Assessing the perceived differences in post-Galantamine lucid dreams vs. non-Galantamine lucid dreams

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Summary. A group of 19 experienced lucid dreamers responded to a 27-item online questionnaire pertaining to their use of the supplement galantamine for the purpose of inducing dreams. The questionnaire included 14 items that assessed the perceived differences in dimensions of dream phenomenology between lucid dreams immediately preceded by the ingestion of galantamine, and lucid dreams that were not. These retrospective quantitative assessments, paired with narratives provided by the participants, suggested that the practice of ingesting galantamine significantly enhanced length and vividness, and decreased negative dimensions of lucid dreaming, including fear, violence, and the presence of threatening characters.

Keywords: Galantamine, Lucid Dreaming, Lucid Dream Induction

1. Introduction

The substance galantamine is a cholinesterase inhibitor used for the treatment of mild to moderate Alzheimers (Takeda, Loveman, Clegg, Kirby, Picot, Payne, & Green, 2006). It has been found, as well, to increase the brain's resilience in response to brain injury in animal studies (Lorrio, Sobrado, Arias, Roda, García, & López, 2007). Research indicates that galantamine enhances human cholinergic receptor activity, but only within a narrow range of dosage (Texidó, Ros, Martin-Satué, Lopez, Aleu, Maral, Solsona, 2005). Galantamine is in a class of drugs that also includes tacrine (Cognex), donezepil (Aricept), and rivastigmine (Exelon), all of which have been associated with the side effect of vivid dreams (Weldemichael & Grossberg, 2010). While currently available in the USA without a prescription, galantamine is packaged as a prescription medication under the labels Razadyne and Reminyl.

Lucid dreaming is defined most simply here as having conscious awareness that one is dreaming while in the dream. Galantamine is anecdotally known to be a catalyst for lucid dreaming (Yuschak, 2006), but little research has been published on the range of its effects. A study by LeMarca and LaBerge (2012) reported that experienced lucid dreamers who ingested galantamine in the middle of the night had an approximate five-fold increase in lucid dream frequency over the placebo condition. For decades, researchers have suggested that acetylcholine is somehow involved with the regulation of sleep (Amatruda et al., 1975). Theoretically, galantamine's promotion of lucid dreaming might be related to the substance's affects on cholinergic receptor activity during sleep, including shortened REM sleep latency, increased REM density and reduced slow wave sleep (Reiman, et al., 1994). Galantamine's well known positive effect on memory (Koontz & Baskys, 2005) may also play a role with increasing lucidity in dreams as lucid dreaming ability is associated with waking-style metacognition during dreams (Kahan & LaBerge, 1994). However, in a meta-analysis of lucid dream induction studies, Stumbrys, Erlacher, Schädlich & Schredl (2012) include a single study (LaBerge, 2004) of the effects of the cholinesterase inhibitor Aricept, but found no peer-reviewed studies on the effects of galantamine on lucid dreaming. In addition to absence of peer-reviewed studies on galantamine's impact on lucid dream frequency, there have no studies published thus far on the phenomenological features of galantamine-influenced lucid dreams.

Galantamine is known to exert minor side effects—such as gastrointestinal distress or headache (National Institute for Health and Clinical Excellence, 2011) and anecdotal reports suggest that galantamine could precipitate unwanted effects on dreaming itself, such as an increase in bizarreness or the frequency of sleep paralysis (Hurd, 2009; Web, 2012; Entropy13, 2014). If so, then its side-effects could offset any benefits of increased lucid dreaming self-measures, or lucidity. However, if galantamine exerts a generalized enhancement of lucidity without unwanted side effects, then it could confidently be used to extend the benefits of lucid dreaming to the general population, as well as used as an adjunct of lucid dreaming therapy (Spoormaker and van den Bout, 2006; Holzinger et al., 2015) for those suffering, for example, with repetitive nightmares associated with post-traumatic stress. Given galantamine's potential as a lucid dream catalyst, the objective of our study was to explore the perceived differences between post-galantamine and non-galantamine lucid dreams, via an online questionnaire that was approved by the IRB of the University of Texas-Rio Grande Valley.

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Submitted for publication: November 2015
Accepted for publication: January 2016

2. Method

2.1. Instrument

We developed a 27-item online questionnaire that assessed, among other things, the respondents' estimated frequency of lucid dreaming, their prior use of galantamine, their most recent galantamine-induced and non-galantamine preceded lucid dreams, and their use of various lucid dream induction strategies. The survey also assessed the subjective perceived effects of galantamine on 14 dimensions of dream phenomenology. The survey can be viewed at https://utrgv.co1.qualtrics.com/SE/?SID=SV_6m6DwBTpFhnUMtL

2.2. Participants

Our survey was advertised through several dream studies websites. We specifically requested participants who had used galantamine previously for the purposes of inducing lucid dreams. Upon collecting data, we excluded any respondent who admitted having never used the supplement, or had never experienced a lucid dream following the ingestion of galantamine. Ultimately, the subject pool included 19 participants—10 male and 9 female—who reported, on average, having recalled a lucid dream about twice a month. Further, they reported using galantamine as a lucid dream induction catalyst on an average of once a month, thus providing a credible basis for making comparisons between post-galantamine dreams and non-galantamine lucid experiences among experiencedsubjects. While we did not assess how often galantamine ingestion resulted in a lucid dream during the same night—which would have required assessing repeated measures over time—LaMarca and LaBerge (2012) indicates it exerts a five-fold increase over the normal frequency of lucid dreaming among similarly experienced participants.

2.3. Design and Procedure

Perceived differences between galantamine-induced lucid dreams (GLDS) and non-galantamine lucid dreams were assessed on 14 phenomenological dimensions by asking participants to respond to statements in the following format: On a scale of 1-6, where 1 is "not true at all," and 6 is "very true," my lucid dreams that follow the ingestion of galantamine are more…(subjective quality)…or more likely to include…(phenomenological feature)…than lucid dreams that do not follow the ingestion of galantamine. Specifically, the 14 items assessed the comparative:

- vividness
- bizarreness
- fear
- presence of threatening figures
- violence
- out-of-body sensation
- emotion
- buzzing or hissing sounds
- sleep paralysis
- presence of companion/guide
- perception of darkness
- length
- felt meaning or impact
- degree to which dream characters seemed real or autonomous

Our preliminary quantitative analyses of the perceived impact of galantamine on lucid dreams focused on the Likert scale means of the above 14 dimensions using one-sample case t-tests with a theoretical mean of 3.5—a constant that can be seen as representing the levels of these subjective features in the participants' non-galantamine lucid dreams. That is, if the level of a given phenomenological quality is x, then x becomes a subjective average against which any deviation due to galantamine is assessed by the participant. We also conducted an analysis of variance by sex to test for differences in the 14 means.

In addition to the 14 quantitative measures, we also asked the participants to provide a verbal comparison of the perceived differences between GLDS and non-galantamine lucid dreams. We believed that these narrative contributions would provide some perspective on the quantitative data, as well as possibly generate additional hypotheses that we might test in future experimental studies.

3. Results

3.1. Quantitative Measures

Subjective assessments of the perceived effects of galantamine on subsequent lucid dreams yielded significant deviations from the hypothesized mean of 3.5 on six of the 14 phenomenological dimensions—two in the positive direction, and four in the negative direction. In specific, respondents reported significantly more vividness ($p<.01$) and length ($p<.01$) and significantly less fear ($p<.01$), threatening figures ($p<.01$), violence ($p<.01$), and darkness ($p<.05$). The means for each dimension are shown in Figure 1.

In addition to the case t-tests, we also conducted an analysis of variance assessing the differences between the 14 means. The null hypothesis was tested with an F distribution at the .05 level. Sphericity could not be assumed, and thus lower-bound conservative degrees of freedom were used. The null hypothesis was rejected ($F= 8.42$, $p<.05$). Further, an analysis of variance by sex was computed, and it yielded no significant differences for any of the 14 means.

Given that the contrast between vividness and length, and the measures for fear, violence, and presence of threatening characters, we computed a Scheffé test that compared the combined means of vividness and length with the combined means of the presence of fear, violence and threatening figures. (Since the perception of darkness was not clearly a positive or negative feature of GLDS, we did not include it in the contrast.)This contrast seemed to be especially meaningful to consider, given the view that the awareness that one is dreaming confers a certain fearlessness that enhances one's ability to confront and resolve dream conflicts. The null hypothesis was rejected ($F=7.69$, $p<.01$).

3.2. Narrative Data

The narrative data revealed three themes: vividness and intensity, length and stability, and ease of onset from the waking state.

Vividness and Intensity. Except for one participant who said that GLDS seemed "hazy and more sluggish," the participants said that GLDS were "much more vivid," that the "mental images were crisper," and that "sensory acuity" was enhanced. One respondent said he did not find "the content different, but in some cases the dreams were more intense." Another participant commented on an overall enhancement

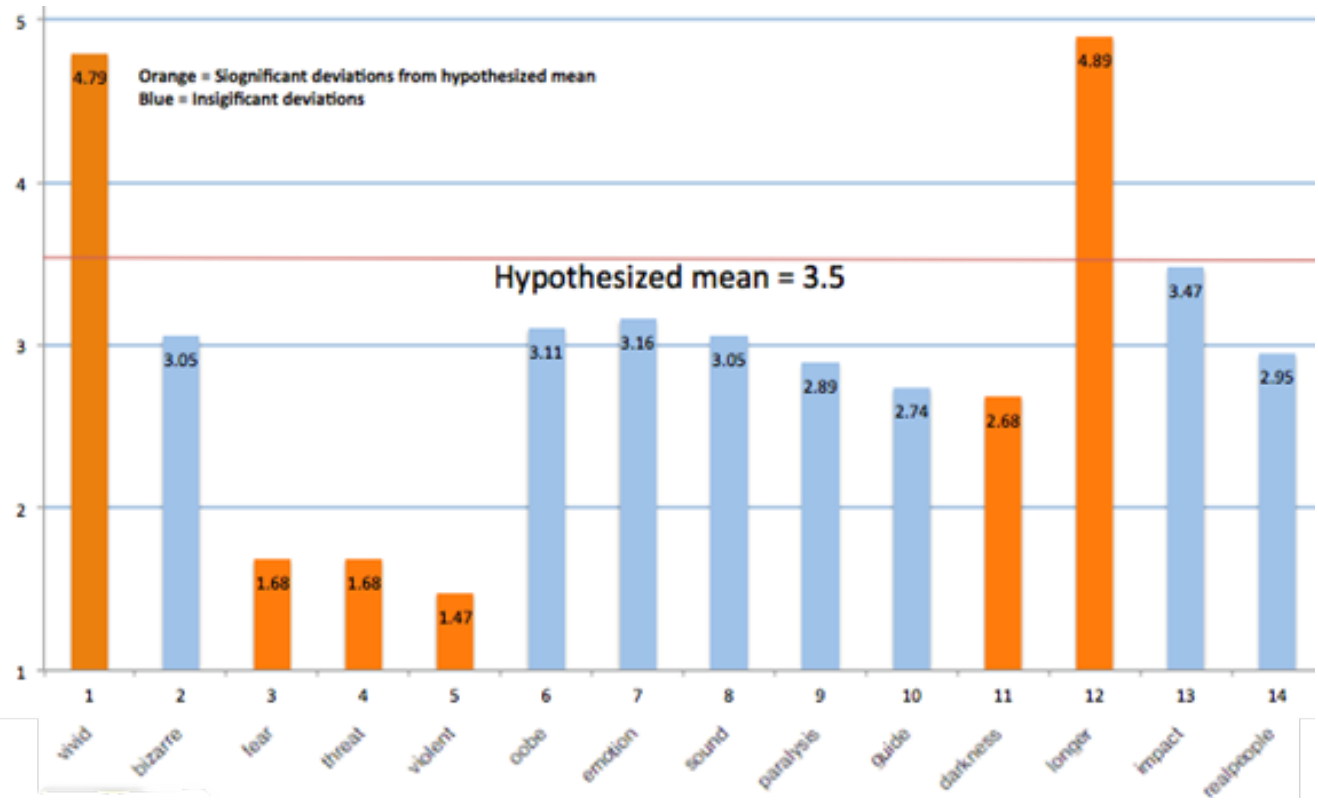

Figure 1. Averages for 14 survey items assessing the perceived differences in post-Galantamine lucid dreams vs. non-Galantamine lucid dreams

of her dream life, saying, that galantamine "increases dream frequency, vividness of the dream, and dream recall. All of these factors add up to an increase in potential to have lucid dreams, to recognize that you are dreaming, and to remember that you had a lucid dream and what happened during the dream."

Length and Stability. One participant said that GLDS "rank highly in stability… One characteristic is that I have found myself unable to leave the lucid dream state as quickly as I have wanted to in several of these dreams." When this happens, he says that he sometimes becomes fearful that he won't be able to return his body. Another respondent said, GLDS "feel more stable." Still another stated that his GLDS were "much long lasting; tend to have better control, especially in the first one, if I have more than one following the ingestion of galantamine."

Ease of Transition into Lucidity from Waking. Three dreamers stated that galantamine facilitates the onset of lucidity without a break in consciousness, commonly referred to as a "waking induction of lucid dreaming (WILD)." One said, "the strength of oncoming entry sensations and ease of entry to the dream state" was enhanced by galantamine. Another said that it was "…easier to get lucid. More stable. Higher likelihood of WILDs." Still another commented that it was "…much easier to exit the body as I often found myself floating about a foot off of the floor on the side of the bed in the middle of the night after having taken galantamine."

While the narrative descriptions provided only anecdotal information, they will serve as a useful data source upon which to generate hypotheses for future studies.

4. Discussion and Limitations

Given the arguments that have recently been made for the acceptability of dream reports in empirical studies (Windt, 2013), we believed that these retrospective assessments could be used as a legitimate source of data. However, we were also aware that our study drew upon dream data that was considerably removed from the more immediate experience of awakening from lucid dreams after ingesting galantamine, and thus did not represent ideal conditions (Windt, 2013) for obtaining these dream reports. While we acknowledge the limitations of our retrospective data, we believe that such data can be useful given the paucity of research in the field, and as a source of hypotheses for more rigorous studies going forward.

This study is only a first step toward assessing the impact of galantamine on lucid dreams. However, some intriguing inferences can be drawn on the basis of our data. For one, the concern that galantamine might exert unwanted effects that would outweigh its benefits is not supported by these retrospective assessments. None of the subjective qualities that might conceivably be considered by some respondents as negative—that is, bizarreness, sleep paralysis, and increased darkness—were considered significantly more prevalent in post-galantamine lucid dreams. Indeed, when compared against the theoretical mean of 3.5, darkness was deemed to be significantly less prevalent in post-galantamine lucid dreams.

Second, the enhancements of dream vividness and length, alongside the reduction of fear, violence, and threat

in post-galantamine dreams support the view that galantamine may actually help to facilitate optimum conditions within the lucid state for the reprocessing and resolution of unresolved conflict and trauma. Whether galantamine itself exerts a direct effect on suppressing the presentation of threatening content, or only enhances the reflective awareness that can address these issues if they should arise, cannot be ascertained from this preliminary data. However, given the fact that cholinergic receptors originate in the basal forebrain (Texidó, et. al, 2005) and extend to various areas of the brain, including the amygdala, it is possible that galantamine increases communication between cortical processes and centers of emotion, and can perhaps help to ameliorate the dissociation between these areas that has been noted in the case of unresolved trauma (Goleman and Goleman, 2002).

Clearly, further research is needed to explore the subjective impact of galantamine on lucid dreaming. A double-blind study conducted with a similar sample of experienced lucid dreamers that would collect galantamine-preceded dream narratives immediately upon awakening, would not only provide further data on the possible lucid dream enhancing effects of galantamine, but would further illuminate the impact of galantamine on the phenomenological features of lucid dreams. If galantamine increases lucid dream frequency, as preliminarily suggested (LeMarca & LaBerge, 2012), and enhances phenomenological features of the lucid dream considered therapeutic from the standpoint of reducing the frequency of distressing dreams, then galantamine may have a bright future as an adjunct to PTSD symptom-reduction cognitive interventions, such as meditation and Dream Reliving (Sparrow, Thurston, Carlson, 2013).

Therapists interested in introducing galantamine as an adjunct to dream-based PTSD treatment such as lucid dream therapy (Spoormaker and van den Bout, 2006; Holzinger et al., 2015), or Dream Reliving (Sparrow, Thurston & Carlson, 2013) should ideally work under the supervision of an MD, at least until further research has been conducted that clearly demonstrates its efficacy and safety in PTSD treatment.

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