Turmeric: From spice rack to medicine cabinet? An analysis of the effectiveness of turmeric in treating Alzheimer’s patients

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Background: Alzheimer’s disease (“AD”) is a terminal, neurodegenerative disorder that affects the elderly. Numerous research studies show the existence of a number of markers of inflammation in the AD brain, suggesting that AD is an inflammatory response and that it significantly contributes to its own pathogenesis. Anti-inflammatory pharmaceuticals have been shown to limit inflammation but not without side effects. A natural source of an anti-inflammatory herb turmeric is a promising target. The lower rates of validated AD are found in rural India, a population known for its turmeric consumption [2].

Objective: This review intends to synthesize the best available evidence associating the therapeutic potential of turmeric with the successful treatment of AD in the elderly (<60 population).

Methods: A literature review was conducted and relevant peer-reviewed journal articles from CINAHL, PubMed and ScienceDirect were collected and prioritized based on inclusion criteria. Two independent researchers assessed the articles for relevancy and the inter-rater reliability was 100%.

Results: A total of 12 studies were included for review and results were relatively consistent among them. The literature shows a clear association between turmeric and a significant reduction in the psychological and behavioral symptoms of this form of dementia. In experimental studies turmeric has been shown to decrease the beta-amyloid plaque burden as well as other AD proteins. The abstract evidence associating the therapeutic potential of turmeric with the successful treatment of AD is limited. Available research synthesized in this review has generated results indicating that naturally occurring turmeric has beneficial potential for the treatment of Alzheimer’s patients. Further human studies is needed to positively ascertain these results, with consideration of bioavailability, safety and tolerability in the target population.

Introduction

What is AD?

This neurodegenerative disease manifests through clinical symptoms such as cognitive dysfunction, apathy, depression, delusion, hallucination, insomnia, and wandering. The disease progresses from memory loss to dementia and eventually death, normally within 8 years of onset [3]. The clinical biomarkers associated with AD pathology are: extracellular accumulation of amyloid protein in the form of senile plaques and accumulation of hyperphosphorylated tau in the form of neurofibrillary tangles [4]. It’s incidence is increasing from 1% between the ages of 70 and 7-6% age 85 [4]. When compared to western populations the prevalence of AD is 4.4 times lower in Indian and Asian populations [5].

Why consider the spice turmeric?

This FDA-approved alternative is associated with various side effects and low effectiveness. Turmeric, specifically it’s active compound curcumin, has been used in traditional Indian medicine for centuries, based on its anti-inflammatory, anti-oxidant, anti-amyloidogenic, metal-chelating and anti-proliferative properties [4]. Results from a large prospective epidemiological study, the Indo-US Cross National Dementia Study, showed that there is a lower incidence and prevalence of AD in the rural Indian population when compared to the US population which is in part attributable to the consumption of turmeric [2].

Research Question

In the elderly (<60) population does the consumption of turmeric effectively treat the clinical symptoms of Alzheimer’s disease?

Methodology

Keywords: Turmeric and Alzheimer’s

Inclusion Criteria:
- Peer-reviewed journal
- AD as the main topic
- Between 1995-2015
- English language
- Human models or in vitro studies

Two independent raters evaluated the articles based on the inclusion criteria and inter-rater reliability was 100% with a Cohen’s kappa of k= 1.0

Discussion

As evidenced by our results, most of the data concerning turmeric’s beneficial effects on AD is relatively recent. All human studies (n=3) have been conducted in the last 7 years and thus clinical and epidemiological evidence is lacking. It is surprising to see that there has been so few randomized control trials (RCT), as turmeric seems to be a safe and natural alternative to current pharmaceutical offerings. However, when looked at from an economic point of view one must remember that turmeric is a naturally occurring spice so it is not patentable. This would limit it’s profitability.

The RCT’s that have been conducted were not rigorous or large-scale, they were limited by a small number of patients, short period of follow up, and no real statistical analysis was presented. It is also difficult to administer turmeric through the oral route or measure its consumption despite its poor aqueous solubility and low systemic bioavailability, bringing into question its clinical efficacy.

Every study reviewed commented on its low bioavailability, and identified this as the largest barrier to turmeric’s success as an AD drug. Rapid metabolism and quick elimination has also been noted in most studies as potential limiting factors.

All studies that commented on turmeric’s safety found it to be well tolerated, even at high doses. What makes this spice an even more attractive candidate is it’s multifaceted neuroprotective ability and lipophilic character that allows it to cross the blood brain barrier. It has been shown to be effective in the reduction of plaque burden, reversal of amyloid pathology and decrease of soluble phosphorylated tau (Figure 2).

Several other compounds have been isolated from turmeric in addition to curcumin, those being curcurminoids. Recent studies have shown the curcuminoids also possess potential roles in the treatment of AD - specifically demethoxycurcumin (curcumin II), bisdemethoxycurcumin [3][4][13]. The fact that turmeric possesses a number of active and non-active compounds suggests that the presence of potential drug candidates could have been unaccounted for.

Figure 1. Methodology flow chart for the structured literature review.

Figure 2. Molecular targets of curcumin against AD. Adapted from [12].

Limitations

- This structured review was subject to non-differential classification bias, which lies within the data collection and was consistent throughout each database that was searched.
- The review was based on two keywords: turmeric and Alzheimer’s. We acknowledge these keywords are limiting in scope, however, when other keywords were added very similar search results were found and this search ascertained the most pertinent data.
- Only English studies were included which leads to a potential inclusion bias. Only three prominent databases searched which could result in some articles being missed.
- An executive decision was made by the researchers to only include titles that included in vitro and human studies excluding animal models (i.e rats) as these studies were not relevant to our research question.

Conclusions

- Based on the results of this review, it is not advisable to have patients (<60) replace their AD medications with turmeric. However, due to it’s safety and potential beneficial effects, it would not be harmful to have the patient consume more turmeric in their diet unless they have gall bladder problems.
- An emphasis on RCT’s and longitudinal studies would prove very beneficial to the crusade for turmeric as an AD treatment.
- Clinical efforts should be directed toward facilitating it’s carrier mediated transport and/or nanotechnology [9][13] based delivery system to increase the bioavailability.

References


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