INTRODUCTION
Pathology laboratories play a central role in patient care and diagnosis. Though there is lot of automation in haematology and clinical pathology labs, still there are many variables which can influence the lab results [1]. Correct reporting requires that all the phases i.e. pre-analytical [1–5], analytical and post–analytical [6] should be free from errors, as far as possible. Earlier, it was required that main emphasis on quality be made in analytical phase, but it is equally important that it be recognized in all phases [7]. It has been estimated that up to 62 % errors happen during pre-analytical phases [8]. In another study, 93 % errors occurred during pre-analytical and post–analytical phases combined [9]. The aim of this study was to survey preanalytical procedures to find sources of error and their relative frequencies in the haematology laboratory of the hospital, associated with our medical college, so that corrective actions could be taken.

MATERIAL AND METHODS
Current study was a retrospective one and it was carried out in haematology unit of Chatrapati Shivaji Hospital; an 800 bedded hospital associated with Subharti Medical College, Meerut. Duration of study was one year, from Jan 2011 to Dec 2011. All samples received during this period in haematology section of the laboratory were included. Sample collection for OPD patients was centralized for different sections of central laboratory, like haematology, clinical pathology, biochemistry and microbiology units. IPD samples were collected in wards, ICUs and OTs and transported to IPD sample collection centre by attendants of the respective wards. From collection centres, samples and forms were distributed to various units of the central lab for analysis.

Total samples received in haematology unit were 135808, out of which 73825 were from OPD patients and 61983 were from IPD patients. Samples were collected using vacuum collection tubes. Following categories of pre-analytical data were available for study period.

1. Misidentification (incorrectly labeled vials or incorrectly filled forms).
2. Incorrect samples ( wrong choice of vials).
3. Clotted samples.
4. Inadequate samples.
5. Diluted samples.
6. Haemolysed samples.

Data for time delay was not available. The reason for doing a retrospective study was to find out preanalytical variables and sources of errors occurring in our laboratory. CMEs and workshops were planned for all laboratory staff, as well as for doctors and nurses. A prospective study was planned to measure the outcome of all these exercises.

RESULT
A total of 135808 samples were received in haematology lab during this period, out of which in 1339 samples, preanalytical errors were found, which constituted 1 % of all samples.

CONCLUSION:
Highest number of samples were rejected due to misidentification, that is 0.35 % and least number were rejected due to dilution of the samples, that is 0.04 %.

<table>
<thead>
<tr>
<th></th>
<th>IPD</th>
<th>OPD</th>
<th>IPD+OPD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Samples</td>
<td>61983</td>
<td>73825</td>
<td>135808</td>
</tr>
<tr>
<td>Misidentification</td>
<td>289</td>
<td>193</td>
<td>482</td>
</tr>
<tr>
<td>Incorrect vials</td>
<td>149</td>
<td>72</td>
<td>221</td>
</tr>
<tr>
<td>Clotted sample</td>
<td>102</td>
<td>128</td>
<td>180</td>
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<tr>
<td>Inadequate sample</td>
<td>136</td>
<td>0.17</td>
<td>264</td>
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<tr>
<td>Diluted</td>
<td>58</td>
<td>58</td>
<td>116</td>
</tr>
<tr>
<td>Hemolysed</td>
<td>95</td>
<td>39</td>
<td>134</td>
</tr>
<tr>
<td>Total</td>
<td>829</td>
<td>510</td>
<td>1339</td>
</tr>
</tbody>
</table>

| [Table/Fig-1]: Percentage of preanalytical errors IPD & OPD samples |
In our study, pre-analytical errors were found in approximately 1% of total samples in haematology, which were comparable to those seen in other studies, but this was too high, because it meant that in one out of every 100 samples was erroneous, even before start of the testing procedure. We compared the results of our study with those of by Chawla et al., [1], [Table/Fig-2] performed in clinical chemistry laboratory in a big hospital in India, which showed that most of their results were comparable with those of our study.

As a first step, we organized a CME on preanalytical errors for all the doctors and paramedical staff of our institute. In this, we discussed various preanalytical variables, including necessity of using paediatric blood collecting vials. It was quite informative to all the staff. Outcomes of these types of CMEs will be presented in due course of time.

**CONCLUSION**

Though there is a lot of development in analytical phase of testing in pathology labs, many errors still occur and they will continue to occur in pre-analytical phase, as there is human intervention in every step, right from filling the requisition form to receiving and preparing the samples for analysis. The better practices reported by the laboratory staff are likely to be the result of quality improvement initiatives undertaken in the laboratories. Competency checks should be done for improvement in the preanalytical phase, after regular training programmes are provided to the staff. This would result in a definite level of competence among sample collecting and lab staff. Standardization, training and collaboration between laboratory and wards can all reduce preanalytical errors. For success of these initiatives, getting active support from top management is probably a key factor. Furthermore, quality improvement in healthcare is an evolutionary process involving continuous adaptation to organizational factors. Some suggestions can be made for quality improvement in the laboratories –

*Providing sampling procedure education to all concerned staff.
*Coordination between lab and ward staff.
*Daily registration and analysis of preanalytical errors occurring in the lab.
*Issuing of competency certificate for trained staff.
*Computerization of the laboratory.

With proper training to staff, preparing and adhering to pre-analytical quality manuals, better communication with clinical staff at all levels, pre-analytical errors can be minimized to a certain extent.

**REFERENCES**


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