

# The effect of fixed oil and water extracts of *Nigella sativa* on sickle cells: an *in vitro* study

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## ABSTRACT

**Introduction:** Various drugs have been investigated in the treatment of sickle cell disease (SCD), such as hydroxyurea, piracetam and calcium antagonists. Most of these drugs are potentially toxic and are not suitable for long-term therapy. Recently, *Nigella sativa* (NS) has been reported to have calcium antagonist and antioxidant activities, both of which play a role in the management of the disease. This study aimed to investigate the *in vitro* antickling effect of extracts from NS.

**Methods:** Thirty-two patients with SCD, aged 7–47 years old, were recruited for the study. A total of 3 ml of venous blood was collected from each patient and divided into six tubes with heparin. The blood was mixed with 0.5 ml of either 0.1 percent, 0.05 percent or 0.01 percent v/v of the oil extract of NS. A slide was prepared by spreading a drop of treated blood, covered with a cover slide to ensure the complete deoxygenation condition. The separation of irreversibly sickled cells (ISCs) was performed on eight patients by a density gradient (Percoll-Renografin) centrifugation method.

**Results:** The 0.1 percent v/v concentration of the oil extract of NS resulted in an approximately 80 percent reduction in the formation of sickle cells. The 0.05 percent v/v concentration of NS produced an intermediate effect, while the 0.01 percent v/v concentration had no effect on the formation of sickle cells. The 0.1 percent v/v concentration of the fixed oil of NS led to a considerable reduction in the formation of ISCs.

**Conclusion:** The fixed oil extracted from NS seeds has an *in vitro* antickling activity.

**Keywords:** antioxidant, antickling, fixed oil

extract, *Nigella sativa*

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## INTRODUCTION

Sickle cell disease is a social problem in the southern part of Iraq. A clear estimate of the prevalence of the disease is not well documented. However, in a recent study in Basrah, it was estimated that the frequency of the sickle cell trait was 0.9%.<sup>(1)</sup> The disease varies in severity and usually presents as vaso-occlusive crisis with severe pain and disability, or as haemolytic crisis with permanent anaemia. As a hereditary disease, no specific drugs are yet available; however, the use of various drugs such as hydroxyurea, piracetam, calcium antagonists and others has been tested against this disease.<sup>(2,3)</sup> The oral administration of hydroxyurea has been attempted *in vivo* and showed promising results. This effect is either due to an increase in the content of foetal haemoglobin (HbF),<sup>(4)</sup> or due to its antioxidant effect,<sup>(5)</sup> but as a cytotoxic drug, it has potentially toxic reactions. Therefore, long-term administration, especially in children, should be carefully monitored. The calcium antagonist drugs, verapamil and nifedipine, have been tested as well, but for these drugs to attain antickling plasma levels, high doses need to be administered. Such levels cannot be attained without severe side effects. The present study originated from the increasing evidence that the oil of *Nigella sativa* contains antioxidants,<sup>(6,7)</sup> as well as calcium antagonist activities,<sup>(8)</sup> both of which are known to play a role in sickle cell disease.

Thus, this *in vitro* study was undertaken to investigate the effect of extracts from *Nigella sativa* on the blood obtained from patients with sickle cell disease.

## METHODS

A total of 32 patients with sickle cell disease were recruited for the study during their consultation at the outpatient department at Basrah Teaching Hospital, Iraq, for minor illnesses as well as for inpatients who had been admitted for a painful crisis. The study was explained to the patients, and written informed consent was obtained. The age of the study population ranged from 7–47 years.

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