Children with sickle cell suffer more severe malaria

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Normal red blood cell (background, coloured red) and red blood cell affected by sickle-cell anaemia (foreground, coloured red). Credit: EM Unit, UCL Medical School, Royal Free Campus, Wellcome Images

The sickle cell trait is known for its protective effect against developing malaria. But new research warns that children with sickle cell anaemia are more likely to die from severe malaria.

Researchers from the Kenya Medical Research Institute (KEMRI) found that children with sickle cell anaemia have a "considerably higher" mortality rate than non-sickle cell sufferers when hospitalised with malaria.

Their findings indicate that sickle cell disease, which affects the shape of a patient's red blood cells, is very much a double-edged sword for children in Africa. Those with sickle cell trait (who carry one copy of the sickle cell gene) benefit from a protective effect against malaria. But those with full sickle cell anaemia (two copies of the sickle cell gene) not

only suffer severe health problems, but also a "massively increased" risk of death if they do develop malaria.

"Much is known about sickle cell disease in Europe and North America, where children born with the condition can now expect to live long and relatively healthy lives," says Dr Tom Williams of KEMRI, who led the study. "Paradoxically however, little is known about the health problems of children with sickle cell disease in Africa - where more than 90 per cent of patients are born."

Malaria is actually considered a major cause of death for such children, but few studies have investigated this.

In the new study, researchers looked at data from four large-scale demographic studies conducted in the Kilifi district on the coast of Kenya, at various periods between 1996 and 2008.

The first part of the study looked at around 1000 children under the age of five admitted to hospital with uncomplicated Plasmodium falciparum malaria, compared with 1000 children admitted to hospital for other conditions.

The second part looked at 1700 children under five years of age with severe malaria (that is, malaria complicated by symptoms such as breathing difficulties or coma). In addition, the researchers also studied a group of 1800 children admitted with bacteraemia (bacteria in the blood).

Comparing the frequency of the sickle cell gene in the groups, they found that severe anaemia was "considerably more common" in those diagnosed with severe malaria. Moreover, mortality was considerably higher.

The researchers note that they didn't find any strongly increased risk of contracting malaria in children with sickle cell anaemia, but the high mortality makes it likely that such an association is there. They argue that a larger, more detailed study may provide the evidence needed. They also warn that susceptibility to malaria is likely to increase as a patient's spleen - which helps remove malaria parasites from the blood, but which is particularly vulnerable in sickle cell anaemia - deteriorates with age.

This comes on top of other severe health problems associated with the condition. The researchers found that four times as many sickle-cell children were admitted to hospital for nonmalarial illnesses than non-sickle cell children, rising to eight times for bacteraemia.

"Although sickle cell disease is relatively rare, affecting only about one per cent of African populations, it is likely to constitute a major health burden as mortality falls from other diseases in the years ahead," said Dr Williams. "It's critical that we gain a better understanding of the health needs of African children with sickle cell disease as soon as possible."

More information: McAuley CF et al. High mortality from Plasmodium falciparum malaria in children living with sickle cell anaemia on the coast of Kenya. *Blood* 8 June 2010. Published online ahead of print.

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