of mercury). In which patient's blood pressure measurement of systolic and diastolic that is 90/70 was considered to have a low blood pressure (were placed in group one), patient's blood pressure measurement of systolic and diastolic that is 110 or 120/80 or 90 was considered to have an ideal blood pressure (were placed in group two), a blood pressure of 140 or 159/100 or 110 was considered pre high blood pressure (were placed in group three) while a blood pressure of 160 or higher/ or higher was considered high blood pressure (were placed in group four).
- **Family History of Uterine Fibroid:** The questionnaire also has a column for family history of uterine fibroid, where patients that ticked yes to having history of uterine fibroid were in group two and patients that ticked no history of uterine fibroid were in group one.

- **Physical Activity Level:** the modified WHO Global Physical Activity Questionnaire was used to determine physical activity level, through converting hours to minutes then multiplied by number of days in a week. Patients who spent one hundred and fifty minutes (150) and below are considered to have a low physical activity level, were placed in group one, patients who spent one hundred and sixty to two hundred and fifty minutes (160-250) are considered to have a moderate physical activity level, were placed in group two, patients who spent two hundred and sixty to four hundred minutes (260 - 400) are considered to have a high physical activity level, were in group three while patients that spent four hundred and ten minutes and above (410 - +) are considered to have a very high physical activity level and were placed in group four.

3.6 Validation of the Research Instrument

To ensure the instrument measures what it is supposed to measure, content validity of the research instrument (questionnaire) was done by the supervisor and three other specialists in Physical and Health Education Departments of Bayero University, Kano. Suggestions, corrections, criticism and comments were incorporated before the instrument was used for data collection.

3.7 Reliability of the Instrument

Split half reliability method was employed to test the reliability of the questionnaire.Saul (2013) stated that Split half reliability is a measure of consistency where a test is split into two and the scores for each half of the test is compared with the other. The higher the correlation between the two halves, the higher the reliability of the instrument. In this study the instrument was subjected

to a pilot study using 20 cases from Modular maternity clinic Kano (private hospital) which is not within the study area. The data so collected was subjected to the Spearman Brown Rank Order Correlation. When tested, a reliability of r =0.65 was obtained, thereafter, the questionnaire was accepted since it was reliable.

3.8 Data Collection Procedure

An introduction letter was obtained from the office of the Head of Department Physical and Health Education, Bayero University, Kano, introducing the researcher and also stating the purpose and benefits of the research. This was required to obtain provisional ethical clearance from the Kano State Hospital Management Board and the chief medical director Murtala Muhammed Specialist Hospital, Kano. Hundred (100) uterine fibroid patients were used for the study, four (4) nurses in the gynecological unit was trained by the researcher and were used as research assistants in the administration of the questionnaire. Data collection took sixteen weeks.

Procedure: In order to be sure that apatienthadonly one fibroid type: The uterine fibroid cases were confirmedat the Murtala Muhammed Specialist Hospital, KanoUltrasound Diagnosis Center.

Age: In this study,patients were grouped intofour categories. Those within the ages of 21 -30 years are in group one, 31 -40 years are in group two, 41 -50 years are in group three and 51 -aboveare in group four.

DietLevel: In this study,dietwas determined through ten item questionnaire where the highest score was forty and the lowest was zero, the questionnaire was divided into four groups patients that scored 0 – 10 were considered to have a low caloric diet andwere in group one, patients that

scored 11- 20 has moderate caloric diet, and in group two, patients that scored 21 – 30 were considered to have a high caloric diet, and in group three while patients that scored 31 – 40 were considered to have a very high caloric diet and in group four.

Stress Level: In this study,stresswas determined through ten item questionnaire which was groupedunder four categories; patients that scored 0 – 10 were considered to have low stress level, 11- 20 were considered moderately stressed, 21 – 30 means a high stressed level and 31 – 40 is considered a very high stressed level.

3.10 Data Analysis

- The Data collected was analyzed using SPSS version 17. Descriptive statistics of frequency count and percentage were used to describe the answers from patient'sbio data and the research questions. Chi square Analysis was used to test the formulated hypotheses whileANOVA was used to find out if the established correlates of uterine fibroid growth significantly differ or not.All hypotheses were tested at 0.05 level of confidence.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The study investigated correlates of uterine fibroid growth among patients in Murtala Mohammed Specialist Hospital Kano. Presented in this chapter are the results and discussion of findings.

4.2 Results

Theresults of the study are presented as follows:

Table 4.2.1: Respondents' Bio Data.

Variables	frequency	percentage
Age:		
20-30years	29	29.0%
31-40years	48	48.0%
41-50years	17	17.0%
51 and above	6	6.0%
Total	**100**	**100**
Obesitystatus:		
Overweight	99	99.0%
Obese	1	1.0%
Total	**100**	**100**
Resting blood pressure:		
Low blood pressure	2	2.0%
Ideal blood pressure	37	37.0%
Pre high blood pressure	25	25.0%
High blood pressure	36	36.0%
Total100100		
Familyhistory:		
No history of fibroid	43	43.0%
History of fibroid	57	57.0%
Total100100		

Table4.2.1, shows the bio data characteristics of the respondents. A total number of 100 respondents were used for this study. The table reveals that the respondents with ages between,21-30 were 29 (29.0%), ages 31-40 were 48 (48.0%), ages 41-50 were 17 (17.0%) and age 51 and above were 6 (6.0%). The obesity status of therespondent'sshows that 99 (99.0%) respondents were overweight and only 1 (1.0%) was obese. The table also revealed that the resting blood pressure of 2 (2.0%) of the respondents was low, 37 (37.0%) of the respondents had an ideal blood pressure, 25 (25.0%) had pre-high blood pressure while 36 (36.0%) respondents' blood pressure was high. 43 respondents representing 43.0% had no family history of uterine fibroid while 57 respondents, representing 57.0% had family history of uterine fibroid.

Sub hypothesis 1: Age is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano

Table4.2.2 χ^2Summary of patients'Age as a correlate of fibroid growth

Age (yrs)	21-30	31-40	41-50	51+	Total	df	χ^2	p
FO	29	48	17	6	100	3	38.800	0.001
FE	25.0	25.0	25.0	25.0				

χ^2tab. = 7.82 df = 3 ($p < 0.05$)

Table4.2.2,shows that, most of the patients were between the ages of 21 – 40, which is considered a high reproductive age. The table also explains the χ^2 value to be 38.800 at df 3 and $p< 0.05$, which simply means that age is a significant correlate of uterine fibroid growth, the null hypothesis is hereby rejected. It shows that uterine fibroid is a disease of the younger age group of women.

Sub hypothesis 2: level of obesity is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.

Table 4.2.3:χ^2Summaryof obesity level as a correlate ofFibroid growth

O.L:	underweight	normal weight	over weight	obese	Total	df	χ^2	p
FO	00	00	99	1	100	3	94.040	0.001
FE	25.0	25.0	25.0	25.0				

χ^2 **tab**= 7.82, df =3 ($p < 0.05$)

Table4.2.3,shows that none of the respondents was under weight and none had a normal healthy weight, while 99 respondents were overweight and only 1 respondent was obese. The χ^2 value is 96.040 at df 3 and p< 0.05, these means that being overweight is a significant correlate of uterine fibroid, therefore the null hypothesis is rejected.

Sub-Hypothesis 3: High Blood pressure is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.

Table 4.2.4:χ^2Summaryof Blood Pressure as a correlate of fibroid growth

Blood Pressure	Low	Ideal	Pre high	High	Total	df	χ^2	p
FO	2	37	25	36	100	3	31.760	0.001
FE	25.0	25.0	25.0	25.0				

χ^2tab= 7.82 df = 3, ($p < 0.05$)

Table 4.2.4shows that 2 respondents' blood pressure was low, 37 respondents had ideal blood pressure, 25 respondents were in pre high blood pressure state while 36 respondents had high blood pressure. The summary of the chi square shows that the χ^2value is 31.760 at df of 3 and p<0.05. This indicates that highblood pressure is a significant correlate of uterine fibroid growth,

therefore the null hypothesis earlier stated is rejected. This means that pre high blood pressure and high blood pressure predispose women to uterine fibroid.

Sub-Hypothesis 4: Family history of uterine fibroid is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.$\chi2$

Table 4.2.5:χ^2Summaryoffamily history as a correlate of fibroid growth

Family history	No History of Fibroid	Have History of Fibroid	Total	df	χ^2	p
FO	43	57	100	1	1.960	0.162
FE	50.0	50.0				

χ^2 **tab**=3.8 df = 1 (p = > 0.05)

The table 4.2.5shows that 43 out of the respondents had no history of uterine fibroid, while 57 had family history of uterine fibroid. With a χ^2value of 1.960 at df 1 p>0.05, the null hypothesis which states that family history of uterine fibroid is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano, is accepted.

Sub hypothesis 5: Physical activity level is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.

Table 4.2.6:χ^2 Summaryof patients'physical activity level as a correlate of fibroid growth

Physical activity	Low	Moderate	High	Very high	Total	df	χ^2	P
FO	58	17	13	12	100	3	58.640	0.001
FE	25.0	25.0	25.0	25.0				

χ^2tab=7.82 df = 3 (p< 0.05) sig

Table4.2.6, shows that 58 respondents had low physical activity level, 17 had moderate physical activity level, 13 respondents' physical activity level was high and 12 respondents physical activity level was very high. This means that, most of the respondents had low physical activity

level. With χ^2 of 58.640, at df of 3 and p<0.05, physical activity level is a significant correlate of uterine fibroid growth, thus the null hypothesis is rejected. Inactivity is thus shown to be a correlate of uterine fibroid among women.

Sub hypothesis 6: Diet is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.

Table 4.2.7: χ^2 summary ofpatients'diet level as a correlate of fibroid growth

Diet (caloric)	Low	Moderate	High	Very high	Total	df	χ^2	P
FO	0.0	13	69	18	100	3	57.620	0.001
FE	25.0	25.0	25.0	25.0				

χ^2tab= 7.82 df = 3, ($p<0.05$)

Table 4.2.7, shows that none of the respondents had a low caloric diet, but 13 respondents had moderate caloric diet, 69 had high caloric diet and 18 had a very high caloric diet. This means that respondents with high caloric diet were more. With a χ^2 value of 57.620 at df of 3 and p<0.05, diet is a significant correlate of uterine fibroid growth. Therefore, the null hypothesis is rejected. High caloric diet predisposes women to uterine fibroid growth.

Sub hypothesis 7: Stress level is not a significant correlate of uterine fibroid size among patients in Murtala Muhammad Specialist Hospital, Kano.

Table 4.2.8: χ^2 summaryofpatients'stress levelas a correlate of fibroid growth

Stress	Low	Moderate	High	Very High	Total	df	χ^2	P
FO	0.0	14	60	26	100	3	34.160	0.001
FE	25.0	25.0	25.0	25.0				

χ^2 tab = 7.82 df = 3, ($p < 0.05$)

Table 4.2.8, shows that none of the respondents had low stress level, 14 respondents were moderately stressed, 60 respondents were highly stressed and 26 were very highly stressed. This means that respondents that were highly stressed were more. The summary of the Chi Square shows a χ^2value of 34.160 at df 3 and p<0.05, which means that the level of stress is a significant correlate of uterine fibroid growth. Thus the null hypothesis earlier stated is therefore rejected. This means that the more stressed women are, the higher their risk of developing uterine fibroid.

Sub hypothesis 8: There is no significant difference among the correlates of uterine fibroid growth in Murtala Muhammed specialist hospital Kano.

Table 4.2.9 Summary of ANOVA on differences among fibroid correlates

Fibroid correlates	Sum of squares	df	Mean square	F	Sig
Between groups	44.611	6	22.306	4.857	.010
Within groups	445.429	93	4.592		
Total	490.040	99			

F_{tab} = 3.07 df 6, 93 p< 0.05

Table 4.2.8 shows summary of ANOVA in which F=4.857, df= 6, 93 at p<0.05. This means that there is a significant difference among the correlates of uterine fibroid growth in Murtala Muhammed Specialist Hospital Kano.

Table 4.2.10: ScheffePost Hoc Test on Fibroid Correlates

Correlates		Mean difference	Std. Error	Sig	95% interval Lower bound	Confidence upper bound
Physical activity	BMI	-1.667	.793	.116	-3.64	.31
	BP	**-2.238***	.729	.011	-4.05	-.42
	Diet	.211	.205	.306	-20	.62
	Stress	-143	.214	.506	-57	.25
	Family History	-199	.184	.521	-.48	.25
	Age	-337	.312	.283	-.96	.28
BMI	Physical activity	1.667	.793	.116	-.31	3.64
	BP	-.571	.493	.513	-1.80	.65
	Diet	.211	.205	.306	-20	.62
	Stress	-143	.214	.506	-57	.25
	Family History	-199	.184	.521	-.48	.25
	Age	-337	.312	.283	-.96	.28
BP	Physical activity	**2.238***	.729	.011	.42	4.05
	BMI	.571	.493	.513	-.65	1.80
	Diet	.211	.205	.306	-20	.62
	Stress	-143	.214	.506	-57	.25
	Family History	-199	.184	.521	-.48	.25
	Age	-337	.312	.283	-.96	.28
Diet	Physical activity	-211	.205	.306	-20	.62
	BP	-571	.493	.513	-1.80	.65
	BMI	.571	.493	.513	-.65	1.80
	Stress	-143	.214	.506	-57	.25
	Family History	-199	.184	.521	-.48	.25
	Age	-337	.312	.283	-.96	.28
Stress	Physical activity	.143	.214	.506	-57	25
	BMI	-571	.493	.513	-1.80	.65
	BP	.571	.493	.513	-.65	1.80
	Diet	.211	.205	.306	-20	.65
	Family History	-199	.184	.521	-.48	.25
	Age	-337	.312	.283	-.96	.28

Correlates		Mean difference	Std. Error	Sig	95% interval Lower bound	Confidence upper bound
F.H.	Physical activity	.199	.793	.116	-31	3.64
	BMI	-571	.493	.513	-1.80	.65
	BP	.571	.493	.513	-.65	1.80
	Diet	.211	.205	.306	-20	.65
	Stress	-143	.214	.506	-57	.25
	Age	-337	.312	.283	-.96	.28
Age	Physical activity	.337	.312	.283	-96	.28
BP		-571	.493	.513	-1.80	.65
BMI		.571	.493	.513	-.65	1.80
	Diet	.211	.205	.306	-20	.65
	Stress	-143	.214	.506	-57	.25
	Family History	-199	.184	.521	-.48	.25

Table 4.2.10 shows that difference exists between physical activity and blood pressure (BP). It also shows that the mean difference of BP is higher than that of physical activity. Hence, BP is a more significant correlate of uterine fibroid growth than other correlates.

Thus the hypothesis is rejected since there are significant differences in the correlates of uterine fibroid growth.

Discussion

This study investigated correlates of uterine fibroid growth among patients in Murtala Muhammad specialist hospital Kano.The findings revealed that patient's age is a correlate of uterine fibroid growth as most cases, 77 percent occurred between 21 and 40years of age.This is in line with the retrospective study byOlotu et. al. (2008), onage related prevalence of uterine fibroids in south-southern Nigeria. They reported that a comparative analysis of the percentage incidence of uterine fibroid within the study period showed that occurrence of fibroid increased

from 1.8percent in 2004 to 3.5percent in 2007 for the 16–25 years age group, 48.8 percent in 2004 to 51.9 percent in 2007 for the 26–35 age group and a decrease from 49.4 percent in 2003 to 44.6 percent in 2007 for the 36–45 years age group. In this study patients' between the ages of 21 – 40years had higher cases of uterine fibroid. The findings of this study, is also in agreement with the findings of Marivate and Siebert (2007) on leiomyomata of the uterus who concluded that between five and twenty percent of women over the age of thirty-five are diagnosed with fibroids, and the peak incidence of fibroids uterus in women is between thirty-five and forty-five years of age.The findings of this study, reinforces the findings of a similar study carried out by Bizjak, Turkanović, But (2016), on prevalence and risk factors ofUterine Fibroids in North-East Slovenia,where the mean age of the participants was42.4 years. Fibroids were found in 21.2% of participants (195 women),of these 63.6% were newly discovered (124 women); it was concluded that Age of the patients was significantly associated with the prevalence of fibroids, since the prevalence of fibroids was lower in women who wereyounger than 35 years and prevalence of fibroids increased from6.7% in patient from the young group (<35 years) to 33.3% in womenbetween 36-45 years of age and to 60% in the age group of 46-56 years. The findings of this study is also in line with the opinion of Elugwaraonu, et al,(2013) who carried out a 5 years retrospective analysis, on the incidence and age distributions of uterine fibroid among reproductive age women presenting at the gynecology department of Irrua Specialist Teaching Hospital (ISTH), in Edo state, Nigeria, from January 2008 to December 2012.Overall, 4536 case files were reviewed among which 896 were positive for uterine fibroid; giving a prevalence of 19.75%. Specifically, the year 2012 recorded the highest incidence of uterine fibroid (23.59%), followed by the year 2008 (23.36%), 2009 (19.78%), 2011 (18.91%) and 2010 (14.56%) respectively. Women within 26 – 35 years were significantly

affected in all the years under study, with an incident rate of 66.96%, while older women (>35) and those younger (<26), presented an incident rate of 29.58% and 3.46% respectively. It was concluded that the high incidence of uterine fibroid among women within the 26-35 age range might be related to thehigh exposure to other risk factors such as reproductive tract infections and abortion considering their involvement in risky social behaviors.

The current study showed that obesity is a significant correlate of uterine fibroid growth, in which 100percent of the patients are either obese or overweight. This agrees with the findings of Eric et al (2012), in their study on relationship between obesity and uterine fibroid among Ghanaian women. Out of the 216 patients confirmed with fibroid, 37.0 percent (80) and 45.4percent (98) were found to be overweight and obese respectively, which showed that obesity is a major risk factor for leiomyomas.This study is also in line with the study of Bizjak, et al. (2016), on prevalence and risk factors ofUterine Fibroids in North-East Slovenia, results showed that theprevalence of fibroids was higher (27.4%) in women with BMI between25 and 29.9 kg/m2 than in women with a BMI between 18.5 to 24.9 kg/Average body mass index (BMI) of women with fibroids detected in the study was, 25.8 kg/m2, while BMI of women without fibroidswas 24.7 kg/m2. Women with fibroids had a 1.2 kg/m2 (95% CI: 0.4-1.9) higher BMI than women without fibroids (t (919) = -3.0, p=0.003).Women were divided into four categories based on their BMI score;comparison of individual categories of BMI showed that women witha BMI of 25 kg/m2 to 29.9 kg/m2 had a higher prevalence of fibroids(27.4%), than women with a BMI of 18.5 kg/m2 to 24.9 kg/m2 (17.6%); it was concluded that that fibroids are more frequent in obese women.In a case-control study ofKong, et al.(2014), on association of hyperglycemia, hyperlipemia with the Risk of Uterine Leiomyomata it was discovered that Women with uterine leiomyoma had significantlyhigher levels of BMI

compared withcontrol patients and suggested that a controlled BMI may reduce uterine leiomyomarisk among premenopausal women; this is also in line with the findings of this study. However, the findings of the current study is in contrast with Babah, Oluwole and Afolabi (2014), who carried out a retrospective study on 169 women to determine the relationship between obesity and development of uterine leiomyomata in Lagos. They discovered that obesity does not appear to influence growth of uterine leiomyomata; but it was, however, found that obesity is a risk factor in the development of post operative complications, in which 83.78percent of those who developed post operative complications were obese.

The current study found High Blood Pressure to be a significant correlate of uterine fibroid growth. This agreed with Boynton, et. al, (2005), who did a prospective study of hypertension and risk of uterine leiomyomata, considering relation among diastolic (and systolic) blood pressure, antihypertensive medication use and risk for clinically symptomatic uterine fibroid tumors. The prospective data demonstrated a dose-response relation between diastolic blood pressure and fibroid incidence, with higher blood pressure associated with increased fibroid risk. For each 10-mmHg increase in blood pressure, the multivariate relative risk was elevated 8 percent (range: 5–11 percent) and 10 percent (range: 7–13 percent) among antihypertensive medication nonusers and users, respectively, indicating a sizeable association with blood pressure that is independent of body mass index, oral contraceptive use and reproductive history. Hypertensive women were 24 percent (range: 11–41 percent) more likely to report fibroids compared with non hypertensive women. Risk for fibroids increased with duration of hypertension and these data supported the idea that atherogenesis is a significant component of a multifactorial etiology of uterine fibroid development and/or growth. The findings of Oudman, Haan, Ankum and Brewster (2013), on High blood pressure in womenwith uterine

fibroids,where the independent association between uterine fibroids and hypertension was assessed and found the prevalence of high blood pressure was significantly higher in women with fibroidscompared to women admitted for other surgery and population controls, respectively; this is in conformity with the finding of this study. another finding that agrees with this study, is the results from the study ofLuoto,Rutanen andAuvinen (2001) on fibroids and hypertension. A cross-sectional study of women undergoing hysterectomy.Women with fibroids were significantly younger and frequent among hypertensive (42%) than normotensive (37%) women. In logistic regression analysis, fibroids were statistically significantly associated with hypertension (OR 1.8, 95% CI 1.2-2.7). The association between myomas and hypertension was strongest (OR 3.6, 95% CI 1.2-10.9) among women with hysterectomies for benign tumors, it was concluded that Uterine fibroids tumors shares pathogenic features with the development of hypertension.

Family History of uterine fibroid was found not to be a significant correlate of uterine fibroid growth in this study. This might be due to the fact that, most people in the study area may have little knowledge of uterine fibroid, poor record keeping in hospitals, the fact that myomectomy was not common in this part of the world, family secrecy and because uterine fibroid was also viewed as a sleeping pregnancy in Kano. This is surprising, since various studies stated otherwise. According to Alam, et. al, (2001), in the late 1980s, a series of Russian studies provided further evidence for familial aggregation of uterine leiomyomas: sisters, daughters, and mothers of affected probands had a 2.3-, 2.0, and 1.6-fold increased risk for uterine leiomyomas, respectively, over the general population. Additional evidence for the heritability of uterine leiomyomas can be inferred from hysterectomy data in the Australian twin registry. A 1992

analysis of this data revealed that the twin-pair correlation for hysterectomy in monozygous twins ($r = 0.65 \pm 0.05$) was twice that of dizygous twins ($r = 0.32 \pm 0.09$), wholly consistent with the expected rates for a genetically influenced trait (Treloar, 1992). The results of a study by Khali, Ali and Hakeem, (2014), on Fibroid; frequency and factors. Also contradict the findings of this study; it was concluded that, Family history of fibroid was found in 51 (42.1%) women, out of which fibroid was found positive in 30 (58.8%) women, which was the most common factor leading to fibroid in the study.In a Japanese study of 140 women by Sato, Mori and Nishi,(2002), with uterineleiomyomas and 288 age- matched controls, theincidence of positive first- degree family historyamong the cases was significantly greater thanamong the controls (31.5% versus 15.2%, respectively; which also contradict the findings of this study. But Okolo, et. al, (2005), concluded that it is also possible that heritability of uterine fibroids may be modulated by nongenetic factors and so result in varying incidence of familiality in different environments. Thus, a recent Finnish twin-pairs study has demonstrated that reproductive and anthropometric factors may play as significant a role in fibroid pathogenesis as genetic factors.

The result of this study showed that physical inactivity is a significant correlate of uterine fibroid growth and it agreed with the study of Baird, David, Michael, Cousins and Joel, (2006), which showed a decreased development of uterine fibroids in both African-American women and white women who were in the upper third of the physical activity distribution (estimated to be equivalent to at least 4 hours of vigorous activity per week), with analyses controlled for BMI, which was an important risk factor for African-American women but not white women. The current study is also in line with the study of Wyshak, Frisch, Albright, Albright and Schiff(1986), who found a reduced risk of self reported fibroids among women who had been

college athletes compared with college-educated women who did not participate in collegiate athletics.The result of this study is also in line with the conclusion of Yuan, et al. (2013), in a study published by Peking University in China on the association between physical activity and fibroids. They found that women who participated in moderately intense occupational activities (physical activity at work) had a significantly lower risk of developing fibroids.

This study also found out if diet is a significant correlate of uterine fibroid growth. The results showed that diet is indeed a correlate of uterine fibroid. This is not surprising as Peter (2011), stated that, a woman's diet can also be a contributing factor in her developing fibroid. Women, who consume a diet of fried food, red meat and food laced with harmful chemicals, can put themselves at risk of developing uterine fibroids.

The finding of this study also agrees with,Radin,et al. (2010), who discovered various risks associated with fibroids, including glycemic index (GI), an indicator of a food's insulin demand, quantified the capacity of food to raise postprandial (after a meal) blood glucose concentrations Glycemic load (GL). The product of food's GI multiplied by grams of carbohydrate in a serving, provides a more complete measure of the portion's effect on postprandial blood glucose. Positive associations of GI were observed with fibroid risk overall and of GL with fibroids in younger women. The finding is also in line with the study ofNagata, et al. (2009), who carried out a study on association of intakes of fat, dietary fiber, soya isoflavones and alcohol with uterine fibroids in Japanese women. They discovered that alcohol intake showed a significant positive association with uterine fibroids; alcohol may have an oestrogenic action on the uterine myometrium. But the study failed to find significant associations between fibroids and intakes of fats and dietary fibre; which is in contrast with this study.However the findings ofBani,

Hasanpour, Jalali, Ebrahimi and Mamaghani (2013), in a study on leiomyoma and nutrition, contradict the findings of this study. They used 200 leiomyomato persons in case group and 200 persons without leiomyoma in control group that were matched in age and parity, the results showed that the mean scores of the two groups in terms of nutrition were not significantly different. There was no relationship between fat, soya or high-fiber diet and uterine myoma, but alcohol increased the risk of myoma.

Stress in this study was revealed to be a significant correlate of uterine fibroid growth. As stated by Lark (1986), stress can have a negative effect on all kinds of diseases. Physiologically, stress increases the cortisone output from the adrenal glands, which impairs immune functions. When this happens, blood pressure, heart rate and hormonal balances can escalate. This can upset the estrogen balance in women consequently triggering excessive output of adrenal stress hormones. The result is that the body is unable to limit the scarring and swelling caused by the endometrial implants, resulting in fibroid tumors growing during times of stress. Similarly another finding that is in support of the findings of this study is that of Atkinson (2008), who stated that modern reports have indicated a strong hyperlink among substantial stress amounts to worsening of signs and symptoms and the true development of fibroidswhen combined with other potent elements that cause toxin to build up.An insufficient diet regime and insulin resistance and anxiety can make fibroids considerably worse. However a contradiction to the findings of this study, is the study of Yuan, et al. (2013), onassociations between uterine fibroids and lifestylesincluding diet, physical activity and stress:a case-control study in China, No association was found between fibroidsand stress, depression or feelings of anxiety.

The findings of this study shows a significant difference between blood pressure and physical activity, this may be due to the fact that most patients in the study, has a low physical activity level, are mostly pre-hypertensive or hypertensive and are scared of engaging in any form of exercise.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

This study investigated correlates of uterine fibroid growth among patients in Murtala Muhammad specialist hospital, Kano. To achieve the purpose of the study, seven research questions were raised and seven hypotheses were also tested. The descriptive survey design was adopted for the study. The population for the study comprised the entire uterine fibroid cases in Murtala Muhammad specialist hospital, Kano while the sample of 100 respondents were selected through purposive sampling of both the in and out patients with only one type of fibroid. The instrument used for this study are digital sphygmomanometer for measuring patients' blood pressure(systolic and diastolic), portable weighing scale to measure patients' body weight and stadiometar tape to measure height. Data was also collected using a self developed questionnaire soliciting response on, age, BMI, resting blood pressure, family history of uterine fibroid, diet and stress level and a modified WHO global physical activity questionnaire was adopted to check physical activity level of respondents. In this study, the bio data of the respondents collected were organized and described using frequency count and percentage while the formulated hypotheses were tested using chi- square, at 0.05 level of significance. The findings of the study revealed that Age, Obesity, High Blood pressure, Physical activity level, High caloric diet and High stress level are all significant correlate of uterine fibroid growth, however family history was found not to be a significant correlates of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.

5.2 Conclusions

Based on the findings of this study the following conclusions are drawn:

- Age is a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano. Because young mothers are found to be more at risk of uterine fibroid growth.
- Obesity (BMI)is a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano. Gaining excess weight is a predisposing factor to uterine fibroid growth.
- High Blood pressure is a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.
- Family history of uterine fibroid is not a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano. Not everyone inherit uterine fibroid.
- Physical activityis a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano. Active mothersare free from uterine fibroid growth.
- High caloric Diet is a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.
- High Stress is a significant correlate of uterine fibroid growth among patients in Murtala Muhammad Specialist Hospital, Kano.

5.3 Recommendations

The following recommendationsare made based on the findings of the study:

- Women especially those in their high reproductive age should be encouraged and enlightened to modify their diet through the media or during hospital visit because of the influence of high caloric diets on uterine fibroid growth.
- Women should also try to maintain a normal blood pressure and an ideal weight through engaging in active physical activities like brisk walking, jogging and other forms of physical activities including domestic (home) activities
- Women should learn to control their emotional problems especially on family issues, as this also posses stress with the view of preventing uterine fibroid growth.
- In order for uterine fibroid growth to be controlled or prevented, government and non governmental agencies should organize periodic seminars, lectures, workshops, enlightenment programs for, especially medical personnel, on current trends of uterine fibroid and the best approach needed in counseling women about possible correlates of uterine fibroid growths.

5.4 Recommendation for Further Studies

- It is also recommended that future researchers should look into the aspect of uterine fibroid growth not covered in this study, like contraceptive usage and fibroid growth. This is because this present study does not claim exhaustive coverage on the issue of uterine fibroid growth.

References

Abiodun, O. O.& Francis, B. (2012). Surgical Management of Uterine Fibroids at Aminu Kano Teaching Hospital. Obstetrics and Gynecology International, (10)1155-1177

ACOG Technical Bulletin. (1994). An Educational Aid to Obstetrician Gynecologists. Uterine Leiomyomata, *(192) 863-870.*

Adam,M. G. (2012). Fibroids and reproductive functions.*American Journal ofEpidemiology.; 143:228–239.*

Alam, N.A., Bevan, S., Churchman, M.,Barclay, E., Barker, K., Jaeger, E.E., Nelson, H. M., Healy, E., Pembroke, A.C.& Friedmann, P.S.(2001). Localization of a gene for multiplecutaneous leiomyomata and uterine fibroids toChromosome. *American Journal of Human Genetology. (68), 1264-1269.*

Aradhana, K . & Lumsden, M. A. (2008). Impact of fibroids on reproductive function. *Best Practice & Research. Clinical Obstetrics and Gynaecology. 22, (4) 749–760.*

Akinyemi, B.O., Akinyemi, B.O., Adewoye, B.R.& Fakoya, T. A. (2004).Uterinefibroid: A review. *Nigeria Journal of. Medicine;* 13(4): 318 –329

Atkinson, G. (2008). Uterine Fibroids and Stress. Ezine Articles United Kindom http://ezinearticles.com (Retrieved 6th November 2014).

Augustus, C.E. (2002). Beliefs and perceptions of African-American women who have had hysterectomy. *Journal of Transcultural Nursing, 13(4):296-302*.

Babah, O. A., Oluwole, A. A. & Afolabi, B. B.(2014). Effects of obesity on the development of uterine leiomyomata: a retrospective study of 169 women who had myomectomy in southern *Nigeria. Journal of Dental and Medical Sciences 13(3):74-78.*

Baird, D. D., David, B., Michael, D. C., Cousins, D.& Joel, M. S. (2006). Association of Physical Activity with Development of Uterine Leiomyoma*American Journal. Epidemiology.165 (2): 157-163.*

Baird, D. D.& Dunson, D. B.(2010). Why is Parity Protective for Uterine Fibroids? *Journal of Epidemiology 14 (2) 247–25.*

Baird, D. D., Hill M. C., Schectman, J. M.& Hollis, B. W.(2013). Vitamin D and the risk of uterine fibroids. *American JournalofEpidemiology*; 24(3):447-453.

Bani, S., Hasanpour, S., Jalali, S., Ebrahimi, H.& Mehrangiz, E. M., (2013).Leiomyoma and Nutrition, a Case-Control Study. *InternationalJournal of Women's Health and Reproduction Sciences. 1(1) 174-186.*

Best, J. W. & Khan, J. V.,(2010). Research in Education. 10th Edition PHI Learning Private Limited, New Delhi, India. 13

Bijan, J. B., Wanda, K. N., Bradley, L.& Stewart, E. A., (2013). The impact of uterine leiomyomas: a national survey of affected women. *American Journal of Obstetrics and Gynecology*, 209 (4): 319-325.

Bizjak, T., Turkanović, A.B., But, I., (2016). Prevalence and Risk Factors of Uterine Fibroids in North-East Slovenia. *Journal of Gynecology and Obstetrics (Sunnyvale) 6 (1) 350-363.*

Boynton, J., Edwards, J. R., Malspeis, S., Missmer, S. A.& Wright, R., (2005). A Prospective Study of Hypertension and Risk of Uterine Leiomyomata. *American Journal of Epidemiology 161(7) 54-68.*

Brindles, L. M.& Winnie, Y.,(2016).Fibroids Health line Media

Buttram, J. V. & Reiter, R. C., (1981). Uterine leiomyomata: Etiology, symptomatology, and management. Fertility Sterility Journal, 5 (36):433-445.

Cabot, S., (1990). *Women's health*. London: Pan Books.

Centre for Diseases Control and Prevention, (2004). Program operations guidelines for STD prevention: community and individual behavior change interventions. htt://www.cdc.gov/std/program/community/9-PGcommunity.htm

Chiaffarino, F., Parazzini, F., La Vecchia, C., Chatenoud, L., Di Cintio, E.& Marsico, S.,(1999). Diet and uterine myomas. *Obstet Gynecol.;94:395 8*. Hypertension, obesity and fibromyomata uterine, as a syndrome. *Arch ofInternal Medicine 128:750–4.*

Coddington, C.C., Collins, R.L., Shawker, T. H., Anderson, R., Loriaux, D.L.,&Winkel, C. A., (1986).Long-acting gonadotropin hormone-releasing hormone analog used to treat uterine fibroid. *Fertility Sterility, 45:624-9.*

Cramer, S. F., & Patel, A., (1990). The frequency of uterine leiomyomas. *American Journalof Clinical Pathology, 8(94) 435-448.*

Crowe, M.& Reider, D., (1998). *Our bodies, ourselves for the new century*. Boston: Women's Health Book Collection.

Coronado, G. D., Marshall, L.M.& Schwartz, S.M., (2000). Complications in pregnancy, labor and delivery with uterine leiomyomas: a population-based study.*Obstetric Gynecology; 95: 764–769.*

D'Aloisio, A. A., Baird, D. D., DeRoo, L.A.& Sandler, D. P., (2010). Association of intrauterine andearly-life exposures with diagnosis of uterine leiomyomata by 35years of age in the Sister Study. *Environmental Health Perspectives*, 118(3):375-381.

D'Aloisio, A. A., Baird, D. D., DeRoo, L. A.& Sandler, D. P., (2012). Early-life exposures and early- onset uterine leiomyomata in black women in the Sister Study. *Environmental Health Perspectives*, 120(3):406-412.

Davis, B. J.& Davis, B., (2007). Uterine leiomyoma longitudinal interventions studies: the fibroid growth. Presented at National Institutes of Health 2nd International Congress on Advances in Uterine Leiomyoma Research, http://orwh.od.nih(Retrieved 6th November 2014).

Davis,B. J., Haneke, K. E., Miner, K., Kowalik, A., Carl,B., Peddada, S.,& Baird, D. D., (2009) The Fibroid Growth Study:Determinants of Therapeutic Intervention.*Journal of Women's Health 18 (5):725-732*

Dennerstein, L., Shelley, J., Smith, A.& Ryan, M., (1994). Hysterectomy experience among midaged Australian women. *Medical Journal of Australian University, 3:161-165; 311- 313.*

DeWaay, D. J., Syrop, C.H., Nygaard, I. E., Davis, W. A., Van Voorhis, B. J., (2002). Natural history of uterine polyps and leiomyomata. Journal of obstetric gynecology 100 (1) 3–7.

Digna, R., Velez, E., Baird, D. D.& Hartmann, K. E., (2013). Association of Age at MenarcheWith Increasing Number of Fibroids in a Cohort of WomenWho Underwent Standardized Ultrasound Assessment. *American Journal of Epidemiology Advance Access. 6 (5)241-262.*

Eduardo, F. M.& Neil, B. R., (2001). Risk Factors for Uterine Leiomyoma: A Practice-based Case-Control Study. II. Atherogenic Risk Factors and Potential Sources of Uterine Irritation. *American Journal of Epidemiology 153,(1) 11-19.*

Elugwaraonu, O., Okojie, A. I.O., Okhia, O.& Oyadoghan, G. P., (2013). The incidence of uterine fibroid among reproductive age women: A five year review of cases at isth, irrua, edo, Nigeria. *International Journal of Basic, Applied and Innovative Research (IJBAIR), 2(3):55 – 60.*

Emembolu, J .O., (1987). Uterine fibromyomata: presentation and management in northern Nigeria. *International Journal of Gynaecology Obstetics;25:413-16.*

Emmanuel, O. W., Henry, N.T., Muchiri, L. W., Sekadde, C. K.& Dominic, W.M.,(2002). Progesterone, estradiol and their receptors in leiomyomata and the adjacent normal myometria of black Kenyan women. African journal of health sciences 9 (3-4)123-128.

Eric, K. O., Asante, M., William, K. A., Jerry, C., Edmund, K. B., Dzefi-Tettey, K., Hewlett, K. V. & Addo, P.,(2012). Relationship Between Obesity and Leiomyomas Among Ghanaian Women.*Journal of Medical and Applied Biosciences (4*), www.cenresinpub.org

Evans, P. & Brunsell, S., (2007). UterineFibroid Tumors: Diagnosis and Treatment *American Family Physician, Volume 75, Number 10:125-135.*

Fibroid relief.org, (2008). Factors that might lead to fibroid growth. http://www.fibroid relief.org/fibroid growth (retrieved 5th September 2015)

Faerstein, E., Szklo,M.& Rosenshein,N. B., (2001). Risk factors for uterine leiomyoma: a practice-based case-control study. I. Atherogenic risk factors and potential sources of uterine irritation. *American Journal of Epidemiology; 153:11–19.*

Fang, R. D., Zhang, X.H., Wang, Q.Y., Lin, Y.Z., Yang, S.P.& Rao, W.N., (2001). Clinical study on the treatment of uterine leiomyoma with Xiao Liu Yiniontophoresis. *Chinese Journal of information on Traditional Chinese Medicine*;12 (8):47–59.

Flake, G.P., Andersen, J. & Dixon, D., (2003). Etiology and pathogenesis of uterine leiomyomas: a review. Environmental Health Perspective;111:1037–1054.

Gallagher, D., Visser, M., Sepulved, D., Pierson, R.N., Harris, T.& Heymsfield, S.B.,(1996). How useful is body mass index for comparison of body fatness across age, sex, and ethnic groups? *American Journal Epidemiology. 143:228–239.*

Glanz, K., Bishop, D.B.,(2012). The role of behavioral science theory in the development and implementation of public health interventions. *Annual Review of Public Health.21:299 418.*

Goldfarb, H. A., (2000). Myoma coagulation (myolysis). Obstetric GynecologyClinic. *North America journal 6 (27) 421-430.*

Halder, S. K., Goodwin, J. S.& Al-Hendy, A., (2011). Dihydroxy vitamin D3 reduces TGFbeta3 induced fibrosis-related gene expression in human uterine leiomyoma cells. *Journal of Clinical Endocrinology Metab;96:E754 E762.*

Howard, R., (2009). A New Treatment Option for Uterine Fibroids University of Maryland School Of Medicine fact sheet.

Ife, O., (2014). Natural Remedies for Fibroids In the Uterus – Infertility TreatmentWomen health/Natural Health Bag.com (Retrieved 3rd December 2014).

Janz, N.K.& Becker, M.H., (1984). The health belief model a decade later. Health education quarterly, 11(1) 1-47

Joong, H. L., Errol, R. N.& Shaw, J., (2010). Contemporary Management of Fibroids in Pregnancy. *Reviews in obstetrics & gynecology. 3(1)50-64*

Jump, D.B., Clarke, S.D., Thelen, A., Liimatta, M., Ren, B.& Badin, M. V., (1997).Dietary fat, genes, and human health. *Adv Exp Med Biol.;422:167-76.*

Katz, V.L., Dotters, D. J.& Droegemeuller, W., (1989). Complications of uterine leiomyomas in pregnancy. *Obstetric Gynecology; 73: 593–596.*

Kerlinger, M., (1973). Survey research: Determining sample size and representative response. Business Education Forum. *Information Technology, Learning and Performance Journal, 19,(1), 3134.*

Khalil, M., Ali, L. & Hakeem, N.,(2014). Fibroid; frequency and factors. *Professional Medical Journal 21(4): 639-643*

Kong, S., Jianqing, H., Min, X., Ying, Y., Anli, X.& Qing, T., (2014). Association of Hyperglycemia, Hyperlipemia with the Risk of Uterine Leiomyomata: A Case-Control Study. Cancer Cell Research 2, 37-41.

Krejcie, R.& Morgan, D., (1970). Determining Sample Size for research activities. *Journal of educational and psychological measurement 30: 607-610.*

Lark, S. M., (1986) Integrative Medicine: Stress Reduction for Relief of Fibroids & Endometriosis (Extracted from The Fibroid Tumors & Endometriosis Self Help Book, Celestial Arts) http://www.healthy.net/Health/Article/Stress(Retrieved 6th November 2014).

Laughlin, S. K., Schroeder, J. C.& Baird, D. D., (2010). New directions in the epidemiology of uterine fibroids. *Semin Reprod Med.*;28(3):204–217.

Ligon, A.H.& Morton, C. C., (2001). Leiomyomata: heritability and cytogenetic studies. Harvard Medical School. *Human Reproductive Update* 7(1):8-14.

Luoto,R., Rutanen, E.M., Auvinen, A., (2001). Fibroids and hypertension. A cross-sectional study of women undergoing hysterectomy.JOURNALReproductive Medicine. 46(4):359-64

Marivate, M.& Siebert, T. I., (2007). Leiomyamata of the uterus. In *Clinical Gynaecology,*. (3rd edition) Cape Town: Juta: 201-210.

Marshall, L.M., Spielgelman, D.& Barbieri, R., (1997). Variation in the incidenceof uterine leiomyoma among premenopausal women by age and race. Obstetrics andGynaecology, 10 (90) 967-973.

Mayo Clinic, (2013)."Uterine fibroids have significant impact on quality of life, workplace performance." ScienceDaily. www.sciencedaily.com (Retrieved 5Th June 2014).

Mc Cormack-Brown, K. (1999). Health belief model. http://hsc.usf.edu/kmbrown/health-belief model

Meniru, G.I., Wasdahl, D., Onuora, C.O., Hecht, B.R.& Hopkins, M. P., (2001).Vaginal leiomyoma co-existing with broad ligament and multiple uterine leiomyomas. Ohio University. *Gynaecological and Obstetric Journal, 265(2):105-107.*

Muhammad, F. G. S., (2013).When Myoma Causes Infertility. *Journal of Natural Sciences Research 3 (4) 95-106.*

Myers, E.R., Barber, M.D., Gustilo-Ashby, T., Couchman, G., Matcher, D.B.& McCroryD, C.,(2002) Management of leiomyomata: what do we reallyknow? *Obstetics Gynecology;100:8-17.*

Nagata, C., Nakamura, K., Oba, S., Hayashi, M., Takeda, N.& Yasuda, K.,(2009). Association ofintakes of fat, dietary fiber, soya isoflavones and alcohol with uterine fibroids in Japanese Women. Britain journal of nutrition 101(10)1427-431.

National Institute of Health (NIH), (2013). Fact Sheet: Uterine Fibroids Research, Rockville MD: NIH Office on Women's Health, http://www.nichd.nih.gov (Retrieved 6th December 2014).

New Health Guide, (2014). Human Estrogen Level. www.newhealthguide.org

Njodi, A. I. & Bwala, W. D., (2007). Skills and techniques of reporting research outcome in health education: Ibadan Loud Books (Publishers)

Office of Research on Women's Health, (2003). Status of research on uterine fibroids (Leiomyomata Uteri) at the National Institutes of Health. InBlaustein's Pathology of Female Genital Tract(5th ed)

Okogbo, F.O., Ezechi, O.C.& Loto, O. M., (2011).Uterine Leiomyomata in South Western Nigeria: a clinical study of presentation, and management outcome.African journal of Health Science, 11(2) : 271-278

Okolo, S., (2008). Incidence, aetiology and epidemiology of uterine fibroids. *Best Practise. Resident Clinical Obstetic and Gynaecology; 22:571-88.*

Okolo. S., Gentry, C.C., Perrett, C.W.& Maclean, A.B., (2005). Familial prevalenceofuterine fibroids is associated with distinct clinical and molecular features. *Human Reproduction 20 (8) 2321–2324, Advance Access*

Olotu, E. J., Osunwoke, E. A., Ugboma, H. A.& Odu, K. N., (2008). Age prevalence of uterine fibroids in south-southern Nigeria: A retrospective study. *Scientific journal ofResearch and Essay 3 (9) 457-459.*

Otieno, D., Parker, R. B.& Thagana, N.G., (2004). Laparoscopic assisted vaginal hysterectomy for benign uterine pathology: it is time to change. *The East AfricanMedicalJournal, 81(5):261-266.*

Palmer, R., Rao, S., Adams-Campbell, L.& Lynn, R., (1999). Correlates ofHysterectomy among African-American Women. *American Journal ofEpidemiology 150 (12)1309 1315.*

Parker, W. H., (2007). Uterine myomas: management. *Journal of Fertility and Sterility 88, 255 -271.*

Peter, G. K., (2000). Obesity as a medical problem. *Nature. 404: 635-643.*

Peter, K., (2011). Fibroids. New York, University Publishers.

Pilot, D. F. & Beck, C. T., (2004). Nursing Research: Principles and Methods. 7th Edition. Philadelphia; Lippincott, Williams and Wilkins

Pokras, R.& Hufnegal, V. G., (1998). Hysterectomies in the United States.*American Journal of Public Health*; 78:852-853.

Proshaska, J.O.& Di Clemente, C., (1986).Towards Comprehensive Model of Change. New York plenum press, 3-27

Qidwai, G.I., Caughey, A. B.& Jacoby, A. F., (2006). Obstetric outcomes in women with sonographically identified uterine leiomyomata. *Obstetric Gynecology; 107: 376–382.*

Rabinovici, J., Inbar, Y., Revel, A., Zalel, Y., Gomori, J. M., Itzchak, Y., Schiff, E.&Yagel, S., (2007). Clinical improvement and shrinkage of uterine fibroids after thermal ablation by magnetic resonance-guided focused ultrasound surgery *Ultrasound Obstetric Gynecol*; 30: 771–777.

Radin, R.G., Palmer, J.R., Rosenberg, L., Kumanyika, S.K., & Wise, L.A., (2010).Dietary glycemic index and load in relation to risk of uterine leiomyomata in the Black Women's Health Study. *The American Journal of ClinicalNutrition*, 91(5):1281-8.

Ravina, J.H., Herbreteau, D., Ciraru-vigneron, N., Bouret, J. M., Houdat, E., Aymard, A. & Merland, J., (1995). Artery Embolisation to treat Uterine myomata.Lancet 57:191-9.

Rice, J. P., Kay, H. H.& Mahony,B.S., (1989). The clinical significance of uterine leiomyomas in pregnancy. American Journal Obstetric Gynecology; 160:1212–1216.

Rimer, B. & Glanz, K.,(2005). Theory at a glance. A guide for health promotion practice. 2nd ed Bethesda, Maryland, US Department of Health and human Service.
http://www.cancer.gov/pdf.

Robin, L.& Shea, S., (2001). Uterine Fibroids. Intestinal Health InstituteArticle, Schoolfor colon hydrotherapyhttp://www.sheilashea.com/uterine(Retrieved 6th November 2014).

Saul,M., (2013). What is Reliability? the simply psychology http://www.simplypsychology.org/reliability (Retrieved 30th December 2014).

Sato, F., Mori, M., Nishi, M., (2002). Familial aggregation of uterine myomas in Japanese women. Journal ofEpidemiology;12(6): 249-290

Savitz, D.A., Janevic, T.M., Engel, S.M., Kaufman, J.S.& Herring, A. H., (2008).Ethnicity and gestational diabetes in New York City, 1995-2003. *British Journal of Obstetrics and Gynaecology*, 115(8):969–978.

Shelton, A. J., Lees, E.& Groff, J. Y., (2001). Hysterectomy: beliefs and attitudes expressed by African-American. *Ethnicity and Disease*, 4:732-740.

Steinauer, J., Pritts, E. A, Jackson, R. & Jacoby, A. F., (2004). Systematic review of mifepristone for the treatment of uterine leiomyomata. *Obstetrics Gynecology;103:1331-6.*

Stewart, E. A.,(2001). Uterine fibroids. Lancet. 357:293-8.

Strom, B. L., Schinnar, R., Ziegler, E. E., Barnhart, K. T., Sammel, M. D., Macones, G. A., et. al., (2001). Exposure to soy-based formula: Endocrinological and reproductive outcomes inyoung adulthood. *American Journal of Medcine 286(7):807–814.*

Taylor, D. K., Phyllis, C. L., (2012).Treatment for uterine fibroids: Searching for effective drug therapies Therapeutic Strategies Urology 30 (20) 60-74

The Cancer Society, (2011). The Uterious. The Cancer Society's information sheets www.cancernz.org.nz (Retrieved 18th December 2014).

Townsend, D. E., Sparkes, R.S., Baluda, M. C.& McClelland, G., (1970).Unicellular histogenesis of uterine leiomyomas as determined by electrophoresis of glucose-6 phosphate dehydrogenase, *American Journal Of Obstetrics Gynecology*;12 (107) 1168 1173.

Treloar, S. A.,(1992). Pathways to hysterectomy: Insights from longitudinal twin research. *American Journal Obstetrics Gynecology 167:(1):82-88*

Unkels, R., (2012). Gynecology For Less-Resourced Locations*American JournalOf Obstetrics Gynecology; 12 (120) 1068-1073.*

Venkatachalam, S., Bagratee, J.S., Moodley, J., (2004). Medical management of uterinefibroids with medroxyprogesterone acetate (Depo Provera): A pilot study.*Journal of Obstetrics Gynecology; 24:798-800.*

Voogt, M. J., De Vries, J., Willem, F.,Paul, N. M. L.& Peter, F. B., (2008). Sexualfunctioning and psychological well-being after uterine artery embolization in women with symptomatic uterine fibroids. Journal of Fertility and sterility92 (2):756-761.

Walker, C. L., (2002). Role of Hormonal and Reproductive Factors in the Etiologyand Treatment of Uterine Leiomyoma. *The University of Texas, Cancer Center, Department of Carcinogenesis, Science Park-Research Division, Smithville, Texas.*

Williams, H. P., (2007). Uterine myomas: management. Fertility and Sterility 88 (2) 255-271.

Williams, R.D. & Clark, A., (2000). Qualitative study of women's hysterectomy experience. *Journal of Women's Health: Gender-based Medicine, 9th Supplement(2):515-525.*

Williams, V. S., Jones, G., Mauskopf, J., Spalding, J.& DuChane, J., (2006). Uterine fibroids: a review of health-related quality of life Assessment. J*ournal of Women's Health (Larchmt). 5(7) 818-829.*

Wise, L. A., Edward, A. R., Palmer, J. R., Cozier,Y. C., Tandon, A., Patterson, N., Radin, G. R., Lynn, R.& David, R., (2012). African Ancestry and Genetic Risk for Uterine Leiomyomata. *American Journal of Epidemiology 10.1093-1110*

Wise, L.A., Palmer, J. R., Harlow, B. L., Spiegelman, D., Stewart, E. A., Adams Campbell, L.L. &Rosenberg, L.,(2004). Risk of uterine leiomyomata in relation to tobacco, alcohol and caffeine consumption in the Black Women's Health Study. *Human Reproduction 19(8):1746-1754.*

World Health Organization, (2007). Global Physical Activity Questionnaire (GPAQ)Department of Chronic Diseases and Health Promotion, Surveillance and Population-Based Prevention,W HO, Geneva, Switzerland.

Wyshak, G., Frisch, R. E., Albright, N. L., Albright, T. E.& Schiff, I., (1986). Lower prevalence of benign diseases of the breast and benign tumours of the reproductive system among former college athletes compared to nonathletes. *Britain Journal of Cancer.;54:841-5.*

Yakasai, I. A., Bappa, L. A., Ibrahim, S. A., & Abubakar, I, S., (2011).Massive Recurrence of Uterine Fibroids: Case report and Literature Review. *British Journal of Science 46 (2) (2) 2047-3745.*

Yuan, H., Qiang, Z., Shengyong, D., Liqiang, Q., Guowei, L.& Peiyu, W., (2013).Associations between uterine fibroids and lifestyles including diet, physical activity and stress: a case control study in Peking University China. *Asia PacJournal ofClinical Nutrition;22 (1):109-117.*

Zelman, K. M., (2013).The Truth About Detox Diets.http://www.webmd.com/diet/detox-diets (Retrieved 12th February 2015)

Appendix A

Questionnaire

Dear respondent,

I am Hauwa Umar Usman, a student in the Physical and Health Education Department of Bayero University, Kano, carrying out a research on correlates of uterine fibroid growth among patients in Murtala Muhammad specialist hospital, Kano.

This research work is mainly for academic purposes, so all responses will be treated confidential.

Section A: - Is on your bio data.

Section B: - Is on your physical activity level.

Section C: - Is on your eating habit (diet).

Section D: - Is on possible stresses you may have.

Section A: Respondent's Bio data

1.	**Age (yrs)**	
2.	**Height in meters**	
3.	**Weight in kilogram**	
4.	**Resting Blood Pressure**	**Systolic BP-----------------------------mmHg** **Diastolic BP--------------------------mmHg**
5.	**Has any member of your family had fibroid before?**	**Yes** ☐ **No** ☐

SECTION B

Physical activity level

These questions are on time you spend doing different types of physical activity in a typical week. Please answer these questions even if you do not consider yourself to be a physically active person

1a. During the last 7 days, on how many days did you do any **vigorous** physical activities like lifting of heavy objects, aerobics dance, pounding yam, pounding maize to get cereal or fast walking that increases your breathing or heart rate?

Think about only those physical activities that you did for at least 10 minutes at a time.

______________________ days per week

1b. How much time in total did you usually spend on one of those days doing **vigorous** physicalactivities?

_______________hours_______________minutes

I did not do any of the above ☐

2a. Again, think only about those physical activities days that you did for at least 10 minutes at a time at a time. During the last 7 days, on how many did you do **moderate** physical activities like carrying light loads, cleaning the house, doing the laundry and ironing, caring for pre-school children or babies at home, preparing food and washing dishes.

Think about only those physical activities that you did for at least 10 minutes at a time.

______________________ days per week

2b. How much time in total did you usually spend on one of those days doing **moderate** physicalactivities?

_______________hours _______________minutes

I did not do any of the above ☐

3a. During the last 7 days, on how many days did you **walk** for at least 10 minutes at a time?

This includes walking around place of work and at home, walking a long distance like taking children to school and bringing them back home and any other walking e.g. for recreation, sports, exercise or leisure.

______________________ days per week

3b. How much time in total did you usually spend on one of those days **walking**?

_______________hours _______________minutes

I did not do any of the above ☐

4a. During the last 7 days, on how many days did you spend sitting or laying down to relax, discussing, reading or watching television?

______________________ days per week

4b. How much time in total did you usually spend on one of those days doing **4a** above?

_______________hours _______________minutes

I did not do any of the above ☐

SECTION C

Diet information

Please tick the column that best suits your opinion on your diet for the past eight (8) weeks

SN	Questions	Never/lesst han one day per week	One or two days per week	Three to five days per week	Every day or more
1.	Do you eat semovita, tuwo, pounded yam, garri and other solid foods?				
2.	Soy milk, Soy cake (awara) are part of my food.				
3.	I take ice cream, chocolate, popcorn, pancakes and biscuits.				
4.	Ram, goat, cow meat, Fish and chicken are part of my food.				
5.	I take tea (shayi), pap with milk and I also take fura da nono.				
6.	I eat eggs for breakfast, when eating noodles and for baking.				
7.	I eat meat pie, egg roll, puff, fish Roll doughnut Beef burgers, shawema, pizza and samosa as snack				
8.	After eating,I take a bottle of coke, or Pepsi cola or any sweet juice drink, chew gums or take candies.				
9.	Potatoes chips, fried eggs form part of my breakfast, I fry my meat before putting them in my fried stew				
10	I put additional species and salt to my food when eating.				

SECTION D

Stress Assessment.

Please tick the column that best suits your opinion on how feeling for the past eight (8) weeks.

SN	Questions	Most Always	Most of the time	Some of the time	Almost never
1.	I have severe or chronic lower back pain due to the uterine fibroid				
2.	I get severe or chronic headaches.				
3.	No matter how much sleep I get, I wake up feeling tired.				
4.	I go to work even when I feel sick.				
5.	It is hard for me to relax at home or anywhere.(I am always restless)				
6.	I have temper outbursts I can't control.				
7.	I feel extremely sensitive and irritable.				
8.	I feel very angry inside me.				
9.	I find situations around me overwhelming.				
10.	I have difficulty in coping with life generally.				

CORRELATES OF UTERINE FIBROID GROWTH AMONG PATIENTS IN MURTALA MUHAMMAD SPECIALIST HOSPITAL, KANO.

NIGERIA

INFORMED CONSENT FORM

Dear participant, this research is concerned with possible risk factors that predisposewomen to uterine fibroid. You will be asked to fill a questionnaire to determine your diet, stress and physical activities level.

Your height and weight will be measured in order to determine your Body Max Index (under weight, healthy weight, overweight or obese). To detect if you have a uterine fibroid, an ultrasound will be carried out on you; your blood pressure will also be measured.

All information provided by you will be treated as confidential and will only be used for academic purposes.

Indemnity

I have read the information above and I understand what is required of me. I consent to participate in this research.

Signature of respondent: ---

Date: ---

Signature of witness: ---

Date: ---