

- 1 **Prevalence of Dysmenorrhea Among Overweight Female College**
- 2 **Students**

25

26 Abstract:

27

28 Background:

29 Dysmenorrhea is a periodic and cramping pain sensation mostly in the
30 lower abdomen before or during menstruation. It is one of the most common
31 gynecologic issues among female students. It is a regular cause of absence from
32 college in this age group and can negatively impact academic performance. In addition,
33 overweight and obesity are also common health concerns among females in general.

34 Objectives:

35 The purpose of this study is to find the relationship between overweights and
36 dysmenorrhea. Some studies suggest there may be a connection between them, but
37 the evidence remains uncertain due to gap in knowledge. Therefore, the purpose of this
38 study is to ascertain the incidence of dysmenorrhea among female college students in
39 Sulaymaniyah who are overweight and explore correlations between BMI and intensity
40 of dysmenorrhea along with associated risk factors.

41 Methodology:

42 A cross-sectional study was conducted among female college students (n=362) who
43 were assessed for data through a self-administered questionnaire for BMI, prevalence
44 and intensity of dysmenorrhea, and associated risk factors. The BMI levels and risk
45 factors were compared according to presence and severity of dysmenorrhea.

46 Results:

47 Females with severe dysmenorrhea had the lowest normal mean BMI level, followed by
48 those with moderate dysmenorrhea, mild dysmenorrhea, and then those with no
49 dysmenorrhea. Those with no dysmenorrhea had the highest normal BMI level. The
50 mean BMI level in females with severe dysmenorrhea was ($n = 150; 22.57 \pm 4.05$
51 (standard deviation) kg/m^2), with moderate dysmenorrhea ($n = 177; 22.95 \pm 3.78$
52 kg/m^2), in those mild dysmenorrhea ($n = 24; 23.21 \pm 3.76 \text{ kg/m}^2$) dysmenorrhea, and in
53 those with no pain ($n=11; 24.08 \pm 3.89$).

54 **Conclusion:**

55 There was no relation between BMI and prevalence of dysmenorrhea, further research
56 is needed to confirm this finding.

57

58 **Keywords:**

59 Dysmenorrhea, Overweight, College Students.

60

61 **Introduction**

62 Dysmenorrhea is the term used to describe the pain experienced before or during
63 menstruation which is a very common gynecological problem. Usually the pain is mild
64 for women, however it can be severe pain for some women and hinder their normal
65 activities for several days. Every month, for about 1 to 2 days, it affects over 50% of
66 women during menstrual cycles [1]. In a systematic review and meta-analysis of
67 research that included more than 20,000 young women from 38 different countries it
68 reported that the prevalence of dysmenorrhea was 71.1% [6]. In addition, especially in
69 severe cases of dysmenorrhea, there may be other associated symptoms such as
70 diarrhea, nausea, vomiting, headaches, and dizziness. [1]. The repercussions of
71 dysmenorrhea encompass physical, social, emotional, educational and economic
72 domains. According to a survey targeting women aged 18 and above with primary
73 dysmenorrhea, over half experienced symptoms that hindered their activities, while 17%

74 missed school or work due to these effects [2]. Dysmenorrhea stands as the primary
75 cause of short-term school absences among girls. Statistics show that 1 in 8 girls aged
76 14 to 20 miss school or work due to this condition [3]. In the US approximately 600
77 million working hours or \$2 billion are lost each year due to debilitating dysmenorrhea
78 when sufficient relief is lacking. Studies indicate that women who persevere with work or
79 classes during dysmenorrhea tend to exhibit reduced productivity or performance
80 scores [4]. Furthermore, in a systematic analysis that included 33 researches the
81 connection between primary dysmenorrhea and mental health was studied and it was
82 found that stress-related illnesses, anxiety, and depression were the most frequently
83 examined conditions in individuals with dysmenorrhea [5]. Women with dysmenorrhea
84 also state that it has a detrimental effect on their social functioning, leading to poor
85 social and athletic activities as well as strained relationships with family and friends [6].
86 Moreover, it is crucial to stress that untreated or improperly managed dysmenorrhea
87 can predispose to nociceptive priming, which increases the risk of developing chronic
88 pelvic pain [5]. Overweight and obesity are conditions of excess fat accumulation inside
89 the body that can deteriorate health. To identify overweight and obese people
90 measurements of height and weight are acquired to calculate body mass index (BMI).
91 Excessive weight is a result of imbalance in calorie intake and expenditure and it can
92 lead to increased risk of diabetes, heart disease, and cancer [7]. In a research done in
93 Iraq the BMI of 76% of Iraqi women were either overweight or obese which means only
94 one-quarter of the females studied were of normal weight. This indicates that further
95 attention to the issue is urgently needed [8]. One of the factors that has been associated
96 with dysmenorrhea is increased weight in young females. The physiological production
97 of prostaglandin by the endometrium is increased in primary dysmenorrhea and
98 increased prostaglandin leads to uterine contractions, which ultimately cause primary
99 dysmenorrhea. It has been suggested that as a result of increased prostaglandin
100 production in obese and overweight individuals dysmenorrhea occurs [9]. However,
101 other researches do not include obesity in the list of associated factors for
102 dysmenorrhea [10]. Given the prevalence of the problems and the mixed findings on
103 their relationships, this study has been undertaken to investigate the association

104 between BMI and dysmenorrhea, find the prevalence of dysmenorrhea and the
105 associated risk factors in female college students in Sulaimani city.

106

107 **Materials & Methods**

108 An analytical and observational cross sectional study was conducted from January 2024
109 to March 2024 in Sulaimani city. The sample size was 362 female college students
110 aged 18-25 years from the departments of Medicine, Veterinary, Engineering, Nursing,
111 Pharmacy, Sciences, Dentistry, Medical Lab Sciences, Humanities, and Law from all 8
112 universities in Sulaimani: University of Sulaimani, Komar University, Cihan University,
113 Tishk International University, Sulaimani Polytechnic University, University of Human
114 Development, Qaiwan International University, and American University of Iraq
115 Sulaymaniyah.

116 Convenience and snowball sampling techniques were used to select participants. The
117 data was collected through a semi-structured self-administered questionnaire. The
118 questionnaire was pre-tested for clarity and was provided in both English and Kurdish
119 languages. There was both an online questionnaire where data was collected through
120 Google Forms (n=150) and a paper-based handout questionnaire (n=212) as well that
121 was distributed on campus for participants to fill out. The questionnaire consisted of two
122 sections. The first part was related to socio-demographic data of the participants and
123 the second part inquired about detailed menstrual information such as age at menarche,
124 quantity of menstrual flow, menstrual regularity, duration of menstrual cycle, severity of
125 pain (dysmenorrhea) and associated symptoms, family history of dysmenorrhea, etc.,
126 and physical exercise and dietary habits also the techniques they used to relieve pain .
127 For assessment of menstrual pain visual analogue scale (VAS) which is a standard pain
128 assessment tool of numerical rating scale of 10-point scale was used, with higher
129 scores indicating stronger pain. The point scales 1 to 3, 4 to 7, and 8 to 10 were
130 classified into mild dysmenorrhea, moderate dysmenorrhea, and severe dysmenorrhea
131 respectively. In addition, BMI was calculated by the formula $\text{Kg}/\text{Height}^2$ in meter. For
132 the on-ground cases (n=212) anthropometric measurements have been undertaken

133 where height with tape measure and weight with a digital scale of 1.0g accuracy were
134 measured for precise calculation of the participants' body mass index (BMI) while for the
135 online data collection cases the subjects reported their own height and weight by
136 measuring them themselves. Based on the World Health Organization (WHO)
137 guidelines the subjects were divided into four groups: underweight, normal, overweight,
138 and obese groups. Females with BMI less than 18.5kg/m² were categorized as
139 underweight, BMI of 18.5kg/m² to 24.9kg/m² as normal, BMI of 25kg/m² to 29.9kg/m²
140 as overweight, and BMI of more than 30kg/m² as obese.

141 Ethical clearance was obtained from the clinical sciences department of College of
142 Medicine in University of Sulaimani. Participation by subjects was strictly voluntary and
143 informed consent was taken from all the students before their participation in the study.
144 Participants' confidentiality of their personal information was reassured.

145 The data was then entered into Microsoft Excel and then transferred into statistical
146 package for social science software (SPSS) version 27 for analysis. The eligibility
147 criteria were females above the age of 18 and younger than 25 that were university
148 students competent in Kurdish or English language. Females that were younger than 18
149 years, non-student females, students who study in universities outside Sulaimani, and
150 those who refused or failed to fill the questionnaire were excluded. Frequencies,
151 percentages, means, standard deviation, and p-values were found and Chi-Square test
152 was used. P-value of under 0.05 was considered significant.

153

154 **Results**

155 A total of 362 female cases aged 18 years and above were collected to evaluate the
156 relationship between Dysmenorrhea and BMI.

157 Sociodemographic data was shown in Table.1

158 The menstrual characteristics of females was shown in Table.2.

159 And as we see most common site of pain is lower abdomen and back, and 96.3% of
160 their pain were cramping pain, 78.7% had positive family history .

161 In Fig.1. We see that 91.16% (330) of females had dysmenorrhea .

162 Also we demonstrated the percentage of Severity of dysmenorrhea and BMI in pie
163 charts Fig.2 and Fig.3 respectively.

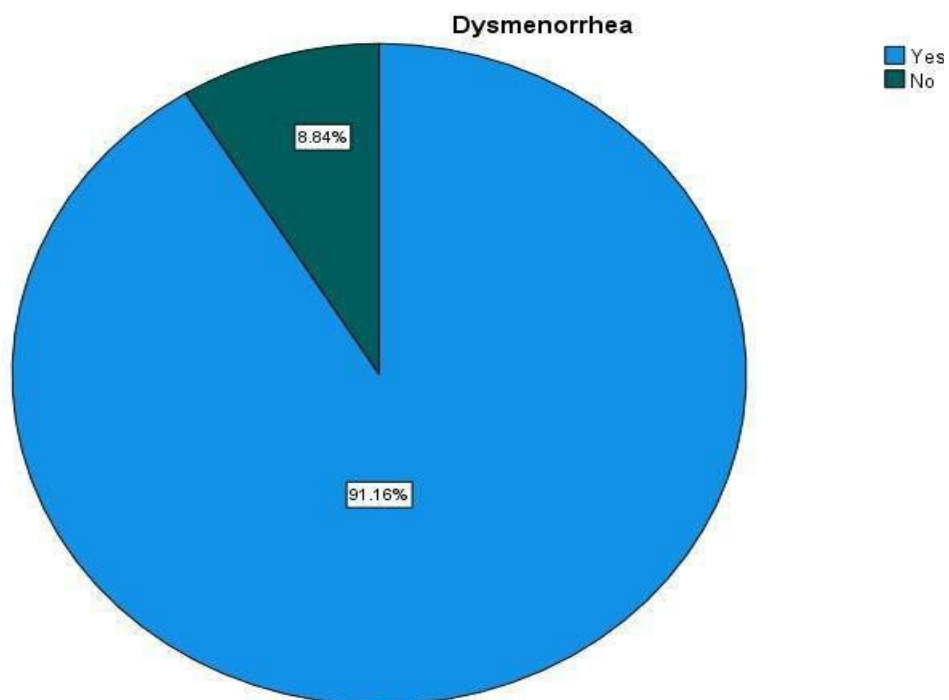
164 In data analysis using Chi-square test the family history was the main factor associated
165 with dysmenorrhea and according to P value there's no statistically significant
166 correlation BMI and prevalence and severity of dysmenorrhea (Table 4 and 5).

167 Other factors like age of menarche, marital status, exercise, smoking and alcohol
168 consumption were found not to be significant.

169 Fig.1 According to our study 91.2% of females had dysmenorrhea and in rest 8.8%
170 there was no dysmenorrhea.

171

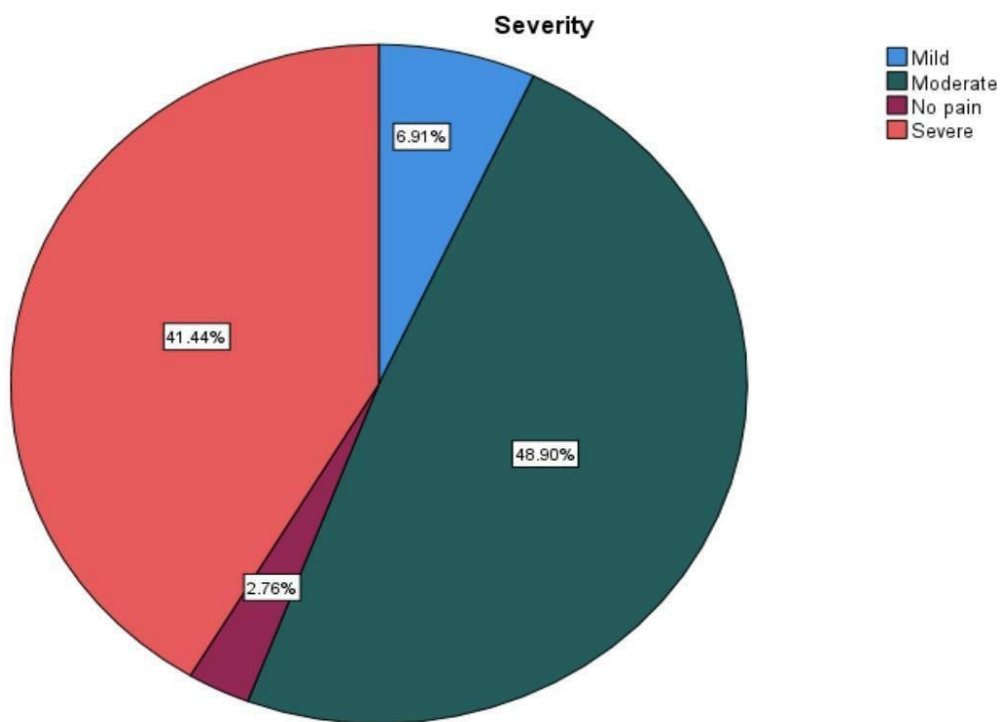
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174 Fig.2 shows that among those that had pain 7%, 49%, and 41% were suffering from
175 mild, moderate and severe dysmenorrhea respectively.

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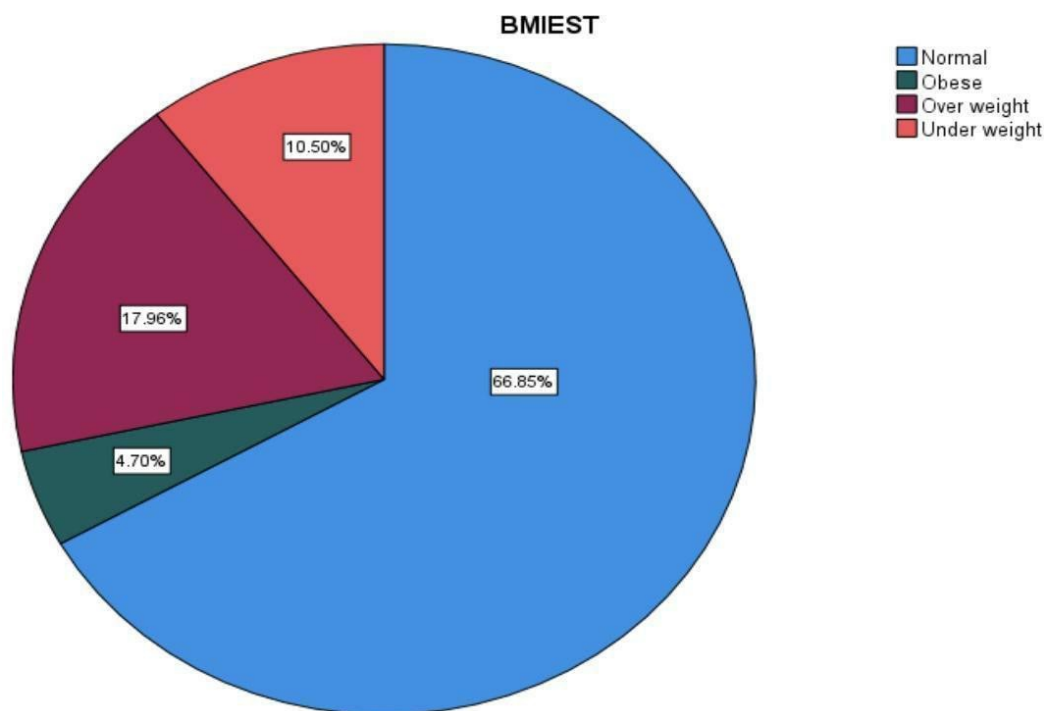
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186 Fig.3 shows percentage of BMI among students that 10%, 66%, 17% and 4% were
187 underweight, normal, overweight and obese respectively.

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192 Most of our participants 236 out of 362 were from the College of Medicine in University
193 of Sulaimani, the majority of them were single and had moderate economic status
194 (Table 1).

Variable	Frequency	Percentage
University		
Sulaimani	236	65.2%
Komar	47	13%
Qaiwan	4	1.1%
AUIS	18	5%
Polytechnic	23	6.4%
Human Development	16	4.4%
Tishk	13	3.6%
Cihan	5	1.4%
Department		
Medicine	133	36.7%
Dentistry	29	8%
Pharmacy	18	5%
Nursing	17	4.7%
Veterinary	7	1.9%
Medical laboratory scientist	19	5.2%
Engineering	34	9.4%
Sciences	14	3.9%
Law	9	2.5%
Humanities	7	1.9%
Other	68	18.8%
Academic year		
Stage 1	41	11.3%
Stage 2	62	17.1%
Stage 3	41	11.3%
Stage 4	160	44.2%
Stage 5	40	11%
Stage 6	18	5%
Marital Status		
Single	342	94.5%
Married	19	5.2%
Divorced	1	0.3%
Residency		
Inside city	269	74.3%
Outside city	93	25.7%
Economic Status		
Low	9	2.5%
Moderate	293	80.9%
High	60	16.6%

196 **Table 1.** Sociodemographic characteristics of participants.

197 Among management strategies the most common methods that are used were Rest
198 and Sleep (72.6%), Heat (69.2%) and Medication (52.5%) respectively (Table.2).

Variable	Frequency	Percentage
Age of menarche		
9_11	81	22.4%
12_14	252	69.6%
15_17	25	6.9%
18_20	4	1.1%
Menstruate every month		
Yes	309	85.4%
No	53	14.6%
Menstrual duration		
2_3	7	1.9%
3_5	99	27.3%
5_7	222	61.3%
More than 7	34	9.4%
Heaviness of blood loss		
Light	20	5.5%
Moderate	288	79.6%
Heavy	54	14.9%
Dysmenorrhea		
Yes	330	91.2%
No	32	8.8%
Onset of menstrual pain		
Before period	206	58.5%
At the beginning of the period	309	87.8%
At the end of the period	27	7.7%
After period	6	1.7%
Pain duration		
Few hours	114	32.6%
1_2 days	183	52.3%
More than 2 days	53	15.1%
Site of pain		
Lower abdomen	328	92.7%
Back	261	73.7%
Thighs	155	43.8%
Other places	82	23.2%
Type of pain		
Cramp pain	339	96.3%
Throbbing pain	89	25.3%
Other	4	1.1%
Management Strategies		
Rest and Sleep	257	72.6%
Heat	245	69.2%
Medication	186	52.5%
Herbal Medicine	36	10.2%
Exercise	16	4.5%
Other	15	4.2%
Family history of dysmenorrhea		
Yes	285	78.7%
No	77	21.3%

199

200 **Table 2.** Menstrual characteristics of participants.

201 This table shows us that most participants had mixed type of diet (85.1%), non smoker
 202 (90.6%) most of them were not alcohol consumers (96.1%), but many of them live with
 203 stress (47.2%) and get mood swing and depression premenstrually (47.4%) (Table 3).

204

Lifestyle factors		
Variable	Frequency	Percentage
Type of diet		
Healthy diet	35	9.7%
Mixed	308	85.1%
Unhealthy diet	19	5.2%
Exercise		
Yes, frequently	24	6.6%
Yes, occasionally	166	45.9%
No	172	47.5%
Smoking		
Yes, frequently	14	3.9%
Yes, occasionally	20	5.5%
No	328	90.6%
Alcohol consumption		
Yes, frequently	2	0.6%
Yes, occasionally	12	3.3%
Never	348	96.1%
Stress		
Yes, highly stressed	171	47.2%
Yes, moderately stressed	163	45%
No	28	7.7%
Mood swing and Depression		
Yes	337	93.9%
No	22	6.1%

205

206

207 **Table 3.** Lifestyle characteristics of participants.

208

209

210 In this table, P value is between prevalence of dysmenorrhea and menstruation
 211 regularity is (0.01) which is statistically significant, and there's a strong relationship
 212 between prevalence of dysmenorrhea and positive family history (P value is highly
 213 significant = 0.001).

214

215

Dysmenorrhea	
Variable	P value
Marital Status	0.92
BMI_ESTIMATION	0.468
Menstruation Irregularity	0.01
Age of menarche	0.121
Mood swing and Depression	0.522
Stress	0.206
Family history of dysmenorrhea	0.001
Menstrual duration	0.06
Heaviness of blood loss	0.106
Type of diet	0.811
Exercise	0.885
Smoking	0.106
Alcohol consumption	0.905

216

217 **Table 4.** Factors associated with dysmenorrhea.

218 As shown in this table the P value is highly significant between severity of
 219 dysmenorrhea and heaviness of blood loss (0.002) and family history of dysmenorrhea
 220 (0.006) (Table 5).

221

222

Severity	
Variable	P value
Marital Status	0.462
BMI_ESTIMATION	0.793
Menstruation Irregularity	0.57
Age of menarche	0.227
Mood swing and Depression	0.727
Stress	0.055
Family history of dysmenorrhea	0.006
Menstrual duration	0.583
Heaviness of blood loss	0.002
Type of diet	0.696
Exercise	0.281
Smoking	0.179
Alcohol consumption	0.637

223

224

225 **Table 5.** Factors associated with severity of dysmenorrhea.

226 The main purpose of our research is to determine the relationship between BMI and
227 severity of dysmenorrhea, as shown below the mean of BMI in all types of severity were
228 normal, but the lowest BMI were associated with severe dysmenorrhea (Table 6).

229

230

Severity of dysmenorrhea	BMI	
	Mean	St.deviation
Mild	23.21	3.76
Moderate	22.95	3.78
Severe	22.57	4.05
No pain	24.08	3.89

231

232

233 **Table 6.** Association between Severity of dysmenorrhea and mean of BMI.

234 **DISCUSSION**

235 Before or during menstruation, dysmenorrhea is a severe cramping feeling in the lower
 236 abdomen that is frequently accompanied by headaches, nausea, vomiting, diarrhea,
 237 and sweating [30]. It is a common gynecological issue that has a detrimental impact on
 238 women's everyday activities and quality of life [11]. According to the results of our study,
 239 91.2% of female college students in Sulaimani had dysmenorrhea. In line with our
 240 findings, a research conducted in Jordan found that 90.1% of women had
 241 dysmenorrhea [12]. A prospective study conducted on female college students in China
 242 found that 56.4% of them had dysmenorrhea; the reason for this discrepancy in the
 243 reported prevalence might be attributed to genetics, dietary differences, and cultural
 244 attitudes in the various regions [21]. But it also needs to be taken into consideration that
 245 this finding depends on the females' perception of pain. The most prevalent type of pain
 246 reported by participants was cramping (96.3%). Additionally, the most frequent site of
 247 pain for the majority of the female participants (92.7%) was lower abdomen; in a
 248 research done in Northern Ethiopia amongst university students most participants also
 249 reported the most frequent site of pain to be lower abdomen [13]. The most frequently
 250 reported sites of pain beyond the lower abdomen were the back (73.7%) and thighs
 251 (43.8%). While the lower abdomen is the primary location of cramping during
 252 dysmenorrhea, radiating pain to the back and thighs is a recognized symptom. These

253 findings of our research align with the established symptoms of dysmenorrhea
254 described in medical literature. Furthermore, 58.5% of participants reported
255 experiencing the onset of menstrual pain premenstrually, which is consistent with the
256 typical pattern of dysmenorrhea pain starting before menstruation [34]. Positive family
257 history of dysmenorrhea ($p = 0.001$) was significantly associated with prevalence and
258 intensity of dysmenorrhea in our analysis and a similar result was obtained from India,
259 and Iran [14, 28]. Positive family history that is shown to be a risk factor for
260 dysmenorrhea could be due to genetic predisposition. It can also be due to visual
261 learning behavior between mother and daughter [22]. Our analysis concluded that there
262 was no significant association between BMI and dysmenorrhea according to results
263 obtained from the chi-square test we conducted and in two researches from Turkey and
264 Iran they also found no association between dysmenorrhea with BMI [19, 28]. On the
265 contrary, in a study in India they found them to be significant and related [18]. Also
266 according to our results the prevalence of dysmenorrhea was higher in those with
267 normal BMI, this goes along with a study done in Iran where they found that the
268 frequency of dysmenorrhea was higher in the normal weight group [16]. However this
269 finding is not consistent with a Japanese study where frequency of dysmenorrhea was
270 greatest amongst the underweight group [15]. And also not consistent with a study done
271 at a university in Turkey where they found the prevalence of primary dysmenorrhea to
272 be higher among young women who were overweight or obese [17]. These
273 discrepancies could be explained by the hypothesis that quality of diet and not just the
274 total calories leading to a certain BMI might be a more relevant factor in dysmenorrhea.
275 The link between BMI and dysmenorrhea might be influenced by diet composition within
276 each BMI category. For example, people with normal BMI who consume a healthy diet
277 might experience less dysmenorrhea compared to those with normal BMI who have a
278 diet high in processed foods and unhealthy fats. In fact, a cross-sectional study
279 amongst Iranian women concluded that high fruit and vegetable intake reduces the risk
280 of dysmenorrhea [28]. We also inquired about the dietary type of the participants, only
281 35 participants reported adherence to a healthy eating pattern.

282 This limited sample size for participants following a healthy diet restricted our ability to
283 further study any possible association between a healthy diet and the risk of

284 dysmenorrhea. In China, increased menstrual blood flow during menstruation has been
285 shown to be associated to severity of dysmenorrhea and this goes in accordance with
286 our highly significant association (p-value =0.002) that we found between heaviness of
287 blood loss and severity of dysmenorrhea amongst our research participants [21]. This
288 association might be due to the fact that the synthesis of prostaglandins in endometrial
289 tissue and prostaglandin release in menstrual fluid are both elevated in many of these
290 dysmenorrhea patients. The uterine muscle becomes uncontrollably hyperactive due to
291 an increase in prostaglandins, which causes uterine ischaemia and pain [33]. Therefore
292 heavier bleeding might be associated with a thicker endometrium potentially leading to
293 more prostaglandin and stronger contractions resulting in worse cramp and pain. Our
294 study also identified a significant association between irregularity of menstrual cycles
295 and dysmenorrhea prevalence (p-value=0.01). The participants with irregular menstrual
296 cycles experienced dysmenorrhea more. Previous research has also found irregular
297 menstrual cycles to be a significant risk factor for dysmenorrhea and this supports our
298 findings [36, 37]. Regular menstrual cycles depend on hormonal balance including
299 estrogen and progesterone; irregular cycles often indicate hormonal imbalance and this
300 imbalance can lead to overproduction of prostaglandins and enhance uterine
301 contractions and contribute to dysmenorrhea. In addition, both irregular cycles and
302 dysmenorrhea can happen due to an underlying gynecological disease like polycystic
303 ovarian syndrome, endometriosis,..etc. and this can also explain the association
304 between menstrual irregularity and dysmenorrhea. Our study also aligns with results
305 obtained from a study amongst female college students in Northern Ethiopia in finding
306 no significant association between age at first menarche and prevalence of
307 dysmenorrhea [13]. However, this contradicts findings from an Egyptian study amongst
308 adolescents [20]. The difference in age groups between our study and the Egyptian
309 research could be the reason for the conflicting results. The hormonal fluctuations that
310 occur in that period of life that could impact menstrual experiences potentially lead to
311 association between early menarche and dysmenorrhea in adolescents compared to
312 college students. Alcohol drinking has previously been associated with prevalence of
313 dysmenorrhea [13]. However, in this study no association was found between drinking
314 alcohol and prevalence or severity of dysmenorrhea, but the cause of no association

315 finding may be due to only 14 subjects submitting that they were alcohol consumers.
316 Exercise also showed no relation to prevalence and intensity of dysmenorrhea in our
317 study. A number of studies have also failed to find any relation between intensity of
318 dysmenorrhea and participation in exercise [13, 23, 25, 28]. A number of other studies
319 found that physically active groups reported lower prevalence of dysmenorrhea and
320 positive influence on dysmenorrhea; this could be due to exercise being a moderator of
321 stress and stress is known to increase sympathetic activity and to dysmenorrhea
322 through increasing severity of uterine contraction. Physical activity also causes release
323 of endorphins by the brain and this may increase pain threshold [24, 26]. Smoking also
324 showed no significant association with dysmenorrhea or its severity in our study
325 although it has been shown to be associated in two studies and a meta-analysis of
326 observational studies [25, 29, 31]. Yet, only 34 of our participants reported being
327 smokers and this may be the reason for the outcome of our analysis. A significant
328 portion of our subjects (premenstrually 47.4% and during menstruation 32.6%) reported
329 mood swings and depression. This aligns with this study showing pooled prevalence of
330 PMS worldwide was 47.8% [32].

331 These mental health symptoms can contribute to repetitive absenteeism reported in
332 previous research on school and work absences in this age group [2, 3, 4, 5, 29].
333 Among the management strategies employed by our subjects rest and sleep were
334 mostly used reported by 72.6% of the female participants. Heat therapy followed closely
335 with a prevalence of 69.2%. Medication use was reported by 52.5% of participants while
336 herbal remedies and exercise were used by 10.2% and 4.5% of participants,
337 respectively. Our findings suggest a preference for non-pharmaceutical management
338 strategies for dysmenorrhea amongst the participating female college students. In
339 addition, a high proportion of the females (41% severe, 49% moderate) reported
340 experiencing moderate to severe dysmenorrhea. This preference of non-pharmaceutical
341 approaches could have a potential association with this finding because medication
342 drugs like NSAIDs are highly effective in treating dysmenorrhea [35].

343

344 **Strengths and Limitations:**

345 Our research design employed several strategies to ensure the validity and reliability of
346 the findings. The most important point of our survey is that this is the first study to
347 explore the relationship between dysmenorrhea and BMI in this region, thus it will serve
348 as a reference for future research and programs. In addition, this study sheds light on
349 an important health issue that affects the quality of female students' lives, and if it
350 becomes severe it might lead to inefficiency. The Visual Analogue Scale (VAS), a
351 standard pain assessment tool for assessing the severity of dysmenorrhea, was one of
352 the comprehensive data collection methods used in our study. We also measured
353 participant height and weight using a scale to obtain a reliable estimate of BMI, and the
354 majority of our questionnaires (n = 212) were given to participants in printed paper. Two
355 languages, English and Kurdish (local language) were used to write the questionnaire in
356 order to make it easier for respondents to understand. To comprehensively evaluate the
357 findings, it is important to acknowledge the limitations of this study. This study was
358 restricted to the area of Sulaymaniyah, Iraq. Future studies can be designed with a
359 broader scope to encompass a larger region within Kurdistan to enhance
360 generalizability. Furthermore, data collection time constraints limited the sample size.
361 Also, the study relied on self-reported data, which can be susceptible to biases like
362 social desirability or recall bias. A convenience sampling technique was employed,
363 potentially limiting the representativeness of the sample. A formal sample size
364 calculation was not performed. Future studies can benefit from a priori sample size
365 calculation to ensure adequate statistical power. This study employed a cross-sectional
366 design, which cannot establish causal relationships between variables. The study
367 participants were all university students. Future research can be designed to include
368 participants with varying educational backgrounds. Further studies and research need
369 to be conducted to explore these potential connections and to confirm the findings.

370

371 **Conclusion**

372 Based on the findings of the present study it can be concluded that there is a high
373 prevalence of dysmenorrhea among the study subjects which denotes that
374 dysmenorrhea is a significant public health problem among girls. According to our

375 research there is no significant relationship between dysmenorrhea and body mass
376 index, marital status and Mood swing and Depression . Otherwise the P value was
377 significant between prevalence of dysmenorrhea and chronic illness,Positive family
378 history.The mean BMI was normal in all groups with mild, moderate, severe and even
379 those with no pain, that's why we consider that there's no relation between severity of
380 dysmenorrhea and BMI. Further research is needed to confirm the findings.

381

382 **Recommendations**

383 We recommended that further research should be conducted on the relationship
384 between dysmenorrhea and BMI, to find the exact cause and risk factor of
385 dysmenorrhea, and also to find management of dysmenorrhea. Further studies on
386 greater sample size, involving people from both public and private institutions and using
387 random techniques in selecting sample size in order for the results and outcomes
388 become more accurate. General awareness about dysmenorrhea being published
389 among the population, to attend to the condition. Health education programs regarding
390 menstruation, proper nutrition and healthy lifestyle should be established in the schools
391 to give students age-appropriate information regarding these important issues.

392

393 **Ethical considerations**

394 This study was approved by the Ethics Committee of Sulaimani University college of
395 Medicine. The work was implemented in accordance with international guidelines and
396 2008 Declaration of Helsinki.Informed consents were obtained from the participants.
397 Student were assured about the confidentiality of their personal information and they
398 voluntarily participated in the study. to be conducted to explore these potential
399 connections and to confirm the findings.

400 **Consent for publication:**

401 The authors give permission for publishing the materials of the study.

402

403 Availability of data:

404 The data used to support the findings of this study are included within the article.

405 Competing interests

406 The authors confirm that there are no competing interests.

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