



UNIVERSITI PUTRA MALAYSIA

***PREVALENCE OF PRIMARY DYSMENORRHEA AND ITS
RELATED DIETARY, ANTHROPOMETRIC, MENSTRUAL,
SOCIODEMOGRAPHIC FACTORS IN ISFAHAN
MEDICAL SCIENCES UNIVERSITY, IRAN***

NAHAL HABIBI

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By

NAHAL HABIBI

**Thesis Submitted to the School of Graduate Studies, Universiti Putra
Malaysia, in Fulfillment of the Requirements for the Degree of Master
of Science**

September 2014

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DEDICATION

I dedicated this dissertation to:

My dear family for their unconditional love, encouragement and support,

Supervisory committee Dr. Mary Huang Soo Lee, Dr. Gan Wan Ying, Dr. Zulida Binti Rejali, Dr. Sayyed Morteza Safavi for their guidance and expertise,

Women in all around the world,

People who feel a sense of responsibility about women health.



Abstract of thesis presented to the Senate of Universiti Putra Malaysia
in fulfillment of the requirement for the degree of Master of Science

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By

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September 2014

Chair: Mary Huang Soo Lee, PhD

Faculty: Medicine and Health Sciences

Women make up approximately half of the global population. Dysmenorrhea is one of the common health problems that can affect negatively different dimensions of women's life and incur economic losses for communities. Thus this cross-sectional study was conducted from January 2013 until April 2013 to determine the prevalence of primary dysmenorrhea and factors associated with its intensity among undergraduate female students of Isfahan University of Medical Sciences, Iran. A total of 311 undergraduate female students who were studying at Isfahan University of Medical Sciences participated in this study. In the present study several instruments include (1) Socio-demographic information questionnaire, (2) 0-10cm Numeric Pain Rating Scale questionnaire, (3) Menstrual characteristics questionnaire, (4) Pictorial Blood Assessment Chart questionnaire, (5) 3day 24hour food recall, (6) Meal skipping questionnaire ,

(7) "PLUSAVIS 333" body composition analyzer to measure the weight and body fat mass, (7) SECA body meter for measuring the height, (8) stretch-resistant tape for measurement the waist circumference and hip circumference were used. Prevalence of primary dysmenorrhea was 89.1% and the intensity of primary dysmenorrhea was reported as mild by 30.3%, moderate by 36.5% and severe by 33.2% ($Mean \pm SD = 4.7 \pm 3.00$). There was significant association between younger age of participants ($r = -0.233$, $p <$

0.001), lower mother's years of formal education ($r = -0.143$, $p < 0.05$), and home residing ($= 16.8$, $p < 0.001$) with the higher intensity of primary dysmenorrhea. In addition, lower bleeding intensity ($r = 0.225$, $p < 0.001$), longer interval between periods ($r = -0.202$, $p < 0.01$), and negative family history of dysmenorrhea ($= 28.09$, $p < 0.001$) were significantly associated with the lower intensity of primary dysmenorrhea. Moreover, association between lower body fat percentage ($r = -0.245$, $p < 0.01$), lower BMI ($r = -0.226$, $p < 0.01$), smaller waist circumference to height ratio ($r = -0.222$,

$p < 0.01$), smaller waist circumference ($r = -0.180$, $p < 0.01$), and smaller waist to hip circumference ratio ($r = -0.122$, $p < 0.05$) with the higher intensity of primary dysmenorrhea were found. Meanwhile, lower calcium intake ($r = -0.238$, $p < 0.01$), lower magnesium intake ($r = -0.235$, $p < 0.001$), and meal skipping ($\beta = 14.611$, $p < 0.001$) were positively associated with the higher intensity of primary dysmenorrhea. However, family size, monthly family income, age of menarche, length of menstrual period, dietary intake of fat, protein, energy, fiber, vitamin E, carbohydrate were not significantly associated with the intensity of primary dysmenorrhea. Result of this study showed that positive family history of dysmenorrhea, meal skipping, younger age, lower intake of calcium and magnesium, residing at home, lower body fat percentage, higher bleeding intensity, lower mother's years of formal education, and shorter interval between periods were factors that significantly contributed to the higher intensity of primary dysmenorrhea ($\beta = 0.404$; $F(10, 266) = 19.735$, $p < 0.05$). In the current study, family history of dysmenorrhea was the strongest factor that contributed to the intensity of primary dysmenorrhea ($\beta = -0.249$; $p < 0.05$) while the weakest factor that contributed to the intensity of primary dysmenorrhea was interval between periods ($\beta = -0.128$; $p < 0.05$). In summary, results of this study indicated that primary dysmenorrhea was a common gynecological complaint and some socio-demographic factors, menstrual characteristics, anthropometric indicators, and dietary parameters were significantly contributed toward the intensity of primary dysmenorrhea among undergraduate female students of Isfahan University of Medical Sciences. Hence, particular consideration should be paid to primary dysmenorrhea as a common health problem among young women and some attention to the associated factors can be helpful. For instance, positive family history of dysmenorrhea, younger age, and heavier menstruation are the signs that can help the healthcare providers to recognize high-risk young university students and focus intervention programs to reduce their pain. Individuals must investigate primary dysmenorrhea and consult specialists to reduce suffering from this problem. Moreover, they should try to have suitable diet with enough intakes of energy, macronutrients, and micronutrients. They should also have daily meals and avoid meal-skipping in order to have good nutritional practices. Additionally individuals should try to be fit and where necessary consult specialists including nutritionists and dietitians and avoid wrong models of fitness and wrong methods of dieting. Further research is needed to support the results of this study and to investigate the other contributed factors to the intensity of primary dysmenorrhea.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra
Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

**PREVALENS DISMENOREA PRIMER DAN FAKTOR DIET,
ANTHROPOMETRIK,HAID, SOSIODEMOGRAFIK YANG
BERKAITAN DENGANNYA DI UNIVERSITI SAINS PERUBATAN
ISFAHAN, IRAN**

Oleh

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September 2014

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Wanita membentuk kira-kira separuh daripada populasi dunia. Dismenorea merupakan salah satu masalah kesihatan yang lazim dan mampu mempengaruhi pelbagai dimensi kehidupan wanita secara negatif juga mengakibatkan kerugian ekonomi kepada komuniti. Oleh yang demikian, kajian keratan rentas yang dijalankan dari Januari 2013 hingga April 2013 ini bertujuan untuk menentukan prevalens dismenorea primer dan faktor-faktor yang berkaitan dengan intensitinya di kalangan mahasiswa wanita Universiti Sains Perubatan Isfahan, Iran. Sejumlah 311 mahasiswa wanita yang mengaji di Universiti Sains Perubatan Isfahan telah menyertai kajian ini. Kajian ini menggunakan beberapa instrumen termasuk (1) Borang soal selidik faktor-faktor sosio-demografik, (2) Borang soal selidik 0-10cm Numeric Pain Rating Scale (McCaffery & Beebe, 1993), (3) Borang soal selidik ciri-ciri kedatangan haid, (4) Borang soal selidik gambar penilaian darah (Higham et al., 1990), (5) 3-hari ingatan diet 24-jam yang lepas, (6) Borang soal selidik skip hidangan (Soyer et al., 2008), (7) Alat analisis komposisi badan "PLUSAVIS 333" untuk mengukur berat badan dan jisim lemak badan, (8) Meter badan SECA untuk mengukur ketinggian, dan (9) Pita pengukur untuk mengukur lilitan pinggang dan punggung. Prevalens dismenorea primer adalah 89.1% dan sebanyak 30.3% mengalami gejala yang ringan, 36.5% mengalami gejala yang sederhana, 33.2% mengalami gejala yang serius ($Min \pm SD = 4.7 \pm 3.00$). Terdapat perkaitan negatif yang signifikan antara umur ($r = -0.233$, $p < 0.001$), tahap pendidikan ibu ($r = -0.143$, $p > 0.05$) dengan intensiti dismenorea primer. Bagi mereka yang tinggal di rumah ($\chi^2 = 16.8$, $p < 0.001$) menunjukkan intensiti yang lebih tinggi secara signifikan. Tambahan pula, terdapat perkaitan yang signifikan antara intensiti pendarahan haid yang rendah ($r = 0.225$, $p < 0.001$), tempoh masa haid yang lebih panjang ($r = -0.202$, $p < 0.01$), dan sejarah keluarga yang negatif tentang dismenorea ($\chi^2 = 28.09$, $p < 0.001$) dengan intensiti dismenorea primer yang rendah. Pada masa yang sama,

perkaitan antara peratus lemak badan yang lebih rendah ($r=-0.245$, $p<0.01$), BMI yang lebih rendah ($r=-0.226$, $p<0.01$), nisbah ukuran lilitan pinggang dan tinggi yang lebih kecil ($r=-0.222$, $p<0.01$), ukuran lilitan pinggang yang lebih kecil ($r=-0.180$, $p<0.01$), dan nisbah ukuran lilitan pinggang dan punggung yang lebih kecil ($r=-0.122$, $p<0.05$) dengan intensiti dismenorea primer yang lebih tinggi telah didapati. Pada masa yang sama, pengambilan kalsium yang lebih rendah ($r= -0.238$, $p<0.01$), magnesium yang lebih rendah ($r= -0.235$, $p<0.001$) dan skip hidangan ($\chi^2= 14.611$, $p<0.001$) juga didapati berkait positif secara signifikan dengan intensiti dismenorea primer yang lebih tinggi. Keputusan kajian menunjukkan bahawa sejarah keluarga yang positif tentang dismenorea, skip hidangan, umur yang lebih muda, pengambilan calcium dan magnesium yang lebih rendah, tinggal di rumah, peratus lemak badan yang lebih rendah, intensiti pendarahan haid yang lebih tinggi, tahap pendidikan ibu yang lebih rendah dan tempoh masa haid yang lebih pendek menyumbang secara signifikan terhadap intensiti dismenorea primer yang lebih tinggi (R^2 0.404; $F(1,266) = 19.735$, $p<0.05$). Dalam kajian ini, sejarah keluarga tentang dismenorea merupakan faktor utama yang menyumbang kepada intensiti dismenorea primer ($\beta= 0.249$; $p<0.05$) manakala factor penyumbang yang paling lemah adalah tempoh masa haid ($\beta= -0.128$; $p<0.05$). Dalam rumusan, keputusan kajian menunjukkan bahawa dismenorea primer merupakan masalah kesihatan ginekologi yang lazim dan faktor-faktor sosio-demografik, ciri-ciri kedatangan haid, ukuran anthropometrik, dan pengambilan diet merupakan penyumbang yang signifikan terhadap intensiti dismenorea primer di kalangan mahasiswa wanita Universiti Sains Perubatan Isfahan. Oleh yang demikian, dismenorea primer perlu diberi pertimbangan tertentu sebagai satu masalah kesihatan yang lazim dan perhatian terhadap faktor-faktor yang berkaitan adalah diperlukan. Sebagai contoh, sejarah keluarga tentang dismenorea, umur lebih muda dan pendarahan haid yang lebih banyak merupakan tanda-tanda yang mampu membantu anggota kesihatan untuk mengenalpasti mahasiswa muda yang berisiko tinggi serta memberi fokus kepada intervensi yang boleh mengurangkan ketidakselesaan mereka. Wanita perlu meneliti gejala dismenorea primer dan mendapatkan bantuan pakar untuk mengurangkan ketidakselesaan akibat masalah ini. Selain itu, mereka harus cuba mengambil diet yang seimbang dengan pengambilan tenaga, makronutrien dan mikonutrien yang secukupnya. Mereka juga disarankan untuk mengambil hidangan harian dan mengelakkan skip hidangan untuk memastikan amalan pemakanan yang baik. Lebih banyak kajian diperlukan untuk menyokong keputusan kajian ini dan mengkaji faktor-faktor lain yang mungkin berkaitan dengan intensiti dismenorea primer.

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I certify that a Thesis Examination Committee has met on 2 September 2014 to conduct the final examination of Nahal Habibi on her thesis entitled "Prevalence of Primary Dysmenorrhea and its Related Dietary, Anthropometric, Menstrual, Sociodemographic Factors in Isfahan Medical Sciences University, Iran" in accordance with the Universities and University Colleges Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The Committee recommends that the student be awarded the Master of Science.

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DECLARATION

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LIST OF ABBREVIATIONS AND TERMINOLOGIES

ADMA	Asymmetric Dimethyl Arginine
BIA	Bio-electric Impedance Analysis
BF%	Body Fat Percentage
BMI	Body Mass Index
BMR	Basal Metabolic Rate
DRI	Dietary Reference Intake
EI	Energy Intake
FAO	Food and Agriculture Organization of the United Nations
FDA	Food and Drug Administration
HC	Hip Circumference
HRQoL	Health-Related Quality of Life
MLR	Multiple Linear Regression
NPRS	0-10cm Numeric Pain Rating Scale
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
OCP	Oral Contraceptive Pill
PBAC	Pictorial Blood Assessment Chart
QoL	Quality of Life
SFT	Skin Fold Thickness
SPSS	Statistical Package for the Social Sciences
STEPS	STEPwise approach to Surveillance
UNU	United Nations University
UPM	Universiti Putra Malaysia
VS	Versus
WC	Waist Circumference
WHO	World Health Organization
WHR	Waist to Hip Ratio
WHtR	Waist to Height Ratio

TERMS

Primary dysmenorrhea: Primary dysmenorrhea refers to menstrual pain without pelvic pathology (Berek, 2007).

Secondary dysmenorrhea: Secondary dysmenorrhea is defined as painful menses associated with underlying gynecological pathology (Berek, 2007).

Oligomenorrhea: When the intervals between a woman's menses exceeds 35 day, this situation is called oligomenorrhea (Hatcher et al., 2007).

Polymenorrhea: polymenorrhea or frequent periods, describes menstrual periods that occur less than 21 days apart (Callahan & Caughey, 2013).

CHAPTER 1

INTRODUCTION

1.1 Background

Women make up approximately half of the global population (World Bank, 2012). Considering this fact, topics related to their health are important. One of the most common health problems that can affect the quality of women's life in different parts of the world is dysmenorrhea (Charu et al., 2012; Hillen et al., 1999; Kumbhar et al., 2011; Osuga et al., 2005; Titilayo et al., 2009; Unsal et al., 2010). Dysmenorrhea is a subgroup of pelvic pain and it means painful menstrual flow (Lefebvre et al., 2005; Nasir & Bope, 2004).

It occurs in two forms: primary and secondary dysmenorrhea. Indeed the difference between these two forms is mainly defined by the time of their occurrence and dependency on gynecological diseases. Primary dysmenorrhea is painful menstruation which happens without any gynecological disease. It often starts at six to twelve months after menarche and can continue to menopause. In secondary dysmenorrhea, gynecological pathology such as endometriosis and ovarian cysts are the contributing factors. Although the secondary form can occur at any time in a woman's life between menarche and menopause it most probably will take place after 25 years of age. While primary dysmenorrhea usually starts around the onset of menstruation and may continue from eight hours to three days, in secondary dysmenorrhea the time it starts may vary from one menstrual period to another (Proctor & Farquhar, 2007).

There is not enough information to select one factor for the etiology of primary dysmenorrhea. A combination of factors is postulated as the contributing agents. Some suspect that it caused by increased secretion of prostaglandin $F_{2\alpha}$ from the endometrium which produces hypercontractility leading to ischemia in the uterus and therefore the pain (Lefebvre et al., 2005). It is evidenced that during the first and second day of the menstrual period, prostaglandins are at their highest level (Proctor & Farquhar, 2006). Also vasopressin and oxytocin may be contributing factors in the etiology of primary dysmenorrhea because of the increase in the synthesis and release of inflammatory prostaglandins. Moreover, stimulation of the type C pain fibers as a result of ischemia in the endometrium has also been quoted as the neuronal origin of primary dysmenorrhea (Montoya et al., 2012; Sheila Rani, 2012). Additionally, Akdemir et al. (2010) postulated that inhibiting the synthesis of nitric oxide by asymmetric dimethyl arginine (ADMA) as a marker of endothelial dysfunction can cause extra vasoconstriction leading to primary dysmenorrhea.

While primary dysmenorrhea is defined with pain some associated symptoms may occur with dysmenorrhea. These symptoms can interact with the person's life causing gastrointestinal irritation, nausea, vomiting, sleeplessness, depression, weakness, headache, backache, pain in the thigh, irritability, and nervousness (Harel, 2006; Perry, 2012). At the same time

increased contraction of uterine muscle can raise its blood pressure to higher than 60 mm Hg (Lefebvre et al., 2005). Some risk factors reported in the literature for primary dysmenorrhea include being younger than 20 years, being nullipara, having intensive menstrual bleeding, experiencing menarche at a younger age, smoking, low BMI, being on a diet to lose weight, and breakfast skipping (Fujiwara, 2003; Ozerdogan et al., 2009; Patel et al., 2006; Perry, 2012; Wang et al., 2004).

This research is designed to determine the prevalence of primary dysmenorrhea, its intensity, and factors associated with the intensity of primary dysmenorrhea among undergraduate female students of Isfahan University of Medical Sciences in Iran.

1.2 Problem statement

Given that primary dysmenorrhea prevalence is high and it affects different stages of a woman's life negatively, it is a fact that primary dysmenorrhea has been highlighted as a problem in women all around the world. Due to the detrimental effects of primary dysmenorrhea on a woman's psychological status, health-related quality of life (HRQoL) among adolescents has been reported to be negatively affected by primary dysmenorrhea (Eryilmaz et al., 2009). Generally, prevalence of primary dysmenorrhea is estimated at 45.0 to 94.4% of women in different countries and different age groups (Abd El-Hameed et al., 2011; Al-Kindi & Al-Bulushi, 2011; Gagua et al., 2012; Grandi et al., 2012; Karout et al., 2012; Molazem et al., 2011; Nazarpour, 2010; Ortiz, 2010; Pitangui et al., 2013; Shah et al., 2013; Unsal et al., 2010; Wong & Khoo, 2010). Prevalence of primary dysmenorrhea and its intensity not only vary from one country to another but are also different from one city to another city within a country. This variation of prevalence can be explained by the characteristics of subjects of the study, sample size and year of the study. Moreover, due to varying reports on prevalence of primary dysmenorrhea in limited number of studies it is difficult to speculate on the trend over the years.

Primary dysmenorrhea results in different losses for individuals and communities. For instance, school absenteeism, interference with daily living activities, and use of medications were positively associated with higher intensity of primary dysmenorrhea (Pitangui et al., 2013). The International Association for the Study of Pain (IASP) in 2007 estimated that in each menstrual period approximately 10 to 15% of dysmenorrheic women were not able to work for one to three days. Ostrzenski (2002) reported that primary dysmenorrhea was the cause of the loss of approximately 140 million working hours in the United States and 38% of the women who suffered from primary dysmenorrhea regularly used medical therapy to relieve their pain.

Primary dysmenorrhea can also cause complicated combinations of individual and psychosocial problems as well as produce different disorders in a person's life. For instance, results of a study among 15-23 year old Omani students revealed that primary dysmenorrhea was the cause of low

class concentration in three quarters of the students, restriction in doing homework in more than half, school absenteeism in around half, limitation in socialization in one quarter, and decrease academic performance in 8% of students (Al-Kindi & Al-Bulushi, 2011). In Nigeria, Titilayo et al. (2009) reported that female students with primary dysmenorrhea were one and half times more depressed than those without dysmenorrhea. In Malaysia, Liliwati et al. (2007) reported that in a rural school those students who suffered from primary dysmenorrhea had reduced concentration and sports participation, and increased class and school absenteeism.

Self-medication with appropriate or inappropriate over the counter options to eliminate or reduce the primary dysmenorrhea is common. For instance, a recent study about self-medication for primary dysmenorrhea among Indian women found that taking inappropriate medicine and mefenamic acid as a non-steroidal anti-inflammatory drug was reported by 42% and 35% respectively (Sugumar et al., 2013). In Malaysia, 37.2% of 801 dysmenorrheic girls used over-counter painkiller without the prescription of a physician to relieve primary dysmenorrhea (Wong & Khoo, 2010).

In Australia, self-medication with analgesia including non-steroidal anti-inflammatory drugs, paracetamol, and aspirin to decrease the intensity of dysmenorrheal pain was reported by 66% of Australian girls (Parker et al., 2010). Shabani-Nashtai and Mohamadalizadeh (2010) showed that among 108 students who suffered from primary dysmenorrhea at a dormitory in Tabriz, Iran only 9.3% never took analgesia to reduce the pain. Moreover, consumption of painkillers during menstruation increased by 12.2% (Shabani-Nashtai & Mohamadalizadeh, 2010).

According to the FDA medication guideline (2007), None-Steroidal Anti-Inflammatory Drugs (NSAIDs) can enhance the risk of heart attack or stroke, stomach ulcer and bleeding especially when used over a long time. Additionally, kidney failure, liver failure, anemia with low count of red blood cell, asthma attacks in people suffering from asthma, allergic reactions, heart failure from fluid retention and high blood pressure as serious side effects of NSAIDs may occur. In addition, stomach pain, diarrhea, constipation, heart burn, dizziness, nausea and vomiting are reported as the mild to moderate side effects.

Primary dysmenorrhea not only has detrimental effects on health and quality of life, but it can affect the economy of the society through school and work absenteeism and over-the counter medications. For instance, in the USA annually 200 million US dollars are lost due to the around six billion work-hours of absenteeism caused by dysmenorrhea (Locklear, 2009). Taketani (2000) revealed that economic losses due to dysmenorrhea were 4.2 billion dollars annually in Japan.

The Current study focuses on primary dysmenorrhea because of its high prevalence and detrimental effects. In addition, primary dysmenorrhea is different from secondary form in that secondary dysmenorrhea is a symptom of gynecological diseases (Tollison et al., 2002).

It is necessary to have a valid guideline for primary dysmenorrhea screening leading to identifying the people who are at risk of dysmenorrhea in order to help them with useful instructions to reduce the intensity of pain or eliminate it completely. For this purposes, determining the associated factors and developing recommendations are extremely important. Association of some socio-demographic factors and dysmenorrhea has been reported in previous researches (Jang et al., 2013; Okoro et al., 2013; Omidvar & Begum, 2012). Menstrual characteristics have been proposed as the associated factor with both prevalence and intensity of dysmenorrhea (Akhavanakbari & Ahangar-Davoudi, 2010; Unsal et al., 2010; Zhou et al., 2010). The association between BMI and risk of dysmenorrhea has been documented in previous study in that underweight women had higher risk of dysmenorrhea (Ozerdogan et al., 2009).

There are limited numbers of studies about association between intake of energy and different nutrients such as energy, fiber, Ca, Mg, and vitamin E in the literature (Abdul-Razzak et al., 2010; Balbi et al., 2000; Molazem et al., 2011; Tavallaei et al., 2011). In addition, improvement of dietary habits can also help to reduce the burden of dysmenorrhea since bad dietary habits such as breakfast skipping and meal skipping have been found to be associated with primary dysmenorrhea (Fujiwara, 2003; Gagua et al., 2012). Meanwhile, in Iran only Akhavanakbari and Ahangar-Davoudi (2010) and Nazarpour (2010) studied the prevalence of primary dysmenorrhea among university students. Therefore, due to lack of study about prevalence of primary dysmenorrhea and association between socio-demographic factors, menstrual characteristics, anthropometric indicators, and dietary parameters with its intensity among undergraduate female students, this study aims to investigate the prevalence of primary dysmenorrhea and the factors associated with its intensity among undergraduate female students of Isfahan University of Medical Sciences in Iran to add to the knowledge about prevalence of primary dysmenorrhea and how intensity can be reduced so that the detrimental effects on individuals and community can be addressed.

1.3 Significance of the study

Results of this study provide baseline knowledge about the prevalence of primary dysmenorrhea among undergraduate students of Isfahan University of Medical Sciences. Additionally, a better understanding of the association between socio-demographic factors, menstrual characteristics, anthropometric indicators, and dietary parameters with the intensity of primary dysmenorrhea among undergraduate students of Isfahan University of Medical Sciences could be identified. Therefore, results of this study are beneficial for researchers, health care providers, individuals, and it indirectly benefits the community through reduction of economic losses.

First, based on the fact that many undergraduate students are affected by primary dysmenorrhea (Grandi et al., 2012; Karout et al., 2012; Nazarpour, 2010; Ortiz et al., 2009; Shah et al., 2013) and the fact that women are increasing regarded as economic resources to the world, special consideration to this health problem is necessary. In addition, determination

of associated factors to the intensity of primary dysmenorrhea among undergraduate female students is very important since due to detrimental effects of primary dysmenorrhea, the quality of their life decrease (Charu et al., 2012; Unsal et al., 2010).

Moreover, primary dysmenorrhea negatively affects daily academic activities, level of concentration in the class, and socialization among young university students (Al-Kindi and Al-Bulushi, 2011; Brito et al., 2012; Ortiz, 2010; Titilayo et al., 2009). Meanwhile, there are only two studies about the prevalence of primary dysmenorrhea among undergraduate students in Iran (Akhavanakbari & Ahangar-Davoudi, 2010; Nazarpour, 2010). Additionally, there is limited literature on the association between intake of energy, macronutrients, calcium, magnesium, and vitamin E with the intensity of primary dysmenorrhea. Therefore, determination of the association between dietary parameters and intensity of primary dysmenorrhea will be very useful.

Also subsequently with exploring the risk factors of primary dysmenorrhea which leads to the detrimental effects on the student's life, they can contribute fully to the development of the country. Hence, economic losses for the society will reduce and efficiency can increase.

Moreover, researchers can use results of this study to compare prevalence of primary dysmenorrhea with previous studies and with their own findings to explore the probable trends. In addition, results of the current study will provide baseline information for future studies. Identifying the associated factors with the intensity of primary dysmenorrhea is useful for comparison with the other studies to achieve more reliable information. Moreover, researchers can use the findings of this study to explore the causal relationships through prospective and experimental studies. Additionally, data from the present study can serve as a reference to investigate the associated factors with the intensity of primary dysmenorrhea in other populations.

Healthcare providers can use the information of this study about the associated factors to provide effective designs and education programs to reduce the intensity of primary dysmenorrhea among undergraduate students. Determination of the associated factors with the intensity of primary dysmenorrhea provided helpful instructions for individuals, their mothers and sisters to deal with primary dysmenorrhea better.

1.4 Objectives

1.4.1 General Objective

To determine the prevalence of primary dysmenorrhea and factors associated with its intensity among undergraduate female students of Isfahan University of Medical Sciences

1.4.2 Specific Objectives

1. To determine the prevalence of primary dysmenorrhea among undergraduate female students of Isfahan University of Medical Sciences.
2. To determine socio-demographic factors (age, family size, residential status, mother's years of formal education, occupation of mother, and family income), menstrual characteristics (age of menarche, family history of dysmenorrhea, length of period, interval between periods, bleeding intensity, and intensity of primary dysmenorrhea), anthropometric indicators (BMI, body fat percentage, waist circumference, waist to hip ratio, and waist circumference to height ratio), and dietary parameters (intakes of energy, macronutrients, vitamin E, calcium, magnesium, and meal skipping) among undergraduate female students.
3. To determine the associations between socio-demographic factors (age, family size, residential status, mother's years of formal education, occupation of mother, and family income) with the intensity of primary dysmenorrhea among undergraduate female students.
4. To determine the association between menstrual characteristics (age of menarche, family history of dysmenorrhea, length of period, interval between periods, and bleeding intensity) with the intensity of primary dysmenorrhea among undergraduate female students.
5. To determine the associations between anthropometric indicators (BMI, body fat percentage, waist circumference, waist to hip ratio, and waist circumference to height ratio) with the intensity of primary dysmenorrhea among undergraduate female students.
6. To determine the association between dietary parameters (intakes of energy, macronutrients, vitamin E, calcium, magnesium, and meal skipping) with the intensity of primary dysmenorrhea among undergraduate female students.
7. To determine the contribution of socio-demographic factors, menstrual characteristics, anthropometric indicators, and dietary parameters toward the intensity of primary dysmenorrhea among undergraduate female students.

1.5 Hypotheses

H_01 : There is no significant association between socio-demographic factors and the intensity of primary dysmenorrhea

H_02 : There is no significant association between menstrual characteristics and the intensity of primary dysmenorrhea

H₀₃: There is no significant association between anthropometric indicators and the intensity of primary dysmenorrhea

H₀₄: There is no significant association between dietary parameters and the intensity of primary dysmenorrhea

H₀₅: There is no significant contribution of socio-demographic factors, menstrual characteristics, anthropometric indicators, and dietary parameters toward the intensity of primary dysmenorrhea

1.6 Conceptual frame work

The independent variables in this study were socio-demographic factors, menstrual characteristics, anthropometric indicators, and dietary parameters, while the dependent variable was the intensity of primary dysmenorrhea (Figure 1.1). Socio-demographic factors included age, family size, residential status, mother's years of formal education, occupation of mothers, and family income. Menstrual characteristics were listed as age of menarche, family history of dysmenorrhea, length of menstrual period, interval between periods, and bleeding intensity. Anthropometric indicators such as BMI, body fat percentage, waist circumference, WHR, and WHtR were used. Dietary parameters were assessed using average daily intakes of energy, macronutrients, vitamin E, calcium, magnesium, and meal skipping.

Previous studies have shown that age, family size, and residential status were associated with the prevalence and intensity of primary dysmenorrhea (Jang et al., 2013; Juang et al., 2006; Omidvar & Begum, 2012). Additionally, intensity of bleeding, age of menarche, and family history of dysmenorrhea were significantly associated with the prevalence and intensity of primary dysmenorrhea in previous researches (Akhavanakbari & Ahangar-Davoudi, 2010; Liliwati et al., 2007; Ozerdogan et al., 2009; Parveen et al., 2009; Shabani-Nashtai & Mohamadalizadeh, 2010; Wu et al., 2000). Furthermore, previous studies revealed that there were significant association between BMI, waist circumference, and WHtR with the intensity of dysmenorrhea (Chauhan & Kala, 2012; Haidari et al., 2011; Okoro et al., 2013; Ozerdogan et al., 2009).

Meanwhile, dietary intakes of fiber, Ca, Mg, vitamin E, breakfast skipping and meal skipping were associated with the prevalence and intensity of primary dysmenorrhea in the previous studies (Abdul-Razzak et al., 2010; Fujiwara, 2003; Gagaa et al., 2012; Molazem et al., 2011; Nagata et al., 2005; Tavallae et al., 2011). Hence, in this study the association between all independent variables and the intensity of primary dysmenorrhea were assessed. Figure 1.1 shows the conceptual framework of the current study.

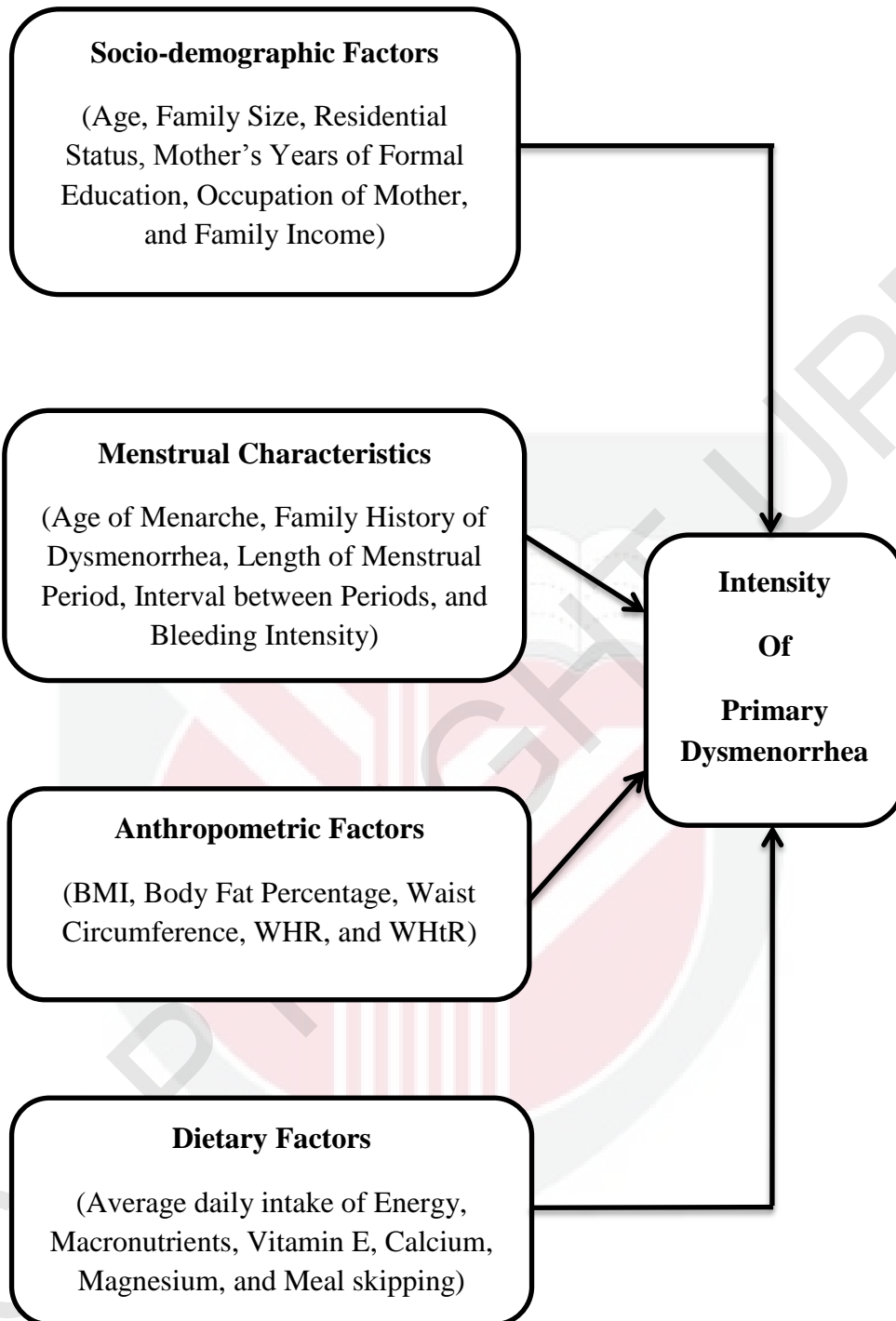


Figure 1.1: Conceptual framework of the study

REFERENCES

- Abd El-Hameed, N. A., Mohamed, M. S., Ahmed, N. H., & Ahmed, E. R. (2011). Assessment of dysmenorrhea and menstrual Hygiene practices among adolescent girls in some nursing schools at El-Minia Governorate, Egypt. *Journal of American Science*, 7(9), 216-223.
- Abdel Aziem, A. A., Duria A, R., Mona, M., & Ishag, A. (2011). Age at menarche and menstrual cycle pattern among schoolgirls in Kassala in eastern Sudan. *Journal of Public Health Epidemiology*, 3(3), 111-114.
- Abdul-Razzak, K. K., Ayoub, N. M., Abu-Taleb, A. A., & Obeidat, B. A. (2010). Influence of dietary intake of dairy products on dysmenorrhea. *Journal of Obstetrics and Gynaecology Research*, 36(2), 377-383.
- Agarwal, A. K., & Agarwal, A. (2010). A study of dysmenorrhea during menstruation in adolescent girls. *Indian Journal of Community Medicine*, 35(1), 159-164.
- Agarwal, A., & Venkat, A. (2009). Questionnaire study on menstrual disorders in adolescent girls in Singapore. *Journal of pediatric & adolescent gynecology*, 22(6), 365-371.
- Akdemir, N., Cinemre, H., Bilir, C., Akin, O., & Akdemir, R. (2010). Increased serum asymmetric dimethylarginine levels in primary dysmenorrhea. *Gynecology Obstetrics Investigation Journal*, 69(3), 153-156.
- Akerlund, M. (1979). Pathophysiology of dysmenorrhea. *Acta obstetricia et gynecologica Scandinavica. Supplement*, 58(87), 27-32.
- Akhavanakbari, P., & Ahangar-Davoudi, S. (2010). Dysmenorrhea frequency and severity and its related factors in students of Ardabil University of Medical Science in 1388. *Journal of Health and Hygiene of Ardabil*, 1(3), 41-47.
- Al-Kindi, R., & Al-Bulushi, A. (2011). Prevalence and impact of dysmenorrhoea among Omani High School Students. *Sultan Qaboos University Medical Journal*, 11(4), 485-491.
- Ambresin, A. E., Belanger, R. E., Chamay, C., Berchtold, A., & Narring, F. (2012). Body dissatisfaction on top of depressive mood among adolescents with severe dysmenorrhea. *Journal of Pediatric & Adolescent Gynecology*, 25(1), 19-22.
- Anastasakis, E., Kingman, C. E., Lee, C. A., Economides, D. L., & Kadir, R. A. (2008). Menstrual problems in university students: An electronic mail survey. *In Vivo*, 22(5), 617-620.

- Arif Zaidi, S. M., Khatoon, K., & Aslam, K. M. (2012). Role of herbal medicine in ussuruttams (dysmenorrhea). *Journal of Academia and Industrial Research*, 1(3), 113-117.
- Ashwell, M. (2011). Charts based on body mass index and Waist-to Height Ratio to assess the health risks of obesity: A review. *The Open Obesity Journal*, 3, 78-84.
- Avasarala, A. K., & Panchangam, S. (2008). Dysmenorrhea in different settings: Are the rural and urban adolescent girls perceiving and managing the dysmenorrhea problem differently? *Indian Journal of Community Medicine*, 33, 246–249.
- Aziem, A. A., Rayis Duria, Mamoun, M., & Adam, I. (2011). Age at menarche and menstrual cycle pattern among schoolgirls in Kassala in eastern Sudan. *Journal of Public Health and Epidemiology*, 3(3), 111-114.
- Baker, F. C., Driver, H. S., Rogers, G. G., Paiker, J., & Mitchell, D. (1999). High nocturnal body temperatures and disturbed sleep in women with primary dysmenorrhea. *American Journal of physiology - Endocrinology and Metabolism*, 277(6 Pt 1), E1013-1021.
- Balbi, C., Muson, R., Menditto, A., Prisco, L. D., Cassese, E., D'Ajello, M.,... Antonio, C. (2000). Influence of menstrual factors and dietary habits on menstrual pain in adolescence age. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 91, 143-148.
- Banikarim, C., Chacko, M. R., & Kelder, S. H. (2000). Prevalence and impact of dysmenorrhea on Hispanic female adolescents. *Archives of Pediatrics and Adolescent Medicine*, 154(12), 1226-1229.
- Bano, R., AlShammery, E., & Aldeabani, H. K. (2013). Study of the prevalence and severity of dysmenorrhea among the university students of Hail City. *International Journal of Health Sciences and Research*, 3(10), 15-22.
- Barnard, N. D., Scialli, A. R., Hurlock, D., & Bertron, P. (2000). Diet and sex-hormone binding-globulin, dysmenorrhea, and premenstrual symptoms. *Obstetrics & Gynecology*, 92(2), 245-251.
- Barnard, N., Scialli, A. R., Bertron, P., Hurluck, D., & Edmonds, K. (2000). Acceptability of a therapeutic low-fat, vegan diet in premenopausal women. *Journal of Nursing Education*, 32(6), 314-319.
- Berek, J. S. (2007). *Berek & Novak's Gynecology (14th ed)* (p:516). Philadelphia: Lippincott Williams & Wilkins.
- Bırı, A., Bozkurt, N., Korucuoğlu, Ü., Yılmaz, E., Tıraş, B., & Güner, H. (2008). Use of pictorial chart for managing menorrhagia among Turkish women. *Journal of the Turkish-German Gynecology Association*, 9(1), 35-37.

- Brito, S. A., Marques, C. C., Alves, D. S., & Alexandre, A. C. (2012). Prevalence of dysmenorrhea in undergraduate health courses at an institution of higher education. *Journal of Nursing UFPE on line*, 6(6), 1386-1394.
- Brodwin, M. G., Siu, F. W., Howarrd, J., & Brodwin, E. R. (2009). *Journal of Medical, psychosocial and vocational aspects of disability*. Athens, GA 30605: Elliott & Fitzpatrick, Inc.
- Burnett, M., Antao, V., Black, A., Feldman, K., Grenville, A., Lea, R., ... Robert, M. (2005). Prevalence of primary dysmenorrhea in Canada. *Journal of Obstetrics and Gynaecology Canada*, 27(8), 765-770.
- Callahan, T., & Caughey, A. B. (2013). Blueprints Obstetrics and Gynecology (6th ed) (p:296). Philadelphia: Lippincott Williams & Wilkins.
- Callister, L. C. (2003). Cultural influences on pain perception and behaviors. *Home Health Care Management and Practice*, 15(3), 207-211.
- Castelo-Branco, C., Reina, F., Montivero, A., Colodrón, M., & Vanrell, J. A. (2006). Influence of high intensity-training and of dietetic and anthropometric factors on menstrual cycle disorders in ballet dancers. *Gynecological Endocrinology*, 22(1), 31-35.
- Castillo-Martínez, L., López-Alvarenga, J. C., Villa, A. R., & González-Barranco, J. (2003). Menstrual cycle length disorders in 18-to 40-year-old obese women. *Nutrition*, 19(4), 317-320.
- Chan, S. S., Yiu, K., Yuen, P., Sahota, D., & Chung, T. K. (2009). Menstrual problems and health-seeking behaviour in Hong Kong Chinese girls. *Hong Kong Medical Journal*, 15(1), 18-23.
- Charu, S., Amita, R., Sujoy, R., & Thomas, G. (2012). Menstrual characteristics and prevalence and effects of dysmenorrhea on quality of life of medical students. *International Journal of Collaborative Research on Internal Medicine & Public Health*, 4(4), 276-294.
- Chauhan, M., & Kala, J. (2012). Relation between dysmenorrhea and body mass index in adolescents with rural versus urban variation. *Journal of Obstetrics and Gynaecology India.*, 62(4), 442-445.
- Chi, C. F., Lai, J. H., Cheung, P. K., Kwong, L. T., Lau, F. P., Leung, K. H., ... Wong, F. C. H. (2013). Dysmenorrhea among Hong Kong university students: prevalence, impact, and management. *Hong kong Medical Journal*, 19, 222-228.
- Chung, F. F., Yao, C. C., & Wan, G. H. (2005). The associations between menstrual function and life style/ working conditions among nurses in Taiwan. *Journal of Occupational Health*, 47, 149-156.

- Chung, P., Chan, S. S., Yiu, K., Lao, T. T., & Chung, T. K. (2011). Menstrual disorders in a Paediatric and Adolescent Gynaecology Clinic: patient presentations and longitudinal outcomes. *Hong Kong Medical Journal*, 17(5), 391-397.
- Corbacioglu, A. (2011). The management of dysfunctional uterine bleeding. In G. Aimaretti, Updates on mechanisms of hormone action- Focus on metabolism, growth and reproduction (pp. 447-470). Rijeka, Croatia: In Tech.
- Daniel, W. W. (1999). Biostatistics: A foundation for analysis in the health sciences. (7th ed.). New York: John Wiley & Sons.
- Davis, N., & de Costa, C. (2011). Primary dysmenorrhea. *Obstetrics & Gynaecology Magazine*, 13(1), 36-37.
- Dawood, M. Y. (1984). Ibuprofen and dysmenorrhea. *The American Journal of Medicine*, 87-94.
- Dawood, M. Y. (2006). Primary dysmenorrhea: Advances in pathogenesis and management. *Obstetrics & Gynecology*, 108(2), 428-441.
- Deligeoroglou, E. (2000). Dysmenorrhea. *Annals of the New York Academy of Sciences*, 900,237-244.
- Diaz, F. J., Anderson, L. E., Wu, Y. L., Rabot, A., Tsai, S. J., & Wiltbank, M. C. (2002). Regulation of progesterone and prostaglandin F2a production in the CL. *Molecular and Cellular Endocrinology*, 191(1), 65-80.
- Dmitrovic, R., Peter, B., Cvitkovic-Kuzmic, A., Strelec, M., & Kereshi, T. (2003). Severity of symptoms in primary dysmenorrhea- A doppler study. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 107(2), 191-194.
- Dorn, L. D., Negriff, S., Huang, B., Pabst, S., Hillman, J., Braverman, P., ... Susman, E. J. (2009). Menstrual Symptoms in Adolescent Girls: Association with Smoking, Depressive Symptoms and Anxiety. *Journal of Adolescent Health*, 44(3), 237-243.
- Duggan, C., Watkins, J. B., & Walker, W. A. (2008). Nutrition in Pediatrics: Basic Science, Clinical Applications. Hamilton, Ontario: BC Decker Inc.
- Durain, D. (2004). Primary dysmenorrhea: Assessment and management update. *Journal of Midwifery & Women's Health*, 49, 520-528.
- El-Gilany, A., Badawi, K., & El-Fedawy, S. (2005). Epidemiology of dysmenorrhoea among adolescent students in Mansoura, Egypt. *Eastern Mediterranean Health Journal*, 11(1-2), 155-163.
- El-Hameed, N. A., Mohamed, M. S., Ahmed, N. H., & Ahmed, E. R. (2011). Assessment of Dysmenorrhea and Menstrual Hygiene Practices

among Adolescent Girls in Some Nursing Schools at EL-Minia Governorate, Egypt. *Journal of American Science*, 7(9), 216-223.

Eryilmaz, G., & Ozdemir, F. (2009). Evaluation of Menstrual Pain Management Approaches by Northeastern Anatolian Adolescents. *Pain Management Nursing*, 10(1), 40-47.

Eryilmaz, G., Ozdemir, F., & Pasinlioglu, T. (2010). Dysmenorrhea prevalence among adolescents in eastern Turkey: Its effects on school performance and relationships with family and friends. *Journal of Pediatric & Adolescent Gynecology*, 23(5), 267-272.

Esmailzadeh, A., Azadbakht, L., & Kimiagar, M. (2011). Major dietary patterns, general and central adiposity among female teachers in Tehran. *Health System Research*, 6(4).

FAO/WHO/UNU. (1985). *Energy and Protein Requirements Report of a Joint Expert Consultation*. WHO Technical Report Series, no 724. Geneva: WHO.

Fatt, L. S. (2007). Pelvic pain. In *Quick management guide in gynaecology* (pp. 43-46). Kuala Lumpur: University of Malaya Press.

Fauconnier, A., Dallongeville, E., Huchon, C., Ville, Y., & Falissard, B. (2009). Measurement of Acute Pelvic Pain Intensity in Gynecology: A Comparison of Five Methods. *Obstetric & Gynecology*, 113(2 Pt 1), 260-269.

Fjerbaek, A., & Knudsen, U. B. (2007). Endometriosis, dysmenorrhea and diet- What is the evidence? *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 132(2), 140-147.

Free, M. M. (2002). Cross-cultural conceptions of pain and pain control. *Baylor University Medical Center Proceedings*, 15, 143-145.

French, L. (2005). Dysmenorrhea. *American Family Physician*, 71(2), 285-291.

Fujiwara, T. (2003). Skipping breakfast is associated with dysmenorrhea in young women in Japan. *International Journal of Food Sciences and Nutrition*, 54(6), 505-509.

Fujiwara, T. (2007). Diet during adolescence is a trigger for subsequent development of dysmenorrhea in young women. *International Journal of Food Sciences and Nutrition*, 58(6), 437-444.

Fujiwara, T., Sato, N., Awaji, H., & Nakata, R. (2007). Adverse effects of dietary habits on menstrual disorders in young women. *The Open Food Science Journal*, 1, 24-30.

Gagua, T., Tkeshelashvili, B., & Gagua, D. (2012). Primary dysmenorrhea: Prevalence in adolescent population of Tbilisi, Georgia and risk factors. *Journal of the Turkish-German Gynecology Association*, 13(3), 162-168.

- Ghaffarpour, M., Houshiar-Rad, A., & Kianfar, H. (1999). The manual for household measures, cooking yields factors and edible portion of food. Tehran: Keshavarzi press, Tehran.
- Goldberg, G. R., Black, A. E., Jebb, S. A., Cole, T. J., Murgatroyd, P. R., Coward, W. A., Prentice, A. M. (1991). Critical evaluation of energy intake data using fundamental principals of energy physiology: Drivation of cutt-off limits to identify underreporting. *European Journal of Clinical Nutrition*, 45, 569-581.
- Grandi, G., Ferrari, S., Xholli, A., Cannoletta, M., Palma, F., Romani, C., ... Cagnacci, A. (2012). Prevalence of menstrual pain in young women: what is dysmenorrhea? *Journal of Pain Research*, 5, 169-174.
- Groeneveld, R.A., & Meeden, G. (1984). "Measuring Skewness and Kurtosis". *The Statistician* 33 (4): 391-399
- Green, S. B. (1991). How many subjects does it take to do a regression analysis? *Multivariate Behavioral Research*, 26, 499-510.
- Gumanga, S. K., & Kwame-Aryee, R. (2012). Menstrual characteristics in some adolescent girls in Accra, Ghana. *Ghana Medical Journal*, 46(1), 3-7.
- Gumanga, S. K., & Kwame-Aryee, R. (2012). Prevalence and severity of dysmenorrhea among some adolescent girls in secondary school in Accra, Ghana. *Postgraduate Medical Journal of Ghana*, 1(1), 1-6.
- Guo, S. W., Mao, X., Ma, Q., & Liu, X. (2013). Dysmenorrhea and its severity are associated with increased uterine contractility and overexpression of oxytocin receptor (OTR) in women with symptomatic adenomyosis. *Fertility and Sterility*, 99(1), 231-40.
- Haidari, F., Akrami, A., Sarhadi, M., & Mohammadshahi, M. (2011). Prevalence and severity of primary dysmenorrhea and its relation to anthropometric parameters. *Journal of Faculty of Nursing and Midwifery, Tehran University of Medical Sciences*, 17(1), 70-77.
- Harel, Z. (2002). A contemporary approach to dysmenorrhea in adolescents. *Pediatric Drugs*, 4(12), 797-805.
- Harel, Z. (2004). Cyclooxygenase-2 specific inhibitors in the treatment of dysmenorrhea. *Journal of Pediatric & Adolescent Gynecology*, 17(2), 75-79.
- Harel, Z. (2006). Dysmenorrhea in adolescents and young adults: Etiology and management. *Journal of Pediatric & Adolescent Gynecology*, 19, 363-371.
- Harel, Z. (2008). Dysmenorrhea in adolescents. *Annals of the New York Academy of Sciences*, 1135, 185-198.

- Harlow, S. D., & Campbell, O. M. (2004). Epidemiology of menstrual disorders in developing countries: a systemic review. *BJOG: An International Journal of Obstetrics and Gynaecology*, 111, 6-16.
- Hatcher, R. A., Trussell, J., Nelson, A. L., Cates, W., Stewart, F. H., & Kowal, D. (2007). *Contraceptive Technology (19th ed)* (p:466). New York: Ardent Media Inc.
- Hegazi, M., & Nasrat, H. (2007). Heart rate variability (HRV) in young healthy females with primary dysmenorrhea. *Bulletin Alexandria Faculty of Medicine*, 43, 3.
- Higham, J. M., O'Brien, P. M., & Shaw, R. M. (1990). Assessment of menstrual blood loss using a pictorial chart. *British Journal of Obstetrics and Gynaecology*, 97(8), 734-739.
- Hillard, P. A. (2006). Dysmenorrhea. *Pediatrics in Review*, 27(2), 64-71.
- Hillen, T. I., Grbavac, S. L., Johnston, P. J., Straton, J. A., & Keogh, J. M. (1999). Primary dysmenorrhea in young western Australian women: Prevalence, impact, and knowledge of treatment. *Journal of Adolescent Health*, 25(1), 40-45.
- Hsieh, K.-C., Lu, H.-K., Chen, C.-H., Jang, T.-R., Chen, Y.-Y., & Kao, M.-F. (2011). The validity and accuracy in foot-to-foot bioelectrical impedance analysis measuring models referenced by dual-energy X-ray absorptiometry in body composition in standing position. *African Journal of Biotechnology*, 10(16), 3222-3231.
- Htut, Y., Amran, A., & Shukri, Y. A. (1996). A prevalence study of dysmenorrhea among university students. *Medical Journal of Malaysia*, 51, 264-269.
- Iacovides, S., Avidon, I., Bentley, A., & Baker, F. C. (2014). Reduced quality of life when experiencing menstrual pain in women with primary dysmenorrhea. *Acta Obstetrica et Gynecologica Scandinavica*, 92(2), 213-217.
- International Association For The Study Of Pain. (2007). Global year against pain in women: Real women, real pain. IASP.
- International Labour Organization. (2008). *International Standard Classification of Occupations*. International Labour Office, Geneva.
- Jang, I. A., Kim, M. Y., Lee, S. R., Jeong, K. A., & Chung, H. W. (2013). Factors related to dysmenorrhea among Vietnamese and Vietnamese marriage immigrant women in South Korea. *Obstetrics & Gynecology Science*, 56(4), 242-248.
- Jahnen-Dechent, W., & Ketteler, M. (2012). Magnesium basics. *Clinical Kidney Journal*, 5, 3-14.
- Jones, R. D., Ruban, L. N., Morton, I. E., Roberts, S. A., English, K. M., Channer, K. S., Jones, T. H. (2003). Testosterone inhibits the

prostaglandin F2a mediated increase in intracellular calcium in A7r5 aortic smooth muscle cells: evidence of an antagonistic action upon store-operated calcium channels. *Journal of Endocrinology*, 178, 381-393.

- Ju, H., Jones, M., & Mishra, G. (2014). The prevalence and risk factors of dysmenorrhea. *Epidemiologic Reviews*, 36(1), 104-113.
- Juang, C. M., Yen, M. S., Horng, H. C., Cheng, C. Y., Yuan, C. C., & Chang, C. M. (2006). Natural progression of menstrual pain in nulliparous women at reproductive age: An observational study. *Journal of the Chinese Medical Association*, 69(10), 484-488.
- Juang, C. M., Yen, M. S., Twu, N. F., Horng, H. C., Yu, H. C., & Chen, C. Y. (2006). Impact of pregnancy on primary dysmenorrhea. *International Journal of Gynecology & Obstetrics*, 92(3), 221-227.
- Kaplan, O., Nazıroglu, M., Guney, M., & Aykur, M. (2013). Non-steroidal anti-inflammatory drug modulates oxidative stress and calcium ion levels in the neutrophils of the patients with primary dysmenorrhea. *Journal of Reproductive Immunology*, 100(2), 87-92.
- Karout, N., Hawai, S. M., & Altuwaijri, S. (2012). Prevalence and pattern of menstrual disorders among Lebanese nursing students. *Eastern Mediterranean Health Journal*, 18(4), 346-352.
- Kumbhar, S. K., Reddy, M., Sujana, B., Roja, R. K., Divya, B. K., & Balkrishna, C. (2011). Prevalence of dysmenorrhea among adolescent girls (14-19YRS) of Kadapa district and its impact on quality of life: A cross-sectional study. *National Journal of Community Medicine*, 2(3), 265-268.
- Kyle, U. G., Bosaeus, I., De Lorenzo, A. D., Deurenberg, P., Elia, M., Gómez, J. M., ... Pichard, C. (2004). Bioelectrical impedance analysis-Part II: Utilization in clinical practice. *Clinical Nutrition*, 23(6), 1430-1453.
- Laganà, A. S., Salmeri, F. M., Sofo, V., Pizzo, A., Retto, G., Sturlese, E., ... Triolo, O. (2013). Obstacles and pitfalls of endometriosis-related chronic pelvic pain management: Trying to alleviate the burden. *Journal Pain Relief*, 2(123), 1-6.
- Larroy, C. (2002). Comparing Visual-Analog and Numeric Scales for Assessing Menstrual Pain. *Journal of Behavioral Medicine* 27(4), 179-181.
- Lefebvre, G., Pinsonneault, O., Antao, V., Black, A., Burnett, M., Feldman, K., ... Robert, M. (2005). Primary dysmenorrhea consensus guideline. *The Society of Obstetricians and Gynaecologists of Canada*, 27(12), 1117-1146.
- Li, N., Liu, H., Chen, C., Yang, F., Li, Z., Fang, Z., ... Chen, D. (2007). CYP1A1 gene polymorphisms in modifying the association between

passive smoking and primary dysmenorrhea. *Annals of Epidemiology*, 17(11), 882-888.

Liang, W., Zhang, Y., Li, H., Chu, J., Qin, Z., Lou, L., ... Wang, W. (2012). Personality and primary dysmenorrhea: A study using a five-factor model in Chinese university women. *Archives of Neuropsychiatry*, 49(2), 92-95.

Liliwati, L., Verna, L. K., & Khairani, O. (2007). Dysmenorrhea and its effects on school activities among adolescent girls in a rural school in Selangor, Malaysia. *Medicine & Health*, 2(1), 42-47.

Locklear, T. D. (2009). Biologically active compounds from *justicia pectoralis*: Significance for the treatment of dysmenorrhea. Chicago: ProQuest LLC.

Lowdermilk, D. L. (2010). Common reproductive concerns (8th ed.). In D. L. Lowdermilk, S. E. Perry, & M. C. Cashion, *Maternity Nursing* (pp. 80-108). Elsevier Health Sciences.

Lukaski, H. C., & Siders, W. A. (2003). Validity and accuracy of regional bioelectrical impedance devices to determine whole-body fatness. *Nutrition*, 19(10), 851-857.

Ma, H., Hong, M., Duan, J., Liu, P., Fan, X., Shang, E., ... Tang, Y. (2013). Altered cytokine gene expression in peripheral blood monocytes across the menstrual cycle in primary dysmenorrhea: A case-control study. *PLOS ONE*, 8(2), e55200.

Ma, Y. M., Li, R., Qiao, J., Zhang, X. W., Wang, S. Y., Zhang, Q. F., ... Zhang, X. (2010). Characteristics of abnormal menstrual cycle and polycystic ovary syndrome in community and hospital populations. *Chinese Medical Journal (English Edition)*, 123(16), 2185-2189.

Maruf, F. A., Ezenwafor, N. V., Moroofo, S. O., Adeniyi, A. F., & Okoye, E. C. (2013). Physical activity level and adiposity: Are they associated with primary dysmenorrhea in school adolescents? *African Journal of Reproductive Health*, 17(4), 167-174.

McCaffery, M., & Beebe, A. (1993). Pain: Clinical manual for nursing practice. (1st ed.). London: Mosby Company.

McGuire, D. B. (1984). The measurement of clinical pain. *Nursing Research*, 33(3), 152-156.

Mehta, B., Kaur, A., Kumar, V., Chawla, S., Malik, M., & Khatri, S. (2013). Adolescent reproductive and sexual health in India: The need to focus. *Journal of Young Medical Researchers*, 1(1), e1.

Miller, C., & Newton, S. E. (2006). Pain perception and expression: the influence of gender, personal self-efficacy, and lifespan socialization. *Pain Management Nursing*, 7(4), 148-52.

- Mirmiran, P., Esmailzadeh, A., & Azizi, F. (2006). Under-reporting of energy intake affects estimates of nutrient intakes. *Asia Pacific Journal of Clinical Nutrition*, 15(4), 459-464.
- Mojarrad Ezbarami, S., Mirzaei, B., & Esfarjani, F. (2014). Comparison the prevalence and severity of dysmenorrhea among athletes and non-athlete girls and its relation with body composition. *Arak Medical University Journal*, 16(80), 80-88.
- Molazem, Z., Alhani, F., Anooshe, M., & Vagharseyyedin, S. A. (2011). Epidemiology of dysmenorrhea with dietary habits and exercise. *Zahedan Journal of Research in Medical Sciences*, 13(3), 41-45.
- Montoya, J. S., Cabezza, A. H., Rojas, O. M., Navarrete, R. C., & Keever, M. A. (2012). Menstrual disorders in adolescents. *Boletín médico del Hospital Infantil de México*, 69(1), 60-72.
- Nagata, C., Hirokawa, K., Shimizu, N., & Shimizu, H. (2005). Associations of menstrual pain with intakes of soy, fat and dietary fiber in Japanese women. *European Journal of Clinical Nutrition*, 59(1), 88-92.
- Naing, L., Winn, T., & Rusli, B. N. (2006). Practical Issues in Calculating the Sample Size for Prevalence Studies. *Archives of Orofacial Sciences*, 1, 9-14.
- Nasir, L., & Bope, ET. (2004). Management of pelvic pain from dysmenorrhea or endometriosis. *The Journal of the American Board of Family Practice* , 43-47.
- National Academy of Sciences. (1997-2011). Dietary Reference Intakes series. Washington, D.C.: National Academy Press. Retrived from <http://www.nap.edu>
- Nazarpour, S. (2010). Study Of Factors of Influencing on Severity of Primary Dysmenorrhea in Students of Faculties of Nursinng and Midwifery of Governmental Universities under the Supervision of Ministry of Health, Treatment and Medical Education in Tehran. *Quarterly Journal of Woman* , 1(2), 109-125.
- Nieman, D. C. (2003). Exercise testing and prescription: A health related approach. (5th ed.). Boston: McGraw-Hill Higher Education.
- Nohara, M., Momoeda, M., Kubota, T., & Nakabayashi, M. (2011). Menstrual Cycle and Menstrual Pain Problems and Related Risk Factors among Japanese Female Workers. *Industrial Health*, 49, 228-234.
- Ohde, S., Tokuda, Y., Takahashi, O., Yanai, H., Hinohara, S., & Fukui, T. (2008). Dysmenorrhea among Japanese women. *International Journal of Gynecology and Obstetrics*, 100, 13-17.

- Okoro, R. N., Malgwi, H., & Okoro, G. O. (2013). Evaluation of factors that increase the severity of dysmenorrhea among university female students in Maiduguri, North eastern Nigeria. *Internet Journal of Allied Health Sciences and Practice*, 11(4), 1-10.
- Omidvar, S., & Begum, K. (2012). Characteristics and determinants of primary dysmenorrhea in young adults. *American Medical Journal*, 3(1), 8-13.
- Ortiz, M. I. (2010). Primary dysmenorrhea among Mexican university students; Prevalence, impact, treatment. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 152, 73-77.
- Ortiz, M. I., Rangel-Flores, E., Carrillo-Alarcón, L., & Veras-Godoy, H. A. (2009). Prevalence and impact of primary dysmenorrhea among Mexican high school students. *International Journal of Gynecology & Obstetrics*, 107, 240-243.
- (2002). Fallopian Tube Disorders. In A. Ostrzenski, *Gynecology Integrating Conventional, Complementary and Natural Alternative Therapies*. Philadelphia: Lippincott Williams & Wilkins.
- Osuga, Y., Hayashi, K., Kobayashi, Y., Toyokawa, S., Momoeda, M., Koga, K., ... Taketani, Y. (2005). Dysmenorrhea in Japanese women. *International Journal of Gynecology & Obstetrics*, 88(1), 82-83.
- Ozerdogan, N., Sayiner, D., Ayranci, U., Unsal, A., & Giray, S. (2009). Prevalence and predictors of dysmenorrhea among students at a university in Turkey. *International Journal of Gynecology & Obstetrics*, 107, 39-43.
- Panahande, Z., Pakzad, Z., & Ashoori, R. (2008). Survey the Prevalence, Knowledge and Practice of Guilan University Students about Dysmenorrhea. *Journal of Guilan University of Medical Sciences*, 66, 85-92.
- Parker, M., Sneddon, A., & Arbon, P. (2010). The menstrual disorders of teenagers (MDOT) study: Determining typical menstrual patterns and menstrual disturbance in a large population-based study of Australian teenagers. *BJOG: An International Journal of Obstetrics & Gynaecology*, 117(2), 185-192.
- Parvaneh Mirabi, M. D. (2011). Effects of valerian on the severity and systemic manifestations of dysmenorrhea. *International Journal of Gynecology and Obstetrics*, 115, 285-288.
- Parveen, N., Majeed, R., & Rajar, U. D. (2009). Familial predisposition of dysmenorrhea among the medical students. *Pakistan Journal of Medical Sciences*, 25(5), 857-860.
- Patel, V., Tanksale, V., Sahasrabhojane, M., Gupte, S., & Nevrekar, P. (2006). The burden and determinants of dysmenorrhoea: a

- population-based survey of 2262 women in Goa, India. *BJOG: An International Journal of Obstetrics & Gynaecology*, 113, 453-463.
- Patil, A. D. (2013). Self medication: Need for increased awareness among general population. *International Journal of Basic & Clinical Pharmacology*, 2(5), 659-660.
- Patil, S. N., Vasnik, V., & Wadke, R. (2009). Health problem amongst adolescent girls in rural areas of Ratnagiri district of Maharashtra India. *Journal of Clinical and Diagnostic Research*, 3, 1784-1790.
- Perry, M. (2012). Looking at the diagnosis and treatment of dysmenorrhoea. *British Journal of School Nursing*, 7(6), 278-282.
- Perry, M. (2012). Treatment options for dysmenorrhea. *Practice Nursing*, 23(4), 195-198.
- Pitangui, A. C., Gomes, M. R., Lima, A. S., Schwingel, P. A., Albuquerque, A. P., & de Araújo, R. C. (2013). Menstrual disturbances: Prevalence, characteristics, and effects on the activities of daily living among adolescent girls from Brazil. *Journal of Pediatric & Adolescent Gynecology*, 26(3), 148-52.
- Pitts, M. K., Ferris, J. A., Smith, A. M., Shelley, J. M., & Richters, J. (2008). Measuring Menstrual Discomfort: A Comparison of Interview and Diary Data. *Medical Journal of Australia*, 189(3), 846-850.
- Polat, A., Celik, H., Gurates, B., Kaya, D., Nalbant, M., Kavak, E., ... Hanay, F. (2009). Prevalence of primary dysmenorrhea in young adult female university students. *Archives of Gynecology and Obstetrics*, 279(4), 527-532.
- Poureslami, M., & Osati-Ashtiani, F. (2002). Assessing knowledge, attitudes, and behavior of adolescent girls in suburban districts of Tehran about dysmenorrhea and menstrual hygiene. *Journal of International Women's Studies*, 3(2), 51-61.
- Proctor, M. L., & Farquhar, C. M. (2007). Dysmenorrhoea. *British Medical Journal*, 3, 813-838.
- Proctor, M., & Farquhar, C. (2006). Diagnosis and management of dysmenorrhea. *British Medical Journal*, 332, 1134-8.
- Proctor, M. L., & Murphy, P. A. (2001). Herbal and dietary therapies for primary and secondary dysmenorrhoea. *Cochrane Database of Systematic Reviews*, Issue 2. Art. No.: CD002124. DOI: 10.1002/14651858.CD002124.
- Rostami, M. (2007). The study of dysmenorrhea in high school girls. *Pakistan Journal of Medical Sciences*, 23(6), 928-931.
- Rupa Vani, K., Veena, K. S., Subitha, L., Hemanth Kumar, V. R., & Bupathy, A. (2013). Menstrual abnormalities in school going girls-

Are they related to dietary and exercise pattern? *Journal of Clinical and Diagnostic Research*, 7(11), 2537–2540.

Sadiq, M. A., & Salih, A. A. (2013). Knowledge and practice of adolescent females about menstruation in Baghdad. *Journal of General Practice*, 2,138. doi: 10.4172/2329-9126.1000138.

Savaris, A. L., & Amaral, V. F. (2011). Nutrient intake, anthropometric data and correlations with the systemic antioxidant capacity of women with pelvic endometriosis. *European Journal of Obstetrics & Gynecology and Reproductive Biology*, 158, 314-318.

Schweiger, U., Tuschl, R. J., Platte, P., Broocks, A., Laessle, R. G., & Pirke, K. M. (1992). Everyday eating behavior and menstrual function in young women. *Fertility and Sterility*, 57, 771-775.

Schofield, W. N. (1985). Predicting basal metabolic rate, new standards and review of previous work. *Human Nutrition - Clinical Nutrition* , 39 Suppl 1:5-41.

Shabani-Nashtai, M., & Mohamadalizadeh, S. (2010). Primary dysmenorrhea among dormitory students of Tabriz. *Tabriz Journal of Nursing & Midwifery*, 18, 15-21.

Shah, M., Monga, A., Patel, S., Shah, M., & Bakshi, H. (2013). A study of prevalence of primary dysmenorrhea in young students- A cross-sectional study. *Healthline*, 4(2), 30-34.

Shahgheibi, S., Darvishy, N., Yousefinejad, V., Moghbel, N., & Shahsavari, S. (2010). Prevalence of menstrual disorders among high school female students (17-18YRS) in Sanandaj. *Journal of the Kordestan University of Medical Sciences*, 4, 20-24.

Shaneshin, M., Rashidkhani, B., & Rabiei, S. (2012). Accuracy of energy intake reporting: Comparison of energy intake and resting metabolic rate and their relation to anthropometric and sociodemographic factors among Iranian women. *Archives of Iranian medicine*, 15(11), 681-687.

Sheila Rani, K. G. (2012). Dysmenorrhea(primary and secondary). In N. Sivalingam, K. Sachchithanantham, K. Nagandla, & M. Najimudeen, *Gynaecology Today (1st ed.)* (pp. 208-213). Melaka: Colour Box Publishing House.

Silberg, J. L., Martin, N. G., & Heath, A. (1987). Genetic and environmental factors in primary dysmenorrhea and its relationship to anxiety, depression, and neuroticism. *Behavior Genetics*, 17(4), 363-383.

Singer, K., Rosenthal, A., & Kasa-Vubu, J. (2009). Elevated Testosterone and hypergonadotropism in active adolescents of normal weight with oligomenorrhea. *Journal of Pediatric and Adolescent Gynecology*, 22(5), 323-327.

- Singh, A., Kiran, D., Singh, H., Nel, B., Singh, P., & Tiwari, P. (2008). Prevalence and severity of dysmenorrhea: A problem related menstruation, among first and second year female medical students. *Indian Journal of Physiology and Pharmacology*, 52(4), 389-397.
- Singh, K., Srivastava, D., Archana, Misra, R., & Tyagi, M. (2013). Cardiac autonomic activity in young females with primary dysmenorrhea. *Indian Journal of Physiology and Pharmacology*, 57(3), 246-254.
- Smith, R. P., & Ellis, J. (2002). NSAIDs: Is newer better for dysmenorrhea? *OBG Management*, 14(7), 71-81.
- Soyer, M. T., Ergin, I., & Gursoy, S. T. (2008). Effects of social determinants on food choice and skipping meals among Turkish adolescents. *Asia Pacific Journal of Clinical Nutrition*, 17(2), 208-215.
- Spears, L. G. (2005). A narrative review of medical, chiropractic, and alternative health practices in the treatment of primary dysmenorrhea. *Journal of Chiropractic Medicine*, 4(2), 76-88.
- Stoelting-Gettelfinger, W. (2010). A case study and comprehensive differential diagnosis and care plan for the three DS of women's health: Primary dysmenorrhea, secondary dysmenorrhea, and dyspareunia. *Journal of the American Academy of Nurse Practitioners*, 22(10), 513-522.
- Sugumar, R., Krishnaiah, V., Channaveera, G. S., & Mruthyunjaya, S. (2013). Comparison of the pattern, efficacy, and tolerability of self-medicated drugs in primary dysmenorrhea: A questionnaire based survey. *Indian Journal of Pharmacology*, 45(2), 180-183.
- Taketani, Y. (2000). Research on prophylaxis, diagnostic, and therapy for endometriosis from reproductive health (health on sex and reproduction) standpoint. *Health Labour Welfare Ministry Resources*, 503-550.
- Tanaka, E., Momoeda, M., Osuga, Y., Rossi, B., Nomoto, K., Hayakawa, M., ... Wang, E. (2014). Burden of menstrual symptoms in Japanese women- An analysis of medical care-seeking behavior from a survey-based study. *International Journal of Women's Health*, 6, 11-23.
- Tavallaee, M., Joffres, M. R., Corber, S. J., Bayanzadeh, M., & Rad, M. M. (2011). The prevalence of menstrual pain and associated risk factors among Iranian women. *Journal of Obstetrics and Gynaecology Research*, 37(5), 442-451.
- Thys-Jacobs, S. (2000). Micronutrients and the Premenstrual Syndrome: The Case for Calcium. *Journal of the American college of Nutrition*, 19(2), 220-227.

- Titilayo, A., Agunbiade, O. M., Banjo, O., & Lawani, A. (2009). Menstrual discomfort and its influence on daily academic activities and psychosocial relationship among undergraduate female students in Nigeria. *Tanzania Journal of Health Research*, 11(4), 181-188.
- Tollison, C. D., Satterthwaite, . R., & Tollison, J. W. (2002). *Practical Pain Management (3rd ed)* (p:477). Philadelphia: Lippincott Williams & Wilkins.
- Turhan, N., Çelik, H., Duvan, C. İ., Onaran, Y., Aydın, M., & Armutcu, F. (2012). Investigation of oxidative balance in patients with dysmenorrhea by multiple serum markers. *Journal of the Turkish-German Gynecological Association*, 13(4), 233-236.
- Unsal, A., Ayranci, U., Tozun, M., Arslan, G., & Calik, E. (2010). Prevalence of dysmenorrhea and its effect on quality of life among a group of female university students. *Upsala Journal of Medical Sciences*, 115(2), 138–145.
- U.S. Food and Drug Administration. (2007, August). Medication guide for non-steroidal anti-inflammatory drugs (NSAIDs). Retrieved from <http://www.fda.gov/downloads/drugs/drugsafety/ucm089162.pdf>
- Wang, L., Wang, X., Wang, W., Chen, C., Ronnennberg, A. G., Guang, W., ... Xu, X. (2004). study, Stress and dysmenorrhoea: A population based prospective. *Occupational and Environmental Medicine*, 61(12), 1021-1026.
- West, S. G., Finch, J. F., & Curran, P. J. (1995). Structural equation models with nonnormal variables: Problems and remedies. In R. H. Hoyle, *Structural Equation Modeling: Concepts, Issues and Applications* (pp. 56-75). Newbury Park, CA : Sage .
- Widholm, O., & Kantero, R. (1971). Correlation of menstrual traits between adolescent girls and their mothers. *Acta Obstetrica et Gynecologica Scandinavica*, 50 (14), 30-36.
- World bank. (2012). *World Development Indicators: Women in development*. Retrived from <http://wdi.worldbank.org/table/1.5>
- World Health Organization "WHO". (2004). *Global Database on Body Mass Index: an interactive surveillance tool for monitoring nutrition transition*. Geneva: WHO. <http://apps.who.int/bmi/index.jsp>.
- World Health Organization "WHO". (2008). *Waist circumference and waist-hip ratio: Report of a WHO expert consultation*. Geneva, Switzerland: Shetty, P.
- Wong, L. P., & Khoo, E. M. (2010). Dysmenorrhea in a multiethnic population of adolescent Asian girls. *International Journal of Gynecology & Obstetrics*, 108, 139-142.

- Wu, D., Wang, X., Chen, D., Niu, T., Ni, J., Liu, X., ... Xu, X. (2000). Metabolic gene polymorphisms and risk of dysmenorrhea. *Epidemiology*, 11(6), 648-653.
- Ye, R., Wang, S., Li, Y., Wu, R., Pei, J., Wang, J., et al. (2014). Primary dysmenorrhea is potentially predictive for initial orthodontic pain in female patients. *Angle Orthodontist*, 84(3), 424-429.
- Zahradnik, H. P., Hanjalic-Beck, A., & Groth, K. (2010). Non-steroidal anti-inflammatory drugs and hormonal contraceptives for pain relief from dysmenorrhea: A review. *Contraception*, 81(3), 185-196.
- Zakharenko, N., Mudriy, A., & Stebliuk, V. (2013). Features of pain perception in women with genital endometriosis, primary and secondary dysmenorrhea and their importance in the planning of rehabilitation. *Journal of Health Science*, 3(4), 24-29.
- Zakherah, M. S., Sayed, G. H., El-Nashar, S. A., & Shaaban, M. M. (2011). Pictorial blood loss assessment chart in the evaluation of heavy menstrual bleeding: Diagnostic accuracy compared to alkaline hematin. *Gynecologic and Obstetric Investigation*, 71(4), 281-4.
- Zhou, H. G., Yang, Z. W., & Group, S. (2010). Prevalence of dysmenorrhea in female students in a Chinese university: A prospective study. *Health*, 2(4), 311-314.