

## Hydration and Hot Yoga: Encouragement, Behaviors, and Outcomes

### Abstract

**Context:** Currently, the literature on hot yoga is lacking, and there is still much to understand regarding the safety of these practices. However, one point of safety often emphasized is hydration during the practice of hot yoga. **Aim:** The aim of this study was to examine hydration encouragement by hot yoga instructors and hydration behaviors and related outcomes by hot yoga participants. **Methods:** A cross-sectional study ( $n = 700$ ) collected self-report data on demographics, types and frequency of yoga practiced, hydration behaviors, and self-report measures of adverse outcomes experienced by participants during hot yoga. Associations between hydration encouragement, protective behaviors, and adverse outcomes were analyzed through Chi-square tests. **Results:** Every protective hydration behavior was significantly associated with instructor encouragement ( $P < 0.05$ ). Hydration before or during hot yoga participation was associated with a lower occurrence of dehydration symptoms ( $P < 0.05$ ). **Conclusions:** Hot yoga instructors hold a key role in encouraging hydration and student safety outcomes.

**Keywords:** Dehydration, hot yoga, hydration, risks, yoga instructors

### Introduction

The practice of yoga is generally thought to be a safe and gentle activity; however, the practice of hot yoga is less clear. Hot yoga is practiced when the temperature is raised above room temperature, generally between 90°F and 100°F.<sup>[1]</sup> Although Bikram® is the most recognizable brand of hot yoga, any style offered in a heated environment is considered “hot” though the degree of elevated temperature does vary from 80 to 108°. The number of studies examining hot yoga specifically is much lower than those examining nonhot yoga practices (room temperature yoga).<sup>[2]</sup> There is evidence that the benefits of hot and nonhot yoga may be similar but that there are particular risks that may be specific to hot yoga, including dehydration and heatstroke.<sup>[1,3-9]</sup>

With little empirical evidence guiding researchers, yoga teachers, and participants alike about the risks of hot yoga, there is much work to do. As fluid loss and dehydration are the focus of the few studies that do exist,<sup>[10,11]</sup> it is a good place to expand sample sizes and to investigate further. Therefore, the aim of this study was to determine the association of self-reported dehydration and related symptoms to

the practice of hot yoga. Instructor encouragement of hydration and participant hydration behaviors related to outcomes of dehydration were examined.

### Methods

A pilot study was conducted<sup>[12]</sup> which resulted in the development of a larger survey. This study employed purposive sampling to gain a higher proportion of male participants and a more representative sample of hot yoga participants. A web-based cross-sectional survey was distributed in the summer of 2016 ( $n = 700$ ), inclusion criteria comprised participants with hot yoga and nonhot yoga practice experience (current or former), speaking/reading English, and being aged 18 years and above. This study was approved by the Human Subjects Review Council at Central Washington University (H14161, H16046).

### Measures

Demographic information collected included gender, race, age, level of education, and income. The main study built upon these measures tested in the pilot study.<sup>[1]</sup> Instructor encouragement was measured by dichotomous (yes or no) questions: “Do most hot yoga studios and instructors encourage you to hydrate before,

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during, and after hot yoga practice?” Participants’ hydration behavior was also measured by three dichotomous (yes or no) questions: “Do you drink water before hot yoga class?” “Do you drink water during a hot yoga class?” “Do you drink an electrolyte beverage before, during, or after a hot yoga class?”

Dehydration was measured by a dichotomous (yes or no) measure: if you have ever experienced an adverse reaction to hot yoga participation, please select dehydration. Dehydration-related symptoms were identified through a literature search, and the following related symptoms were examined through a similar dichotomous measure: nausea, headache, dizziness, confusion, muscle cramps, and heatstroke.<sup>[1,13]</sup>

Participants were asked to report whether they preferred hot yoga to nonhot yoga through a yes or no question. Participants were also asked whether they practiced Bikram<sup>®</sup> hot yoga or another type of hot yoga that was non-Bikram<sup>®</sup> which was defined as any yoga practice that was performed in a heated setting.

### Data analysis

Descriptive analyses along with a series of Chi-squared tests were performed because the study had a large sample size and employed dichotomous measures (yes or no). Chi-squared tests analyzed the association between instructor encouragement and hydration behavior as well as the development of dehydration-related symptoms. Each hydration behavior was analyzed through Chi-squared test for an association to each dehydration-related adverse outcome. Dichotomous measures for hot yoga preference were compared to instructor encouragement and dehydration outcomes in a Chi-squared analysis as well. A Chi-squared and Pearson correlation score was calculated to determine whether instructors of Bikram<sup>®</sup> versus non-Bikram<sup>®</sup> yoga were more likely to encourage hydration behaviors as well as whether those who practiced Bikram<sup>®</sup> were more likely to experience adverse outcomes than those who practiced non-Bikram<sup>®</sup>.

### Results

The sample ( $n = 700$ ) was 60% female ( $n = 420$ ) and 40% male ( $n = 277$ ). However, the majority of the sample (73%) identified as Caucasian ( $n = 514$ ), followed by African-American (11%,  $n = 76$ ), Hispanic/Latino (8%,  $n = 59$ ), Asian (6%,  $n = 43$ ), Native American (1%,  $n = 4$ ), Pacific Islander, (<1%,  $n = 1$ ), and other (<1%,  $n = 3$ ). The sample age ranged from 18 to 79 with the average age of the participants being 32.6 (standard deviation 5.4 years).

### Hot yoga participation

Just over half of the sample (52%) reported that they preferred hot yoga over nonhot yoga practice. Respondents most frequently reported that they participated in hot yoga

2–3 times per month (23%) or once a month (21%) or once a month (19%), followed by once a week (16%) and then 2–3 times per week (13%). Nearly half of the participants reported currently practicing Bikram<sup>®</sup> hot yoga, i.e., 49%, while another half reported participating in another non-Bikram<sup>®</sup> hot yoga, i.e., 48% (3% reported “other”).

### Instructor encouragement outcomes

Most participants (91%) reported that hot yoga instructors encouraged drinking water before, during, or after hot yoga practice. Instructors who encouraged hydration were associated with students who drank water before participating in hot yoga class  $\chi^2 (1, n = 700), = 32.8, P < 0.001$ , those who drank water during class  $\chi^2 (1, n = 700), = 9.8, P = 0.002$ , and those who drank electrolyte beverages before, during, or after hot yoga practice  $\chi^2 (1, n = 700), = 9.6, P = 0.002$ . Those who reported that their yoga teachers encouraged hydration before, during, and after a yoga class had an association with developing confusion during hot yoga practice  $\chi^2 (1, n = 700), = 9.5, P = 0.002$ ; however, none of the other risk factors were significantly correlated with instructor encouragement of hydration. Hot yoga participants that preferred hot yoga over regular yoga were associated with instructors that encouraged hydration  $\chi^2 (1, n = 700), = 16.25, P < 0.001$ . There was no statistical difference between Bikram<sup>®</sup> and non-Bikram<sup>®</sup> in terms of instructor encouragement of hydration.

### Hydration behaviors and outcomes

A high number of participants reported that they drank water before engaging in hot yoga practice (82.7%) though it is unclear when these individuals hydrated themselves before class. Those who drank water before hot yoga practice were associated with not having reported symptoms of heatstroke  $\chi^2 (1, n = 700), = 11.89, P = 0.001$  and confusion  $\chi^2 (1, n = 700), = 12.6, P < 0.001$ , but none of the other dehydration-related symptoms were significant, including self-reported dehydration.

A lower number of participants reported that they drank water during hot yoga practice (63.4%). Drinking water during hot yoga practice was associated with not experiencing symptoms of dehydration  $\chi^2 (1, n = 700), = 7.4, P = 0.007$ .

Another 46% reported that they drank an electrolyte beverage either before, during, or after engaging in hot yoga practice. Those who drank an electrolyte beverage before, during, or after a hot yoga session were associated with not experiencing an adverse reaction during a hot yoga session  $\chi^2 (1, n = 700), = 8.0, P = 0.005$ . Specifically, those who drank an electrolyte beverage had a lower association of heatstroke  $\chi^2 (1, n = 700), = 8.6, P = 0.003$ .

The only precautionary behavior that was different between those who practiced Bikram<sup>®</sup> style hot yoga and those who practiced non-Bikram<sup>®</sup> hot yoga was choosing to

drink water before hot yoga practice, those who practiced non-Bikram<sup>®</sup> were less likely to consume water before practice ( $P < 0.05$ ). There was no difference in adverse outcomes for participants who engaged in Bikram<sup>®</sup> versus non-Bikram<sup>®</sup> type of yoga related to dehydration.

## Discussion

Despite being presented safety information in these hot yoga classes, a number of participants reported experiencing dehydration-related symptoms such as self-reported confusion, heatstroke, and dizziness. There seems to be an opportunity for hot yoga teachers to retain students, increase participant satisfaction, and reduce risks while ensuring that students have the most optimal experience in a hot yoga class. Teachers who provide hydration encouragement have students who are more physically prepared for a hot yoga class. Students also appear to prefer hot yoga when instructors provide encouragement to stay hydrated.

Most importantly every hydration behavior was associated with instructor encouragement. Instructors hold a key position in reducing risk of dehydration and related adverse outcomes in their hot yoga students. It may be advisable that a policy or guideline be undertaken by yoga authority organizations such as Yoga Alliance<sup>®</sup> or Bikram<sup>®</sup> or other hot yoga teacher training certification programs to require a verbal disclosure and summary statement of the risks such as dehydration, related symptoms, and possible adverse outcomes from the practice of hot yoga.

The sample is one of the largest ever examining hot yoga and health but the findings of this study may not be generalizable. Though the nature of the measures allowed for associations to be established between hot yoga practice and a variety of key health risks, it is still unclear who exactly is practicing hot yoga versus nonhot yoga in terms of demographic variables (gender, race, ethnicity, education, and income) and health status.

## Conclusions

Hydration encouragement by hot yoga students is associated with a variety of hydration behaviors in hot yoga students. Hot yoga students who drink water before or during practice experience a lower number of dehydration-related symptoms. Overall, the majority of hot yoga instructors who instruct both Bikram<sup>®</sup> and non-Bikram<sup>®</sup> hot yoga appear to be encouraging hydration. Therefore, hot yoga instructors should continue to encourage hydration behaviors in their students.

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## Conflicts of interest

There are no conflicts of interest.

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