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The effect of vitamin B1 on heavy menstrual bleeding

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Summary. Profuse menstrual bleeding is a main reason for a poor quality of life and iron deficiency anemia in women of reproductive age. Therefore, it is necessary to take measures to reduce the volume of such bleeding. Therefore, this study was conducted to determine the effect of vitamin B1 on the volume of menstrual bleeding. This is a double-blind clinical trial. The study was performed on 98 single students of paramedicine faculty (aged 18-26 years) who suffered from menstrual bleeding volume during 2016-17. The samples were selected provided their bleeding lasted for longer than 7 days and in case more than 14 pads were used by them. Then, 100 mg of vitamin B1 and placebo were administered to the intervention and control groups for 3 months during three consecutive menstrual cycles, respectively. The samples were evaluated for bleeding 1 month before and after intervention (without taking medication or placebo). In this study, Higham's chart was used to measure bleeding. Data analysis was done using Mann-Whitney test, Wilcoxon rank sum test, and repeated measures test. 83 subjects completed the study. In the intervention group, mean duration of bleeding was decreased from 8.7±1.5 to 5.7±1.21 and from 9.15±1.08 to 8.01±0.78 in intervention and control groups, respectively. The number of pads used in the intervention group decreased from 18.5±3.2 to 11.8±4.2 and from 19.5±2.6 to 18.69±2.23 in control and intervention groups, respectively (P <0.001). The results of this study showed that vitamin B1 is a useful supplement for reducing menstrual bleeding.

Keywords: Heavy menstrual bleeding; Vitamin B1; Thiamine; Girls; Iran

Introduction

The onset of physiological menstrual bleeding that begins on average from 12 years of age and lasts up to menopause is an indicator of health during reproductive age of women (1). In abnormal uterine bleeding, the menstrual period may be longer than 7 days with a blood volume of over 80 milliliters, sometimes during intervals shorter than 21 days, and with blood clots of different sizes. Although menorrhagia does not increase the mortality rate of women, physical, mental, and social consequences of these bleedings frequently occur, which are the main causes of deteriorated work performance and education efficiency, a poor quality of life as well as iron deficiency anemia in women of reproductive age, increasing the expense of medical services during infection (2).

In the study of Jitesh and colleagues (2015), 50% of patients under 40 years of age and approximately 30% of women experienced menorrhagia, and 20% of patients with menorrhagia were anemic (3). In the study of Shahghaybi, 13.9% of subjects had hypermenorrhea (4). There is no obvious reason for menorrhagia in over 50% of cases; however, if a certain abnormality such as genital tract infection, excessive secretion of prolactin hormone, thyroid gland disorders, etc. is diagnosed, the underlying condition must be treated. Nevertheless, there is no definite cause for abnormal bleeding in most cases, and the patient is subject to conventional medical treatment (5). Tranexamic acid is the first effective, well-tolerated, and non-hormone drug used in the treatment of idiopathic menorrhagia (6). Nonsteroidal anti-inflammatory drugs (NSAID) reduce the production of prostaglandin, decreasing

general prostaglandin levels by inhibiting the cyclooxygenase enzyme and increasing the contraction of uterine arteries (7). NSAIDs such as mefenamic acid are preferred over other drugs since they should be administered during menstrual period, especially in cases where contraception is not needed (8). The application of hormonal IUD in women who do not intend to become pregnant slowly releases progestin, decreasing the volume of menstrual bleeding and the number of bleeding days through the strong anti-proliferative effect of levonorgestrel on endometrium (9). Endometrial ablation, during which the endometrium is damaged, is performed by a hysteroscope or another other tool. Hysteroscopy is used to remove fibroids or polyps, and laser beam or cauterization is often performed in cases where ulceration and chronic cervical infection cause abnormal hemorrhage. Dilation and curettage (D &C) has diagnostic and therapeutic value for primary functional hemorrhagic abnormalities, and the patient's problem is completely resolved and bleeding ceased using curettage and ablation of endometrium (10), although the lack of evidence-based therapies and unnecessary surgeries are a major concern in these cases (11).

There are several therapies for controlling menorrhagia with different efficacies and complications, which are often effective for patients. Evaluation of the efficacy of various treatments for menorrhagia is difficult due to problems in measuring the volume of bleeding in patients, and on the other hand, the attitude and understanding of patients from menorrhagia plays a key role in the decision-making process to select different treatments for menorrhagia (12). Treatment using medicinal herbs and vitamins is a type of treatment with much lower side effects than traditional therapies (13). Thiamine (vitamin B1) is a vital vitamin for protein metabolism and growth (14) that plays a role in the formation of hemoglobin, which is a protein carrying oxygen in red blood cells (15). Oxygen transfer is highly important for bodybuilders' performance. The higher the intensity and the time of training, the more important the role of oxygen transfers. According to investigations, thiamine is a vitamin supplement that should be added while repeating and increasing the duration and intensity of exercises (16). Although little information is available regarding the effects of vitamin B1 on vascular system, studies have shown that high doses of thiamine improve endothelial activity of the arteries in diabetic patients (17, 18). The aim of this study was to evaluate the effect of vitamin B1 on the volume of menstrual bleeding, which should be used as a treatment to reduce menstrual bleeding as well as a dietary supplement for women's health in case of efficacy.

Subjects and Methods

After being registered with Ethics Code of IR.IAU.ARAK.REC.1395.2 from Ethics Committee and clinical trial center with registration number IRCT2017070710451N2, this double-blind clinical trial was conducted on 98 female students aged 18-26 years who lived in dormitories of Boroujerd Islamic Azad University in 2016-17. Girls with regular menstrual periods lasting 26-30 days, menstrual bleeding time of over 7 days, taking more than 14 pads with no history of kidney disease and stone, abdominal or pelvic surgery, mental and psychological disease nor liver, kidney, thromboembolic, and coagulation disorders, oral contraceptive pills or other steroid hormones were enrolled. The subjects were monitored for bleeding for 1 month and they were asked to record a checklist of their menstrual profile during the menstrual cycle, and the volume of bleeding and the number of pads were recorded according to Higham's chart. Subsequently, each research unit consistent with inclusion criteria in terms of bleeding duration, the length of menstrual cycle, and the number of pads with no underlying disease was selected as the sample and signed the written consent form. Then, the subjects were randomly assigned to intervention and control groups (sample size was 98 with regard to $\alpha \leq 0.05$ and 95% strength according to studies). Medications included 100 mg vitamin B1 and the placebo that was prepared as a compound drug with lactose and dry starch formulation in a pharmacy. To prepare the placebo, the powders were poured into a capsule after weighing and mixing steps. The medications (vitamin B1 and placebo) were submitted to subjects monthly for 3 months or 3 menstrual periods in 30 packs separated from each other as A and B packets. Subjects were also given checklists after

receiving the drugs. Vitamin B1 pill was delivered to the intervention group and placebo was given to the control group in one dose per day during the second, third, and fourth menstrual cycles of the study. Then, one month after the end of the intervention, the samples were examined for bleeding without receiving the drug and placebo.

In addition, the subjects were notified that they should refrain from using any other drug as much as possible. In case they received a drug, they were asked to explain the name of the drug or any treatment other than the selected treatment as well as its amount.

After these 3 treatment steps with medication and placebo, subjects who did not consume the drug regularly or failed to continue their treatment for any reason were considered as drop-outs of our study. According to research objectives, content validity was used to determine scientific credibility. Data were collected by a questionnaire containing 28 questions concerning demographic features as well as midwifery and menstrual characteristics of the research units. The second part of the observation sheet (checklist) involved the information extracted from the bleeding record sheet using Higham's chart. Content validation was used to check for the validity and reliability of the tool. We first used ANOVA for repeated measures to analyze the response variables (outcome), which were quantitatively measured. Due to the fact that Mocheli test rejected the sphericity assumption of variance-covariance matrix, modified Greenhouse Gray's test was used to observe the TIME*Group interaction results. If the response variable was measured as qualitative grade response or did not have a normal distribution, Friedman test was used to measure dependent sizes, and Cochran test was used for dependent sizes when the response variable was in qualitative-nominal form.

Results

15 out of 98 cases (9 from control and 6 from intervention group) were excluded from the study for a variety of reasons. Statistical analysis based on per protocol analysis (figure 1) was performed on 43 subjects in the intervention group and 40 subjects in the control group (a total of 83 subjects). The results

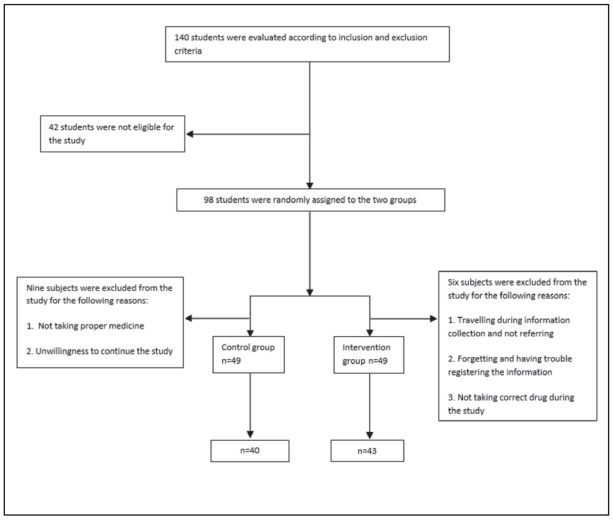

Figure 1. Flowchart of research units evaluated in the study

showed that mean age in the intervention and control groups was 20.3±1.6 and 20.1±1.07 years, respectively. There were no significant differences between the two groups regarding demographic factors (Table 1). The average number of pads used in the intervention group decreased from 17.9 in the second month of study to 11.8 in the fifth month. Also, ANOVA for repeated measures using modified Greenhouse Gray's test showed that the interpersonal effects of intervention were significant in reducing the number of used pads (P<0.001). There was no significant difference in the number of pads used by the control group relative to the previous month (P>0.05), and the number of pads used by the control group decreased to 18.69 in the fifth month from 19.04 in the second month of study (P<0.05) (Table 2), (Figure 2).

Table 1: Demographic and menstrual characteristics of participants in the study

p	Control group (n=40)	Intervention group (n=43)	Variable
	Mean ± SD		
0.549	20.1±1.07	20.3±1.6	Age (years)
0.741	12.14±1	12.3±1	Onset age of menstruation (years)
0.467	14.98±1	15.17±1	Onset age of menstrual pain (years)
0.885	28.2±1.8	27.7±1.7	Duration of menstrual cycle (days)
0.645	9.1±1.07	8.7±1.4	Duration of menstruation (days)

Table 2: Comparison of the mean number of pads used in both intervention and control groups

Group	Duration of intervention (month)	Mean	SD	95% Confidence Interval		P-Value	P-Value
				Lower Bound	Upper Bound	(Within subjects impact test)	(Between groups impact test)
Control	First	19.5	2.6	18.71	20.31	<0.001	<0.001
	Second	19.04	2.80	18.17	19.91		
	Third	18.98	2.33	18.08	19.88		
	Fourth	18.97	2.25	18.04	19.90		
	Fifth	18.69	2.23	17.65	19.74		
Average total		14.58	2.60	13.82	15.35		
intervention	First	18.5	3.2	17.55	19.55		
	Second	17.92	4.22	17.08	18.76		
	Third	15.51	3.99	14.64	16.38		
	Fourth	13.05	3.98	12.15	13.95		
	Fifth	11.87	4.20	10.86	12.87		
Average total		14.58	3.70	13.82	15.35		

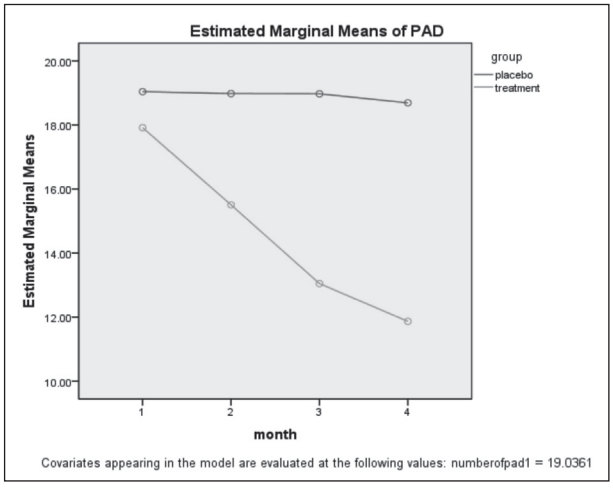

Figure 2. Average number of pads in intervention and control groups

The mean bleeding time was 8.74±1.5 and 9.15±1.08 in the intervention and control groups, respectively, as shown in the Figure. According to the results of Mann-Whitney test, there was no significant difference between the two groups before the intervention (P=0.121). Mean duration of bleeding during the second month of study in the intervention group was 7.98±1.68, which decreased to 5.77±1.21 days during the fifth month. The result of ANOVA test for repeated measures using modified Greenhouse Gray's test showed that the interpersonal effects of intervention were significant in reducing the number of bleeding days (P<0.001).

However, in the control group, the duration of bleeding in second month of study was 8.70±0.76, which reached 8±0.78 in the fifth month. According to paired t-test, there was no significant difference between the second and fifth months in the control group, which was not significant within all months after bleeding (P<0.05) (Table 3), (Figure 3).

Discussion

In this study, administration of vitamin B1 significantly reduced the duration of menstrual bleeding and the number of pads used. Severe menstrual bleeding, which occurs physiologically in women of reproductive age, is one of the most common causes of iron deficiency anemia in these women (3).

Although only 10% of women discharge more than 80 mL of menstrual blood and 60% of them become anemic (i.e. hemoglobin concentration <12) (19), 15% of referrals to gynecologic clinics are due to severe menstrual bleeding. Approximately 50-75% of hysterectomy operations performed in the age range of 25-49 years are due to menorrhagia, although no pathologic finding is observed in 50% of hysterectomy cases (20). Recent studies indicate the involvement of fibrinolysis and imbalance of prostaglandins in abnormal menstrual bleedings (21). Pacal et al. found that a high dose of vitamin B1 could potentially reduce the adverse effects of hyper-

Table 3: Comparison of bleeding time between intervention and control groups

Group	Duration of intervention (month)	Mean	SD	95% Confidence Interval		(within subjects impact test)	(Between groups impact test)
				Lower Bound	Upper Bound		
Control	First	9.15	1.08	8.74	9.56	<0.001	<0.001
	Second	8.70	0.76	8.28	9.12		
	Third	8.38	0.90	7.98	8.77		
	Fourth	8.08	0.73	7.76	8.39		
	Fifth	8.00	0.78	7.68	8.32		
Average total		8.46	0.82	8.14	8.77		
Intervention	First	8.74	1.50	8.35	9.14		
	Second	7.98	1.68	7.58	8.38		
	Third	7.02	1.52	6.64	7.41		
	Fourth	6.07	1.18	5.77	6.37		
	Fifth	5.77	1.21	5.46	6.08		
Average total		7.11	1.42	6.81	7.41		

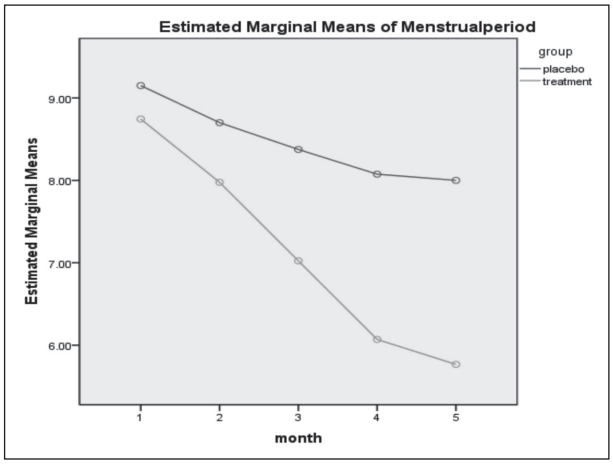

Figure 3. Mean number of bleeding days in intervention and control groups

glycemia on vascular cells in diabetic patients with its positive effects through improving vascular endothelial function (22). Tornali and colleagues demonstrated that vitamin B1 supplementation can prevent vascular problems and dyslipidemia among diabetics (18). Gokhal concluded that all common treatments for menstruation are based on suppression, but vitamin B1 is not a suppressor but a treatment and a cure for the disease without side effects (23).

Jafari and colleagues in a study showed that the use of vitamin B1 could significantly reduce the mean duration of bleeding and spotting in women using IUD after intervention relative to after it. On the other hand, the level of satisfaction with IUD use was increased, so that the IUD withdrawal rate in the intervention group had a significant difference with the control group (P<0.001) (24).

This study is consistent with the results of the present study in terms of vitamin B1 effect on reduction of bleeding and the number of pads used. Our knowledge about the effect of vitamin B1 on menstrual bleeding is limited because there has been no study to be compared with ours in this respect. There is also no comparative study in this regard except for the investigation by the author on the effect of this vitamin on bleeding due to the insertion of IUD. The mechanism of vitamin B1 action in reducing bleeding is not known and requires further studies. It is recommended to study the effect of vitamin B1 on menstrual bleeding during luteal phase. The results of this study suggested that vitamin B1 use is a safe and inexpensive way to reduce the duration of bleeding and the number of pads used and that the research units were satisfied with drug use.

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