

## CHAPTER III

The present study was undertaken to evaluate the intervention of yoga on postural control and performance variables among male adolescent recurve archers. The selection of subjects, dependent and independent variables, experimental design, pilot study, criterion measures, reliability of instruments, testers' reliability, subjects' reliability, orientation of the subjects, yoga intervention, data collection, and statistics were described in this chapter.

### 3.1 SELECTION OF SUBJECTS

To achieve the purpose of the study, thirty (n=30) male adolescent recurve archers were selected from various archery coaching centers in Chennai, Tamil Nadu state, India. The age range was between 15 and 18 years.

The inclusion criteria for selecting samples include:

- i. Male adolescent recurve archers between the ages of 15 and 18 years old.
- ii. Intermediate skill level in archery, as determined by a coach.
- iii. Practicing archery at least three times a week.
- iv. No current or recent experience in yoga (within the past six months).

The exclusion criteria include:

- i. Female participants
- ii. Age below 15 and above 18 years old
- iii. Beginner or advanced skill level in archery
- iv. Practicing archery less than three times a week
- v. Current or recent experience in yoga (within the past six months)
- vi. Any history of substance abuse or addiction
- vii. Recent surgery or injury or any medical or physical condition that may increase the risk.

A certified archery coach assisted in selecting the participants, ensuring that individuals with suitable skills and experience were included. Random sampling technique was employed to select the participants in an unbiased manner. Participants were informed about the study, including its purpose, procedures, regularity, and the benefits. Informed consent was obtained from all participants' legal guardians since they were under 18 years old.

### **3.2 SELECTION OF VARIABLES**

The existing scientific literature on archery and yoga was reviewed from a range of books, journals, periodicals, magazines, and publications. Based on accessibility, relevance, criteria, and available resources, the dependent variables described below had been selected.

#### **3.2.1 INDEPENDENT VARIABLES**

1. Yoga Intervention

#### **3.2.2 DEPENDENT VARIABLES**

##### **3.2.2.1 POSTURAL CONTROL VARIABLES**

- i. Body Sway

- a) Mean Sway Amplitude (MSA) at Anterior-Posterior plane (AP).
- b) Mean Sway Amplitude (MSA) at Medial-Lateral plane (ML)
- c) Mean Sway Velocity (MV) at Anterior-Posterior plane (AP)
- d) Mean Sway Velocity (MV) at Medial-Lateral plane (ML)

- ii. Static Visual Acuity

- iii. Hand-Eye Coordination

##### **3.2.2.2 PERFORMANCE VARIABLES**

###### **3.2.2.2.1 PHYSICAL FITNESS VARIABLES**

- i. Hand Grip Strength

ii. Upper Body Strength

iii. Shoulder and Wrist Flexibility

#### **3.2.2.2.2 CARDIO-RESPIRATORY VARIABLES**

i. Heart Rate

ii. Respiratory Rate

#### **3.2.2.2.3 PSYCHOLOGICAL VARIABLES**

i. Anxiety (Cognitive Anxiety and Somatic Anxiety)

ii. Self-Confidence

iii. Concentration

iv. Sports Achievement Motivation

#### **3.2.2.2.4 ARCHERY SHOOTING SKILL**

i. Accuracy

### **3.3 EXPERIMENTAL DESIGN**

A random group experimental design was implemented for this research. The subjects (n =30) were randomly split into experimental group and control group. Each group consisted of 15 male adolescent recurve archers. Before the intervention, all the subjects underwent initial testing to assess their selected postural control and performance variables. Following the initial test, the experimental group underwent 16-weeks yoga intervention, with sessions held four days a week. During this intervention period, the control group continued with their regular routine and did not receive any additional training. After the 16-weeks intervention period, all the subjects were retested to measure the same dependent variables which were assessed initially.

### **3.4 PILOT STUDY**

The pilot study was conducted to evaluate the effectiveness of the intervention schedule and identify any challenges that could potentially arise during the training. Five subjects were enlisted for the study and they underwent training for four days. The study evaluated the subjects' performance and responsiveness to the training schedule. Participants' compliance, adherence, and challenges faced during the study were documented. Based on the results, the training schedule was modified and enhanced. This pilot study provided valuable insights into the feasibility and effectiveness of the intervention, allowing for adjustments to be made for future implementation.

## 3.5 CRITERION MEASURES

**TABLE –I**  
**CRITERIA FOR MEASURING THE SELECTED VARIABLES**

S. No	Dependent Variables	Test Item / Equipment	Unit	
1.	Mean Sway Amplitude (MSA) at Anterior-Posterior plane (AP).	Kistler Force Plate (Model: 9287CAQ01)	mm	
2.	Mean Sway Amplitude (MSA) at Medial-lateral plane (ML)		mm	
3.	Mean Sway Velocity (MSV) at Anterior-Posterior plane (AP)		mm/s	
4.	Mean Sway Velocity (MSV) at Medial-Lateral plane (ML)		mm/s	
5.	Static Visual Acuity		Snellen Chart	Scores in Numbers
6.	Hand-Eye Coordination		SMS Mirror Drawing Apparatus	Scores in Numbers
7.	Hand Grip Strength	Physical Fitness Variables	QUINFING Hand grip dynamometer	Kg
8.	Upper Body Strength		Push-Up test	Counts/min
9.	Shoulder and Wrist Flexibility		Shoulder and Wrist Elevation Test	Cm
10.	Heart Rate (HR)	Cardio-Respiratory Variables	OMRON CMS50N Pulse Oximeter	Beats/min
11.	Respiratory Rate (RR)		Stop Watch	Breaths/min
12.	Somatic Anxiety	Psychological Variables	Competitive State Anxiety Inventory-2 (CSAI-2) by Martens et al. (1990)	Scores in Numbers
13.	Cognitive Anxiety		Competitive State Anxiety Inventory-2 (CSAI-2) by Martens et al. (1990).	Scores in Numbers
14.	Self-Confidence		Competitive State Anxiety Inventory-2 (CSAI-2) by Martens et al. (1990)	Scores in Numbers
15.	Sports Achievement Motivation		Sports Achievement Motivation Test (SAMT) framed by M L Kamlesh (1993).	Scores in Numbers
16.	Concentration		Concentration Grid Test (Harris & Harris, 1984).	Scores in Numbers
17.	Accuracy	Archery Shooting Skill	36 arrows in six ends at a 70-meter target.	Scores in Numbers

### **3.6 RELIABILITY OF INSTRUMENTS**

The instrument OMRON CMS50N Pulse Oximeter, QUINFING Hand grip dynamometer, and SMS Mirror drawing apparatus (Samyukdha Publications Solutions), were got from department of Yoga, TNPESU. Kistler Force plate (Model: 9287CAQ01; Dimension: 1200 × 600 mm; Frequency: 3000 Hz;), with MARS software was used from biomechanics lab, TNPESU. They were obtained from reputable sources and have been calibrated frequently to ensure their precision. These institutionalized and standardized instruments have undergone rigorous testing and validation to ensure reliability and accuracy. These instruments also have been widely used in recent research and have demonstrated their accuracy and reliability in various studies. Their validation by the scientific community establishes them as trustworthy tools for measuring specific variables.

Similarly, the Competitive State Anxiety Inventory-2 (CSAI-2) by Martens et al. (1990), Sports Achievement Motivation Test (SAMT) framed by M L Kamlesh (1993) and concentration grid test framed by Harris, D.V., & Harris, B. L. (1984) have been developed and validated by experts in the field and used in numerous studies. The widespread use of these questionnaire and test in recent research further confirms their reliability and accuracy. By utilizing these instruments, the researcher had confidence in the reliability of the data collected in this study.

### **3.7 TESTER'S RELIABILITY**

The tester maintained the consistency and accuracy by following standardized procedures and providing clear instructions to the subjects. Regular meetings and discussions were held to address any concerns and maintain high levels of motivation among the participants. Body sway, visual acuity, hand-eye coordination, hand grip strength test, push up test, shoulder elevation test, heart rate, respiratory rate,

concentration grid test was prescribed individually by the investigator to all the subjects by considering all necessary requirements along with consistency and encouragement. The questionnaires were administered with clear instructions and explanations when needed, to minimize potential errors or misunderstandings. This assures the integrity and effectiveness of the testing techniques.

To assess the reliability of the testing techniques, a test-retest method was employed during a four days pilot study conducted before and after the yoga intervention. This approach involved measuring the same variables on the same subjects at two different time points to evaluate the consistency of the measurements. In the results of test-retest analysis, the intra-class correlation coefficients (ICCs) were used to determine the agreement between the repeated measurements and establish the reliability of the testing procedures. The results of intra class correlation of pre- and post-data were shown below in table II.

**TABLE-II**  
**INTRACLASS CORRELATION COEFFICIENT OF TEST-RETEST SCORES**

<b>S. No</b>	<b>Variables</b>	<b>Correlation Co-efficient</b>
1.	Mean Sway Amplitude (MSA) at Anterior-posterior plane (AP)	0.94*
2.	Mean Sway Amplitude (MA) at Medial-Lateral plane (ML)	0.91*
3.	Mean Sway Velocity (MV) at Anterior-Posterior plane (AP)	0.91*
4.	Mean Sway Velocity (MV) at Medial-Lateral plane (ML)	0.93*
5.	Right eye Static Visual Acuity	0.88*
6.	Left eye Static Visual Acuity	0.89*
7.	Right Hand-Eye Coordination	0.94*
8.	Left Hand-Eye Coordination	0.92*
9.	Right Hand Grip Strength	0.91*
10.	Left Hand Grip Strength	0.90*
11.	Upper Body Strength	0.94*
12.	Shoulder and Wrist Flexibility	0.89*
13.	Heart Rate (HR)	0.98*
14.	Respiratory Rate (RR)	0.97*
15.	Somatic Anxiety	0.84*
16.	Cognitive Anxiety	0.86*
17.	Self-confidence	0.85*
18.	Sports Achievement Motivation	0.85*
19.	Concentration	0.90*
20.	Accuracy	0.92*

\*Significant at 0.05 level of confidence.

### **3.8 SUBJECTS' RELIABILITY**

The high level of commitment, equal group sizes, consistent attendance, and dedication displayed by the subjects contribute to the reliability and validity of the findings. Initially, both the experimental and control groups had an equal number of participants at the beginning and completion of the 16-week yoga intervention. This balanced distribution helps to minimize potential biases and ensures comparability between the groups. All participants in the study were given the opportunity to withdraw their consent if they felt uncomfortable. However, none of the participants chose to do so. This indicates a high level of commitment and willingness to participate in the study, enhancing the reliability of the data collected. Furthermore, participant attendance was calculated, and the experimental group demonstrated a strong attendance rate of 91.7%. This high attendance rate indicates the subjects' commitment and active participation throughout the duration of the intervention. This high attendance rate further supports the reliability of the data, as it indicates the participants' active involvement and harmony with the intervention program. Finally, during the intervention, all participants were under the same settings and were supervised by the same investigator. This consistency in the intervention conditions and supervision helps to ensure that all participants received similar treatment and were exposed to the same variables, reducing potential sources of variation.

### **3.9 ORIENTATION OF THE SUBJECTS**

The orientation was given to all the subjects before the training. The subjects were briefed about the purpose, importance and benefits of yoga, yoga training, and its research relevance. They were also informed about the duration of the training, the specific tests that would be conducted, and the significance of regular attendance. Both the control group and the experimental group underwent separate orientations to

ensure clarity and prevent any potential bias. An initial questionnaire was given to each participant to collect basic information such as name, years of practice, level of competition, and similar data before the sessions began.

### **3.10 YOGA INTERVENTION**




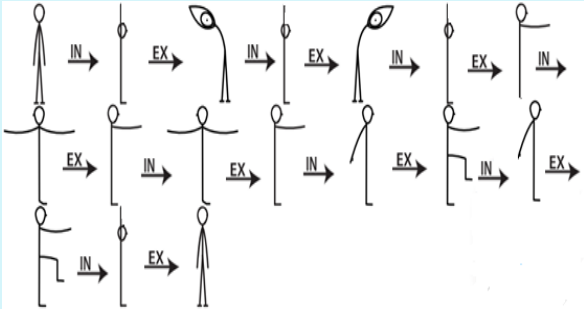
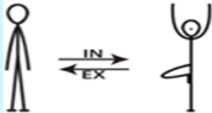
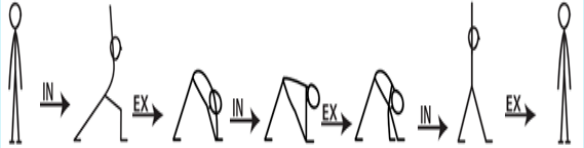
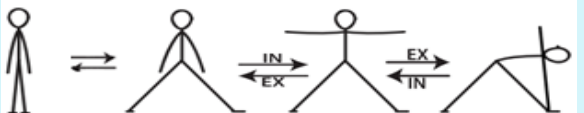
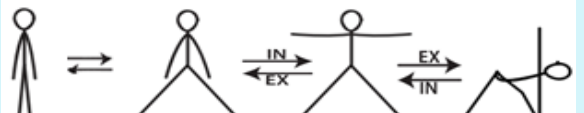
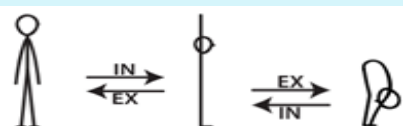
The yoga program was created with the insight acquired from the examination of literature and interaction with experts in the field of yoga, archery, and biomechanics. The experimental groups engaged with Krishnamacharya Yoga Mandhiram style of yoga practices which involved asana, pranayama, nyanam and trataka. All the subjects were instructed to pay attention on both the movements and their breath in all the practices. The training sessions were held in the mornings from 6 to 7 am. Yoga intervention was provided four days per week for 16 weeks. Sessions started off at 40 minutes for the first four weeks, 45 minutes for the second four weeks, 50 minutes from weeks nine to twelve, and an hour from weeks 13 to 16. The yoga intervention was closely supervised to maintain safety and no injuries or discomforts were reported.

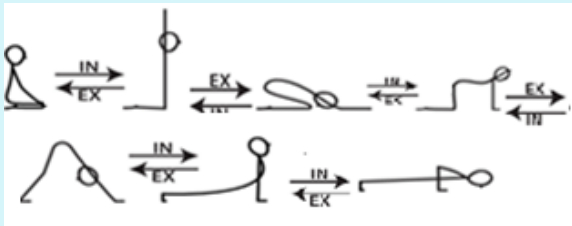


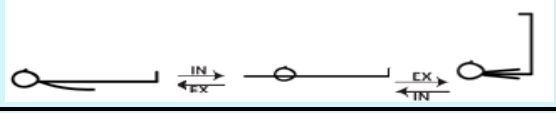

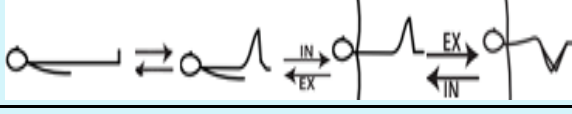
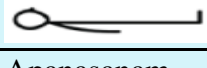
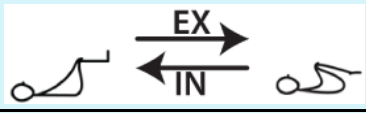

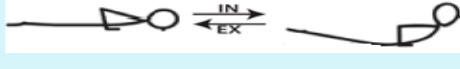
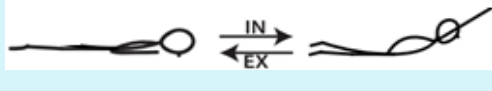
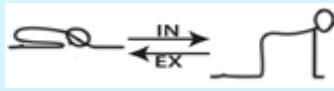

The following describes the yoga sequence administered to the experimental groups.

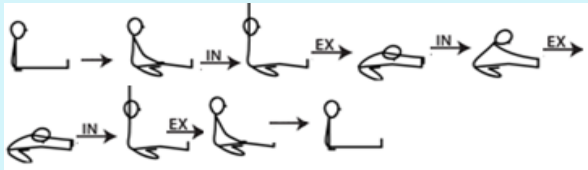
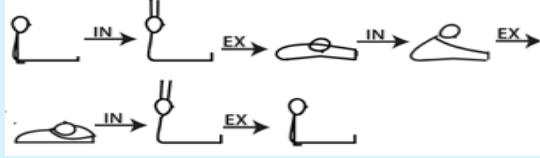
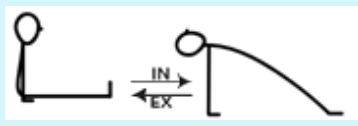







### 3.11 YOGA INTERVENTION SCHEDULE

TABLE-III

#### YOGA INTERVENTION SCHEDULE FOR EXPERIMENTAL GROUP (1-4 WEEKS)



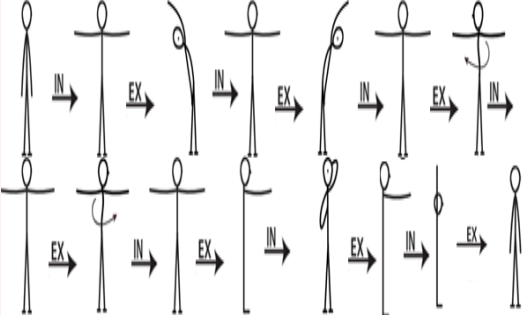

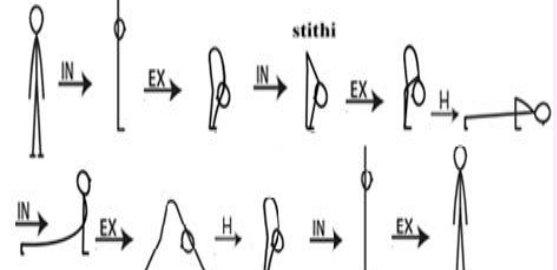
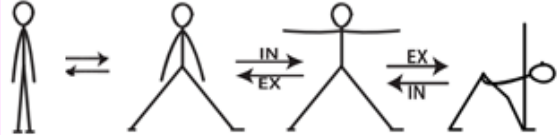
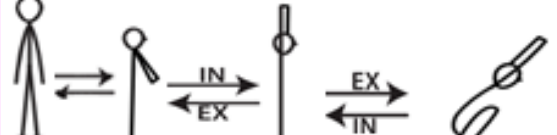

S. N	Yoga Sequence and its' Vinyasa	Rounds	Practice Method	Duration	Frequency
1	Prayer 	-	-	1 Min	4
2	Free Inhale / Exhale 	6	-	30 Sec	4
3	Conscious Breathing 	6	-	1 Min	4
4	Tadasanam-Modified 	3	Dynamic	4 Min	4
5	Bhagiratasanam-Modified 	4	Dynamic	40 Sec	4
6	Virabhadrasanam to Parsva Uttanasanam Sequence 	2 / Each Side	Dynamic	2 Min	4
7	Utthita Trikonasanam-Parsva Bheda 	2 / Each Side	Dynamic	1 Min	4
8	Utthita Trikonasanam-Parivritti Bheda 	2 / Each Side	Dynamic	1 Min	4
9	Uttanasanam 	4	Dynamic	1 Min 20 Sec	4

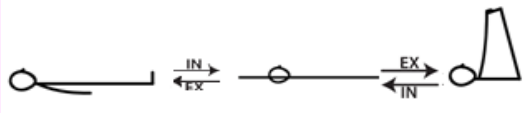

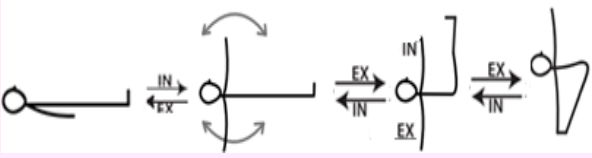
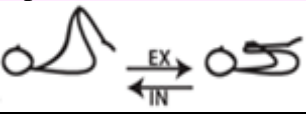

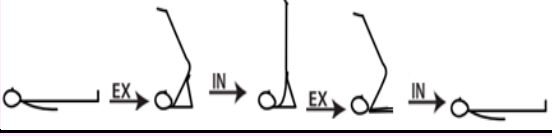
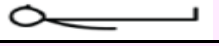




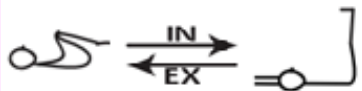


10	Vajrasanam Sequence 	4	Dynamic	4 Min	4
	Rest ( Free Inhale and Free Exhale) 	-	-	30 Sec	4
11	Dvipadapitham 	4	Dynamic	40 Sec	4
12	Urdhva Prasartha Padasanam 	4	Dynamic	1 Min 20 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
13	Jathara Parivritti- Modified 	3 / Each Side	Dynamic	2 Min	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
14	Apanasanam 	4	Dynamic	40 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	10 Sec	4
15	Bhujangasanam 	4	Dynamic	40 Sec	4
16	Ardha Salabhasanam 	2 / Each Side	Dynamic	40 Sec	4
17	Vajrasanam Forward Bend Sequence 	4	Dynamic	40 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	10 Sec	4




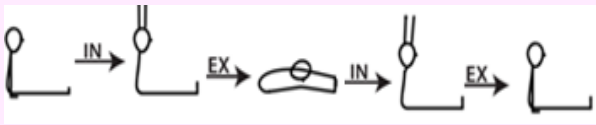









18	Janu Sirsasanam 	3/ Each Side	Dynamic	3 Min	4
19	Pascimatanasanam 	3	Dynamic	1 Min 30 Sec	4
20	Purvatanasanam 	4	Dynamic	40 Sec	4
	Rest- Conscious Breathing 	4	Inhale: Exhale	40 Sec	4
21	Brahmari Pranayama 	5	Inhale: Exhale	50 Sec	4
22	Ujjayi Pranayama 	6	Inhale: Exhale	1 Min	4
23	Sitali Pranayama with Neck Movement 	6	-Inhale: Head Up -Exhale: Head Down	1 Min	4
	Rest 	-	-	10 Sec	4
24	Preparatory Eye Practices • Palming • Blinking • Horizontal, Vertical, Diagonal Movements • Circular Movements	4	-	4 Min	4
25	OM Chanting 	10	-	2 Min	4
26	Closing Prayer 	-	-	1 Min	4

Note: The total duration of the practices for weeks 1 to 4 was 40 minutes.

**TABLE-IV**  
**YOGA INTERVENTION SCHEDULE FOR EXPERIMENTAL GROUP (5-8WEEKS)**



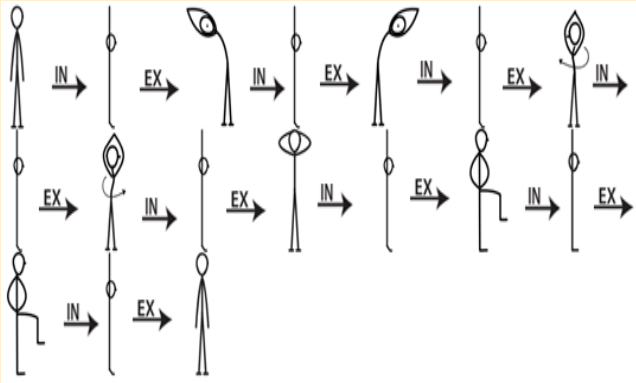


S. No	Yoga Sequence and its' Vinyasa	Rou nds	Practice Methods	Durati on	Frequ ency
1	Prayer 	-	-	1 Min	4
2	Conscious Breathing 	4	-	40 Sec	4
3	Tadasanam-Modified Sequence 	2	Dynamic	2 Min 30 Sec	4
4	Bhagiratasanam 	2 / Each Side	Dynamic	40 Sec	4
5	Jumping Sequence 	4	Dynamic	2 Min 40 Sec	4
6	Utthita Trikonasanam-Parivrtti Bheda 	2/ Each Side	Dynamic- 1 time  Stay 1 breath-1 time	1 Min 30 Sec	4
7	Utkatasanam 	2	Dynamic	40 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	30 Sec	4

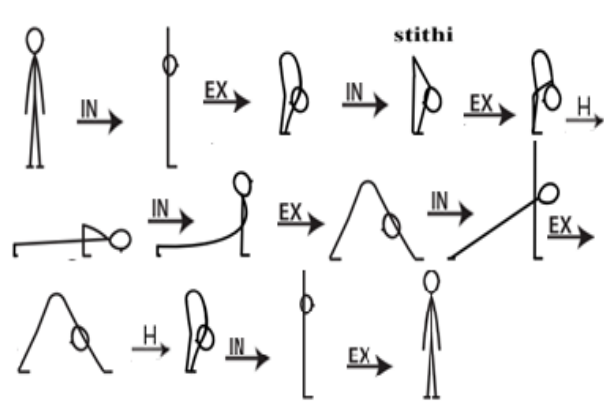
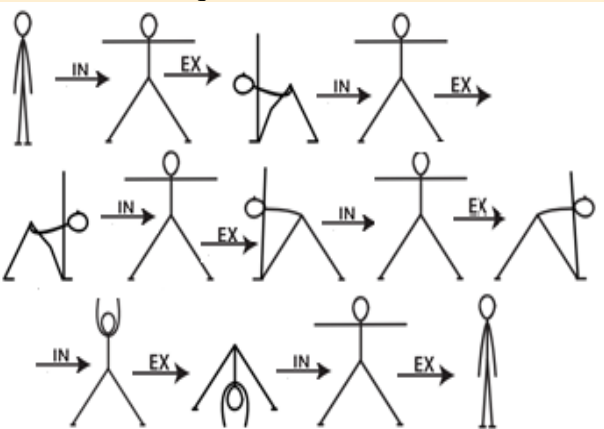
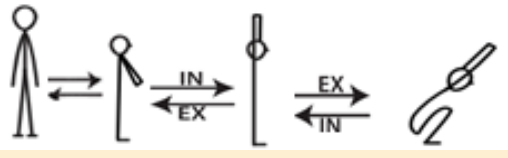

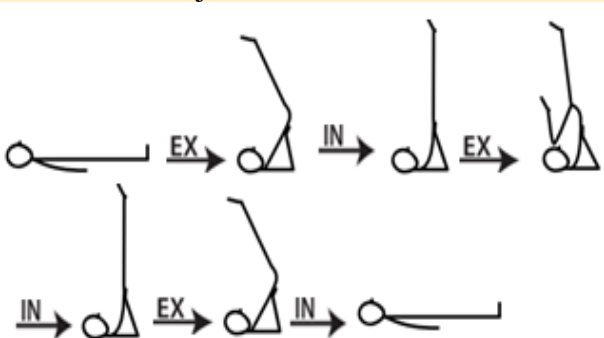

8	Supta Padangustasanam 	2	Stay 2 breaths	1 Min 30 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
9	Jatara Parivritti 	2 / Each side	Stay 2 breaths	3 Min 30 Sec	4
10	Apanasanam 	2	Dynamic	30 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
11	Sarvangasanam 	2	Stay 4 breaths	2 Min	4
	Rest ( Free In and Free Ex) 	-	-	5 Sec	4
12	Bhujangasanam-Modified 	2	Dynamic	20 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
13	Dhanurasanam 	2	Stay 4 breaths	1 Min 40 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
14	Apanasanam to Urdhva Prasrta Padasanam 	2	Dynamic	20 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	30 Sec	4
15	Ustrasanam 	2	Dynamic	1 Min	4

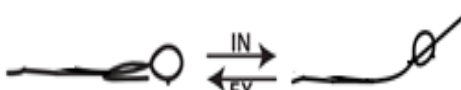
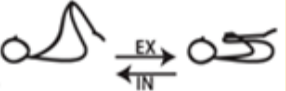

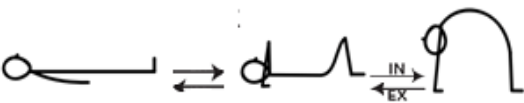

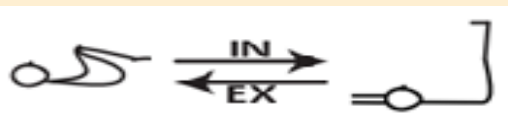

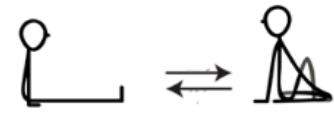

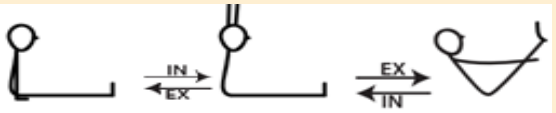

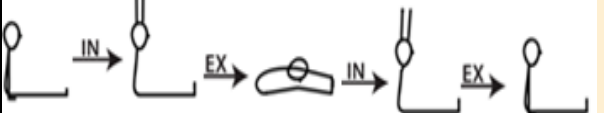
16	Vajrasanam Forward Bend 	2	Dynamic	30 Sec	4
	Rest (Free Inhale and Free Exhale) 	-	-	10 Sec	4
17	Ardha Matsyendrasanam 	2	Stay 4 breaths	1 Min 20 Sec	4
18	Pascimatanasanam- Modified 	4	Dynamic	1 Min	4
	Rest (( Free Inhale and Free Exhale) 	-	-	30 Sec	4
19	Brahmari Pranayama 	6	Inhale: Exhale	1 Min	4
20	Ujjayi Pranayama 	6	Inhale: Exhale	1 Min 15 Sec	4
21	Sitali Pranayama 	6	Inhale: 0 Exhale: Hold	2 Min 20 Sec	4
22	Nadi Shodana Pranayama 	6	Inhale: 0 Exhale: Hold	2 Min 20 Sec	4
	Rest (Observe the Breath) 		-	5 Sec	4
23	Preparatory Eye Practices • Palming • Blinking • Horizontal, Vertical, Diagonal Movements • Circular Movements	3	-	3 Min	4
24	Trataka 	-	-	3 Min	4
	Rest 	-	-	5 Sec	4
25	Karanyasam	3	-	3 Min	4
26	Anganyasm	3	-	1 Min 30 Sec	4
27	Vyapakanyasm	3	-	1 Min	4
28	Closing Prayer 	-	-	1 Min	4

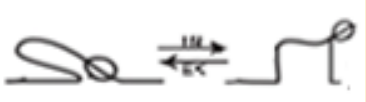





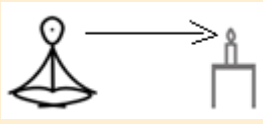


Note: The total duration of the practices for weeks 5 to 8 was 45 minutes.

**TABLE-V**  
**YOGA INTERVENTION SCHEDULE FOR EXPERIMENTAL GROUP (9-12 WEEKS)**

S. No	Yoga Sequence and its' Vinyasa	Rou-nds	Practice Methods	Durati-on	Frequ-ency
1	Prayer 	-	-	1 Min	4
2	Conscious Breathing 	4	-	40 Sec	4
3	Tadasanam- Modified 	4	Dynamic	5 Min 20 Sec	4
4	Bhagiratasanam 	2 / Each Side	Dynamic	40 Sec	4
5	Parsva Uttanasanam to Virabadrasanam Sequence 	2 / Each Side	Stay- 1 breath	2 Min 40 Sec	4

6	<p>Jumping Sequence (Vasistasanam)</p> 	2 / Each Side	Stay- 1 breath	4 Min 40 Sec	4
7	<p>Konasanam Sequence</p> 	2	Dynamic	2 Min	4
8	<p>Utkatasanam</p> 	2	Dynamic	30 Sec	4
	<p>Rest (( Free Inhale and Free Exhale)</p> 	-	-	30 Sec	4
9	<p>Eka Pada Akunjanasanam</p> 	1/ Each Side	Stay 4 breaths	2 Min 20 Sec	4
	<p>Rest ( Free Inhale and Free Exhale)</p> 	-	-	5 Sec	4



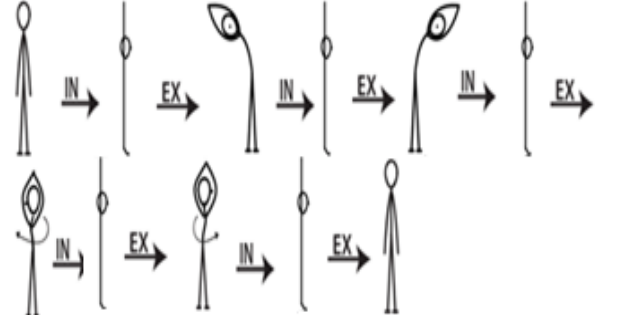
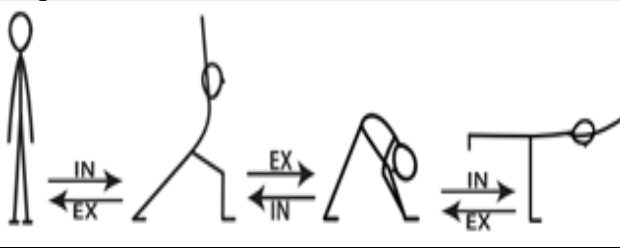
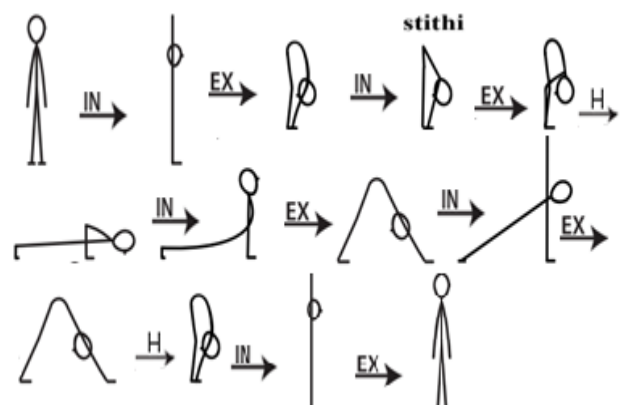
10	Bhujangasanam-Modified 	2	Dynamic	20 Sec	4
11	Apanasanam 	2	Dynamic	20 Sec	4
	Rest (Free Inhale and Free Exhale) 	-	-	5 Sec	4
12	Urdhva Dhanurasanam 	2	Stay 6 breaths	2 Min 20 Sec	4
	Rest (Free Inhale and Free Exhale) 	-	-	5 Sec	4
13	Apanasanam to Urdhva Prasrta Padasanam 	2	Dynamic	20 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
14	Ardha matsyendrasanam 	2	Stay 4 breaths	1 Min 20 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
15	Navasanam 	2	Stay 4 breaths	1 Min 50 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
16	Pascimatanasanam 	2	Dynamic	30 Sec	4

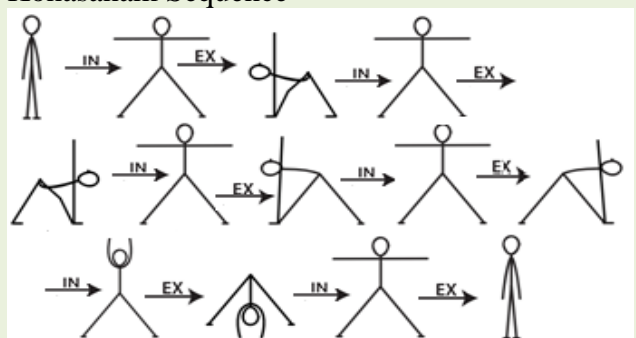
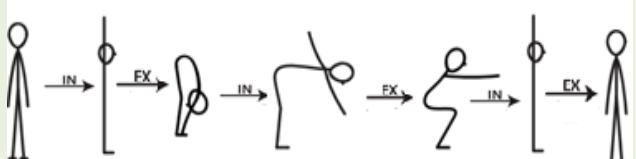

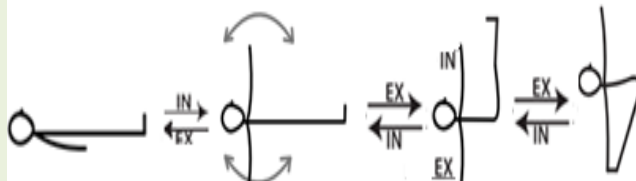

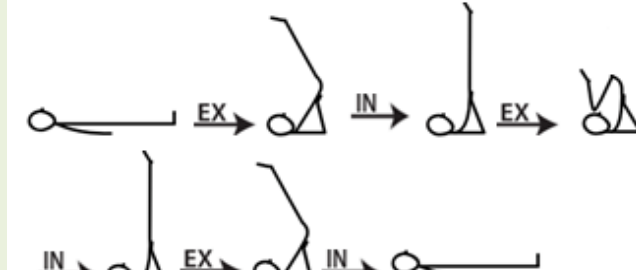

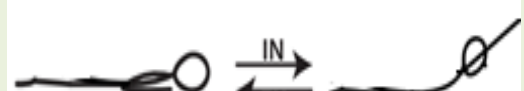
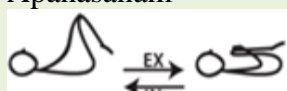
17	Vajrasanam Forward Bend Sequence 	4	Dynamic	40 Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	30 Sec	4
18	Brahmari Pranayama 	4	Inhale: Exhale	40 Sec	4
19	Sitali Pranayama 	6	Inhale: Hold: Exhale: Hold	3 Min	4
20	Nadi Shodana pranayama 	6	Inhale: Hold: Exhale: Hold	3 Min	4
	Rest ( Observe the breath) 	-	-	5 Sec	4
21	Preparatory Eye Practices • Palming      • Blinking • Horizontal, vertical, diagonal movements • Circular movements	4	-	3 Min	4
22	Trataka ( Using Ghee lamp) 	-	-	5 Min	4
	Rest 	-	-	10 Sec	4
23	Karanyasam	3	-	3 Min	4
24	Anganyasam	3	-	1 Min 15 Sec	4
25	Vyapakanyasam	3	-	50 Sec	4
26	Prayer 	-	-	1 Min	4


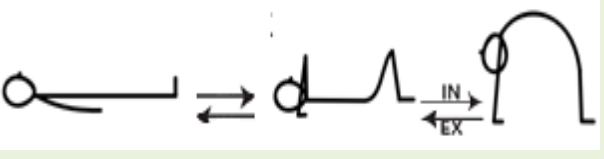

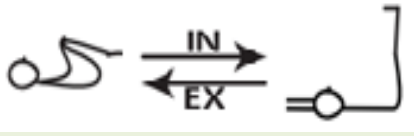

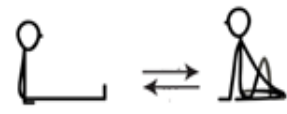

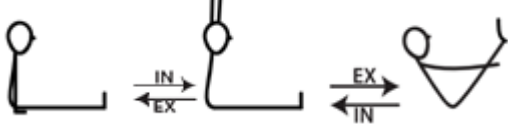

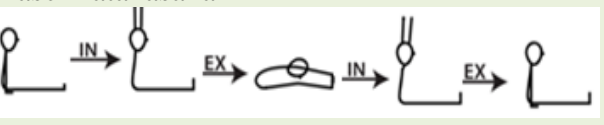
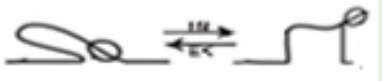

Note: The total duration of the practices for weeks 9 to 12 was 50 minutes





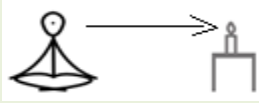


TABLE-VI

## YOGA INTERVENTION FOR EXPERIMENTAL GROUP (13-16 WEEKS)

S. No	Yoga Sequence and its' Vinyasa	Rou-nds	Practice Methods	Durati-on	Frequ-ency
1	Prayer 	-	-	1 Min	4
2	Conscious Breathing 	4	-	40 Sec	4
3	Tadasanam 	4	Dynamic	3 Min 20 Sec	4
4	Parsvau ttanasanam and Virabhadrasanam Sequence 	2 / Each Side	Stay 1 breath	2 Min 40 Sec	4
5	Jumping sequence (Vasistasanam) 	2 / Each side	Stay 2 breaths	4 Min 40 Sec	4

6	Konasanam Sequence 	2	Dynamic	2 Min	4
7	Uttanasanam-Ardha Uttanasanam-Utkatasanam Sequence 	2	Dynamic	1 Min	4
	Rest ( Free In and Free Ex) 	-	-	30 Sec	4
8	Jatara Parivritti 	2 / Each Side	Stay 2 breaths	3 Min 20Sec	4
	Rest ( Free Inhale and Free Exhale) 	-	-	5 Sec	4
9	Akunjanasnam 	2	Stay 4 breaths	2 Min 20 Sec	4
	Rest ( Free Inhale and Free Exhale ) 	-	-	5 Sec	4
10	Bhujangasnam-Modified 	2	Dynamic	20 Sec	4
11	Apanasnam 	2	Dynamic	20 Sec	4

	Rest (Free Inhale and Free Exhale)		-	-	5 Sec	4
12	Urdhva Dhanurasanam		2	Stay 6 breaths	2 Min 40 Sec	4
	Rest (Free Inhale and Free Exhale)		-	-	10 Sec	4
13	Apanasanam to Urdhva Prasrta Padasanam		6	Dynamic	1 Min	4
	Rest (Free Inhale and Free Exhale)		-	-	30 Sec	4
14	Ardha Matsyendrasanam		2	*Stay 6 breaths	2 Min 40 Sec	4
	Rest (Free Inhale and Free Exhale)		-	-	5 Sec	4
15	Navasanam		2	*Stay 4 breaths	2 Min	4
	Rest (Free Inhale and Free Exhale)		-	-	30 Sec	4
16	Pascimatanasanam		2	Dynamic	40 Sec	4
17	Vajrasanam Forward Bend Sequence		4	Dynamic	40 Sec	4
	Rest (Free Inhale and Free Exhale)		-	-	30 Sec	4

18	Brahmari Pranayama		4	Inhale: Exhale	40 Sec	4
19	Sitali		6	Inhale: Hold: Exhale: Hold	3 Min 15 sec	4
20	Nadi Shodana Pranayama		6	Inhale: Hold: Exhale: Hold	3 Min 15 Sec	4
	Rest ( Observe the Breath)		-	-	10 Sec	4
21	Preparatory Eye Practices • Palming      • Blinking • Horizontal, vertical, diagonal movements • Circular movements		4	-	3 Min	4
22	Trataka (Using Ghee lamp)		-	-	7 Min	4
	Rest		-	-	10 Sec	4
21	Karanyasam		5	-	4 Min 30 Sec	4
22	Anganyasam		5	-	2 Min	4
23	Vyapakanyasam		5	-	1 Min 10 Sec	4
24	Closing Prayer		-	-	1 Min	4

Note: The total duration of the practices for weeks 13 to 16 was 60 minutes

### 3.12 YOGA INTERVENTION PROCEDURE

#### 3.12.1 PRAYER

**Figure-6**  
**Prayer to Patanjali**



*“Yogena cittasya padena vācām /  
malam śarīrasya ca vaidyakena //  
yo ’pākarottamaṁ pravaraṁ munīnām /  
patañjaliṁ prāñjalirānato ’smi //  
ābāhu puruṣākāraṁ śaṅkhacakrāsi dhāriṇām /  
saharaśirasam svetaṁ praṇamāmi patañjalim //  
śrimate anantāya nāgarājāya namo namah” //*

- (Bhojadeva, A commentary on the Yoga Sutras of Patanjali, 1100)

#### 3.12.2 CONSCIOUS BREATHING (Young et al., 2010, p. 115)

**Figure-7**  
**Conscious Breathing**



1. On inhalation, the adolescent archers were instructed to expand their chest from top to bottom, front to back, and all sides, while the diaphragm moved

down to allow the chest to expand and the abdomen to bulge out. At the same time, the spine straightened.

2. On exhalation, the archers were instructed to let the diaphragm move up, causing the abdomen to go in, the chest to contract, and the spine to return to its natural curvature.

### 3.12.3 STANDING ASANA

#### 3.12.3.1 Tadasanam (Desikachar, 2009, p. 99)

*i) Vinyasa:*

**Figure-8**  
**Tadasanam**



*ii) Classification:*

- a. Standing
- b. Symmetrical
- c. Purvatana
- d. Dynamic or static
- e. Final posture achieved on inhale.

*iii) Technique:*

1. Adolescent archers adopted the samasthiti posture, which is a standing position with the feet together and arms by their sides, back erect, chin tucked in and the weight is equally distributed on both legs.
2. While inhaling, they were instructed to lift both the arms from sides simultaneously lift the heels while maintaining the balance on the balls of the feet with their hands closer to the ears; the heels pressed against one another, and the palms touching each other.

3. While exhaling, they were instructed to bring the arms down to the sides of the body and simultaneously bring the feet to the floor.
4. They were instructed to repeat steps 2 and 3 and returned back to samasthiti.

### 3.12.3.2 Uttanasanam (Desikachar, 2009, p. 65-67)

i) *Vinyasa:*

**Figure-9**  
**Uttanasanam**



ii) *Classification:*

- a. Standing
- b. Symmetrical
- c. Pascimatana
- d. Dynamic or static
- e. Final posture achieved on exhale

iii) *Technique:*

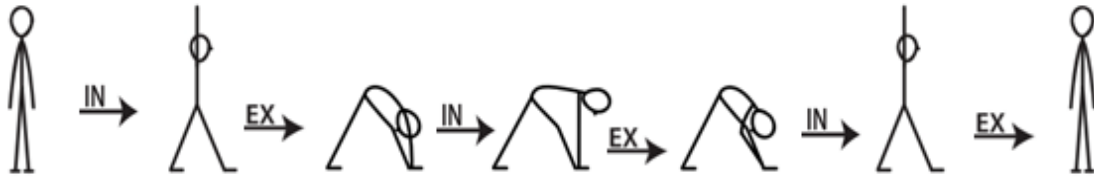
1. Adolescent archers adopted the samasthiti posture, which is a standing position with the feet together and arms by their sides, back erect, chin tucked in and the weight is equally distributed on both legs.
2. They were instructed to bring both hands over their head, with palms facing upwards, while inhaling.
3. While exhaling, they were asked to lean forward and rest their arms on the floor at either side of their feet. Palms were in line with the heels and front fingers were facing forward with their forehead touching their legs near the knee.
4. On inhaling, they lifted their arms and came up with the arms leading the movement of the trunk.

5. Finally, on exhaling, they brought down the arms and returned to the samasthiti posture.

### 3.12.3.3 Parsva Uttanasanam (Desikachar, 2009, p. 61-64)

i) *Vinyasa:*

**Figure-10**  
**Parsva Uttanasanam**



ii) *Classification:*

- a. Standing
- b. Symmetrical
- c. Pascimatana
- d. Dynamic or static
- e. Asana achieved on exhale

iii) *Technique:*

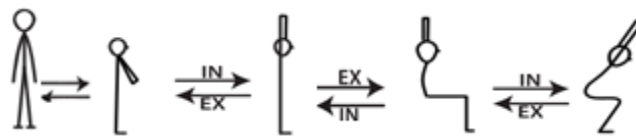
1. Adolescent archers assumed the position of samasthiti.
2. They were instructed to take a comfortable stride forward with the left leg, with the body facing forward. A comfortable stride was one where they could easily come back in 1 step.
3. On inhalation, they were instructed to lift both arms from the front, with hands closer to the ears and straight, and palms facing forwards.
4. Then, on exhalation, they leaned forward and rested the arms on the floor at either side of the feet, with palms in line with the heel and front fingers facing forward.
5. During the forward bend, only the legs bear the whole body weight, while the spine is curved, the head is held erect, and the chin is tucked in.

6. On inhalation, they were instructed to allow the spine to extend, with the chin remain tucked in.
7. On exhalation, they were asked to bend forward further towards the front leg and the head should touch the leg (near the knee).
8. On inhalation, they came up with the arms raised, arms leading the movement of the trunk.
9. On exhalation, they brought down the arms from the forward position, and returned back to samasthiti.
10. This sequence was repeated on the right leg.

#### 3.12.3.4 Ardha Utkatasanam (Desikachar, 2009, p. 103-105)

i) *Vinyasa:*

**Figure-11**  
**Ardha Utkatasanam**



ii) *Classification:*

- a. Standing
- b. Symmetrical
- c. Purvatana
- d. Dynamic or static
- e. Asana achieved on inhale

iii) *Technique:*

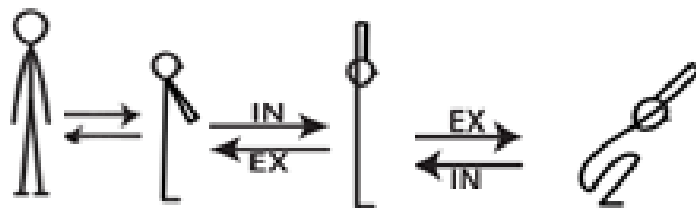
1. Adolescent archers assumed the position of samasthiti. Then, they were instructed to interlock their fingers and turn the palms facing down.
2. On inhale, they were told to lift both arms from the front, with the hands closer to the ears and straight, heels closer to each other, and palms facing upwards.

3. On exhale, they were asked to go down half way to the half squatting position while keeping the back straight during the movement. The knees and feet were together, and the heels were on the floor.
4. They were then asked to inhale and arch the back. This is Ardha Utkatasanam.
5. On exhale, they were asked to relax the back.
6. They were then asked to inhale and come up, with the arms initiating the movement of the torso.
7. On exhale, they were instructed to lower the arms down from the front, unlock the fingers and return to samasthiti.

### 3.12.3.5 Utkatasanam (Desikachar, 2009, p. 68 & 69)

i) *Vinyasa:*

**Figure-12**  
**Utkatasanam**



ii) *Classification:*

- a. Standing
- b. Symmetrical
- c. Pascimatana
- d. Dynamic or static
- e. Final posture achieved on exhale

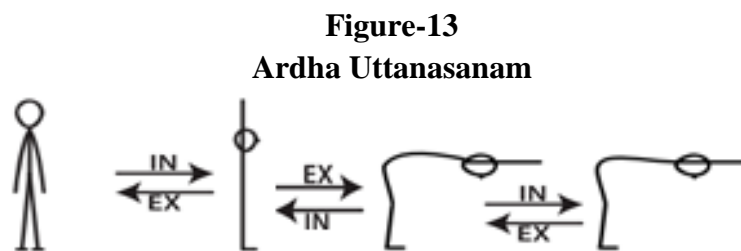
iii) *Technique:*

1. Adolescent archers assumed the position of samasthiti. Then, they were instructed to interlock their fingers and turn the palms facing down.

2. On inhalation, they were told to lift both arms from the front, with the hands closer to the ears and straight, heels closer to each other, and palms facing upwards.
3. On exhale, they were asked to go down to the squatting position while keeping the back straight during the movement. The knees and feet were together, and the heels were on the floor.
4. They were then asked to inhale and come up, with the arms initiating the movement of the trunk.
5. On exhale, they were instructed to lower the arms down from the front, unlock the fingers and return to samasthiti.

### 3.12.3.6 Ardha Uttanasanam (Desikachar, 2009, p. 100-102)

i) *Vinyasa:*



ii) *Classification:*

- a. Standing
- b. Symmetrical
- c. Purvatana
- d. Dynamic or static
- e. Final posture achieved on inhale

iii) *Technique:*

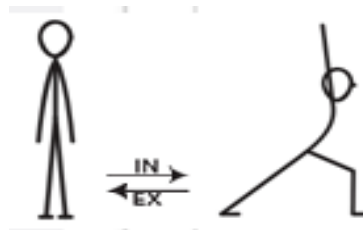
1. The samasthiti posture was adopted by the adolescent archers.
2. Both arms were lifted from the front while inhaling, with the hands closer to the ears and straight, and the palms facing front.

3. On exhalation, the body was bent forward halfway from the hips, and the arms and trunk were horizontal with the palms facing down.
4. The back was arched with the head in line with the spine while inhaling.
5. The back was relaxed while exhaling.
6. The arms were raised, with the trunk leading the movement while inhaling.
7. The arms were lowered from the front to the sides of the body, and the samasthiti posture was adopted again by the adolescent archers.

### 3.12.3.7 Virabhadrasanam (A) (Desikachar, 2009, p. 106 & 107)

*i) Vinyasa:*

**Figure-14**  
**Virabhadrasanam (A)**



*ii) Classification:*

- a. Standing
- b. Asymmetrical
- c. Purvatana
- d. Dynamic or static
- e. Posture achieved on inhale

*iii) Technique:*

1. The adolescent archers adopted the samasthiti posture and then made a comfortable stride forward with their left leg, pressing the heel of their back foot down and turning slightly to an angle and their their body was facing forward.
2. On inhalation, they were instructed to bring their hands up from the front while simultaneously bending the front knee, retaining the perpendicular axis of the spine. The weight was balanced on both legs, arms were straight and

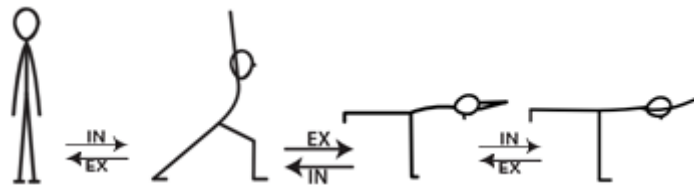
across the ears, palms were together, and their eyes were focused on the horizon.

3. On exhalation, they brought their arms down from the front while simultaneously straightening the front knee. The back foot was turned to face forward, the left leg was taken behind, and they returned to samasthiti.
4. This was repeated on the other leg.

### 3.12.3.8 Virabhadrasanam (B) (Stephens, 2011, p. 258)

i) *Vinyasa:*

**Figure-15**  
**Virabhadrasanam (B)**



ii) *Classification:*

- a. Standing
- b. Asymmetrical
- c. Visesa
- d. Static
- e. Posture achieved on inhale

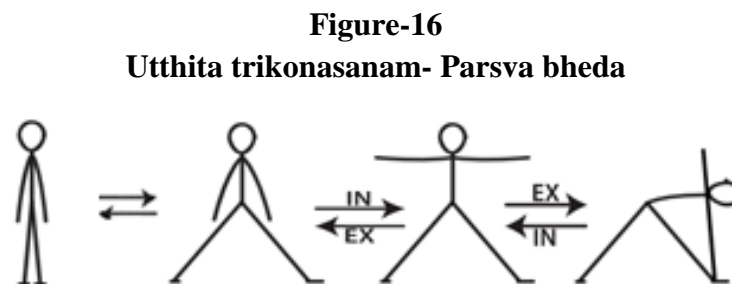
iii) *Technique:*

1. The adolescent archers adopted the samasthiti posture and then made a comfortable stride forward with their left leg, pressing the heel of their back foot down and turning slightly to an angle with their body facing forward.
2. On inhalation, they brought their hands up from the front simultaneously bending the front knee and retaining the perpendicular axis of their spine. The weight was balanced on both legs, their arms were straight and across the ears, palms were together, and their eyes were focused on the horizon.

3. On exhalation, they straightened their left leg while extending and stretching the right leg from behind. They kept their palms together, and their arms were stretched in front of their ears. Their body was parallel to the floor, and their eyes were fixed on the ground.
4. On inhalation, they arched their back and maintained their head in line with their spine, holding the pose for a few breaths. This is Virabhadrasanam (B), then they relaxed their back on exhalation.
5. On the next inhalation, they dropped their lifted leg, bent the front knee, and returned to Virabhadrasanam (A).
6. On exhalation, they descended their arms from the front while straightening the front knee and returned to samasthiti by straightening their back foot.

### 3.12.3.9 Utthita Trikonasanam -Parsva Bheda (Desikachar, 2009, p. 131-133)

i) *Vinyasa:*



ii) *Classification:*

- a. Standing
- b. Asymmetrical
- c. Parsva
- d. Dynamic or static

e. Posture achieved on inhale

1. Adolescent archers adopted the samasthiti posture, then they were instructed to take a comfortable sideways step to the left. The legs were kept straight,

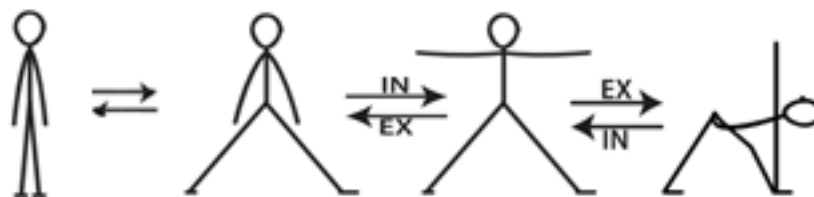
and the feet were parallel to each other, while the arms were at the sides of the body.

2. On inhalation, they raised their arms from the side to shoulder level, palms facing downwards.
3. On exhalation, they bent laterally to the left, placing their left hand outside the left foot on the floor in line with the heel, while the right arm was stretched up, parallel to the shoulders.
4. On inhalation, they turned their head and looked up at the outstretched arm.
5. On exhalation, they twisted their head downward and came up with inhalation, and repeated the same on the other side.
6. Finally, on exhalation, they brought their arms down by their sides and returned to samasthiti by bringing their feet together.

### 3.12.3.10 Utthita Trikonasanam -Parivrtti Bheda (Desikachar 2009, p. 145-147)

*i) Vinyasa:*

**Figure-17**  
**Utthita Trikonasanam-Parivrtti Bheda**



*ii) Classification:*

- a. Standing
- b. Asymmetrical
- c. Parivrtti
- d. Dynamic or static
- e. Posture achieved on inhale

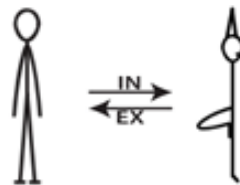
*iii) Technique:*

1. As adolescent archers assumed the samasthiti posture, they were instructed to take a comfortable sideways step to the left. The legs were kept straight, and the feet were parallel to each other, while the arms were at the sides of the body.
2. Then, on the inhalation, they raised their arms from the side to shoulder level, palms facing downwards.
3. On exhalation, they were asked to turn and bring the right palm outside the left foot in line with its heel. Their fingers face front, while the left arm is stretched upward.
4. On inhalation, they twisted their head downward and came up, and repeated the same on the other side.
5. Finally, they brought their arms down by their sides on the exhalation and returned to samasthiti by bringing their feet together.

**3.12.3.11 Bhagirathanam (Stiles, 2008, p.112).**

*i) Vinyasa:*

**Figure-18**  
**Bhagirathanam**



*ii) Classification:*

- a. Standing
- b. Asymmetrical
- c. Visesa
- d. Static
- e. Posture achieved on inhale

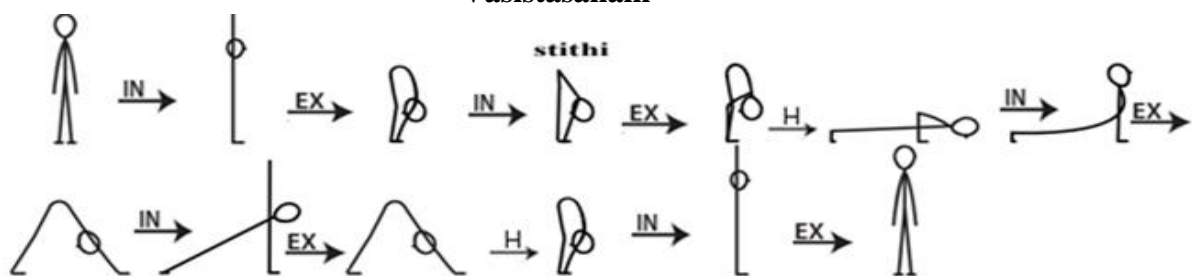
iii) *Technique:*

1. The adolescent archers were instructed to take a stance in samasthiti.
2. They were then instructed to bend their right leg and place their right foot on the left leg's inner thigh, with the right toes pointed down and the knee parallel to the ground, and the bent knee pointing to the side. They were also told to keep their arms at their sides.
3. During inhalation, they were instructed to raise their arms up from the sides while rising up on the ball of their left foot and bringing their palms together across their ears. They were instructed to maintain this position. This is Bhagirathanasana.
4. On exhalation, the archers were instructed to drop their arms to the sides and bringing the left heel down simultaneously.
5. Finally, they were instructed to return to samasthiti by lowering the right foot and repeating the entire sequence on the other side.

3.12.3.12 Vasisthasana (Lasater, 1985, p.25)

i) *Vinyasa:*

**Figure-19**  
**Vasisthasana**



ii) *Classification:*

- a. Standing
- b. Asymmetrical
- c. Visesa
- d. Static
- e. Posture achieved on inhale

*iii) Technique:*

1. The adolescent archers were asked to adopt samasthiti.
2. On inhalation, they were asked to bring both hands over their head with palms facing front.
3. On exhalation, they leaned forward, placing their arms on the floor at either side of their feet, with palms in line with the heel and front fingers facing forward. The weight of their body was balanced only on their legs, while their spine was curved, head was held erect, and chin was tucked in.
4. On inhalation, they were instructed to allow their spine to lengthen with their palms still on the floor, while keeping their chin tucked in.
5. On exhalation, they were asked to bend forward further towards their legs until their forehead touched their legs.
6. Then, on hold, they were asked to shift their weight to their palms, and jump backwards by throwing their legs back. In this position, their body was balanced only on their palms and toes, with their knees, chest, and abdomen off the floor, elbows bent, and feet together.
7. On inhalation, they lifted their chest up while straightening their elbows, with their head moving in line with their spine. Their body was balanced between their palms and toes, with their chest forward and shoulders relaxed.
8. On exhalation, they lifted their hips up by lowering their head and chest until the crown of their head touched the floor with the weight on their legs and hands. Their heels were on the floor.
9. On the next inhalation, they turned their trunk laterally upwards, raising their right arm vertically from the side. Their trunk was parallel to the ground, and their body was balanced only on their left arm and left foot. The outer edge of

their left foot rested firmly on the floor, and their right foot rested on top of their left foot. They balanced in this position, keeping their body straight, with their shoulders in line with each other. They turned their head and looked up at their right arm, holding the position. This is called vasistasanam.

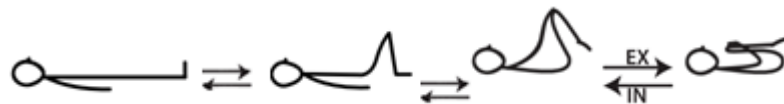
10. On exhalation, they returned their right arm and right foot to the floor, raised their hips up, and lowered their head and chest back to adho mukha svanasanam.
11. On inhalation, they repeated the sequence on the other side before returning to adho mukha svanasanam on the exhale.
12. Finally, they were asked to hold their breath, shifted their weight to their palms, and jumped forward, placing their feet between their palms.
13. On inhalation, they raised their arms up and came up with the arms leading the movement.
14. On exhalation, they brought their arms down and came back to samasthiti.

### 3.12.4 LYING ASANA- SUPINE POSITION

#### 3.12.4.1 Apanasanam ((Desikachar, 2009, p.76-78)

i) *Vinyasa:*

**Figure-20**  
**Apanasanam**



ii) *Classification:*

- a. Lying supine
- b. Symmetrical
- c. Pascimatana
- d. Dynamic or static
- e. Posture reached on exhale

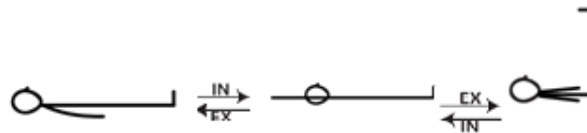
*iii) Technique:*

1. Adolescent archers were asked to adopt lying samasthiti posture.
2. Then, they were instructed to bend their knees closer to the hips, knees are together.
3. Next, the archers were asked to place their palms by the sides of their knees, simultaneously lift both legs off the floor, and were instructed to inhale in this position.
4. On exhalation, they were instructed to bring their knees closer to the chest. This is called apanasanam.
5. Then, on inhalation, they were asked to move the knees away from the chest and return back to lying samasthiti.

**3.12.4.2 Urdhva Prasrta Padasanam (Desikachar, 2009, p.78&79)**

*i)Vinyasa:*

**Figure-21**  
**Urdhva Prasrtha Padasanam**



*ii) Classification:*

- a. Lying supine
- b. Symmetrical
- c. Pascimatana
- d. Dynamic or static
- e. Asana reached on exhale

*iii) Technique:*

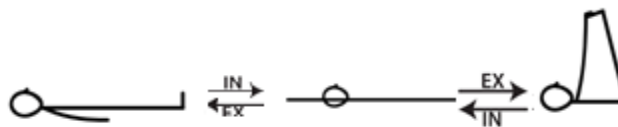
1. The adolescent archers were instructed to lay in samasthiti.
2. On the inhale, they were asked to raise both arms over the head on the floor. The hands should be straighter and closer to the ears, heels together, and palms facing upwards.

3. On the exhale, they were asked to raise their legs to a vertical angle while lowering their arms. Their legs should be straight and together, hips on the ground, arms along the sides of the body, and palms on the ground.
4. Then, they were instructed to drop their legs to the floor while rising their arms above the head on the inhale, with the legs remaining straight throughout.
5. Finally, on the exhale, they were asked to return to samasthiti by dropping their arms down the sides of the body to the floor.

### 3.12.4.3 Supta Padangusthasanam (Lasater, 1981, p.48)

i) *Vinyasa:*

**Figure-22**  
**Supta Padangusthasanam**



ii) *Classification:*

- a. Lying supine
- b. Symmetrical
- c. Pascimatana
- d. Dynamic or static
- e. Posture reached on exhale

iii) *Technique:*

1. The adolescent archers were instructed to lie down in samasthiti.
2. On inhalation, they were asked to raise both arms over their head on the floor. Their hands should be straighter and closer to their ears, with their heels together and palms facing upwards.
3. Next, on exhalation, they were instructed to lift both legs up vertically simultaneously, holding their big toes using their thumbs, index, and middle fingers. They were further instructed to keep their hips on the floor, ensure

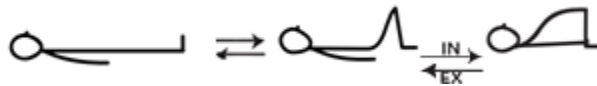
their knees remained straight and on the ground, and relax their shoulders, allowing them to rest on the ground.

4. On inhalation, they were instructed to release the grip of their big toes and raise both arms over their head while returning their legs to the floor, keeping their legs together.
5. Finally, on exhalation, they were told to return to samasthiti by dropping their arms to the floor along the sides of their body.

#### 3.12.4.4 Dvipadapitham (Desikachar, 2009, p.111-112)

i) *Vinyasa:*

**Figure-23**  
**Dvipadapitham**



ii) *Classification:*

- a. Lying supine
- b. Symmetrical
- c. Purvatana
- d. Dynamic or static
- e. Posture achieved on inhale

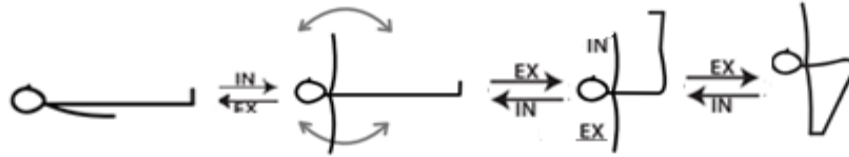
iii) *Technique:*

1. Adolescents archers were instructed to relax in the samasthiti pose.
2. They were instructed to bend their knees and bring their feet near their hips, grasping the ankles with their hands. The knees were instructed to be together, and the feet together.
3. On inhalation, they were instructed to lift their hips up while keeping their feet and knees together, chin remains tucked in. They were specifically instructed not to push their abdomen out.
4. On exhalation, they were told to drop their hips down to the floor, release the grasp on their ankles, and stretch their legs back to samasthiti.

### 3.12.4.5 Jathara Parivrtti -Parivrtti Bheda (Desikachar, 2009, p.151-155)

i) *Vinyasa:*

**Figure-24**  
**Jathara Parivrtti- Parivrtti bedha**



ii) *Classification:*

- a. Lying Supine
- b. Asymmetrical
- c. Parivrtti
- d. Static
- e. Posture achieved o exhale

iii) *Technique:*

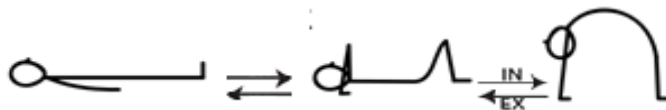
1. The adolescent archers were instructed to lie in samasthiti.
2. On inhalation, they were instructed to sweep their arms by the sides up to the shoulder level with the palms facing down, arms straight and on the floor.
3. They were instructed to lift their head gently and turn it to the left on exhalation. Their left ear lobe should touch the floor, the head should be in line with the body, and they should inhale in this position.
4. On exhalation, they were instructed to raise both legs to the vertical position, keeping the legs together and the hips on the floor. They were advised to inhale in this position.
5. They were instructed to exhale and lower their legs to the right side on the floor and hold the toes with the right hand. They were advised to keep their legs straight, heels together, and left shoulder and ear on the floor, and stay in the position with normal breath. This is called as Jathara Parivrtti-Parivrtti Bheda.

6. On inhalation, they were told to release the hold on their feet and raise their legs to the vertical position with their knees straight and asked to exhale in this position.
7. They were instructed to inhale and lower their legs down to the floor with their knees straight, and exhale in this position.
8. On inhalation, they were instructed to turn their head back to the center with the head facing up, and repeat the process on the other side.
9. Finally, they were instructed to exhale and sweep their arms down from the side along the sides of the body and return to samasthiti.

#### 3.12.4.6 Urdhva Dhanurasanam ( Ezrat, 2002, p.128)

i) *Vinyasa:*

**Figure-25**  
**Urdhava Dhanurasanam**



ii) *Classification:*

- a. Lying supine
- b. Symmetrical
- c. Purvatana
- d. Static
- e. posture achieved on inhale

iii) *Technique:*

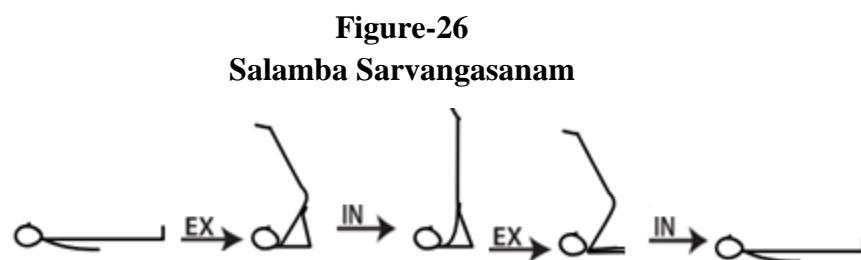
1. Adolescent archers were instructed to relax in the samasthiti pose.
2. They were instructed to bend their knees and rest their feet closer to the torso on the floor.
3. Then, they were instructed to lift their arms from the front and keep both palms on each side of the head near the ears. The elbows were to be kept parallel, and the fingers pointing towards the shoulders.

4. On inhalation, adolescent archers were instructed to press the palms and feet, simultaneously lifting the trunk up by arching the back until both hands were completely extended out. They were advised to distribute the weight between the feet and palms and stay in this position. This is called Urdhva Dhanurasanam.
5. On exhalation, they were told to drop the trunk back to the floor while simultaneously bending the elbows and knees.
6. They were instructed to drop the arms to the floor at the sides of the body with the palms facing down.
7. Finally, they were instructed to stretch their legs and return back to samasthiti.

### 3.12.5 INVERTED ASANA

#### 3.12.5.1 Salamba Sarvangasanam (Desikachar, 2009, pp.169-171)

*i) Vinyasa:*



*ii) Classification:*

- a. Lying supine
- b. Symmetrical
- c. Viparita
- d. Static
- e. Posture achieved on inhale

*iii) Technique:*

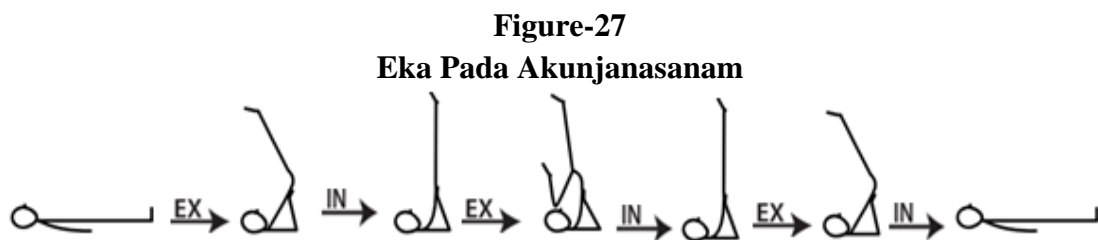
1. Adolescent archers were instructed to lay in samasthiti.
2. They were asked to exhale and lift their legs up along with the hips, extending the legs beyond the head. They were advised to support their lower back with

the palms of their hands, fingers pointing upwards. The arms were to be in a parallel position with the elbows resting on the floor. The legs were to be kept straight, and the toes should not touch the floor.

3. On inhalation, they were instructed to bring their legs up to the vertical position, aligning the trunk and legs in a vertical line. They were advised to support the body using the shoulders and elbows, and continue to hold in this position. This is called Salamba Sarvangasanam.
4. On exhalation, asked them to drop their legs towards the head without allowing the toes to touch the floor, simultaneously lowering the palms to the floor.
5. On inhalation, they were instructed to bring their feet and hips to the floor. They were advised to lower the trunk as if lowering one vertebra at a time, without lifting the shoulders or head, and bringing the legs back down to samasthiti.

### 3.12.5.2 Eka Pada Akunjanasanam

i) *Vinyasa:*



ii) *Classification:*

- a. Lying supine
- b. Asymmetrical
- c. Viparita
- d. Static
- e. posture achieved on inhale

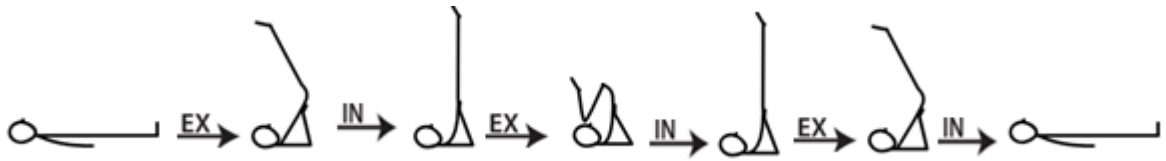
*iii) Technique:*

1. Adolescent archers were instructed to lay in samasthiti.
2. They were asked to exhale and lift their legs up along with the hips, extending the legs beyond the head. They were advised to support their lower back with the palms of their hands, fingers pointing upwards. The arms were to be in a parallel position with the elbows resting on the floor. The legs were to be kept straight, and the toes should not touch the floor.
3. On inhalation, they were instructed to bring their legs up to the vertical position, aligning the trunk and legs in a vertical line. They were advised to support the body using the shoulders and elbows.
4. On exhalation, asked them to bend the left leg and lower the left knee to touch the forehead. The right leg remains straight up. Insisted to stay in this position. This is called Eka Pada Akunjanasanam.
5. On inhalation, asked them to lift the left knee and straighten the leg. Both the legs were upright and together.
6. On exhalation, asked them to drop their legs towards the head without allowing the toes to touch the floor, while simultaneously lowering the palms to the floor.
7. On inhalation, they were instructed to bring their feet and hips to the floor. They were advised to lower the trunk as if lowering one vertebra at a time, without lifting the shoulders or head, and bringing the legs back down to samasthiti.
8. They were instructed to do it on the other side.

### 3.12.5.3 Akunjanasanam

i) *Vinyasa:*

**Figure-28**  
**Akunjanasanam**



- g. Symmetrical
- h. Viparita
- i. Static
- j. Posture achieved on inhale

iii) *Technique:*

1. Adolescent archers were instructed to lay in samasthiti.
2. They were asked to exhale and lift their legs up along with the hips, extending the legs beyond the head. They were advised to support their lower back with the palms of their hands, fingers pointing upwards. The arms were to be in a parallel position with the elbows resting on the floor. The legs were to be kept straight, and the toes should not touch the floor.
3. On inhalation, they were instructed to bring their legs up to the vertical position, aligning the trunk and legs in a vertical line. They were advised to support the body using the shoulders and elbows.
4. On exhalation, asked them to bend both legs and lower the knee to touch the forehead and they were insisted to stay in this position. This is called as akunjanasanam.
5. On inhalation, asked them to lift the knees and straighten the legs. Both the legs were upright and together.
6. On exhalation, asked them to drop their legs towards the head without allowing the toes to touch the floor, while simultaneously lowering the palms to the floor.

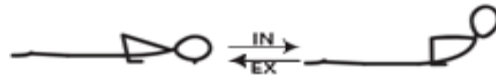
7. On inhalation, they were instructed to bring their feet and hips to the floor. They were advised to lower the trunk as if lowering one vertebra at a time, without lifting the shoulders or head, and bringing the legs back down to samasthiti.

### 3.12.6 LYING ASANA – PRONE POSITION

#### 3.12.6.1 Bhujangasanam (Desikachar, 2009, p.113-114)

i) *Vinyasa:*

**Figure-29**  
**Bhujangasanam**



ii) *Classification:*

- a. Lying prone
- b. Symmetrical
- c. Purvatana
- d. Dynamic or static
- e. Asana achieved on inhale

iii) *Technique:*

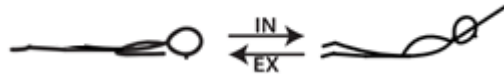
1. Adolescent archers were instructed to lie on their stomach with their foreheads touching the floor. They were advised to keep their knees straight and together, toes turned out. Their arms were straight, down the sides of the body, palms up, shoulders relaxed, and eyes closed.
2. They were instructed to keep their palms on the floor at their navel.
3. On inhaling, asked them to lift their head and chest without support, placing their palms on the floor, and aligning their head with the spine.
4. On exhaling, they were instructed to drop their head, torso, and forehead back to the floor.
5. Finally, they were asked to stretch their arms along the sides with palms up and return back to samasthiti.

### 3.12.6.2 Ardha Salabhasanam (Desikachar, 2009, p.115-116)

i) *Vinyasa:*

**Figure-30**  
**Ardha Salabhasanam**

ii) *Classification:*



- a. Lying prone
- b. Asymmetrical
- c. Purvatana
- d. Dynamic or static
- e. Posture achieved on inhale

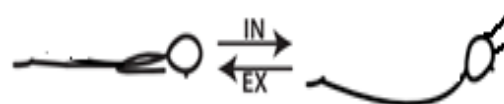
iii) *Technique:*

1. Adolescent archers were instructed to relax in samasthiti.
2. They were instructed to inhale and raise their head, torso, and left leg while extending the left arm over the head. The legs and hands were to be kept straight, with the left arm positioned across the left ear. They were advised to align the head with the spine and ensure that the left palm faced down. This is called as Ardha Salabhasanam.
3. On exhalation, they were instructed to drop their head, chest, and left leg back to samasthiti while simultaneously lowering the left arm along the side of the body. The entire sequence was repeated on the other side.

### 3.12.6.3 Salabhasanam (Desikachar, 2009, p.113-114)

i) *Vinyasa:*

**Figure-31**  
**Salabhasanam**



*ii) Classification:*

- a. Lying supine
- b. Symmetrical
- c. Purvatana
- d. Dynamic or static
- e. Postures achieved on inhale

*iii) Technique:*

1. Adolescent archers were instructed to lay in samasthiti with their eyes closed.
2. Then, they were instructed to inhale and raise their head, torso, and legs while sweeping both arms over the head. They were advised to keep their legs, limbs, head, and palms straight during this movement. This is called Salabhasanam.
3. On exhale, they were told to return their arms to the floor on the sides of the body and drop their head, knees, and chest, returning to samasthiti.

**3.12.6.4 Dhanurasanam (Desikachar, 2009, p.113 &114)***i) Vinyasa:*

**Figure-32**  
**Dhanurasanam**

*ii) Classification:*

- a. Lying prone
- b. Symmetrical
- c. Purvatana
- d. Static
- e. Posture achieved on inhale.

*iii) Technique:*

1. Adolescent archers were instructed to relax in samasthiti.
2. They were instructed to bend their knees and grip their ankles, ensuring that their knees and feet remained together, and placing their forehead on the floor.

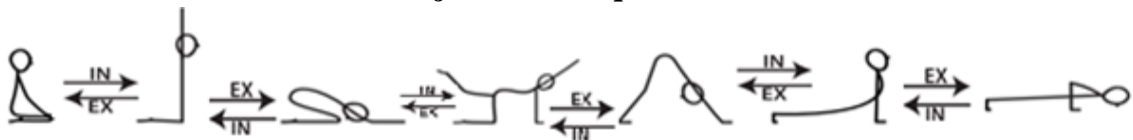
3. On inhalation, they were asked to pull their feet back, raise their torso and head, and lift their knees. They were advised to align their head, spine, knees, and feet. They were encouraged to hold this position for as long as they could. This is called as Dhanrasanam.
4. On exhalation, they were told to drop their head, chest, and knees, and relax.
5. They were then asked to relax their ankles, straighten their legs, lower their arms, and return to samasthiti.

### 3.12.7 KNEELING SEQUENCE

#### 3.12.7.1 Vajrasanam Sequence

i) *Vinyasa:*

**Figure-33**  
**Vajrasanam Sequence**



ii) *Technique:*

1. Adolescent archers were instructed to kneel in samasthiti.
2. On inhalation, they were instructed to raise their arms straight across the ears, with their hands pointing forward.
3. On exhalation, they were asked to bend forward, place their palms on the floor in line with the shoulders, keep their hips away from the heels, and ensure that their elbows were off the ground.
4. On inhalation, they were asked to gently arch their back and simultaneously lift their head, left leg and right hand up. They were advised to keep their eyes closed, shoulders and arms relaxed and erect.
5. On exhalation, instructed them to bring their toes inward, raise their hips up, and lower their head and chest down. They were advised to ensure that the top

of their head touched the floor, with the body supported by the legs and hands, and to keep their heels on the floor.

6. On inhalation, they were told to slide their body forward by lowering their hips, aligning their head with the spine. They were instructed to balance on their palms and toes, with the chest facing forward and the shoulders relaxed, while keeping the knees off the ground.
7. On exhalation, they were guided to lower their body downwards, maintaining a horizontal position balanced only on their palms and toes, with the knees, chest, and abdomen above the ground by flexing their elbows and keep their feet close together.
8. On inhalation, they were instructed to bring their chest forward, straighten their elbows, align their head with the spine, balance on their palms and toes, relax their shoulders and knees, and keep the head in line with the spine.
9. On exhalation, they were instructed to lift their hips up while lowering their head and chest down, simultaneously raising the right leg and ensuring the top of the head touched the ground. They were advised to support their body with their legs and hands, with their heels on the ground.
10. On inhalation, asked them to lower their knees to the floor while arching their back, lifting the head, and simultaneously lifting the right leg and left hand.
11. On exhalation, they were told to lower the head down and slide the hips back, ensuring the hips did not touch the heels, and keeping the head and elbows away from the ground.
12. On inhalation, instructed them to lift their arms and rise to the kneeling position.

13. Finally, on exhalation, they were instructed to drop their arms, sit on their heels, and return to vajrasanam.

### 3.12.7.2 Ustrasanam (Desikachar, 2009, p.122)

i) *Vinyasa:*

**Figure-34**  
**Ustrasanam**



ii) *Classification:*

- a. Kneeling
- b. Symmetrical
- c. Purvatana
- d. Static
- e. Asana achieved on inhale

ii) *Technique:*

1. Adolescent archers were instructed to kneel in samasthiti.
2. On inhalation, they were instructed to raise their arms straight across the ears, with their hands pointing forward, simultaneously maintaining kneeling position.
3. On exhalation, they were asked to lower the arms from the front & place the palms on the waist, fingers forward and thumbs back.
4. On inhalation, they were asked to arch the back, lower the arms, hold the ankles with the hands, drop the head back and stay in this position. This is called as Ustrasanam.
5. On exhalation, they were instructed to release the hold on their ankles, come up, return to the vertical position, and place their palms on their waist.

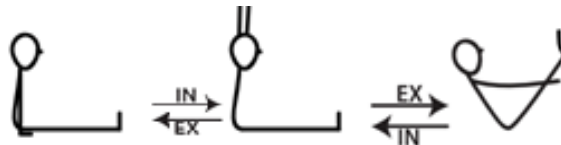
6. On inhalation, they were instructed to raise their arms straight across the ears, with their hands pointing forward, simultaneously maintaining kneeling position.
7. Finally, on exhalation, they were instructed to drop their arms, sit on their heels, and return to vajrasanam.

### 3.12.8 SEATED ASANAS

#### 3.12.8.1 Navasanam (Desikachar, 2009, p. 94& 95)

i) *Vinyasa:*

**Figure-35**  
**Navasanam**



ii) *Classification:*

- a. Seated
- b. Symmetrical
- c. Pascimatana
- d. Static
- e. Posture achieved on exhale

iii) *Technique:*

1. The adolescent archers were asked to adopt samasthiti posture.
2. They were instructed to inhale and raise their arms straight across the ears, with their hands pointing forward.
3. On exhalation, they were guided to lower their arms to shoulder level, lean back, and lift their legs. They were instructed to keep their legs straight, with palms placed across their legs and facing inward, while balancing their bodies on the seat. They were advised to hold this position. This is Navasanam.
4. On inhalation, they were directed to drop their legs to the floor while simultaneously raising their arms.

5. Finally, on exhalation, they were instructed to lower their arms from the front and return to samasthiti.

### 3.12.8.2 Janu Sirsasanam (Desikachar, 2009, pp.81-84)

i) *Vinyasa:*

**Figure-36**  
**Janu Sirsasanam**



ii) *Classification:*

- a. Seated
- b. Asymmetrical
- c. Pascimatana
- d. Dynamic or Static
- e. Posture achieved on exhale

iii) *Technique:*

1. The adolescent archers were instructed to assume a position in samasthiti.
2. They were guided to bend their right leg and place the sole of their right foot near the left inner groin. Their body was facing forward, and their hands were placed on each side of the left leg.
3. On inhalation, they were instructed to raise their arms over their heads, ensuring that the arms were straight and aligned with the ears, with palms facing forward.
4. On exhalation, they were directed to lean forward and grasp the left foot with the palms of their hands.
5. On inhalation, they were encouraged to lengthen their spine while maintaining the posture.
6. On exhalation, they were advised to lean further towards the left leg, allowing their forehead to rest on the leg. This is called as Janu Sirsasanam.

7. Finally, they were instructed to raise their arms and come up, with the arms leading the movement of the trunk, while inhaling.
8. On exhalation, asked them to drop their arms and return back to samasthiti. It was repeated on the other side.

### 3.12.8.3 Pascimatanasanam (Desikachar, 2009, pp. 85-87)

i) *Vinyasa:*

**Figure-37**  
**Pascimatanasanam**



ii) *Classification:*

- a. Seated
- b. Symmetrical
- c. Pascimatana
- d. Dynamic or Static
- e. Posture achieved on exhale

iii) *Technique:*

1. The adolescent archers were instructed to assume a position in samasthiti.
2. They were guided to inhale and lift their arms straight over their head from the front, ensuring that their arms were aligned with their ears.
3. On exhalation, they were directed to lean forward and grasp their big toes using their index and thumb.
4. On inhalation, they were encouraged to extend their spine while maintaining the posture.
5. On exhalation, they were advised to bend further towards their legs, allowing their forehead to rest on their legs. This is called as Pascimatanasanam.
6. On inhalation, they were instructed to come up, with their arms leading the movement of the trunk by releasing the hold on their big toes.

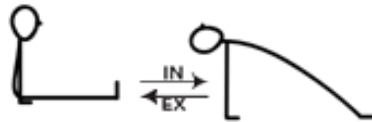
7. Finally, on exhalation, they were directed to bring down their hands from the front, and return back to samasthiti.

#### 3.12.8.4 Purvatanasana (Jois, 2010, p.72)

i) *Vinyasa:*

**Figure-38**

#### **Purvatanasana**



ii) *Classification:*

- a. Seated
- b. Symmetrical
- c. Purvatana
- d. Dynamic or static
- e. Posture achieved on inhale

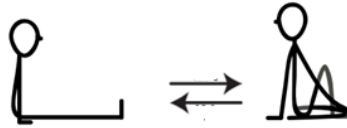
iii) *Technique:*

1. The adolescent archers were instructed to adopt dandasana.
2. They were guided to place their hands behind their back with the palms on the floor and fingers pointing towards their body.
3. On inhalation, they were directed to lift their body up fully, arching their back and dropping their head back. They were instructed to keep their knees and feet together, with arms straight and the soles of their feet touching the floor. The weight of their body was evenly distributed between their arms and legs.
4. On exhalation, they were advised to bring their hips down to the floor, straighten their legs, and tuck their chin in.
5. Finally, they were instructed to bring their palms to their laps, returning back to samasthiti.

### 3.12.8.5 Ardha Matsyendrasanam (Desikachar, 2009, pp. 161-163)

i) *Vinyasa:*

**Figure-39**  
**Ardha Matsendrasanam**



ii) *Classification:*

- a. Seated
- b. Asymmetrical
- c. Parivrtti
- d. Static

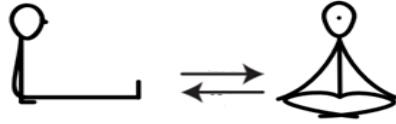
iii) *Technique:*

1. The adolescent archers were instructed to adopt seated samasthiti posture.
2. They were guided to fold their left leg and place the ankle beneath their right thigh. The right leg was to be bent and placed outside the left knee. The right knee should be kept vertical while the left knee rested on the floor.
3. They were then instructed to twist their trunk to the right and place their left elbow outside the right knee. The left palm was to be placed on the right foot. From behind, they were to take their right hand and position the right palm on the base of the left thigh. They were advised to turn their head to the right and maintain this position. This is called Ardha Matsyendrasanam.
4. To release the twist, they were directed to turn their head to the front and remove the right hand from the left thigh, as well as the left hand from the right foot.
5. Finally, they were instructed to bring their legs forward, returning to a neutral position and asked them to repeat on the other side.

### 3.12.8.6 Sukhasanam (Desikachar, 2009, p.51)

i) *Vinyasa:*

**Figure-40**  
**Sukhasanam**



ii) *Classification:*

- a. Seated
- b. Samasthiti
- c. Static

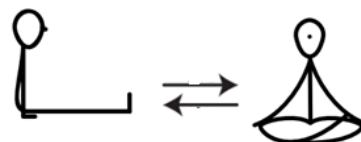
iii) *Technique:*

1. The adolescent archers were instructed to sit with their legs extended forward, keeping their legs together and straight. They were advised to maintain a straight back, with their palms resting on their legs. They were guided to relax their shoulders, close their eyes, and tuck their chin in.
2. They were then directed to cross their legs and place their palms on their knees. This is Sukhasanam.
3. Finally, they were instructed to extend their legs and relax.

### 3.12.8.7 Ardha Padmasanam

i) *Vinyasa:*

**Figure-41**  
**Ardha Padmasanam**



ii) *Classification:*

- a. Seated
- b. Samasthiti
- c. Static

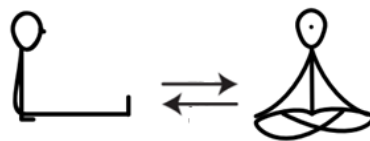
*iii) Technique:*

1. The adolescent archers were instructed to adopt samasthiti.
2. They were advised to place their left ankle all the way under their right thigh and their right foot beneath their left thigh. Their palms were to be placed on their knees, with their back kept straight and their arms relaxed. They were instructed to maintain this position. This called Ardha Padmasanam.
3. They were then guided to stretch their legs and repeat the same posture on the opposite side.

**3.12.8.8 Padmasanam (Desikachar, 2009, p.54)**

*i) Vinyasa:*

**Figure-42  
Padmasanam**



*ii) Classification:*

- a. Seated
- b. Samasthiti
- c. Static

*iii) Technique:*

1. The adolescent archers were instructed to take a position in samasthiti.
2. They were advised to bend their knees and place their right heel over the base of their left thigh, near the hips, and their left heel over the base of their right thigh. They were guided to place their hands on their knees, and their arms relaxed. They were instructed to maintain this position. This is Padmasanam.
3. They were then directed to spread their legs..

**3.12.9 REST**

1. The adolescent archers were instructed to take a relaxed position.
2. They were advised to engage in normal breathing for a few seconds

### 3.12.10 PRANAYAMA

#### 3.12.10.1 Nadi Sodhana Pranayama (Desikachar, 2009, p.355)

**Figure-43**  
**Nadi Sodhana Pranayama**



*Technique:*

1. The adolescent archers were instructed to sit in any meditative poses with back straight, shoulders relaxed, eyes closed, and chin tucked in; adopted mrigi mudra in right hand and chin mudra in left-hand.
2. They were instructed to close the right nostril with the right thumb, inhale deeply via the left nostril, seal the left nostril with the ring and little finger, and release the thumb. Exhale via the right nostril; again inhale through right nostrils and use the left nostril to exhale. This makes one round.

#### 3.12.10.2 Ujjayi Pranayama (Desikachar, 2009, p.355)

**Figure-44**  
**Ujjayi Pranayama**



*Technique:*

1. The adolescent archers were instructed to sit in any meditative asana, straighten their spines, relax their shoulders, close their eyes, and tuck in their chins. They were guided to adopt chin mudra on both hands and place them on their knees.

2. They were directed to inhale through both nostrils, producing a gentle hissing sound, while focusing on their throat. Then, they were instructed to exhale through both nostrils, maintaining their focus on the throat.
3. This sequence of inhalation and exhalation constituted one round.

### 3.12.10.3 Brahmari Pranayama

**Figure-45**

#### **Brahmari Pranayama**



*Technique:*

1. The adolescent archers were instructed to sit in any meditative asana, straighten their spines, relax their shoulders, close their eyes, and tuck in their chins. They were guided to adopt chin mudra on both hands and place them on their knees.
2. Then they were told to place thumbs on ears, index fingers above the eyebrows, middle fingers on the eyes, ring fingers under the nostrils, and little fingers under lips. This shanmuki mudra lightly covers the sensory organs.
3. They were instructed to take a slow and deep inhalation through nose, filling the lungs completely. On exhalation, asked them to make a humming sound like a bee.
4. This sequence of inhalation and exhalation constituted one round.

### 3.12.10.4 Sitali Pranayama (Desikachar, 2009, p.356)

**Figure-46**

#### **Sitali Pranayama**



*Technique:*

1. The adolescent archers were instructed to sit in a meditative asana, ensuring their backs were straight, shoulders relaxed, eyes closed, and chin tucked in. They were guided to adopt chin mudra on both hands, placing them on their knees.
2. They were instructed to inhale through the mouth, by curling their tongues and slightly protruding them outside the lips. Then, they were directed to exhale slowly through both nostrils.
3. This inhalation and exhalation process constituted one round, and they were encouraged to repeat this process again.

**3.12.11 TRATAKA****a) Preliminary Eye Exercises***i) Palming:*

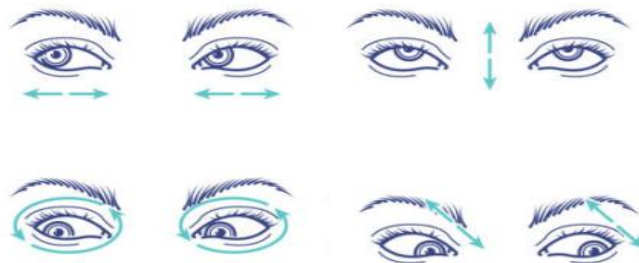
**Figure-47**  
**Palming**

*Technique:*

1. The adolescent archers were advised to rub both their palms together until they felt warmth.
2. Then, the archers were directed to gently place their warm palms over their closed eyeballs.
3. They were guided to take slow and deep breaths while keeping their hands on their eyes, allowing the warmth to relax their eyes.
4. Next, it was emphasized that they should repeat this process four to five times to experience optimal relaxation.

**ii) Blinking:****Figure-48****Blinking***Technique:*

1. The adolescent archers were instructed to blink their eyes rapidly for about 10 times.
2. The archers were advised to take a few deep breaths while keeping their eyes closed.
3. They were encouraged to repeat the rapid blinking exercise multiple times to refresh their eyes.

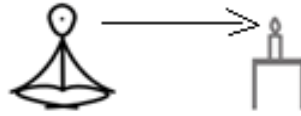
**iii) Horizontal, Vertical, Diagonal, and Circular Eye Movements:****Figure-49****Horizontal, Vertical, Diagonal, and Circular Eye Movements***Technique:*

1. The adolescent archers were directed to perform horizontal, vertical, diagonal, and circular motions with their eyes.
2. After that, they were instructed that each eye movement should be repeated clockwise and then anticlockwise for a few rounds.
3. After each eye movement, they were advised to sit silently with closed eyes for a few seconds, allowing their eyes to rest and relax.

**b. Trataka ( Krishnamacharya, 1935, p.42)**

**Figure-50**

**Trataka**



*Technique:*

1. Adolescent archers were asked to sit in a cross-legged seated position on the floor.
2. Then, they were advised to hold a ghee lamp at a distance of 2 metres, at eye level.
3. The archers were guided to keep their eyes fixed on the light flame without blinking.
4. Next, they were directed to close their eyes and imagine a flame between their brows to enhance their focus.
5. The archers were instructed to repeat this sequence to strengthen their concentration.
6. Finally, they were advised to defocus and relax their eyes by doing palming.

**3.12.12 NYASAM**

**3.12.12.1 Kara Nyasam**

Karanyasam is a practice that involves specific hand gestures (mudras) and associated movements while reciting mantras. The methodology for Karanyasam may vary depending on the specific mantra or tradition being followed. This exercise combines physical movement with the recitation of a mantra, providing a holistic practice that promotes relaxation, focus, and inner connection. It promotes a deeper sense of awareness and harmony between the mind and body during the practice. (Swami Harshananda, 2020). It can be a valuable tool for adolescent archers to enhance their mental and physical well-being.

*Technique:*

Adolescent archers were asked to adopt a relaxed, cross legged posture on the floor with back erect, hands on knees, eyes closed, and chin tucked in and advised them take a few deep breaths to relax and centre themselves.

**a. Thumb Sliding Technique:**

1. The adolescent archers were guided to slide the tip of their thumb from bottom to top and top to bottom on all four fingers, with the hands resting on the knees.
2. While performing this movement, they were instructed to chant the mantra "Sri Krishna Gurave Namah" in parts each time.
3. The mantra can be divided into syllables or phrases, and recited internally or softly spoken.

**b. Flicking Technique:**

1. The adolescent archers were guided to slide the thumb along each finger, beginning with the index finger, from base to tip, and then flick it at the end while reciting the mantra.
2. While performing this movement, they were instructed to chant the mantra "Sri Krishna Gurave Namah" in parts each time.

**c. Palm Sliding Technique:**

1. Following the thumb sliding practice, the archers were guided to slide their left palm over the back of the right hand, and the right palm over the back of the left hand.
2. They were instructed to repeat this sliding motion, allowing the palms to gently glide over each other's surface.
3. This action helps to release tension and promote a sense of relaxation.

#### **d. Relaxation and Repetition:**

After completing the palm sliding technique, the archers were advised to relax and take a moment to observe any sensations or changes in their body and mind.

#### **3.12.12.2 Anganyasam**

Anganyasam combines specific hand gestures (mudra) with the touching of significant points on the body and the recitation of a mantra. This practice aims to promote inner awareness, focus, and alignment of body, mind, and spirit (The Shiva Purana 1.17).

##### *Technique:*

1. Adolescent archers were instructed to sit in a relaxed, cross-legged posture with their back erect, maintaining a straight and upright posture. Asked them to place their hands on the knees, palms facing downward, eyes closed, chin tucked in.
2. Archers were advised to adopt the Chin Mudra with both hands. The Chin Mudra is formed by touching the tip of the index finger to the tip of the thumb, while keeping the other three fingers gently extended.
3. Archers were guided to touch following points on their body with the right hand's Chin Mudra while reciting a mantra in parts.
  - a) Heart: Place the Chin Mudra on the center of the chest, in the area of the heart.
  - b) Throat: Move the Chin Mudra to the throat region.
  - c) Mid eyebrow: Place the Chin Mudra between the eyebrows, at the center of the forehead.
  - d) Top of the head: Finally, touch the top of the head with the Chin Mudra.
4. While touching each point, archers were advised to recite the chosen mantra in parts aloud, then lip movement and in mind.

### 3.13.8.3 Vyapakanyasm

Vyapakanyasm is a practice that involves running the palms through the body while reciting a mantra. This practice aims to promote a deep sense of connection, relaxation, and awareness throughout the entire body. It helps in centering the mind, releasing tension, and fostering a harmonious state of being (Swami Harshananda 2020).

*Technique:*

1. The adolescent archers were asked to sit comfortably on the floor in a cross-legged position with back straight, eyes closed, and chin tucked in.
2. With the seated posture maintained, archers were guided to run through their body using both palms.
3. Starting from the top of the head, they were instructed to slowly and mindfully move their palms down the body, touching various parts along the way.
4. The movement should be gentle and fluid, creating a sense of connection and awareness throughout the entire body.
5. While running their palms through the body, archers were advised to recite the mantra fully.

### 3.12.13 CLOSING PRAYER

SHANTI PATHA

“Om, Sarve Bhavantu Sukhinah,  
 Sarve Santu Nirāmayāh  
 Sarve Bhadrāni Paśyantū,  
 Mā kascit Duhkha Bhāgabhavet  
 Om, Sāntih Sāntih Sāntih”

- Brihadaranyaka Upanishad verse 1.4.14

### 3.13 TEST ADMINISTRATION

#### 3.13.1 Body Sway Measurement (Sarro et al., 2021; Ahmad et al., 2014)

The Kistler force plate (Model: 9287CAQ01; Dimension: 1200mm x 600mm; Frequency: 3000 hz) was used to measure the body sway amplitude and velocity. It was connected with the Kistler MARS (Measurement, Analysis, and Reporting Software), which is a comprehensive and user-friendly software for analysing the force plate measurements.

*Goal:*

To find out the body sway amplitude and velocity in anterior-posterior plane and medial-lateral plane during archery performance.

*Needed:* Force Plate

*Procedure:*

1. Adolescent archers were instructed to stand on the force plate with their feet shoulder-width apart and asked them to perform archery technique. All archers completed shots to 70-m target with their own bows. The target was a standard FITA (World Archery Federation) circle of 122 cm diameter.
2. Prior to data collection, participants went through 6 shots as trials to become familiar with standing on the force plate and maintaining their shooting position.
3. Data was collected upon completion of the archery technique within a 20-second timeframe. The force plate captured both the body sway amplitude and velocity at anterior-posterior and medial-lateral plane.

*Scoring:*

The force plate was used to measure the body sway parameter based on COP (Center of Pressure). The Kistler MARS software analyzed the COP data derived

from the force plate measurements and provided the body sway amplitude values in millimeters and body sway velocity values in mm/s.

### **3.13.2 Static Visual Acuity**

*Goal:* The ability to see something clearly when the player was standing still.

*Needed:* Snellen chart

*Procedure:*

1. The adolescents were instructed to position themselves at a distance of six meters (20 feet) away from the Snellen chart, ensuring proper lighting conditions and avoiding any obstructions that could hinder their vision.
2. They were advised to read the chart starting from the bigger letters and moving towards the smaller ones. The chart normally consists of multiple rows of letters, with each row decreasing in size.
3. The measurement was recorded up to the line where the adolescents could read the letters clearly without any difficulty or hesitation.

*Scoring:*

Visual acuity was measured in feet relative to 20/20 and the score is expressed as decimal.

### **3.13.3 Hand-Eye Coordination Test**

*Goal:* The intention was to assess the hand-eye coordination skills of the participants.

*Needed:* SMS Mirror drawing apparatus (Samyukdha Publications Solutions), star pattern, pencil

*Procedure:*

1. The adolescents were instructed to look at the mirror, where they would see a star image. This star image is a reflection of a star pattern that is grooved on a wooden board and hidden by a screen.

2. They were asked to trace the star pattern by looking at the mirror. The objective was to accurately follow the star pattern, without touching the edges of the grooves. Any contact with the edges would be considered an error.
3. The adolescents were encouraged to perform the task as quickly as possible while maintaining accuracy. The time taken to complete one chance was recorded in seconds, and any errors in hand-eye coordination were counted.

*Scoring:*

Each participant was given three trials to become familiar to perform the task. The scoring was based on two factors: trial duration and errors. The time taken to complete the task was recorded, and errors in hand-eye coordination, such as touching the groove edges, were counted. Hand eye coordination was recorded in decimals.

**3.13.4 Hand Grip Strength Test (Hoeger & Hoeger, 2014, p.237).**

*Goal:* The purpose is to measure the hand grip strength of the participants.

*Needed:* Qingfeng model hand grip dynamometer

*Procedure:*

Short warm-up before the test was performed by the archers.

1. The adolescent archers were instructed to adjust the width of the dynamometer.
2. They were then asked to hold the hand grip dynamometer firmly in their hand, with their fingers wrapped around the grip.
3. To ensure proper positioning, they were advised to keep their elbows at a 90-degree angle and approximately 2 inches away from their body.
4. Once in position, the adolescent archers were instructed to grip the dynamometer tightly for a few seconds without any movement.

5. After releasing the grip, the dynamometer readings were recorded. The recorded readings indicate the force or grip strength exerted by the individual during the test. The measurements were noted to the nearest kilogram.

*Scoring:*

Three trials were performed for each hand with a 15-second rest between trials to prevent fatigue. The highest hand grip strength from these trials, measured in kilograms on a dynamometer, was recorded as the final score for each hand.

### **3.13.5 Push- Up Test (Yobu, 2022, p.347)**

*Goal:* The purpose was to find out the upper body strength of the participants.

*Needed:* Stop watch, mat

*Procedure:*

Short warm-up before the test was performed by the archers.

1. The adolescent archers were instructed to start the push-up with hands under shoulders, keeping their backs straight, heads up, and using their toes as the pivot point.
2. Next, they were asked to lift their bodies by straightening their elbows until their arms were straight, and then asked them to go down. They needed to ensure that their chin touched the mat and their stomachs were off the ground.
3. It was emphasized that throughout the test, they should maintain a straight back and arms at all times. Each lift and lower counted as one repetition.

*Scoring:*

The scoring was based on the maximal number of correct push-ups consecutively performed within duration of 1 minute.

### 3.13.6 Shoulder and Wrist Elevation Test (David H. Fukuda, 2019, p.85)

*Goal:* The shoulder elevation test was used to measure shoulder and wrist flexibility.

*Needed:* Ruler

*Procedure:*

Short warm-up before the test was performed by the archers.

1. The adolescents were instructed to stand comfortably and hold a ruler with their hands shoulder-width apart in a relaxed manner.
2. A measurement was taken from the top of the shoulder to the end of the ruler, and it was noted down as the initial measurement.
3. They were then asked to lie down with their stomach and chest on the ground, and lift their arms over their head.
4. While keeping their chin on the floor, they were instructed to gently lift the stick as high as possible. The measurement was taken from the floor to the bottom of the stick, and recorded as the highest height achieved.
5. This measurement process was repeated two more times for a total of three measurements.

*Score:*

The following formula was used to calculate a score in cm.

$$\text{Shoulder elevation score} = \frac{\text{Best lift achieved from the floor (cm)} \times 100}{\text{Arm length (cm)}}$$

### 3.13.7 Heart Rate

The evaluations were undertaken early in the morning before the commencement of any warm up or exercises.

*Goal:* The goal was to measure heartbeat of the participants.

*Needed:* OMRON CMS50N digital finger pulse oxymeter, pencil, paper

*Procedure:*

All the evaluations were undertaken early in the morning before the commencement of any warm up or exercises.

1. The adolescent archers were seated comfortably in a quiet environment to minimize external disturbances.
2. The index finger of the archer was inserted into the probe of the pulse oximeter. The probe is typically designed to fit on the index finger or middle finger, but any finger can be used as long as it fits properly.
3. Once the finger is properly positioned, they were asked to wait for a few seconds until the pulse oximeter displays the heart rate and breathe rate. The heart rate is typically shown in beats per minute (BPM).
4. The measurements were recorded.

*Score:* Data was recorded in number of beats/minute.

**3.13.8 Respiratory Rate**

The evaluations were undertaken early in the morning before the commencement of any warm up or exercises.

*Goal:* This test was used to measure the respiratory rate.

*Needed:* Stopwatch

*Procedure:*

1. The adolescent archers were instructed to be comfortable either in a supine position or a more upright seated position.
2. They were advised to remain inactive for 10-15 minutes before testing.
3. The number of times the chest rose and fell in a minute was counted.

*Scoring:* Data was recorded in number of beats/minute.

### **3.13.9 Competitive State Anxiety Questionnaire-2**

Martens et al. framed the competitive state anxiety questionnaire in 1990. The questionnaire measures sports people's anxiety and self-confidence. It is a widely used self-report questionnaire aimed to measure anxiety related to performance in sports, including archery. The CSAI-2 measures three dimensions of anxiety: cognitive anxiety, somatic anxiety, and self-confidence.

Cognitive anxiety states negative thoughts and worries about performance, such as self-doubt, fear of failure, and difficulty concentrating. Somatic anxiety refers to the physical symptoms of anxiety, such as increased heart rate, sweating, and trembling. Self-confidence refers to an individual's belief in their ability to perform well.

CSAQ-2 has 27 questions with 4-point likert scale responses. Its other name is Illinois self-evaluation questionnaire. This questionnaire helps to measure cognitive and somatic anxiety as well as self-confidence.

Adolescent archers were asked to rate their level of anxiety 30 minutes before the practice session. Participants rated their anxiety on a scale from 1 (not at all) to 4 (very much so) for each of the 27 items on the questionnaire.

All questions except question 14 were rated on a 4-point likert scale ranging from 1 to 4. The 14th question was reverse-scored. The total score was 36, with a minimum score of 9. A score of 36 indicated higher anxiety and self-confidence, while a score of 9 indicated lower anxiety and self-confidence

### **3.13.10 Sports Achievement Motivation Test**

M L Kamlesh created Sports achievement motivation test (SAMT) in 1990. It is a self-assessment questionnaire with twenty incomplete multiple-choice statements. The subjects have to choose option to finish the statement. SAMT covers both

positive and negative responses, positive answers earning 2 scores and negative answers receiving 0 marks. The questionnaire's total score is 40 and the lowest score is 0.

Adolescent archers were asked to fill up their level of sports achievement motivation before the practice session. They selected options to finish the incomplete multiple choice statements.

Correct responses:-

1a,2b,3a,4a,5b,6b,7b,8b,9b,10a,11a,12a,13a,14b,15b,16a,17a,18a,19a,20a.

If the Adolescent archers marked the above given options, then they would get a maximum score of 2. However, if they chose the other option, they would score 0.

Raw score Classification:-

0-24 - low

24-30 - moderate

30 and above - high

### **3.13.11 Concentration Grid Test**

Concentration grid test measured attention, concentration, focus, and memory. This test uses 00–99 numbers. Each digit was randomly arranged in a 10×10 numerical grid. Participants have one minute time to mark the numerals in ascending/descending order. The concentration score was measured by the last digit marked within the time.

### **3.13.12 Archery Shooting Test (age 15-18)**

All participants were given 36 arrows in six ends at a 70-meter target with a face size of 122 cm. This shooting distance and target face size are used in competitions for intermediate skill level boys participating in FITA (Federation Internationale de Tir a l'Arc) rounds. After completing 6 shots in each round, the

athletes had a 2-minute rest before the other shots. Each shot was assessed between 0–10 points. Each athlete got scores between 0 and 360 after their shots (Lau et al., 2023).

### **3.14 COLLECTION OF DATA**

Thirty male adolescent recurve archers were randomly selected, and they were equally divided into two groups, the experimental group, and the control group. Before the intervention, all chosen subjects underwent initial testing to assess their postural control and performance variables as pre-test. After 16 weeks of intervention period, all participants were retested to assess the same dependent variables using standardized tests and tools as post-test.

### **3.15 STATISTICAL TECHNIQUES**

All the collected data were statistically analyzed using the Shapiro-Wilk test to assess the normal distribution of the dependent variables (Shapiro & Wilk, 1965, P.593). Then Analysis of Co-Variance (ANCOVA) was used to determine the significant difference between the experimental group and control group (Sorbom, 1978). Finally, dependent t-test (paired t-test) was used to compare the means of control group to assess whether there is any significant change in pre and posttest values. The level of significance was set at 0.05.

Figure-51

## Flowchart Showing the Variables of the Study

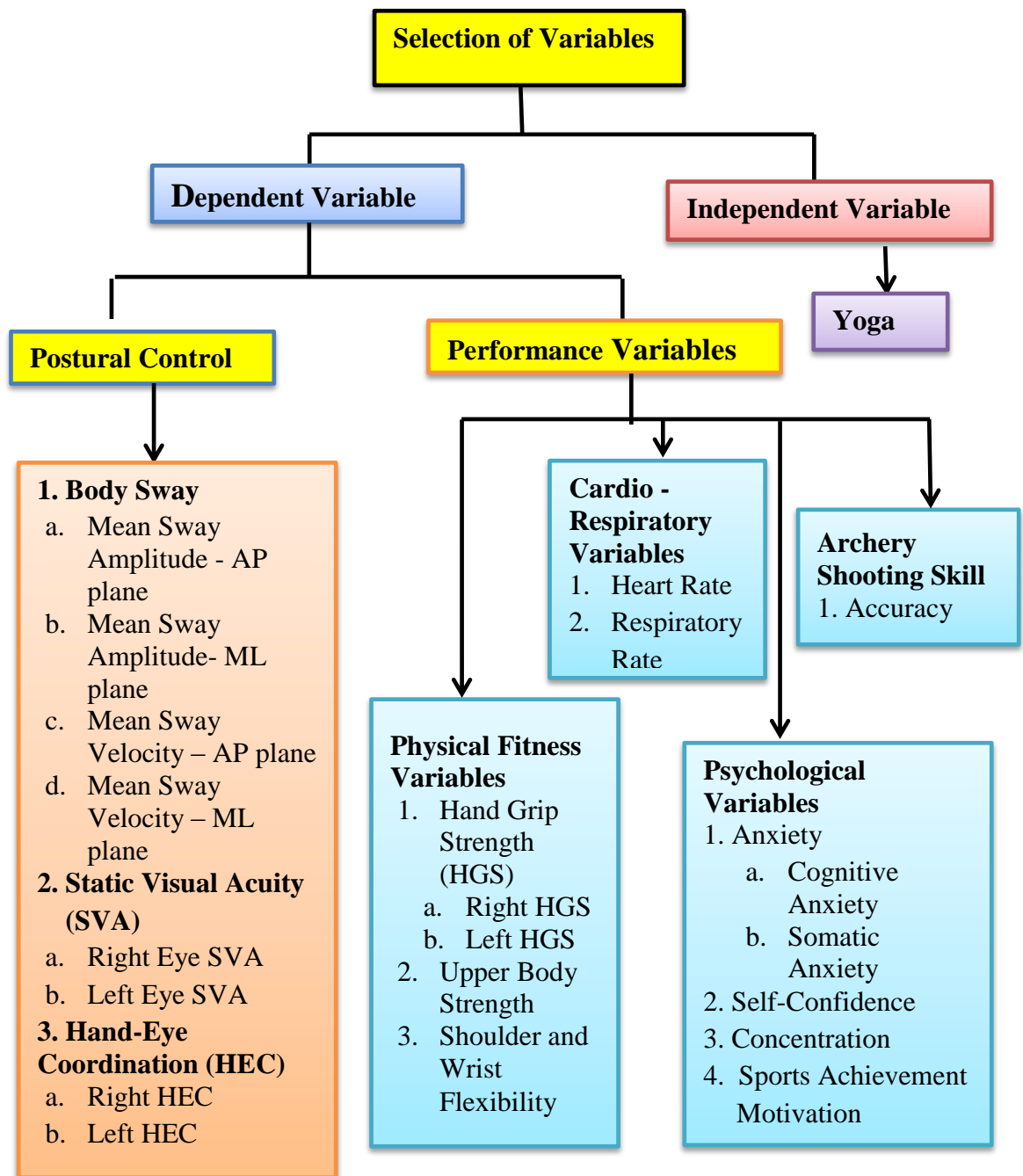


Figure-52

## Flow Chart Showing the Methodology of the Study

