INTRODUCTION
The different sports had need varied movement skills like jump, hop, sudden stop, twisting, and cutting et al. Those skills would lead to knee joint certain more laxity. The more laxity of knee joint, the more increased the injury rate of knee. So, the stability level of knee joint was played an important role to prevent knee injuries, especially closed chain movement. However, few researches had analyzed the movement of knee joint among different sports events. Therefore, the purpose of this pilot study was to analysis the knee joint kinematics data in closed chain movement among different sports.

METHODS
Three men subjects (mean mass 74 kg, height 182.7 cm and age 20.7 yrs) were recruited from badminton team, basketball team, and track and field team of University to perform the measured activity. All of subjects Zebris 3D ultra-sound based motion analysis system CMS-HS (Medical GmbH, Tubingen, Germany) was used to measure the kinematics data of knee joint. The WinData Software (Medical GmbH, Tubingen, Germany) was used to collected and analyzed the knee joint kinematics data. Squatting activity was selected as closed chain movement that performed the measurement of kinematics data from knee joint. The squatting activity performed five repeats. The average degree of five repeats was calculated the flexion-extension, internal-external rotation, and abduction-adduction motion of knee joint.

RESULTS AND DISCUSSION
The results were found that basketball players had greatest abdution degree (Table 1, Figure 1) and badminton players had maximum rotation degree (Table 1, Figure 2). The flexion degree at maximal abduction had occurred at 139.1 degree in basketball players. The flexion degree at maximal rotation had occurred at 110.5 degree in badminton players. The track and field athletes had shown smallest degree at any direction (Table 1).

CONCLUSIONS
The results were found that basketball event had greater abduction degree of knee and badminton player had more rotation degree of knee joint in closed chain movement. The track and field players were shown smallest degree in abduction and rotation angle among three sports events.

REFERENCES

Table 1: kinematic data of different sport event in knee joint.

<table>
<thead>
<tr>
<th>Sport event</th>
<th>Maximal flexion (deg)</th>
<th>Maximal abdution (deg)</th>
<th>Maximal rotation (deg)</th>
<th>The flexion degree at maximal abduction</th>
<th>The flexion degree at maximal rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Badminton</td>
<td>113.9°</td>
<td>6.3°</td>
<td>35.5°</td>
<td>90.1°</td>
<td>110.5°</td>
</tr>
<tr>
<td>Basketball</td>
<td>139.1°</td>
<td>87.3°</td>
<td>31.1°</td>
<td>139.1°</td>
<td>137.8°</td>
</tr>
<tr>
<td>Track and field</td>
<td>83.2°</td>
<td>7°</td>
<td>12.4°</td>
<td>75.9°</td>
<td>48.1°</td>
</tr>
</tbody>
</table>

The results may show that track and field athletic had smallest degree during squatting. This event did not use twisting or cutting skill. Compared to basketball and badminton event, they needed to do sudden stop, twisting, or cutting skill. Basketball and badminton players may result in more rotation and valgus angle. It would lead to higher knee injury at non-contact sports event. The therapies and others professions need to improve the movement skill and muscle strength of knee to prevent injury occurred(1.2.3).