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# The Effect of Cuminum Cyminum L on Hemoglobin Levels in Tried Animals: Systematic Literature Review

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**ABSTRACT**
The prevalence of anemia in women childbearing age in Indonesia according to Riskesdas in 2013 has increased in each age group. Anemia has an impact on decreased performance, work productivity, endurance and threatens the safety of mothers and babies during pregnancy, childbirth, and the puerperium. Research on cumin has been carried out in several experimental animals that can be used to increase hemoglobin levels.
To prove that giving cumin has an effect on hemoglobin levels in experimental animals.
Systematic literature review with article searches was carried out in 2015-2020 on the Science Direct and Google Scholar databases using the PRISMA method. The keywords used were cuminum cyminum L and hemoglobin. The article was selected as an experiment. From 723 articles, 9 were filtered.
The content of cumin per 100 grams includes iron 66.36 mg, vitamin C 1270 IU, folic acid 10 µg, and protein 44.24 mg. The content of iron as an ingredient in the formation of hemoglobin, vitamin C, folic acid and protein plays a role in supporting the absorption and formation of hemoglobin.

**Keywords:** Cuminum Cyminum L, Hemoglobin, Experimental Animal

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## BACKGROUND

Anemia in women (age ≥15 years) is a condition where a hemoglobin level is less than 12 g/dl(World Health Organization 2011). Anemia in women of productive age in 2012-2016 increased by 1.5%. Anemia in women of reproductive age is targeted to reduce by 2025 by 50% so that it only reaches 15.2%(FAO, IFAD, UNICEF, WFP 2018; Word Health Organization 2014). The prevalence of anemia in women childbearing age in Indonesia according to Riskesdas data from 2007-2013 There was an increase in the 15-24 years age group by 11.5%, 25-34 years old by 11.4%, 35-44 years old by 12.1%, and 45-54 years old by 13.5%(Badan Penelitian dan Pengembangan Kesehatan 2008, 2013). The prevalence of anemia in pregnant women in 2013 to 2018 is 11.8%(Badan Penelitian dan Pengembangan Kesehatan 2018).

Anemia has an impact on decreased performance, work productivity, endurance and threatens the safety of mothers and babies during pregnancy, childbirth, and the puerperium(Fadlun 2014; Kementerian Kesehatan Republik Indonesia 2016). The iron supplementation program in Indonesia has been implemented which aims to control anemia, but it has a weakness in that there is a lack of compliance with the reason that it causes dizziness, metallic taste, nausea, constipation and diarrhea(Kementerian Kesehatan Republik Indonesia 2014; Plianbangchang 2011; Vani Sethi, Monique Sternin, Deepika Sharma, Arti Bhanot 2017). The government program has not produced satisfactory results, it is evident that there is an increase in anemia sufferers. The content of cumin per 100 grams includes 66.36 mg of iron, 1270 IU of vitamin C, 10 µg of folic acid, and 44.24 grams of protein(Rudra Pratap Singh, Gangadharappa H.V 2017). This content can increase hemoglobin levels. Cumin research has been carried out on several experimental animals such as rats, ducks, sheep, chickens and rabbits.

## METHODS

### Search Strategy

Search for articles was carried out in the last 5 years (2015-2020) on the Science Direct database, and Google Scholar. The keywords used were *Cuminum Cyminum L* and Hemoglobin.

### Inclusion and Exclusion

The inclusion criteria included articles published in 2015-2020 both nationally and internationally with experimental research designs on *Cuminum Cyminum L* and hemoglobin. The exclusion criteria for articles were incomplete, duplicated, using languages other than Indonesian and English.

### Extraction Data

The author submits articles according to the inclusion, exclusion and selection criteria for article duplication. The results of the filtering are displayed in tabular form.

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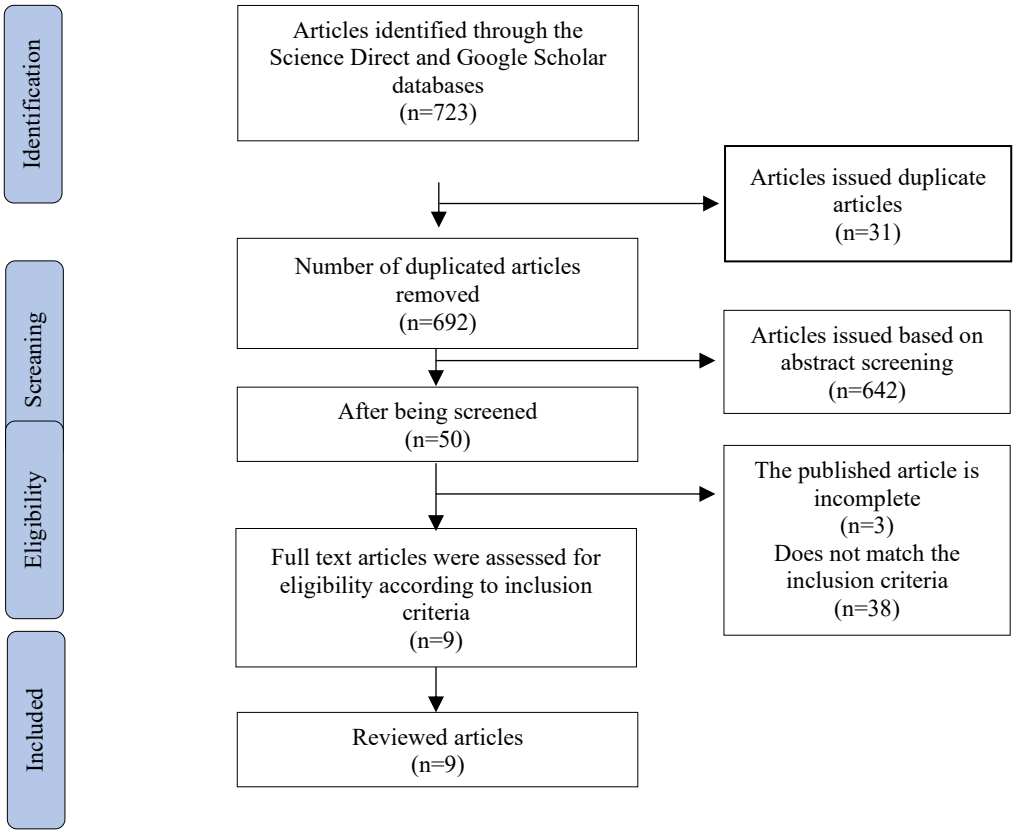


## RESULTS

The search results for articles used the keywords Cuminum Cyminum L and Hemoglobin in the Science Direct database and Google Scholar (n = 723). Articles identified as duplicates (n = 692). Articles were identified based on abstract screening (n = 50). Articles were identified as incomplete and did not fit the inclusion criteria (n = 9).

Table 1 Research article Cuminum cyminum L.

| No | Writer's name | Interventions and Comparisons | | Time | Population | Research result |
|---|---|---|---|---|---|---|
| | | Intervention | Comparison | | | |
| 1. | D. A. Chougule<br><br>2018(D. A. Chougule, D. T. Gaikwad 2018) | 1. Elemental iron containing 0.68 ml/kg suspension<br>2. Cumin extract 400 mg/kg<br>3. Microemulsion of caraway extract<br>Phenylhydrazine 30 mg / kg is injected for 2 days to induce anemia. | 1. Control | 15 days | A total of 24 albino mice were randomly selected (6 animals in each group) | Improvement was measured from day 0 and day 15 per group:<br>ΔHb (g/dl)<br>1. 11,9<br>2. 3,4<br>3. 5,8<br>4. 1,4 |
| 2. | Mohsen Taghizadeh<br><br>2017(Taghizadeh et al. 2017) | 1. Cumin essential oil at a dose of 250 mg/kg /day<br>2. Cumin essential oil at a dose of 500 mg/kg/day<br>3. Cumin essential oil at a dose of 1000 mg/ kg/day | 4. Without being given cumin essential oil | 23 and 45 days | 80 female Wistar rats | Comparison between the intervention group and the control group:<br>ΔHb (g/dL)<br>23 days<br>250 mg/kg/dl: 0,9<br>500 mg/kg/dl: 1,4<br>1000 mg/kg/dl: -0,4<br><br>45 days<br>250 mg/kg/dl : 0,4<br>500 mg/kg/dl: -1,2<br>1000 mg/kg/dl: -1,3 |

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|---|---|---|---|---|---|---|
| 3. | M. H. A. Alasadi<br><br>2020(Alasadi, Al-Salhie, and Al-Hummod 2020) | 1. 1 ml of cumin oil per kg<br>2. 2 ml of cumin oil per kg<br>3. 3 ml of cumin oil per kg | 1. Control | 8 weeks | 200 ducks | Comparison between the intervention group and the control group:<br>ΔHb (g/100ml)<br>1. 0,34<br>2. 2,24<br>3. 0,33 |
| 4. | Younes Esmaeil Jami<br><br>2015(Biosci et al. 2015) | 1. 7% Cuminum cyminum<br>2. 14% Cuminum cyminum<br>3. 21% Cuminum cyminum | 1. 0% Cuminum cyminum | | 36 Moghani rams | Comparison between the intervention group and the control group:<br>ΔHb (mg/dl)<br>1. -0,15<br>2. -0,75<br>3. -0,68 |
| 5. | Zahra Berrama<br><br>2017(Berrama et al. 2017) | 1. Regular feed and added with 0.2% cumin (Cuminum cyminum L.) in the form of a fine powder. | 2. Regular feed | 21 days | 440 chickens | Comparison between the intervention group and the control group:<br>ΔHb (g/dL): -0,53 |
| 6. | Majed Rafeeq<br><br>2016(Rafeeq et al. 2016) | 1. Basic diet + Cuminum cyminum 1%<br>2. Basic diet + C. cyminum 0.5%<br>3. Basic diet + 1% Foeniculum vulgare,<br>4. Basic diet + F. vulgare 0.5%<br>5. Basic diet + Achillea wilhelmsii 1%<br>6. Basic diet + A. wilhelmsii 0.5%. | 7. Basic diet | 42 days | 280 chickens | Comparison between the intervention group and the control group:<br>ΔHb (mg/100ml)<br>1. 1,46<br>2. 1,31<br>3. 1,08<br>4. 1,13<br>5. 1,22<br>6. 1,21 |
| 7. | Amr A. Gabr<br><br>2017(Gabr, Shalaby, and Rahma 2017) | 1. Rabbits are weaned at 21 days (GS21) and added for 6 days with a mixture of MCM (mixture of mentha (4 g), cumin extract (10 g) and fresh cow's milk). | 2. Rabbits weaned at 27 days (G27)<br>3. Rabbits weaned at 21 days (G21) | 6 days | 288 rabbits | Comparison between the intervention group and the control group:<br>ΔHb (g/dL)<br>2. 0,07<br>3. 0,31 |
| 8. | Shalaby, N. A<br><br>2016(Shalaby, Gabr, and Rahma 2016) | 1. Weaning at 21 days plus for six days with a mixture of MCM (mixture of Mentha extract (4 g) and Cumin (10 g) with cow's milk) fresh (GS21) | 2. G27: weaned at 27 days<br>3. G21: weaned at 21 days | 6 days | 288 rabbits Consists of four races (New Zealand White, California, Chinchilla and Rex). | Comparison between the intervention group and the control group:<br>ΔHb (g/dl)<br>NZW<br>2. -0,76<br>3. 0,07<br>California<br>2. 1,45<br>3. 0,17<br>Chinchilla<br>2. -0,1<br>3. 0,44 |
| 9. | Adel, A. Elmotty<br><br>2016(Adel, Tahan, and Sara 2016) | 1. Given 10% cumin<br>2. Give 10% ginger<br>3. Given 10% turmeric | 1. Regular diet | 4 weeks | 24 mice | Comparison between the intervention group and the control group:<br>ΔHb (g/L)<br>1. 1,24<br>2. 2,04<br>3. 3,14 |

## DISCUSSION

Cumin is one of the traditional spices that can be used as a cooking spice(Rudra Pratap Singh, Gangadharappa H.V 2017). Hemoglobin levels have decreased, there are 2 articles that use experimental animals sheep and rabbits. This article does not provide anemia treatment, but the increase in hemoglobin can be measured by comparing the treatment group and the control group(Berrama et al. 2017; Biosci et al. 2015). This is also found in

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several other articles in articles using experimental mice and animals. rabbits stated that there was an increase and a decrease(Shalaby et al. 2016; Taghizadeh et al. 2017). Articles stating that there was an increase in experimental animals ducks, chickens, rabbits, and rats(Adel et al. 2016; Alasadi et al. 2020; D. A. Chougule, D. T. Gaikwad 2018; Gabr et al. 2017; Rafeeq et al. 2016). Articles using experimental mice using the pre-post method on mice treated with phenylhydraz anemia 30 mg/kg for 2 days then given treatment according to groups treatment. Hemoglobin levels on day 15 indicated that the microemulsion group had an increase in hemoglobin levels compared to the extract group because the microemulsion containing cumin had low zeta potential, higher particle size and drug content and the percentage of transmission, was more stable and the iron content in 1 gram of extract. cumin as much as 0.57 mg/g, while the microemulsion contains 0.48 mg/g(D. A. Chougule, D. T. Gaikwad 2018). Hemoglobin levels have decreased and increased or both are influenced by the factor of cumin preparation related to the iron content in cumin after processing, the dose is how much must be consumed to achieve the desired results, while the duration of administration affects the treatment process or iron fulfillment. The experimental animal used will affect the results of the study because of differences in the body structure of each animal. Animals that are used are the same, but the types of animals are different, so the results will be different. Research subjects are very influential on the results of the study. The research used the subject in the form of experimental animals in accordance with the objectives and benefits of conducting research.

Every 100 grams of cumin contains 66.36 mg of iron, 1270 IU of vitamin C, 10 µg of folic acid, and 44.24 grams of protein(Rudra Pratap Singh, Gangadharappa H.V 2017). Iron is an ingredient in the formation of hemoglobin along with vitamin C which plays a role in helping the reduction process and increasing the absorption of nonheme iron by up to 4 times(Almatsier 2009; Ciesla 2012; Robert K. Murray, Daryl K. Granner 2009). The iron that has been absorbed in the proximal duodenum is then converted into $Fe3^+$ and bound by ferritin, while the other part is basolateral $Fe2^+$ transporters and is carried to the bloodstream assisted by hephaestin. Hephaestin has feroxidase activity to free iron from cells, so that $Fe2^+$ is converted into $Fe3^+$, the form that is transported by transferrin to plasma(Robert K. Murray, Daryl K. Granner 2009). Transferrin is a protein that is formed in the liver that helps deliver iron to erythroblasts in the bone marrow. Transferrin receptors on pronormoblasts bind to iron so that iron molecules can begin to fuse into heme molecules during erythropoiesis(Ciesla 2012). Folic acid is a component that plays a role in the process of maturing red blood cells. Folic acid plays a role in DNA synthesis which is needed for the formation of thymidine triphosphate. Thymidine triphosphate is one of the essential building blocks of DNA. The purpose of fulfilling folic acid in red blood cells is that the red blood cells produced are mature and perfect so that they have a normal life span(Hall 2016). Protein as a component of the formation of red blood cells.(Ciesla 2012) Protein functions for the synthesis of globin, part of cellular protein and hemoglobin. Protein deficiency can affect hemoglobin synthesis(Aris, Tarwoto 2009). In membranes, protein deficiency can reduce the strength, elasticity, and flexibility of the membrane(Huether and McCance 2014). The content of cumin can be sufficient and helps the absorption and formation of hemoglobin in the blood.

## CONCLUSION

Cumin contains 66.36 mg of iron, 1270 IU of vitamin C, 10 µg of folic acid, and 44.24 grams of protein. The content of cumin can increase hemoglobin levels in the blood.

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