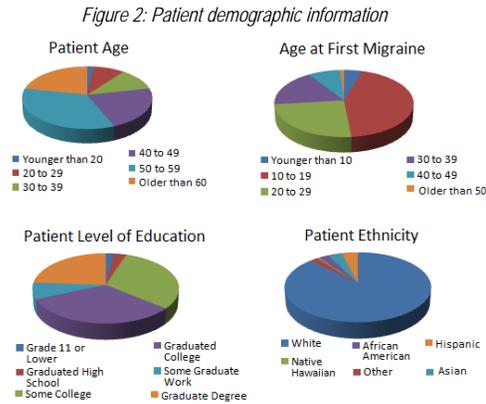


Abstract

This study examines whether subjective directionality of headaches determines the effectiveness of pharmacological treatments for migraine patients. 201 patients were recruited in the Women's Health Internal Medicine Program at Mayo Clinic and asked to categorize their headache type as ocular, exploding, or imploding headaches. Patients were also surveyed about prophylactic medications or triptans and their effectiveness. This data was analyzed to determine whether a significant difference existed between medications that were effective. The study found that no such difference existed. However, it does continue the trend of current research searching for a better way to predict effective migraine prevention and treatment, and continues to make use of the relatively recent characterization of migraine headaches by directionality. In the future, research will hopefully uncover additional factors which are useful as predictors for migraine pharmacology.

Introduction

Migraines are a special class of headaches characterized by severe throbbing, often unilateral pain sometimes associated with nausea, vomiting, photophobia, or phonophobia.^{8,9} Successful treatment of migraines is difficult due to the unclear etiology of these disorders, although progress has been made in the past several decades. The introduction of triptans in the 1990s revolutionized the acute treatment of migraines. Multiple agents have also been discovered to be effective for migraine prevention. Despite these advances, there is still a great deal of individual patient variability in their response, with one study showing over 1/3 of patients do not respond consistently to triptans and less than 50% achieve complete pain freedom with preventative medications.⁵ In recent years, it is recognized that patients perceive their pain as pressure buildup inside their head (exploding headache) while others perceive pain inflicted from the outside (imploding headache). Ocular migraines - headaches that involve pressure surrounding the eyes - may also occur. Most significantly, recent research suggests that the subjective migraine classification may predict responsiveness to an emerging migraine treatment - botulinum toxin A. This raises interesting questions about how subjective sensation of headache pain might predict responsiveness to other treatment types, particularly triptans and preventative medications. If found, this correlation would help guide treatment choices and possibly increase treatment success.



Methods

A total of 201 patients were recruited from the Internal Medicine department at the Mayo Clinic in Scottsdale, Arizona. Patients included in the study were female patients who were at least 18 years of age or older. Patients did not need to have migraine headaches as a chief complaint for their visit, but did need to have a diagnosis of migraines as defined by the Second International Classification of Headache Disorders. Patients were consented and given a patient survey, which included graphic representations of three types of headache pain: exploding (Figure 1a), imploding (Figure 1b), or ocular (Figure 1c). Patients were also asked about current or previous prescription usage - both triptans and prophylactic medications, and the perceived effectiveness. Demographic information, including age at first migraine, was also elicited to determine the baseline characteristics of the study population (Figure 2). An additional component of the survey was administered by a trained interviewer, and included a series of questions to elicit the physician-identified headache type. This data was then analyzed using chi-square tests to determine statistical significance between treatment efficacy of patients with and without each migraine type. The medications were analyzed as broad medication classes, as triptans and as prophylactic medications.

Figure 1: Illustrated depictions of migraine types



Figure 1a: Exploding Migraine
Figure 1b: Imploding Migraine
Figure 1c: Ocular Migraine

Results

A total of 77 patients had used prophylactic agents, and 135 patients had used triptans. These patients were then analyzed based on their physician-identified headache type, and compared to those patients without that headache type. Based on these headache types, patients could have more than one headache type and were therefore analyzed within each headache type group into which they were classified. The results are presented below by respective headache type.

	w/o imploding headache (n=104)	w/ imploding headache (n=97)	P-value (Chi-square test)
Use of prophylactic agents	45 (43.3%)	43 (33.0%)	0.1341
Prophylactic agents were effective	32 (71.1%)	19 (59.4%)	0.2832
Use of triptan agents	69 (66.4%)	66 (68%)	0.7982
Triptan agents were effective	55 (79.7%)	57 (86.4%)	0.3040

	w/o exploding headache (n=89)	w/ exploding headache (n=112)	P-value (Chi-square test)
Use of prophylactic agents,	30 (33.7%)	47 (41.2%)	0.2317
Prophylactic agents were effective	19 (71.1%)	32 (68.1%)	0.6672
Use of triptan agents	56 (62.9%)	79 (70.5%)	0.2535
Triptan agents were effective	49 (87.5%)	63 (79.8%)	0.2378

	w/o ocular headache (n=101)	w/ ocular headache (n=100)	P-value (Chi-square test)
Use of prophylactic agents, yes	41 (40.6%)	64 (64%)	0.5029
Prophylactic agents were effective	30 (71.1%)	21 (58.3%)	0.1696
Use of triptan agents, yes	68 (67.3%)	67 (67%)	0.9607
Triptan agents were effective	57 (83.8%)	55 (82.1%)	0.7887

Discussion

Based on the study results, there is no significant difference in the use or effectiveness of prophylactic or triptan medications among migraine headache types. The p-values representing the difference among patients with and without each headache type were not statistically significant. The data may suffer from difficulties in patient recall. The surveys ask patient to recall which medications they have used in the past and whether these medications are effective. Additionally, the survey may have benefited from some standard definition of effectiveness, perhaps a clarification of whether frequency, severity, or both were reduced by medications. Additional variability may exist in the way in which patients perceive exploding and imploding headaches. Although physicians administer a portion of the survey designed to diagnose the headache type, patients may have difficulty characterizing their migraines or may not accurately remember the nature of their headaches. The study used the basis of several previous studies^{4,6} which suggested organizing data of responders to various treatment types could be better analyzed by viewing it after separating it according to headache type. Although there were no positive correlations found, this study is important in adding to the growing body of work surrounding migraine research. In particular, it focuses on a new and interesting subject of recent research which suggests a possible difference in treatment responses amongst imploding and exploding headache types.

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