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Pedometer Recorded Activity and Self-Report as Measures of Treatment Outcome in Primary Dysmenorrhea: Relationship to Premenstrual Syndrome

Vicki Link Trejbal
Western Michigan University

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PEDOMETER RECORDED ACTIVITY AND SELF-REPORT AS MEASURES OF
TREATMENT OUTCOME IN PRIMARY DYSMENORREA:
RELATIONSHIP TO PREMENSTRUAL SYNDROME

by

Vicki Link Trejbal

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
Degree of Master of Arts
Department of Psychology

Western Michigan University
Kalamazoo, Michigan
April 1985
The purpose of this study was threefold: first, to determine if a pedometer measure of motor activity could be used as one indicator of the degree of dysmenorrhea present in an individual; second, to determine the degree, if any, of the relationship present between this measure and self-report measures of symptomatology used in a modified Daily Symptom Rating Scale; and third, to assess the effects of naproxen sodium and a placebo on the self-report measures and the behavioral measure of symptomatology. Three subjects wore pedometers and completed modified Daily Symptom Rating Scale forms throughout the study. Each subject showed treatment and/or placebo effects on one or more measures of symptomatology. The results must be interpreted with caution since the significant differences demonstrating these effects could have occurred by chance.
ACKNOWLEDGEMENTS

I would first like to thank Dr. I. R. Weiss whose generosity was apparent in his giving of both time and knowledge with no thought to personal or professional gain.

Of equal importance was the long-term support and constructive criticism of my advisor, Dr. R. W. Fuqua; the support of the other members of my committee, Dr. M. Robertson and Dr. C. Koronakos; and, the input of Dr. F. Gault.

I would also like to thank my good friend, Dr. L. R. Cannon, specifically for help with statistical analyses, and, in general, for more than can be stated here; my "wonderful husband", John Link, the computer whiz, for aid and patience; and, Friend, Oboe, Linda Rae, Starbuck, and Four-nine for tolerating temporary cat neglect.

Finally, I would like to thank my father, Mr. O. J. Trejbal, for all of our heated but loving debates, which taught me that everyone has something to learn, and if both sides do learn, they each come out winning.

Vicki Link Trejbal
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<table>
<thead>
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<th>TABLE OF CONTENTS</th>
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<tbody>
<tr>
<td>ACKNOWLEDGEMENTS</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
</tr>
<tr>
<td>CHAPTER</td>
</tr>
<tr>
<td>I.  INTRODUCTION</td>
</tr>
<tr>
<td>II. METHOD</td>
</tr>
<tr>
<td>Subjects</td>
</tr>
<tr>
<td>Apparatus</td>
</tr>
<tr>
<td>Dependent Variables</td>
</tr>
<tr>
<td>Procedure</td>
</tr>
<tr>
<td>Data Analysis</td>
</tr>
<tr>
<td>Compliance</td>
</tr>
<tr>
<td>III. RESULTS</td>
</tr>
<tr>
<td>Adjacent Phase Analysis</td>
</tr>
<tr>
<td>Comparison of Baseline Follicular to Premenstrual Phases</td>
</tr>
<tr>
<td>Analysis of Menstrual Phase</td>
</tr>
<tr>
<td>IV. DISCUSSION</td>
</tr>
<tr>
<td>APPENDICES</td>
</tr>
<tr>
<td>A. SUBJECT FORMS</td>
</tr>
<tr>
<td>B. MODIFIED DAILY SYMPTOM RATING SCALE</td>
</tr>
<tr>
<td>BIBLIOGRAPHY</td>
</tr>
</tbody>
</table>
LIST OF TABLES

1. Adjacent Phase Analysis, Consecutive Phases:
   Menstrual Symptoms ........................................... 13

2. Comparison of Baseline Follicular Phases to Premenstrual Phases:
   Premenstrual Symptoms ....................................... 14

3. Analysis of Menstrual Phases: Cycle-to-Cycle Variability; Treatment and Placebo Effects .............. 16
CHAPTER I

INTRODUCTION

Women are entering the work force in increasing numbers, making apparent the problems associated with dysmenorrhea. Dysmenorrhea is estimated to cause 140 million lost work hours per year, an average of two or more days lost per female per year. Female college students miss class two to three days per month. And, 20% of high school women miss one day of school per year due to problems related to dysmenorrhea (Sobczyk, 1980).

The reported incidence of dysmenorrhea varies widely. Moos (1968) and Coppen and Kessel (1963) found that 45% of women suffer from this problem. Earlier data support this figure (Drillien, 1946; Haman, 1945). More recently, in a survey of 113 patients, Sobczyk, Braunstein, and Solberg (1978) showed a prevalence ranging from 29% to 44% in any two month period. This incidence may vary with age, parity, weight, and exercise (Gannon, 1981; Sobczyk, 1980).

A variety of treatments for dysmenorrhea have include psychotherapy, ovulation suppression, and hysterectomy. Pharmacological treatments have been extensively investigated. Treatments with various prostaglandin synthetase inhibitors appear to be effective, time-limited, and relatively free from side effects (Lannane, 1980). Although there are no controlled studies of the comparative efficacy of all the various prostaglandin synthetase inhibitors to date, newer agents such as ibuprofen and naproxen appear to have fewer side
effects than the older agents such as indomethacin (Gonzalez, 1980). The following studies demonstrate that treatment with naproxen sodium appears effective in relieving dysmenorrhea.

In a double blind parallel trial, 11 dysmenorrheic women were given a single dose (1,100 mg) of Anaprox; 13 dysmenorrheic women were given a placebo (Henzl, Ortega-Herrera, Rodriguez, & Izu, 1979). At the end of a two-hour period, the 11 patients given Anaprox, and 3 patients given the placebo, experienced complete pain relief. The intensity of pain, both pre- and post-medication, was self-rated on a scale of 1 to 5: 1, no pain; 2, mild pain; 3, moderate pain; 4, severe pain; 5, very severe pain.

In a later study, 212 women treated with naproxen sodium during 496 dysmenorrheic episodes experienced complete or substantial pain relief in 63% of painful menstruations, a mild to substantial relief in 11%, and a mild relief in 9% (Henzl, Massey, Hanson, Buttram, Rosenwaks, & Pauls, 1980). The 219 women receiving placebo experienced complete or substantial relief in 18% of painful menstruations, and mild to substantial relief in 7%. A pain scale assessing the severity of menstrual cramping, similar to that used by Henzl et al. (1979) was used in this study. The relief scale was constructed in a like manner.

In an attempt to reduce the subjectivity of this data, the investigators also assessed functioning by asking subjects questions concerning activities. Normal to slightly impeded functioning was reported during 64% of treatments with naproxen sodium. Some interference was reported in 31% of the treatments, and in 5% of the
treatments staying at home, and/or in bed (incapacitation), for at least one day was reported. Incapacitation during menstruation for the placebo groups was reported at 34%. Subjects also reported taking additional pain medication, with the naproxen sodium group taking additional medication in 16% of the treatment courses, and the placebo group taking additional medication in 56% of the courses.

A similar study was conducted comparing naproxen sodium, aspirin, and a placebo (Rosenwaks, Seecar-Jones, Henzl, Dubin, Ghodgonkar, & Hoffman, 1981). Pain relief, interference with activities, need for additional pain medication, and level of a prostaglandin F metabolite, were used as criteria for effectiveness. In affording relief, naproxen sodium was superior to aspirin and placebo, though aspirin did not prove superior to placebo. Activities were less impaired with naproxen sodium than with aspirin or placebo. Reliability and validity data for the self-report measures used were not presented in these three studies.

Self-report measures have also been used in determining treatment efficacy in desensitization based procedures. Chesney and Tastro (1975), using muscle relaxation combined with menstrual imagery scenes, reduced symptoms associated with primary dysmenorrhea, but not those associated with premenstrual syndrome. The Menstrual Symptom Questionnaire, used in this study to assess symptomatology, was later found to be invalid and unreliable (Webster, Martin, Uchalik, & Gannon, 1978). Cox and Meyer (1978), using deep muscle relaxation in a systematic desensitization paradigm, reduced symptoms associated with both dysmenorrhea and premenstrual syndrome. The
Menstrual Distress Questionnaire used in this study has since been shown to be invalid (Abplanap, Donnelly, & Rose, 1979). Both the Menstrual Syndrome Questionnaire and Menstrual Distress Questionnaire were retrospective. The self-report measures used to assess treatment efficacy in both pharmacological and behavioral studies are not necessarily valid or reliable. In addition those measures used in the behavioral studies were retrospective. The manner in which the efficacy of the drug has been evaluated may not be the most productive in terms of treating the individual patient. The measures used revealed little about the actual time of distress, the degree or type of pretreatment discomfort, the amount of relief afforded, or changes in individual functioning.

The criteria for treatment success have been inadequate. Although past measures have provided some indication of overall efficacy, they are not necessarily valid, reliable measures of an individual's degree of distress during the menstrual period or post-treatment. Also, symptoms reported throughout the cycle are not measured, leaving open the possibility that treatment is not actually directed at symptomatology occurring during the menstrual phase.

Taylor (1979) has since developed a Daily Symptom Rating Scale, and reported data which did indicate adequate reliability and validity, for most items. Certain items, hopelessness, withdrawal, cheerfulness, energy, breast swelling or tenderness, and swelling of face, hands, ankles, did not correlate with the selected validity criteria for premenstrual symptoms, which were: 1) the numbers of tablets consumed in the premenstrual week, 2) a history of having consulted
with a doctor about premenstrual symptoms, 3) the subject's self-rating of the usual severity of premenstrual symptoms, and 4) the subject's estimate of the severity of her premenstrual symptoms relative to those of most women. The items which did not correlate with these criteria, excluding breast swelling and tenderness, plus the item, lack of initiative, also did not demonstrate clear cyclic patterns.

Although this scale seems preferable to the previously mentioned self-report measures in that it is valid and reliable for most items, and avoids the problems inherent in retrospective reports, it remains a subjective measure.

Henzl et al. (1980) stated that since pain is a subjective phenomenon, changes in pain intensity cannot be objectively measured. Therefore, we cannot objectively measure the analgesic effects of a drug. Lennane (1980) appears to agree, suggesting that the only argument possible about whether or not pain is present in the subject is whether or not the subject is lying.

Fordyce and Steger (1979) made a distinction which suggests that the problem may be definitional. They distinguished "pain" as a form of sensation, "suffering" as a feeling state, and "pain behavior" as the visible or audible manifestations of the problem. A further suggestion was made. Since self-report data are subject to distortion and linked to non-treatment variables, the criterion for success should be observable and measurable behavior. Uptime, the number of miles walked in an hour, and the number of pounds lifted, are examples given which avoid the complications of self-report data.
There is little evidence in support of observable and measurable changes in behavior taking place throughout the menstrual cycle in women not necessarily reporting pain or premenstrual symptomatology (Sommer, 1973). Morris and Udry (1970) did find increases in activity in 25 women wearing pedometers for three menstrual cycles. These increases occurred on Days 2, 15, 16, and 27. However, the data were aggregate. Differences between women, within cycles and between cycles, were not reported.

Although the implications of these findings are not clear, objective measurement of pain behavior may avoid problems inherent in the use of retrospective self-report data which are then statistically aggregated. Objective measures may be useful in evaluating both behavioral and pharmacological treatments of dysmenorrhea, providing a valid and reliable outcome criteria. Additionally, an objective measure of behavior could prove useful in assessing symptomatology throughout other phases of the cycle.

This study used pedometer-recorded activity as an index of general motor activity in an attempt to assess pain associated with dysmenorrhea, the effects of treatment with naproxen sodium, and the effects of a placebo. A modified Daily Symptom Rating Scale was used as an additional measure of symptomatology in order to determine the relationship between the behavioral data and the daily self-report measures.
CHAPTER II

METHOD

Subjects

The subjects were three volunteers, recruited via posters and word of mouth, ages 20, 30, and 33, reporting regular (between 24 and 30 day) menstrual cycles, and pain during menstruation. Each subject was screened for exclusionary conditions contraindicating the use of naproxen sodium prior to obtaining a physical examination and written permission from a physician, and had signed a statement of informed consent (see Appendix A). Prior to inclusion, the subjects were questioned regarding the possibility of pregnancy and current birth control methods. Those who were planning a child were excluded.

Apparatus

Precise K & R, Model #301 pedometers were used to measure activity level. Prior to beginning the study, each pedometer was checked for accuracy and reliability by being worn during a one-mile walk for three walks. In order to ensure that any changes in the measure were not due to instrument malfunction, the pedometers were checked after the subjects had completed data recording. An additional check was made on Subject A's pedometer approximately 1½ months after beginning recording.

A modified Daily Symptom Rating Scale form was used as an
additional measure (see Appendix B). All items, excluding energy, which had not shown clear perimenstrual (at about the time menstruation begins) peaks were eliminated: hopelessness; lack of initiative; withdrawal; cheerfulness; and swelling of face, hands, and ankles. Although the item, energy, also had not shown any clear cyclic pattern, this item was retained due to the possible relationship between it and the behavioral measure used. Other changes in format were made. Designated spaces for recording drug intake, alcohol consumption, pedometer readings, and day of menstrual period were added. The original form was designed in a manner by which subjects rated items daily for entire cycles on the same form. In order to avoid data already recorded from influencing the following ratings, separate forms were used each day. Each form was stamped and addressed to the investigator. The treatment medication used was Anaprox manufactured by Syntex. The placebo used was Cebocaps 3 manufactured by O'Neal, Jones & Feldman.

Dependent Variables

The dependent variables were the number of miles per day recorded on the pedometer and reported on the form, the ratings (0-5) of the items on the Daily Symptom Rating Scale form, and the number of drinks recorded on the form. Each subject wore a pedometer from the time of getting out of bed in the morning until just prior to retiring at night, excluding bathing and toilet related activities. They recorded the number of miles registered immediately after removing the pedometer, and completed the modified Daily Symptom Rating Scale.
form at the end of each day. Each form was mailed to the investigators on the following day. Weekend reports were mailed the following Monday.

Procedure

The independent variables were ingestion of naproxen sodium and ingestion of placebo. The subjects were instructed to take the medication daily, in four separate doses per day, with food or milk. The initial dose, taken at the onset of the menstrual period, was 550 mg (two tablets or capsules). The following doses consisted of 275 mg (one tablet or capsule) taken every 6 hours, for the duration of time that the subject reported pain during menstruation. The instructions for taking the placebo were given in the same manner: 2 initial tablets or capsules followed by 1 every 6 hours. The subjects were apprised of possible reactions to the drug, mainly gastrointestinal disturbance; instructed not to ingest alcohol or analgesics while taking the medication; and, to report any occurrence of side-effects to the investigator. In the event that analgesics were considered necessary by the subject when not taking the test medication, the subject was required to record the type, the amount, the data, and the time of administration. This was done in order to partially control and assess the effects of these confounding variables, full control being impractical and possibly unethical.

The subjects received both instructions and medication from an assistant who had no knowledge of the drug being administered. The tablets or capsules were contained in identical unmarked envelopes.
In order to help ensure that the test medications were taken as directed, the subjects were required to record the date and time of self-administration directly on the packets, and to return the packets to the investigator.

The onset of each intervention phase was determined by the onset of each subject's menstrual period. The duration of intervention was determined by the duration of reported pain in baseline.

The maximum number of days each subject reported pain during menstruation in the two baseline cycles was four. Each subject received medication for four days, a total of seventeen tablets, for the first treatment cycle.

Data Analysis

No standard procedure exists for phase definition (Gannon, 1981). Number of phases and phase length vary from study to study (Sommer, 1973). However, following ovulation, the corpus luteum has a predetermined life span of approximately 14 days. Variation in cycle length may occur until the time of ovulation (Moghissi, 1980). Consequently, most procedures for phase definition use an indirect method, assuming ovulation, to designate phases of interest.

Four phases of the menstrual cycle were defined in the following manner: menstrual, from the first day of menstruation through the fifth day of the cycle; follicular, the nineteenth day prior to the onset of menstruation through the fifteenth day prior to onset; luteal, the tenth day prior to onset through the sixth day prior to onset; and, premenstrual, the five days preceding the onset of menstruation.
Data points for each dependent variable for each subject were summed across each phase for each cycle and then averaged. The following analyses of variance were performed: (a) comparisons between adjacent phases of the menstrual cycle from the premenstrual phase in Baseline 1 through the premenstrual phase in Baseline 2 for each subject, to determine significant differences revealing menstrual symptomatology; (b) between the follicular phase and premenstrual phase of both Baseline 1 and Baseline 2 cycles for each subject to determine premenstrual symptomatology; and (c) comparisons among all menstrual phases for each subject to determine cycle-to-cycle variability and treatment and/or placebo effects.

Compliance

No subject took the medication as instructed. During the first treatment cycle, Subject A took a total of four tablets at irregular intervals for one day. Subject B took a total of six tablets, intervals unreported, for two days. Subject C took a total of seven tablets at irregular intervals for three days. Each subject was still reporting some pain when she discontinued medication.

In order to make valid comparisons between cycles, the number of tablets or capsules given to each subject after the first treatment cycle remained the same as she had taken during the first treatment cycle.
CHAPTER III

RESULTS

The results suggest treatment effects for Subjects A and B, and both treatment and placebo effects for Subject C, on one or more measures of symptomatology occurring during the menstrual phase. Placebo effects for Subject B, and treatment effects for Subject C, appear on measures which otherwise had remained relatively constant throughout all four phases of the menstrual cycle, showing no significant differences among phases in baseline cycles.

Adjacent Phase Analysis

The adjacent phase analysis (see Table 1) compares five consecutive phases, from premenstrual in Baseline 1 through premenstrual in Baseline 2, in order to determine any significant differences between consecutive phases which would reveal menstrual symptomatology. The data show a statistically significant increase in abdominal swelling and pelvic/abdominal pain during the menstrual phase for Subject A, a significant increase in breast swelling or tenderness for Subject B, and a significant increase in alcohol consumption and pelvic/abdominal pain during the menstrual phase for Subject C.

Comparison of Baseline Follicular to Premenstrual Phases

The comparison of Baseline premenstrual to follicular phases
Table 1

ADJACENT PHASE ANALYSIS, CONSECUTIVE PHASES: MENSTRUAL SYMPTOMS

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P<.05
B - Baseline
P - Premenstrual
M - Menstrual
F - Follicular
L - Luteal
**Table 2**

**COMPARISON OF BASELINE FOLLICULAR PHASES TO PREMENSTRUAL PHASES: PREMENSTRUAL SYMPTOMS**

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<tr>
<td>1 Depression</td>
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<td>.60 1.60 .40 .40</td>
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<tr>
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<td>1.40 2.40 .40 .40</td>
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<td>1.20 1.20 .40 1.00</td>
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<td>3.00 3.20 2.60 3.00</td>
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<td>0.00 .60 0.00 1.00</td>
<td>.20 1.60 .20 3.00</td>
</tr>
<tr>
<td>8 Abdominal Swelling</td>
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<td>.60 1.20 .80 .80</td>
</tr>
<tr>
<td>9 Pelvic/Abdominal Pain</td>
<td>0.00 0.00 0.00 0.00</td>
<td>.60 1.00 1.20 .20</td>
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<td>10 Backache</td>
<td>.40 0.00 0.00 .40</td>
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<td>11 Headache</td>
<td>.80 .60 0.00 .60</td>
<td>.60 .80 1.00 1.60</td>
</tr>
<tr>
<td>12 Tiredness</td>
<td>1.20 2.20 1.60 .80</td>
<td>.60 1.00 1.80 1.40</td>
</tr>
</tbody>
</table>

---

[■— ■] - Significant Difference
P < .05
B = Baseline
F = Follicular
P = Premenstrual

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(see Table 2) determined premenstrual symptomatology which may not have been demonstrated in the adjacent phase analysis, since premenstrual and menstrual symptomatology may be similar due to the similarity in hormonal levels. Progesterone and estrogen are decreasing during the premenstrual phase and are lowest at the onset of menstruation. Both hormones are increasing during the follicular phase, estrogen peaking at ovulation, and progesterone peaking about two to three days after ovulation. Since the hormonal levels differ more between the follicular and premenstrual phases than between the premenstrual and menstrual phases differences in symptomatology may be greater. Measures which show a significant difference between phases in only one out of the two baseline cycles demonstrate cycle-to-cycle variability on these measures.

A significant increase in the pedometer measure and in breast swelling or tenderness occurred during the premenstrual phase, when compared to the follicular phase, in both cycles for Subject B. The increase in argumentativeness occurred in Baseline 2 only. In Baseline 1 only, outgoingness was significantly increased and headache was significantly decreased for Subject C.

Analysis of Menstrual Phase

Comparisons of the menstrual phase only, among all cycles for each subject (see Table 3), were made in order to: (a) determine further cycle-to-cycle variability, and (b) to demonstrate treatment and/or placebo effects.

In comparing the menstrual phases between Baselines 1 and 2,
Table 3
ANALYSIS OF MENSTRUAL PHASES: CYCLE-TO-CYCLE VARIABILITY; TREATMENT AND PLACEBO EFFECTS

<table>
<thead>
<tr>
<th>Subject A</th>
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<th>Subject C</th>
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<tr>
<td>B1 B2 T1 P T2</td>
<td>B1 B2 T P</td>
<td>B1 B2 T1 P</td>
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<td>N=5 N=4 N=5 N=5 N=5</td>
<td>N=5 N=4 N=5 N=5</td>
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</tbody>
</table>

| Alcohol | 0.00 0.00 0.00 0.00 0.00 | 0.00 0.80 0.40 0.20 | 1.00 2.25 0.80 0.80 |
| Pedometer | 2.40 1.62 1.40 1.10 1.05 | 2.54 2.62 4.03 2.55 | 3.65 3.25 3.05 1.85 |
| Depression | .20 0.00 .40 1.00 0.00 | 1.40 1.00 .50 .40 | .80 2.00 0.00 1.40 |
| Tension | .40 .75 1.60 0.00 1.20 | 1.80 1.60 1.00 .40 | 2.20 3.50 1.20 2.80 |
| Irritability | 1.60 0.00 .40 0.00 1.60 | 1.60 1.80 1.00 .80 | 1.80 3.25 .40 1.80 |
| Argumentativeness | .80 0.00 0.00 .80 .60 | 1.40 1.60 .75 .40 | 1.20 2.00 0.00 1.00 |
| Outgoingness | 3.40 3.50 3.20 3.60 3.60 | 3.20 2.80 3.00 2.40 | 2.60 3.00 2.60 3.20 |
| Energy | 3.20 3.50 3.60 3.80 2.80 | 3.00 2.80 3.50 2.60 | 2.40 3.00 2.80 3.00 |
| Breast Swelling or Tenderness | 1.00 1.25 .60 .60 2.60 | 3.00 1.60 1.50 1.40 | 0.00 0.00 0.00 0.00 |
| Abdominal Swelling | .60 1.50 0.00 .60 .20 | 2.20 2.60 2.60 1.60 | 1.60 1.75 .20 1.40 |
| Pelvic/Abdominal Pain | 1.60 1.50 .40 1.60 .80 | 2.60 2.40 1.75 1.20 | 2.60 3.00 .40 .80 |
| Backache | .60 0.00 .20 1.40 .40 | 1.80 2.20 1.75 .80 | 1.80 .75 0.00 0.00 |
| Headache | 1.20 0.00 .80 .40 1.20 | .60 1.40 .50 1.00 | 0.00 2.00 0.00 0.00 |
| Tiredness | 1.20 .50 1.20 1.60 2.20 | 1.60 1.40 .75 1.20 | 2.20 2.25 2.20 1.00 |

[———] - Significant Difference
p < .05
B = Baseline
T = Treatment
P = Placebo

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the increase in alcohol and headache varied from cycle-to-cycle for Subject C.

Eliminating those changes which may be due to cycle-to-cycle variability, and, excluding those measures which remain consistent throughout the cycle, showing no significant differences among phases, the following measures remain as reliable symptoms occurring during the menstrual phase which may show changes due to either treatment or placebo effects: Subject A, abdominal swelling and pelvic/abdominal pain; Subject B, pedometer and breast swelling or tenderness; and Subject C, pelvic/abdominal pain.

Of these targeted measures a significant decrease in abdominal swelling occurred between Baseline 2 and Treatment 1 for Subject A (see Table 3). The decrease from Baseline 2 to Placebo was not significant, and although the decrease from Baseline 2 to Treatment 2 was greater than that from Baseline 2 to Placebo, it was also not statistically significant. For Subject B, a significant increase occurred between Baseline 1 and Treatment on the pedometer measure. Subject C's data show significant decreases in pelvic/abdominal pain from Baseline 2 to both Treatment 1 and Placebo, the differences being greater between Baseline 2 and Treatment 1.

Changes occurred also on non-targeted measures, measures which had shown no significant differences among phases in the two analyses of baseline. The data for Subject A show: (a) a decrease in tension between Treatment 1 and Placebo; (b) a decrease in irritability between Baseline 1 and Placebo, Baseline 2 and Treatment, and an increase from Placebo to Treatment 2; and (c) increases in both energy
and breast swelling or tenderness from Placebo to Treatment 2.

Upon visual inspection of the data, these changes appear to be due to cycle-to-cycle variability not demonstrated in prior analyses. The decrease for Subject A from Treatment 1 to Placebo on the pedometer measure appears to be a result of a gradual decrease on that measure from the beginning to the end of daily recording.

For Subject B the depression measure showed significant decreases from Baseline 1 to both Treatment and Placebo, demonstrating a probable placebo effect. There was a significant decrease in tension from Baseline 1 to Placebo. It is not clear whether this was a placebo effect since the decrease from Baseline 1 to Treatment was not significant.

There were significant decreases on the pedometer measure for Subject C from both Baseline 1 and Baseline 2 to Placebo. This was not a placebo effect since the decrease from Baseline 2 to Treatment was minimal. Depression, tension, and irritability decreased significantly from Baseline 2 to Treatment 1 and increased significantly from Treatment 1 to Placebo. Argumentativeness decreased from both Baseline 1 and Baseline 2 to Treatment. Abdominal swelling decreased from Baseline 1 to Treatment. These changes appear to be effects associated with Treatment. They were measures which had otherwise shown little phase variability.
CHAPTER IV

DISCUSSION

Effects of treatment and/or placebo on two types of symptomatology have been demonstrated: on symptoms associated with the menstrual phase only, and on measures of symptomatology which had remained relatively stable throughout all phases of the menstrual cycle during Baseline.

The treatment and/or placebo effects on menstrual phase symptoms were few. Subject A's data revealed a treatment effect on abdominal swelling. Subject B's data revealed a treatment effect on the pedometer measure. Subject C's data revealed a treatment and possible placebo effect on pelvic/abdominal pain.

Although these effects were few, the only menstrual symptoms consistently reported during the two Baseline cycles that were not affected by either treatment or placebo, according to criteria of significant differences, were breast swelling or tenderness for Subject B, a symptom that is usually considered premenstrual, but had occurred in both the premenstrual and menstrual phases for Subject B; and, pelvic/abdominal pain for Subject A, which did show non-significant decreases during both Treatment phases.

Although effects have been demonstrated, any conclusions are suspect. Since there was a large number of significant differences, some of the significant differences which show treatment and/or
placebo effects may have occurred by chance. Other problems also contributed to the difficulties in demonstrating effects.

More effects, and more salient effects, may have been observed if two conditions had been met: (a) if the method of subject selection had included a criterion of initial reports of fours (large amount) or fives (very large) on the self-report measures usually associated with dysmenorrhea, pelvic/abdominal pain, backache, and abdominal swelling; and (b) if compliance with instructions for taking the medication had occurred.

The method of statistical analysis may have obscured both existing symptomatology and treatment and/or placebo effects. Although Subject B's data did not demonstrate pelvic/abdominal pain during menstruation, according to the criteria of significant differences, there was an increase in this measure during the menstrual phase over other phases in the cycle. Also, a decrease in this measure occurred during Treatment. Variability during the phase may have contributed to obscuring this effect. It was necessary for an equal number of data points to be used in comparing phases. However, menstrual symptomatology is usually greatest during the first two days of the cycle, contributing to within-phase variability.

An additional problem contributing to the difficulty in demonstrating treatment outcome was the low pedometer recordings for Subject A, virtually eliminating that measure as a behavioral index of pain for that particular subject.

The pedometers in this study were set for accuracy and reliability. The measures reported were actual recorded miles; the

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lowest report was 1.05 for Subject A, the highest report was 4.03 for Subject B. In the study determining variations in pedometer activity during menstruation (Morris & Udry, 1970), the pedometers were set for maximum deflection. The measures reported were pedometer units: the lowest value was 4.30; the highest value was 5.15. Setting the pedometer for maximum deflection may increase the daily measures but this increase in itself would not necessarily result in significant differences between phases for a subject with very low activity levels.

Again, a partial solution may be in the development of criteria for subject selection, perhaps requiring pedometer recordings to meet a particular level prior to beginning the actual study. This would not eliminate the potential for a decrease due to other variables, but would at least ensure that the subject was currently engaging in a level of activity comparable to other subjects. However, it must be considered that other factors besides dysmenorrhea control pedometer recordings.

Subject C's data demonstrated effects associated with treatment on symptoms that had previously shown no phase-to-phase variability: abdominal swelling, depression, tension, irritability, and argumentativeness. The causal relationships between these effects and treatment are not clear.

It is possible that the decrease in these measures was a consequence of a decrease in pain. This seems most probable for the decrease on the self-report measure of abdominal swelling, a symptom frequently associated with dysmenorrhea.
However, there may be an alternative explanation for the effects on the remaining four measures (depression, tension, irritability, and argumentativeness), symptoms usually associated with premenstrual syndrome.

Negative central nervous system effects have been reported with the use of prostaglandin synthetase inhibitors (Robinson, 1983). These include headache, dizziness, tinnitus, deafness, sweating, dryness, nervousness, drowsiness, and confusion. Although these negative effects involve headache, tollefanic acid has been shown to be as effective as ergotamine in reduction of pain during migrane attacks (Hakkarainen, Vapaatalo, Gothoni, & Parantainen, 1979). When compared to placebo tollefanic acid also reduced tiredness. It has not yet been determined how these effects are related to prostaglandin synthetase inhibition.

Positive side effects of a drug are seldom investigated. It is possible that naproxen sodium may have both positive and negative effects on the central nervous system and that the decreases on the measures of depression, tension, irritability, and argumentativeness for Subject C may be related to these effects.

Evidence is indirect and contradictory in support of the idea that prostaglandins are related to central nervous system symptomatology during the premenstrual phase. In comparing mefenamic acid to placebo, mefenamic acid was found to affect improvement in tension, irritability, depression, pain, anger, and headaches (Wood & Jakubowicz, 1980). In comparing Ponstel to placebo, the Ponstel did not affect tension, lethargy, or depression (Budoff, 1980).
A lack of congruence existed between the effects on the self-report measure and the effects on the pedometer measure. In a discussion of emotional responding, emotion has been defined in terms of three response classes: language behavior, motor acts, and changes in the viscera and level of muscle tonus (Lang, 1977). These response classes are also those involved in menstrual pain, although the third response class also includes changes in other organ systems. A response may show strength in one class and not even be detectable in others (Lang, 1977). It is likely that different factors controlled the pedometer recordings than controlled the ratings on the self-report measures.

Future research on treatment of dysmenorrhea may address the problems of subject selection, method of analysis, and the discovery of a more sensitive behavioral index. Investigating the effects of prostaglandin synthetase inhibition on central nervous system symptoms associated with the premenstrual phase may also be important, since effects of the central nervous system may influence both the self-report and behavioral measures of dysmenorrhea.
APPENDICES
APPENDIX A

SUBJECT FORMS

Informed Consent

Study: Pedometer-recorded Activity as a Measure of Treatment Outcome in Primary Dysmenorrhea

Investigator: Vicki Trejbal

Description: During this study you will wear a pedometer and complete modified DSRS forms daily. You will receive medications that are classified as non-steroidal anti-inflammatory. For the first 2 menstrual cycles you will not receive any test medications. This will enable the investigator to assess the duration and severity of discomfort. During the final cycles you will be receiving test medications.

I ___________________________ (name) give my informed consent to participate in this study. I understand that I may withdraw this consent at any time, that information obtained during the course of this study will remain confidential, and that the investigators will endeavor to keep my identity anonymous. I consent to allow this information to be presented to other professionals, through reports and presentations, as long as my identity is kept anonymous. I understand that a placebo may be administered during the course of this study.

To the best of my knowledge I am not currently pregnant. I am not planning a pregnancy for the duration of this study.

Potential benefits of participation in this study:

The medications used in this study may be effective in alleviating your menstrual pain.

If ineffective, the information provided during debriefing may be helpful in the selection of an alternative medication.

You will gain potentially useful information about your particular responses during the menstrual cycle.

Potential risks of participation in this study:

Side effects have been reported with the use of these medications; the main side effect being gastrointestinal disturbance. In order to mitigate against this effect, you will be instructed to take the medication with food or milk, and not to ingest alcohol or analgesics while taking a test medication. You will be instructed to immediately report the occurrence of this, or any other, side effect to the investigator.

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A low incidence of rectal bleeding has been reported with the use of this medication. In the event of this symptom you are to call Dr. Weiss.

If any side effect or injury is incurred due to the test medications, the investigator will assume costs of treatment, excluding costs incurred in the unlikely event of hospitalization, and post hospitalization expenses. I understand that I will be responsible for these costs.

Western Michigan University will assume responsibility only as required by law. Emergency medical treatment is available where injury or illness is incurred in the course of an experiment. I have been advised that I should look to my own health care insurance program for payment of medical expenses not assumed by the investigator. No additional financial compensation is available.

Name ____________________________ Date ____________________________
Witness ____________________________ Date ____________________________
Investigator ____________________________ Date ____________________________

Investigator: Vicki Trejbal
Phone: 381-0896
Assistant: Karla Myers
Phone: 383-0342
343-0070
Physician: Dr. I. R. Weiss
Phone: 381-7470
No Answer: 343-1636
Address: 1517 S. Park
Physician's Permission

Study: Pedometer-recorded Activity as a Measure of Treatment Outcome in Primary Dysmenorrhea

Investigator: Vicki Trejbal

Date:

Description

This study is designed 1) to determine if a pedometer measure of motor activity may be used as an indicator of the degree of dysmenorrhea present in an individual, 2) to determine the relationship between this measure and items on a daily symptom rating scale (DSRS), and 3) to assess the effects of naproxen sodium on a behavioral measure of pain.

Six subjects, in two groups of three, will wear pedometers and complete modified DSRS forms throughout the course of their participation. Periods of dysmenorrhea will be determined during two baseline cycles. Subjects in Group 1 will receive treatment with naproxen sodium during this time period in Cycle 3, a placebo in Cycle 4, and treatment with naproxen sodium in Cycle 5. Subjects in Group 2 will receive a placebo in Cycle 3 and treatment in Cycle 4. All subjects will be instructed to take the medications with food or milk, not to ingest alcohol or analgesics while taking the test medication, and to immediately report the occurrence of any possible side effects.

__subject

Check one:

( ) This subject has no physical limitations which would restrict participation in this study. I give my permission for this subject to participate in this study.

( ) This subject has some physical limitation which does not allow for her participation in this study. I withhold my permission for this subject to participate in this study.

I understand that I will be notified if this subject develops any untoward symptoms while participating in this study, and that I will be responsible for treatment.

________________________
physician's signature

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Preliminary Screening Questions

Exclusionary

Are you allergic, or sensitive, to aspirin?

To any similar medications, such as Motrin?

After taking aspirin have you experienced any of these reactions? Asthma? Swelling or excretions of the nasal passages? Hives or rashes?

Do you have a history of ulcers?

A history of other gastro-intestinal disease?

Have you ever had kidney disease?

Do you have asthma?

Do you have a history of cardiac disease or problems?

Are currently taking any anti-coagulant medication? (Coumarin)

Are you on a sodium restricted diet?

Do you have epilepsy?
Are you currently taking any medication for this condition? (Hydantoin, Dilantin)

Are you currently taking a sulfa drug for any infection?

Are you now pregnant or planning a pregnancy?

**Non-exclusionary**

Do you presently have any other known medical condition or disease?

If yes, are you now receiving any treatment or medications?

Are you currently experiencing any symptoms or physical discomfort, other than menstrual pain?

Are you currently taking any over the counter drugs for these symptoms?

Are your menstrual cycles regular?

How long are your menstrual cycles? (Between ____ and ____ days)

For how many days do you menstruate?

When did you first experience menstrual pain?

What is your current method of birth control?
APPENDIX B

MODIFIED DAILY SYMPTOM RATING SCALE

SUBJECT CODE ___________ DATE ___________

Each night before retiring, please record your experience during the day of the feelings and sensations listed below. Write a number in the box opposite the item to indicate how intensely this symptom or feeling was experienced.

0 = NOT AT ALL  1 = VERY LITTLE  2 = LITTLE  
3 = MODERATE AMT  4 = LARGE AMT  5 = VERY LARGE

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<td>TENSION</td>
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<td>3.</td>
<td>IRRITABILITY</td>
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<td>ABDOMINAL SWELLING</td>
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BIBLIOGRAPHY


