Ganoderma lucidum (Reishi mushroom) for cancer treatment

Review

Intervention

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Citation tools

English French Japanese
Abstract

Background

_Ganoderma lucidum_ is a natural medicine that is widely used and recommended by Asian physicians and naturopaths for its supporting effects on immune system. Laboratory research and a handful of preclinical trials have suggested that _G. lucidum_ carries promising anticancer and immunomodulatory properties. The popularity of taking _G. lucidum_ as an alternative medicine has been increasing in cancer patients. However, there is no systematic review that has been conducted to evaluate the actual benefits of _G. lucidum_ in cancer treatment.

Objectives

To evaluate the clinical effects of _G. lucidum_ on long-term survival, tumour response, host immune functions and quality of life in cancer patients, as well as adverse events associated with its use.

Search methods

The authors ran an extensive set of databases including the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE, NIH, AMED, CBM, CNKI, CMCC and VIP Information/Chinese Scientific Journals Database was searched for randomised controlled trials (RCTs) in October 2011. Other strategies used were scanning the references of articles retrieved, handsearching of the International Journal of Medicinal Mushrooms and contact with herbal medicine experts and manufacturers of _G. lucidum_.

Selection criteria

To be eligible for being included in this review, studies had to be RCTs comparing the efficacy of _G. lucidum_ medications to active or placebo control in patients with cancer that had been diagnosed by pathology. All types and stages of cancer
were eligible for inclusion. Trials were not restricted on the basis of language.

Data collection and analysis
Five RCTs met the inclusion criteria and were included in this review. Two independent review authors were assigned to assess the methodological quality of individual trials. Common primary outcomes were tumour response evaluated according to the World Health Organization (WHO) criteria, immune function parameters such as natural killer (NK)-cell activity and T-lymphocyte co-receptor subsets, and quality of life measured by the Karnofsky scale score. No trial had recorded long-term survival rates. Associated adverse events were reported in one study. A meta-analysis was performed to pool available data from the primary trials. Results were gauged using relative risks (RR) and standard mean differences (SMD) for dichotomous and continuous data respectively, with a 95% confidence interval (CI).

Main results
The methodological quality of primary studies was generally unsatisfying and the results were reported inadequately in many aspects. Additional information was not available from primary trialists. The meta-analysis results showed that patients who had been given *G. lucidum* alongside with chemo/radiotherapy were more likely to respond positively compared to chemo/radiotherapy alone (RR 1.50; 95% CI 0.90 to 2.51, P = 0.02). *G. lucidum* treatment alone did not demonstrate the same regression rate as that seen in combined therapy. The results for host immune function indicators suggested that *G. lucidum* simultaneously increases the percentage of CD3, CD4 and CD8 by 3.91% (95% CI 1.92% to 5.90%, P < 0.01), 3.05% (95% CI 1.00% to 5.11%, P < 0.01) and 2.02% (95% CI 0.21% to 3.84%, P =
0.03), respectively. In addition, leukocyte, NK-cell activity and CD4/CD8 ratio were marginally elevated. Four studies showed that patients in the *G. lucidum* group had relatively improved quality of life in comparison to controls. One study recorded minimal side effects, including nausea and insomnia. No significant haematological or hepatological toxicity was reported.

**Authors' conclusions**

Our review did not find sufficient evidence to justify the use of *G. lucidum* as a first-line treatment for cancer. It remains uncertain whether *G. lucidum* helps prolong long-term cancer survival. However, *G. lucidum* could be administered as an alternative adjunct to conventional treatment in consideration of its potential of enhancing tumour response and stimulating host immunity. *G. lucidum* was generally well tolerated by most participants with only a scattered number of minor adverse events. No major toxicity was observed across the studies. Although there were few reports of harmful effect of *G. lucidum*, the use of its extract should be judicious, especially after thorough consideration of cost-benefit and patient preference. Future studies should put emphasis on the improvement in methodological quality and further clinical research on the effect of *G. lucidum* on cancer long-term survival are needed. An update to this review will be performed every two years.

**Plain language summary**

*G. lucidum (Reishi mushroom) for cancer treatment*

There have been an increasing number of patients diagnosed with cancer each year. Certain malignancies have been a major cause of death in some populations. People who have been diagnosed with cancer want to do everything
they can to combat the disease, manage its symptoms and cope with the side effects of radio/chemotherapy. Many turn to complementary and alternative medicine. *G. lucidum* extract is a medication that has been widely used by traditional Chinese medicine (TCM) practitioners for this regard. It is usually recommended as an immune system support supplement in cancer treatment. Latest laboratory research and preclinical trials of *G. lucidum* have shown promising results of its antitumour activity. However, clinical evidence of its efficacy is sparse and a systematic review is in need to provide collective information for health-care consumers.

Our review identified and subsequently included five relevant randomised controlled trials. A total of 373 subjects were analysed. A meta-analysis was performed to pool available data from individual trials. Our results found that patients with *G. lucidum* extract in their anticancer regimen were 1.27 times more likely to respond to chemotherapy or radiotherapy than those without. However, the data failed to demonstrate significant effect on tumour shrinkage when it was used alone. In addition, *G. lucidum* could stimulate host immune functions by considerably increasing CD3, CD4 and CD8 lymphocyte percentages. Nevertheless, natural killer (NK)-cell activity, which has been suggested to be an indicator of self-defence against tumour cell, was marginally elevated. Patients in the *G. lucidum* group were found to have a relatively better quality of life after treatment than those in the control group. A few cases of minor side effect associated with *G. lucidum* treatment including nausea and insomnia were reported.

There are limitations of the results from this systematic review. First, most included studies were small and there were concerns on the methodological quality of individual
trials. Second, all participants in the individual trials were recruited from the Chinese population. Together, the robustness and applicability of the results were largely affected.