Case Report

An Indian Female with Heterozygous Haemoglobin D Iran : A Rare Haemoglobinopathy

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Abstract

Background : Haemoglobin D Iran variant is very rare in India, in heterozygous as well as homozygous forms. Here we report a 32 year old female who visited home clinic for day to day complaints of weakness and fatigue. On analysing the blood sample using High Performance Liquid Chromatography (HPLC), Haemoglobin A2 window displayed area percentage of 47.7%. As Hb D Iran elutes in the Hb A2 window, constituting usually more than 40% of the total Haemoglobin with a range of 40 to 48%, so it's confirmed our diagnosis as Hb D Iran heterozygous.

Key words : Haemoglobinopathy, Hb D Iran, High Performance Liquid Chromatography, Haemoglobin Variant.

Haemoglobinopathies is a group of disorders in which there is abnormal production or structure of the Haemoglobin molecule. It's passed down through families. Haemoglobin D is a rare form of Haemoglobinopathy in homozygous as well as heterozygous form.

Phenotypically Hb D Iran heterozygous present as a asymptomatic carrier state and genotypically it's described as beta 22 – Glu-> Gin(GAA ->CAA). Haemoglobin D Iran first described in 1973 and found in Pakistani and Iranian families. In India it's seen in north western regions, particularly in Punjab. The present case report describes a rare case of heterozygous Hb D Iran in 32 years old lady from Kota, Rajasthan.

Case Report

We report a case where we unexpectedly found a young female patient to have Haemoglobin D Iran heterozygous. My patient was a 32-year-old Indian Hindu female, who visited home clinic with complaints of weakness and fatigue of long duration. On Clinical examination she looked pale but there was no history of chronic blood loss. Blood sample of patient collected and sent for complete blood counts and peripheral blood film detail study. Complete blood count was done using automated blood analyser. Finding of complete blood count and PBF detail study were suggestive of microcytic hypochromic anemia with Haemoglobin value of 6.8 gm%. The sample was further subjected to haemoglobin detection using High Performance Liquid Chromatography based haemoglobin typing system. The high performance liquid chromatography report displayed haemoglobin A2 window with variant percentage being 47.7% with retention time of 3.06 minute as shown in Fig 1.

After the diagnosis was made, it was conveyed to the patient and counselled regarding the condition and advised her to have her children screened for the same.

Editor's Comment :

- Heterozygous Haemoglobin D Iran represents an asymptomatic carrier state; however, accurate identification is essential for appropriate genetic counseling and population screening, particularly in regions with higher prevalence. High Performance Liquid Chromatography (HPLC) is a useful initial screening modality, while molecular genetic analysis remains the definitive diagnostic gold standard.

Discussion

It was Itano in 1951 who first described a group of Haemoglobinopathy in a white family and classified it as Haemoglobin D (Hb D)[1]. After two decades in 1973 Rahbar independently found a substitution of Glutamic acid -> Glutamine (GAA -> CAA) at beta 22 and labelled it as haemoglobin D- Iran[2].

In our case, the retention time of the Variant Haemoglobin on HPLC (3.06 min)which was slightly differ with the finding of Joutovsky A, *et al* (3.49 min) but was quite distinct from the retention time of Hb A2 (3.63 min), Hb E (3.69 min) and Hb Lepore (3.37 min)[3]. In our HPLC instrument, there are separate window-D (for Hb D Punjab), window-S (for Hb S), window-C (for Hb C) but limitation of HPLC is that, it cannot differentiate between Haemoglobin D Iran, Haemoglobin A2, Hb Lepore and Hb E, as all of these Haemoglobin elutes in the same A2 window.

Various studies have reported that the quantity of Hb D Iran elating in the Hb A2 window in HPLC varies from 36.0 to 47.7% in a heterozygous condition while in compound heterozygous states the quantity varies between 47.3 to 94.4 %[4-8]. Similar to results of these studies, in our case also percentage area of eluting in the A2 window in HPLC was 47.7% which is suggestive this case as a heterozygous Hb D Iran.

Similar study done by Seema Rao, *et al*[9] reported mean percentage area of Hb D Iran (40.6%) which was close to value of our case (47.7%) made us suspect of Hb D Iran.

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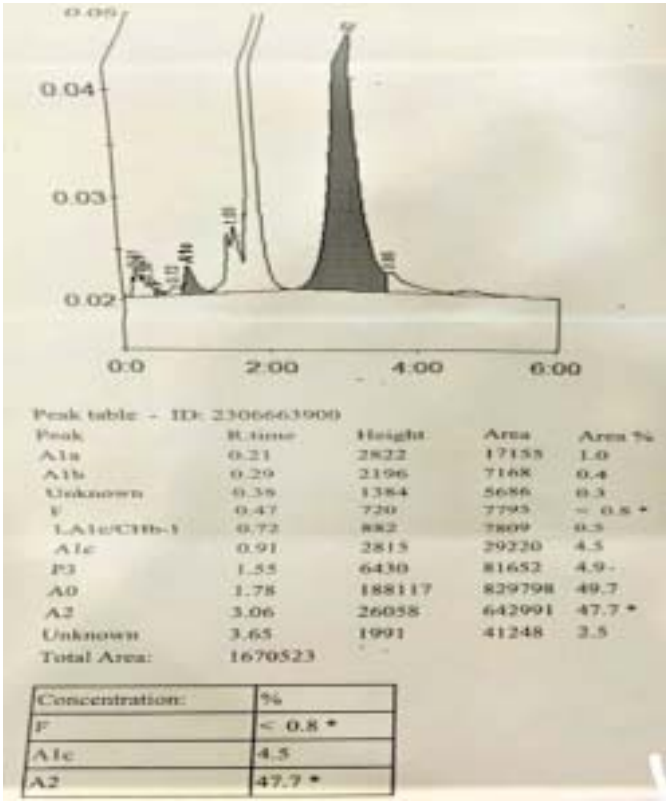

Fig 1 — Chromatogram of the patient

As per Bio Rad Library of abnormal Haemoglobin version 3, the abnormal Hb in A2 window is most likely due to Hb D Iran or Hb E, which elutes closely at that position. However, Hb D Iran was considered to be a better possibility in view of the amount of this abnormal Haemoglobin to be between 38 to 48%, similar to our case. In case of Hb E this percentage area may be between 22 to 36%.

Limitation of our study was that we could not perform DNA analysis for further confirmation of Hb D Iran as DNA analysis was too much costly and patient financial condition didn't allow for that.

Conclusion

Although Hb D Iran heterozygous is an asymptomatic carrier state but diagnosis is necessary for research purposes as well pre-conceptional or neonatal screening programmes. Cation exchange High Performance Liquid Chromatography (HPLC) is emerging as a method of choice for the initial screening of such type of Haemoglobinopathies. However, gene sequencing still remains the gold standard and can be done for further study in this field.

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