PROCEDURE AND METHODOLOGY

In this chapter the selection of subjects, selection of tests, procedure for administering test items and statistical treatment of data have been described.

Selection of the subjects

For this study, 300 male subjects were randomly selected from the different universities, colleges and academy of field hockey run in various States of India. The subjects who come under 17 to 24 years age category were considered in present study.

General hockey playing ability

The general hockey playing ability of the subjects was assessed by a panel of three experts who were technically qualified in Hockey. All the experts were asked to give marks to the subject from a maximum of fifty points. The evaluation was done by the expert through observing the performance of the subject in the real game situations.

Selection of skills for Test

On the basis of available literature and discussion with field hockey experts, it was felt that performance in unitary fundamental skill such as Dribbling, Rolling, Hitting, Pushing, Slap Shot, Flick, Receiving and like through can be measured objectively, do not prove a valuable guide for predicting the ability of a player in a game situation. The tests available on field hockey are meagre, so it will be worthwhile attempt to construct the skill test in field hockey.

Selection of the test items

The test could be used for grading students taking instruction in hockey and selecting players for a team on the merit of their objectively demonstrated ability. By reviewing books on the method of teaching physical education, research reports and discussion with the hockey experts the following combination skill test items were selected which to a greater extent assess the general playing ability of hockey players.

1. Zig-zag Dribbling (30 Second)
2. Forehand Rolling
3. Straight Push
Procedure and Methodology

4. **Straight Hit**
5. **Slap**
6. **Flick**
7. **Receiving**

These seven test items having three variations to each and measurements were set on the basis of pilot study which was conducted on the students of Banaras Hindu University, Varanasi. The subjects were from different faculty in the age group of seventeen to twenty four years.

Reliability of data

Reliability of data was considered upon the instrument, tester competency, subject reliability and hence reliability of these items was established scientifically.

Instrument reliability

The instrument used for present study were reliable and accurate enough to carry out the procedure successively as there were manufactured by very reputed company known for their expertise in the field : hence considered reliable.

Tester competency

All the measurement was taken by the investigator himself with assistance of qualified personnel and hockey coach. Who were trained and well acquainted with the test and testing procedure. Tester’s competency was calculated by test – retest method.

Subject reliability

The test and retest method was also used for subject reliability. as the same subjects were used under similar condition by the same tester. No motivational techniques were used at the time of testing.

Pilot study

Twenty four male hockey players of Banaras Hindu University, Varanasi were randomly chosen for conducting a pilot study to determine the final test item for the seven test items. In pilot study each skill has three variations of test. Before administering the test items a brief description and importance of the study was explained by research scholar. Each variation of test item was administered on selected subjects.
Selection of Test Items

Dribbling Zig-zag
Rolling Forehand
Push Straight
Hit Straight
Slap
Flick
Receiving

Variation 1(a), 1(b), 1(c)
Variation 2(a), 2(b), 2(c)
Variation 3(a), 3(b), 3(c)
Variation 4(a), 4(b), 4(c)
Variation 5(a), 5(b), 5(c)
Variation 6(a), 6(b), 6(c)
Variation 7(a), 7(b), 7(c)

Pilot study N-24

Finalized 7 Test Items

1(a), 2(c), 3(a), 4(a), 5(b), 6(b), 7(c)

Fig. 1- Outline of Pilot Study
1. ZIG-ZAG DRIBBLING (30 Second)

Variation 1 (a) - In variation 1 (a), 11 cones are placed in a line between a starting line and turning point. Different colour of cone is used to signify the starting point. The distance from start to turning point is 22.90 meter. The distance between first cone and starting line was 3.45 meter. The distance between last cone and turning point was also 3.45 meter. The distance between remaining cones between each other was 2 meter. This is shown in fig.1 (a).

On command GO the subject started dribble in Zig – Zag manner for 30 second. The cone of the starting line cone will not be counted at the time of start. Three trials were given for each subject. The maximum number of cone passed within 30 second was the counted as a subject score.

Fig.1 (a) – Zig zag dribbling variation 1(a)
**Variation 1 (b)** - In variation 1 (b), 9 cones are placed in Zig-Zag way between a starting line and turning point. Different colour of cones is used to signify the starting point. The distance from start to turning point is 16 meter. The distance between each cone is 2 meter. This shown in fig.1 (b).

On command GO the subject started dribble in Zig – Zag manner for 30 second. The starting line cone will not be counted at the time of start. Three trials were given for each subject. The maximum number of cone passed within 30 second was the count as a subject score.

![Zigzag Dribbling Variation 1(b)](image)

**Fig. 1(b) - Zig zag dribbling variation 1(b)**
Variation 1 (c) - In variation 1 (c), 16 cones are placed in a parallel way between a start to turning point. A different colour of cone is used to signify the starting point. The distance from starting point to turning point is 16 meter. The distance between each cone is 2 meter. This shown in fig.1(c).

On command GO the subject started dribble in Zig – Zag manner for 30 second. The first line cone will be not counted at the time of start. Three trials were given for each subject. The maximum number of cone passed within 30 second was the count as a subject score.

Fig. 1 (c) - Zig zag dribbling variation 1(c)
TABLE - 1

COEFFICIENT OF CORRELATIONS OF DIFFERENT VARIATION OF THE 30 SECONDS ZIG – ZAG DRIBBLING WITH PLAYING ABILITY

<table>
<thead>
<tr>
<th>variation</th>
<th>Mean</th>
<th>Coefficient Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(a)</td>
<td>30.33</td>
<td>.726*</td>
<td>.000</td>
</tr>
<tr>
<td>1(b)</td>
<td>20.16</td>
<td>.633*</td>
<td>.001</td>
</tr>
<tr>
<td>1(c)</td>
<td>26.62</td>
<td>.708*</td>
<td>.000</td>
</tr>
</tbody>
</table>

Correlation is significant at the 0.05 level.*

Table 1 displayed the Coefficient of Correlation between playing ability and 30 second zig – zag dribbling Tests, which is evident that all the variations of dribbling Test were significantly correlated with playing ability. Since, relationship values with playing ability were .726, .633, and .708 for the dribbling test variation 1(a), 1(b), 1(c) respectively and all the variations of 30 second dribbling test are highly correlated with the playing ability.

Further, Table 1 clearly shows that among these variations of 30 second dribbling test 1 (a) is most significantly correlated with playing ability.

Above statistical findings can be clearly interpreted that the variation 1(a) is the closest and authentic test item which represents the skill based testing abilities. Hence, based on these significant findings the test variation 1(a) is considered to be the most appropriate test item for the dribbling test.
2. FOREHAND ROLLING

**Variation 2 (a)** - In variation 2 (a), two cones are placed in a straight line the distance between cones is 15 meter. The starting line cones signify by the different color and turning point cone is different color. This shown in fig.2 (a).

On command ‘GO’ the subject starts rolling from staring line AB and turn from turning point T and finish till finishing line CD. Three trials were given for each subject. And minimum time count as a subject score.

![Diagram of Forehand Rolling Variation 2 (a)](image-url)

*Fig. 2 (a) – Forehand rolling variation 2 (a)*
**Procedure and Methodology**

**Variation 2 (b)** - In second variation three cone placed in a straight line namely A, B and C. The distance between cone A to cone B is 5 meter. The distance between cones B to cone C is also 5 meter. This shown in fig.2 (b).

On command GO subject start rolling from starting line AB and take first turn from cone B and move towards cone A and take second turn and move towards cone C and take one more turn and move towards finishing line FG and finish on the line. Three trials were given for each subject. Minimum time count as a subject score.

![Fig.2 (b) - Forehand rolling variation 2 (b)](image-url)
Variation 2 (c) - In third variation four cones are placed in ‘T’ shape namely A, B, C, and D. The distance between A to B is 10 meter. B to C is 2.5 meter. And B to D is also 2.5 meter. The total distance between C to D is 5 meter. This shown in fig.2 (c).

On command GO the subject start dribble from starting line EF and take turn from B to towards C and again take turn from C to towards D. And D to towards B and B to towards A and finish on finishing line GH. Three trials were given to each subject. Minimum time count as a subject score.

Fig. 2 (c) - Forehand rolling variation 2 (c)
TABLE - 2

COEFFICIENT OF CORRELATIONS OF DIFFERENT VARIATION OF THE FORE HAND ROLLING WITH PLAYING ABILITY

<table>
<thead>
<tr>
<th>variation</th>
<th>Mean</th>
<th>Coefficient Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>2(a)</td>
<td>7.857</td>
<td>.587</td>
<td>.173</td>
</tr>
<tr>
<td>2(b)</td>
<td>10.532</td>
<td>.233*</td>
<td>.003</td>
</tr>
<tr>
<td>2(c)</td>
<td>10.958</td>
<td>.738*</td>
<td>.000</td>
</tr>
</tbody>
</table>

Correlation is significant at the 0.05 level.*

Table 2 displayed the Coefficient of Correlation between playing ability and fore hand rolling Tests, which is evident that the variation 2(c) and 2(b) of rolling Test were significantly correlated with playing ability. And 2(a) variation were insignificant. Since, relationship values with playing ability were .587, .233*, and .738* for the rolling test variation 2(a), 2(b), 3(c) respectively. And variation 2 (c) and 2 (b) of fore hand rolling test are highly correlated with the hockey playing ability.

Further, Table 2 clearly shows that among these variation of fore hand rolling test 2 (c) is most significantly correlated with playing ability.

Above statistical findings can be clearly interpreted that the variation 2 (c) is the closest and authentic test item which represents the skill based testing abilities. Hence, based on these significant findings the test variation 2(c) is considered to be the most appropriate test item for the fore hand rolling test.
3. STRAIGHT PUSH

Variation 3 (a) - In variations 3(a), A target was fixed by different colors of cones. With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter. A starting line GH of 2 meter drawn parallel to the target at the distance of 15 meter, this shows in figure no. 3(a).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to push the ball between the target by using the straight push skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

Fig. 3 (a) – Straight push variation 3 (a)
**Procedure and Methodology**

**Variation 3 (b)** – In variations 3(b), A target was fixed by different colors of cones. With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter. A starting line GH of 2 meter drawn parallel to the target at the distance of 20 meter, this shows in figure no. 3(b).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to push the ball between the target by using the straight push skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

![Fig 3 (b) - Straight push variation 3 (b)](image-url)
Variation 3 (c) – In variations 3(c), a target was fixed by different colors of cones. With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter. A starting line GH of 2 meter drawn parallel to the target at the distance of 25 meter, this shows in figure no. 3(c).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to push the ball between the target by using the straight push skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

Fig. 3 (c) - Straight push variation 3 (c)
TABLE - 3
COEFFICIENT OF CORRELATIONS OF DIFFERENT VARIATION OF THE STRAIGHT PUSH WITH PLAYING ABILITY

<table>
<thead>
<tr>
<th>variation</th>
<th>Mean</th>
<th>Coefficient Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3(a)</td>
<td>5.70</td>
<td>.794*</td>
<td>.000</td>
</tr>
<tr>
<td>3(b)</td>
<td>5.54</td>
<td>.656*</td>
<td>.001</td>
</tr>
<tr>
<td>3(c)</td>
<td>5.91</td>
<td>.485*</td>
<td>.016</td>
</tr>
</tbody>
</table>

Correlation is significant at the 0.05 level.*

Table 3 displayed the Coefficient of Correlation between playing ability and straight push Tests, which is evident that all the variations of straight push Test was significantly correlated with playing ability. Since, relationship values with playing ability were .794, .656, and .485 for the straight push test variation 3(a), 3(b), 3(c) respectively and all the variations of straight push test are highly correlated with the hockey playing ability.

Further, Table 3 clearly shows that among these variations of straight push test, test 3 (a) is most significantly correlated with playing ability.

Above statistical findings can be clearly interpreted that the variation 3 (a) is the closest and authentic test items which represents the skill based testing abilities. Hence, based on these significant findings the test variation 3(a) is considered to be the most appropriate test item for the straight push test.
4. STRAIGHT HIT

**Variation 4 (a)** – In variations 4(a), a target was fixed by different colors of cones. With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter. A starting line GH of 2 meter drawn parallel to the target at the distance of 30 meter, this shows in figure no. 4(a).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to hit the ball between the target by using the straight hit skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

![Fig 4 (a) – Straight hit variation 4 (a)](image-url)
**Procedure and Methodology**

**Variation 4 (b)** – In variations 4(b), A target was fixed by different colors of cones. With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter. A starting line GH of 2 meter drawn parallel to the target at the distance of 35 meter, this shows in figure no. 4(b).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to hit the ball between the target by using the straight hit skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

![Diagram](image.png)

**Fig. 4 (b) - Straight hit variation 4 (b)**
**Procedure and Methodology**

**Variation 4 (c)** – In variations 4(c), a target was fixed by different colors of cones. With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter. A starting line GH of 2 meter drawn parallel to the target at the distance of 40 meter, this shows in figure no. 4(c).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to hit the ball between the target by using the straight hit skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

Fig. 4 (c) - Straight hit variation 4 (c)
**Procedure and Methodology**

**TABLE - 4**

**COEFFICIENT OF CORRELATIONS OF DIFFERENT VARIATION OF THE STRAIGHT HIT WITH PLAYING ABILITY**

<table>
<thead>
<tr>
<th>variation</th>
<th>Mean</th>
<th>Coefficient Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>4(a)</td>
<td>5.87</td>
<td>.866*</td>
<td>.000</td>
</tr>
<tr>
<td>4(b)</td>
<td>5.37</td>
<td>.691*</td>
<td>.000</td>
</tr>
<tr>
<td>4(c)</td>
<td>5.41</td>
<td>.420*</td>
<td>.041</td>
</tr>
</tbody>
</table>

Correlation is significant at the 0.05 level.

Table 4 displayed the Coefficient of Correlation between playing ability and straight hit Tests, which is evident that all the variation of straight hit Test were significantly correlated with playing ability. Since, relationship values with playing ability were .866, .691, and .420 for the straight hit test variation 4(a), 4(b), 4(c) respectively and all the variation of straight hit test are highly correlated with the hockey playing ability.

Further, Table 4 clearly shows that among these variation of straight hit test, test 4 (a) is most significantly correlated with playing ability.

Above statistical findings can be clearly interpreted that the variation 4(a) is the closest and authentic test item which represents the skill based testing abilities. Hence, based on these significant findings the test variation 4(a) is considered to be the most appropriate test item for the straight hit test.
5. SLAP

Variation 5 (a) – In variations 5(a), A target was fixed by different colors of cones, With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter, a restricted line IJ of 2 meter drawn parallel to the target at the distance of 15 meter, and a starting line GH drawn parallel to restricted line ahead 3 meter. This shows in figure no. 5(a).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject start the rolling till restricted line and then try to put the ball between the target by using the slap skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

Fig. 5 (a) – Slap variation 5 (a)
Procedure and Methodology

**Variation 5(b)** - In variations 5(b), a target was fixed by different colors of cones, with distance between AB, BC, DE and EF was 1 meter and between CD was 1.66 meter and total width of target was 5.66 meter. A restricted line IJ of 2 meter drawn parallel to the target at the distance of 20 meter, and a starting line GH drawn parallel to restricted line ahead 3 meter. This shows in figure no. 5(b).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject start the rolling till restricted line and then try to put the ball between the target by using the slap skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial point count as a subject score.

![Diagram of procedure variation 5(b)](image_url)

**Fig. 5 (b) - Slap variation 5 (b)**
**Variation 5 (c)** - In variations 5(c), A target was fixed by different colors of cones. With distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter, total width of target was 5.66 meter. A restricted line IJ of 2 meter drawn parallel to the target at the distance of 25 meter, and a starting line GH drawn parallel to restricted line ahead 3 meter. This shows in figure no. 5(c).

On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject start the rolling till restricted line and then try to put the ball between the target by using the slap skill. Three trials were given for each subject.

If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all three trial points count as a subject score.
TABLE – 5

COEFFICIENT OF CORRELATIONS OF DIFFERENT VARIATION OF THE SLAP WITH PLAYING ABILITY

<table>
<thead>
<tr>
<th>variation</th>
<th>Mean</th>
<th>Coefficient Correlation</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>5(a)</td>
<td>4.95</td>
<td>.433*</td>
<td>.034</td>
</tr>
<tr>
<td>5(b)</td>
<td>5.37</td>
<td>.780*</td>
<td>.000</td>
</tr>
<tr>
<td>5(c)</td>
<td>5.33</td>
<td>.575*</td>
<td>.003</td>
</tr>
</tbody>
</table>

Correlation is significant at the 0.05 level.*

Table 5 displayed the Coefficient of Correlation between playing ability and slap Tests, which is evident that all the variations of slap Test were significantly correlated with playing ability. Since, relationship values with playing ability were .433, .780, and .575 for the slap test variation 5(a), 5(b), 5(c) respectively and all the variation of slap test are highly correlated with the hockey playing ability.

Further, Table 5 clearly shows that among these variations of slap test, test 5 (b) is most significantly correlated with playing ability.

Above statistical findings can be clearly interpreted that the variation 5(b) is the closest and authentic test item which represents the skill based testing abilities. Hence, based on these significant findings the test variation 5(b) is considered to be the most appropriate test item for the slap test.
6. FLICK

**Variation 6 (a)** – Variations 6(a), a target was fixed with the help of hockey stick and two cones. The hockey stick placed on cones at height of 9 inch, a starting line AB drawn parallel to the target at the distance of four meter. And another line CD has drawn parallel to AB from target at distance of 1 meter. The area between target and restricted line was called restricted area. A one meter area drawn ahead of target called controlling area. This shows in fig. 6(a).

The subject was asked to stand on starting line and on signal go he take a ball and roll or dribble the ball in to the restricted area. The subject asked to flick the ball above target and immediately control the ball in controlling area. Three trials were given to each subject.

If ball controlled in controlling area the subject was given 3 point. Subject flick the ball and not able to control the ball in controlling area the subject was given to 2 point. If he was not able to flick the ball successfully then award one point. Sum of all three trial point count as a subject score.
**Procedure and Methodology**

**Variation 6 (b)** – Variations 6(b), a target was fixed with the help of hockey stick and two cones. The hockey stick placed on cones at height of 12 inch, a starting line AB drawn parallel to the target at the distance of four meter. And another line CD has drawn parallel to AB from target at distance of 1 meter. The area between target and restricted line was called restricted area. A one meter area drawn ahead of target called controlling area. This shows in fig. 6(b).

The subject was asked to stand on starting line and on signal go he take a ball and roll or dribble the ball in to the restricted area. The subject asked to flick the ball above target and immediately control the ball in controlling area. Three trials were given to each subject.

If ball controlled in controlling area the subject was given 3 point. Subject flick the ball and not able to control the ball in controlling area the subject was given to 2 point. If he was not able to flick the ball successfully then award one point. Sum of all three trial point count as a subject score.

![Fig. 6 (b) – Flick Variation 6 (b)](image-url)
**Variation 6 (c)** – Variations 6(c), a target was fixed with the help of hockey stick and two cones. The hockey stick placed on cones at height of 15 inch, a starting line AB drawn parallel to the target at the distance of four meter. And another line CD has drawn parallel to AB from target at distance of 1 meter. The area between target and restricted line was called restricted area. A one meter area drawn ahead of target called controlling area. This shows in fig. 6(c).

The subject was asked to stand on starting line and on signal go he take a ball and roll or dribble the ball in to the restricted area. The subject asked to flick the ball above target and immediately control the ball in controlling area. Three trials were given to each subject.

If ball controlled in controlling area the subject was given 3 point. Subject flick the ball and not able to control the ball in controlling area the subject was given to 2 point. if he was not able to flick the ball successfully then award one point. Sum of all three trial point count as a subject score.
TABLE - 6
CO - EFFICIENT OF CORRELATIONS OF DIFFERENT VARIATION OF THE
FLICK WITH PLAYING ABILITY

<table>
<thead>
<tr>
<th>variation</th>
<th>Mean</th>
<th>CO-EFFICIENT CORRELATION</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6(a)</td>
<td>5.20</td>
<td>.520*</td>
<td>.009</td>
</tr>
<tr>
<td>6(b)</td>
<td>5.62</td>
<td>.698*</td>
<td>.000</td>
</tr>
<tr>
<td>6(c)</td>
<td>5.29</td>
<td>.310</td>
<td>.141</td>
</tr>
</tbody>
</table>

Correlation is significant at the 0.05 level.*

Table 6 displayed the Coefficient of Correlation between playing ability and flick Tests, which is evident that variation 6(a) and 6(b) Test were significantly correlated with playing ability. And variation 6(c) was insignificant. Since, relationship values with playing ability were .520, .698, and .310 for the flick test variation 6(a), 6(b), 6(c) respectively and Variation 6(a), 6(b) of flick test are highly correlated with hockey playing ability.

Further, Table 6 clearly shows that among these variation of flick test 6 (b) is most significantly correlated with playing ability.

Above statistical findings can be clearly interpreted that the variation 6(b) is the closest and authentic test items which represents the skill based testing abilities. Hence, based on these significant findings the test variation 6(b) is considered to be the most appropriate test item for the flick test.
7. RECEIVING

Variation 7 (a) - Variations 7(a), were made a receiving area CDEF of 1x1 meter. The distance between push line AB and receiving area was 10 meter. The three starting line was drawn of 5 meter each from the receiving area i.e. respectively starting line left GH, starting line front IJ and starting line right side KL. This shows in figure no. 7(a).

An elite player pushes the ball from push line AB. Subject stand on starting line left side GH and call to push than pusher push the ball towards the receiving area CDEF. After that the subject runs towards the receiving area to receive the ball and return the ball to pusher. And again move towards the next starting line. One time same process repeat at all starting line.

If ball receive by the subject from one side given 3 point after all three side sum of all point. If subject try to receive the ball and unable to receive in receiving area given one point. If ball deflect from stick and go out of receiving area given two points.

![Diagram of receiving variation 7](image-url)

Fig. 7 (a) – Receiving variation 7 (a)
**Procedure and Methodology**

**Variation 7 (b)** - Variations 7(b), were made a receiving area CDEF of 1.5x1.5 meter. The distance between push line AB and receiving area was 10 meter. The three starting line was drawn of 5 meter each from the receiving area i.e. respectively starting line left GH, starting line front IJ and starting line right side KL. This shows in figure no. 7(b).

An elite player pushes the ball from push line AB. Subject stand on starting line left side GH and call to push than pusher push the ball towards the receiving area CDEF. After that the subject runs towards the receiving area to receive the ball and return the ball to pusher. And again move towards the next starting line. One time same process repeat at all starting line.

If ball receive by the subject from one side given 3 point after all three side sum of all point. If subject try to receive the ball and unable to receive in receiving area given one point. If ball deflect from stick and go out of receiving area given two points.

![Diagram](image)

**Fig. 7 (b) - Receiving variation 7 (b)**
**Variation 7 (c)** - Variations 7(c), were made a receiving area CDEF of 2x2 meter. The distance between push line AB and receiving area was 10 meter. The three starting line was drawn of 5 meter each from the receiving area i.e. respectively starting line left GH, starting line front IJ and starting line right side KL. This shows in figure no. 7(c).

An elite player pushes the ball from push line AB. Subject stand on starting line left side GH and call to push than pusher push the ball towards the receiving area CDEF. After that the subject runs towards the receiving area to receive the ball and return the ball to pusher. And again move towards the next starting line. One time same process repeat at all starting line.

If ball receive by the subject from one side given 3 point after all three side sum of all point. If subject try to receive the ball and unable to receive in receiving area given one point. If ball deflect from stick and go out of receiving area given two points.

![Diagram of the receiving area and starting lines](image-url)
TABLE - 7

CO - EFFICIENT OF CORRELATIONS OF DIFFERENT VARIATION OF THE RECEIVING WITH PLAYING ABILITY

<table>
<thead>
<tr>
<th>variation</th>
<th>Mean</th>
<th>CO-EFFICIENT CORRELATION</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>7(a)</td>
<td>5.37</td>
<td>.436*</td>
<td>.033</td>
</tr>
<tr>
<td>7(b)</td>
<td>5.12</td>
<td>.490*</td>
<td>.015</td>
</tr>
<tr>
<td>7(c)</td>
<td>5.75</td>
<td>.771*</td>
<td>.000</td>
</tr>
</tbody>
</table>

Correlation is significant at the 0.05 level.*

Table 7 displayed the Coefficient of Correlation between playing ability and receiving Tests, which is evident that all the variations of receiving Test was significantly correlated with playing ability. Since, relationship values with playing ability were .436, .490, and .771 for the receiving test variation 7(a), 7(b), 7(c) respectively and all the variation of receiving test are highly correlated with the hockey playing ability.

Further, Table 7 clearly shows that among these variation of receiving test 7 (c) is most significantly correlated with playing ability.

Above statistical findings can be clearly interpreted that the variation 7 (c) is the closest and authentic test item which represents the skill based testing abilities. Hence, based on these significant findings the test variation 7(c) is considered to be the most appropriate test item for the receiving test.
TEST ADMINISTRATION

1. ZIG ZAG DRIBBLING (30 SECONDS)

**Purpose** – The purpose of this test is to determine the 30 second Zig - Zag dribbling ability of the players.

**Facilities And Equipments** – 11 cones/flag/marker, measuring tape, stop watch, lime powder, hockey sticks, balls, paper, pen/pencil.

**Ground Marking** - For dribbling zig-zag (30 second) 22.90 x 10 meter area of field hockey will used. Mark starting point A from backline of field hockey and indicated by C-1 cone/marker/flag. From C-1 cone or starting point keep C-2 cone at distance of 3.45 meter. Take 2 meter distance from C-2 to C-3 cone and it will goes up to C-10 but distance from C-10 to C-11 (turning point) will 3.45 meter. In this test we can use cone/marker/flag. This shown in fig.1.1

**Test Administration** – The subject stand on staring point with a ball. On command Go he will start zig zag dribbling in controlled manner up to C-11 cone i.e. turning point and return back toward cone C-1 and if time left again go toward cone C-11. He will dribble (zig-zag) for 30 second.

**Scoring** – A time of start cone C-1 will not count but if subject covered during 30 second again it will be count.

Subject will perform dribbling up to 30 second and on signal of complete time, the total no. of covered cone will count. If subject will at the mid of two cone then next cone will add in score.

Three chances will give to each subject and best of three will be score of subject.
Procedure and Methodology

Fig.1.1 - Zig-Zag Dribbling Test (30 Second)
Procedure and Methodology

Fig. 1.2 - Photograph of Zig-Zag Dribbling Test (30 Second)
2. FOREHAND ROLLING

**Purpose** – The ability of forehand rolling was assessed by the minimum time taken for covering the given rolling manner.

**Facilities and Equipments** - Four cones/flag.marker, measuring tape, stop watch, lime powder, hockey sticks, balls, paper, pen/pencil.

**Ground marking** – Four cones are placed in ‘T’ shape namely A, B, C, and D. the distance between A to B is 10 meter. B to C is 2.5 meter. And B to D is also 2.5 meter. The total distance between C to D is 5 meter. This shown in fig. 2.1.

**Test administration** – On command GO the subject start dribble from starting line EF and take turn from B to towards C and again take turn from C to towards D. And D to towards B and B to towards A and finish on finishing line GH. Three trials were given to each subject.

**Scoring** - Minimum time count as a subject score.
Procedure and Methodology

Fig. 2.1 - Forehand Rolling test
Fig. 2.2 – Photograph of Forehand Rolling test
Procedure and Methodology

3. STRAIGHT PUSH

**Purpose** – To measure the push ability of subject.

**Facilities and Equipments** - Seven cones/flag/marker, measuring tape, lime powder, hockey sticks, balls, paper, pen/pencil.

**Ground marking** – A target was fixed by different colors of cones. The dimension of target was distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter. Total width of target was 5.66 meter. And a starting line GH of 2 meter drawn parallel to the target at the distance of 15 meter. This shows in fig.3.1.

**Test administration** - On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to push the ball between the target by using the straight push skill. Three trials were given to each subject.

**Scoring**  If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of target the subject score zero (0) points. Sum of all trial points count as a subject score.
**Procedure and Methodology**

![Figure 3.1 - Straight Push Test](image)

1. 5.66mtr.
2. 1.66mtr.
3. 2 points
4. 1 points
5. 3 points
6. 1 mtr.
7. 1 mtr.
8. 1 mtr.
9. 1 points
10. 1 mtr.
11. 15mtr.
12. 2mtr.

Starting line

**Fig.3.1 - Straight Push test**
Fig. 3.2 - Photograph of Straight Push test
4. STRAIGHT HIT

**Purpose** - To measure the hitting ability of the subject.

**Facilities and Equipments** - Seven cones/flags/marker, measuring tape, lime powder, hockey sticks, balls, paper, pen/pencil.

**Ground marking** – A target was fixed by different colors of cones. The dimension of target was distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter. Total width of target was 5.66 meter. And a starting line GH of 2 meter drawn parallel to the target at the distance of 30 meter.

**Test administration** - On the signal ‘GO’ the subject take one ball and keep it on starting line and according to instruction given by tester, the subject try to hit the ball between the target by using the straight hit skill. Three trials were given to each subject.

**Scoring** If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. And if ball pass between BC and DE the subject score 3 points. If ball pass out of target the subject score zero (0) points. Sum of all trial points count as a subject score.
Fig. 4.1 - Straight Hit Test
Fig. 4.2 – Photograph of Straight Hit Test
5. SLAP

**Purpose** – To measure the slap shot ability of subject.

**Facilities and Equipments** - Seven cones/flags/marker, measuring tape, lime powder, hockey sticks, balls, paper, pen/pencil.

**Ground marking** – A target was fixed by different colors of cones. The dimension of target was distance between AB, BC, DE, EF was 1 meter and between CD was 1.66 meter. Total width of target was 5.66 meter. A restricted line IJ of 2 meter drawn parallel to the target at the distance of 20 meter. And a starting line GH drawn parallel to the restricted line ahead 3 meter. This shows in fig. 5.1.

**Test administration** - On the signal ‘GO’ the subject pick one ball and keep it on starting line and according to instruction given by tester, the subject try to put the ball between the target by using the slap shot skill. Three trials were given to each subject.

**Scoring** - If ball pass between AB and EF the subject score 1 point. If ball pass between CD the subject score 2 points. If ball pass between BC and DE the subject score 3 points. If ball pass out of given target the subject score zero (0) points. Sum of all trial points count as a subject score.
Procedure and Methodology

Fig. 5.1 - Slap Test
Fig. 5.2 - Photograph of Slap Test
6. FLICK

**Purpose** – to measure the flick ability of subject.

**Facilities and Equipments** – two cones, measuring tape, lime powder, hockey sticks, balls, paper, pen/pencil.

**Ground marking** – A target was fixed with the help of hockey stick and two cones. The hockey stick placed on cones at height of 12 inch, a starting line AB drawn parallel to the target at the distance of four meter. And another line CD has drawn parallel to AB from target at distance of 1 meter. The area between target and restricted line was called restricted area. A one meter area drawn ahead of target called controlling area. This shows in fig. 6.1.

**Test administration** - The subject was asked to stand on starting line and on signal go he take a ball and roll or dribble the ball in to the restricted area. The subject asked to flick the ball above target and immediately control the ball in controlling area. Three trials were given to each subject.

**Scoring** - If ball controlled in controlling area the subject was given 3 point. Subject flick the ball and not able to control the ball in controlling area the subject was given to 2 point. If he was not able to flick the ball successfully then award one point. Sum of all three trial point count as a subject score.
Fig. 6.1 – Flick Test
Fig. 6.2 - Photograph of Flick test
7. RECEIVING

Purpose – To measure the receiving ability of subject.

Facilities and Equipments - measuring tape, lime powder, hockey sticks, balls, paper, pen/pencil.

Ground marking – Make a receiving area CDEF of 2x2 meter. The distance between push line AB and receiving area was 10 meter. The three starting line was drawn of 5 meter each from the receiving area i.e. respectively starting line left GH, starting line front IJ and starting line right side KL. This shows in figure no. 7.1.

Test administration - An elite player pushes the ball from push line AB. Subject stand on starting line left side GH and call to push than pusher push the ball towards the receiving area CDEF. After that the subject runs towards the receiving area to receive the ball and return the ball to pusher. And again move towards the next starting line. One time same process repeat at all starting line.

Scoring - If ball receive by the subject from one side given 3 point after all three side sum of all point. If subject try to receive the ball and unable to receive in receiving area given one point. If ball deflect from stick and go out of receiving area given two points.
Procedure and Methodology

Recieving Area
2 x 2 mtr.
10mtr.
5 mtr.
5 mtr.
5 mtr.
5 mtr.
Push line
Starting line front side
Starting line left side
Starting line right side

Fig.7.1 - Receiving Test
Fig. 7.2 – Photograph of Receiving Test
COLLECTION OF DATA

For the purpose of the study 300 players from different universities, sports colleges, sports academy and institute were selected from BHU Varanasi, IIT BHU Varanasi, IIT Roorkee, STC Lucknow, STC Ranchi, Saifai sports hostel, Karmpur, Gorakhpur sports stadium, MII collage Allahabad, Short NIS BHU Varanasi, Sambalpur hostel, M.G.K.V.P. Varanasi, D.L.W. Varanasi, The data of the study was collected by administering the test item used. The items were explained to the subjects prior to the administration of each test. The test items were demonstrated by the research scholar and the subjects were allowed to have adequate practice, whenever necessary to become familiar with the test.

The subject started undergoing the test with 30 Second Zigzag Dribbling test, Fore Hand Rolling test, Straight Push test, Straight Hit test, Slap Shot test, Flick and Receiving test items. All the test item were administered on the same day.

STATISTICAL PROCEDURE

The following statistical techniques were considered for the analysis of data in the present study.

The data was analyzed by using descriptive statistics and Pearson Product Moment Correlation. The Norms & rating scale for hockey players were developed by using percentile and 6 sigma scale as well as properties of normal curve.