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강황의 항치매효과에 대한 체계적인 문헌고찰

조나영

세명대학교

Abstract

Analysis of Papers on *Curcuma longa Rhizoma* for Possibility Evaluation of Therapeutic against dementia

Na Young Jo

Dept. of Acupuncture & Moxibustion Medicine, Je-Cheon Hospital of Traditional Korean Medicine, Semyung University

Objectives

The incidence of degenerative diseases is increasing as society ages, and this increased the economic burden on society. Oxidative stress was also under suspicion as one of the causes. Recent studies have found that Curcuma longa Rhizoma had antioxidant, anti-inflammatory, antimutagenic, and anticancer effects. Through this study, we figure out trends in Curcuma longa Rhizoma research and evaluate the therapeutic potential of Curcuma longa Rhizoma for dementia.

Methods

The search was made using domestic and international internet search sites. "Naver academic," "Google scholar," "Korea institute of oriental medicine (KIOM OASIS)," "Korean traditional knowledge portal (KTKP)," "Library of Congress," "Research information sharing service (RISS)," "National Digital Science Links (NDSL)," and "Pub med" are used to search. The searched for words were "turmeric," "*Curcuma longa Rhizoma*," "antioxidant," and "nerve regeneration."

Results

It could be seen that a lot of research done on *Curcuma longa* recently. In previous studies, the most common research disease was cancer. In previous studies, the most common effects of *Curcuma longa* was antioxidant and anticancer. Curcumin, Vitamin B1, and various essential oils were the functional components of *Curcuma longa Rhizoma. Curcuma longa Rhizoma* performs DPPH radical scavenging activity and ABTS radical cation decolorization activity; it inhibits NO and iNOS.

Conclusion

The destruction of nerve cells due to oxidative stress is a cause of dementia. *Curcuma longa Rhizoma* have antioxidant effects. Therefore, we believed that it is an effective treatment for dementia. Various studies will be made on *Curcuma longa Rhizoma*.

Key words

Curcuma longa, Rhizoma dementia, antioxidant, Korean medicine

* 교신저자 : Na Young Jo / Dept. of Acupuncture & Moxibustion Medicine, Je-Cheon Hospital of Traditional Korean Medicine, Semyung University. Semyungro65, sinwoul-dong, jecheon city, chungbuk, 27136, Republic of Korea
Tel : +82-43-649-1825, Fax : +82-43-645-1382, E-mail : cswcny2@hanmail.net
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I. Introduction

The incidence of degenerative diseases is increasing as society ages, and this increases the economic burden on society. The percentage of Korean seniors aged 65 and over who suffer from dementia is approximately 10%. Dementia is assumed a continuously increasing condition[1], the causes of which are damaged neurons. It causes memory impairment, cognitive deterioration and mental function decline. Brain neural damage and brain organizational damage are different, and dementia is a type of brain organization damage[2].

In the West, research is being conducted on the causes and symptoms of dementia, and there are various hypotheses about the causes; hypothesized relations to anti oxidants, neurotransmitters, oxidative stress, and acetylcholine are supported. Since in most cases it is associated with the antioxidants, antioxidant-related research is actively underway[3].

Dementia is classified into several types. Alzheimer's disease (AD) occupies the largest ratio[4], yet the causes of AD are not obvious. Several causes have been investigated as to whether they cause Alzheimer's disease. Oxidative stress is also under suspicion as one of the causes. The destruction of nerve cells due to oxidative stress is a cause of Alzheimer's; therefore, studies have been made into drugs that reduce oxidative stress[5].

In Korean medicine, dementia is classified as a psychiatric disease, caused by decreased brain function due to aging[6]. The primary research that is being done into herbal medicines is mainly related to antioxidants. In this study, we have focused on *Curcuma longa Rhizoma*, which is a type of zingiberaceous.

Curcuma longa Rhizoma has the effect of restoring damage, increasing circulation and reducing pain in Korean medicine. It treats the pain and swelling that occur especially because of non-circulation. It also has excellent ability to regenerate damage[7]. The elderly have decreased energy, circulatory ability, and physiological activity. This situation causes various geriatric diseases. Dementia is also one of the diseases. The cause of dementia in Korean medicine is lack of energy and decreased physiological activity[4]. Therefore, it is estimated that *Curcuma longa Rhizoma* can be used for dementia from the perspective of Korean medicine.

Curcuma longa Rhizoma is used as both a food and medicine in Korea. The taste is spicy and warm, and it circulates with the blocked energy in our body[7]. Curcumin is a well-known functional component of *Curcuma longa Rhizoma*. Recent studies have found that *Curcuma longa Rhizoma* has antioxidant, anti-inflammatory, antimutagenic, and anticancer effects[8-9].

In this respect, the existing studies about *Curcuma longa Rhizoma* are significant. Through discussion, we propose its potential as a therapeutic agent for dementia.

Ⅱ. Method

The first search was made using domestic and international internet search sites. “Naver academic,” “Google scholar,” “Korea institute of oriental medicine (KIOM OASIS),” “Korean traditional knowledge portal (KTKP),” “Library of Congress,” “Research information sharing service (RISS),” “National Digital Science Links (NDSL),” and “Pub med” are used to search. The searched for words were “turmeric,” or

"*Curcuma longa Rhizoma*," and "antioxidant," or "nerve regeneration."

In order to include papers that were not found through these searches, we performed a secondary search at "The Korean Association of Herbology" and "The Society of Korean Medicine" website.

Ninety-seven papers about *Curcuma longa Rhizoma* have been found, and literature and complex multiple regimen papers were excluded from this study. Finally the 23 papers were selected(Figure 1).

Ⅲ. Result

1. Annual number of published papers.

There are five papers were published in 2005-2006. Two papers were published in 2007-2008. Two papers were published in 2009-2010. Four papers were published in 2011-2012. Ten papers were published in 2013-2014. It can be seen that a lot of research done on *Curcuma longa* recently(Figure 2).

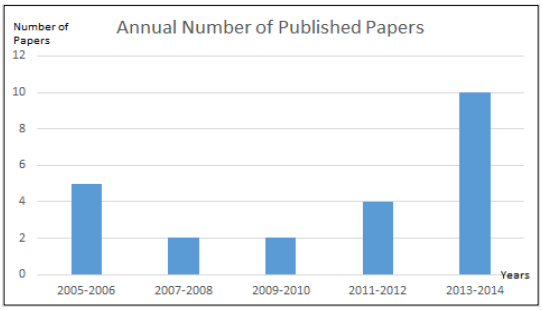

Figure 2. The number of papers published every 2years from 2005 to 2014

2. The subject disease of study

In previous studies, the most common research disease is cancer. Type of cancer is various. Such as lung cancer, liver cancer, prostate cancer, uterine cancer and breast cancer has been studied. Besides, there

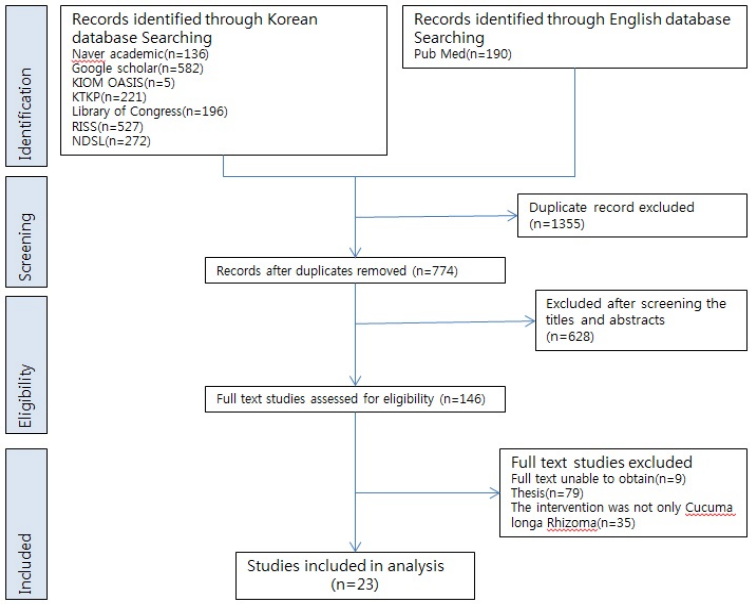

Figure 1. Flowchart of the selection prdcess

are study on osteoporosis, prostatic hyperplasia, hyperlipemia, spinal cord injury, arthritis, pancreatitis, renal failure and asthma(Figure 3).

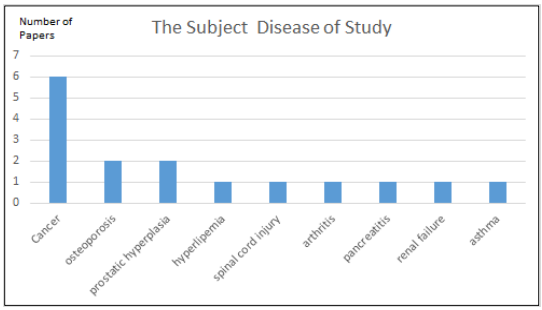

Figure 3. Classification according to disease on paper

3. Study design

In previous studies design 10 invivo study and 13 in vitro study.

4. Effects of *Curcuma longa* on paper.

In previous studies, the most common effects of *Curcuma longa* is antioxidant and anticancer. and, there are effects on anti-inflammatory, protect organization, bone growth, anti uredo, anti hyperlipidemia and vasorelaxation(Figure 4).

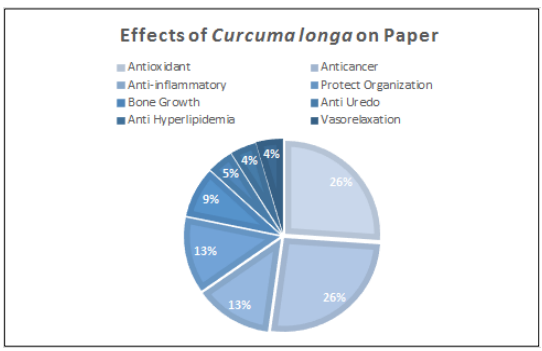

Figure 4. Classification according to Effect of *Curcuma longa* on paper

5. Functional component of *Curcuma longa Rhizoma*

Curcumin, Vitamin B1, and various essential oils are the functional components of *Curcuma longa Rhizoma*.

1) Curcumin

The major functional component of *Curcuma longa Rhizoma* is curcumin, which has antioxidant, anti-tumor, anticancer, and anti-inflammatory properties. It inhibits the DNA damage caused by oxidation and removes free radicals[10].

2) Vitamin B1

Vitamin B1 is water-soluble and known as thiamin. It is involved in regulating carbohydrate metabolism, and a deficiency of B1 causes a disorder known as beriberi[11].

3) Essential Oils

The major essential Oils of *Curcuma longa Rhizoma* are 3-carene, alpha-pinene, alpha-terpinolene. 5-Methyl -3-heptene, Camphene, beta-pinene, alpha-terpinen, and limonene are also present[10].

6. Potential as therapeutic agent of dementia

1) Antioxidant Study of *Curcuma longa Rhizoma.*

Curcuma longa Rhizoma performs DPPH radical scavenging activity and ABTS radical cation decolorization activity; it inhibits NO and iNOS12). There are two kinds of antioxidants in the above

ground part of *Curcuma longa Rhizoma* ethanol extract. They are 1,2,3,4,6-penta-Ogalloyl-β-D-glucopyranoside and gallic acid, both of which are powerful antioxidants[13]. The leaves of *Curcuma longa Rhizoma* also have antioxidant effects14).

2) Neuroprotective Study of *Curcuma longa Rhizoma*

Curcuma longa Rhizoma hot water extract has an excellent protective effect on DNA against oxidative stress[15] it has also helped restore functionality to a damaged spinalcord[16].

3) Adjuvant treatment of dementia

Curcuma longa Rhizoma has been used as a secondary medicine for dementia. Mixed water extracts of Chenwhangbosim-dan and *Curcuma longa L.* improved the memory ability of AD model rats, but showed varying results, depending on the dose[17].

Ⅳ. Discussion

The social and economic burden caused by dementia is increasing, and it is becoming a serious problem worldwide. The whole world is making efforts towards treating and preventing dementia, and the Korean medical sector has made similar efforts. Korean medical researchers are looking into developing drugs for the treatment of dementia, one of which may be *Curcuma longa Rhizoma*.

The hypothesized pathogenesis of dementia is reduced acetylcholine (ACh), increased acetylcholinesterase (AChE), amyloid cascade hypothesis[18], inflammation occurs in the brain[19], activeoxygen[20], Genemutations[21-23]. However, no clear mechanism has yet been revealed. The most likely hypothesis is the reduced acetylcholine(ACh), increased acetylcholinesterase(AChE) and amyloid cascade hypothesis[24].

The active oxygen hypothesis has attracted attention recently. Active oxygen is generated in the respiration process. When the aggregation of amyloid beta increases the active oxygen, dementia patients have large amounts of oxidized organic matter in their brains, cerebrospinal fluid, blood, and urine[25-27]. Oxidative stress is one of the causes of dementia, and *Curcuma longa Rhizoma* can remove this. Therefore, *Curcuma longa Rhizoma* has significant antioxidant and neuro protective effects; it is believed to be an effective treatment for dementia.

Studies showed that the memory is increased when testing is administered concurrently with *Curcuma longa Rhizoma*. It shows similar recovery to authorized treatments; in particular, it is significant that *Curcuma longa Rhizoma* superior effect of curcumin's antioxidant effect in *Curcuma longa Rhizoma* can be seen as similar to other drugs[28]. MDA(malondialdehyde) is indexed for evaluating the oxidation of brain tissue. Melatonin is effective at reducing increased MDA[29], and red yeast rice inhibits MDA formation[30]. The antioxidant effect of *Curcuma longa Rhizoma* is not inferior to the two drugs.

This study has limitations in searching existing research on 23 limited databases. However, it can be concluded that turmeric has antioxidant and nerve regeneration effects and that it can be used as a dementia improving drug. However, since there is a high proportion of papers published in Korea and

few studies have directly linked to dementia, further studies are needed in the future.

Ⅴ. Conclusion

The existing research suggests that the use of *Curcuma longa Rhizoma* is a possible treatment of dementia. We considered the pathogenesis of dementia and the corresponding effects of *Curcuma longa Rhizoma* to support this conclusion. Our conclusions are as follows.

1. Recently, increased research on *Curcuma longa Rhizoma*.
2. Most common study of *Curcuma longa* is about antioxidant and anticancer.
3. The active oxygen hypothesis has attracted attention in recent years. *Curcuma longa Rhizoma* has the effect of removing this.
4. *Curcuma longa Rhizoma* hot water extract has an excellent effect of protecting DNA from oxidative stress.
5. Memory is increased when administered concurrently with *Curcuma longa Rhizoma*.
6. *Curcuma longa Rhizoma* showed excellent memory recovery, more than curcumin. It is assumed to have active ingredients other than curcumin.

Therefore, we believed that it is an effective treatment for dementia. Various studies will be made on *Curcuma longa Rhizoma*.

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