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Estimation of Haemoglobin in Postmortem Period: A Preliminary Study

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Abstract

Anaemia is prevalent in Indian women. Moreover, presence of anaemia is a leading cause of maternal death. The aim of the present study is to evaluate haemoglobin level in postmortem period and assess its utility in anaemic deaths. The material comprised of 10 cadavers with known time of death. All these cases have haemoglobin estimated prior to death. Estimated haemoglobin more than 24 hours prior to death was excluded from the study. These cadavers consist of 10 female with age varied from 20 years to 46 years (mean age 30.3 years). Estimation of haemoglobin in conjugation with blood smear study may give fair idea regarding the status of anaemia in maternal deaths.Up to 3 hours postmortem interval all samples show decrease in haemoglobin content.

Keywords: Death; Anaemia; Haemoglobin; Forensic; Blood.

Introduction

Anaemia is prevalent in Indian women [1]. Moreover, presence of anaemia is a leading cause of maternal death [2]. In hospitalized patients it is relative easy to estimate haemoglobin or other parameters and treat the patient accordingly. If patient dies in spite of treatment then it is easy for clinician to certify such deaths. Many times such patients with history of anaemia are brought in emergency department and they are declared dead on arrival or treated for brief period. Such patients are referred for forensic postmortem examination. During autopsy gross examination of organs and microscopic examination of tissues are studied and accordingly cause of death is provided. But in this entire exercise, anaemia though present, receives seldom attention. Perusal of literature reveals that few studies were conducted to estimate haemoglobin in postmortem period [3]. Considering this the aim of the present study is to evaluate haemoglobin level in postmortem period and assess its utility in anaemic deaths.

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Material and Methods

The material comprised of 10 cadavers with known time of death. All these cases have haemoglobin estimated prior to death. Estimated haemoglobin more than 24 hours prior to death was excluded from the study. These cadavers consist of 10 female with age varied from 20 years to 46 years (mean age 30.3 years). Total 70 samples were analysed. In each case 10 ml blood was collected without adding any preservative in polycarbonate tubes. All samples were maintained at room temperature. Sequential analysis of blood for estimation of haemoglobin was done at interval of 3 hour, 6 hour, 12 hour, 24 hour, 36 hour, 48 hour and 60 hour in postmortem period. The haemoglobin content was determined by the visual method described by Sahli and test done by using Sahli'shemoglobinometer (Fig 1).

Results

The antemortem value and postmortem value of haemoglobin in different postmortem interval (PMI)

is shown in table 1. Up to 3 hours PMI all samples show decrease in haemoglobin content (Fig 2). At the end of 6 hours PMI, 90% of samples show increase in haemoglobin content than the 3 hour PMI content and only 10% sample show decrease in haemoglobin content. From 12 hours PMI, the haemoglobin content show different values. About 30% of samples show increase in haemoglobin content than the 6 hour PMI whereas 70% samples show decrease in haemoglobin content over the same PMI. After 24 hours PMI the values become erratic with varying results. After 36 hours PMI decomposing smell begins to appear and after 60 hours PMI the blood becomes unsuitable for the test.

Table 1: Showing antemortem and postmortem haemoglobin value in (%)

Case number	Antemortem haemoglobin (%)	Postmortem haemoglobin (%) in hours						
		3	6	12	24	36	48	60*
1	11.3	7.5	8.5	7.5	7.8	8	9	8.5
2	8.3	7.5	12.5	10	11	9	8.5	11
3	12.5	8.5	12	8	11	12.5	9.5	6
4	10	6.4	9	10.5	11.5	12.5	8	5.5
5	12	9.5	11	13	14.5	13.5	11	9
6	12.5	8.5	5.5	8	9	11	9.5	8
7	13.2	11.5	12.6	8.5	13	10.5	10.1	6.8
8	13	10.8	11.2	7.5	9.2	10.5	9.5	10.5
9	10.5	9.2	10.5	13	15.2	11.5	9.5	11
10	11.5	8.8	11.2	9.2	10.5	13.2	12.6	9.5

* Blood not suitable for estimation

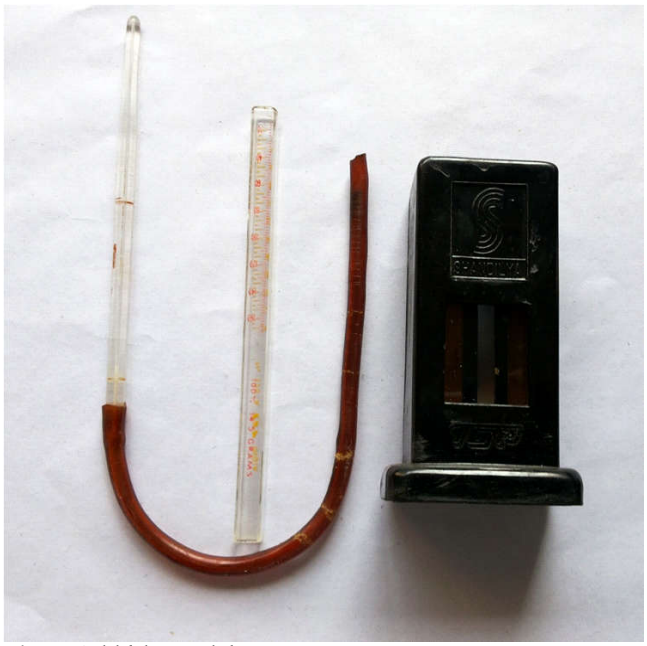

Fig. 1: Sahli'shemoglobinometer

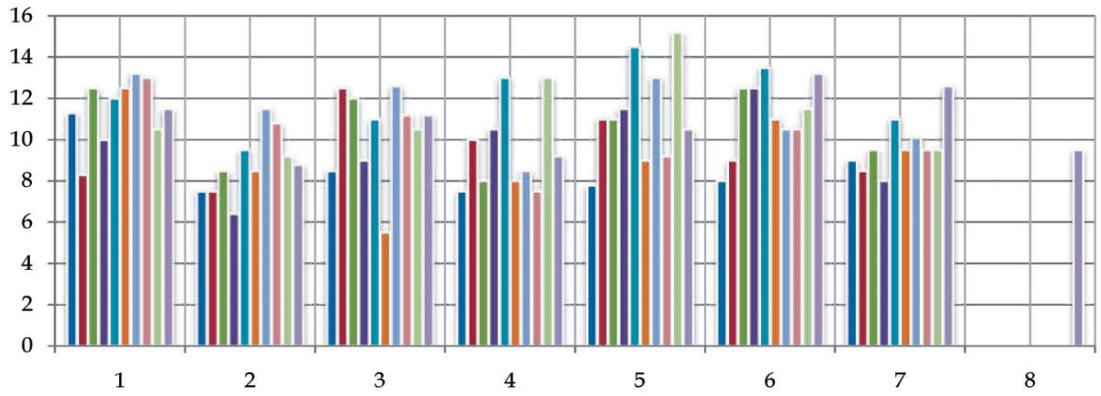

Fig. 2: Postmortem value of haemoglobin in postmortem period in different hours

Discussion

Utility of measuring haemoglobin in postmortem period assumes greater importance in cases which are declared dead on arrival and involves medicolegal formalities especially in maternal deaths with anaemia. Estimation of haemoglobin in conjugation with blood smear study may give fair idea regarding the status of anaemia in maternal deaths. The present study was conducted to measure the haemoglobin in postmortem period and to compare with the antemortem value. But the results are disappointing and erratic. For the first three hours PMI there is fall in haemoglobin content but after this period no reliable measurements could be obtained. When compared the present study with study of Laiho et al (1981), which was conducted in Finland, the researchers had noted the haemoglobin content remained quite steady up to PMI of 168 hours and thereafter started decreasing [3]. The mean haemoglobin content in 0 to 12 hour PMI was about 10 gm% while in the PMI of 120 to 168 hours the mean value was 10.5 gm%. They had studied 123 human cadavers stored in a mortuary cold room at about 4^{O}C. The results of present study are not in agreement with the cited study. The difference in the results could be attributed to temperature difference. The present study was conducted in summer months where mean environmental temperature was about 32.3^{o}C. Similarly we had not used any preservative to preserve the blood and the blood samples were kept at room temperature. Considering our environmental conditions, the blood gets rapidly decomposed and therefore result obtained at Finland cannot be reproduced in India. The other aspect is that Laiho et al (1981) had used cyanmethaemoglobin method to determine haemoglobin content whereas in the present study we had employed method described by Sahli [3].

The major Limitations of present study were (1) small sample size; (2) evaluation of samples in uniform environmental conditions i.e. in an ambient environmental temperature of 32.3^{0} C and (3) the study had not considered the clinical interventions like fluid or volume overload, or blood transfusions. Though the results of present study are not encouraging beyond three hours PMI, but one can attempt further study with large sample size with contemporary laboratory method to estimate haemoglobin content.

Conclusion

Estimation of haemoglobin in early PMI of 3 hours is reliable one and there is fall in the haemoglobin content as compared with antemortem value.After 3 hour PMI the results obtained are erratic and non-reliable and therefore caution to be exercised while interpreting the results.

References

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