Anaemia in Sri Lanka: the missing pieces

Introduction

Anaemia is a major public health problem contributing significantly to maternal and child morbidity and mortality. Globally 25% of the world’s population is affected by anaemia, of which half is due to iron deficiency [1]. Any efforts to mitigate this would be justified by the sheer numbers affected and the impact on global health.

Each county is likely to have different causes of anaemia contributing to the disease burden of that community. It would be inappropriate to apply global statistics to any country and more so to decide public health policy without studying local dynamics.

There are many studies conducted in Sri Lanka assessing prevalence of anaemia in the community [2-6]. Most studies are small and regional with only a few covering the whole island. Some researchers have studied prevalence of anaemia without attempting to identify the cause, whilst most have attempted to identify the role of iron deficiency as a cause of anaemia [2,4,6]. Few others have attempted a broader assessment of micro nutrient deficiencies contributing to anaemia [3,5]. Most of these anaemia surveys have an inherent weakness in ignoring the contribution of non-nutritional causes.

The occurrence of \( \beta \) thalassaemia was first reported in Sri Lanka in 1950 and description of haemoglobin variants Hb E, Hb S and Hb D had been reported by mid-1980 [7-10]. Most of these were restricted to case reports or case series and did not attempt to quantify the disease burden of haemoglobinopathies in the community. The public health specialists largely ignored the existence of haemoglobinopathies and these entities were not included in any of the early anaemia surveys.

The first national epidemiological survey of haemoglobinopathies carried out in 1997 identified that the prevalence of \( \beta \) trait was about 2.2% and that of haemoglobin variants Hb E and Hb S was 0.5% or less [11]. This survey highlighted the burden of haemoglobinopathies in the country but was limited by not being comprehensive enough to include prevalence of \( \beta \) thalassaemia in the survey.

Recent studies have begun to address the contribution of haemoglobinopathies in assessing anaemia burden in the community. In a survey...
conducted in 2012, in children aged between 6-59 months, iron deficiency anaemia accounted for only 48% of the causes whilst β thalassaemia accounted for 12%. In a further 30% with hypochromic microcytosis the cause remained undetermined [5].

The island-wide Haemoglobinopathy and Iron Deficiency Survey (HIS) was carried out between 2009-2010 in an adolescent population of 7526. This survey reports that iron deficiency (defined as low serum ferritin and raised soluble transferrin receptors (sTFr)) occurred in 34.9% of the population, but iron deficiency anaemia occurred only in 3.9% of them β thalassaemia and deletional forms of α thalassaemia explained anaemia in another 3% of the population and in another 3% anaemia could not be explained by the above two mechanisms [12]. The same study analysing the cause of low red cell indices in 1963 individuals reported that iron deficiency accounted for 37% of cases and α thalassaemia accounted for a further 21%. In 36% of cases the cause could not be attributed to either iron deficiency or haemoglobinopathies [13]. This study highlighted the hitherto unknown contribution of α thalassaemia to low red cell indices and anaemia in Sri Lanka [13].

What disorders might be causing low red cell indices and anaemia that is not due to iron deficiency or α or β thalassaemia, highlighted in the Haemoglobinopathy and Iron Deficiency Survey?

The HIS did not envisage analysing other nutritional anaemias like folate or B12 deficiency. Previous community surveys done in Sri Lanka have identified high prevalence of these micronutrient deficiencies [3,14]. α thalassaemias occurring due to mechanisms other than the two commonest mechanisms of α3.7 and α4.2 deletions were not studied in the HIS. A novel deletional αβ thalassaemia was reported from Sri Lanka previously [15]. There are over 70 types non-deletional α thalassaemia identified worldwide and it would not be surprising if a few of these were identified in Sri Lanka.

The bigger concern is the lack of systematic studies of other red cell disorders in Sri Lanka. Community prevalence of membranopathies and enzymopathies in Sri Lanka are not known. In India, studies suggest that G6PD deficiency occurs at a rate varying from 2% to 13% in different states [16]. Studies of other enzymopathies and membranopathies have been carried out at expert centres [17]. Research in this field in Sri Lanka is very limited. In 1968 a study of patients admitted to Kegalle Hospital using the screening technique of methaemoglobin reductase (Brewers test) postulated the presence of G6PD deficiency in 1.26% of males and 1.28% of females [18]. The results are surprising given the fact that G6PD deficiency is an X-linked recessive disorder and the study identified a higher prevalence in females. It may be that co-existing oxidative unstable haemoglobins like Hb E would have resulted in false positive results. In a more recent study from hospital attendees from Anuradhapura and Kurunegala, 14% of female and 8% of males, were found to be G6PD deficient [19]. The technique used for the analysis of G6PD enzyme deficiency was a WST-8/1-methoxy PMS method. This technique, unlike the Brewers test, is not affected by haemoglobinopathies. Surprisingly here too more females were affected than males.

The above-mentioned studies did not attempt to assess the degree of anaemia in the patient cohorts and thus it is difficult to make a judgment on the contribution of G6PD deficiency to anaemia burden in Sri Lanka. Quite distressingly, even 50 years after the first studies of enzymopathies there are no established centres, which have the capability to study the full spectrum of membrane disorders and enzymopathies in Sri Lanka. This is in a backdrop where most developed research centres analyse these haemolytic anemias using next generation sequencing [20].

Developing research capabilities will be essential if we are to understand the true burden and the causes of anaemia in the community. It is imperative that policy makers understand the complexity of the causation of anaemia in the community and the technical and design limitations of available research studies, to prevent implementing misguided policy decisions.

**Conflicts of interest**

Authors declare that they have no conflicts of interest.

**References**


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