Cognitive Interference in Migraine: Results of the MiCOAS Qualitative Study

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Learning Objectives

1. Upon completion, participants will be able to recognize migraine-related impacts to sustained attention, executive function, language/speech, and memory as reported by patients in qualitative interviews
2. Upon completion, participants will be able to distinguish patient-reported experiences with migraine-related cognitive interference across pre-headache, headache, post-headache, and inter-ictal periods
3. Upon completion, participants will be able to describe the patient-reported burden of cognitive deficit co-occurrence among persons living with migraine disease

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Background and Objectives

- The Migraine Clinical Outcome Assessment System (MiCOAS) is a multi-stage FDA grant focused on integrating patient input into clinical trial outcomes
- Little previous research has been conducted to understand the prevalence and burden of migraine-related cognitive interference
- Study aim: Capture patient perspectives on migraine-related cognitive changes during and between migraine attacks
  - Essential first step in the development of a core set of patient-centric COAs in migraine

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Methods:
Recruitment, Sampling, Data Collection, Analysis

- N=428 eligible individuals screened and consented through online platform distributed via the Coalition for Headache and Migraine Patients (CHAMP)
- Iterative purposeful sampling targeted variation and representation in study sample
- A total of N=40 semi-structured interviews were conducted in 8 sampling waves
  - n=20 episodic migraine (EM); n=20 chronic migraine (CM)
- Hybrid deductive/inductive approach to transcript coding
  - Saturation of concepts achieved (84% of cognitive interference codes identified within first 30% of interviews [Wave 3])
- Concept frequencies utilized as a starting point for analysis
- Thematic content analysis to identify key patterns and recurrent themes

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Select Characteristics of Interview Sample

Variable	Category	Total Interview Sample (N=40)
Gender, n (%)	Women	31 (77.5)
	Men	7 (17.5)
	Trans Man	1 (2.5)
	Genderqueer/Gender Non-Binary	1 (2.5)
Race*, n (%)	American Indian or Alaskan Native	4 (10.0)
	Asian	3 (7.5)
	Black or African American	9 (22.5)
	Native Hawaiian or Other Pacific Islander	1 (2.5)
	White	27 (67.5)
	Other	1 (2.5)
	Prefer not to answer	1 (2.5)
Ethnicity, n (%)	Hispanic	9 (22.5)
	Non-Hispanic	31 (77.5)
Education, n(%)	Grade 12 or GED equivalent	3 (7.5)
	Associates degree, technical school, or trade apprenticeship	8 (20.0)
	Some college (No degree awarded)	10 (25.0)
	College Degree (BA, BS, or similar)	11 (27.5)
	Advanced or graduate/post-graduate degree (PhD, MD, JD, PharmD, or similar)	8 (20.0)
	Prefer not to answer	-
Household Income, n (%)	Under $12,999	2 (5.0)
	$13,000 to $21,999	6 (15.0)
	$22,000 to $49,999	10 (25.0)
	$50,000 to $74,999	6 (15.0)
	$75,000 to $99,999	4 (10.0)
	$100,000 and over	8 (20.0)
	Prefer not to answer	4 (10.0)
Average Number of Headache Days per Month, n (%)	0-1	-
	2-3	6 (15.0)
	4-7	8 (20.0)
	8-14	6 (15.0)
	15-23	18 (45.0)
	24 or more	2 (5.0)

*Total percent exceeds 100 because participants were able to identify with more than one race category

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Cognitive Interference: Concept Frequencies

Frequency of migraine related cognitive changes reported by interview participants (N=40) across pre-headache, headache, post-headache, and inter-ictal phases of their typical migraine attacks

Cognitive Interference	Pre-Headache	Headache	Post-Headache	Inter-Ictal
Trouble with concentration/focus	25	25	11	0
Confusion/disorientation	4	3	2	0
Avoid making decisions	17	18	6	0
Fogginess	18	9	17	0
Losing words/speech	24	12	9	2
Memory	12	15	11	12
General	3	5	7	9
Learning	9	7	5	6
Retrieval/recall	3	10	4	1
Slurred words/speech	1	3	0	0
Difficulty processing information	14	11	7	1

- Cognitive changes often manifest in pre-headache, carry into headache, and may resolve or linger during the post-headache period
- Pain during headache may dominate experience, use up attentional resources, and thus, reduce “bandwidth” to focus on/identify cognitive changes

> *00-12: I have no activities, no talking. I'm just laying there, I'm in pain. It’s not - nothing else is happening. Everything is focused on my body and how it’s reacting to it.*

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Co-Occurrence of Cognitive Deficits

Proportion of participants (N=40) reporting occurrence and co-occurrence of migraine-related cognitive interference features across pre-headache, headache, post-headache, and inter-ictal phases

# of Endorsed CI Features	Pre-headache	Headache	Post-headache	Inter-ictal
0	10.0%	12.5%	32.5%	67.5%
1	10.0%	7.5%	22.5%	22.5%
2	22.5%	22.5%	20.0%	5.0%
3	15.0%	22.5%	7.5%	5.0%
4	20.0%	10.0%	7.5%	0.0%
5	15.0%	15.0%	5.0%	0.0%
6	7.5%	5.0%	5.0%	0.0%
7	0.0%	0.0%	0.0%	0.0%
8	0.0%	2.5%	0.0%	0.0%
9	0.0%	2.5%	0.0%	0.0%

- Vast majority of participants endorsed two to five cognitive features during pre-headache/headache
  - Co-occurrence of cognitive deficits during these phases may be common
- In contrast, among participants reporting cognitive interference during post-headache/inter-ictal periods, most endorsed only one or two cognitive features

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Cognitive Interference: Key Findings

Key Finding	Exemplary Quote
• Impairments to 1) receptive language, 2) language production, and/or 3) speech production reported by majority of participants (29/40; 72.5%)	*00-06: It's like the connection between knowing what I'm trying to say and my mouth is just broken. Which is really frustrating, and that ends up just making things worse, because then I frustrate myself, and the frustration makes the pain worse. [pre-headache]*
• Changes in ability to sustain attention include fogginess, confusion/disorientation, and trouble maintaining concentration/focus	*00-18: Sometimes it really – I just say that I'm thinking through cotton or that my brain feels foggy. [pre-headache]*
• Deficits in executive function include difficulty making decisions and processing information	*00-27: When – I've had my husband basically forcibly take me to the emergency room when it was bad enough. He'd ask me, do you want to go to the emergency room, and I can't even decide yes or no. [headache]*
• Issues with memory (i.e., learning, retrieval/recall) cited across all phases of attack and as a key cognitive impact in the inter-ictal period	*00-01: Well, you don't notice it until there's a need for something, where you – if, that day after the migraine, there's a need for that memory, even if it's short-term memory, and you can't access it, then it's very noticeable – something that happened two days before the migraine and it's not immediately available, but you sort of know it...That's uncomfortable. [inter-ictal]*
• Variable relationship between pain and cognitive interference	*00-14: It's gotten more back – it was I would say more back to normal because I didn't have that pain that would distract my focus, take away from my focus…definitely my focus came back together because I didn't have that intense pain. [post-headache]* *00-41: I'll still have brain fog. I actually will still have brain fog for days. And I won't realize it until later. I could be completely fine, have ba – brain fog and work on my report, like my budget or whatever, and come back a couple days later without brain fog and be like, OK, that makes no sense. I don't know why I did that. I must have had brain fog.[post-headache]*

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Conclusions and Study Limitations

- Cognitive interference is a common burden for people with migraine disease
  - 36 out of 40 (90%) participants reported one or more cognitive feature during pre-headache
  - 35 out of 40 (87.5%) participants reported one or more cognitive feature during headache
  - 27 out of 40 (67.5%) participants reported one or more cognitive feature during post-headache
  - 13 out of 40 (32.5%) participants reported one or more cognitive feature during interictal period
- Cognitive interference during and between migraine attacks impacts function
- Findings highlight the importance of assessing cognitive-related outcomes in this population
- Study assessed subjective cognition (i.e., patient self-report) and used particpants' perceptions of cognitive change to drive categorization of cognitive impacts/features