



Original Article

The effect of balance taping for prevention of menstrual pain in female middle school students

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Abstract. [Purpose] The age at menarche in Korean women has been declining sharply. However, for the students who are just beginning to menstruate, taking pain medication might become a long-term habit continuing until adulthood. Therefore, this study investigated whether balance taping would be more helpful than medication in relieving the pain. [Subjects and Methods] Subjects of this study included 125 female students. The participants were assigned to the balance taping group, the control group, and the medication group. The medication group was given 1 dose of Tylenol (acetaminophen 500 mg) and the balance-taping group had taping applied, and the changes in pain were measured before the taping, as well as 1 hour, 4 hours, 8 hours, and 24 hours after. The measurement was done two times for the repeatability of the result. [Results] The balance-taping group showed a difference in pain from 1 hour after the taping compared with the control group, and the pain was significantly reduced until 24 hours after the taping. The balance taping group showed a statistically significant difference in pain compared with the medication group from 4 hours after the taping, and it lasted until 24 hours after the taping. The results were similar in the second measurement as well. [Conclusion] Balance taping was shown to be effective in relieving menstrual pain. Balance taping could be an effective alternative to medication in relieving menstrual pain and distress.

Key words: Menstrual pain, Female middle school students, Balance taping

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INTRODUCTION

The age at menarche in South Korean women has been declining. According to the 2008 Korean National Health and Nutrition Survey, the average age of menarche among women born in 1920's was 16.0 years old, while women born after 1995 had it at about 11.39 years old. Thus, it is concluded that the average age at menarche in South Korean women has been declining by about 0.731 years per decade¹⁾.

Unlike secondary dysmenorrhea caused by organic pelvic pathology, primary dysmenorrhea occurs due to the prostaglandins. Prostaglandins make the uterine muscles contract, helping the uterus shed the lining that has built up for embryo implantation; the contraction decreases the blood flow to the uterus, depriving oxygen^{2, 3)}. In case of primary dysmenorrhea, high levels of prostaglandins (PGE2 and PGF2) with endometrial tissues are found in menstrual fluid.

Menstrual pain is most commonly felt in the lower abdomen (80.6%) or the back (59.1%), being accompanied by other symptoms such as headaches (38%), muscle aches, nausea, or diarrhea^{4, 5)}. The pain is usually more severe in the first 1–2 days (87.5%), but it rarely lasts longer than 72 hours⁶⁾.

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According to some research, menstrual pain was reported in 81.9% to 89% of female college students, 83% of high school students, and 79% of middle school students^{7, 8)}. Of these, 8.0% of the middle school students and 16.6% of the high school students reported difficulty in performing everyday activities. The severe menstrual pain is a common cause of school absenteeism, and in 10% of cases, the pain was so severe that they couldn't do any normal activity for 1 to 3 days^{9, 10)}.

In general, to relieve menstrual pain, pain medication or alternative therapies are used. According to Hewison & Olga's research¹¹⁾, only one-third of the female college students were medicated after consulting with doctors, and rest of the students took medicine without prescription. However, long-term use of pain medications may lead to physical dependency.

Another choice of medication is estrogen, as it suppresses ovulation, resulting in very effective pain reduction. However, it requires taking the pills for 21 days to relieve pain in only a 24–48 hour period. Furthermore, women with contraindication to estrogen can't use this method.

As for alternative therapies, there have been a variety of studies to assess the effects of alternative methods on menstrual pain including aroma therapy^{12, 13)}, taping therapy¹⁴⁾, and biofeedback therapy¹⁵⁾.

Balance taping therapy involves applying elastic tape without any medicine to the skin to cure diseases. This gives balance to muscles and internal organs and maximizes the body's natural healing ability, controlling electromagnetic currents on the skin. Balance taping differs from sports taping, in that it allows normal movements as well as pain reduction, improving blood circulation and lymphatic circulation in the area. As normal movement improves circulation, it restores natural healing power through solidifying soft tissues.

In female students, menstrual pain interferes with their school activities, preventing them from going to school, making them late for classes, or forcing them to leave school early. Furthermore, for the students who are just beginning to menstruate, taking pain medication might become a long-term habit continuing until adulthood. Therefore, there was a need to study whether balance taping, which is easy to use and a non-pharmacological pain management method, would be more effective than medication in relieving menstrual pain.

SUBJECTS AND METHODS

A total of 500 female students (13–15 years old) attending a middle school located in Seoul were surveyed using a questionnaire to select the girls who suffer from severe menstrual pain. The visual analogue scale (VAS) was used to rate their pain. Of students who scored 5.0 points or higher on the scale, those who submitted parental informed consents participated in the study.

Students who hadn't been diagnosed with internal, gynecological, or psychological disorders that might cause pain in the pelvic area were included. Study participants were not taking medication or other alternative therapies for menstrual pain. And they didn't have a history of Tylenol side effects and allergic reactions to the tape. Students who were taking any other medications containing acetaminophen and who had a history of asthma, allergic rhinitis, or other allergies were excluded. A total of 125 participants were assigned to the balance taping group, the control group, and the medication group.

Prior to the experiment, detailed explanation with precautions related to the experiment was given, and the participants were instructed not to receive any pain treatment except the experimental treatment during the experiment.

All participants were measured for their changes in pain intensity right before the taping, as well as 1 hour, 4 hours, 8 hours, and 24 hours after, twice per each measurement. The medication group took only 1 dose of Tylenol 500 mg, but midterm and final exam periods were made an exception.

The Visual Analogue Scale¹⁶⁾, which is the most widely used pain intensity scale with high repeatability, was used to assess the participants' pain severity. Students themselves marked their perceived pain, and then the distance from the start point to mark point along the scale was converted into a numeric pain score.

There are two types of tape available for the treatment; elastic tape and non-elastic tape. Elastic tape can be applied in I shape, X shape, Y shape, or finger shape. While non-elastic tape can be applied in lattice shape (to the muscle motor points), spiral shape (to the response points in the same direction of the electromagnetic current on the muscles and skin) etc., there's also a colored tape (methyl processed to deliver color wavelength to the skin, used mostly in meridian massage).

As a preliminary test, general characteristics of participants were obtained through a questionnaire, and the participants were instructed to visit the school nurse's office to take the taping treatment as soon as they arrived at school on the morning following when they started their period.

Collected data was processed using the SPSS/WIN 12.0 (Statistical Package for social Sciences for windows 12.0 version, Chicago, USA). Differences in the VAS scores among the groups were evaluated by using χ^2 -test and ANOVA, and the effects of treatments and the changes in pain before and after experimental treatments were compared by using ANCOVA. P value of less than 0.05 was considered to be statistically significant.

This study obtained an IRB approval from The Catholic University of Korea, Uijeongbu St. Mary's Hospital.

RESULTS

There were no significant differences in the general characteristics of participants and the characteristics of menstruation among the three groups (Table 1). There were no significant differences in menstrual cycle and days of severe pain among the

Table 1. General characteristics of participants

	Control (n=46)	Medication (n=46)	Taping (n=33)
Age	14.2 ± 0.8	14.1 ± 0.9	14.1 ± 0.7
Height	159.6 ± 5.4	159.3 ± 6.0	157.7 ± 5.6
Weight	56.1 ± 10.2	53.7 ± 10.8	53.3 ± 11.0
Religion			
Yes	22 (32.4)	26 (38.2)	20 (29.4)
No	23 (41.1)	20 (35.7)	13 (23.2)
Family relationship			
Very good	13 (33.3)	15 (38.5)	11 (28.2)
Good	18 (30.5)	25 (42.4)	16 (27.1)
So-so	12 (52.2)	6 (26.1)	5 (21.7)
Personality			
Introspective	12 (57.1)	8 (38.1)	1 (4.8)
Extroverted	17 (40.5)	12 (28.6)	13 (31.0)
Easy going	15 (25.9)	25 (43.1)	18 (31.0)
Sensitive, shy	2 (50.0)	1 (25.0)	1 (25.0)
Exercise			
Never	8 (29.6)	10 (37.0)	9 (33.3)
2 times/wk	26 (37.7)	27 (39.1)	16 (23.2)
3 times/wk	7 (36.8)	6 (31.6)	6 (31.6)
Over 4 times/wk	4 (50.0)	3 (37.5)	1 (12.5)
Stress level			
Very high	7 (63.6)	2 (18.2)	2 (18.2)
High	19 (39.6)	15 (31.3)	14 (29.2)
Low	18 (32.7)	24 (43.6)	13 (23.6)
Very low	2 (22.2)	5 (55.6)	2 (22.2)

Data are expressed as mean ± standard deviation or N (%).

three groups; the most painful day was the first 1–2 days (62.4%), and some reported that they suffered from menstrual pain over the whole period (10.4%) (Table 2). Some students reported that they took pain medication, of them, 58 had medication only once for the whole period, 3 took medication every day, and 4 more than twice a day. Regarding the most painful site, 116 students out of 125 complained pain in the lower abdomen, 80 in the back, and 25 in the pelvic area.

In the taping group, VAS pain score was significantly reduced compared with the other two groups (from 6.91 ± 0.98 before to 3.94 ± 1.84 1 hour after), and the effect still remained until 24 hours after (VAS score 0.36 ± 0.70). Furthermore, these statistically significant differences in VAS scores were found between the medication group and the taping group.

As to changes in menstrual pain over time, in the medication group, VAS score was the lowest at 4 hours after medication (4.17 ± 2.20), and it rose to 5.02 ± 2.55 at 8 hours after, 5.13 ± 2.79 at 24 hours after. In the control group, VAS scores rose to 5.91 ± 2.26 at 8 hours after and 5.22 ± 2.82 at 24 hours after. In contrast, VAS score of the taping group started to decrease significantly from 1 hour after the treatment (3.94 ± 1.84), and it continued to reduce until 24 hours after (0.36 ± 0.70); the differences in the VAS scores were statistically significant compared with the other two groups ($p < 0.001$) (Table 3). The results were similar in both first and second measurements.

For side effects or discomfort experienced after the taping treatment, 2 students reported skin allergic reactions (6.1%), 1 dizziness (3.0%), and 30 no side effects at all (90.9%). Concerning the amount of satisfaction with the treatment, 10 students responded that they were very satisfied (30.3%), 21 satisfied (63.6%), and 2 so-so (4.0%).

For pain relief methods with which students would like to take in the future, 34 responded that they would take pain medication (27.2%), 24 would endure the pain (19.2%), 5 would go to a clinic (4.0%), and 62 would choose an alternative method (49.6%) (Table 4).

DISCUSSION

The systematic approach to taping therapy was made possible thanks to a Japanese doctor, Arikawa, who established a contact test based on muscle action and its pathophysiology. Taping therapy is being used for treating motor system diseases

Table 2. Menstrual characteristics of participants

	Control (n=46)	Medication (n=46)	Taping (n=33)
Menarche age	12.0 ± 1.3	12.0 ± 0.9	12.3 ± 1.0
Menstrual cycle			
<20 days	6 (35.3)	7 (41.2)	4 (23.5)
<25 days	8 (41.2)	7 (36.8)	4 (21.1)
<30 days	15 (31.3)	18 (37.5)	15 (31.3)
>30 days	11 (44.0)	9 (36.0)	5 (20.0)
Irregularity	6 (37.5)	5 (31.3)	5 (31.3)
Menstrual duration			
3–5 days	23 (33.3)	22 (31.9)	24 (34.8)
over 6 days	23 (42.6)	23 (42.6)	8 (14.8)
Days of severe pain			
1–2 days before	3 (27.3)	5 (45.5)	3 (27.3)
First 1–2 days	28 (35.9)	32 (41.0)	18 (23.1)
2–3 days	7 (33.3)	7 (33.3)	7 (33.3)
Whole period	7 (53.8)	1 (7.7)	5 (38.5)
Frequency of medication			
Once for the whole period	18 (31.0)	27 (46.6)	13 (22.4)
Once per day	1 (33.3)	1 (33.3)	1 (33.3)
Twice for the whole period	6 (42.9)	5 (35.7)	3 (21.4)
Over twice per day	0 (0)	3 (75.0)	1 (25.0)
None	21 (45.7)	10 (21.7)	15 (32.6)

Data are expressed as mean ± standard deviation or N (%).

Table 3. Differences in VAS pain scores among groups over time

Group	Before	1 hour	4 hours	8 hours	24 hours
1 Control	7.11 ± 1.27	6.59 ± 1.45	6.48 ± 1.77	5.91 ± 2.26	5.22 ± 2.82
Medication*	7.02 ± 1.04	4.91 ± 2.14	4.17 ± 2.20	5.02 ± 2.55	5.13 ± 2.79
Taping**	6.91 ± 0.98	3.94 ± 1.84	1.67 ± 1.65	0.82 ± 1.07	0.36 ± 0.70
2 Control	7.26 ± 1.34	6.83 ± 1.37	6.17 ± 1.84	6.04 ± 2.13	5.35 ± 2.72
Medication*	6.85 ± 1.03	4.98 ± 1.98	3.89 ± 1.95	4.78 ± 2.21	4.87 ± 2.47
Taping**	7.15 ± 0.94	3.91 ± 1.65	1.42 ± 1.35	0.55 ± 1.06	0.27 ± 0.84

*p-values correspond to between group comparisons for the changes over time for each variable.

**p<0.001: compared with the medication group.

Data are expressed as mean ± standard deviation or N (%).

after diagnosing disorders in joints and muscles by using tonic reflexes, associated reflexes, or the contact test of muscles and tendons, and it has been expanding to the treatments of internal diseases. Since it was first introduced in the early 1990s from Japan, it has been widely used in orthopedics, rehabilitation, internal medicine, general surgery, gynecology, and sports medicine. In addition, different health care professionals including medical doctors, dentists, and oriental medical doctors are using the taping therapy¹⁷⁾. Furthermore, as balance taping has fewer side effects and is easy to use and learn, it is being widely utilized for different types of pain¹⁷⁾.

The effects of taping therapy on menstrual pain have been shown in several previous researches in Korea^{13, 18)}.

However, this study is different from them in several aspects.

First, the subjects of this study were different. In Song's research¹⁸⁾, it was on the subject of female college students. Other previous studies were on the subject of adults such as clinical nurses or women in their early 20s^{19, 20)}. There was no research on female middle school students who just experienced their menarche with pain. Furthermore, this study is meaningful in that it has shown that balance taping could be an easy to use pain management method for young female students.

Second, this study compared the effects of medication and taping therapy directly. In Lee Kyungsook's research on pain medication for menstrual pain, 60.6% of female high school students reported moderate pain²¹⁾. Of them, 11.7% took pain

Table 4. Side effects and level of satisfaction

	Symptom, Satisfaction level	N	%
Side effects or discomforts	Skin allergic reactions	2	6.1
	Dizziness	1	3.0
	Headaches	0	0
	None	30	90.9
Taping satisfaction	Very satisfied	10	30.3
	Satisfied	21	63.6
	So-so	2	6.1
	Dissatisfied	0	0
Pain management to choose	Medication	34	27.2
	Endurance	24	19.2
	Seeing a doctor	5	4.0
	Alternative therapy	62	49.6

medication, and 66.7% of them reported that the first time they had the medication was when they were in middle school. In Lim Kyungtaek's research⁸⁾, 6.9% of middle school students were absent from school or left school early, and 45.3% took pain medication. In Kim Younghee's research⁷⁾, 61.5% of female college students took pain medication. Of them, 92.3% were self-medicated. This study has shown that the effects of the taping and the medication were equal, and the effect of taping treatment continued for 24 hours, longer than the effect of the medication. Therefore, the result indicates that balance taping could be used as an alternative method to medication, preventing abuse of pain medication in the future.

Third, the taping application site was different. In this study, crossing taping was done on the area between navel and pubic bone, along with sacroiliac joint taping in an X shape instead of traditional straight line shape, producing an effective back pain reduction and supporting the sacroiliac joint by covering the pelvic and hip areas.

Fourth, taping application time was different. In the case of female middle school students, it is difficult to predict when the next period will come because their menstrual cycles are mostly irregular, which might result in applying taping during a time of no pain. In this study, taping was applied only once on the 2nd day (when it was the most painful) at the school nurse's office.

Finally, while previous studies measured pain intensity only once, this study measured it twice to obtain the repeatability of results.

However, the participants of this study were limited to female students at only one middle school; it would be limited to generalize the results. Although exam periods were made an exception to minimize stresses or psychological factors that might affect students' perceived pain, there were limitations in controlling the external factors of stress. To minimize menstrual pain and distress and to shorten the taping duration, further research on applying taping before menstruation starts (before the pain starts) is required. Since the pain relieving effect of the taping continued 24 to 48 hours afterward, a study to compare the pain relieving effects of the taping and the medication of 3 doses a day is needed in the future.

In conclusion, this study has shown that the pain relieving effects of the balance-taping group were more effective than those of the control group. This finding suggests that applying taping to women with severe menstrual pain may reduce the need for additional medication. For female middle school students, balance-taping could be an effective pain management method, preventing abuse of pain medication in the future.

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