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To feed or to fast? Nutritional triggers in migraine: a narrative review

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SUPPLEMENTARY MATERIAL

Supplementary Table 1. Summary of studies assessing fasting as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Kelman et al. (2007)	USA	Retrospective clinical database analysis	1,207 (1018)	Patient rating scale (0-3)	Not eating (fasting), Food, Alcohol	Not eating: 57.3%	Not eating was 3rd most frequent trigger after stress and hormones	Fasting is a major trigger, distinct from specific foods
Fukui et al. (2008)	Brazil	Cross-sectional interview	200 (162)	Interview with trigger list	Fasting, alcohol, chocolate	Fasting reported by 63.5% of patients	Descriptive (Prevalence only)	Fasting is the leading dietary migraine trigger in this population.
Awada & Al Jumah (1999)	Saudi Arabia	Cross-sectional (Questionnaire during Ramadan)	116 (51)	Questionnaire	Fasting (Ramadan), caffeine withdrawal	Headache: 41% (Fasters) vs. 8% (non-fasters)	$p=0.002$	Headache frequency increased with the duration of fasting
Mosek & Korczyn (1995)	Israel	Prospective survey (Yom Kippur)	370 (220)	Questionnaire before/after fast	Fasting (25 h)	39% of those who fasted suffered from headache, as opposed to only nine (7%) in the non-fasting group	χ^2 testing = 42.8, $p<0.001$	Fasting is a strong headache precipitator, especially among chronic headache sufferers
Abu-Salameh et al. (2010)	Israel (Bedouin)	Cohort crossover (diary)	30 (22)	Migraine diary (Ramadan vs. Control month)	Fasting (Ramadan)	9.4 days (Ramadan) vs 3.7 days (Control)	$p<0.001$; 3-fold increase in attacks	Ramadan fasting markedly increased attack frequency

Supplementary Table 2. Summary of studies assessing milk and dairy products as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Vitali-Silva et al. (2024)	Brazil	Prospective cross-sectional	502 (437)	Structured interview with predefined food list	Alcohol, chocolate, cheese, excessive carbohydrates, coffee, cold cuts, citrus fruits, MSG, sweeteners, tomato, dairy, fermented foods	Cheese 27.7%;	Photophobia (OR ~3.2) and osmophobia (OR ~2.5) predict food triggers	Food triggers perceived by 58.4% of patients; associated with sensory hypersensitivity and higher migraine impact; milk and dairy included in the list
Aladdin et al. (2022)	Saudi Arabia	Cross-sectional survey	90 (all female)	Questionnaire on diet–headache relationships	Chocolate, dairy, caffeine, citrus, pickles	No association for cheese or dairy	Only caffeine showed notable triggering frequency; others minimal	Dairy not reported as a trigger

OR, odds ratio.

Supplementary Table 3. Summary of studies assessing chocolate as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Tai et al. (2018)	Malaysia	Prospective cross-sectional study	319 migraine pt (261) 365 TTH	Structured headache questionnaire + 25-item dietary checklist	Chocolate, coffee, cheese, MSG foods, mutton, "heaty" foods, fatty meals, fried foods, durian, tea, soft drinks, spicy foods, beef, oranges, instant noodles, onions, pineapple, lime, eggs, tomatoes, nuts, banana, sugarcane, mango, alcohol	Coffee 25.4% and chocolate 11.6% of migraine patients	Chocolate (OR 2.16, p=0.035) and coffee (OR 1.73, p=0.014) significantly associated with migraine vs. TTH	Chocolate significant dietary trigger
Scharff et al. (1995)	USA	Cross-sectional observational study of self-reported triggers	69 (62)	Questionnaire	Alcohol, aspartame, cheese, chocolate, caffeine, MSG	Chocolate 22.1%	Descriptive (Prevalence only)	Chocolate as headache trigger in ~22% of migraine Prevalence similar across migraine, tension-type, and combined headache groups
Casanova et al. (2023)	USA, UK, and other countries (multinational digital cohort)	Prospective longitudinal cohort study	1,125 (990)	Electronic diary	11 dietary factors including chocolate	N/A	Chocolate decreased migraine risk in 6.6% of individuals and increased risk in 1.9%; in ~80% there was no association	Chocolate acted more often as a protector than as a trigger
Mollaoğlu (2013)	Turkey	Cross-sectional interview-based study	126 (86)	Interview	Chocolate, milk and cheese, alcohol (red/white wine), coffee, fasting	Chocolate 18.3%	Descriptive (Prevalence only)	Chocolate was the second most common dietary trigger

Chądzyński et al. (2019)	Poland	Cross-sectional study	40	Questionnaire	Chocolate, dairy products, cocoa, spices, citrus, alcohol, fasting	Chocolate 27%	Descriptive (Prevalence only)	Chocolate was the most frequently reported dietary product associated with migraine;
Esteves-Mesquita et al. (2025)	Spain	Cross-sectional observational study	260 (239)	Questionnaire	Chocolate, coffee, cured meats, plus additional items spontaneously reported by participants	Chocolate 20.9%	Descriptive (Prevalence only)	Chocolate was the third most commonly reported dietary trigger
Lisicki & Schoenen (2021)	Belgium and Argentina	Two-part study: cross-sectional survey of eating habits + 2-month prospective daily monitoring of food intake before migraine attacks	136 (125)	Self-reported avoidance survey + prospective daily recording of chocolate consumption	Chocolate, wine, beer, other alcoholic drinks, fermented cheese, citrus fruits, sweeteners, caffeinated beverages	Chocolate 16%, Citrus 3%	Chocolate intake associated with premonitory craving (p=0.001 day before; p=0.0004 hours before)	No differences in chocolate consumption between groups Chocolate more likely consumed due to pre-attack craving
Moffett et al. (1974)	UK	Double-blind, placebo-controlled, crossover challenge study	25 (all female)	Headache diary	Chocolate	all patient selected	Descriptive	Chocolate rarely precipitated migraine
Marcus et al. (1997)	USA	Double-blind, randomized, placebo-controlled, cross-over provocative study	63 (56)	Headache diary	Chocolate (active trigger) vs. carob (placebo)	Prior to testing, 17.5% of participants	Headaches occurred in 41% of chocolate trials and 43% of placebo trials (not significantly different; p=0.80)	Chocolate did not provoke headaches more than placebo

Gibb et al. (1991)	UK	Double-blind, placebo-controlled, parallel-group challenge study	20 (17)	Headache diary, interview	Chocolate (active trigger) vs. cocoa-free placebo	All 20 patients selected	Migraine occurred in 5/12 patients after chocolate and 0/8 after placebo (p=0.051, one-tailed)	Chocolate triggered migraine in a subset of patients who self-identified as chocolate-sensitive
Khafaf & Meral Koç (2023)	Iraq	Cross-sectional online survey	159 (all female)	Self-reported questionnaire	Chocolate, cheese, nuts, milk, hot/spicy foods, tomato, banana, citrus fruits, yogurt, smoked fish, aspartame, caffeine	Chocolate consumption 74.84%; headache change 22.64%– 89.94%	Aspartame → p=0.012 Citrus fruits → p=0.045	Aspartame was reported as a trigger
Rist et al. (2015)	USA	Cross-sectional analysis	7,042 (all female)	Questionnaire	Chocolate, citrus fruits, cheese, ice cream, sour cream, skim/low-fat milk, processed meats, wine (red and white), total alcohol	N/A	Women experiencing monthly migraine attacks were modestly more likely to have low citrus intake (OR 1.22; p=0.033), suggesting avoidance in this subgroup	Citrus not broadly associated with migraine or aura subtype but showed greater avoidance in women with monthly attacks, suggesting a behavioral response

TTH, tension-type headache; MSG, monosodium glutamate; OR, odds ratio.

Supplementary Table 4. Summary of studies assessing meat and processed food as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Fayed et al. (2024)	Egypt	Cross-sectional study	124 (101)	Food habits assessment scale and food-frequency questionnaire	Processed/fried meats, aged cheese, citrus	Processed meats consumption associated with chronic migraine	OR=3.21 for processed meat, p=0.005	Unhealthy eating habits (processed meats) significantly associated with chronic migraine
Özön et al. (2018)	Turkey	Randomized, open-label dietary intervention (patients randomly divided into 2 groups; diet restriction vs. relaxation after 2 months)	50 (41)	Self-reported food sensitivity questionnaire (checklist of many foods) + headache diaries to record monthly attack frequency, duration and VAS severity	Red meat, sujuk (processed meat/sausage)	Red meat 22%, Sujuk 26%	Elimination of triggers (including meat) led to attack ↓ (frequency, duration, pain intensity), at 2 months Benefit lost after re-exposure	Meat and processed meat were moderately common triggers Removing identified trigger foods reduced migraine burden; effect persisted only when dietary restriction was maintained
Rist et al. (2015)	USA	Cross-sectional analysis within the Women's Health Study	38,370 (all females)	Food-frequency questionnaire	Bacon, hamburger, hot dogs, processed meats (sum of bacon, hot dogs, other processed meats)	Low-intake prevalence among migraineurs: Bacon 51.8%; Hamburger 16.1%; Hot dogs 61.3%; Processed meats 26.0%	Any migraine vs. no headache: No significant association for bacon, hamburger, hot dogs, or processed meats Migraine with aura vs. without aura: significantly higher odds of low intake for hot dogs (OR 1.28, p<0.001) and processed meats (OR 1.20, p=0.009)	Migraineurs, especially those with aura, were more likely to report low intake of hot dogs and processed meats, suggesting possible avoidance No clear differences for bacon or hamburger. No evidence that meat intake differs by overall

								migraine status, but intake patterns vary by aura subtype
Izquierdo-Casas et al. (2018)	Spain	Randomized double-blind placebo-controlled trial in episodic migraine with low DAO	82 (68)	Plasma DAO activity assay (cut-off <80 HDU/mL) to select DAO deficient migraineurs; 1 month headache diary for attack duration, frequency, pain (NPRS) and triptan use	Histamine rich diet modeled indirectly via oral DAO supplement versus placebo	N/A	DAO group: mean attack duration pre-treatment: 6.1±3.06 h, after treatment: 4.76±2.68 h p (within-group): 0.0217 Placebo group: no significant variation	In DAO deficient episodic migraineurs, 1 month of DAO supplementation modestly shortens attacks but does not clearly outperform placebo for frequency or intensity
Manzotti et al. (2016)	Italy	Retrospective case series in patients with suspected histamine intolerance	14 (10) symptomatic food intolerance patients 34 healthy controls	DAO activity measurement	Histamine-rich foods	10/14 patients had DAO <10 U/mL (probable histamine intolerance), 3/14 <3 U/mL (highly likely).	Mean DAO 7.0±6.9 U/mL in patients vs 39.5±18.2 U/mL in controls (p=0.0031); headache present in 5/14 as one of several symptoms	In a highly selected "histamine intolerance" clinic population, low serum DAO is common and DAO supplementation plus histamine poor diet is often perceived as beneficial

VAS, Visual Analogue Scale; DAO, diamine oxidase; OR, odds ratio.

Supplementary Table 5. Summary of studies assessing citrus as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Lisicki & Schoenen (2021)	Belgium and Argentina	Two-part study: cross-sectional survey of eating habits + 2-month prospective daily monitoring of food intake before migraine attacks	136 (125)	Self-reported avoidance survey + prospective daily recording of chocolate consumption	Chocolate, wine, beer, other alcoholic drinks, fermented cheese, citrus fruits, sweeteners, caffeinated beverages	Chocolate 16%, Citrus 3%	Chocolate intake associated with premonitory craving (p=0.001 day before; p=0.0004 hours before)	No differences in chocolate consumption between groups Chocolate more likely consumed due to pre-attack craving
Taheri (2017)	UK	Prospective observational case series	115 (48)	Headache diary	Caffeine, MSG, cocoa, cheese, citrus, tomato, aspartame, nitrites	Citrus 17%,	Descriptive (Prevalence only)	Citrus and aspartame reported as a trigger
Rist et al. (2015)	USA	Cross-sectional analysis	7042 (all female)	Questionnaire	Chocolate, citrus fruits, cheese, ice cream, sour cream, skim/low-fat milk, processed meats, wine (red and white), total alcohol	N/A	women experiencing monthly migraine attacks were modestly more likely to have low citrus intake (OR 1.22; p=0.033),	Citrus was not broadly associated with migraine or aura subtype but showed greater avoidance in women with monthly attacks
Khafaf & Meral Koç (2023)	Iraq	Cross-sectional online survey	159 (all female)	Self-reported questionnaire	Chocolate, cheese, nuts, milk, hot/spicy foods, tomato, banana, citrus fruits, yogurt, smoked fish, aspartame, caffeine	Citrus fruits 49.68%	Citrus fruits → p=0.045	N/A

MSG, monosodium glutamate; OR, odds ratio.

Supplementary Table 6. Summary of studies assessing tea as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Tai et al. (2018)	Malaysia	Prospective cross-sectional study	319 migraine pt (261) 365 TTH	Questionnaire + 25-item dietary checklist	Chocolate, coffee, cheese, MSG foods, mutton, "heaty" foods, fatty meals, fried foods, durian, tea, soft drinks, spicy foods, beef, oranges, instant noodles, onions, pineapple, lime, eggs, tomatoes, nuts, banana, sugarcane, mango, alcohol	Tea 4.7%	Chocolate (OR 2.16, p=0.035) and coffee (OR 1.73, p=0.014) associated with migraine vs. TTH	Dietary triggers more common in migraine (44.2%) than TTH (31.2%) Coffee most common Chocolate and MSG more frequent in migraine
Özön et al. (2018)	Turkey	Randomized, open-label dietary intervention (patients randomly divided into 2 groups; diet restriction vs. relaxation after 2 months)	50 (41)	Food-sensitivity questionnaire (>100 items) + 1-month diary	Wheat, orange, egg, Nescafe, cheese, chocolate, milk, sujuk, sugar, red meat, pickles, alcohol, mushroom, corn, tea, onion, garlic	Tea 12%	Elimination led to attack ↓ (frequency, duration, pain intensity, at 2 months) Benefit lost after re-exposure	Eliminating triggers led to attacks ↓ Benefit sustained with continuous dietary restriction
Özön & Karadaş (2021)	Turkey	Prospective interventional elimination-diet study in elderly	31 (23)	Food-sensitivity questionnaire (~100 items) + 1-month diary	Wheat, egg, cheese, Nescafe, milk, chocolate, alcohol, sujuk, tea, red meat, onion, pickle, orange, oat, grape, garlic, sesame	Tea 19%;	Elimination led to attack ↓ (frequency, duration, pain intensity, analgesic and triptan use)	Diet restriction effective Continuous restriction maintains improvement

TTH, tension-type headache; OR, odds ratio; MSG, monosodium glutamate.

Supplementary Table 7. Summary of studies assessing onion as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Tai et al. (2018)	Malaysia	Prospective cross-sectional study	319 migraine pt (261) 365 TTH	Headache questionnaire + 25-item dietary checklist	Chocolate, coffee, cheese, MSG foods, mutton, "heaty" foods, fatty meals, fried foods, durian, tea, soft drinks, spicy foods, beef, oranges, instant noodles, onions, pineapple, lime, eggs, tomatoes, nuts, banana, sugarcane, mango, alcohol	Onion 0.9%	Chocolate (OR 2.16, p=0.035) and coffee (OR 1.73, p=0.014) significantly associated with migraine vs TTH	Dietary triggers more common in migraine (44.2%) than TTH (31.2%) Coffee most common; chocolate and MSG more frequent in migraine;
Özön et al. (2018)	Turkey	Randomized, open-label dietary intervention (patients randomly divided into 2 groups; diet restriction vs. relaxation after 2 months)	50 (41)	Broad food-sensitivity questionnaire (>100 items) + 1-month diary	Wheat, orange, egg, Nescafe, cheese, chocolate, milk, sujuk, sugar, red meat, pickles, alcohol, mushroom, corn, tea**,** onion, garlic	Onion 6%	Elimination of triggers (including onion) led to attack ↓ (frequency, duration, pain intensity) at 2 months Benefit lost after re-exposure	Eliminating triggers led to attacks ↓ Benefit sustained with continuous dietary restriction
Özön & Karadaş (2021)	Turkey	Prospective interventional elimination-diet study in elderly	31 (23)	Broad food-sensitivity questionnaire (~100 items) + 1-month diary	Wheat, egg, cheese, Nescafe, milk, chocolate, alcohol, sujuk, tea**,** red meat, onion, pickle, orange, oat, grape, garlic, sesame	Onion 19.4%,	Elimination led to attack ↓ (frequency, duration, pain intensity, analgesic and triptan use)	Diet restriction effective Continuous restriction maintains improvement

TTH, tension-type headache; OR, odds ratio; MSG, monosodium glutamate.

Supplementary Table 8. Summary of studies assessing tomatoes as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Tai et al. (2018)	Malaysia	Prospective cross-sectional study	319 migraine pt (261) 365 TTH	Structured headache questionnaire + 25-item dietary checklist	Chocolate, coffee, cheese, MSG foods, mutton, "heaty" foods, fatty meals, fried foods, durian, tea, soft drinks, spicy foods, beef, oranges, instant noodles, onions, pineapple, lime, eggs, tomatoes, nuts, banana, sugarcane, mango, alcohol	Tomatoes 0.6% of migraine patients	Chocolate (OR 2.16, p=0.035) and coffee (OR 1.73, p=0.014) significantly associated with migraine vs. TTH	Dietary triggers more common in migraine (44.2%) than TTH (31.2%) Coffee most common; chocolate and MSG more frequent in migraine
Vitali-Silva et al. (2024)	Brazil	Prospective cross-sectional	502 (437)	Structured interview with predefined food list	Alcohol, chocolate, cheese, excessive carbohydrates, coffee, cold cuts, citrus fruits, MSG, sweeteners, tomato, dairy, fermented foods	N/A	Photophobia (OR ~3.2) and osmophobia (OR ~2.5) predict food triggers	Food triggers perceived by 58.4% of patients; associated with sensory hypersensitivity and higher migraine impact; milk and dairy included in the list

TTH, tension-type headache; OR, odds ratio; MSG, monosodium glutamate.

Supplementary Table 9. Summary of studies assessing wine and alcohol as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Vives-Mestres M et al. (2022)	International (English-speaking countries: USA, UK, Canada, Australia)	Observational prospective cohort study	487 (419)	Mobile app	Alcohol (beer, wine, spirits)	N/A	Temporal association, 24 and 48 h after alcohol intake	No effect in the first 24 h Risk of attack ↓ after 24-48 h
Onderwater GLJ et al. (2019)	Netherlands	Cross-sectional survey	2,197 (1,887)	Web based Questionnaire	Alcoholic beverages (beer, wine, spirits)	35.6% reported as trigger	Temporal association	Migraine sufferers frequently recognize alcohol as a cause, leading to consuming less alcohol The type of alcohol (beer, wine, spirits) does not change this effect
Yokoyama M et al. (2012)	Japan	Cross-sectional survey	5,408 (2,630)	Questionnaire	Alcohol drinking, flushing, hangover	N/A	Associations between headache types and alcohol drinking, alcohol flushing, and hangover	Migraine sufferers tend to drink alcohol less often than those with other types of headaches

Supplementary Table 10. Summary of studies assessing coffee and caffeine as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Chen A et al. (2025)	Europe	Mendelian randomization study	184,654	NA	Coffee, caffeine	N/A	OR=0.547 (95% CI, 0.359-0.834), p=0.005 OR=0.985 (95% CI, 0.873-1.111), p=0.805	Significant inverse relationship between coffee consumption and migraine risk
Esteves-Mesquita et al. (2025)	Spain	Observational cross-sectional study	260 (239)	Questionnaire	Fruits, vegetables, dairy products, cereals, nuts, legumes, oils, tubers, eggs, meat, fish, caffeine-rich foods and drinks	11.9%	N/A	Coffee and foods rich in caffeine reported as triggers in individuals with episodic or chronic migraine (no measures of the strength of the association)
Liao Z et al. (2025)	USA	Observational cross-sectional study	5,234 (2,859)	Interview	Caffeine intake [Q1 (≤1.81 mg/d); Q2 (1.81–45.48 mg/d), Q3 (45.48–125.95 mg/d), Q4 (≥125.95 mg/d)] Caffeine intake <97.5 (mg/d) [low] vs. ≥97.5 (mg/d) [high]	N/A	Q2 OR 1.15 (95% CI: 0.95-1.38, p=0.15) Q3 OR 1.44 (95% CI: 1.19-1.73, p=0.001) Q4 OR 1.56 (95% CI: 1.28-1.91, p<0.001) [low] OR 1.0038 (1.0019, 1.0058); p=0.0001 [high] OR 1.0003 (0.9994, 1.0011); p=0.524	Over 97.5 mg/day correlates with severe headache/migraine attacks
Vitali-Silva A et al. (2024)	Brazil	Observational cross-	293 (255)	Interview	Alcohol, chocolate, cheese, excess carbohydrates, coffee, cold cuts, and citrus fruits	21.8% coffee	N/A	Coffee reported as a trigger

		sectional study						
Zhang J et al. (2024)	Europe	Mendelian randomization study	184,654	Questionnaire	Coffee	N/A	AM OR 0.528 (CI 0.342-0.817) p=0.004 MA OR 0.374 (0.208-0.672) p=0.001 MO OR 0.593 (0.316-1.111) p=0.103	Association between coffee consumption and migraine with aura in 3541 patients
Cho S et al. (2024)	Republic of Korea	Observational cross-sectional study	170	Questionnaire	Coffee	N/A	N/A	Higher prevalence in coffee consumption in migraine versus non-migraine patients and controls (p=0.035)
Cha C et al. (2024)	Republic of Korea	Observational longitudinal cohort study	521	Questionnaire	Coffee intake: <3 cups/day Coffee intake: ≥3 cups/day	N/A	<3 cups: RR=1.439; (95% CI = 1.053-1.966) ≥3 cups: RR=1.666; (95% CI = 1.175-2.362)	Strength of the study was that it analysed a cohort of nurses to identify risk factors for migraine
Liu X et al. (2023)	Europe	Mendelian randomization study	448,204	Questionnaire	Coffee, cheese, oily fish, alcohol (red wine), raw vegetables, muesli, and wholemeal/wholegrain bread, cornflakes/frosties, and poultry	N/A	AM OR 0.71 (95% CI: 0.59-0.86) per cups/day (p=0.00035) MA OR 0.67 (95% CI 0.5-0.9) p=0.007 MO OR 0.79 (95% CI 0.6-1.05) p=0.11	Genetically determined higher consumption of coffee, cheese, fatty fish, raw vegetables, whole grains/muesli, whole grain bread, and moderate amounts of alcohol (especially red wine) is associated with a lower risk of developing migraine

Casanova A et al. (2023)	USA, UK, and others country	Observational longitudinal cohort study	1,125	Mobile app	Caffeine, alcohol, and chocolate	N/A	HR<1: 10%; HR = 1: 41,8%; HR>1: 1%	Caffeine intake protective against migraine attacks
Zhang L et al. (2023)	USA	Observational cross-sectional study	8,993 (4,759)	Interview	Caffeine: ≥ 40 to < 200 mg/day Caffeine ≥ 200 to < 400 mg/day Caffeine ≥ 400 mg/day	N/A	Caffeine: ≥ 40 to < 200 mg/day OR 1.12 (CI 0.98-1.27) p=0.09 Caffeine ≥ 200 to < 400 mg/day OR 1.24 (CI 1.05-1.46) p= 0.01 Caffeine ≥ 400 mg/day OR 1.42 (CI 1.16-1.75) p<0.001	For each 100 mg/day increase of caffeine intake, the risk of migraine increases by 5% [OR 1.05, (95% CI 1.02-1.07)] p<0.001
Aladdin YS et al. (2022)	Saudi Arabia	Observational cross-sectional study	410	Questionnaire	Coffee, cheese, oily fish, alcohol (red wine), raw vegetables, muesli, and wholemeal/wholegrain bread, cornflakes/frosties, and poultry	7.8% coffee	N/A	Coffee reported as a trigger
Chen H et al. (2022)	Europe	Mendelian randomization study	59,674	Questionnaire	Coffee	N/A	AM OR, 0.97; (95% CI 0.83-1.14); p=0.71 MA OR 0.81 (95% CI 0.58-1.12); p = 0.19 MO OR, 0.97 (95% CI 0.72-1.30); p=0.83	No genetically determined association between caffeine consumption and the development of migraine

Hajjarzadeh S et al. (2022)	Iran	Observational cross-sectional study	300	Questionnaire	Tyramine, caffeine, fats	N/A	N/A	No prevalence or association measures for caffeine
Taheri S et al. (2017)	UK	Prospective study	115 (48)	Interview	Caffeine, MSG, cocoa, aspartame, cheese, citrus, nitrites, tomato	28%	N/A	Coffee reported as a trigger The strength of the study was its prospective analysis of the dietary habits of a cohort of children aged 3-15 years.
Mollaoğlu M et al. (2013)	Turkey	Observational cross-sectional study	126 (86)	Questionnaire	Milk and cheese, alcohol, coffee, chocolate	6.3%	N/A	Coffee reported as a trigger
Milde-Busch A et al. (2012)	Germany	Observational cross-sectional study	1,047	Questionnaire	Alcohol, coffee	13.6% (11.6–15.9)	N/A	Coffee reported as a trigger The strength of the study was that it analysed the dietary and perceived triggers of a cohort of high school adolescents
Takeshima T et al (2004)	Japan	Observational cross-sectional study	340	Questionnaire	Fatty/oily foods, coffee/tea	N/A	OR 2.4 (CI 0.6–1.9) $p<0.0001$	Daily consumption of coffee/tea is considered to increase the risk of migraine attacks
Scharff L et al. (1995)	USA	Observational cross-sectional study	69 (62)	interview	Alcohol, aspartame, cheese, caffeine, chocolate, MSG	10.6%	N/A	No measure of association

Rasmussen BK (1993)	Denmark	Observational cross-sectional study	119 (89)	Interview	Coffee, alcohol	N/A	OR 0.78 (CI 0.52-1.16) p = 0.204	Prevalence of coffee consumption as a trigger for attacks not reported

OR, odds ratio; CI, confidence interval; RR, risk ratio; AM, any migraine; MA, migraine with aura; MO, migraine without aura; HR, hazard ratio; MSG, monosodium glutamate.

Supplementary Table 11. Summary of studies assessing monosodium glutamate as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Shimada et al. (2013)	Denmark	Double-blind, placebo-controlled, crossover	14 (9)	Questionnaire on adverse effects	MSG 150 mg/kg (single dose in beverage)	Headache: 57.1% (8/14 subjects) during MSG vs. 14.3% (2/14) during placebo; Overall adverse effects more frequent in MSG week	McNemar's test p=0.041	MSG induced mechanical sensitization in masseter muscle and adverse effects (headache 57% vs. 14% placebo)
Geha et al. (2000)	USA	Multicenter, randomized, double-blind, placebo-controlled, crossover (4 protocols: A, B, C, D)	130 (84)	Standardized checklist of 10 symptoms	MSG – 5 g dose in beverage (protocol A, B); increasing doses 1.25, 2.5, 5 g (protocol B); 5 g in capsules with water (protocol C); 5 g with food (protocol D)	Protocol A: 50/130 (38.5%) responded to MSG only, 19/130 (14.6%) to both MSG and placebo, 17/130 (13.1%) to placebo only; Protocol B: dose-dependent increase; Protocol C: only 2/12 reproducible; Protocol D: minimal reproducible responses	Protocol A: Headache-migraine 5 g MSG vs. Placebo RR: 1.89, p<0.005	Large MSG doses (5 g without food) elicit more symptoms in self-identified MSG-reactive subjects vs. placebo Inconsistent responses on retesting (only 51% consistent from protocol A to B). More rigorous protocols with capsules (C,D) with few reproducible responses
Prawirohardjono et al. (2000)	Indonesia	Randomized, double-blind, placebo-controlled	52 (N/A)	Open-ended questionnaires with ranking scale (1-5 intensity) for sensations and discomforts	MSG - 1.5g and 3.0g in capsules with standardized Indonesian breakfast	No difference MSG vs. placebo	Friedman test: p>0.05 for all symptom comparisons between MSG and placebo at all time intervals	No difference in symptoms between MSG ingestion (1.5-3.0 g) and placebo when MSG taste is masked (encapsulated) and given with food Headache incidence similar across groups

MSG, monosodium glutamate; RR, risk ratio**.**

Supplementary Table 12. Summary of studies assessing aspartame as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Johns (1986)	USA	Single-case clinical report (letter to the editor)	1 (N/A)	Interview	Aspartame	N/A	Recurrence of migraine attacks shortly after aspartame consumption Elimination of attacks after avoidance of aspartame	Possible individual sensitivity to aspartame
Lipton et al. (1989)	USA	Cross-sectional survey	171 (132)	Questionnaire	Aspartame	Aspartame 10.6%	Descriptive (prevalence only)	Aspartame reported as a trigger more often than carbohydrates but less often than alcohol
Taheri (2017)	UK	Prospective observational case series	115 (48)	Headache diary	Caffeine, MSG, cocoa, cheese, citrus, tomato, aspartame, nitrites	Aspartame 13%	Descriptive (prevalence only)	Citrus and aspartame reported as a trigger
Schiffman et al. (1987)	USA	Double-blind placebo-controlled crossover trial	40 (28)	Headache diary	Aspartame	35% reported headache after aspartame; 45% reported headache after placebo	Not significantly different ($p>0.50$)	Aspartame did not provoke headaches more frequently than placebo
Koehler & Glaros (1988)	USA	13-week randomized double-blind placebo-controlled cross-over trial	11 (8)	Headache diary	Aspartame	All patients selected	Attack ↑ with aspartame ($t=2.66$, $p=0.0237$) Frequency ↑ during aspartame vs. placebo ($p<0.05$)	Aspartame ingestion significantly increased migraine frequency in susceptible individuals

							6 of 11 subjects (54.6%) with headaches ↑ during aspartame	
Van Den Eeden et al. (1994)	USA	Randomized double-blind placebo-controlled four-period crossover trial	32 (28)	Headache diary	Aspartame	All patients selected	Headache-days occurred on: 33% of days during aspartame, 24% of days during placebo → Significant difference (p=0.04)	Aspartame led to headache frequency ↑ in a subset of individuals who believed themselves sensitive to it
Leon et al. (1989)	USA	Randomized double-blind placebo-controlled parallel-group 24-week trial	108 (57)	Headache diary	Aspartame	N/A	Long-term consumption of high-dose aspartame did not increase headache frequency or severity compared with placebo	
Khafaf & Meral Koç (2023)	Iraq	Cross-sectional online survey	159 (all female)	Self-reported questionnaire	Chocolate, cheese, nuts, milk, Hot/spicy foods, tomato, banana, citrus fruits, yogurt, smoked fish, aspartame, caffeine	Aspartame consumption 24.53%	Aspartame → p=0.012	

MSG, monosodium glutamate.

Supplementary Table 13. Summary of studies assessing nitrites and nitrates as a trigger for migraine attacks.

Author (year)	Country	Study design	Number of patients (Females)	Method for Identifying Triggers	Dietary Triggers Assessed	Prevalence of the Trigger	Association With Attacks	Key findings
Henderson and Raskin (1972)	USA	Case report	1 male	Report of symptoms	Sodium nitrite	N/A	Temporal association	10 mg of sodium nitrite and 100 mg of tyramine trigger attack
Schürks et al. (2011)	USA	Cross-sectional cohort analysis (i.e., PCA)	1,675 (all females)	Self-reported structured questionnaire (Women's Health Study module)	Preserved/cold cuts	Preserved/ cold cuts 10.3%;	No direct statistical trigger–attack analysis	Food triggers were the dominant PCA component
Taheri (2017)	UK	Prospective observational case series	115 (48)	Headache diary	Caffeine, MSG, cocoa, cheese, citrus, tomato, aspartame, nitrites	Nitrites 3%	Descriptive (prevalence only)	Citrus and aspartame reported as a trigger

PCA, principal component analysis; MSG, monosodium glutamate.