INTRODUCTION

Fixed dose combination (FDC) is a combination of drugs that includes two or more active pharmaceutical ingredients combined in a single dosage form. Such combination of drugs being used in wide range of conditions and are also used in the treatment of HIV/AIDS, tuberculosis, malaria, etc., which are considered to be foremost infectious disease threats in the world [1]. The Food and Drug Administration, the USA defines a combination product as a product composed of any combination of a drug and a device or a biological product and a device or a drug and a biological product or a drug, device, and a biological product [2].

Fixed ratio combination products are acceptable only when the dosage of each ingredient meets the requirement of a defined population group and when the combination has a proven advantage over single compounds administered separately in therapeutic effect, safety or compliance [3]. The use of FDCs is associated with many advantages such as synergistic action, increased efficacy, improved patient compliance, and reduced adverse effects. However, it also has some disadvantages such as additional side effects and mismatched pharmacokinetics; different clinical indications for different ingredients, delayed action of components, contraindications of one compound can cause contraindication of whole product, etc. [4].

Because of advantages, FDCs are accepted worldwide and used widely. The WHO has prepared some guidelines for the use of FDCs and also have declared a list of it [5]. However, many irrational FDCs are also present in the market and are used rampantly [6]. The rationality of FDCs is based on certain aspects which are as follows [7].

- The combination should not have supra-additive toxicity of the ingredients.

Studies regarding the use of FDCs have been conducted in Gujarat [8] and other states of India. Some meta-analysis studies are also done for this topic. As no such studies have been conducted in this area, we conducted this study in our teaching hospital. The study aims to collect information about the use of FDCs in medicine outpatient clinic in the Krishna Hospital, Karad. The study is conducted over a period of 6 weeks. This study would help us - to evaluate prescribing pattern of FDCs and to analyze their rationality.

METHODS

The study was conducted in the Department of Medicine, Krishna Hospital, Karad. This is a prospective cross-sectional study which was conducted over a period of 6 weeks in the medicine outpatient department (OPD) from May 2015 to June 2015.

The patients for the study were selected by following criteria.

Inclusion criteria

Patients who visited the medicine outpatient clinic in the study period, prescription given only by the consultant and patients who agreed to give informed consent are included in the study.

Exclusion criteria

Patients not willing to give the informed consent are excluded from the study.

The data were collected on every working day of the hospital. This cross-sectional study was started after approval by the institutional ethical committee. We got 83 patients according to our inclusion and exclusion criteria. All patients visiting the medicine OPD during the study period...
and the prescriptions from consultants only were considered. The data were collected on data record form. The sociodemographic details such as age, sex, occupation, chief complaints, and prescribed drugs with dosage were recorded. The total number of FDCs prescribed was calculated. The data obtained were subjected to descriptive statistical analysis using Microsoft Excel.

RESULTS
A total of 83 patients included in the study according to inclusion and exclusion criteria. Percentage of prescribed FDCs as compared to total drug prescribed is shown in Table 1. Rationality of FDCs calculated as per the WHO list of essential drugs and the results of this are shown in Table 2. In Table 3 system wise distribution of prescribed FDCs is shown.

DISCUSSION
The objective was to study the prescription pattern of FDCs in medicine outpatient clinic at Krishna Hospital, Karad and also to find out the rationality of prescribed FDCs.

According to our study, out of 83 prescriptions, 64 prescriptions had FDC formulations. Thus 77.13% of prescriptions contain FDC Formulations. The total number of FDCs prescribed is about 39.92%, i.e., out of 287 drugs (from 83 prescriptions) 111 are FDCs. In a similar study conducted in Gujarat, out of 1170 prescriptions, 941 contained FDC formulations, i.e., 80.3%. Therefore, comparison of both the studies shows that the percentage of use of FDCs is nearly the same [9]. As our study was conducted in OPD, the majority of prescriptions were given by oral route. Some were topical preparations.

As per drug category analysis, a higher number of FDCs containing nutritional supplements were used (47.74%). While, 27.02% of FDCs were given for cardiovascular complaints. Our results differ from the study by Balat et al. as their study concludes that 20.2% FDCs contain nutritional supplements and 18.1% for central nervous system.

Among all the FDCs, about 70.28% of them were irrational according to the list of FDCs approved by Drugs Controller General of India, November 2014. This number is higher by 10% from the study conducted in Gujarat [8]. From the prescribed FDCs only 4 are included in the WHO list of essential drugs, 2015. In the study conducted by Bangalore et al., it was found that compliance of patient is better with FDCs [9]. Our study was conducted for short duration; it will not represent the entire population. There is no follow-up in our study, so we could not compare the compliance and adverse drug reaction profile of two types of formulations. We will extend this study to observe the compliance, efficacy, and adverse drug reaction profile of FDCs for long duration.

CONCLUSION
FDCs used are about 39.92%. Most of the FDCs are used as nutritional supplements. Out of total FDCs used, 29.72% FDCs are rational and 70.28% FDCs are irrational. While prescribing these drugs, precaution should be taken as there are rational as well as irrational combinations available in the market.

<table>
<thead>
<tr>
<th>Number of FDCs</th>
<th>Percentage of FDCs</th>
<th>Other (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>287</td>
<td>111</td>
<td>39.92</td>
</tr>
</tbody>
</table>

FDC: Fixed dose combination

<table>
<thead>
<tr>
<th>Number of FDCs</th>
<th>Rational FDCs</th>
<th>Percentage of rational FDCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>111</td>
<td>33</td>
<td>29.72</td>
</tr>
</tbody>
</table>

FDC: Fixed dose combination

<table>
<thead>
<tr>
<th>System</th>
<th>Number of FDCs</th>
<th>Percentage of FDCs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nutritional</td>
<td>53</td>
<td>47.74</td>
</tr>
<tr>
<td>CVS</td>
<td>30</td>
<td>27.02</td>
</tr>
<tr>
<td>RS</td>
<td>10</td>
<td>9.03</td>
</tr>
<tr>
<td>Others</td>
<td>18</td>
<td>16.21</td>
</tr>
</tbody>
</table>

FDC: Fixed dose combination, CVS: Cardiovascular system, RS: Respiratory system

ACKNOWLEDGMENT
Authors wish to acknowledge the Medical Director of Krishna Hospital and Research Center, Karad. Furthermore, we wish to thank Head of Department of Medicine as well as all consultants of Medicine Department for their cooperation. We also extend thanks to the patients involved in the study.

REFERENCES