

**EFFECTS OF AEROBIC AND STRETCHING EXERCISES
ON PRIMARY DYSMENORRHEA OF FIRST YEAR STUDENTS
OF COLLEGE OF NATURAL AND COMPUTATIONAL SCIENCES
IN WOLAITA SODO UNIVERSITY**

MSc. THESIS

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**Effects of Aerobic and Stretching Exercise on Primary Dysmenorrhea of First
Year Students of College of Natural and Computational Sciences in Wolaita
Sodo University**

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As thesis Research advisors, we hereby certify that we have read and evaluated this thesis entitled: **“Effect of Aerobic and Stretching Exercise on Primary Dysmenorrhea of First Year Students of College of Natural and Computational Science Students in Wolaita Sodo University”** prepared under our guidance by Adanech Teshome Admasu. We recommend that it was submitted as fulfilling the thesis requirement.

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DEDICATION

I dedicate this thesis manuscript to my mother, Shitaye Fufa and my beloved husband, Teferi Tademe for their dedication in the success of MSc. thesis.

STATEMENT OF THE AUTHOR

First, I declare that this thesis is my genuine work and that all sources of materials used for this thesis have been duly acknowledged. This thesis has been submitted in partial fulfillment of the requirements for a Sport Nutrition Msc. Degree at Haramaya University and is deposited at the University Library to be made available to borrowers under rules of the library. I solemnly declare that this thesis is not submitted to any other institution anywhere for the award of any academic degree, diploma or certificate.

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ACRONYMS AND ABBREVIATIONS

AA	Arachidonic Acid
ACSM	American College of Sport Medicine
AG	Aerobic Group
AV	Arterial Vasoconstriction
BMI	Body Mass Index
CNCS	College of Natural and Computational Sciences
FITT	Frequency, Intensity, Time, and Type
HU	Haramaya University
MHC	Myometrial Hyper Contractility
MSQ	Menstrual Symptom Questionnaire
NSAID	Non Steroid Anti Inflammatory Drug
PD	Primary Dysmenorrhea
PG M	Prostaglandin Mixture
PID	Pelvic Inflammatory Diseases
P _o T	Post Test
PT	Pre Test
RTI	Reproductive Tract Infection
SG	Stretching Group
SNNPR	Southern Nations, Nationalities and People Regional State
SPSS	Statistical Package for Social Sciences
VAS	Visual Analog Scale
WHO	World Health Organization
WSU	Wolaita Sodo University

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Effects of Aerobic and Stretching Exercises on Primary Dysmenorrhea of First Year Students of College of Natural and Computational Sciences in Wolaita Sodo University

ABSTRACT

Aerobic and Stretching exercise are useful for reduction of primary dysmenorrhoea. This study attempted to find out effects of aerobic and stretching exercises on the primary dysmenorrhoea on first year students of College of natural and computational sciences in Wolaita Sodo University. Purposive and stratified sampling techniques were used to select 32 female student of age 18-21 years old and randomly assigned into groups, aerobic (16) and (16) stretching groups randomly. All groups participated in supervised aerobic and stretching workouts 3 days/week for 12 weeks. All subjects under this study took part in experimental design pre, post test without control group from November 2017 to January 2018, and 40,50,60 minutes per month session. The exercise for Aerobic group were: rope jumping, Step aerobics exercise, step-up and running on treadmill. For stretching group, were, hip stretching, side to side, Double leg curl training, Sit and rich. Data were analyzed by using SPSS paired samples t- test with pair wise comparison of means at 95% confidence interval. The results of VAS Pretest was 7.50 ± 1.00 aerobic, 7.62 ± 0.885 stretching. posttest were 5.43 ± 1.03 aerobic, 5.125 ± 0.806 , were stretching. This result indicated that there were significant improvements in selected aerobic and dynamic stretching exercises on primary dysmenorrhoea. The significant value MD: 1.81 with Sig 0.001 for aerobic, MD:-2.500 with Sig 0.000 for stretching. ($p < 0.05$). This study also proved that, aerobic exercise was significantly better than stretching in reduction of pain symptoms of cramps, breast tenderness and stretching exercise was significantly better than aerobic exercise in improving muscle stiffness and stay at home. While both exercises had almost the same effect on vomiting, fatigue, VAS. The researcher recommended that student chose combined both exercise or either of one based on their interest to relief priamary dysmenorrhoea.

Keywords: Aerobic, ,Primary Dysmenorrhoea,Stretching.

1 INTRODUCTION

This chapter deals with background of the Study, Statement of the problem, objective of the study significance of the study, and scope of the study.

1.1. Background of the Study

Menstruation is a biological phenomenon laden with cultural implications. In turn, women interpretations of the physiological and hormonal changes associated with menstruation cannot be understood outside of the social and historical context in which they live, which is influenced by the meaning attributed to these menstrual changes by westernized medical discourses (Ussher, 2006).

Menstruation has important implications on the physical and emotional wellbeing of adolescents' reproductive health. The way girls perceive menstruation has an effect on their own body image, gender identity, self-acceptance, sexual and health behavior. Throughout history, menstruation has been assigned roles that ranged from defining a woman's status and social role to being seen as a curse that all women had to endure (Suresh *et al.*, 2011).

It is this positioning of the female reproductive body as inadequate and needing to be controlled, and menstruation as a site of madness and debilitation, which provide the framework for women to interpret changes associated with menstruation as pathological symptoms (Ussher, 2006).

The period of adolescence is transition from childhood to adult life along with pubertal development and sexual maturation. During puberty, hormonal, psychological, cognitive and physical changes occur simultaneously. One of the major physiological changes that take place in adolescent girls is the onset of menarche. The problems of irregular menstruation, excessive bleeding, and dysmenorrhoea are common. Dysmenorrhoea is the commonest problem experienced by most of the adolescent girls (Suresh *et al.*, 2011).

It is a condition characterized primarily by recurrent, cramps, lower abdominal pain during menstruation. (Sager and Laufer, 2013).

When adolescent girls are ovulatory cycles, primary dysmenorrhea begins during the teenage years, and its prevalence increases and then decreases with age spread other unpleasant symptoms associated with dysmenorrhea include nausea, vomiting, loss of appetite, headaches, backache, diarrhoea, flushing, sleeplessness, and weakness (Harel, 2006).

Menstrual pain may result from increased contraction of uterine muscle which is innervated by the sympathetic nervous system. Stress is supposed to increase the sympathetic activity which may lead to the increase of menstrual pain by enhancing the intensity of uterine contraction. So, due to the fact the exercise could reduce and moderate stress, the sympathetic activity may be decreased. Thereby, intensity of menstrual pain and other related symptoms may reduce as well. Another possible dilemma in this respect is that, since performing physical activity leads to the release of endorphins which are produced by brain, the pain threshold could be enhanced (Shahrjerdy *et al.*, 2012).

Younger are a large and growing segment of world's population. Menstruation is a significant process that begins in life of girls when they enter in adolescence. Common problem among the adolescents and young adult girls is painful menstruation which is termed as dysmenorrhea. The word dysmenorrhea is derived from the Greek words Dys (difficult, painful, or abnormal), meno (month) and rrhea (Flow). Primary dysmenorrhea is one of the most common menstrual pain. Dysmenorrhea is also a major cause of impaired quality of life and social activities for young women (Dawood, 2006).

Primary dysmenorrhea starts some hours before menstruation and continues up to 12-72 hours and is like delivery of pains along with cramps in the lower abdomen radiating toward the inner side of the thighs. Half of such cases experience systemic symptoms, such as nausea, vomiting, diarrhea, fatigue, irritability, and dizziness (Doubova *et al.*, 2007).

Menstrual pain resulted from increased contraction of uterine muscle which is innervated by the sympathetic nervous system. Stress is supposed to increase the sympathetic activity which may lead to the increase of menstrual pain by enhancing the intensity of uterine contraction. Even though the causes of primary dysmenorrhea are still not clearly determined,

But, it has been demonstrated that prostaglandin plays a major role in its occurrence, and most of its symptoms could be justified by prostaglandin activity (Speroff, 2005 and Chantler *et al.*, 2009).

1.2. Statement of the Problem

Dysmenorrhea means painful menstruation. In primary dysmenorrhea (intrinsic, essential, idiopathic) there is no macroscopic clinically detectable pelvic pathological process. They are primary and secondary dysmenorrhea. Primary dysmenorrhea is pain that begins with the onset of menstruation and is experienced as severe cramping and general discomfort in the lower abdomen and back. It also refers to a syndrome or symptoms of complex that may encompass nausea, vomiting, headache, nervousness, fatigue, diarrhea, backache, lower abdomen cramping, bloating, breast tenderness, mood changing and dizziness (Sager and Laufer, 2013).

These symptoms mostly occur before 12-72 hours or at the onset of menstruation. It is perhaps the greatest single cause of lost work and school days among young women. Menstrual pain may be resulted from increased contraction of uterine muscle which is innervated by the sympathetic nervous system. Stress is supposed to increase the sympathetic activity which may lead to the increase of menstrual pain by enhancing the intensity of uterine contraction. So, due to the fact that exercise could reduce and moderate stress, the sympathetic activity may be decreased. (Balbi *et al.*, 2000).

There by, intensity of menstrual pain and other related symptoms may be reduced as well. Another possible dilemma in this respect is that, since performing physical activity leads to the release of endorphins which are produced by brain, the pain threshold could be enhanced (Dawood, 2006; Shahr-jerdy *et al.*, 2012 and Balbi *et al.*, 2000).

Regular physical activity regarded as an important component of a healthy lifestyle. Recently, this impression has been reinforced by new scientific evidence linking regular physical activity

to a wide array of physical and mental health benefits. Despite this evidence and the public's apparent acceptance of the importance of physical activity,

Doing exercise can relieve the pain associated with dysmenorrhea; Some observational studies in this area have provided controversial results. Some researchers have reported that exercise can improve dysmenorrhea, while some others have found that regular physical activities can worsen the symptoms of dysmenorrhea. (Speroff, *et al* 2005).

Exercise has been found to reduce menstrual discomfort through increase in vasodilatation, and decrease in ischemia; release of endogenous opiates, specially beta endorphins and suppression of prostaglandins and shutting of blood flow from viscera resulting in less pelvic congestion. This reduces the pain. So Exercise helps in smoothing an aching back, relieving pain, improving flexibility, restoring mobility increasing circulation in the spinal tissues and joints, relaxing tense uterine muscles and maintaining good abdominal tone. Stretch-based exercises have been found to lower the excitability of the motoneuron pool. (Scholz and Campbell, 1980).

Therefore, considering the positive effects of exercise on health, the effects of exercise on dysmenorrhea can be discussed, and also particularly for adolescent. Most of the time student who have no habit of doing regular exercise if they are not forced to do, studying this research is very important. Although few comparative studies have been conducted on the effects of exercising on primary dysmenorrhea,

But, no studies have done on the effects of the aerobic and stretching exercises on dysmenorrhea age 18-21 in Ethiopian especially in freshman university students. Therefore, the researcher have been initiated to conduct scientific study to know the effects of the selected aerobic and dynamic stretching exercise on dysmenorrhea in Wolaita Sodo University, College of Natural and Computational Science Students. The researcher has been observing the problem related to primary dysmenorrehea on fresh students.

Therefore, the research was focused on the following basic research hypothesis

H₁ : There is a significance change on primary dysmenorrehea due to Aerobic exercise.

H₀₁ : Aerobic exercises have no any effect on primary dysmenorrehea

H₂ : There is a significance change on primary dysmenorrehea due to stretching exercise.

H₀₂ : There is no a significance change on primary dysmenorrhea due to Stretching exercise.

H₃: Aerobic and stretching exercises have equal significance changes on primary dysmenorrhea.

H₀₃ : Aerobic and stretching exercises have no relationship on primary dysmenorrhea.

1.3 Objective of the Study

1.3.1 General objective of the study

The General objective of this study was to compare the effect of selected aerobic and dynamic stretching exercise on primary dysmenorrhea in Wolayita Sodo University first year Natural and Computational Science students.

1.3.2 Specific objectives of the study

- ❖ To investigate the effects of selected aerobic exercises on primary dysmenorrhea
- ❖ To investigate the effects of dynamic stretching exercise on primary dysmenorrhea
- ❖ To compare the effects of selected aerobic and dynamic stretching exercise on primary dysmenorrhea

1.4. Scope of the Study

The study was delimited to Wolaita Sodo University first year Natural and Computational Sciences students from department of Biology, physics, Chemistry, Mathematics, Statistics, Biotechnology, Geology, Environmental science who have problem of primary dysmenorrhea with regular menstrual cycle and free from any pelvic problem. The paper was also delimited to the effect of aerobic and stretching exercise on students only.

1.5. Significance of the Study

Dysmenorrhea refers to painful menstruation in the absence of an identifiable pathological condition (Onur *et al.*, 2012). It is one of the leading causes of the females' recurrent short-term absenteeism in schools and workplaces (Sehar *et al.*, 2015).

Different research findings revealed that both aerobic and stretching exercises have an effect on the primary dysmenorrhea. In order to see these effects, a 12 weeks exercise program was designed. The result of the study provided important information whether aerobic or stretching exercise best effect on reduction of primary dysmenorrhea. It helps to encourage female students to engage in aerobic and stretching exercise to reduce menstrual pain. Furthermore; it provides open door to any interested researcher to conduct further research up on it.

2. REVIEW OF RELATED LITERATURE

This chapter consists different theories, scholar articles component of the chapter brief review of the literature related to the major topic will be described. The concept of primary dysmenorrhea, alternative name, etiology of dysmenorrhea, cause of dysmenorrhea and its benefits, study's on aerobic exercise and stretching exercise on primary dysmenorrhea are discussed.

2.1. Dysmenorrhea

Dysmenorrhea is chronic, cyclical pelvic pain associated with menstruation. Typically it is characterized by cramping lower abdominal pain occurring just before and/ or during menstruation, usually starting soon after menarche once regular ovulation is established. Yet despite this substantial effect on their quality of life and general wellbeing, few women with dysmenorrhea seek treatment, as they believe it will not help (Ussher, 2006).

Dysmenorrhea is a leading cause of recurrent short term school absents in adolescent girls and a common problem in women of reproductive age. Risk factors for dysmenorrhea include nulliparity, heavy menstrual flow, and depression. Empiric therapy can be initiated by typical history of painful menses and negative physical examination. It is about a colic pain located in the lower abdomen, it happens just before or during menstrual period and it usually comes with other symptoms: perspiration, sickness, vomits, diarrhea and also it can cause loss of consciousness. Self-care practices as well as menstrual hygiene are basic requirements for promoting a satisfied life and personal esteem in a woman (Adika *et al.*, 2013).

According to its clinical presentation, primary dysmenorrhea (PD) is characterized by lack of visible structural abnormality or any gynecological pelvic disease and is the most commonly diagnosed type among teenagers. Exercises also stimulate the production of endorphins, which act as the body's natural painkillers. (Ronning, 2016). This group of symptoms is usually called catamenial molimen (French, 2005).

Individuals are diagnosed with primary dysmenorrhea when they experience symptoms without any pelvic abnormalities and have a normal ovulatory cycle (Klein and Litt, 1981). The causes of primary dysmenorrhea are not fully understood, although mechanisms such as myometrial hypercontractility (MH) and arteriolar vasoconstriction (AV) are thought to contribute to menstrual pain (Akerlund *et al.*, 1994). Factors associated with MH and AV include an excessive secretion of prostaglandins (Tzafettas, 2006), which are initiated in the uterus during menstruation (Alvin and Litt, 1982), and abnormal plasma levels of vasopressin (Åkerlund, 2006 and Tzafettas, 2006).

Other possible contributors to menstrual pain include oxytocin receptor immune reactivity, cytokine gene expression profiles of peripheral blood mononuclear cells (Ma *et al.*, 2013; Nie *et al.*, 2010) and increases in innervation of the endometrial and myometrial layers of the uterus. Although these factors are associated with dysmenorrhea, more research on uterine contractility is needed to fully understand the mechanisms behind menstrual pain. (Aguilar and Mitchell, 2010).

2.2. Alternative Names and Frequency

The dysmenorrhea alternative names are Painful menstrual periods and menstrual colic. These terms are not very accepted scientifically and in general terms are more used for patients. It constitutes one of the main consultation reasons in young women population. Its frequency turns more significant when the gynecological and the axis hypothesis hypothalamus- ovary maturation progresses. It is suffered by a 30 to 50% of the adolescents. Between the 10 and 15% of them are helpless of carrying out their school tasks (Arbués and Lacadena, 2001).

2.3. Classification of Dysmenorrhea

The dysmenorrhoea is classified in primary and secondary.

Primary dysmenorrhea: It is defined as pain during menses in the absence of an identifiable pathologic lesion. It starts by definition around the menarche and describes pain during the menstrual period without any underlying cause. So most patients you'll see for primary dysmenorrhea will be of younger age. The onset of pain is usually a few hours before blood flow starts and will last for the first one to two days of the period. Often primary dysmenorrhea

becomes less with age or after childbirth. Individuals are diagnosed with primary dysmenorrhea when they experience symptoms without any pelvic abnormalities and have a normal ovulatory cycle (Klein and Litt, 1981).

Primary dysmenorrhea starts some hours before menstruation and continues up to 12-72 hours and is like delivery of pains along with cramps in the lower abdomen radiating toward the inner side of the thighs. Half of such cases experience systemic symptoms, such as nausea, vomiting, diarrhea, fatigue, irritability, and dizziness (Speroff, 2005 and Balbi, 2000). Chaudhuri and Singh (2012) reported high rates of sickness absenteeism (25.8%) among school girls due to menstrual cramps, as well as difficulty concentrating and poor school performance.

The main causes of primary dysmenorrhoea are Elevated Prostaglandin F₂ level in the secretory endometrium. Closely linked with uterine hyper contractility, complaints of severe cramping and other prostaglandin induced symptoms. Elevated Arachidonic Acid (AA) levels. Precursor to prostaglandin production, found at high levels in the uterus during ovulation, it is converted into PG F₂ and PG E₂ and leukotrienes, which are all involved in increasing myometrial contractions. Increased myometrial contraction, decreased uterine blood flow, ischemia and sensitization of pain fibres. PG F₂ and PG E₂ affect organ like the bowel, and cause nausea, vomiting and diarrhea. Different myometrial contraction pattern, specially causing an increased intensity of uterine contraction. Primary dysmenorrhoea presents with or shortly after menarche.

Secondary dysmenorrhoea: It is product of an existent pelvic affection and it is characterized because it begins several years after the menarche and the pain last more during the menstruation. The most frequent causes of secondary dysmenorrhoea are: endometriosis pelvic inflammatory illness, uterine myoma, uterine polyps, cervical stenosis, pelvic adherences, use of intra-uterine devices, congenital anomalies of the development of the genital tract (fundamentally the obstructive ones), and ovary cysts. Membranous dysmenorrhoea as some authors denominate it consists on the presence of intense colic caused by the step of endometrial tissue (uterine cover) through the not distended uterine neck and it is not very common (Arbués and Lacadena, 2001).

2.4 Etiology of Dysmenorrhoea

Dysmenorrhoea cause was ignored during a lot of time. Pickles was the first one in suggesting that it was caused by a "menstrual stimulant" and later he discovered that it was a prostaglandin mixture (PG) E2 and F2. There are a lot of works that link the dysmenorrhoea to the action of the prostaglandins; their levels are increased in cases of dysmenorrhoea, myoma,. The prostaglandins F2 and the prostaglandins E2 are so much in high concentrations in the secretor endometrium and in the menstrual fluid of women with primary dysmenorrhoea. The prostaglandins F2 is a potent oxytocic uteroconstrictor; when it is administrated inside the uterus it produces an intense pain like the one that happens in the dysmenorrhoea and occasionally, menstrual bleeding. The role of the prostaglandins E2 is less clear, but it could increase the sensibility of the nervous terminations.

The reason of the increase the values of the prostaglandins in the primary dysmenorrhoea is not very well-known. The primary dysmenorrhoea happens almost exclusively in ovulatory cycles and it is known that the steroid hormones of the ovary affect the uterine contractility. However, the existence of any abnormality has not been demonstrated in the hormonal values of women with primary dysmenorrhoea, neither the exact relationship between progesterone and primary dysmenorrhoea. It has also been proved that the exogenous supply of prostaglandins causes contractions of the myometrium and the increase of the dose entails associated symptoms: vomits, uneasiness, and diarrhea. (Andersch and Milsom, 1982).

Other factors related to the etiology of the primary dysmenorrhoea are the uterine synthesis of leukotriene, the increased secretion of vasopressin, the endothelin or the activator factor of the platelets. Psychological and cervical factors were considered before as important etiopathogenic factors, they have lost a lot of value as fundamental cause of the dysmenorrhoea, being valued at the moment as preponderant factors, according to what we already pointed out; the role of the hormones and of the prostaglandins. Never the less, we should not stop recognizing there are patients that somatize more than others. It has also been

studied groups of adolescents and we can also observe that those with more crises in their life experimented more marked symptoms.

The emotional reaction in front of the menstrual period has aspects of cultural nature that determine different attitudes we cannot obviate (Andersch and Milsom, 1982).

2.5 Awareness towards Exercise on Menstruation Cycle

Noorbakhsh Mahvash *et al.*, (2012). Studied on effect of Physical activity on Primary dysmenorrhea of female University Students. The results shows that performing a regular physical activity significantly reduced pain intensity in experimental group when comparing with control group. It is concluded that participating in physical activity program is likely an approach to reduce the detrimental effect of primary dysmenorrhea symptoms in young females

The onset of menstruation in adolescence is a phenomenon that signals reproductive maturity and should not be seen as an abnormal condition or disease. Adolescent girls often do not receive accurate information about menstrual health because of culturally specific practices that lead to incorrect and unhealthy behaviors (Moloudet *et al.*, 2012).

Menstruation has important implications on the physical and emotional wellbeing of adolescents' reproductive health. The way girls perceive menstruation has an effect on their own body image, gender identity, self acceptance, sexual and health behavior (Çevirmeet *et al.*, 2010).

Most of the girls believe that menstruation affects their performance negatively and recently many girls refuse to join physical activities during menstruation. Most girls who are professional or non professional probably form their attitudes toward menstruation and sport in their elementary school classes (Neşe, 2013).

Most girls experience some degree of pain and discomfort in their menstruation period, which could have important impacts on their daily activity. menstrual hygiene is the personal hygiene during menstruation It includes bathing daily for comfort, using clean, dry absorbent material and disposal of used pads/material in clean environmentally acceptable , safe methods and to feel fresh, keep perennial area clean from anterior to posterior (Eswi *et al.*, 2012).

Menstrual hygiene, a very important risk factor for reproductive tract infections, is a vital aspect of health education for adolescent girls. Hygiene relates practices of schoolgirls during menstruation are of considerable importance, as it has a health impact in terms of increased vulnerability to reproductive tract infections (Shokry *et al*, 2012).

This is likely to result in a change in hygiene patterns during menstruation for girls. So that young girls should be aware of areas of special concern include choice of the best “period protection bathing care of the vulva Provisions for good menstrual hygiene include home-made pieces of cotton cloth which are either placed on a girl's undergarment (Haber and Wood, 2010).

In addition, Adinma 2008. reported that faulty perceptions or misconception on menstruation and menstrual cycle will lead to faulty menstrual practices. Menstrual education is a vital aspect to health education.

Females in schools may have their own attitude toward menstrual cycle; this attitude may be affected by cultural perspective, lack of knowledge, and embarrassment to speak about this normal phenomenon with their mothers at home or others. And they often are reluctant to discuss this topic with their parents and often hesitate to seek help regarding their menstrual problems.

Unhygienic menstrual practices may affect their health such as increased vulnerability to RTIs (Reproductive Tract Infections) and PIDs (Pelvic Inflammatory Diseases) and other complications. So that all mothers should make their daughters aware of menstruation even before they could attain menarche and girls should be educated about “menstruation and healthy menstrual practices through expanded programmed of health education in schools. Addressing menstrual hygiene management directly contributes to improve girl's health. Thus, the objective of the study is to assess the knowledge, attitudes and practice of school girl and disturb their productivity at home or at their work place (Wong and Khoo, 2011).

2.6. Causes of Primary Dysmenorrhea

This is caused by an excessive production of prostaglandins in the body just before menstruation starts. This is due to the fall in progesterone which induces sloughing of the endometrial lining to

prepare for menstruation and, through this, increased prostaglandin production. Prostaglandin is a hormone which you might know from obstetrics as misoprostol. The additional symptoms of dysmenorrhea such as nausea and diarrhea are the same as the side-effects of misoprostol. Prostaglandin is a sort of by-product of menstrual changes of the

endometrium and it is not known why some women produce more prostaglandin than others, but this seems to be only possible when menstrual cycles are ovulatory (with an ovulation).

The fact that often the very first cycles in a girl are an ovulatory explains why primary dysmenorrhea often only starts a few cycles after menarche. Excess of prostaglandins leads to hyper frequent, dysrhythmic uterine contractions and reduced uterine blood flow, which leads to pain. Very seldom, primary dysmenorrhea is caused by congenital or acquired malformations of the female reproductive tract, such as imperforated hymen, and obstruction after female genital mutilation. It is good to know that primary dysmenorrhea can be very painful but that it is always harmless and does not interfere with reproductive function.

2.7. Exercise Participation on Menstrual Pain and Symptoms

Proper growth and maintenance of good health and participation in daily physical activities is an indispensable one. The high level of physical fitness comes from years of daily experience in a selected variety of vigorous physical activities. It is a biological principle that function builds structure and structure decides function. Man needs vigorous exercises for growth and development. To perform the daily activities in a more efficient manner, a condition of muscles, their strength and endurance are essential to man. A muscle must be overloaded in order to be strengthened. (Govindarajulu, 1991)

Exercise status was found to interact with menstrual cycle phase with predicting pain especially. Exercise participants reported less pain than sedentary women during menses. Throughout there were no difference between the two groups during the follicular and Uteal phase. Again it reports of anxiety during menses (Obstet and Gynecol, 1982).

Evidence from controlled trial suggests that exercise can reduce Primary dysmenorrhea and associated symptoms. But these have been small and of low methodological quality. Large randomized controlled trial is required before women and clinicians are advised that exercise is likely to be effective in reducing PD and related menstrual symptoms (Hightower, 1997).

There are various approaches proposed for primary dysmenorrhea which include NSADs, oral contraceptives, vitamins, tocolytic agents, acupuncture, and other. Among these, one approach involves physical activity. Because it is proved that physical activity improve pelvic and extra pelvic organ functioning by adjusting metabolism, hydroelectric balance, hemodynamic condition and blood flow, which promote the phenomenon called analgesia by physical exercise. Through endogenous mechanisms and endogenous opioids release which increased pain threshold. Aerobic exercise is physical activity of low to high intensity that depends primarily on the aerobic energy generating process. Aerobic exercise increase blood circulation which helps cramps to go away. In a study published in the 'journal of research in science' in 2006, Iranian researchers found that exercise helped decrease the duration sand severity of primary dysmenorrhea in high school girls. So, this study will be done to evaluate such method as a non pharmacological research to know the effects of aerobic and stretching exercise in primary dysmenorrhea.

2.8.Exercise and primary dysmenorrhea

Appropriate daily regular physical activity is a major component in preventing chronic disease, along with a healthy diet and not smoking. For individuals, it is a powerful means of preventing chronic diseases; for nations, it can provide a cost effective way of improving public health across the population. Available experience and scientific evidence show that regular physical activity provides people, both male and female, of any conditions including disabilities with a wide range of physical, social and mental health benefits. (WHO, 2003).

Physical exercise is more related to individual's self-image; therefore one of the roots of our relations with others and the feeling we have of ourselves stems from our body posture and physical fitness (Yildirim, 2012).

physical activity improve pelvic and extra pelvic organ functioning by adjusting metabolism, hydroelectric balance, hemodynamic condition and blood flow, which promote the phenomenon

called analgesia by physical exercise. Through endogenous mechanisms and endogenous opioids release which increased pain threshold. (Quintana ,*et al.*, 2010).

The scientific evidence mentioned that, exercises considered another strategy for reducing the dysmenorrhea. It can help to relieve menstrual cramps in a few ways. It increases blood circulation, which helps cramps to go away. (Uzoma, 2015).

Also, Chang & Chen) 2010. Reported that women who have premenstrual symptoms are often encouraged to increase their activity level. It has been hypothesized that exercise increases endorphin levels, which in turn improves mood and quality of life.

Descriptive studies indicate that women who exercise regularly have fewer premenstrual symptoms than sedentary women. One randomized controlled un blinded trial involving 23 women found that women randomized to an aerobic exercise group reported fewer premenstrual symptoms after three cycles than women who were in a non aerobic exercise group. (Chang & Chen.) 2010.

A study stated that both aerobic and stretching exercises were effective in reducing the severity of dysmenorrhea. Therefore, women could choose one of these two methods with regard to their interest and lifestyle. (Vaziri *et al.*, 2015)

Stretching Exercise and primary dysmenorrehea

Stretching exercises are one of the non-pharmacological methods for management of primary dysmenorrhea. (Wong and Khoo) 2010. According to Saleh and his colleagues (Saleh *et al.*, 2016) added that, active stretching or core strengthening exercises seem to be an easy, non-

pharmacological method for managing primary dysmenorrhea. It reduces pain intensity and duration of primary dysmenorrhea. So, these can be safely used as a non-pharmacological method for pain relief in primary dysmenorrhea.

Saleh *et al.*, 2016. Stretching exercises are effective in increasing flexibility, thereby allowing people to more easily do activities that require greater flexibility. For this reason, flexibility activities are a reasonable part of an exercise programmer, even though they have no known

health benefits and it is unclear whether they reduce risk of injury. Exercise is known to cause the release of endorphins, substances produced by the brain that raise the pain threshold.

According to Abbaspour, 2006. types of stretch training program (abdomen, pelvis and thigh). Significantly reduced symptoms of dysmenorrhea (Karampour, 2012).

2.8.1. Benefit of stretching exercise for primary dysmenorrhea

According to Scholz and Campbell, 1980 Therapeutic benefits of stretching exercise and Dysmenorrhea are listed below.

- Nausea and vomiting, other dysmenorrhea symptoms are decreases.
- Help to reduce mood swings on pre menstrual phase
- Heart pumps effectively
- Tones up the elasticity and strengthen the spine& pelvic muscle
- The diaphragm is more elastic and strong, and can stretch to accommodate the uterus easily.
- Healthy blood, oxygenation and other fluids are circulated properly to the uterus
- Exercise stabilizes the nervous system.
- Pain in joints and backache decreases.
- Exercise helps to stimulate the appetite and bowel action, hence constipation decreased.
- Raising the level of energy and also helping in maintenance of the metabolism.
- Anemia decrease & free flow during menstruation
- Obesity is controlled.
- Maintain the hormone balance

2.9. Aerobic Exercise and primary dysmenorrhea

Nategheh Deghanzadeh, *et al* (2014), had done study on effects of 8 weeks aerobic exercises training on primary dysmenorrhoea on 30 females had concluded that aerobic training reduces psychological and physical symptoms of primary dysmenorrhoea. Given primary dysmenorrhoea increase uterine muscle contraction and nerve by the sympathetic nervous system is forming thus reducing sympathetic activity, aerobic activity can reduce stress. Aerobic exercise increases the release of endorphins by the brain, which can raise the pain threshold. The increase in uterine blood flow and metabolism in aerobic activities can be effective against dysmenorrhoea. The aerobic training took pain to faster transfer of waste and prostaglandin the womb helps reduce the pain of dysmenorrhoea. Any activity that uses large muscle groups, can be maintained continuously, and is rhythmical in nature can be regarded as an aerobic exercise. In general, aerobic exercises requiring little skill to perform are more commonly recommended for all adults to improve fitness. Aerobic exercises that require minimal skills and can be easily modified to accommodate individual physical fitness levels include brisk walking, leisure cycling, swimming, and aqua-aerobics and slow dancing.

Aerobic exercises that are typically performed at a higher intensity and, therefore, are recommended for persons who exercise regularly include jogging, running, aerobics, stepping exercise, fast dancing and elliptical exercise.

The effect of regular physical activity is the neither reduction of nor epinephrine hormone level at rest, which in turn can cause reduced heart rate and blood pressure at resting time. (Gumanga, 2012 and Dincher and Hood, 1992.)

Another possible mechanism is the effect of exercise on blood leptin levels in women with PMS. Leptin is a hormone secreted from fat cells and regulates the metabolism of the hypothalamus–pituitary–gonadal and has an important role in human reproduction. This hormone exerts its metabolic and neuro-endocrinologic effects through its receptors in the hypothalamus area of emotional control. Some researchers showed that physical activity reduces the amount of leptin in blood to 30-34%. (Essig *et al*).

Dosage of Aerobic Exercise: The dosage of aerobic exercise is a function of the frequency (F), intensity (I) and duration (time, T) of the exercise performed. In combination with the type (T) of exercise performed, these factors constitute the basic components of the core principle of exercise prescription (the FITT principle). Primary care practitioners should be able to specify each of the above components when prescribing aerobic exercises to their patients. Further descriptions and elaborations of some related concepts about the FITT principle are summarized. It should be noted that even small increases in caloric expenditure with physical activity may improve physical fitness outcomes, with sedentary persons accruing the most benefits.

2.10. Research studies Related to effects of stretching exercise on primary dysmenorrhea

The typical age range of occurrence for primary dysmenorrhea is between 17 and 22 years, whereas secondary dysmenorrhea becomes more common as women age (Andrea2009). Stretching exercise has been found to reduce menstrual discomfort through increase in vasodilatation, and decrease in ischemia ; release of endogenous opiates, specially beta endorphins and suppression of prostaglandins and shutting of blood flow from viscera resulting in less pelvic congestion.

This reduces the pain. So stretching exercise helps in smoothing an aching back, relieving pain, improving flexibility, restoring mobility increasing circulation in the spinal tissues and joints, relaxing tense uterine muscles and maintaining good abdominal tone. Stretch-based exercises have been found to lower the excitability of the motoneuron pool (Scholz & Campbell 1980). Exercise is known to cause the release of endorphins, substances produced by the brain, that raise the pain threshold (Abbaspour 2006).

Stretch training program (abdomen, pelvis and thigh).significantly reduced symptoms of dysmenorrhea (Karampour 2012). The effect of 8 weeks of stretching exercise on primary dysmenorrhea 15-17years high school students. The results demonstrated that after 8 weeks, pain severity had decreased from 7.65 ± 1.94 to 4.88 ± 1.92 ; pain duration was decreased from 7.48 ± 5.26 to 3.86 ± 2.5 hours.

No significant differences were observed between these parameters in control group ($P > 0.01$). (Shahna, 2010). Studied on dysmenorrhea, difficult menstrual flow in the absence of any pelvic pathology where pain is spasmodic in character and felt mainly in lower abdomen. Stretching

exercise showed significant improvement in pain. Pain intensity was reduced. So stretching exercises were effective in reducing pain in young females with primary dysmenorrhea. (Gamit *et.al.*, (2014))

3. MATERIALS AND METHODS

This chapter deals with description of study area, sample size and sampling techniques, instruments, methods and procedure of data collection, method of data analysis and ethical consideration.

3.1. Description of the Study Area

The study conducted at Wolaita Sodo University located at 390km away from Addis Ababa in sodo district, in Wolaita Sodo Zone SNNPR State, South Ethiopia from November, 2017–January, 2018. The university is established in 2005 GC year by government as higher education institutions, which is the result of the capacity building strategies undertaken by the Ministry of Education in order to enhance the number of universities and to alleviate the shortage of educated man power in the country. Population range of 50,000-249,999 inhabitants with stable climate and temperature variation between 24 and 30 °C during the day and 16 to 20 °C at night, all year round (<http://www.wsu.edu.et>).

WSU offers courses and programs leading to officially recognized higher education degrees such as bachelor degrees in several areas of study. WSU also provides several academic and non-academic facilities and services to students including a library, as well as administrative services. Currently, the university offers undergraduate programs in 5 Faculties and 2 Schools, comprised of more than 22 departments.

WSU has around five gymnasium with different well organized materials and instructors but, female students not beneficial from these gymnasium due to different problems like :-lack of money to afford the payment for gymnasium,gymnasium is not available for undergraduate students,lack of engagement to join exercise regularly as a solution for reduction of primary dysmenorrhea rather than seek another medication,fear of academic performance which means participating in exercise may be take time etc.

primary dysmenorrhea is menstruation pain during menses. Some factors may increase pain symptoms of primary dysmenorrhea like:- environment, cafeteria, lack of proper fluid replacement, lack of regular physical exercise which helps relax the uterus muscle which means fresh students just fresh for those things in a university grounds life. Map of the study site are indicated on Appendix I page 70.

3.2. Source of Data

Primary data were gathered to meet the objective of the study. The data were collected from sample subjects selected by using purposively and stratified sampling technique from Wolayita Sodo University, College of Natural and Computational Sciences with age range of 18-21 years. The data were obtained pre test, and post test.

3.3. The Research Design

Experimental research design with pre-test and post-tests without control group was used to evaluate 12 weeks effect of practicing selected aerobic and dynamic stretching exercise on reducing pain intensity of primary dysmenorrhea on students. This design is one type of the experimental designs in which data collected from research subjects both before and after introducing the intervention. Pretest-posttest design was the preferred method to compare participant groups and measure the degree of change occurring as a result of treatments or interventions (<https://explorable.com>). The subjects were practiced different types of selected aerobic and dynamic stretching exercises ranges with light to moderate intensity. Both training was done for 3 days per week with in 40, 50 and 60 minutes duration. Indeed, the effect of these exercises on primary dysmenorrhea of WSU students from CNCS was studied.

3.4. Study Population and Participants of the Study

This study was including experimental field test for aerobic and stretching exercise on reduction of primary dysmenorrhea before and after. The total population of WSU college of natural and computational science first year students were 226 (two hundred and twenty six). The researcher meet all students of CNCS of the University and introduced about the symptoms of primary dysmenorrhea and selected 32 students from the total population by physical activity readiness questionnaire and MSQ.

3.5. Sampling and Sampling Technique

Thirty two (32) students age between 18-21year, having problems with primary dysmenorrhea, no pelvic problem and volunteer for this study was selected by purposive and stratified

sampling technique and randomly grouped in to stretching and aerobic group from WSU college of natural and computational science first year students. In the preliminary meeting, the researcher has given an explanation of all procedures, and benefits associated with the experimental protocol and the interpretation of the use of exercise during the intervention.

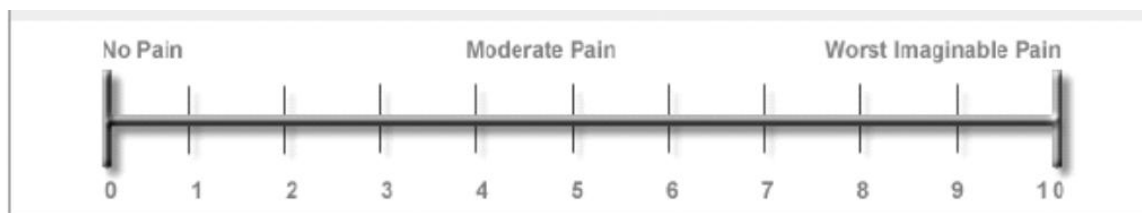
3.6. Data Collection Tools

3.6.1. Questionnaire

The researcher used questionnaires as the main data gathering instrument because it is simple for respondents to answer with in short period of time. Besides, it allows respondents to express the feeling confidentially and enables the researchers to use representative samples as the source of data to avoid biases. A number of questionnaires both subjective and objective type were developed. The questionnaire contains 17 menstrual symptoms questionnaires (MSQ) which are self reported instrument and five point Likert scale (Severe(1)/Moderate(2)/ Mild(3)/ Hardly(4)/ No problem(5) and another personal questionnaire attached on appendix A. (Banikarim *et al.*, 2000).

3.6.2. The Visual Analogue Scale (VAS)

VAS is a self-report measure consisting simply of a 10 centimeter line with a statement at each end representing one extreme of the dimension being measured (most often intensity of pain). The respondents have given their indication with a pen mark on the line corresponding to their answer, e.g. the present pain level. It is a widely used, noted for ease of administration. The patient was asked to make three pain ratings, corresponding to current, best and worst pain experienced over the past 24 hours. The average of the 3 ratings was used to represent the patient's level of pain over the previous 24 hours. (Grant, *et al.* (1999).



This scale asks you to assign a number, from zero to ten, to the severity of your pain. Use the following statements to rate your pain intensity.

- ✓ 'Zero' means you have no pain at all.
- ✓ 'Ten' means the worst possible pain you can image.

Please tick your pain intensity on the pain scale corresponds to pain levels as follows:

- A. 0 = no pain
- B. 1 – 3 = mild pain
- C. 4 – 6 = moderate pain
- D. 7 – 10 = severe pain

3.6.3. Procedure of Data Collection

The data were collected through the data collection tools such as questionnaire, BMI and visual analogue scale (VAS) both before and after introducing the intervention of the aerobic and stretching exercises workout in Wolaita Sodo University college of natural and computational science first year female students age between 18 -21years.

The training program was given for 12 consecutive weeks, three days/week and the duration was 40 minutes,50minutes and 60 minutes respectively a month. The training schedule for both groups was arranged at the same time. The data was recorded by the two assistant data recorders after they received training for two days about which data and information was collected from the participants. The appropriate aerobic and stretching exercises workout was given by the researcher. The comparison on the effects of both exercises on primary dysmenorrhea was also done by the researcher.

Body mass index: BMI (Body Mass Index) is a measurement of body fat based on height and weight that applies to both men and women between the ages of 15 and 63 years. BMI can be used to indicate if you are overweight, obese, underweight or normal. A healthy BMI score is between 18.5 and 24.9. A score below 18.5 indicates that you may be underweight; a value above 25 indicates that you may be overweight (Anschel, *et al*, 1991). BMI is just a guide - it does not accurately apply to elderly populations, pregnant women or very muscular athletes such as weight lifters. The method of evaluating body composition is to use the body mass index (BMI) method, which evaluates weight in relation to height using the following equation:

$$BMI = \frac{\text{body weight in kilograms}}{\text{height in meters squared (m}^2\text{)}}$$

This method assesses the appropriateness of an individual's weight in comparison to height. For example, if a client's height is 1.60 m and weight is 60 kg, then

$$1.60 \text{ m} \times 1.60 \text{ m} = 2.56 \text{ m}^2$$

$$60 \text{ kg} / 2.56 \text{ m}^2 = 23.43 \text{ BMI} = \text{Healthy}$$

However, there is no distinction between fat and fat-free mass. This method cannot be used with pregnant women, or with clients who are very muscular. But since the participants of this study are not physically active it is possible to administer this type of test. (www.bmi-calculator.net). Finally the purpose of the BMI method of data records were to know the general information of individual body mass index like whether they are under or normal category of the body mass index

First the researcher was obtained the ethical clearance from concerning body and met the participants of the study, during the familiarization session, participants were informed all procedures and familiarized with all measurement techniques before conducting the study. Before the participants were going to aerobic and stretching exercises workouts the pre general history toward the dysmenorrhea test was taken and recorded by the researcher and the two data recorders. Subjects were instructed by a researcher not to take any medicine related with primary dysmenorrhea and the participants were grouped in to aerobic and stretching exercises groups.

Data collection procedure was done through three phases; assessment, implementation, and evaluation phases.

Assessment phase: During the assessment phase, all students who met the inclusion criteria discussed with researcher for clarifying the purpose of the study. Data was collected over a period of 3 months from beginning of November, 2017 – January, 2018 at Wolaita Sodo University, three days per week and one day interval. Each student was asked questionnaires to collect the personal data which included age, height, weight, and BMI. Besides, the written pre-test questionnaire and VAS test was given to know the individual's pain intensity of primary dysmenorrhea. These pre-test assessments were taken about 15-20 minutes with respondent. The baseline data were collected from both groups.

Implementation phase: During the implementation phase, the researcher conducted the planned instructional sessions for the 32 students. The two groups comprised of 16 who were encouraged to practice the stretching exercises and 16 for aerobic exercise. After that, they were asked to practice the stretching and aerobic exercises based on exercise scheduled program. Each group

consumed about 40-45minutes and extra time allowed for the students for asking any question or clarification related to the exercise.

Evaluation phase: All students were followed up for evaluating the effect of practicing the aerobic and stretching exercises on reducing the intensity of the menstrual pain and the premenstrual symptoms. Posttest was examined after 12 weeks for pain intensity, pain duration, and effectiveness of doing exercise for both groups.

3.7. Inclusion and Exclusion Criteria

The subject that included in the study was first year natural and computational science students from department of Biology, physics, Chemistry, Mathematics, Statistics, Biotechnology, Geology, Environmental science four students from each Department selected for this study who have the problem of primary dysmenorrhea age between 18-21 and not taking any medicine, free

from any pelvic problem, give positive response for the exercise readiness questionnaire and volunteer are included. Subjects with any known pelvic pathology or related to secondary dysmenorrhea, age above and below the gap and no have primary dysmenorrhea are excluded. Subjects were instructed to be free from taking any medical treatments about a week preceding the test, and were asked to avoid from taking any additional treatments during the time of the study and Sport science student also excluded from study group because of they do have their own practical class.

3.8. Method of Data Analysis

The data collected through questionnaire and VAS was analyzed, interpreted and tabulated in to a meaningful idea using manually and computer in order to compare the selected exercise changes observed in mean value on participants that underwent aerobic and stretching exercise program. For the statistical processing, data was analyzed using computerized statistical package software (SPSS) version 20. The coded data was analyzed by using paired T- test and SPSS version 20.0 software to summarize changes. The level of significance was at $p \leq 0.05\%$.

3.10. Ethical Issue

This study was done in line with ethical issues. The privacy of the participants was protected. Generally this research was conducted based on the research ethics of Haramaya University. The protocol was approved by the university guidelines. The participant was informed earlier with a written letter.

3.11. Training protocol

The researcher selected different selected Aerobic and dynamic stretching exercise which were provided to the subjects in 12 weeks according to the schedule. Physical exercise needs activities

which are helpful to prepare the body to the main activities and reduce the occurrence of certain injuries like warming up and cooling down.

There are also training principles which should be followed while performing physical activity. Training principle is very important to achieve what we want to gain from the training. So in each exercise the researcher followed the training principle. Before the main activity the subjects performed warm up activity and after exercise cool down activities.

4. RESULTS AND DISCUSSIONS

This chapter presents the analysis of data collected from the subjects based on the findings under this study. The purpose of this study was to compare the effects of 12 weeks selected aerobic and stretching exercise training on primary dysmenorrhea of student's age range of 18-21 in Wolaita Sodo University College of Natural and Computational Sciences. Thirty two subjects selected from the university. They were randomly assigned in to two groups of stretching group and aerobic group with 16 subjects for each group.

In this study, field tests were given two times (Pretest and Post test). Under this, two dependent variables (aerobic and stretching) had been evaluated based on training schedule and the results of those variables are discussed as follows.

4.1. Demographic Characteristics of the Sample

Table 2 Demographic Characteristics of the Sample

Variables		N		%	
		Aerobic	Stretching	Aerobic	Stretching
Age	18	9	6	56.25	37.5
	19	3	7	18.75	43.75
	20-21	4	3	25	18.75
menstrual cycle variables	Regular	16	16	100	100
	Irregular	0	0	0	0
Length of menstrual flow (days)	1-3	10	9	62.5	56.25
	3-5	6	7	37.5	43.75

As we can see from table 1, the total no of participants for this study is 32 players. From this when we see their age 9 (56.25%) are in the age 18 years, 3(18.75%) are in the age 19 years, and the rest 4(25%) are in the age range of (20-21%) years for aerobic group and 6(37.5%) are in the age 18 years, 7(43.75%) are in the age 19 years, 3(18.75%) are in the age range of (20-21%) years for stretching group. All respondent of both group had a regular menstruation cycles. Length of menstrual flow was 1-3 10(62.5%), aerobic and 9(56.25%) for stretching respondent and 3-5days 6 (37.5%) aerobic and 7(43.75%).stretching respondent.

4.2 Mean value of Pre and post test result of Body mass index and pain symptom of primary dysmenorrhea

Table 3 Pre and Post test of BMI Measurement

variable	PT		POT	
	AG	SG	AG	SG
BMI	18.75±1.00	18.87±0.88	18.87±1.087	18.93±0.85

Values are in the form of BM-Body mass index, mean \pm SD = standard deviation, PT, = pre training test which was taken before training, AG=aerobic group,SG=stretching group, POT= post training test measured at the end of 12 weeks training

The above BMI mean result of pretest aerobic and stretching was 18.75±1.00, 18.87±0.88 aerobic and stretching group respectively. These indicate that they lie under normal category of body mass index. The posttests were 18.87±1.087 aerobic, 18.93±0.85 stretching. Therefore, no significances difference was recorded in both groups.but, the inttention of the researcher were try to know the general body weigt of individuals.which helps to avoid some problem related to underweight or BMI.So based on these the researcher conclude that the exercise in both group had no a significant effect. Therefore,the researcher fear were if the respondent BMI result in the range of under weight; the symptoms of primary dysmenorrhea may happen intensively than normal category.which means they should seeek more medication or nutritional treatment to minimize the pain symptoms of primary dysmenorrehea.

4.3. The Effect of Aerobic and stretching exercise on symptoms of primary dysmenorrhea among the study participant.

Table 4 mean value of Pre and Post test for pain symptoms of primary dysmenorrhea

Variable	PT		POT		Sig (p<0.05)	
	AG	SG	AG	SG	AG	SG
Muscle- stif	2.81±1.276	2.43±1.03	3.56±0.96	3.25±1.064	0.054	0.018
Backache	2.87±1.360	2.18±1.046	2.31±1.078	2.31±1.078	0.379	0.432
General pain	2.00±1.154	1.81±0.108	2.87±1.14	2.31±1.195	0.069	0.191
Cramps	1.50±0.730	1.37±0.619	2.93±0.77	1.81±1.108	0.00	0.249
Fatigue	1.43±0.813	1.500±0.703	3.31±0.873	2.31±1.400	0.00	0.043
Breast tenderness	1.43±0.727	2.18±1.51	3.43±1.209	3.68±0.873	0.00	0.003
vomiting	1.125±0.341	1.125±0.447	2.43±0.892	3.06±0.853	0.00	0.00

Values are in the form of mean \pm SD = standard deviation, sig= $p < 0.05$, PT, = pre training test which was

taken before training, POT= post training test measured at the end of 12 weeks training.

In the above table the pretest mean of aerobic group was 2.81±1.276, while the stretching group was 2.43±1.03. Post training test result 3.56±0.96 for aerobic, 3.25±1.064 for Stretching for muscle stiffness pain symptoms of primary dysmenorrhea and the significance level were 0.054 for aerobic group, while 0.018 for stretching group. after the 12 week treatment based on these result stretching group were recorded a positive significance so the 12 week stretching exercise had a positive effect on reduction of muscle stiffness on primary dysmenorrhea so the result were indicate significant difference was observed between aerobic and stretching group of the post

test. When we compare aerobic and stretching group stretching group were significant than Aerobic group

The pre mean of backache pain symptoms was 2.87 ± 1.360 aerobic; 2.18 ± 1.046 stretching after aerobic and stretching exercise was performed posttest mean was 2.31 ± 1.078 aerobic, 2.31 ± 1.078 for stretching with the level of significance were 0.379 for aerobic and 0.432 for stretching based on these result show that no significance between the group but, there was a change between the pre and post test due to 12 week aerobic and stretching exercise given for both group.

The pre mean of general pain aerobic 2.00 ± 1.154 , stretching 1.81 ± 0.108 then posttest were 2.87 ± 1.14 aerobic, 2.31 ± 1.195 stretching group not significant change which means level of significance were $P > 0.05$. but, there was change in pre and post group. The pre mean of cramps during menstruation 1.50 ± 0.730 aerobic, 1.37 ± 0.619 stretching, posttest mean 2.93 ± 0.77 aerobic, 1.81 ± 1.108 stretching and a positive significant were recorded means 0.000 for aerobic group and not significant in stretching group which means 0.249. therefore, a 12 week exercise showed the apposite effect on pain symptoms cramps due to primary dysmenorrhea.

Aerobic exercise is physical activity of low to high intensity that depends primarily on the aerobic energy generating process. Aerobic exercise increase blood circulation which helps cramps to go away. Significance was recorded on aerobic group this indicate that aerobic exercise had a positive effect on PD. $p < 0.00$. these results agree with Uzoma. (2015). Aerobic exercise increases blood circulation, which helps cramps to go away.

The pretest mean response for fatigue pain symptoms of aerobic and stretching group was 1.43 ± 0.813 , 1.500 ± 0.7030 respectively. Posttest mean 3.31 ± 0.87 aerobic, 2.31 ± 1.400 stretching, which indicates the result of both group were significance which means 0.00 for aerobic and 0.043 for stretching therefore aerobic and stretching exercise had a positive effect on reduction of fatigue symptoms of primary dysmenorrhea. Breast tenderness mean on pre test was 1.43 ± 0.727 aerobic, 2.18 ± 1.51 stretching group. Posttest mean 3.43 ± 1.209 aerobic, 3.68 ± 0.873 stretching. The level of 0.00 aerobic group while 0.003 stretching group.

Both exercises were significance on breast tenderness of pain symptoms of primary dysmenorrhea. vomiting pain symptoms mean was 1.125 ± 0.341 aerobic, 1.25 ± 0.447 stretching. Posttest were 2.43 ± 0.892 aerobic, 3.06 ± 0.853 stretching. with the level of significance were 0.00 for aerobic and stretching groups. the post result of both group were show significance. Based on the above result most of results showed that a positive effect on primary dysmenorrhea.

Nategheh Deghazadeh, *et al* (2014), had done study on effects of 8weeks aerobic exercises training on primary dysmenorrhoea on 30 females had concluded that aerobic training reduces psychological and physical symptoms of primary dysmenorrhoea. Given primary dysmenorrhoea increase uterine muscle contraction and nerve by the sympathetic nervous system is forming thus reducing sympathetic activity, aerobic activity can reduce stress.

Generally, the response of above indicate that the effect of aerobic and stretching exercise on primary dysmenorrhea were recorded a positive effects when comparing the pre-post exercise Also when comparing the all significance of Aerobic and Stretching group both group were effective so doing aerobic and stretching exercise are important as non pharmacological drug on reduction of primary dysmenorrhea.

The scientific evidence mentioned that, Exercises considered another strategy for reducing the dysmenorrhea. It can help to relieve menstrual cramps in a few ways. It increases blood circulation, which helps cramps to go away.

Uzoma. (2015). Chaudhuri and Singh (2012) reported high rates of sickness absenteeism among school girls due to menstrual cramps, as well as. difficulty to concentrating and poor school performance. The researcher conclude that aerobic and stretching exercise had a positive effect on symptoms of primary dysmenorrhea. In additionally participating in any physical exercise have different positive effect like reduce risk of chronic disease as well as gainig of body fat and icreasease healthy life style

4.4. Result of Aerobic and Stretching exercise in overcoming negative effects of primary dysmenorrhea

Table 5 pre and post test results for negative effect of primary dysmenorrhea

Negative effect	<i>Mean±SD,sig</i>					
	PT		POT		SIG (P<0.05)	
	AG	SG	AG	SG	AG	SG
Tension	1.37±0.50	1.37±0.50	3.18±1.046	3.12±1.500	0.054	0.018
Mood swing	1.56±0.629	2.06±1.123	2.50±1.095	3.06±1.062	0.379	0.432
Depression	2.06±1.123	2.56±1.504	2.81±0.834	3.06±1.123	0.069	0.191
Irritability	2.25±1.183	1.37±1.454	2.93±1.569	2.93±1.34	0.00	0.249
School absent	1.87±0.806	2.62±1.454	2.25±1.290	2.68±1.078	0.00	0.043
Stay at home	1.56±0.629	1.56±0.727	1.81±0.981	2.25±1.06	0.468	0.029
Avoid social work	1.31±0.602	1.500±0.730	2.87±1.204	231±1.400	0.00	0.00

Values are in the form of mean ± SD = standard deviation, AG=Aerobic group, SG=Stretching group, sig= significance, PT, = pre training test which was taken before training, POT= post training test measured at the end of 12 weeks training

The table above indicate pre mean of aerobic and stretching group on negative effect due to primary dysmenorrhea on tension 1.37±0.50 aerobic, 1.37±0.50 stretching group. Posttest mean 3.18±1.046 aerobic, 3.12±1.500 stretching group with the level of significance of 0.054 for aerobic group and 0.018 for stretching group. Which means the results were indicating that stretching group were recorded a positive significance a 12 week treatments showed that a positive effect on reduction of tension symptoms due to primary dysmenorrhea based on the

result these study were accept the alternative hypothesis which means there is a significance on primary dysmenorrhea due to stretching exercise and reject the null hypothesis.

The pretest mean 1.56 ± 0.629 aerobic, 2.06 ± 1.123 stretching posttest 2.50 ± 1.095 aerobic, 3.06 ± 1.062 for mood swing symptoms with significance of 0.379 for aerobic and 0.432 for stretching exercise .the result were indicated that there were no significance recorded Therefore, the researcher were accept the null hypothesis which is aerobic and stretching exercise were no effect on primary dysmenorrhea. The pre mean of depression was 2.06 ± 1.123 aerobic, 2.56 ± 1.504 stretching group. Posttest was 2.81 ± 0.834 aerobic, 3.06 ± 1.123 stretching there were no positive significance which means($P > 0.05$)

Irritability pre mean of aerobic and stretching exercise was 2.25 ± 1.183 , 2.32 ± 1.454 respectively. Posttest was 2.93 ± 1.569 , 2.93 ± 1.34 respectively which shows a significance of 0.00 for Aerobic group and 0.249 for stretching group.the result showed that Aerobic group significantly reduce a symptoms of depression due to primary dysmenorrehea. School absent mean of pre 1.87 ± 0.806 aerobic, 2.62 ± 1.454 stretching. Posttest 2.25 ± 1.290 aerobic, 2.68 ± 1.078 stretching groups.baased on the above result both group showed a positive significance on reduction of school absent which means 0.00 for aerobic group and 0.043 for stretching group.generally, both exercise had a positive effect on feeling of school absent.

Stay at home pre mean of aerobic and stretching exercise was 1.56 ± 0.629 , 1.56 ± 0.727 respectively. Posttests were 1.81 ± 0.981 aerobic 2.25 ± 1.06 stretching. Stretching group has show positive significance $P < 0.029$ on effect of stretching exercise on feeling of stay at home due to symptoms of primary dysmenorrehea.therefore the researcher suggested thatan individuals who have the problems of stay at home symptoms should considered the positive effect exercise and be familiar with these exercise regularly at least twice a week. The pre test mean of aerobic and stretching exercise on Avoid social work due to primary ysmenorrehea was 1.31 ± 0.602 aerobic 1.500 ± 0.730 stretching.Posttest was 2.87 ± 1.204 aerobic 2.31 ± 1.400 stretching.with the significance level of 0.00 for both groups. After the treatment was introduced for both group were significance on avoiding social work. therefore,the respondent was show a great improvement. The above table show that significance was recorded on stretching group in reduction of tension, school absent and avoid social work in stretching group.

Whereas irritability, school absent and avoid social work was significant in Aerobic group.

These result indicate that both aerobic and stretching exercise had a positive effect on reduction of negative effect symptoms of primary dysmenorrhea.

Generally, selected aerobics and stretching exercise has positive effect as the overall result shows on the negative effect symptoms of primary dysmenorrhea. But, when we can compare the aerobic group and stretching group Aerobic groups were more significance than stretching. The most reported premenstrual symptoms that reduced pain symptom include fatigue, headache, mood changes, and excessive sweating. Due to this the result were agree with Chang & Chen 2010. Reported that women who have premenstrual symptoms are often encouraged to increase their activity level. It has been hypothesized that exercise increases endorphin levels, which in turn improves mood and quality of life. Another study mentioned that primary dysmenorrhea increases the uterine muscle contractions and nerve by the sympathetic nervous system is forming, thus reducing sympathetic activity, aerobic activity can reduce stress and pain. Thereby, the intensity of menstrual pain and other related symptoms may be reduced as well. Dehghanzadeh *et al.*, (2014).

4.5. Effects of Aerobic and Stretching exercise on Behavioral Change Symptoms of Primary Dysmenorrhea

Table 6 mean value of Pre and Post test for Behavioral change symptoms of primary dysmenorrhea.

	PT		Mean \pm SD POT		SIG	
	AG	SG	AG	SG	AG	SG
Behavioral change						
Dizziness	1.87 \pm 0.957	1.81 \pm 0.910	2.93 \pm 1.123	2.56 \pm 1.263	0.055	0.102
Loneliness	1.81 \pm 0.981	1.62 \pm 0.957	2.62 \pm 1.147	2.31 \pm 1.195	0.019	0.068
Anxiety	2.31 \pm 0.946	1.87 \pm 0.718	3.06 \pm 0.85	2.56 \pm 1.093	0.75	0.111

Values are in the form of mean \pm SD = standard deviation, PT, = pre training test which was taken before training, POT= post training test measured at the end of 12 weeks training.

In table above it shows that the mean pretest and posttest result of behavioral change due to primary dysmenorrhea tested by dizziness the pre mean of aerobic and stretching was 1.87 \pm 0.957 aerobic 1.81 \pm 0.910 stretching. Posttest was 2.93 \pm 1.123, 2.56 \pm 1.263 respectively.

Both group had significant value. This mean difference between the pre and post test may indicate the positive effect of the exercises. Behavioral change due to menstruation pain tested by Loneliness indicated Pretest means was 1.81 ± 0.981 aerobic 1.62 ± 0.957 stretching. Posttest means 2.62 ± 1.147 aerobic 2.31 ± 1.195 stretching. Based on the result aerobic group showed significance in minimizing loneliness.

Generally, there are various approaches proposed for primary dysmenorrhea which include NSAIDs, oral contraceptives, vitamins, tocolytic agents, acupuncture, and other. Among these, one approach involves physical activity.

Because it is proved that physical activity improve pelvic and extra pelvic organ functioning by adjusting metabolism, hydroelectric balance, hemodynamic condition and blood flow, which promote the phenomenon called analgesia by physical exercise. Through endogenous mechanisms and endogenous opioids release which increased pain threshold. so that these exercise were the best option to minimizing the problem of primary dysmenorrhea with out any side effect on the body or physiologically and psychologically. which means every tablet or medication has its own side effect but, exercise is not because its non pharmacological treatment if the participant follow the instruction of training.

4.6. Mean value of Pre and post test result of VAS of primary dysmenorrhea

Table 7 mean value of Pre and Post test for VAS symptoms of primary dysmenorrhea

Variable	PT		POT	
	Aerobic	stretching	Aerobic	stretching
VAS	7.50 ± 1.00	7.62 ± 0.885	5.43 ± 1.03	5.125 ± 0.806

Values(Mean \pm SD),SD

Values are in the form of VAS = Visual Analog Scale, SD==Standard deviation PT, = pre training test which was taken before training, POT= post training test measured at the end of 12 weeks training.

In the above table the mean result of visual analog scale was 7.50 ± 1.00 aerobic, 7.62 ± 0.885 stretching. Posttest mean was 5.43 ± 1.03 , aerobic 5.125 ± 0.806 stretching. based on these result the significance were recorded in both groups.

4.7. the effect of aerobic and stretching exercise on primary dysmenorrhea of the respondent

Table 8 Means value and significance of Aerobic and stretching group for pain symptoms of PD

	MD		significance	
	Aerobic	stretching	Aerobic	Stretching
Muscle stiffness	-0.7500	-0.8125	0.054	0.018
Back ache	-0.437	-0.2500	0.379	0.432
General pan	-0.875	-0.500	0.069	0.191
Cramps	-1.437	-0.437	0.00	0.249
Fatigue	-1.875	-0.812	0.00	0.043
vomiting	-1.315	-1.82	0.00	0.00

Values are in the form of MD=mean difference, PT, = pre training test which was taken before training, POT= post training test measured at the end of 12 weeks training.

Aerobics and stretching exercise has positive effect as the overall result shows on the negative effect symptoms of primary dysmenorrhoea .But, when we can compare the aerobic group and stretching group Aerobic groups were more significance than stretching. Therefore, in order to see effect of aerobic and stretching both result show significance and also when comparing the groups aerobic group were more significance than stretching.

Another study mentioned that primary dysmenorrhoea increases the uterine muscle contractions and nerve by the sympathetic nervous system is forming, thus reducing sympathetic activity, aerobic activity can reduce stress and pain. Thereby, the intensity of menstrual pain and other related symptoms may be reduced as well. Dehghanzadeh *et al.*, (2014).

4.8. The effect of aerobic and stretching exercise for negative effect on primary dysmenorrhea

Table 9 means value and significance of Aerobic and stretching group for negative effect of primary dysmenorrhea

Negative effect	MD		significance	
	Aerobic	stretching	Aerobic	Stretching
Tension	-2.437	-0.8125	0.054	0.018
Mood swing	-0.437	-0.2500	0.379	0.432
Depression	-0.875	-0.500	0.069	0.191
Irritability	-1.437	-0.437	0.00	0.249
School absent	-1.875	-0.812	0.00	0.043
Avoid social work	-1.315	-1.82	0.00	0.00

Values are in the form of MD=mean difference, PT, = pre training test which was taken before training, POT= post training test measured at the end of 12 weeks training .for negative effect

Stretching exercise is an effective, simple, non-pharmacological measure to reduce dysmenorrhea. Dysmenorrhea affects the regular classes, studies and daily activities of the adolescent girls. Stretching exercise is an effective and safe form of therapy for adolescent with primary dysmenorrhea society has tremendous technological advancement in day to life. The natural method of pain reduction is acceptable and accessible to everyone in the world.

4.9. Effects of aerobic and stretching exercise on Behavioral symptoms of primary dysmenorrhea

Table 10 means value and significance of Aerobic and stretching group for Behavioral change of primary dysmenorrhea.

Behavioral change	MD		significance	
	Aerobic	stretching	Aerobic	Stretching
Loneliness	-1.062	-0.750	0.019	0.068
Dizziness	-0.812	-0.687	0.055	0.102
Anxiety	-0.750	-0.687	0.75	0.111

Values are in the form of MD=mean difference, PT, = pre training test which was taken before training, POT= post training test measured at the end of 12 weeks training.

The above table shows that mean difference and significance level of aerobic and stretching on primary dysmenorrhea tested by loneliness was MD -1.062, -0.750 and significance were 0.019, 0.068 respectively. Which indicate aerobic exercise have positive effect while stretching group was no significance change. Mean difference and significance level dizziness was MD -0.812, -0.687 and significance were 0.055, 0.102 which indicate no significance change. Mean difference and significance anxiety was -0.750, -0.687 and 0.75, 0.111 respectively no significance.

4.10. Mean difference and significance value of Aerobic and Stretching group VAS on primary dysmenorrhea.

Table 11 means value and significance of Aerobic and stretching group VAS of primary dysmenorrhea

Variable	MD		significance	
	Aerobic	stretching	Aerobic	Stretching
VAS	1.81	-2.500	0.001	0.000

Values are in the form of MD=mean difference, PT, = pre training test which was taken before training, POT= post training test measured at the end of 12 weeks training .for VAS.

The findings of the current study showed that both types of aerobic and stretching exercises were effective in reducing the intensity of primary dysmenorrhea. Given the similar effects of these two types of Exercises on primary dysmenorrhea, students can choose either of them depending on their conditions and interest. Physical exercises have been recommended as a non-pharmacological approach to the management of these symptoms. It appears that exercises have analgesic effects that act in a non specific way these study was collaborated (Saleh *et al.*, 2016) who stated that both exercise have significance on reduction of primary dysmenorrhea

5. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1. Summary

This study was to find out the Effects of Aerobic and Stretching Exercise on Primary Dysmenorrhea in the case of Wolaita Sodo University CNCS student age between 18 to 21. In this study, the role of selected aerobic and dynamic stretching Exercise on Primary Dysmenorrhea. To achieve the purpose of the study 32 were Purposely selected from Wolaita Sodo University of CNCS by using purposive and stratified sampling technique from eight department. All the subjects were from the age group of ≥ 18 and < 21 years old. They were grouped into two groups and each group consisted of 16 participants. First group assigned as aerobic (16) and second group assigned as stretching (16). The exercise training programs were given for 12 consecutive weeks for the two groups.

The collected data were analyzed by SPSS version 20 with significance level of 0.05%. Final result of the study summarized and demonstrated that the result of pre test to post test showed improvement in all cramps, fatigue, tension, mood swing, breast tenderness, depression, and VAS. Generally the results obtained from this study showed that there was improvement in reducing primary dysmenorrhea pain symptoms during menstruation due to the aerobic and stretching exercise.

Final result of the study proved that, aerobic exercise was significantly better than stretching exercise in breast tenderness, depression, Behavioral change. stretching exercise was better than aerobic to reduce stay at home symptoms, but there was no change on irritability, backache, general pain symptom and dizziness in both group. But, it doesn't mean that there was no change between the group pre and post result. There were significance in stretching group regarding to muscle stiffness, stay at home than aerobic group. The results of VAS Pretest was 7.50 ± 1.00 aerobic, 7.62 ± 0.885 stretching posttest were 5.43 ± 1.03 aerobic, 5.125 ± 0.806 , the significant value MD: 1.81 with Sig 0.001 for aerobic, MD: -2.500 with Sig 0.000 for stretching. ($p < 0.05$). Therefore, in order to see the positive effect of 12 week selected aerobic and stretching on primary dysmenorrhea were a positive effect on reducing pain intensity after intervention.

5.2. Conclusions

Based on the major finding of this study the following points were stated as conclusions.

- ❖ The result of the study of the 12 consecutive weeks on selected aerobic and dynamic stretching exercise showed a significant improvement on reduction of primary dysmenorrhea.
- ❖ Aerobic exercise has a positive effect on pain symptoms of primary dysmenorrhea when comparing with stretching exercise.
- ❖ Stretching exercise workouts significantly improved reduction of muscle stiffness and feeling of stay at home than aerobic group ,
- ❖ Both selected aerobic and dynamic stretching exercise in irritability, school absence, anxiety, dizziness programs had no effects
- ❖ Both aerobic and stretching groups had a positive effect on VAS (Visual Analog Scale).
- ❖ The finding of this study showed that both aerobic and stretching exercise significantly improved on cramps, vomiting, breast tenderness, fatigue and mood swing.

5.3. Recommendations

By considering the major findings and discussion of the study, the following recommendations were made.

- ✓ Future researchers may follow the methodology more sophisticated while using more subjects of current study in order to improve non pharmacological medicine to reduce primary dysmenorrhea by doing different types of exercise for longer training period.
- ✓ As effects of selected aerobic exercise and dynamic stretching on cramps, fatigue, breast tenderness students who suffered with problem of primary dysmenorrhea should considered the positive effect of aerobic exercise and stretching exercise on primary dysmenorrhea for minimizing symptoms of pain during menstruation.
- ✓ Female students can choose either of them depending on their conditions and interest. Physical exercises have been recommended as a non-pharmacological approach to the management of these symptoms. To be more beneficial in all pain symptoms of primary dysmenorrhea female student use different types of aerobic and stretching exercise to reduce primary dysmenorrhea.
- ✓ Since aerobic exercises have more advantages than stretching exercise to minimize tension, cramps, avoid social work. Students who suffered those symptoms may be encouraged to undergo these types of trainings regularly for healthy life style.

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7. APPENDICES

Appendix A

Questionnaire for Health Status and Physical Readiness

This questionnaire is designed to obtain information on the health status and physical readiness of the subjects participating for the research study. The information will be kept strictly confidential.

Dear student; please read the following question carefully and indicate your correct response to question by encircling with on the choice letter given.

1. Age: _____
2. Does your period come regularly?
 - A. Yes
 - B. no
3. Do you have any experience in doing physical exercise?
 - A. Regularly
 - B. sometimes
 - C. not at all
4. Do you feel discomfort during menstruation?
 - A. Yes
 - B. no
5. Do you have suffered with heart problem before
 - A. Yes
6. Have you ever suffered from shortness of breath at rest with mild exercise?
 - A. Yes
 - B. No
7. Which type of pain you usually feel(if any)

Muscle stiffness	<input type="checkbox"/>	Backache	<input type="checkbox"/>	vomiting	<input type="checkbox"/>
Headache	<input type="checkbox"/>	Fatigue	<input type="checkbox"/>		
Cramps	<input type="checkbox"/>	General aches and pains	<input type="checkbox"/>		
8. Do you have recent physical injury such us bone, muscle, joint etc will be aggravated by physical exercise
 - A. Yes
 - B. No

If your response is yes indicate the type of injury that you had before

9. Are you taking any prescription medicines recently regarding menstrual pain?

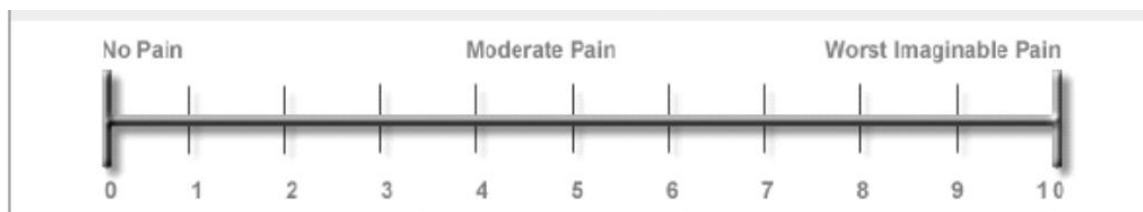
- A. Yes
- B. No

10. Tell your menstrual cycle variables

- A. Length of cycle (days)
- B. Length of menstrual flow (days)

11. Pain Assessment with the “0—10 visual analog scale (VAS)

The 0 to 10 pain scale is commonly and successfully used with hospitalized and nursing home patients, even those with mild to moderate dementia. The scale is often displayed as a line numbered from zero to ten as shown below.



This scale asks you to assign a number, from zero to ten, to the severity of your pain. Use the following statements to rate your pain intensity.

- ✓ ‘Zero’ means you have no pain at all.
- ✓ ‘Ten’ means the worst possible pain you can image.

Please tick your pain intensity on the pain scale corresponds to pain levels as follows:

- E. 0 = no pain
- F. 1 – 3 = mild pain
- G. 4 – 6 = moderate pain
- H. 7 – 10 = severe pain

Appendix B

Menstrual Symptom Questionnaires

In relation to your menstrual periods, to what extent the following issues have been a problem for you?

Table 1 MSQ (Menstrual symptom questionnaires).

Items	Severe problem(1)	Moderate problem(2)	Mild problem(3)	Hardly problem(4)	No problem(5)
Pain					
1	Muscle stiffness				
2	Backache				
3	General aches & pains				
4	Cramps				
5	Fatigue				
6	Breast tenderness				
7	Nausea/vomiting				
Negative Effect					
8	Tension				
9	Mood swings				
10	Depression				
11	Irritability				
12	School absent				
13	Stay at home				
14	Avoid social work				
Behavioral Change					
15	Loneliness				
16	Dizziness				
17	Anxiety				

I hereby state that I have read, understood and answered honestly the questions above. I also state that I wish to participate in exercise

Subject's full Name: _____ Date: _____

Subject's Signature: _____

Trainer's Name: _____ Date: _____

Trainer's Signature: _____

Appendix C

Consent to participate voluntarily in this research study

Researcher Name: Adanech Teshome Admasu

Supervisor Name: Wegene Waltenege (PhD) and Desta Enyew (PhD)

Thesis Title: -Effect of Aerobic and Stretching Exercise on Primary Dysmenorrhea of First Year Students of College of Natural and Computational Sciences in Wolaita Sodo University.

You are being asked to participate in this study as described below. All this like research study carried out are governed by the regulation for research on human beings. These regulations require that the researcher should obtain a signed agreement (consent) from you to participate in this research project. The researcher will explain to you in detail the purpose of the project, the procedure to be used, the potential benefits and the possible risk of participation in this study. You can ask the researcher any questions that you may have about the study. The basic explanation of the project is summarized below.

After discussion, if you agree to participate in the study, please sign this form in the presence of the researcher. You may discontinue at any time from the study if choose to do so.

1. Purpose and procedure

The purpose of this research project is to investigate the effect of selected aerobic and stretching exercise primary dysmenorrhea on references of first year natural and computational science student of WSU with age of 18-21 years. The subjects to be involved in this study were 32 in number and participation on this study will required to answer the physical redness questionnaire

2. Risk and the safeguards

The risks of this research study are small, while administering the tests and during test you may experience localized muscle fatigue in your thigh, you might feel some muscle soreness and fatigue during the tests. But we do not expect any unusual risks as a direct result of the study, if any unexpected physical injury occurs, appropriate first aid will be provided, but no financial compensations will be given.

3. Confidentiality

The information obtained about you will be kept in confidence, although you are free to release it to your own trainer. The information will be used only for scientific purpose without identifying you as an individual.

4. Contact Address:

Adanech Teshome Admasu -----251965840382

E-mail Address:-----adanehteshome25@gmail.com

Wegene Waltenegeus(PhD)-----251923670360

E-mail Address: -----wegu4025@gmail.com

Desta Enyew(PhD)-----251938310940

E-mail Address:-----destaenyew@yahoo.com

I certify I have read and fully understand the above project. I willingly consent to participate

Name of subject: _____

Signature of subject: _____

Address: _____

Date: _____

I certify that I have explained fully to the above subject the nature, the purpose, the potential benefits and the possible risks involved in this research study.

Date: _____

Signature of the investigator: _____

Appendix E

Description of Training schedule for the three months

The main goal of this study training plan schedule is to reduce pain intensity of primary dysmenorrhea by doing aerobic and stretching exercise on natural and computational science students through 12weeks aerobic and stretching exercise. The schedule is prepared with time frame, intensity and frequency of exercises.

The following table includes different types of aerobic and stretching exercise which was performed by the subjects within 12weeks in order to improve their awareness toward exercise as pain relief of primary dysmenorrhea. The exercises involve in this study are warming up exercise, Running, Stationary bicycle, Treadmill running, , aerobic, strength exercise like, step touch, side to side ,walking, step up and down, and finally cooling down exercise which will help to develop athletes' fitness level. Also FITT (Frequency, Intensity, Time and Type of Exercise) principle of training is applied in the schedule;

1. **Frequency of training:** the repetition of exercise in one set. The training schedule were performed 3 days per week on Monday, Wednesday and Friday.
2. **Intensity of training:** is how hard the body exercising or how much energy is expended when exercising. In this study the researcher used low to moderate intensity in the consecutive three months.

Exercise is categorized into three different intensity levels. These levels include **Low** (40-50% MHR), **Moderate** (50-65% MHR), and **Vigorous** (65-85% MHR) for aerobic exercise and are measured by the metabolic equivalent of task. The effects of exercise are different at each intensity level (i.e. training effect). Recommendations to lead a healthy lifestyle vary for individuals based on age, weight, and existing activity levels. "Published guidelines for healthy adults state is that 20-60 minutes of medium intensity continuous or intermittent aerobic activity 3-5 times per week is needed for developing and maintaining fitness"(ACSM, 1990).

3. **Duration of training:** the subjects perform the exercise for 40,50,60 min per day in this study. Duration is dependent on the intensity of the activity, thus, medium-intensity activity should be conducted over a longer period of time (30 min or more) and conversely individuals training at higher levels of intensity should train at least 40min or longer.

4. **Type of activity:** any activity that uses large muscle groups, which can be maintained continuously, E.g., dips, leg extension, jogging, bicycling, squat, chest press , biceps curl, stair climbing, back extension, and various endurance game activities.

Stretching Exercises: Schedule

The researcher has started the session by welcoming the students and telling the types of stretching exercises in Effect Dynamic Stretching Exercises the abdominal, pelvic, and groin regions. The correct techniques of acting the stretching exercises was explained and practiced first by the researchers in front of them. In the study, the researcher was selected types of exercises after extensive review to reduce pain intensity of primary dysmenorrhea symptoms for the adolescent girls. The training program was given for 12 consecutive weeks, three days/week and the duration was 40 minutes, 50minutes and 60 minutes respectively a month. Saleh *et al.*, 2016 and Shahr-jerdy (2012).

The first stretching exercise: the students were asked to stand behind a chair, bend trunk forward from the hip joint so that the shoulders and back are positioned on a straight line and the upper body placed parallel to the floor.

The second stretching exercise: the students were requested to stand 10-20 cm behind a chair, then raised 1 heel off the floor, then repeated the exercise with the other heel alternatively.

The third stretching exercise: the students were asked to spread feet wider than shoulder width. Then they asked to touch left ankle with their right hand while putting their left hand in a stretched position above their head so that, the head in the middle and their head turn and look for their left hand. The students repeated the exercise for the opposite foot with the same method.

The fourth stretching exercise: students were asked to lie down in the supine position so that the shoulders, back, and feet kept on the floor. In this position, the knees bent with the help of their hands and reach to their chin.

The fifth exercise: the female students were asked to stand against a wall and put hands behind their head and elbows pointed forward in the direction of the eyes then without bending the vertebral column; the abdominal muscle wall was contracted.

For aerobic exercises:

The researcher started the session as usual by welcoming the students and telling the following types of aerobic exercises:

I. Basic right step

On 1, step up with right foot

On 2, step up with left foot

On 3, step down with right foot (to starting position)

On 4, step up with left foot (to starting position).

All steps are near the middle of the step.

II. Basic left step

This is performed the same as basic right step, starting with left foot.

III. Turn step

On 1, step up to right side of platform with right foot.

On 2, step up to left side of platform with left foot

On 3, turn to right (1/4 turn) as you step back down, placing right foot on floor by left corner of platform. Left shoulder is turned toward platform.

On 4, step down with left foot, placing it next to right foot.

On 5, step up to left side of platform with left foot.

On 6, turn to left (1/4 turn) as you step up with right foot to right side of platform

On 7, turn to left (1/4 turn) as you step back down, placing left foot on floor near right corner of platform. Right shoulder is turned toward platform

On 8, step down with right foot placing it next to left foot.

Appendix F

Training schedules

Table 2 First Month Aerobic Training Schedule (November, 2017)

Days per week	Types of Exercises	Duration 40 (min)	Frequency (Rep/ sets)	Rest	Intensity of exercise
Monday 5:00pm- 5:55pm	1.Warming up exercise Different types of exe. for General and specific.	10min	-		Light intensity 40-50%
	2.Main work out Jogging	5min			
	Rope jumping	7min	46x3	1min per set	
	Step up and down	6min	19x2	1min per set	
	Step aerobics dance	7min		1min	
	3. Cooling down: different types of stretching exe.	5min	-		
Wednesday 5:00pm- 5:55pm	1.Warming up exercise: Different types of exe. for General and specific	10min	-		Light intensity 40-50%
	2. Main work out Jogging	5min			
	Rope jumping	7min	46x3	1min per set	
	Step up and down	6min	19x2	1min per set	
	Step aerobics exe.	7min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
Friday 5:00pm- 5:55pm	Warming up exercise: Different types of exercises for General and specific exercise	10min	-		Light intensity 40-50%
	2. Main workout Jogging and running on treadmill	5 min			
	Rope jumping	7min	46x3	1min per set	
	Step up and down	6min	19x2	1min per set	
	Step aerobics dances	7min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		

The above table showed the first month (November, 2017) training schedule for Aerobic group

Table 3. Second Month Training Schedule for Aerobic group (December, 2017)

Days per week	Types of Exercises	Duration (50min)	Frequency (Rep/sets)	Rest	Intensity of exercise
Monday 5:00pm-6:00pm	1.Warming up exercise Different types of exe. for General and specific exercise	10min	-		Moderate 50-60
	2.Main work out Running on track	9min			
	Rope jumping	8min	46x4	1 min per set	
	Step up and down	8min	20x3	1 min per set	
	Step aerobics dance	10min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
	1.Warming up exercise: General and specific	10min	-		Moderate 50-60
2. Main work out Running on track	9min				
Rope jumping	8min	46x4	1 min per set		
step up with right, left foot, combination	8min	20x3	1 min per set		
Step aerobics exe.	10min	-	1min		
3. Cooling down:	5min	-			
Warming up exercise: General and specific exercise.	10min	-		Moderate 50-60	
2. Main workout Running on track	9 min				
Rope jumping	8min	46x4	1 min per set		
Step up and down	8min	20x3	1 min per set		
Step aerobics exe.	10min	-	1min		
3. Cooling down: different types of stretching exe.	5min	-			

The above training schedule was performed every week of December, 2017

Table 4 Training for Third Month for Aerobic Group. (January,2017)

Days per week	Types of Exercises	Duration (60min)	Frequency (Rep/ sets)	Rest	Intensity of exercise
Monday 5:00pm-5:50pm	1.Warming up exercise Different types of exe. for General and specific	10min	-		Moderate 50-60%
	2.Main work out Walking	5min			
	Treadmill running	8min			
	Rope jumping	7min	-	1min per set	
	Aerobic dance	13min	-	1min per set	
	Step aerobics exe.	10min	-	1min	
Wednesday 5:00pm-5:50pm	3. Cooling down: different types of stretching exe.	7min	-		Moderate 50-60%
	1.Warming up exercise: Different types of exe. for General and specific	10min	-		
	2. Main work out Aerobic dance				
	Walking	5min			
	Rope jumping	7min	42x3	1min per set	
	Step up and down	10min	17x2	1min per set	
Friday 5:00pm-5:50pm	Step aerobics exe.	10 min	-	1min	Moderate 50-60%
	3. Cooling down: different types of stretching exe.	5min	-		
	Warming up exercise: General and specific	10min	-		
	2. Main workout Walking	8 min			
	Rope jumping	7min	42x3	1min per set	
	Step up and down	6min	17x2	1min per set	
	Step aerobics exe.	8min	-	1min	
	3. Cooling down: different Types of stretching exe.	5min	-		

The above table showed the training schedule January for aerobic group

Table 5. First month stretching exercise (November, 2017)

Days per week	Types of Exercises	Durat. (40min)	Freq. (Rep/sets)	Rest	Intensity of exercise
	1.Warming up exercise Different types of exe. for General and specific.	10min	-		
Monday 5:00pm- 5:55pm	2.main work out Jogging	8min			Light intensity 40-50%
	leg extension	9min	46x3	1min per set	
	stretch the lower abdominal	6min	19x2	1min per set	
	sit and rich ,side to side stretch	5min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
	1.Warming up exercise: Different types of exe. for General and specific	10min	-		
Wednesday 5:00pm- 5:55pm	2. main work out Jogging	8min			Light intensity 40-50%
	Rope jumping	9min	46x3	1min per set	
	hip stretching side to side	6min	19x2	1min per set	
	Double leg curl	5min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
	Warming up exercise: Different types of exercises for General and specific exercise	10min	-		
Friday 5:00pm- 5:55pm	2. main workout Jogging	8 min			Light intensity 40-50%
	Double leg curl	9min	46x3	1min per set	
	Sit and rich	6min	19x2	1min per set	
	3. Cooling down: different types of stretching exe.	5min	-		

The training schedule for every weeks of Month for Stretching Exercise (Novber, 2017)

Table 6. Second month training for stretching (December, 2017)

Days per week	Types of Exercises	Durat. (50min)	Freq. (Rep/ets)	Rest	Intensity of exercise
	1.Warming up exercise Different types of exe. for General and specific.	10min	-		
Monday 5:00pm- 5:55pm	2.Main work out Jogging	5			Moderate 50-60
	leg extension	12min	-	1min per set	
	stretch the lower abdominal	10min	--	1min per set	
	sit and rich ,side to side stretch	8min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
	1.Warming up exercise: General and specific	10min	-		
Wednesday 5:00pm- 5:55pm	2. Main work out Jogging	8min			Moderate 50-60
	Rope jumping	9min	46x3	1min per set	
	hip stretching side to side	6min	19x2	1min per set	
	Double leg curl	5min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
	Warming up exercise: General and specific exercise	10min	-		Moderate 50-60
Friday 5:00pm- 5:55pm	2. Main workout Jogging	8 min			
	Double leg curl	9min	46x3	1min per set	
	Sit and rich	6min	19x2	1min per set	
	3. Cooling down: different Type of stretching exe.	5min	-		

The above table indicate the training schedule December, 2017 for stretching group

Table 7 Third Month Training for Stretching (January2017)

Days per week	Types of Exercises	Durat. (60min)	Freq. (Rep/sets)	Rest	Intensity of exercise
	1.Warming up exercise Different types of exe. for General and specific.	10min	-		Moderate 50-60
Monday 5:00pm- 5:55pm	2.Main work out Jogging	8min			
	leg extension	9min	46x3	1min per set	
	stretch the lower abdominal,duble leg curl	15min	19x2	1min per set	
	sit and rich ,side to side stretch	10 min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
	1.Warming up exercise: Different types of exe. for General and specific	10min	-		Moderate 50-60
Wednesday 5:00pm- 5:55pm	2. Main work out Jogging	8min			
	Rope jumping	9min	46x3	1min per set	
	hip stretching side to side	10min	19x2	1min per set	
	Double leg curl	8min	-	1min	
	3. Cooling down: different types of stretching exe.	5min	-		
Friday	Warming up exercise: General and specific exercise	10min	-		Moderate 50-60
5:00pm- 5:55pm	2. Main workout Jogging	8 min			
	Double leg curl	9min	46x3	1min per set	
	Sit and rich	6min	19x2	1min per set	
	3. Cooling down: different types of stretching exe.	5min	-		

The above table shows the training schedule for every week of January

Appendix G

Paired Samples Test for all variables

Table 8. Paired Sample Test for VAS

Parameters VAS	Mean	Std. Deviation	Paired Differences		t	df	Sig. (2- tailed)
			Std. Error Mean	95% Confidence Interval of the Difference Lower Upper			
V AS PrS - PoS	- 2.50000	1.03280	.25820	1.94966 3.05034	9.682	15	.000
- VAS - PrA- PoA	1.812 50	1.75950	.43987	.87493 2.75007	4.120	15	.001

Table 9 Paired sample t test of pain symptoms, of primary dysmenorrhea

Parameters (pre- post)	Mean	Std. Deviation	Paired Differences		t	Df	Sig. (2- tailed)
			Std. Error Mean	95% Confidence Interval of the Difference Lower Upper			
Muscle_stiff - A	-.75000	1.43759	.35940	-1.51604 .01604	-2.087	15	.054
Muscle stiff- S	-.81250	1.22304	.30576	-1.46421 -.16079	-2.657	15	.018
Backache-A	-.43750	1.93111	.48278	-1.46651 .59151	.59151	15	.379
Backache-S	-.25000	1.23828	.30957	-.90983 .40983	-.808	15	.432
general_acheA	-.87500	1.78419	.44605	-1.82573 .07573	1.962	15	.069
general ache-A	-.50000	1.46059	.36515	-1.27830 .27830	-1.369	15	.191
Cramps-A	1.43750	.96393	.24098	-1.95114 -.92386	-5.965	15	.000
Cramps-S	-.43750	1.45917	.36479	-1.21503 34003	. 1.199	15	.249
Fatigue-A	1.87500	1.31022	.32755	-2.57316 -1.17684	-5.724	15	.000
Fatigue-S	-.81250	1.47054	.36764	-1.59610 -.02890	-2.210	15	.043
breast_tenderenes- A	2.00000	1.31656	.32914	-2.70155 -1.29845	-6.076	15	.000
breast_tenderenes- S	1.50000	1.67332	.41833	-2.39165 -.60835	-3.586	15	.003

Table 10 Paired sample t test of symptoms, negative effect and Behavioral change of primary dysmenorrhea

Parameters Negative effect and Behavioral change (pre-post)	Mean	Paired Differences				T	df	Sig. (2- taile d)
		Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Tension A	-2.43750	1.20934	.30233	-3.08191	-1.79309	-8.062	15	.000
Tension-S	-.68750	1.85180	.46295	-1.67426	.29926	-1.485	15	.158
Mood Swing -A	-.93750	1.06262	.26566	-1.50373	-.37127	-3.529	15	.003
Mood Swing -S	-1.00000	1.59164	.39791	-1.84813	-.15187	-2.513	15	.024
Depression A	-.75000	1.34164	.33541	-1.46491	-.03509	-2.236	15	.041
Depression-S	-.50000	1.93218	.48305	-1.52959	.52959	-1.035	15	.317
Irritability-A	-.68750	1.66208	.41552	-1.57316	.19816	-1.655	15	.119
Irritability-S	-.56250	1.50416	.37604	-1.36401	.23901	-1.496	15	.155
School Absent -A	-.37500	1.31022	.32755	-1.07316	.32316	-1.145	15	.270
School Absent -S	-.06250	1.80624	.45156	-1.02498	.89998	-.138	15	.892
Stay Home -A	-.25000	1.34164	.33541	-.96491	.46491	-.745	15	.468
Stay Home S	-.68750	1.13835	.28459	-1.29408	-.08092	-2.416	15	.029
Avoid Social Work-A	-1.56250	1.03078	.25769	-2.11176	-1.01324	-6.063	15	.000
Avoid Social Work	-.81250	1.68201	.42050	-1.70878	.08378	-1.932	15	.072
Vomiting-A	-1.31250	1.01448	.25362	-1.85308	-.77192	-5.175	15	.000
Vomiting-S	-1.81250	.98107	.24527	-2.33528	-1.28972	-7.390	15	.000
Dizziness-A	-.81250	1.55858	.38964	-1.64301	.01801	-2.085	15	.055
Dizziness-S	-.68750	1.57982	.39496	-1.52933	.15433	-1.741	15	.102
Loneliness-A	-1.06250	1.61116	.40279	-1.92103	-.20397	-2.638	15	.019
Loneliness-S	-.75000	1.52753	.38188	-1.56396	.06396	-1.964	15	.068
Anxiety -A	-.75000	1.57056	.39264	-1.58689	.08689	-1.910	15	.075
Anxiety-S	-.68750	1.62147	.40537	-1.55152	.17652	-1.696	15	.111

APPENDIX H

Table 11. Row data of pre and post test for all variables

Table-11 Pre Raw Data of Menstruation Symptom Questionnaire for Aerobic Group

No	CO DE	MS	BA	GP	C	F	BT	V	T	MS W	D	I	SA	SH	AW	L	DI	A
1	A1	1.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0	4.0	1.0	1.0	1.0	1.0	3.0	1.0	3.0
2	A2	2.0	3.0	2.0	2.0	3.0	1.0	1.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	3.0	2.0	2.0
3	A3	4.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0	4.0	1.0	3.0	2.0	1.0	1.0	1.0	1.0	3.0
4	A4	1.0	2.0	2.0	1.0	3.0	1.0	2.0	2.0	2.0	1.0	2.0	1.0	2.0	2.0	3.0	2.0	1.0
5	A5	4.0	3.0	1.0	2.0	1.0	1.0	1.0	1.0	3.0	2.0	1.0	2.0	1.0	1.0	1.0	3.0	2.0
6	A6	4.0	4.0	3.0	1.0	1.0	1.0	1.0	2.0	2.0	1.0	1.0	2.0	1.0	1.0	4.0	1.0	4.0
7	A7	2.0	5.0	3.0	1.0	1.0	3.0	2.0	1.0	2.0	2.0	3.0	1.0	1.0	1.0	1.0	3.0	2.0
8	A8	4.0	1.0	4.0	1.0	1.0	1.0	2.0	1.0	1.0	3.0	3.0	2.0	1.0	1.0	2.0	2.0	3.0
9	A9	4.0	4.0	1.0	2.0	1.0	2.0	1.0	1.0	2.0	4.0	2.0	1.0	2.0	2.0	1.0	1.0	4.0
10	A10	4.0	2.0	1.0	3.0	3.0	1.0	2.0	2.0	2.0	4.0	1.0	2.0	1.0	1.0	2.0	3.0	3.0
11	A11	2.0	3.0	4.0	1.0	1.0	3.0	2.0	1.0	1.0	3.0	2.0	3.0	1.0	1.0	1.0	2.0	2.0
12	A12	4.0	1.0	1.0	3.0	2.0	1.0	1.0	1.0	2.0	3.0	2.0	1.0	2.0	1.0	2.0	1.0	2.0
13	A13	4.0	5.0	3.0	1.0	1.0	2.0	1.0	2.0	1.0	2.0	3.0	2.0	1.0	1.0	1.0	2.0	1.0
14	A14	2.0	4.0	1.0	1.0	1.0	1.0	1.0	2.0	2.0	3.0	1.0	1.0	3.0	1.0	2.0	1.0	2.0
15	A15	1.0	4.0	1.0	2.0	1.0	2.0	1.0	3.0	1.0	1.0	2.0	2.0	1.0	1.0	1.0	4.0	1.0
16	A16	2.0	2.0	3.0	1.0	1.0	1.0	1.0	2.0	5.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	2.0

MS= Muscle stiffness, BA=Back ache, GP= General pain, C=Cramp, F=Fatigue, BT=Breast tenderness, V=Vomiting, T=Tension, MSW=Mood swing, D=Depression, I=Irritability, SA=School absent, SH=Stay at home, AW=Avoid social work, L=Loneliness, D=Dizzines, A=Anxiety

Table-12 Pre Raw Data of menstruation symptom Questionnaire for Stretching(S) Group

CO DE	MS	B A	GP	C	F	BT	V	T	M S W	D	I	SA	SH	AW	L	DI	A
S1	1.0	1.0	1.0	2.0	2.0	2.0	1.0	3.0	1.0	2.0	1.0	1.0	1.0	1.0	1.0	2.0	1.0
S2	2.0	3.0	1.0	1.0	1.0	3.0	2.0	3.0	5.0	1.0	2.0	1.0	3.0	1.0	1.0	1.0	2.0
S3	1.0	1.0	1.0	3.0	1.0	1.0	3.0	1.0	5.0	1.0	1.0	1.0	1.0	1.0	3.0	1.0	3.0
S4	3.0	4.0	1.0	1.0	1.0	2.0	1.0	1.0	1.0	3.0	3.0	1.0	3.0	2.0	1.0	2.0	1.0
S5	2.0	2.0	2.0	2.0	1.0	4.0	2.0	3.0	1.0	4.0	4.0	1.0	1.0	1.0	2.0	1.0	2.0
S6	4.0	3.0	1.0	1.0	1.0	1.0	3.0	1.0	5.0	1.0	3.0	1.0	2.0	1.0	3.0	2.0	2.0
S7	3.0	2.0	2.0	1.0	2.0	1.0	1.0	2.0	3.0	1.0	1.0	1.0	1.0	2.0	1.0	3.0	3.0
S8	1.0	1.0	3.0	1.0	1.0	4.0	5.0	1.0	2.0	5.0	2.0	1.0	1.0	1.0	1.0	1.0	1.0
S9	2.0	3.0	4.0	2.0	1.0	1.0	2.0	1.0	4.0	2.0	5.0	1.0	2.0	1.0	4.0	2.0	2.0
S10	4.0	2.0	1.0	1.0	2.0	1.0	1.0	1.0	3.0	2.0	5.0	2.0	1.0	2.0	1.0	3.0	3.0
S11	3.0	4.0	4.0	1.0	1.0	5.0	3.0	2.0	2.0	3.0	2.0	2.0	2.0	1.0	2.0	1.0	1.0
S12	2.0	2.0	1.0	1.0	3.0	1.0	3.0	3.0	1.0	1.0	5.0	2.0	1.0	1.0	2.0	4.0	2.0
S13	4.0	1.0	2.0	2.0	1.0	5.0	1.0	4.0	1.0	5.0	1.0	2.0	1.0	2.0	1.0	2.0	1.0
S14	2.0	3.0	1.0	1.0	2.0	1.0	5.0	2.0	3.0	4.0	3.0	2.0	2.0	1.0	1.0	2.0	2.0
S15	3.0	2.0	1.0	1.0	1.0	2.0	1.0	4.0	2.0	1.0	2.0	3.0	1.0	1.0	1.0	1.0	2.0
S16	2.0	1.0	3.0	1.0	3.0	1.0	5.0	1.0	2.0	2.0	2.0	3.0	1.0	1.0	1.0	1.0	2.0

MS= Muscle stiffness, BA=Back ache, GP= General pain, C=Cramp, F=Fatigue, BT=Breast tenderness, V=Vomiting, T=Tension, MSW=Mood swing, D=Depression, I=Irritability, SA=School absent, SH=Stay at home, AW=Avoid social work, L=Loneliness, D=Dizziness, A=Anxiety

Table 13: post test raw data of Raw Data of menstruation Symptom Questionnaire for Aerobic

CO DE	MS	BA	GP	C	F	BT	V	T	MS W	D	I	SA	SH	AW	L	DI	A
P1	4.0	2.0	2.0	3.0	4.0	2.0	3.0	2.0	3.0	3.0	3.0	3.0	3.0	2.0	3.0	2.0	3.0
P2	2.0	3.0	3.0	4.0	2.0	1.0	3.0	3.0	2.0	1.0	2.0	4.0	3.0	2.0	2.0	3.0	3.0
P3	3.0	4.0	2.0	2.0	4.0	4.0	2.0	1.0	4.0	3.0	1.0	1.0	3.0	3.0	1.0	2.0	2.0
P4	4.0	2.0	4.0	3.0	2.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.0	3.0
P5	2.0	3.0	2.0	3.0	3.0	2.0	5.0	2.0	3.0	4.0	1.0	3.0	4.0	3.0	3.0	3.0	3.0
P6	4.0	2.0	3.0	3.0	4.0	5.0	3.0	3.0	2.0	1.0	2.0	1.0	2.0	3.0	3.0	2.0	3.0
P7	4.0	4.0	4.0	2.0	3.0	4.0	5.0	2.0	4.0	4.0	3.0	3.0	1.0	2.0	1.0	3.0	4.0
P8	4.0	3.0	3.0	3.0	4.0	3.0	4.0	4.0	2.0	5.0	1.0	1.0	3.0	4.0	2.0	4.0	3.0
P9	5.0	3.0	3.0	4.0	3.0	5.0	3.0	2.0	2.0	4.0	5.0	1.0	4.0	2.0	3.0	4.0	2.0
P10	4.0	5.0	5.0	2.0	5.0	3.0	5.0	4.0	3.0	3.0	1.0	2.0	3.0	4.0	3.0	1.0	1.0
P11	3.0	2.0	2.0	4.0	4.0	3.0	3.0	1.0	4.0	5.0	3.0	1.0	1.0	1.0	4.0	3.0	4.0
P12	5.0	5.0	5.0	4.0	3.0	5.0	5.0	2.0	4.0	1.0	2.0	2.0	4.0	3.0	3.0	5.0	3.0
P13	4.0	3.0	1.0	2.0	3.0	3.0	4.0	5.0	2.0	5.0	4.0	2.0	1.0	2.0	1.0	2.0	3.0
P14	3.0	4.0	3.0	3.0	2.0	3.0	5.0	2.0	3.0	1.0	1.0	1.0	5.0	1.0	2.0	5.0	4.0
P15	4.0	3.0	2.0	2.0	4.0	4.0	3.0	2.0	3.0	4.0	4.0	1.0	3.0	3.0	5.0	3.0	4.0
P16	2.0	5.0	2.0	3.0	3.0	5.0	5.0	2.0	2.0	1.0	1.0	1.0	4.0	2.0	4.0	2.0	4.0

MS= Muscle stiffness, BA=Back ache, GP= General pain, C=Cramp, F=Fatigue, BT=Breast tenderness, V=Vomiting, T=Tension, MSW=Mood swing, D=Depression, I=Irritability, SA=School absent, SH=Stay at home, AW=Avoid social work, L=Loneliness, D=Dizziness, A=Anxiety

Table- 14 Post test Raw Data of menstruation Symptom Questionnaire for Stretching (T)

CO DE	MS	BA	GP	C	F	BT	V	T	MS W	D	I	SA	SH	AW	L	DI	A
T1	1.0	1.0	2.0	2.0	1.0	2.0	1.0	3.0	2.0	2.0	4.0	1.0	1.0	4.0	2.0	2.0	3.0
T2	2.0	3.0	2.0	1.0	2.0	3.0	4.0	2.0	3.0	1.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0
T3	3.0	1.0	1.0	1.0	3.0	4.0	1.0	3.0	2.0	2.0	3.0	1.0	5.0	3.0	1.0	3.0	2.0
T4	2.0	2.0	4.0	2.0	1.0	3.0	4.0	2.0	3.0	4.0	3.0	3.0	1.0	2.0	2.0	3.0	4.0
T5	5.0	3.0	1.0	1.0	4.0	5.0	5.0	3.0	4.0	5.0	2.0	2.0	2.0	5.0	2.0	2.0	1.0
T6	4.0	2.0	4.0	4.0	1.0	4.0	1.0	2.0	3.0	1.0	3.0	3.0	3.0	3.0	5.0	3.0	3.0
T7	4.0	3.0	3.0	1.0	3.0	3.0	4.0	2.0	4.0	4.0	3.0	1.0	3.0	3.0	1.0	2.0	2.0
T8	3.0	3.0	2.0	2.0	1.0	5.0	5.0	4.0	2.0	2.0	2.0	3.0	1.0	3.0	2.0	4.0	5.0
T9	4.0	1.0	4.0	1.0	5.0	4.0	1.0	3.0	3.0	3.0	1.0	1.0	2.0	3.0	1.0	1.0	2.0
T10	3.0	2.0	1.0	4.0	2.0	3.0	4.0	2.0	5.0	5.0	3.0	2.0	1.0	3.0	4.0	2.0	2.0
T11	4.0	4.0	2.0	1.0	2.0	4.0	3.0	4.0	1.0	4.0	3.0	3.0	2.0	2.0	2.0	1.0	3.0
T12	3.0	2.0	1.0	3.0	5.0	4.0	4.0	3.0	5.0	1.0	4.0	2.0	5.0	4.0	3.0	4.0	1.0
T13	3.0	3.0	2.0	1.0	1.0	3.0	2.0	4.0	2.0	4.0	1.0	4.0	1.0	4.0	3.0	4.0	3.0
T14	3.0	4.0	4.0	3.0	3.0	4.0	5.0	5.0	3.0	3.0	4.0	4.0	3.0	2.0	2.0	1.0	2.0
T15	5.0	2.0	1.0	1.0	2.0	3.0	3.0	2.0	4.0	3.0	1.0	3.0	1.0	3.0	1.0	5.0	4.0
T16	3.0	3.0	3.0	1.0	1.0	5.0	3.0	5.0	3.0	3.0	4.0	1.0	4.0	3.0	4.0	1.0	2.0

MS= Muscle stiffness, BA=Back ache, GP= General pain, C=Cramp, F=Fatigue, BT=Breast tenderness, V=Vomiting, T=Tension, MSW=Mood swing, D=Depression, I=Irritability, SA=School absent, SH=Stay at home, AW=Avoid social work, L=Loneliness, D=Dizziness, A=Anxiety

Table 15. Pre test Raw Data for VAS (T) Group on primary dysmenorrhea

NO	CODE	PTA	POA	CODE	PTS	POS
1	A1	6.00	4.00	S1	9.00	6.00
2	A2	7.00	5.00	S2	8.00	6.00
3	A3	8.00	6.00	S3	7.00	6.00
4	A4	9.00	3.00	S4	7.00	6.00
5	A5	6.00	7.00	S5	8.00	4.00
6	A6	7.00	7.00	S6	7.00	5.00
7	A7	7.00	6.00	S7	7.00	6.00
8	A8	9.00	5.00	S8	7.00	5.00
9	A9	8.00	5.00	S9	8.00	5.00
10	A10	6.00	6.00	S10	6.00	3.00
11	A11	7.00	5.00	S11	7.00	5.00
12	A12	7.00	6.00	S12	9.00	5.00
13	A13	6.00	6.00	S13	7.00	5.00
14	A14	7.00	6.00	S14	8.00	5.00
15	A15	8.00	5.00	S15	8.00	5.00
16	A16	8.00	5.00	S16	9.00	5.00

VAS=Visual Analog Scale, PTA=Pretest Aerobic, POS=Posttest aerobic, PTS=Pretest stretching, POS=Posttest stretching, A=Aerobic, S=Stretching.

Table 16. Sample size from each department

NO	Department	Total population in department	Sample size
1	Biology	31	4
2	Physics	19	4
3	Chemistry	30	4
4	mathematics	30	4
5	Statistics	28	4
6	Biotechnology	21	4
7	Geology	20	4
8	Environmental science	30	4

Table 17. Pre test Raw Data BMI for Aerobic and Stretching Group on primary dysmenorrhea

NO	Age(year)		Weight(kg)		Height(m)		BMI(Kg/m ²)	
	AG	SG	AG	SG	AG	SG	AG	SG
1	18	19	50	52	1.55	1.58	20.81165	21.64412
2	18	18	54	58	1.6	1.62	21.09375	22.65625
3	19	19	55	55	1.6	1.6	21.48438	21.48438
4	19	18	57	49	1.62	1.62	21.71925	18.67093
5	20	18	49	53	1.55	1.6	20.39542	22.06035
6	20	18	52	52	1.6	1.65	20.3125	20.3125
7	18	18	52	62	1.56	1.65	21.36752	25.47666
8	18	19	50	48	1.6	1.65	19.53125	18.75
9	18	19	49	48	1.56	1.52	20.13478	19.72387
10	18	19	48	47	1.53	1.53	20.50493	20.07775
11	18	20	50	51	1.55	1.55	20.81165	21.22789
12	21	20	55	55	1.61	1.55	21.21832	21.21832
13	19	21	50	58	1.58	1.6	20.02884	23.23346
14	20	19	55	55	1.6	1.68	21.48438	21.48438
15	18	18	64	67	1.7	1.6	22.14533	23.18339
16	18	19	55	67	1.68	1.68	19.48006	23.73025

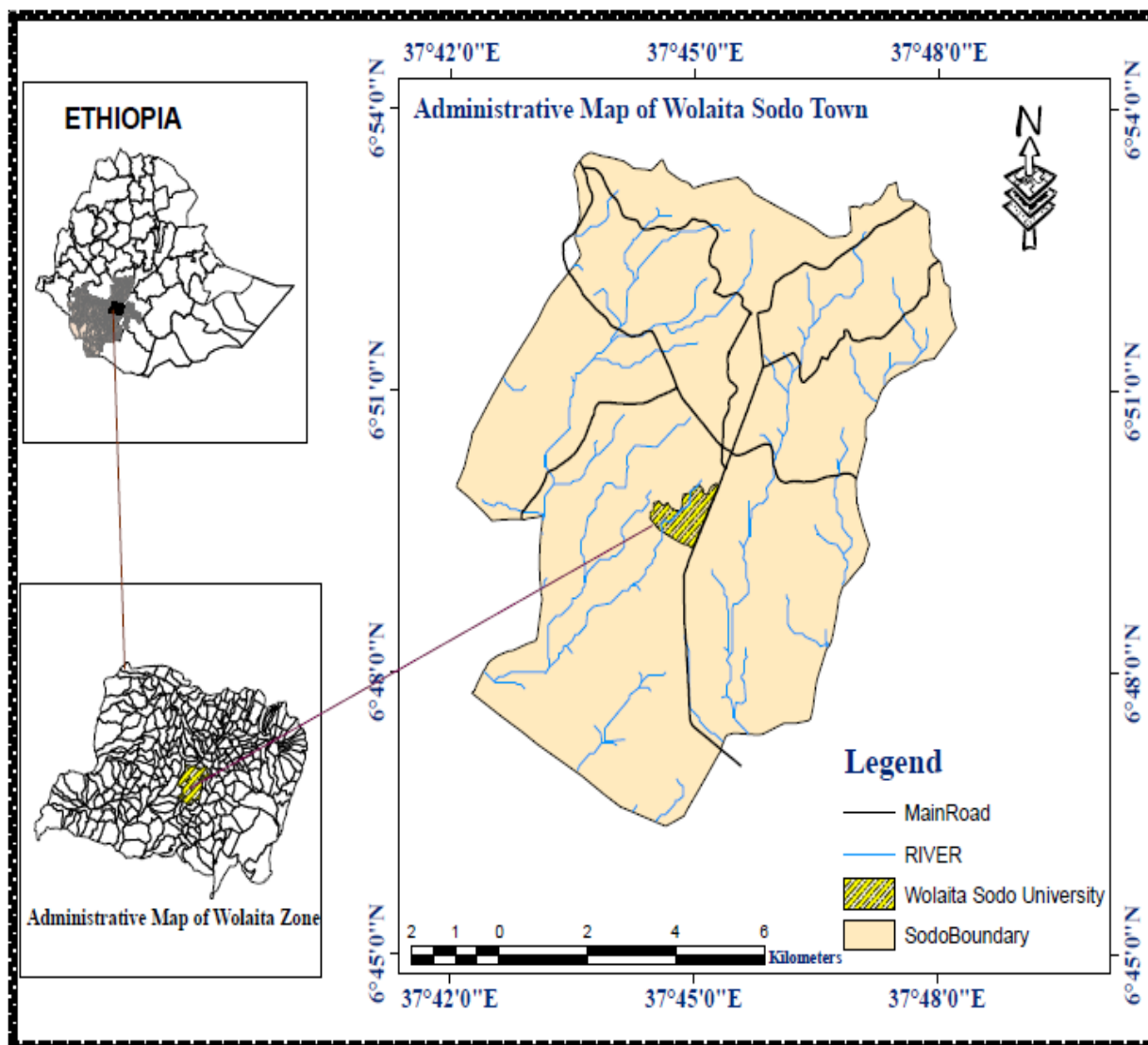
Table 18. Description of Body Mass Index

BMI	Description
<18.5	Underweight
18.5 to 24.9	Healthy
25 to 29.9	Overweight
30 to 34.9	Grade 1 obesity
35 to 39.9	Grade 2 obesity
>=40	Grade 3 (Morbid obesity)

*source: American College of Sports Medicine. ACSM's Guidelines for Exercise Testing and Prescription, 7th Edition. Lippincott Williams and Wilkins: Philadelphia; 2006.

Appendix I

Figure 1 Map of the Study Area



Source <http://WWW.WSU.edu.et>.