Pain, 49 (1992) 321–324

PAIN 02052

The efficacy and efficiency of a self-administered treatment for adolescent migraine *

Patrick J. McGrath, Peter Humphreys, Daniel Keene, John T. Goodman, Maureen A. Lascelles, S. June Cunningham and Phillip Firestone

Department of Psychology and the Neurology Service, Children's Hospital of Eastern Ontario (Canada)

(Received 9 August 1991, revision received and accepted 20 December 1991)

Summary Migraine headaches are frequent in adolescents. Although many adolescents are adequately treated palliatively with analgesics, an important subgroup requires prophylactic treatment. Medical treatments for adolescents with frequent severe headaches is often problematic. Prophylactic pharmacological treatments are often shunned by adolescents and their parents because of concern over drug usage. Moreover, propranolol, the most widely used prophylactic drug with adults, is frequently not effective. Psychological interventions are effective but are costly and often not available. A randomized controlled trial was undertaken to evaluate the efficacy and efficiency of a predominantly self-administered treatment that could be delivered in a very cost-efficient format. Eighty seven adolescents (63 females and 24 males) ranging in age from 11 to 18 years were randomly assigned to receive a self-administered treatment, the same treatment delivered by a therapist or a control treatment. Self-administered and clinic treatment were equally effective and superior to the control treatment. However, the self-administered treatment was substantially more efficient. Both active treatments were durable at 1-year follow-up.

Key words: Migraine; Adolescents; Psychological treatment

Introduction

Adolescent migraine is a common disorder with prevalence rates ranging from 6.4% to 15.1% for adolescent girls and from 4% to 8.1% for adolescent boys (Bille 1962; Sillanpaa 1983). Palliative treatments, such as acetaminophen, are usually effective in relieving relatively infrequent headaches. However, when headaches are more frequent and severe, palliative treatments are insufficient and prophylactic treatments are required.

The two most common prophylactic strategies for migraine are pharmacological and psychological treatments. Propranolol is the drug of choice with adults, but recent studies have shown it to be ineffective or counter-therapeutic with adolescents (Forsythe et al. 1984; Olness et al. 1987). Calcium channel blockers have shown some promise (Sorge and Marano 1985) but are not, as yet, widely accepted for adolescent migraine. Psychological stress management treatments have been shown to be efficacious (Richther et al. 1986; Olness et al. 1987) and are often preferred because of the reluctance on the part of adolescents and parents to use daily prophylactic medication. Psychological treatments most often involve stress reduction by teaching coping strategies with muscle relaxation or hypnosis, and other behavioral and cognitive strategies (Richter et al. 1986; Lascelles et al. 1990).

A major impediment to widespread application of these psychological treatments is their cost and availability. Psychological interventions for migraine typically require from 10 to 20 h of professional contact. Depending on the amount of contact, location and

* This research was conducted in the Department of Psychology and the Neurology Service at the Children's Hospital of Eastern Ontario, 401 Smyth Road, Ottawa, Ontario K1H 8LI, Canada.

Correspondence to: Dr. P. McGrath, Department of Psychology, Dalhousie University, Halifax, Nova Scotia B3H 4J1, Canada. Tel.: (902) 494-1580; FAX: (902) 494-6585.

TABLE I

RATINGS OF HEADACHE INTENSITY

0 = No headache
1 = Headache: I am only aware of it when I pay attention to it
2 = Headache: but I can ignore it at times
3 = Headache: I can't ignore it but I can do my usual activities
4 = Headache: it's difficult for me to concentrate, I can only do easy activities
5 = Headache: such that I can't do anything

training of the mental health professional, the cost may be between $300 and $2000.

The purpose of this research was to evaluate a largely self-administered treatment program for adolescents with migraine. The self-administered treatment package was designed as an 8-week home-based treatment program focusing on cognitive and behavioral stress coping and relaxation strategies for adolescents with limited therapist involvement. The self-administered treatment was compared to an 8-week therapist-administered version of the same treatment program and an appropriate control condition.

Method

Subjects

The sample included 87 adolescents (63 females and 24 males) ranging in age from 11 to 18 years. Thirteen subjects dropped out before the 3-month follow-up. There were 6 dropouts each in the clinic and self-administered treatment and 2 in the control treatment. This left 23 subjects in the clinic treatment, 24 subjects in the self-administered treatment and 26 subjects in the control group. There was an even distribution of males and females and no significant age differences among the 3 groups.

Procedure

Adolescents were referred by their pediatrician or family physician to the migraine clinic at the Children's Hospital of Eastern Ontario. Each was initially examined by a pediatric neurologist to confirm the diagnosis of migraine. The criteria for this diagnosis included intermittent, paroxysmal headache for at least 3 months, and 2 of the following 4 criteria: family history of migraine, scotoma or related phenomena, throbbing pain, and nausea or vomiting. In addition, subjects were required to be between 11 and 18 years of age, not to have taken prophylactic medication for the previous 2 months, not to have headaches that were obviously linked to diet or allergy, to have more than 2 headaches a month, to have no neurological problems, to have no major psychological or other medical problems, to be able to speak and read English or French, and to consent and have a parent consent to participate in study.

Participants were given 4 weeks of headache diaries in which headaches were to be rated 4 times a day on a 6-point scale in order to establish their baseline headache activity. We have previously shown the validity of these measures for adolescent migraine (Richardson et al. 1983). The anchors used to rate intensity are shown in Table I.

After the 4-week baseline period, subjects were stratified by sex and severity of headaches and randomized to 1 of the 8-week treatments: the self-administered program, the clinic program or the control group program. The self-administered treatment program consisted of an 8-chapter treatment manual and cassette tapes (McGrath et al. 1990a). Each week a different chapter was assigned and the adolescents could either read the manual or listen to instructions by tape or both. Each chapter focused on different coping and relaxation strategies. Subjects in the self-administered treatment were seen for an initial appointment and contacted weekly by telephone to answer any questions and to discuss homework assignments received by mail. The assignments consisted of a headache diary, a coping exercise and a chapter comprehension questionnaire. The program for the clinic group was identical to the self-administered group, except that instead of receiving the manual and tapes and being telephoned weekly, each was seen individually by a trained therapist. The treatment protocol is outlined in Table II.

The control group subjects were given a list of common triggers that can cause migraines such as different foods, too much sun, too much exercise. In an initial treatment session with a therapist, they were asked to become aware of triggers that caused them headaches and to avoid them. They were also taught to use a brainstorming technique to deal with stressful situations. The therapist contacted the subjects weekly by telephone to monitor their progress. The control group was designed as a credible placebo that would have a similar amount of therapist contact as the self-administered treatment.

After treatment was completed, all participants kept diaries for another 4 weeks after which they were seen for a 1-month follow-up

TABLE II

SUMMARY OF CONTENT OF ACTIVE TREATMENTS

Week 1	Rationale and explanation of coping exercise and relaxation with tension
Week 2	Cognitive restructuring
Week 3	Examining unrealistic beliefs and relaxation without tension
Week 4	Distraction strategies
Week 5	Imagery, behavior rehearsal, mental activities, relaxation with imagery
Week 6	Assertiveness
Week 7	Problem solving
Week 8	Summary of coping strategies

TABLE III

HEADACHE INDEX AT BASELINE, 1-MONTH, 3-MONTH AND 1-YEAR FOLLOW-UP FOR CLINIC AND SELF-ADMINISTERED GROUP

Time	Clinic group (N = 20)	Self-administered group (N = 21)
Baseline	166	153
1-month follow-up	88	72
3-month follow-up	85	75
1-year follow-up	71	46

session. Teenagers in the self-administered and clinic treatments were seen for a 3-month and 1-year follow-up for which they completed 4 weeks of headache diaries. Adolescents in the control treatment were offered another treatment after the 1-month follow-up.

Results

The major outcome variable was the total headache index, which was calculated by summing the 112 headache ratings made over each 4-week period. Using repeated measures analysis of variance, the total headache index from the 4 baseline weeks were compared to those during the 1-month follow-up period for the self-administered (159), clinic (159) and the control groups (129). There was a significant group-by-time effect ($F = 7.89$; $P > 0.001$). Planned contrasts revealed that there were no significant differences between groups at baseline and no interaction between severity and group membership. Consequently, data were collapsed across severity. The control group did not change between baseline (129) and 1-month follow-up (120). There was a significant treatment effect for the clinic (159 to 83) and self-administered (159 to 79) treatment programs. An alternative analysis strategy was to determine success and failure of treatments. Success was defined as a 50% reduction in headache index from baseline to 1-month follow-up. The self-administered group had a higher success rate (16 of 24 participants) than either the clinic (10 of 23 participants) or control group (6 of 25 participants). Chi square analysis ($\chi = 12.7$; 2 df, $P < 0.01$) revealed that these differences were significant with the self-administered treatment contributing an excess of successful cases and the control group contributing an excess of failed cases.

TABLE IV

ANALYSIS OF EFFICIENCY OF TREATMENTS

Group	Average improvement (%)	Average minutes of contact	Improvement/ contact minute (%)	Relative efficiency
Self-administered treatment	50.3	178	0.28	7.6
Clinic treatment	47.8	485	0.098	2.7
Control treatment	5.8	157	0.037	1.0

TABLE V

DEPRESSION SCORES

Group	Baseline	Follow-up		
		1 month	3 month	1 year
Clinic	21.4	18.2	19.1	17.7
Self-administered	21.9	19.9	18.7	18.5
Control	20	18.7		

Table III presents the data for a second analysis of headache indexes comparing the clinic and self-administered treatment groups at baseline, 1-month follow-up, 3-month follow-up and 1-year follow-up. Analysis showed the maintenance of reduced headache activity in the 2 active treatments.

In order to examine the efficiency of the different treatments, the number of minutes of therapist contact (including time spent on the telephone) was divided by the percentage of improvement at 3-month follow-up. Table IV shows that the self-administered and the clinic group were approximately equal in percentage of improvement of headache index and superior to the control condition. The self-administered treatment was superior to the other 2 groups in terms of efficiency or improvement per minute. In this study, we examined efficiency from the point of view of the health care professional. We did not consider the amount of time expended by our patients or their parents in completing the program.

As is evident in Table V, there was a significant time effect on depression (F (2) = 13.61, $P < 0.001$) as measured by the Poznanski depression scale (1979) but no differences between the groups at any time throughout the study.

Discussion

Both methods of delivering the stress management treatment were effective in reducing headache activity and maintaining gains over a 1-year follow-up. However, the self-administered treatment was more efficient from the point of view of the therapist and yielded greater reductions in headache per minute of therapist time. The self-administered treatment was almost 3 times as efficient as the therapist-administered treatment. The effectiveness of self-administered treatment for pediatric migraine is consistent with a single-case experimental design study (Burke et al. 1989) using temperature biofeedback treatment and a school-based study of tension headache sufferers using

relaxation (Larsson et al. 1987). A professional handbook (McGrath et al. 1990b) is available to guide health care professionals such as physicians and nurses in using the program. Adolescents with chronic severe migraine headache now have an efficient and effective method of treatment available.

Acknowledgements

This research was funded by the National Health and Welfare Research and Development Program of Canada. Dr. McGrath was supported by a Career Scientist Award of the Ontario Ministry of Health.

References

Bille, B., Migraine in schoolchildren. Acta Pediatr Scand., 51 Suppl. 136 (1962) 1–151.

Burke, E.J. and Andrasik, F., Home- versus clinic-based treatment for pediatric migraine: results of treatment through one year follow-up, Headache, 29 (1989) 434–440.

Forsythe, W.I., Gillies, D. and Sills, M.A., Propranolol (Inderal) in the treatment of childhood migraine. Dev. Med. Child Neurol., 26 (1984) 737–741.

Larsson, B., Daleflod, B., Hakansson, L. and Melin, L., Therapist-assisted versus self-help relaxation treatment of chronic headaches in adolescents: a school-based intervention, J. Child Psychol. Psychiat., 28 (1987) 127–136.

Lascelles, M.A., Cunningham, S.J., McGrath, P.J. and Sullivan, M.J.L., Teaching coping strategies to adolescents with migraine, J. Pain Sympt. Manag., 4 (1990) 135–145.

McGrath, P.J., Cunningham, S.J., Lascelles, M.A. and Humphreys, P., Help Yourself: A Treatment for Migraine Headaches, Professional Handbook, University of Ottawa Press, Ottawa, 1990a, 61 pp.

McGrath, P.J., Cunningham, S.J., Lascelles, M.A. and Humphreys, P., Help Yourself: A Treatment for Migraine Headaches, Patient Manual and Audiotape, University of Ottawa Press, Ottawa, 1990b, 65 pp.

Olness, K., MacDonald, J.T. and Uden, D.L., Comparison of self hypnosis and propranolol in the treatment of juvenile classic migraine, Pediatrics, 79 (1987) 593–597.

Poznanski, E.O., Cook, J. and Carroll, C., A depression rating scale for children, Pediatrics, 64 (1979) 442–450.

Richardson, G.M., McGrath, P.J., Cunningham, S.J. and Humphreys, P.J., Validity of the headache diary for children, Headache, 23 (1983) 184–187.

Richter, I.L., McGrath, P.J., Humphreys, P.J., Goodman, J.T., Firestone, P. and Keene, D., Cognitive and relaxation treatment of pediatric migraine, Pain, 25 (1986) 195–203.

Sillanpaa, M., Prevalence of headache in prepuberty, Headache, 23 (1983) 10–14.

Sorge, F. and Marano, E., Flunarizine vs. placebo in childhood migraine: a double-blind study, Cephalagia, Suppl. 2 (1985) 145–148.