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

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

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

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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± SD= 4.7± 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 (= 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 (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 (β= -0.249; p<0.05) while the weakest factor that contributed to the intensity of primary dysmenorrhea was interval between periods (β= -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

NAHAL HABIBI

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± SD= 4.7± 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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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the Degree of Master of Science. The members of the Supervisory Committee were as follows:

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DECLARATION

Declaration by the student

I hereby confirm that:

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- The research conducted and the writing of this thesis was under our supervision;
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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; Tavallaee 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

$\boldsymbol{H_0 1}$: There is no significant association between socio-demographic factors and the intensity of primary dysmenorrhea

$\boldsymbol{H_0 2}$: There is no significant association between menstrual characteristics and the intensity of primary dysmenorrhea

H_0**3:** There is no significant association between anthropometric indicators and the intensity of primary dysmenorrhea

H_0**4**: There is no significant association between dietary parameters and the intensity of primary dysmenorrhea

H_0**5**: 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; Gagua et al., 2012; Molazem et al., 2011; Nagata et al., 2005; Tavallaee 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.

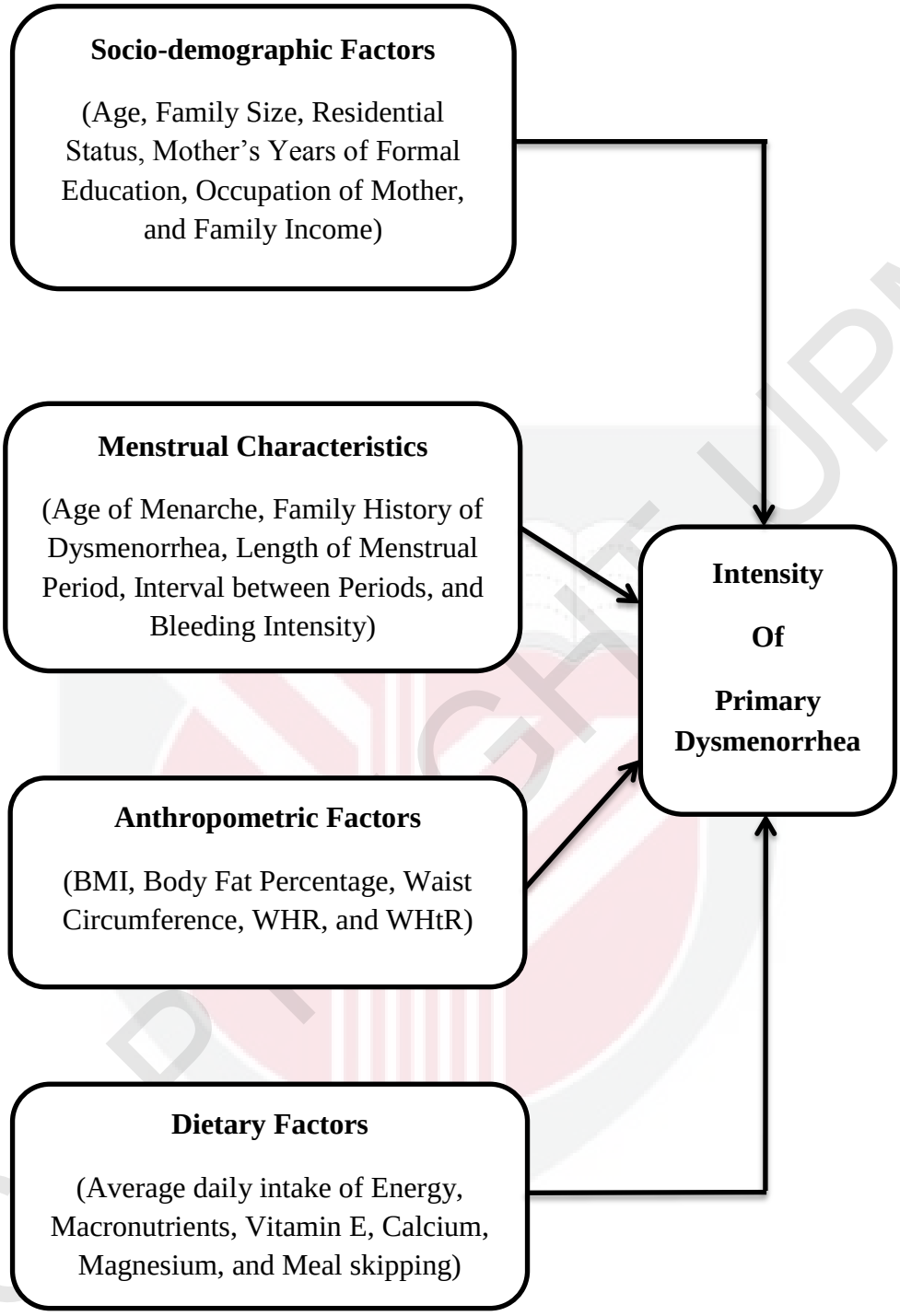

Figure 1.1: Conceptual framework of the study

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