

# A review of 50 cases of bath-related headache: clinical features and possible diagnostic criteria

Uma revisão de 50 casos de cefaleia relacionada ao banho: características clínicas e possíveis critérios diagnósticos

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## ABSTRACT

**Objective:** To describe clinical features and possible diagnostic criteria of the 50 bath-related headache (BRH) cases that have been published in the literature to date. **Methods:** Based on a literature search in the major medical databases, we analyzed all case reports or case series on BRH that were published between 2000 and 2017. **Results:** We describe 48 women and two men diagnosed with BRH. Of these 50 patients, 90% were from Asian countries. The average age was 49.3 years. There was an association of BRH with migraine (28%), tension-type headache (12%) and cold stimulus headache (4%). Headache was bilaterally localized, had an explosive or pulsating quality and a severe intensity. The pain lasted from five minutes to four days. Associated manifestations were nausea, vomiting, photophobia or phonophobia. There was a good therapeutic response with nimodipine and when avoiding a hot bath. **Conclusions:** Bath-related headache is a benign headache that is not associated with a structural lesion.

**Keywords:** headache disorders; diagnosis, drug therapy

## RESUMO

**Objetivo:** Descrever as características clínicas e possíveis critérios diagnósticos dos 50 casos de cefaleia relacionada ao banho (CRB) que foram publicados na literatura até agora. **Métodos:** Com base em uma pesquisa de literatura nas principais bases de dados médicos, analisamos todos os relatos de casos ou séries de casos sobre BRH que foram publicados entre 2000 e 2017. **Resultados:** Descrevemos 48 mulheres e 2 homens diagnosticados com CRB. Destes 50 pacientes, 90,0% eram asiáticos. A média de idade foi 49,3 anos. Houve associação com migrânea (28,0%), cefaleia do tipo tensional (12,0%) e cefaleia por estímulo frio (4,0%). A cefaleia foi localizada bilateralmente, explosiva ou pulsátil e de forte intensidade. A dor durou de 5 minutos a 4 dias. As manifestações associadas foram náuseas, vômitos, fotofobia ou fonofobia. Houve uma boa resposta terapêutica com nimodipina e evitando-se banho quente. **Conclusões:** CRB é uma cefaleia benigna não associada com lesão estrutural.

**Palavras-chave:** transtornos da cefaleia, diagnóstico, tratamento farmacológico

Bath-related headache (BRH) is a rare headache disorder first described by Negoro et al. in 2000 with the name of “benign hot bath-related headache”<sup>1</sup>. In 2003, after publication of four more cases, the authors suggested the term “bathing headache”<sup>2</sup>.

This headache disorder is characterized by its development while the patient is bathing in hot water or being immersed in a hot bath. There is not yet a diagnostic criterion for BRH and it has not been described in the International Classification of Headache Disorders, Third Edition (beta version)<sup>3</sup>.

To date, only a few BRH cases have been described in the literature, most of which are case reports<sup>1,2,4,5,6,7,8,9,10,11,12,13,14</sup>. There is only one large series published with 21 cases<sup>15</sup>. Therefore, it is still not well characterized clinically. As a consequence of the rarity of BRH, the pathophysiology remains unclear<sup>16</sup>.

We present the first review on all cases of BRH that have been published since the initial description, and highlight their main clinical characteristics.

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## METHODS

Based on a literature search in the major medical databases (LiLacs, SciELO, Bireme, Scopus, EBSCO and PubMed), we analyzed all case reports or case series on BRH that were published in the period between 2000 (the first description) and 2017.

All reported patients were included regardless of which diagnostic criteria had been adopted. Because there are no diagnostic criteria for BRH established by the International Classification of Headache Disorders<sup>3</sup>, we enrolled all cases where the patients were defined by the authors as having BRH.

Data were analyzed based on demographic and clinical features, therapeutic experience and clinical outcomes. Data are presented as an arithmetic mean with the standard deviation (SD), or as percentages. The percentage is always related to the total number of patients whose information was available for the specific issue.

All collected data were organized in a database. The BioEstat version 5.0 for statistical analysis was used.

## RESULTS

A total of 50 patients were diagnosed with BRH in this review. We describe the various clinical features, the therapeutic options and outcome in these patients. The clinical features of all patients with BRH are summarized in Table 1.

Regarding the geographical and ethnic distribution of BRH, we found that 45 (90%) patients were from Asian countries. A total of 26 (52%) patients were found in Taiwan. The remaining 24 patients were found in the following countries: China (6), Japan (5), Turkey (4), India (3), South Korea (1), Spain (1), France (an African patient), and Brazil (3).

Of the 50 patients with BRH, 48 (96%) were women and two (4%) men. Considering only the 29 case reports, the average age of the patients was 45.9±12.9 years, ranging from 18 to 67 years, but in the series of 21 patients<sup>15</sup>, the average age was 54 ± 8 years old and ranged from 32 to 76 years. From these data, we found that the average age of all patients with BRH was 49.3 years and ranged from 18 to 76 years.

There was no patient with a family history of BRH, but there was an association with other primary headaches in the following order of frequency: migraine (28%), tension-type headache (12%) and cold stimulus headache (4%).

Most patients had three or more episodes of BRH and these occurred most often during a hot bath (Table 2). In more than 50% of the patients, headache was bilaterally localized, with an explosive or pulsatile character. All patients reported that the intensity of pain was severe. The duration of pain ranged from five minutes to four days, with an average of 60-180 minutes.

The most frequent manifestations associated with BRH were nausea, vomiting, photophobia or phonophobia. Associated symptoms were absent or not reported in 34% of the patients. There was no description of autonomic manifestation in any patient.

Both medical and neurological examinations were normal in all patients. Almost all the patients (96%) with BRH underwent the following imaging studies: computed tomography, magnetic resonance imaging, magnetic resonance angiography, computed tomography angiography and/or transcranial Doppler. In 34.7% of these patients, the examinations showed focal narrowing of cerebral arteries (Table 3).

A pharmacological or non pharmacological treatment was used by the majority of the patients. The most commonly used drugs were nimodipine (48%) and migraine prophylactics (10%), which had a good therapeutic response. However, the most improved therapeutic response occurred in patients who avoided a hot bath (8/50; 16%).

## DISCUSSION

In 1988, a headache attributed to the external application of a cold stimulus was recognized by the International Headache Society<sup>17</sup>. This headache occurs when a cold stimulus is applied externally to the head, such as immersion of the head in ice water<sup>3</sup>.

In recent years, descriptions of a new headache have appeared, in which a warm stimulus applied to the head provoked the headache. The onset of this headache may occur during a cold bath<sup>11</sup>. However, in almost all patients, the headache started during a hot bath, especially when pouring hot water over her- or himself<sup>1,2,5,7,8,9,10,12,13,14,15</sup>, but this headache also occurred when the patient was getting out of the hot bath<sup>4</sup> or washing his/her hair<sup>6</sup>.

Since the first description of BRH<sup>1</sup>, the frequency of diagnoses has gradually increased in recent years. This fact is possibly due to the increasing recognition of this headache disorder. The exact prevalence of BRH is unknown and needs further investigation. It cannot be calculated based on the literature. However, in the only series of patients that has been published, the authors found a prevalence of 0.4%<sup>15</sup>.

The first description of BRH was made only in women in their fifth decade of life<sup>1</sup>. A few years later, the large case series by Wang et al., also found this headache only in women after age 50<sup>15</sup>. When we analyzed all the patients described in the literature, we found that BRH occurs almost exclusively in middle-aged women.

According to the geographical location of the 50 cases described, we identified only five non-Asian patients (one Spanish, one African and three Brazilian)<sup>7,10,13,14</sup>. From this finding, we speculate whether the occurrence of BRH depends on Asian ancestry.

Table 1. Clinical characteristics of 50 patients with bath-related headache who were analyzed in this review

Published studies	Sex	Age (years)	Other headaches	In relation to the bath	Location of pain	Quality of pain	Duration of pain	Associated symptoms	Imaging studies	Prophylactic treatment
Negoro et al., <sup>1</sup> 2000 [3 patients in Japan]	F	54	TTH	pouring hot water over herself	ND	not throbbing	5–10 min	floating sensation	CT/MRI/MRA were normal	by avoiding taking a hot bath
	F	49	ND	pouring hot water over herself	frontal and right occipital	explosive	1–4 h	No	CT/MRI/MRA were normal	by avoiding taking a hot bath
	F	47	ND	soaking in a hot bath	bitemporal	throbbing	60 min	nausea	MRI/MRA were normal	by avoiding taking a hot bath
Liao et al., <sup>2</sup> 2003 [4 patients in Taiwan]	F	51	No	pouring hot water over herself	vertex	pulsatile	6 h	nausea	MRI/MRA showed vasospasm	nimodipine
	F	53	No	pouring hot water over herself	frontal-vertex	explosive	7–8 h	blurred vision	MRI/MRA were normal	nimodipine
	F	32	ND	pouring hot water over herself	neck-to-vertex	pulsatile	2 h	No	MRI/MRA were normal	nimodipine
	F	53	ND	pouring hot water over herself	left-sided	explosive	5–30 min	ND	MRI/MRA were normal	by avoiding taking a hot bath
Müngen and Bulut, <sup>4</sup> 2003 [4 patients in Turkey]	F	29	Migraine	getting out of a hot bath	bifrontal	not throbbing	60–90 min	ND	CT/MRI were normal	ND
	F	18	Migraine	getting out of a hot bath	occipital	not throbbing	60–90 min	No	CT/MRI were normal	ND
	M	34	TTH, CSH	getting out of a hot bath	generalized	not throbbing	30–60 min	No	CT/MRI were normal	ND
	F	38	Migraine	getting out of a hot bath	bifrontotemporal	not throbbing	3–6 h	No	CT/MRI were normal	ND
Mak et al., <sup>5</sup> 2005 [6 patients in China]	F	67	ND	during a hot bath	bitemporal	throbbing	60–90 min	ND	CT was normal	sumatriptan
	F	50	ND	during a hot bath	generalized	throbbing	60 min	ND	CT was normal	amitriptyline
	F	51	ND	during a hot bath	frontal	ND	30 min	ND	CT was normal and MRI showed nonspecific neuroradiological findings	sodium valproate
	F	47	ND	during a hot bath	right occipital	throbbing	1–4 h	nausea and vomiting	CT was normal	ND
	F	58	TTH	during a hot or cold bath	vertex	ND	2–9 h	vomiting, sweating, scalp tenderness, slurred speech and mild gait unsteadiness	CT was normal and MRI showed a small arachnoid cyst in the cerebellum	ND
	F	50	ND	during a hot bath	left-sided	ND	2–6 h	nausea and vomiting	TCD/MRI showed vasospasm	nimodipine

Continue



Despite the association of BRH with other primary headaches, especially migraine<sup>4,6,7,14,15</sup> and tension-type headache<sup>1,4,5,15</sup>, the diagnosis of this headache disorder should only be made when other headaches have been excluded. In the studies in this review, neuroradiological examinations showed vasospasm in 34.7% of the patients.

The pathophysiological mechanism of BRH is unknown<sup>16</sup>, but it is assumed that in predisposed individuals, excessive stimulation of the scalp's temperature-sensitive receptors may cause this headache<sup>18</sup>. The bath may be one of the triggers of the reversible cerebral vasoconstriction syndrome and prophylactic use of nimodipine may shorten the duration of attacks<sup>2</sup>.

Bath-related headache may be considered a primary headache when there is no cerebral arterial vasospasm or identifiable pathology, similar to primary thunderclap headache. If there is evidence of intracranial vasoconstriction, it would be considered as headache attributed to reversible cerebral vasoconstriction syndrome<sup>3</sup>.

Based on the absence or presence of vasoconstriction demonstrated by magnetic resonance angiography, approximately 65% of the patients fulfilled the criteria for a diagnosis of primary headache and the remaining 35% could be classified as reversible cerebral vasoconstriction syndrome<sup>3</sup>. Nimodipine was effective in preventing headache attacks secondary to vasospasm in 80% of the patients<sup>19</sup>.

From the initial description of the BRH, all patients were taking a warm bath<sup>1</sup> and the pain disappeared spontaneously after a period of two to three weeks. Most of these patients did not present with alterations in the imaging examinations. Therefore, we believe that BRH is a primary headache and we suggest possible diagnostic criteria for it (Table 4).

In this review, successful acute and prophylactic treatments of BRH included, primarily, the avoidance of hot baths. However, these treatment recommendations are based on case reports and need further validation. In most cases, the pain is self limited in the period of a week to a few months. To date, there is no effective prophylactic treatment,

**Table 2.** Temperature of the water that triggered the bath-related headache in 50 patients.

Water temperature	Patients	
	N	%
Hot water	41	82
Cold water	2	4
Not indicated	7	14

**Table 3.** Neuroradiological findings in 49 patients with bath-related headache submitted to imaging studies.

Neuroradiological findings	Patients	
	n	%
No abnormalities	30	61.2
Vasospasm	17	34.7
Nonspecific changes	2	4.1

**Table 4.** Suggested diagnostic criteria for bath-related headache.

Suggested diagnostic criteria
A. At least two acute headache episodes fulfilling criteria B-D
B. The patient is taking a hot bath
C. Evidence of causation demonstrated by both of the following: headache developed during a hot bath, headache did not recur after avoiding hot baths
D. Headache has at least two of the following four characteristics: bilateral location, moderate or severe pain intensity, explosive or pulsating quality, lasting 60–180 minutes
E. Not better accounted for by another International Classification of Headache Disorders diagnosis

although some drugs have been used, among them topiramate<sup>20</sup>, amitriptyline<sup>5,13</sup>, sodium valproate<sup>5</sup>, propranolol<sup>7</sup> and varenicline<sup>21</sup>. Avoiding a hot bath prevents the onset of pain and seems to be the most effective treatment.

In conclusion, BRH is a benign headache not associated with a structural lesion.

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