STATUS ANALYSIS OF PHYSICAL AND SOCIAL VULNERABILITY OF COASTAL AREA CHILDREN AND INTERVENTION OF PHYSICAL EDUCATION PROGRAMME WITH AND WITHOUT HATHA YOGA PRACTICES ON SELECTED HEALTH-RELATED FITNESS AND PSYCHOSOCIAL VARIABLES

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IN

PHYSICAL EDUCATION

Submitted by

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CERTIFICATE BY THE SUPERVISOR

This is to certify that the thesis entitle "STATUS ANALYSIS OF PHYSICAL AND SOCIAL VULNERABILITY OF COSTAL AREA CHILDREN AND INTERVENTION OF PHYSICAL EDUCATION PROGRAMME WITH AND WITHOUT HATHA YOGA PRACTICES ON SELECTED PHYSICAL AND PSYCHOSOCIAL VARIABLES" is a record of research work done by H. SATHISH KUMAR (Reg. No. F1801PEFM152) a Full time Research Scholar of Doctor of Philosophy in Physical Education, Department of Physical Education, Tamil Nadu Physical Education and Sports University, Chennai – 600 127, during the year 2019 - 2022.

This thesis is his original work and it has not previously formed the basis for the award, to any candidate, of any degree, diploma, associate ship or other similar titles. This thesis represents, entirely an independent work on the part of the candidate, but for the general guidance by me.

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DECLARATION BY THE SCHOLAR

I H. SATHISH KUMAR (Reg. No. F1801PEFM152) Full time Research Scholar of Doctor of Philosophy in Physical Education, Department of Physical Education hereby declare that the thesis entitled "STATUS ANALYSIS OF PHYSICAL AND SOCIAL VULNERABILITY OF COSTAL AREA CHILDREN AND INTERVENTION OF PHYSICAL EDUCATION PROGRAMME WITH AND WITHOUT HATHA YOGA PRACTICES ON SELECTED PHYSICAL AND PSYCHOSOCIAL VARIABLES" submitted to Tamil Nadu Physical Education and Sports University, for the award of Doctor of Philosophy in Physical Education, Department of Physical Education is my original work and that it has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or any other similar titles to any candidate of any university

Place: Chennai **H. SATHISH KUMAR**
Date: **Research Scholar**

DEDICATED TO MY

MOTHER

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CHAPTER - I

INTRODUCTION

1.1 COASTAL AREA

"The coastal zone is an interface between the land and sea, which comprised of a continuum of coastal land, intertidal area, aquatic systems including the network of rivers and estuaries, islands, transitional and intertidal areas, salt marshes, wetlands, and beaches" **(Cicin-Sain and Knecht, 1998).**

The world has about 620000 kilometers of coastline. According to United Nations currently, forty percentages (40%) of the population exists within Hundred (100) Kilometers of the coast. It is a natural ecosystem such as freshwater and aquatic species. Coastal areas are constantly varying as active contact concerning the sea and the land. The waves, winds hit the coast day today and the water level also increasing day-by-day.

1.2 CHENNAI COASTAL AREA

Chennai's coastal length covers 19 kilometers. It is India's longest and the world's second-longest beach, Marina beach is located south-eastern coast of India along the Bay of Bengal. Chennai is the Capital of Tamil Nadu which is located in the south of India. For this research work selected location from Tiruvottiyur to Mylapore

coastal area. Most of their occupation depends on the sea and seafood. Kasimedu fishing harbour is one of the significant fishing grounds in the Royapuram, it is found north of Chennai port which is the second-largest container port of India. This harbour can accommodate around 2300 fishing boats.

1.3 VULNERABILITY

Vulnerability is defined as "the characteristics of a person or group and their situation that influences their capacity to anticipate, cope with, resist and recover from the impact of a natural hazard" **(Wisner Ben et.al 2004).** In addition, man-made hazards also influence the vulnerability of the place, people and environment. Poverty also plays a major role in vulnerability to people. Day by day the risk factor increases. Earthquakes, Floods, hurricanes and tsunami destroy physical things such as houses, things in many cases lots of life also lost.

1.3.1 PHYSICAL VULNERABILITY

In this research context, Physical Vulnerability is considered as a lack of physical activity or exercise. A person has a risk of injury prone or reduced Endurance, Strength, Speed and reduced movement or dexterity.

1.3.2 SOCIAL VULNERABILITY

Social Vulnerability alludes to the likely adverse consequences on communities brought about by outer weights on human wellbeing. Such anxieties incorporate regular or human-caused fiascos, Infection flare-ups, Poverty, Unemployment, Family Income, Educational Status, Disability, Single Parent (divided family), Housing, Vehicles and Physical neglects (Food, Clothes, shelter), Educational neglect (Parent not giving Education for Child), Emotional neglect (Humiliating, Intimating & Isolating), Medical neglect (Health care and Dental Care).

1.4 CHILDREN

Children are generally energetic and playful with their friends and family. The current modern world and their busy schedule of parents and their family and current circumstances they are not much active these days and lack of play or exercises spoil their physical growth of children and also mental growth and well-being.

1.5 PHYSICAL EDUCATION

“Physical Education is a process through which an individual obtains optimal, physical, mental and social skills and fitness through physical activity” **(Lumpkin, 1990).** “Physical Education can be defined as a meaningful and worthwhile experience obtained through participation in physical activities that are physically wholesome mentally stimulating, satisfying and socially sound ”**(Gabriel Moreno,**

2011). The main objective of physical exercise is to be the fitness of an individual to do the regular activity without any fatigue. The process can be content in physical education to improve physical fitness that is to be visualized.

1.6 BENEFITS OF PHYSICAL EXERCISE

Reduce the risk of Heart Disease

Physical exercises can counter key risk aspects such as cardiovascular disease, obesity, inactivity and high blood pressure.

Improved Physical Fitness

A good program improves children's cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition.

Sturdier Bones

An efficient physical workout expands bone thickness to shape a sturdy skeleton.

Weight Parameter

A good program can help children regulate their weight by burning calories, toning their physique and improving their overall body composition and controlling their weight.

Health Advancement

Suitable physical activity averts the onset of certain diseases and delays the debilitating effects of the aging process.

Improvement of Judgment

Quality physical education inspires ethical development. Children have the prospect to take responsibility for leadership, cooperate with other children and accept responsibility for their own behaviour.

Self-Discipline

A respectable physical education teacher demonstrates children to follow rules and recognized procedures and to be responsible for their own health-related physical fitness.

Stress Reduction

Physical movement is a channel for discharging tension and anxiety.

Self-Confidence and Self Esteem

It instils strong wisdom of self-respect in children. They can become more confident, emotionally stable, assertive, self-controlled and independent.

Setting Goals

Physical education provides children the time and encouragement they need to set and strive for personal, achievable goals.

1.7 HATHA YOGA

"Yoga is an alternative form of physical activity which may assist in achieving recommended levels of physical activity for some individuals. Yoga is increasing in popularity" **(Chandler, 2001).** "The term Hatha (the act of physical stances) is comprised of two components. "Sanskrit, "HA" meaning "sun", the positive vibration in the human body, and "THA" meaning "moon", the negative vibration in the human body.It is one of the various paths of yoga, which emphasizes overall fitness through pranayamas (breath-control exercises), asanas (yoga postures), and chanda (meditation). Hatha yoga is professed to silent the mind and focus concentration; however, of all the yoga traditions, the importance of physical fitness is emphasized most in hatha yoga" **(https://www.rishikulyogshala.org/the-10-health-benefits-of-hatha-yoga/).**

"Hatha yoga uses physical alignment and breathing control to achieve equilibrium between the active body and its universe. The subsequent agreement shows itself as physical strength, physiological wellbeing and passionate prosperity" **(https://www.rishikulyogshala.org/the-10-health-benefits-of-hatha-yoga/).**

1.7.1 Benefits Of Hatha Yoga

Hatha yoga, with its diverse practices, is designed to bring in health, joy and harmony of the body, mind and soul. Positioning the body to a variety of postures does astonishment for the organs, muscles, mind and spirits.

Health Heart

The devoted act of hatha yoga stances is effective in controlling the disease of hypertension- one of the significant reasons for heart issues and coronary failures. The hatha yoga further develops the bloodstream to the heart and diminishes the shot at angina episodes in individuals bringing about a sound heart.

Builds Core Strength

The center is the midriff of the body comprising of the traverse abdominis, erector spine, obliques and lower lates. To stay away from the injury, to perform well in sports and to manifest a robust body-it is essential that your core is strong and flexible.

Lubricate the Joints

Hatha yoga effectively works on the multiple joints of the body helping them get their full range of motion. In an inactive way of life, the joints are not worked to their full limit. Subsequently, they will generally solidify up. Significantly further develop your mobility in joints with hath yoga.

Balance and Posture

The developed stance advantages of hatha yoga are profoundly charming. Hatha yoga presents work with balance and a feeling of proprioception. The hatha yoga rehearses stretch the spine making you look taller and certain.

More Bone Density

Hatha yoga framework incorporates a few weight-bearing yoga stances like Tree pose, Warrior Pose, Triangle Pose, and so on, that assistance in turning around bone misfortune by building bone-thickness. Healthy bones are critical for individuals of all ages to limit the danger of creating delicate bones-therapeutically known as osteoporosis and osteopenia. The advantages of Hatha yoga practice consistently incorporate structure bone mass in the spine and femur.

Stress Reliever

A characteristic method for warding off the pressure is to appear on a yoga mat and to perform specific hatha yoga poses. Hatha yoga asana guides people to mental harmony and positive energy. Practice for acquiring the psychological wellness advantages of hatha yoga.

Upgrade Nature of Pranayama

Pranayama is necessary to the hatha yoga technique. The diverse breathing techniques improve the quality of life force-prana and nourish the body and mind thereby increasing your lifespan.

Clear and Sparkly Skin

Shat-kriya performs deeply purifies the body inside-out. Furthermore, the stances fill in as detoxifying specialists at certain levels taking out the poisons and acquiring inward gleam, lustrous skin, and a peach shine.

Overall Well-being

Regular practice of hatha yoga enhances multiple aspects of physical, mental and spiritual being respecting the practitioners with an efficiently working sound body, mind and soul.

1.8 HEALTH-RELATED PHYSICAL FITNESS

"Health-related fitness relates to those components of fitness which make up our health status: cardiovascular endurance, muscular strength, muscular endurance, flexibility and body composition" **(Ray Baker, 2003).**

"Health-related fitness is defined as a state characterized by an ability to perform and sustain daily activities and demonstration of traits or capacities that are

associated with low risk or premature development of diseases and conditions related to movement" **(Joseph & Francis, 1998).**

1.9 STATEMENT OF THE PROBLEM

The motive of this study was to evaluate the situation with physical and social weakness of coastal area children and to measure the impact of experimentation of physical education programme with and without hatha yoga practices on selected health-related fitness and psychological variables.

1.10 HYPOTHESES

1. It was hypothesized that coastal area children could be successfully selected at random and their physical and social vulnerability status could be assessed.
2. It was hypothesized that there would be a significant improvement on selected health-related fitness variables among coastal area children due to physical education programme with hatha yoga practices (PEPWHYP).
3. It was hypothesized that there would be a significant improvement on selected health-related fitness variables among coastal area children due to physical education programme without hatha yoga practices (PEPWOHYP).
4. It was hypothesized that there would be a significant improvement on selected psychosocial variables among coastal area children due to physical education programme with hatha yoga practices (PEPWHYP).

5. It was hypothesized that there would be a significant improvement on selected psychosocial variables among coastal area children due to physical education programme without hatha yoga practices (PEPWOHYP).
6. It was hypothesized that experiment of physical education programme with hatha yoga practices (PEPWHYP) would produce better significant improvement than physical education programme without hatha yoga practices (PEPWHOYP) on the selected health-related fitness and psychosocial variables among coastal area children.

1.11 DELIMITATION

The following delimitations were taken into consideration during this study.

1. The presented study was restricted only to children from the Chennai District Coastal area.
2. The presented study was only restricted to boys.
3. The age of the subjects selected for the study was between 10 to 14 years.
4. The duration of the experimental period was restricted to 12 weeks.
5. The number of groups for the study was delimited to three (3) groups with Twenty-Five (25) subjects in each group.

6. The following variables were selected for this study.

- **Independent variables**

1. Physical Education Programme With Hatha Yoga Practices (PEPWHYP)
2. Physical Education Programme Without Hatha Yoga Practices (PEPWOHYP)

- **Dependent Variables**

Health-Related Physical Fitness Variables

1. Cardiovascular Endurance
2. Muscular Strength
3. Muscular Endurance
4. Flexibility

Psychosocial Variables

1. Quality of Life
2. Self-Esteem
3. Depression

1.12 LIMITATION

The following uncontrollable factors associated with the study were considered as limitations of the research study.

1. Certain factors like daily routine, diet and climate conditions would not consider for this study.
2. The subject's body type would not be taken into consideration.
3. The homogeneous characters of the subjects, hereditary, would not be considered.

1.13 OBJECTIVES OF THE STUDY

1. To measure the physical and social vulnerability status of coastal area children.
2. To measure the health-related fitness variables among coastal area children.
3. To measure the psychosocial variables among coastal area children.
4. To identify suitable training to improve the selected health-related fitness and psychosocial variables among coastal area children.

1.14 SIGNIFICANCE OF THE STUDY

1. This study would help the children to identify their physical and social vulnerability status levels.
2. The results of the study would help the children understand the physical education programme

3. This study would help the coastal area children to improve their social status through physical education programme with and without hatha yoga practices.
4. The results of the study would give a clear picture of physical education programme for coastal area children.

1.15 DEFINITION OF TERMS

1.15.1 Cardiovascular Endurance

"Cardiovascular endurance is the ability of the heart, lungs and blood vessels to deliver sufficient nutrients, oxygen and blood to working skeletal muscles, during-moderate to high intensity activities over prolonged periods of time" **(Cheryl, 2002).**

1.15.2 Muscular Strength

"Muscular strength is defined as the ability of a muscle group to develop maximum contractile force against a resistance in a single contraction" **(Vivian, 2010).**

1.15.3 Muscular Endurance

"Muscular endurance is the ability of a muscle group to exert submaximal force for extended periods" **(Vivian, 2010).**

1.15.4 Flexibility

"Flexibility is the ability of a limb to move freely around a joint through a full range of motion" **(Patricia, Anita & Pierre, 2007).**

1.15.5 Psychosocial

"Social factors include general factors at the level of human society concerned with social structure and social processes that impinge on the individual. Psychological factors include individual-level processes and meanings that influence mental states. Sometimes, these words are combined as psychosocial. This is shorthand term for the combination of psychological and social, but it also implies that the effect of social processes is sometimes mediated through psychological understanding" **(Stansfeld & Rasul, 2007).**

1.15.6 Quality of Life

"World Health Organization (WHO) defined QOL as an individual perception of their position in life in the context of culture and value systems in which they live and in relation to expectations, standards, and concerns. It is a broad ranging affected in a complex way by the person's physical health, psychological state, level of independence, goals, social relationships and their relationship to salient features of their environment **(WHOQOL Group, 1993).**

1.15.7 Self-Esteem

"How worthy or valuable a person considers him or herself in self-esteem. Conceptually, this is very close to other terms, such as self-image, which is how one imagines oneself or supposes one to be, and self-concept, which means all the elements that make up a person's view of him or herself and which includes self-image. The cognate term idealized self is a characterization of what one would like to be or become. Self-presentation - 'presentation of the self'- is behaviour designed to influence the impressions of the self' formed by others. The various concepts are intertwined" **(Ellis Cashmore, 2004).**

1.15.8 Depression

"Depression is a mood typified by a sense of insufficiency, dejection, sadness, hopelessness, fatigue or acute lack of motivation. It may arise in response to a specific incident or set of circumstances, or it may be a part of a complex or syndrome of related symptoms. Gloria Balague and James Reardon's case study of an athlete whose mother had died illustrates how depression can affect rapidly. Reason for depression is varied and change with changing contexts. Eating disorders are often a manifestation of some forms of depression and reflect dissatisfaction with body image" **(Ellis Cashmore, 2004).**

CHAPTER – II

REVIEWS OF RELATED LITERATURE

It is in every case better to know the opinions and ideas of specialists and past analysts on the side of the examination embraced. An all encompassing perspective on the connected writing becomes vital to have an obvious comprehension toward this path.

It is by and large recognized that the specialist should be perceptive of the writing in his space of interest prior to leaving upon an examination project. It is important to find out the best in class which figures out what is known regarding the subject, what questions have ascended from past work, which is needed for the examination and advantages can be acquired from the experience of different examinations. The current clarification of writing be that as it may makes it very hard for researchers to stay aware of the most recent data in this field. The prime focus of this research work was to evaluate the presence of physical and social vulnerability of coastal area children and to quantify the impact of adopted intervention in the research.

An earnest and academic endeavor has been made by the researcher to go through the relevant literature. A concise audit of the studies identified with the issue is depicted to get a full outlook of what has been managed with regard to the issues

under the examination. Reference of examination materials from the books, periodicals, journals, etceteras were collected to bring about a deep and clear prospects of the field of study, some of which are presented in the following heads

The research scholar has endeavored in this chapter to project the related literature of this research under the following four titles.

1. Studies Related to Coastal Area Children
2. Studies Related to Intervention of Physical Education Programme
3. Studies Related to Yoga Practices
4. Studies Related to Health Related Physical Fitness Variables
5. Studies Related to Psychosocial Variables

2.1 STUDIES RELATED TO COASTAL AREA CHILDREN

Azahari et al. (2019) compared physical fitness between urban and rural school children and to determine relationship between body mass index and physical fitness primary school children in east coast of Peninsular Malaysia. This study is a cross-sectional study and conducted in primary schools. Anthropometric measurement involved weight and height measurement, and body mass index (BMI) calculation. Fitness test that were measured are power and flexibility. Power was measured by using Standing Broad Jump (SBJ), and flexibility test was measured using Sit and Reach Test (SRT). Total number of subjects were 14880, 71% (n=10532) were classified in normal BMI, and remaining 10% (n=1423) were in obesity; 9% (n=1303)

were overweight, 8% (n=1164) were underweight; and 3% (n=458) were in severe thinness. In school area category, 59% (n=8769) rural school children and 41% (n=6111) urban school children. In conclusion, the current study found flexibility had shown a difference in area of school where urban school children performed slightly better than that of rural with F-value 2.09 (Pr>F= 0.15; p<0.05). It also showed a significant negative correlation between BMI and power (r= - 0.12) with p-value was 0.0001. However, there was no significant difference in power with areas of school, and no correlation between flexibility and BMI.

Ashbullby et al. (2013) explored the neglected issue of how families engage with beach environments in their local areas and use them in health promoting ways. Fifteen families with children aged 8–11 years living in coastal regions in Southwest England participated in individual semi-structured interviews. The findings indicate that beaches encouraged families to be physically active. Although families valued the opportunities for physical activity and active play afforded by beaches, the key health benefits emphasised were psychological, including experiencing fun, stress relief and engagement with nature. Increased social and family interaction was also highlighted as benefits. Despite perceiving health benefits, not all families regularly visited the beach. Barriers to visits included parents having limited time, cost of parking, lack of car access and cold weather. Parents played a key role in enabling visits by choosing to share these environments with their children. The social dimension of visits also

encouraged families to make regular trips. The findings support the use of beach environments to promote families' health and wellbeing and positive relationships with nature.

Wood et al. (2016) Childhood obesity is one of the 21st century's most serious global health challenges. Research suggests that better access to 'greenspace' (e.g. parks) may encourage physical activity and reduce the risk of obesity amongst children. We extend earlier work by considering childhood obesity in relation to proximity to the coast, using data from England's National Child Measurement Programme. Results suggest that although the overall prevalence of childhood obesity is slightly lower at the coast (−0.68% points comparing <1 km to >20 km, $p<0.001$), the relationship depends on area type. Specifically, although a coastal proximity gradient (lower obesity rates nearer the coast) was found for rural areas and smaller cities and towns, it was not present among large urban conurbations (interaction p-value<0.001). Coastal environments and access to them are changing in many areas, and research to explore potential impacts on child health is warranted.

Nettlefold et al. (2012) Physical activity (PA) is beneficially associated with arterial compliance in adults; however, whether this association persists in children is unclear. We examined the cross-sectional relationship of PA and sedentary time with arterial compliance in children. Large and small artery compliance was determined by diastolic pulse contour analysis in 102 children aged 8–11 years (43 boys). We

used accelerometers and age-specific cut points to classify activity as sedentary, light, or moderate-to-vigorous (MVPA). We also categorized MVPA according to bout length (0–5, 5–10, 10–20, and ≥20 min). Hierarchical linear regression examined: (i) the contribution of activity to large and small artery compliance (controlling for body surface area, systolic blood pressure, and body mass index (BMI)) and (ii) whether bouted MVPA was associated with arterial compliance independent of total MVPA. Activity variables did not explain any additional variance in large artery compliance beyond that captured by body surface area, BMI, and systolic blood pressure (P = 0.118 to P = 0.990). Light activity and MVPA explained an additional 5.8% (P = 0.003) and 2.7% (P = 0.043) of the variance in small artery compliance. MVPA accumulated in bouts was not significantly associated with small artery compliance after controlling for the total volume of MVPA (P = 0.784 to P = 0.923). Objectively measured PA is associated with small, but not large artery compliance in children aged 8–11 years. Future research should explore the influence of bout frequency and the effect of a PA intervention on arterial compliance.

Barnett, (2008) investigated whether perceived sports competence mediates the relationship between childhood motor skill proficiency and subsequent adolescent physical activity and fitness. In 2000, children's motor skill proficiency was assessed as part of a school-based physical activity intervention. In 2006/07, participants were followed up as part of the Physical Activity and Skills Study and completed

assessments for perceived sports competence (Physical Self-Perception Profile), physical activity (Adolescent Physical Activity Recall Questionnaire) and cardiorespiratory fitness (Multistage Fitness Test). Structural equation modelling techniques were used to determine whether perceived sports competence mediated between childhood object control skill proficiency (composite score of kick, catch and overhand throw), and subsequent adolescent self-reported time in moderate-to-vigorous physical activity and cardiorespiratory fitness. 928 original intervention participants, 481 were located in 28 schools and 276 (57%) were assessed with at least one follow-up measure. Slightly more than half were female (52.4%) with a mean age of 16.4 years (range 14.2 to 18.3 yrs). Relevant assessments were completed by 250 (90.6%) students for the Physical Activity Model and 227 (82.3%) for the Fitness Model. Both hypothesised mediation models had a good fit to the observed data, with the Physical Activity Model accounting for 18% ($R^2 = 0.18$) of physical activity variance and the Fitness Model accounting for 30% ($R^2 = 0.30$) of fitness variance. Sex did not act as a moderator in either model. Developing a high perceived sports competence through object control skill development in childhood is important for both boys and girls in determining adolescent physical activity participation and fitness. Our findings highlight the need for interventions to target and improve the perceived sports competence of youth.

Reilly, (2006) assessed whether a physical activity intervention reduces body mass index in young children. Cluster randomised controlled single blinded trial over 12 months. Thirty six nurseries in Glasgow, Scotland and 545 children in their preschool year, mean age 4.2 years (SD 0.2) at baseline. Enhanced physical activity programme in nursery (three 30 minute sessions a week over 24 weeks) plus home based health education aimed at increasing physical activity through play and reducing sedentary behaviour. Main outcome measure Body mass index, expressed as a standard deviation score relative to UK 1990 reference data. Secondary measures were objectively measured physical activity and sedentary behaviour; fundamental movement skills; and evaluation of the process. Group allocation had no significant effect on the primary outcome measure at six and 12 months or on measures of physical activity and sedentary behaviour by accelerometry. Children in the intervention group had significantly higher performance in movement skills tests than control children at six month follow-up (P=0.0027; 95% confidence interval 0.3 to 1.3) after adjustment for sex and baseline performance. Physical activity can significantly improve motor skills but did not reduce body mass index in young children in this trial.

Pate et al. (2004) described the physical activity levels of children while they attend preschools, to identify the demographic factors that might be associated with physical activity among those children, and to determine the extent to which children's physical activity varies among preschools. A total of 281 children from 9 preschools wore an Actigraph (Fort Walton Beach, FL) accelerometer for an average of 4.4 hours per day for an average of 6.6 days. Each child's height and weight were measured, and parents of participating children provided demographic and education data. The preschool that a child attended was a significant predictor of vigorous physical activity (VPA) and moderate-to-vigorous physical activity (MVPA). Boys participated in significantly more MVPA and VPA than did girls, and black children participated in more VPA than did white children. Age was not a significant predictor of MVPA or VPA. Children's physical activity levels were highly variable among preschools, which suggests that preschool policies and practices have an important influence on the overall activity levels of the children the preschools serve.

Giles-Corti & Donovan (2002) Spatial access to recreational facilities and perceptions of the neighbourhood environment and physical activity levels were examined by the socioeconomic status of area of residence (SES). A cross-sectional survey of adults (18–59 years) (n = 1,803) stratified by SES using a geographic-based index was conducted. Respondents in low SES areas had superior spatial access to many recreational facilities, but were less likely to use them compared with those

living in high SES areas. They were more likely to perceive that they had access to sidewalks and shops, but also perceived that their neighborhood was busier with traffic, less attractive, and less supportive of walking. After adjustment, respondents living in low SES areas were 36% less likely to undertake vigorous activity. While they were more likely to walk for transport, this was not statistically significant (OR, 1.27; 95% CI, 0.98–1.64), nor were other SES differences in walking for recreation and walking as recommended. Modifiable environmental factors were associated with walking and vigorous activity, especially perceived access to sidewalks and neighbourhood attractiveness. Spatial access to attractive, public open space was associated with walking. Creating supportive environments—particularly sidewalks in attractive neighbourhoods—has the potential to increase walking and vigorous activity.

2.2 STUDIES RELATED TO INTERVENTION OF PHYSICAL EDUCATION PROGRAMME

Kliziene et al. (2018) investigated the psychosocial adjustment and anxiety of adolescents during a 7-month exercise intervention programme. In addition, extensive research on the psychosocial adjustment of adolescents during intense physical activity was performed. The experimental group included adolescent girls (n=110) and boys (n=107) aged between 14 and 15 years while the control group included adolescent girls (n=99) and boys (n=112) of the same age group attending

the same school. The girls and boys in the EG participated in modified physical education lessons two times a week. Once a month they received a theory class where they were taught about communication disorders of adolescents and ways of preventing them by means of physical activities. In practical classes, the girls and boys in the EG had sports and games (basketball, volleyball and football) as well as Pilates, enhancing physical abilities. The measurement of psychosocial adjustment included the modification method developed by Roger and Daimond. The measurement of anxiety, the methodology of Reynolds and Richmond. In summarising the results of the 7-month exercise intervention programme of enhancing psychosocial adjustment and its components (self-esteem, dominance, positive self-evaluation, emotional comfort, internality, and evaluation by others) and decrease in anxiety in physical education lessons, we can state that after the intervention there are certain tendencies towards improved psychosocial adjustment that assists in overcoming various critical situations.

Kelly et al. (2021) examined the immediate and long-term effects of an 8-week FMS intervention programme on 255 Year 3 and 4 Irish school children's (50% male, 7.4 ± 0.6 yr) FMS proficiency levels. Participants were conveniently recruited from 4 schools and randomly assigned to the intervention-control (Group I-C: 2 schools, $n = 134$, 48% male) or control-intervention (Group C-I: 2 schools, $n = 121$, 52% male) sequence. Group I-C completed the intervention (i.e. two 45-minute FMS

classes per week in place of usual PE for 8 weeks) in phase 1, and after a 4-week washout, completed the control condition (i.e. routine PE lessons for 8 weeks) in phase 2, and vice-versa for Group C-I. FMS proficiency, assessed using the Test of Gross Motor Development-Third edition, and weight status based on body mass index (BMI) were recorded at 5 time points: pre and post phase 1, pre and post phase 2 and at 13-months post-intervention (i.e. follow-up). Linear mixed models revealed significant group × time interaction effects for locomotor, ball skills and total FMS scores (all $p < 0.001$) following engagement in the FMS intervention. No significant changes were observed following engagement in the control condition (i.e. Group C-I: pre to post phase 1 and Group I-C: pre to post phase 2; all $p > 0.05$). Significant improvements for locomotor, ball skills and total FMS scores were reported for both groups at follow-up compared to baseline (all $p < 0.001$). No significant group × time × gender or group × time × weight status interaction effects were reported (all $p > 0.05$). The proportion of participants who improved from poor-mastery to mastery/near-mastery was significant for eight skills, immediately following the intervention and from baseline to follow-up. Significant improvements in FMS proficiency were observed following a short-duration intervention that was delivered by an instructor with specialist FMS knowledge and an ability to create a mastery-oriented climate during lessons. Although the long-term effectiveness remains unclear, it is likely that mastery-oriented PE lessons could facilitate greater

improvements in FMS development for children of all abilities compared to traditional PE lessons. Future studies should explore if primary teachers feel they have sufficient confidence and pedagogical skills to support children's FMS development during PE.

Latorre-Roman et al. (2018) examined the effects of a 10-week aerobic games programme on physical fitness. One hundred eleven children, aged 3 to 6 years, participated in this study; 60 children were male (age: 4.28 ± 0.61 years old), and 51 were female (age 4.59 ± 0.49 years old). Participants were randomly assigned to an experimental group (EG; n = 56) and a control group (CG; n = 55). A fitness test battery previously validated for preschoolers was used. The children in the EG performed 3 weekly training sessions of physical activity in a classroom during a 10-week period. Every EG session lasted about 30 min. There were no significant differences in any variable in the pretest between groups. In the posttest, the EG achieved better results in horizontal jump and sprint. In relation to posttest–pretest differences, the EG showed a greater increase in horizontal jump, sprint, and endurance. An aerobic games programme in the school setting improved physical fitness in preschool children.

Arnauasalvador et al. (2020) aimed to test the effectiveness of a long-term physical exercise programme in postmenopausal women. Longitudinal design. Thirty-two women participated in this study (age 61.6 years). At the beginning of the

study, an evaluation of participants' physical condition, adherence to the Mediterranean diet (AMD) and different biochemical parameters were performed. When the initial results were obtained, a PA intervention programme was conducted. Three months after the start of the intervention, all the previous parameters were reassessed, and 6 months after the end of the intervention, the parameters were revaluated. In total, 90% of the women completed the programme. The intervention increases the level of PA and improves biochemical parameters. At 6 months after the end of the intervention, the positive effects of the PA programme were maintained, especially in agility ($p<0.01$) and resistance ($p<0.000$). Adherence to PA was observed after a physical exercise programme. For the entire study population, the exercise programme improved physical condition, and those indicators remained improved after 6 months. Additionally, increases in PA were associated with improvements in AMD.

Merino-Marban et al. (2015) examined the effects of a 1-minute stretching programme and 5 weeks of detraining on sit-and-reach score among schoolchildren aged 5–6 years in a physical education setting. Forty-five schoolchildren 5–6 years old from two classes were clustered randomly assigned to an experimental group (n = 23) or a control group (n = 22). During the physical education classes, the students of the experimental group performed a 1-minute stretching programme twice a week for 8 weeks. Subsequently, these participants underwent a 5-week detraining period. The

classic sit-and-reach test was performed at the beginning and at the end of the development programme, as well as at the end of the detraining period. The results of the two-way ANOVA showed that the intervention programme increased significantly the students' sit-and-reach scores ($p < 0.001$). However, after 5 weeks of detraining, children's flexibility reverted back to the baseline levels ($p > 0.05$). Although an only 1-minute stretching programme seems to develop the schoolchildren's flexibility, after the 5-week detraining period students' score reverts back to its initial level. This knowledge could help physical education teachers to design programmes that permit students to increase and maintain flexibility levels along the entire academic year.

2.3 STUDIES RELATED TO YOGA PRACTICES

Jain & Singh (2020) examined due to yogic practices on kinesthetic sense among school going children sixty male subjects were selected by simple random sampling technique. They were dividing into two groups of 30 each. 30 subjects were categorized as experimental group and another 30 subjects were taken as control group. All the students were in between the age group of 14 to 17 years. The Experimental group went for 3 months (5 days in a week) of treatment programme, both pre and post test were made for collection of data. The data collection was made on kinesthetic ability test by Arms Raising Test made by Scott. The collection data from the two groups before and after the experiment was statistically analysed by

using T-Test. The result of this study revealed that the experimental group shows significant improvement in kinesthetic sense as compared with control group.

Nandar & Ravindra (2020) examined a study to find out the effects of six weeks yoga training on physiological variables of government rural secondary school children, the variables are pulse rate and blood pressure. The training protocol has followed for six weeks. Every day after the assembly conditioning exercise subjects practiced the selected Asanas. 30 subjects have taken for the study. The selected physiological variables were assessed by using the standardized test manual. The collected data on the study indicate that there was significant difference on physiological variables. It was found that the rural school children are better in pulse rate after six weeks of yogic practices.

Nagajothi et al. (2020) investigated a study of aerobic capacity and anaerobic power of sedentary school girls of west Bengal. Subject: twenty five(n=25) sedentary school students were randomly selected as subjects for this study from Atulia Neta Adharsha Vidyapath, North 24 paraganas. The age ranged from 16-18 years. The study was confined in a single experimental group and no control group was considered. In the present study of aerobic capacity and anaerobic power were two variables. Aerobic capacity were measured in terms of maximum oxygen consumption during excersice i.e. VO2 max. Aerobic capacity & anaerobic power were measured respectively by Queens College Step Test and Margaria-

kalamenanaerobic power test. A structured yogic training was intervened for six week. Mean and Standard deviation statistical procedure was carried out. The mean of different variables were compared by using t-test statistical significance was tested at 0.05 levels. The results highlighted that there were the significant difference in aerobic capacity between pre and post treatment condition. On the other hand a significant difference was found in anaerobic power between the pre and post treatment condition.

Sujatha & Elangovan (2020) study was to find out the effect of Yogic practices on selected psychological variables among women student teachers. To resolve the purpose of the study 30 college women were randomly selected from Sarada college of Education student teachers (women) Salem. Their age ranged between 23 and 25 years. The selected subjects were randomly divided into two groups consisting of fifteen each. No attempt was made to equate the groups. Experimental Group I underwent Yogic practices (YPT) for a period of 12 weeks. Group- II acted as control group (CG) and were not engaged in any training programme other than their work. The subjects were free to withdraw their consent in case of feeling any discomfort during the period of their participation but there was no dropout during the study. The psychological variables namely anger, stress and anxiety were selected and anger was tested through Anger inventory, and stress and anxiety were taken though DASS inventory. Pre and post tests were conducted in all

the variables. Yogic practices was given to the experimental group for a period of 12 weeks. Dependent t test was used to determine the significant difference between the treatment means. Yogic practice group had significantly decreased in anger, stress and anxiety whereas the control group had no significant decrease in all the variables.

Yamamoto-Morimoto et al. (2019) evaluated a study on Positive effects of yoga on physical and respiratory functions in healthy inactive middle-aged people. For the study total of twenty eight participants with the average age 52.7 years were selected and they were divided into a yoga asana group and yoga asana with pranayama group. Participants attended a 70-min session once a week for 8 weeks. The yoga asana group practiced basic asana without specific breathing instructions, while the yoga asana with pranayama group practiced basic asana with specific breathing instructions (pranayama). Respiratory function was measured with an auto-spirometer. The result of the study showed that Both groups showed significant improvements in physical and overall respiratory functions after the 8-week yoga intervention. However, the maximal inspiratory pressure and lower extremity flexibility improved only in the yoga asana with pranayama group. Further it was concluded that the 8-week yoga intervention for healthy inactive middle-aged people improved the overall respiratory and physical functions, and the inclusion of pranayama had the added benefit of improving inspiratory muscle strength and global body flexibility.

Kumar & Parasuraman (2019) revealed a study of Ashtanga Vinyasa Surya Namaskar A&B (AVSN) practices on strength and balance among adolescence boys". To achieve the purpose of the present study, forty adolescence boys from Chennai district, Tamil Nadu were selected as subjects at random and their ages ranged from 15 to 19 years. The subjects were further classified at random into two equal groups of 20 subjects each such as Experimental Group and Control Group. Experimental Group underwent Ashtanga Vinyasa Surya Namaskar A&B (AVSN) Practices for thrice in a week for 6 weeks. Control Group (CG) did not participate in any special training apart from the regular day programme. The selected variables such as strength and balance were measured by using push up and Stork Balance Stand Test. The collected data were analysed statistically through analyse of covariance (ANCOVA) to find a significant difference. The results of the study showed that strength and balance were significantly improved due to Ashtanga Vinyasa Surya Namaskar A&B (AVSN) practices among adolescence boys.

Vidyashree et al. (2019) investigated the effect of yoga intervention on short-term heart rate variability in children with Autism spectrum disorder. In this study, fifty children (38 boys and 12 girls) with Autism spectrum disorder were recruited from Swabhimaan Trust, Palavakkam, Chennai. They were randomly grouped into Autism spectrum disorder with yoga intervention group (n = 25) and Autism spectrum disorder without yoga intervention group (n = 25) by simple lottery method. Yoga

group children underwent yoga training for 3 months, and the control group did not receive any such training. For short-term heart rate variability, 15 min electrocardiogram recording in sitting posture was recorded in lead II using a simple analog amplifier. In heart rate variability, time domain parameters such as mean RR interval, standard deviation of the NN intervals, and root of the mean squared differences of successive NN interval significantly increased in Autism spectrum disorder children after yoga intervention. In frequency-domain parameters, high frequency in n. u shows a significant increase and low frequency in n. u, and LF/HF ratio shows a significant decrease in Autism spectrum disorder with yoga intervention group children after 3 months of yoga training.

Pradnya et al. (2019) conducted a study on effect of yoga as an add-on therapy in the modulation of heart rate variability in children with duchenne muscular dystrophy. In this study, 124 patients with duchenne muscular dystrophy were randomized to Physiotherapy alone or Physiotherapy with yoga intervention. Home-based Physiotherapy and yoga were advised. Adherence was serially assessed at a follow-up interval of 3 months. Error-free, electrocardiogram was recorded in all patients at rest in the supine position. heart rate variability parameters were computed in time and frequency domains. heart rate variability was recorded at baseline and at an interval of 3 months up to 1 year. Repeated-measures ANOVA was used to analyze longitudinal follow-up and least significant difference for post hoc analysis

and $P < 0.05$ was considered statistically significant. The results of the study showed that with Physiotherapy protocol, standard deviation of NN, root of square mean of successive NN, total power, low frequency, high-frequency normalized units (HFnu), and sympathovagal balance improved at varying time points and the improvement lasted up for 6–9 months, whereas Physiotherapy and yoga protocol showed an improvement in HFnu during the last 3 months of the study period and all the other parameters were stable up to 1 year. Thus, it is evident that both the groups improved cardiac functions in duchenne muscular dystrophy. However, no significant difference was noted in the changes observed between the groups. Further it was concluded that the intense Physiotherapy and Physiotherapy with yoga, particularly home-based program, is indeed beneficial as a therapeutic strategy in duchenne muscular dystrophy children to maintain and/or to sustain HRV in duchenne muscular dystrophy.

Meshram & Meshram (2019) reported on effect of yogic exercise on resting heart rate variability-a study in central India. Being non-invasive technique has increased its use to measure the work load of individual. We assessed the effect of yogic exercise on resting heart rate variability by using resting heart rate variability software (AD-Instrument) in 20 healthy males of 18–20 years age both pre and post interventional. Practice of yogic exercise consist set of physical postures (asana), breathing techniques (pranayama) and meditation (dhyana). These were practised

35mins, 5times /wk for 6 months guided by certified yoga trainer. Analysis done by Student's paired 't' test of HRV revealed that all time domain parameters were increased while frequency domain parameters like low-frequency (LF) and LF/HF ratio were found to be decreased after practice of yogic exercise. Practicing yogic exercise has shown better improvement in autonomic balance by shifting towards parasympathetic predominance as suggested by resting heart rate variability.

Donahoe-Fillmore & Grant (2019) conducted a study on effects of yoga practice on balance, strength, coordination and flexibility in healthy children. To determined the purpose of this study a convenience sample of twenty six childrens in the aged group between 10–12 years was obtained. The children participated in 40 min yoga sessions, led by a registered yoga teacher, the training period limited with thrice in a week for 8 weeks. The result of the study showed that there was a statistically significant within-subject difference from pre-test to post-test for balance, sit and reach, popliteal angle right and left. There were no statistically significant differences in strength and bilateral coordination from pre-to post-test measurements. Further it was concluded that yoga may be a beneficial form of exercise in the school-based setting for improving balance and flexibility in healthy children.

Hayes (2019) examined the efficacy of a 6-week yoga intervention in improving reactive balance in older adults. Thirteen older adults were randomized into a yoga intervention group (n=7) or a control group (n=6). Subjects in the yoga

group participated in hour long classes, twice per week for six weeks. The results of the study showed that No statistically significant effects were noted between groups on response time. However, the low sample size likely compromises our ability to make definitive conclusions. This study is an early attempt to get very focused measures to evaluate yoga, using a balance task that emphasized heightened cognitive demand. With this study we were able to demonstrate the feasibility of using yoga as an intervention and provide insight for future studies looking at the potential effects of yoga on reactive balance in older adults.

Park & Kim (2017) investigated the effects of Iyengar yoga practice on the lower body imbalance in middle-aged women. The subjects (n=24), who had not performed yoga training prior to this study (and) were not attending any other training programs, participated after undergoing an X-RAY examination with the Gonstead Technique and then their lower body imbalance (was reevaluated). The subjects completed the yoga program for 12 weeks (3 times per week, 90 minutes per session). The results of the study suggest that Iyengar yoga training for 12 weeks reduces the pelvic imbalance and length differences between the right and left lower limbs in middle-aged females.

Polsgrove et al. (2016) To determine the impact of yoga on male college athletes (N = 26). Over a 10-week period, a yoga group (YG) of athletes (n = 14) took part in biweekly yoga sessions; while a nonyoga group (NYG) of athletes (n = 12) took part in no additional yoga activity. Performance measures were obtained immediately before and after this period. Measurements of flexibility and balance, included: Sit-reach (SR), shoulder flexibility (SF), and stork stand (SS); dynamic measurements consisted of joint angles (JA) measured during the performance of three distinct yoga positions (downward dog [DD]; right foot lunge [RFL]; chair [C]). Significant gains were observed in the YG for flexibility (SR, P = 0.01; SF, P = 0.03), and balance (SS, P = 0.05). No significant differences were observed in the NYG for flexibility and balance. Significantly, greater JA were observed in the YG for: RFL (dorsiflexion, l-ankle; P = 0.04), DD (extension, r-knee, P = 0.04; r-hip; P = 0.01; flexion, r-shoulder; P = 0.01) and C (flexion, r-knee; P = 0.01). Significant JA differences were observed in the NYG for: DD (flexion, r-knee, P = 0.01: r-hip, P = 0.05; r-shoulder, P = 0.03) and C (flexion r-knee, P = 0.01; extension, r-shoulder; P = 0.05). A between group comparison revealed the significant differences for: RFL (l-ankle; P = 0.01), DD (r-knee, P = 0.01; r-hip; P = 0.01), and C (r-shoulder, P = 0.02). Results suggest that a regular yoga practice may increase the flexibility and balance as well as whole body measures of male college athletes and therefore, may enhance athletic performances that require these characteristics.

2.4 STUDIES RELATED TO HEALTH RELATED PHYSICAL FITNESS VARIABLES

Cardiovascular Endurance

Das, Konai, & Ghosh (2021) observed the relationship between motor fitness and motor creativity of different groups of Rhythmic Activity. 30 students of varsity level were selected as the subjects of the present study. Subjects were divided into three groups, i.e. Dance, Aerobics and Bratachari group. Each group consists of 10 female students from different universities of West Bengal. To conduct the study selected motor fitness i.e. flexibility, static balance, coordination and cardiovascular endurance and test of motor creativity were taken. After collecting the data Mean, SD and co-efficient of correlation were calculated and the following conclusions were drawn1. In Motor creativity Dance and Aerobic group is better than Bratachari group.Static Balance is better in Aerobic group than Dance and Bratachari group.Motor creativity is not related with motor fitness and its components for all the three groups.

Dadgostar et al. (2020) aimed to determine the anthropometric indices and aerobic and cardiopulmonary capacity of Iranian elite female taekwondo athletes and also to investigate the relationship between the anthropometric indices and the cardiopulmonary capacity of this group of athletes at national and championship levels. For this purpose, 33 elite female taekwondo athletes (12 at national and 21 at

championship levels) participated in this study. The body fat percentage was measured by body impedance analyzer, and cardiopulmonary evaluation was performed using an incremental exercise test. Mean height, BMI (body mass index), and the body fat percentage were determined as 169.86 Â± 6.74 cm, 20.89 Â± 2.57 kg.m-2, and 22.54 Â± 5.44, respectively. The rates of VO2max and VO2@AT in the Cardiopulmonary Exercise testing (CPET) were 48.95 Â± 7.11 mL/kg.min and 60.43 Â± 6.43, respectively. Correlation results showed that VO2max was negatively correlated with the body fat percentage (r =-0.50, P = 0.003), BMI (r =-0.40 P = 0.02), and weight (r =-0.35, P = 0.044). Furthermore, it was found that the age factor was negatively correlated with HRMAX in CPET test (r =-0.46, P = 0.007) and exercise hours per week (r =-0.37, P = 0.031). The findings of this study revealed that the rate of VO2max, as the index of aerobic capacity among elite female taekwondo athletes, was about 50 mL/kg.min. Normal BMI, which was similar to that of the other taekwondo elites in the world, and an acceptable body fat percentage were reported in our study, while the body fat percentage was relatively higher than that of the other elite female taekwondo athletes in the world.

Seabra et al. (2020) examined the effects of a 6-month school-based soccer programme on cardiovascular (CV) and metabolic risk factors in overweight children. Methods: 40 boys [8–12 years; body mass index (BMI) >2 standard deviations of WHO reference values] participated in complementary school-based physical

education classes (two sessions per week, 45–90 min each). The participants were divided into a soccer group (SG; n = 20) and a control group (CG; n = 20). The SG intervention involved 3 extra-curricular school-based soccer sessions per week, 60–90 min each. The intervention lasted for 6-months. All measurements were taken at baseline and after 6-months. From baseline to 6-months, the SG significantly improved ($p < .05$) BMI z-score, waist circumference, waist-to-height ratio, percentage of fat mass, percentage of fat-free mass, diastolic blood pressure, total cholesterol, triglycerides, low-density lipoprotein cholesterol (LDL-C) and high-density lipoprotein cholesterol, but no such improvements were observed for the CG. After the intervention, the prevalence of soccer participants with normal waist-to-height ratio (30 vs. 5%; $p = .037$), systolic blood pressure (90 vs. 55%; $p = .039$), total cholesterol (80 vs. 65%; $p = .035$) and LDL-C (90 vs. 75%; $p = .012$) were significantly higher than at baseline. The findings suggest that a 6-month school-based soccer intervention program represents an effective strategy to reduce CV and metabolic risk factors in overweight children prepared to take part in a soccer program.

Muscular Strength

Cabeo & Lopez (2020) analyzed the relationship between body image and muscle strength in Spanish children and adolescents.230 Spanish school children participated (104 boys and 126 girls), between 3 and 15 years old with an average age of 9.05 ± 3.10 years. The body image was measured by the Stunkard silhouettes. The level of muscular strength was evaluated by manual dynamometry (Takei TKK 5101 dynamometer). The statistical analysis was carried out with SPSS 23.0. Significant positive correlations were found between the current body image and the level of muscular strength of the dominant side ($r = 0.182$, $p=0.027$), non-dominant side ($r=0.155$, $p = 0.002$), and average strength ($r = 0.171$, $p = 0.015$) of Spanish schoolchildren. According to sex, significant correlations were found between body image and strength in both boys and girls. According to age, the significant correlations between body image and strength were found in the Secondary Education group (12-15 years).The results of this study show that muscle strength can be a determining factor in the perception of body image of children and adolescents. It is recommended to carry out intervention programs with the aim of improving strength, because this will have positive effects on the body image of the participants.

Sun et al. (2020) The primary aim of this study was to establish sex and age-specific muscular fitness (MF) norms for Chinese children and adolescents aged 7–18 years old. The secondary aim was to compare their MF values with those of children

and adolescents in other countries and regions. The MF of 93,755 participants from China was evaluated by handgrip strength (upper limbs strength), sit-ups (trunk strength) and a standing broad jump (lower limbs strength), with a total of 90,424, 90,281 and 90,663 data values, respectively. The Lambda-Mu-Sigma (LMS) method was used to calculate smooth curves and table data. The MF of Chinese boys was higher than that of girls in all age groups. After the age of 11, the growth rate of boys accelerated while that of girls slowed down. Age-related changes were larger for boys than for girls. In the international comparison, all the MF indicators of Chinese children and adolescents were lower than those of their Japanese peers but were higher than those of their European peers, with the exception of handgrip strength. The results of this study can be used to evaluate, monitor and apply interventions that improve MF. They can also be used to compare trends across countries and regions.

Burns & Brusseau (2017) explored the associations among physical activity, muscular strength, and metabolic risk among children.The sample included 378 Portuguese children (213 girls; 9–11 years). Moderate-to-vigorous physical activity was assessed by accelerometry and children were classified as active (≥60 min/day) or insufficiently active (<60 min/day). Static strength was expressed as the ratio of handgrip strength/body weight and used to classify children as having high (≥P50) or low (<P50) muscular strength. Children were classified into four groups: active and high strength, active and low strength, insufficiently active and high strength,

insufficiently active and low strength. A continuous metabolic risk score was computed from cardiometabolic risk factors.In general, the insufficiently active and low strength group had the worst metabolic risk score, and the active and high strength group had the best. Significant differences were found within physical activity groups for metabolic risk: children classified as “active and high strength” and “insufficiently active and high strength” had better metabolic risk scores than “active and low strength” and “insufficiently active and low strength”, respectively. Muscular strength has a relevant role in attenuating the association between physical inactivity and metabolic risk in children; a further benefit was identified in children with high physical activity and high muscular strength.

Muscular Endurance

Chang et al. (2020) investigated the effects of a core conditioning in the warm-up routine of physical education classes on trunk muscular endurance, movement capability, and flexibility in this population. In these pre- and post-test control group experiments, 52 healthy, school-aged children (aged 10–11 years) were cluster randomized allocated to either the dynamic core exercise (DCE) group or general physical education (GPE) group. The DCE group performed a 10-min core exercise routine twice per week for six consecutive weeks; the GPE group performed traditional physical education warm-up exercises regularly. The children were assessed by conducting the trunk muscular endurance test (i.e., dynamic curl-up, static

curl-up, plank, and lateral plank), functional movement screen (FMS), and single-leg balance test before and after the intervention. At the end of the intervention, the DCE group demonstrated a significant effect on trunk muscular endurance, movement capability (i.e., FMS scores), flexibility, and balance (each $p < 0.001$, effect size: 0.38–1.3). Furthermore, the DCE group showed significant improvements in all outcome measurements compared with the GPE group ($p < 0.05$, effect size: 0.29–1.68). These data may provide a reference for incorporating additional core stability exercises in the warm-up routine of physical education classes in school-aged children in the future.

Thomas & Palma (2018) evaluated the fitness levels of different physical components in schoolchildren in southern Italy and identify age-related effects of physical performance. One hundred and fifty-four schoolchildren with ages ranging between 6 and 10 years (age 8.1 ± 1.45 years; 33.70 ± 10.25 kg; 131.50 ± 13.60 cm) were recruited for the investigation. Each scholar underwent a fitness-test battery composed of five elements. A Hand-Grip Strength Test to assess the strength of the hand muscles, a Standing Broad Jump Test to assess lower body explosive strength, a Sit-Up Test to exhaustion to evaluate abdominal muscular endurance, a 4 × 10-m Shuttle Run Test to assess agility, and a 20-m sprint test to assess speed. Cross-sectional analysis revealed that boys perform better than girls and that age affects performance. Lower limb measures show a significant increase after 8 years of age,

whereas upper limb measures show a significant increase at 7 and 10 years of age. No age-related differences were found in muscular endurance measures. It is possible to consider age-related performance measures to program exercise interventions that follow the growth characteristics of schoolchildren.

Blagojevic et al. (2017) established the effects of specially programmed circuit training on physical fitness in primary school children. A total of 58 (28girls) primary school children aged 11-13(experimental group 12.2±1.2, control group12.4±1.1) years voluntarily participated in this study. Physical fitness of children is assessed based on motor skills, through the following tests: abdominal muscle endurance - Sit-ups test, upper body strength and muscular endurance - Bent-arm hang test, upper-body muscular endurance – Push-ups test, muscular strength and power of the lower limbs - Standing broad jump test, agility and speed- 4x10m test and flexibility - Sit and reach test. During the regular classes of physical education, the experimental group conducted a circular training lasting 15-20 minutes, at the same time control group practiced exercises that were in accordance with the plan and program of teaching physical education for a particular teaching unit. The treatment lasted for 15 weeks, with two classes of physical education per week. The results for the standing broad jump indicated significant differences between groups following 15 weeks. Furthermore, the group that participated in the circuit training program made significantly greater gains compared to the control group ($p<0.05$) in bent-arm

hang, sit-ups and sit and reach. The results for the 4x10m test indicated no significant differences in time, group and their interaction ($p \geq 0.05$). To conclude, circuit training appears tobe an effective way of improving physical fitness in primary school children. The results of thisstudy indicate that this method was more effective for performance than traditional school program.

Flexibility

Cibinello et al. (2020) investigated the effects of an exercise program, based on the Pilates Matwork method, on posterior chain flexibility and trunk mobility in healthy school age children.The study was a parallel-group randomized clinical trial. The participants were randomly assigned to groups: Pilates Group (PG) and Control Group (CG). The program was developed at the Early Childhood Education Institute, 43 children with age between eight to 12 years, no prior knowledge of the Pilates method, and no exercise training in the last six months. Four months of twice a week 50 min Pilates Matwork exercises were administered.Flexibility and mobility, assessed using the sit-and-reach test, fingertip-to-floor test and photogrammetry. The assessors were blinded to the allocation of participants.Three children were excluded before randomization and 40 were randomized (PG n = 20; CG n = 20).12 children were excluded during the protocol (PG n = 7; CG n = 5) and included in the intention to treat analysis. No significant difference between groups was observed for flexibility measures. There was a significant difference in the following outcomes for the PG:

distance reached in the sit-and-reach test between pre-test (median 14.25[11.25–28.38]) and post-test (median 20.25[12.00–29.63]) (ES = 0.29, SRM = 0.73); Posterior angle of the knee in the fingertip-to-floor test between pre-test (median 191.60[187.20–191.60]) and post-test (median 189.00[185.90–191.50]) (ES = 0.56, SRM = 0.54). There were no differences in posterior chain flexibility and trunk mobility between school age children who underwent Pilates Matwork exercises and the control. However, children who participated in the exercise program showed improvement in some results of flexibility.

Sivanandha prabhu et al. (2021) investigated the realize the effect of bear walk and frog jumps on selected strength parameter Muscular strength and Flexibility underwent school boys students in the age group of 13 to 16 on health related physical fitness. To attain this purpose, 30 male school students were randomly selected as subjects from C.M.S. Higher Secondary School, Srivilliputtur, Virudhunagar District studying in various classes. The age of the subjects were ranged from 13 to 16 years. The subjects were formed a two group of 15 subjects each, in which group - I underwent Bear walk training and frog jump training for three days per week for eight weeks and group - II acted as control group who were not undergo any type of training programme. The chosen criterion variables such as Muscular Strength and Flexibility were measured before and after the training period. The collected data were statistically analyzed by using Analysis of Covariance (ANCOVA). From the

obtained results the study was found that there was a significant improvement on Muscular Strength and Flexibility for bear walk and frog jump group when compared with the control group.

Donahoe-Fillmore & Grant (2019) investigated the effects of yoga practice on balance, strength, coordination, and flexibility in healthy children aged 10–12 years. A convenience sample of 26 children, aged 10–12 years was obtained. The children participated in 40 min yoga sessions, led by a registered yoga teacher, 1–3 times per week for 8 weeks. The Bruininks-Oseretsky Test of Motor Proficiency, second edition (BOT-2), the sit and reach test, and the 90/90 hamstring flexibility test were administered at baseline and at the end of the 8 weeks. Descriptive statistics were calculated for all measurements. A Shapiro-Wilk test was used to test normality. A Wilcoxin signed-rank test was used to analyze pre- and post-test measurements for all variables.There was a statistically significant within-subject difference from pre-test to post-test for balance ($p = 0.026$), sit and reach ($p = 0.000$), popliteal angle right ($p = 0.005$), and popliteal angle left ($p = 0.018$). There were no statistically significant differences in strength and bilateral coordination from pre-to post-test measurements. Yoga may be a beneficial form of exercise in the school-based setting for improving balance and flexibility in healthy children.

2.5 STUDIES RELATED TO PSYCHOSOCIAL VARIABLES

Quality of Life

Karras et al. (2019) examined on developmental coordination disorder (DCD) is primarily a motor disorder, it can also impact emotional and psychosocial functioning of children with this condition. Evidence suggests that children with DCD experience lower quality of life than their peers, but few studies have explicitly examined the health-related quality of life (HRQOL) of these children.(1) describe HRQOL of children with DCD compared to typically-developing children; (2) compare HRQOL from the perspectives of children with DCD and their parents; and (3) explore predictors of HRQOL for children with DCD.Data from the KidScreen-52 and Strength and Difficulties Questionnaire were collected from 50 children with DCD [Mean(SD) age: 9.8 (1.2) years] and their parents and compared to normative data.Children with DCD and their parents report significantly lower HRQOL compared to published norms. Caregivers have a significantly lower perception of their child's HRQOL than their child's self-report in many domains. Parents of children with DCD report that their children experience significantly more emotional and behavioral disturbances compared to norms. Poor motor function and attentional difficulties predict HRQOL.DCD appears to contribute to lower perceived HRQOL. Findings inform therapeutic targets for children with DCD, beyond motor skill intervention.

his study examined the different aspects of quality of life in asthmatic children for the first time in this geographic area.

Germain et al. (2019) investigated a study on impact of disease and treatment on children's Health-Related Quality of Life (HRQoL) has given rise to an increasing use of child self-report and observer or proxy instruments. In this article, we review the status quo and challenges of HRQoL measurement specific to children under five. A number of HRQoL questionnaires exist for use with children and/or proxies, and both guidelines and reviews have been published on paediatric HRQoL. However, none address the challenges of measurement for children under five, for whom proxy measures should be used. In reality, there is significant heterogeneity in the cut-off age for self-report questionnaires. Recommendations are that proxies should be used for observable concepts, but not for concepts that require interpretation. Some research has been undertaken on dimensions/concepts in paediatric HRQoL questionnaires. However, no HRQoL models have been developed specifically for children, and heterogeneity in questionnaire dimensions underlines that there is no clear grasp of what HRQoL means in paediatric populations. There is a need to carry out research in order to develop theoretical models of HRQoL that are specific to children at different developmental stages, in order to evaluate and support new and existing measures for paediatric HRQoL and their use in clinical practice as well as clinical trials.

Kouzegaran et al. (2018) comparison of on quality of life in children with Asthma versus Healthy Children asthmatic group was 100 patients aged 8 to 12 admitted to the Asthma and Allergy Clinic of Ghaem Hospital (as) in Mashhad with the control group composed of 100 healthy children of the same age and gender. The standard questionnaire pedsQLTM was used for comparing the quality of life of children in the two groups. Statistical analysis was SPSS23 with P-value less than 0.05, which was statistically significant.In each group, 58 patients were boys, and 42 were girls. In a comparison of the quality of life of children, the asthma group with a mean total score of Peds QL 20.99 ± 12.54 compared to the healthy children with a mean total score of Peds QL of 8.8 ± 5.41 had a lower quality of life ($P < 0.001$). Moreover, regarding various aspects of quality of life asthma group had a lower quality of life in physical performance, emotional performance and performance in school ($P < 0.001$). Nonetheless, there was no significant difference between the two groups considering social function ($P = 0.267$). Examining the relationship between Peds QL score of patients with asthma with various variables was indicative of the fact that Peds QL scores were significantly correlated with the gender of the patients, showing better quality of life in the girls ($P = 0.001$). The results indicated that children with asthma have a significantly lower quality of life compared with healthy children of the same age. Also, in examining the different aspects of quality of life, these children had a lower quality of life in physical performance, emotional

performance, and performance at school, and were at the level as that of healthy children only in social performance.

Self Esteem

Fakunmoju et al. (2021) Studies consistently suggest that emotional intelligence and parenting styles are associated with self-esteem, although validation has relatively been based on correlation analysis. Using a sample of 252 respondents in Nigeria, the present study examined the relationships among parenting styles, emotional intelligence, and self-esteem with the aim of generating knowledge that transcends the nature and extent of their correlations. A bivariate analysis identified significant correlations: emotional intelligence (i.e., self-emotion appraisal, others' emotion appraisal, uses of emotion, and regulation of emotion), authoritative parenting, and authoritarian parenting significantly positively correlated with self-esteem. There was no significant correlation between emotional intelligence and parenting styles. Results of the independent-samples t test indicated that emotional intelligence and self-esteem differed by gender. Specifically, women were more likely than men to report high self-emotion appraisal, others' emotion appraisal, and uses of emotion. Similarly, women were more likely than men to report high self-esteem. Using multiple regression analysis, emotional intelligence and parenting styles were associated with self-esteem: being a student, emotional intelligence (i.e., self-emotion appraisal and uses of emotion), and authoritative parenting were associated with self-

esteem. Emotional intelligence accounted for a larger effect on self-esteem than did parenting styles. In general, findings lend credence to the relevance of authoritative parenting in the development of self-esteem and suggest that, among components of emotional intelligence, uses of emotion and self-emotion appraisal may be considered in facilitating improvement of self-esteem among young adults at the developmental stage of increasing self-esteem. Implications of findings for research, education, and practice are discussed.

Maharani et al. (2017) examined impacts of oral health on child self-esteem, school performance and perceived employability. The aim of this study was to determine levels of child oral health in primary school children in Indonesia, the prevalence of key causal factors; and, to determine relationships between oral health, self-esteem and school academic performance. Cross-sectional epidemiological study in a sample ($n = 984$) of children aged 6–7 and 10–11 years old attending three public schools in Indonesia. A dental visual impact study was conducted, in which teachers reported their perceptions of the impact of child oral health on school academic performance. Oral health behaviors, self-esteem, and school performance were assessed. The children were clinically examined to measure dental caries and oral cleanliness. Teachers believe that children with visually poor oral health and impaired smiles are more likely to perform poorly at school, be socially excluded and have lower job prospects than their peers with visually good oral health and healthy smiles.

The percentages of children with decayed teeth were 94 and 90% in the 6-7- and 10–11-year age groups, respectively. Families reported high levels of child consumption of sugar-containing foods and drinks; many had irregular use of fluoride toothpaste. Children with substantial plaque on their teeth achieved significantly lower levels of school performance than their peers with clean teeth. Significant associations were found between school performance and self-esteem for these children. The study findings highlight the need for preventive care programs to improve the oral health of children in Indonesia and prospective determination of associations between child oral health; self-esteem and school academic performance.

Boyes et al. (2018) investigated a study on children with reading difficulties are at elevated risk for externalising (e.g., conduct disorder) and internalising (e.g., anxiety and depression) mental health problems. Reading ability is also negatively associated with self-esteem, a consistent predictor of child and adolescent mental health more broadly. This study examined whether self-esteem moderated and/or mediated relationships between reading ability and mental health. One hundred and seventeen children (7–12 years) completed standardised reading assessments (Castles and Coltheart Test 2; CC2) and self-report measures of mental health (Strengths and Difficulties Questionnaire; SDQ) and self-esteem (Coopersmith Self-esteem Inventory). Non-verbal intelligence (IQ) was measured using the block design and matrix reasoning subscales of the Wechsler Abbreviated Scale of Intelligence, and

was controlled for in all multivariate analyses. Reading ability was negatively associated with internalising symptoms. This relationship was not moderated by self-esteem. Poor readers also reported more total difficulties and externalising symptoms, but only at low levels of self-esteem. There was no evidence that self-esteem mediated relationships between reading ability and mental health. Poor reading was associated with internalising symptoms. Self-esteem moderated the impact of reading ability on total difficulties and externalising symptoms, with high self-esteem buffering against negative impacts of poor reading. However, the reliability of the self-esteem scale used in the study was poor and findings need replication using a reliable and valid self-esteem measure, as well as other measures of child mental health. If replicated, future research should examine whether interventions aiming to improve self-esteem can reduce the risk of externalising problems in children with reading difficulties.

Depression

Lindberg et al. (2020) investigated whether obesity increases the risk of anxiety or depression independently of other risk factors in a large cohort of children and adolescents, using robust measures with regard to exposure and outcome. Children aged 6–17 years in the Swedish Childhood Obesity Treatment Register (BORIS, 2005–2015) were included (n = 12,507) and compared with a matched group (sex, year of birth, and area of residence) from the general population (n = 60,063).

The main outcome was a diagnosis of anxiety or depression identified through ICD codes or dispensed prescribed medication within 3 years after the end of obesity treatment. Hazard ratios (HRs) with 95% confidence intervals (CIs) from Cox proportional models were adjusted for several known confounders. Obesity remained a significant risk factor for anxiety and depression in children and adolescents after adjusting for Nordic background, neuropsychiatric disorders, family history of anxiety/depression, and socioeconomic status. Girls in the obesity cohort had a 43% higher risk of anxiety and depression compared to girls in the general population (adjusted HR 1.43, 95% CI 1.31–1.57; $p < 0.0001$). The risk in boys with obesity was similar (adjusted HR 1.33, 95% CI 1.20–1.48; $p < 0.0001$). In sensitivity analyses, excluding subjects with neuropsychiatric disorders and a family history of anxiety/depression, the estimated risks in individuals with obesity were even higher compared with results from the main analyses (adjusted HR [95% CI]: girls $= 1.56$ [1.31–1.87], boys $= 2.04$ [1.64–2.54]). Results from this study support the hypothesis that obesity per se is associated with risk of both anxiety and depression in children and adolescents.

Fernandez – Martínez et al. (2019) investigated on effectiveness of the program super skills for life in reducing symptomsof anxiety and depression in young Spanish children super Skills for Life (SSL) is a trans diagnostic prevention program designed for children with anxiety and depressive symptoms based on cognitive-

behavioural therapy. This study is a trial of the efficacy of the SSL program to reduce anxiety and depression symptoms in a representative sample of Spanish children aged 6 to 8. Method: This cluster randomized controlled trial involved 123 Spanish speaking children recruited from 10 schools. Schools were the unit of randomization, and were randomly assigned to one of two experimental conditions: intervention group (SSL) and waiting list control (WLC) group. Assessments were conducted before and after the 8-week intervention. Results: Generalized estimating equations showed that, compared with WLC, the intervention significantly reduced emotional symptoms of anxiety and depression. Significant improvements were also found in specific symptoms of anxiety disorders, and in the interference of anxiety in the child´s life. Conclusions: The findings of this study provide initial support for the immediate effects of SSL, suggesting that it is a valuable resource for the early reduction of anxiety and depressive symptoms in young Spanish-speaking children.

Bressington et al. (2019) assessed the effectiveness of a yoga-based social-emotional wellness promotion program, *Transformative Life Skills* (TLS), on indicators of adolescent emotional distress, prosocial behavior, and school functioning. Participants included 159 students attending an inner-city school district who were randomly assigned to treatment or business-as-usual comparison conditions. Results suggested that students who participated in the TLS program demonstrated significant reductions on unexcused absences, detentions, and increases

in school engagement. Significant concurrent improvements in primary engagement stress-coping strategies and secondary engagement stress-coping strategies were noted as well. Specifically, significant increases in student emotion regulation, positive thinking, and cognitive restructuring in response to stress were found. No effects were found for measures of somatization, suspensions, academic grades, or general affect. Student report of treatment acceptability indicated that the intervention was generally well-received and strategies were perceived as socially valid by most participants. Implications and directions for future research are discussed.

CHAPTER – III

METHODOLOGY

The researcher determines the response of health-related psychosocial and fitness variables to physical and social vulnerability children from the coastal area of physical and social vulnerability due to the physical and social vulnerability program intervention with and without hatha yoga practices. Subjects, identification and selection of variables, training protocol identified and selected for the adopted experimental design, standard measures and test selection, data reliability, instrument reliability, tester reliability, reliability of subjects, experimental training methods, administration of tests and statistical techniques.

3.1 IDENTIFICATION AND SELECTION OF SUBJECTS FOR RESEARCH

The prime focus of this research work was to evaluate the presence of physical and social vulnerability of coastal area children and to quantify the impact of adopted experiment in the research. Based on suitability and nature of the research, true random group design was adopted.

Research work consists of two parts:

Research-work Phase–I: Status Analysis-Physical and Social Vulnerability.

Research-work Phase –II: Experimental Training (PEPWHYP, PEPWOHYP)

Research-work Phase – I: Status Analysis-Physical and Social Vulnerability

One Thousand and Seventeen (1017) children were taken for analysis from the Chennai Coastal Area (CCA). The children age range was fixed from 10 to 14 years old boys were selected as true random design. They were analyzed through a Physical and Social Vulnerability (PSV) checklist made for this research purpose with due standardization process. From the investigation Six Hundred and Forty One (641) children were identified, they are living their live hood as Physical and Social Vulnerability (PSV).

Research-work Phase – II: (PEPWHYP, PEPWOHYP)

Six Hundred and Forty One (641) children were physically and socially vulnerable from the population 75 children were randomly selected as subjects for this experimental study. They were assigned into three groups. Two experiment group and one Non-Experimental Group (NEG), each group consists of 25 children at random. Group-I Physical Education Programme with Hatha Yoga Practices (PEPWHYP),

Group-II Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Group-III Non-Experimental Group (NEG).

3.2 IDENTIFICATION AND SELECTION OF VARIABLES

The investigator done preliminaries, gone through various scientific articles, journals, books, internet resources and research articles before identification and selection of variables, also taking in to the consideration of achievability, standards, availability of mechanisms and the relevance of the variable of this study, the following variables were identified and selected.

3.3 VARIABLES IDENTIFIED AND SELECTED FOR TESTING

(A) Health-Related Physical Fitness Variables

(a) Cardiovascular Endurance

(b) Muscular Strength

(c) Muscular Endurance

(d) Flexibility

(B) Psychosocial Variables

(a) Quality of life

(b) Self-Esteem

(c) Depression

3.4 TRAINING PROTOCOL IDENTIFIED AND SELECTED FOR EXPERIMENTAL TRAINING

1. Physical Education Programme with Hatha Yoga Practices (PEPWHYP).
2. Physical Education Programme without Hatha Yoga Practices (PEPWOHYP).

3.5 EXPERIMENTAL DESIGN ADOPTED IN THE RESEARCH

The experimental research was formulated as a true random group design, consisting of two phases namely

Research-work Phase –I: Status Analysis- Physical and Social Vulnerability.

Research-work Phase –II: Experimental Training (PEPWHYP, PEPWOHYP).

Research-work Phase –I: Status Analysis - Physical and Social Vulnerability

Physical, Social Vulnerability and Standardization of checklist consist of 30 statements. Assessed One Thousand and Seventeen (1017) children from Chennai Coastal Area, true random group design were used. Physical and Social Vulnerability (PSV) check list made for this purpose with due standardization process. The factors involved in the checklist were Health, Poverty, Unemployment, Family Income, Educational Status, Disability, Single Parent (divided family), Housing, Vehicles and Physical neglects (Food, Clothes, shelter), Educational neglect (Parent not giving

Education for Child), Emotional neglect (Humiliating, Intimating & Isolating), Medical neglect (Health care and Dental Care).

From the investigation it was found that out of One Thousand and Seventeen (1017) Coastal Area Children Six Hundred and Forty One (641) were Vulnerable to Physical and Social Vulnerability (PSV).

Phase –II: Experimental Training (PEPWHYP, PEPWOHYP)

From Six Hundred and Forty One (641) Physical and Social Vulnerable children seventy five coastal area children were selected based on Physical and Social Vulnerability scores from Chennai as subjects. Their age ranged from 10 to 14 years. The subjects (n=75) were randomly assigned to three equal groups of twenty five each, they were assigned as Group-I Physical Education Programme with Hatha Yoga Practices (PEPWHYP), Group-II Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Group-III Non-Experimental Group (NEG). Pre-test was accompanied for all the 75 subjects on selected Health Related Physical Fitness (HRPF) variables namely Cardio-Vascular Endurance (CVE), Muscular Strength (MS), Muscular Endurance (ME), Flexibility (FX) and Psychosocial variables namely Quality of Life (QOL), Self-Esteem (SE), Depression (DP). The two experimental groups underwent scheduled experimental training for a period of twelve weeks, five days in a week. Non-

Experimental Group (NEG) was not exposed to training, other than their regular activities. After the 12 weeks experimental scheduled experimental training, all the three groups were measured on above mentioned variables. The experiment training programme duration 5 day in a week for 12 weeks scheduled at 4.00 pm to 5.15pm for both the experiment groups. Before the investigation permission were made from the children parent/guardian. During this investigation all the COVID-19 Standard Operation Procedures were followed.

3.6 CONSTRUCTION PROCEDURES AND STANDARDIZATION OF CHECKLIST

The core purpose of this study was to discover the Physical and Social Vulnerability of Coastal Area Children. To succeed the purpose and to measure the Physical and Social Vulnerability, the researcher investigated for the standardized checklist specific for the Vulnerable Coastal Area Children. It wasn't found such standardized checklist for above mentioned Vulnerability. In those circumstances, the researcher discussed with his guide, subject experts social worker, field expert, sports psychologist and language expert to develop checklist specifically for Vulnerable Coastal Area Children. The collected inputs were transformed into statements to measure the criterion Vulnerability. Totally 50 statements were prepared. Repetitive statements and confusing statements were removed. They were prepared carefully, meaningfully and

systematically. Thirty (30) numbers of statements were finalized, Physical vulnerability statements Fifteen (15); Social Vulnerability statements Fifteen (15), they were simply prepared as 'Yes'/'No' to tick easily to measure the criterion Vulnerability. In this construction procedure and standardization the Objectivity, Reliability and Validity of the checklist was analysed and verified statistically.

TABLE 3.1

CONSTRUCTED CHECKLIST AND DESCRIPTION

Physical and Social Vulnerability Checklist

S.No.	CHECKLIST	YES	NO
1.	Do you have a permanent residence?		
2.	Do you have a toilet facility at home?		
3.	Do you have the habit of washing hands before food?		
4.	Do you follow healthy food habits?		
5.	Do you have access to the playground?		
6.	Do you play/ exercise?		
7.	Do you have habit of doing any form of yogic practice?		
8.	Do you follow a proper sleeping habit?		
9.	Do you have access to hospitals/child helpline number?		
10.	Do you know Covid-19 precautionary measures?		
11.	Have you been timely vaccinated**?**		
12.	Do you have any chronic illness/diseases?		
13.	Have you meet with an accident in the past?		
14.	Do you have any physical disability or reformative in your body?		
15.	Is there any person from your family affected by Covid-19?		
16.	Are you living with your Parents?		

17.	Does your family has a permanent income source?		
18.	Does your family has any financial crisis?		
19.	Is there any alcoholic person in your family/friends?		
20.	Do you have good friends?		
21.	Do you have any recreational facility nearby your residence?		
22.	Are you happy with your present living condition?		
23.	Is your living area free from hazardous communicable diseases?		
24.	Is there any chance of anti-social activity near to your house?		
25.	Have you involved in any Anti-social activities?		
26.	Does your family has any threat from external persons or any other sources?		
27.	Have you face any physical torture from external forces?		
28.	Have you faced any domestic violence or torture from your family?		
29.	Do you respect elders and women?		
30.	Do you know the difference between good touch and bad touch?		

To determine score, Yes = 0, No = 1, reverse the scoring for the Eleven (11) statement in the checklist (12, 13, 14, 15, 18, 19, 24, 25, 26, 27, 28) as follows Yes = 0, No = 1. Then, add up scores across the 30 items. Total score should fall between 0 and 30. A score of greater than 15 indicates the Physical and Social Vulnerability of Coastal Area Children.

3.7 TRIAL OF EXPERIMENTAL STUDY

A trial study was conducted beforehand and finalizing the training schedule with 5 coastal area children with assistance of Physical Education Professionals and yoga experts to finalize that the intensity, aptness and time of the exercises comprised Physical Education Programme and Hatha Yoga Practices were within the abilities of the subjects. They were asked to perform the exercises continuously to their sub-maximal effort. The aim of trial was to know the subject capability and to know the struggle of conducting the training programme and to set a perfect understanding about the exercises, practices and duration, which is required for conducting the training programme. The subjects were comfortable during the trial. Before the trail permission were made from the children parent/guardian. During this trial all the COVID-19 Standard Operation Procedures were followed as instructed by the Central Govt. of India and the Government of Tamil Nadu.

TABLE 3.2

STANDARD MEASURES AND SELECTION OF TEST

S. No	Variables	Test	Unit of Measurement
Health Related Fitness Variables			
1.	Cardiovascular Endurance	12min Run/Walk Test	Meters
2.	Muscular Strength	Pull-Ups	Numbers
3.	Muscular Endurance	Sit-Ups	Numbers
4.	Flexibility	Sit and Reach	Centimetres
Psychosocial Variables			
5.	Quality of Life	Q.O.L Scale of Jamila K. Warrier and Samsananda Raj	Scores
6.	Self-Esteem	Rosenberg Self-Esteem Scale	Scores
7.	Depression	Beck Depression Inventory(Beck)	Scores

3.8 TRUSTWORTHINESS OF DATA

The investigator is proficient with the technique of conducting the test. All the test and measurement were taken preciously and recorded by the investigator with the support of Physical Education and yoga experts.

3.9 TRUSTWORTHINESS OF INSTRUMENTS

The investigator used instruments such as sit & reach box, tape, stop watch and cones and standard qualities. The instruments were authorized; they were calibrated in standard units. To define the trustworthiness of the instruments on each of the variables were noted for two times under similar environments using the similar instruments. The score were equated and hence the instruments were considered trustworthy to use in this research.

3.10 TESTERS TRUSTWORTHINESS

Tester reliability was recognized by test-retest processes. For this determination four subjects were selected at random on the designated variables, which were recorded twice under identical environments on diverse circumstances by the investigator.

3.11 SUBJECTS SUITABILITY

The investigator administered the subjects in the two experiment and Non-Experimental Group (NEG) during the testing of both pre & post-test. The investigator has described the purpose of Physical Education Programme and Hatha Yoga Practices

(PEPHYP) and described the techniques to test the preferred standards variables to the subjects. They system of scoring were precisely clarified as well as demonstrated by the investigator to enrich the subjects suitability. A session was organized to train the subjects to pursue their cooperation. They were cooperative during the training and assessment periods.

3.12 EXPERIMENTAL TRAINING METHODS

The two investigational groups underwent experimental training for a period of twelve weeks, five days in a week. Non-Experiment Group (NEG) was not exposed to any experiment training other than their regular activities. The adopted training programme duration 5 day in a week for 12 weeks scheduled at 4.00 pm to 5.15pm.

TABLE 3.3

TRAINING PROGRAM FOR EXPERIMENTAL GROUPS

S.NO.	NAME OF THE GROUPS	DURATION	FREQUENCY
1	Group – I Physical Education Program with Hatha Yoga Practices (PEPWHYP)	12 weeks	5 days/week
2	Group – II Physical Education Program without Hatha Yoga Practices (PEPWOHYP)	12 weeks	5 days/week
3	Group – III Non-Experimental Group (NEG)	Not exposed to Training	

3.13 EXPERIMENTAL TRAINING SCHEDULE

The exercise training programme consisted of twelve weeks of experimental training programme with and without hatha yoga practices were scheduled for five days in a week. This tested the methods of PEPWHYP, PEPWHOYP and NEG. During the entire training program, participants were closely supervised and monitored by certified fitness trainers, coaches, and yoga certified trainers, ensuring proper execution of exercise techniques. A standardized warm-up preceded training and testing sessions and finished by a cool-down period. Testing was the same for the pre and post testing measurements and was performed before and after the 12-weeks training period. All tests were administered at a similar time of day.

TABLE 3.4

INDEX OF EQUIPMENT USED FOR THE EXPERIMENTAL TRAINING	
➢ Wooden Dumbbells ➢ Indian Clubs ➢ Hoops ➢ Gymnastic Mat ➢ Yoga Mat ➢ Pole ➢ Mini Resistant Band ➢ Bosu Ball ➢ Mini Swiss Ball ➢ Tennis Ball ➢ Football ➢ Beach Volleyball ➢ Cones	**Technical Equipments** ➢ First Aid Box ➢ Laptop ➢ Video Tutorials ➢ Speaker ➢ Projector ➢ Projector Board **Hygienic Protocols** ➢ Soap ➢ Sanitizer ➢ Mask

TABLE 3.5

GENERAL STRUCTURE OF TRAINING PROGRAMMES

Groups	Training	Duration	Intensity		
			Phase - I	Phase - II	Phase – III
IVG – I	IPEPWHYP	75min	65%	75%	85%
IVG- II	IPEPWOHYP	75min	65%	75%	85%
NIG	Not Exposed to Training				

TABLE 3.6
EXERCISES USED FOR THE EXPERIMENTAL PHYSICAL EDUCATION PROGRAMME PHASE – I
(1^{st} to 4^{th} Weeks)

10min Warm activities (Jogging, mobilization)			
Workout – 1 (25min)	**Workout – 2 (25min)**	**Workout – 3 (25min)**	**Workout – 4 (25min)**
Free Hand Exercise Upper Extremities 4 Counts 8 Counts Lower Extremities 4 Counts 8 Counts **Dumbbells Exercise** Upper Extremities 4 Counts 8 Counts Lower Extremities 4 Counts 8 Counts	**Dumbbells Exercise** Upper Extremities 4 Counts 8 Counts Lower Extremities 4 Counts 8 Counts **Resistance Band** Glut bridge with Abduction Side-lying Abduction Squat Clock tap Glute kickback	**Gymnastics** Forward Roll Cartwheel Backward Roll Handstand Back Bend/Back Bend Kick Over **Bosu Ball** SingleLeg Hold Bird dog Bridge Mountain Climbers	**Free Hand Exercise** Upper Extremities 4 Counts 8 Counts Lower Extremities 4 Counts 8 Counts **Resistance Band** Glut bridge with Abduction Side-lying abduction Squat Clock tap
RECREATION ACTIVITY (15min)			
Ostrich tag Foot Cricket	Hopping Relay Team – Kangaroo Jump	Human Obstacle Relay Hand Hockey	Over Head Passing Relay Hand Cricket
COOL DOWN EXERCISE (10min)			
Note: After the training session researcher taught **(15min)** on personal hygiene, the importance of Physical Education, Social Problems.			

TABLE 3.7
EXERCISES USED FOR THEEXPERIMENTAL PHYSICAL EDUCATION PROGRAMME PHASE – II
(5^{th} to 8^{th}Weeks)

<table>
<tr><td colspan="4">10min Warm activities (Jogging, mobilization, Jump and Jack, High kneel, Leg raise walking)</td></tr>
<tr><td>Workout – 5
(25min)</td><td>Workout – 6
(25min)</td><td>Workout – 7
(25min)</td><td>Workout – 8
(25min)</td></tr>
<tr><td>Free Hand Exercise
Upper Extremities
8 Counts
16 Counts
Lower Extremities
8 Counts
16 Counts
Dumbbells Exercise
Upper Extremities
8 Counts
16 Counts
Lower Extremities
8 Counts
16 Counts</td><td>Pole Exercise
Upper Extremities
8 Counts
16 Counts
Lower Extremities
8 Counts
16 Counts
Resistance Band
Clock tap
Glute kickback
Lat pull--down
Plank jacks
Overhead press</td><td>Gymnastics
Forward Roll
Cartwheel
Backward Roll
Handstand
Half turn on one foot
Full turn on one foot
Bosu Ball
Mountain Climbers
Burpees
Lunges
V Squat
Side to Side Squat</td><td>Swiss ball Exercise
Hamstring curl
push up
Crunches
Squat
Inner thigh squeeze
Resistance Band
Clock tap
Glute kickback
Lat pull--down
Plank jacks</td></tr>
<tr><td colspan="4">RECREATION ACTIVITY (15min)</td></tr>
<tr><td>Circle Snatch
Musical Number</td><td>Hand Cricket
(Volleyball)
Couple Tag</td><td>Dodge Ball
Fish Net</td><td>Foot Cricket
Namaskar Tag</td></tr>
<tr><td colspan="4">COOL DOWN EXERCISE (10min)</td></tr>
<tr><td colspan="4">Note: After the completion of the session the researcher taught on fitness and sports awareness and sports personality to motivate the children.</td></tr>
</table>

TABLE 3.8
EXERCISES USED FOR THE PHYSICAL EDUCATION PROGRAMME
PHASE – III
(9^{th} to 12^{th} Weeks)

<table>
<tr><td colspan="4">10min Warm activities (Jogging, Jump and Jack, High kneel, Back Leg Kick, Skater Jack, Tuck Jump)</td></tr>
<tr><td>Workout – 9
(25min)</td><td>Workout – 10
(25min)</td><td>Workout – 11
(25min)</td><td>Workout – 12
(25min)</td></tr>
<tr><td>Aerobic Dance
A Step
V Step
Grape Vine Step
Z- Step
V- Jump Step
Turn-step
Charleston</td><td>Gymnastics
Half turn on one foot
Full turn on one foot
Full turn with free leg in scale above horizontal
Straight Jump
Tuck Jump
Straddle Jump
Split Jump
Pike Jump
Wolf Jump</td><td>Swiss ball Exercise
Push Up
Crunches
Squat
Inner thigh squeeze
Back extension
Triceps push-ups
Abductor lift</td><td>Bosu Ball
Single Leg Hold
Bird dog
Bridge
Mountain Climbers
Burpees
Lunges
V Squat
Side to Side Squat
Push-up
Triceps Dip
Seated Oblique twist</td></tr>
<tr><td colspan="4">RECREATION ACTIVITY (15min)</td></tr>
<tr><td>Foot Cricket
Hopping Relay</td><td>Kangaroo Relay
Hand Cricket</td><td>Hopping Tag
Hand Hockey</td><td>Over Head Passing Relay</td></tr>
<tr><td colspan="4">COOL DOWN EXERCISE (10min)</td></tr>
<tr><td colspan="4">Note: After the completion of the session the researcher arranged special videos such as sports games and skills activities, Motivational Videos, Sports Governing Bodies awareness were given to motivate the children.</td></tr>
</table>

TABLE 3.9
HATHA YOGA PRACTICES – I (HYP -1)
1st to 4th Weeks

Sl. No	Yogic Practices	Repetition or round	Breathe	Duration
1	Loosening Exercises	One round	-	2 minutes
2	Suryanamaskar	3 – 6 rounds	-	10 minutes
3	Tadasana	One round	-	2 minutes
4	UrdhvaHastasana	One round	-	2 minutes
5	Utthanasana	One round	-	2 minutes
6	PrasaritaPadottanasana	One round	-	2 minutes
7	AdhomukhaSvanasana	One round	-	2 minutes
8	UthithaTrikonasana	One round	-	2 minutes
9	Ustrasana	One round	-	2 minutes
10	Virasana	3 – 5 times	-	10 minutes
11	AdhomukhaVirasana	2 times	8 breath	2 minutes
12	Janushirsasana	2 times	8 breath	2 minutes
13	Paschimotasana	2 times	8 breath	2 minutes
14	Upavistakonasana	2 times	8 breath	2 minutes
15	Shalabasana	2 times	8 breath	2 minutes
	PRANAYAMA			
16	Ujjai	2 times	8 breath	2 minutes
17	Viloma	2 times	8 breath	2 minutes
	Meditation	**1 time**	**-**	**5 – 10 minutes**
	Relaxation	**1 time**	**-**	**10 - 20 minutes**

TABLE 3.10
HATHA YOGA PRACTICES (HYP -2)
5th to 8th Weeks

Sl. No	Yogic Practices	Repetition or round	Breathe	Duration
1	Loosening Exercises	One round	-	2 minutes
2	Suryanamaskar	3 – 6 rounds	-	10 minutes
3	Tadasana	One round	-	2 minutes
4	UrdhvaHastasana	One round	-	2 minutes
5	Utthanasana	One round	-	2 minutes
6	PrasaritaPadottanasana	One round	-	2 minutes
7	AdhomukhaSvanasana	One round	-	2 minutes
8	UthithaTrikonasana	One round	-	2 minutes
9	Ustrasana	One round	-	2 minutes
10	Virasana	3 – 5 times	-	10 minutes
11	AdhomukhaVirasana	2 times	8 breath	2 minutes
12	Janushirsasana	2 times	8 breath	2 minutes
13	Paschimotasana	2 times	8 breath	2 minutes
14	Upavistakonasana	2 times	8 breath	2 minutes
15	Shalabasana	2 times	8 breath	2 minutes
16	Baddhakonasana	2 times	8 breath	2 minutes
17	SuptaBaddhakonasana	2 times	8 breath	2 minutes
20	SuptaVirasana	2 times	8 breath	2 minutes
21	Savasana	2 times	8 breath	2 minutes
	PRANAYAMA			
22	Ujjai	2 times	8 breath	2 minutes
23	Viloma	2 times	8 breath	2 minutes
	Meditation	**1 time**	**-**	**5 – 10 minutes**
	Relaxation	**1 time**	**-**	**10 - 20 minutes**

TABLE 3.11
HATHA YOGA PRACTICES (HYP -3)
9^{th} to 12^{th} Weeks

Sl. No	Yogic Practices	Repetition or round	Breathe	Duration
1	Loosening Exercises	One round	-	2 minutes
2	Suryanamaskar	3 – 6 rounds	-	10 minutes
3	Tadasana	One round	-	2 minutes
4	UrdhvaHastasana	One round	-	2 minutes
5	Utthanasana	One round	-	2 minutes
6	PrasaritaPadottanasana	One round	-	2 minutes
7	AdhomukhaSvanasana	One round	-	2 minutes
8	UthithaTrikonasana	One round	-	2 minutes
9	Ustrasana	One round	-	2 minutes
10	Virasana	3 – 5 times	-	10 minutes
11	AdhomukhaVirasana	2 times	8 breath	2 minutes
12	Janushirsasana	2 times	8 breath	2 minutes
13	Paschimotasana	2 times	8 breath	2 minutes
14	Upavistakonasana	2 times	8 breath	2 minutes
15	Shalabasana	2 times	8 breath	2 minutes
16	Baddhakonasana	2 times	8 breath	2 minutes
17	SuptaBaddhakonasana	2 times	8 breath	2 minutes
18	SuptaVirasana	2 times	8 breath	2 minutes
19	ViparitaKrani	2 times	8 breath	2 minutes
20	Savasana	2 times	8 breath	2 minutes
	PRANAYAMA			
21	Ujjai	2 times	8 breath	2 minutes
22	Viloma	2 times	8 breath	2 minutes
	Meditation	**1 times**	**-**	**5 – 10 minutes**
	Relaxation	**1 time**	**-**	**10 - 20 minutes**

TABLE 3.12
EXPERIMENTALGROUP – 1
PHYSICAL EDUCATION PROGRAMME WITH HATHA YOGA PRACTICES SCHEDULE (PEPWHY)

Weeks	Days	Schedule	Set	Sec/Rep
1	Monday	Workout – 1	2	5Rep
	Tuesday	HYP -1	-	--
	Wednesday	Workout – 2	2	5Rep
	Thursday	HYP -1	-	--
	Fri	Workout – 3	2	5Rep
2	Monday	Workout – 1	2	5Rep
	Tuesday	HYP -1	-	--
	Wednesday	Workout – 3	2	5Rep
	Thursday	HYP -1	-	--
	Fri	Workout – 4	2	5Rep
3	Monday	Workout – 3	2	5Rep
	Tuesday	HYP -1	-	--
	Wednesday	Workout – 4	2	5Rep
	Thursday	HYP -1	-	--
	Fri	Workout – 2	2	5Rep
4	Monday	Workout – 3	2	5Rep
	Tuesday	HYP -1	-	--
	Wednesday	Workout – 4	2	5Rep
	Thursday	HYP -1	-	--
	Fri	Workout – 3	2	5Rep
5	Monday	Workout – 5	3	6Rep
	Tuesday	HYP -2	-	--
	Wednesday	Workout – 6	3	6Rep
	Thursday	HYP -2	-	--
	Fri	Workout – 5	3	6Rep
6	Monday	Workout – 6	3	6Rep
	Tuesday	HYP -2	-	--
	Wednesday	Workout – 7	3	6Rep
	Thursday	HYP -2	-	--
	Fri	Workout – 5	3	6Rep
7	Monday	Workout – 7	3	6Rep
	Tuesday	HYP -2	-	--
	Wednesday	Workout – 8	3	6Rep
	Thursday	HYP -2	-	--
	Fri	Workout – 8	3	6Rep
8	Monday	Workout – 7	3	6Rep
	Tuesday	HYP -2	-	--
	Wednesday	Workout – 8	3	6Rep
	Thursday	HYP -2	-	--
	Fri	Workout – 7	3	6Rep

Weeks	Days	Schedule	Set	Sec/Rep
9	Monday	Workout – 9	3	8Rep
	Tuesday	HYP -3	-	--
	Wednesday	Workout – 10	3	8Rep
	Thursday	HYP -3	-	--
	Fri	Workout – 11	3	8Rep
10	Monday	Workout – 10	3	8Rep
	Tuesday	HYP -3	-	--
	Wednesday	Workout – 11	3	8Rep
	Thursday	HYP -3	-	--
	Fri	Workout – 12	3	8Rep
11	Monday	Workout – 9	3	8Rep
	Tuesday	HYP -3	-	--
	Wednesday	Workout – 7	3	8Rep
	Thursday	HYP -3	-	--
	Fri	Workout – 12	3	8Rep
12	Monday	Workout – 11	3	8Rep
	Tuesday	HYP -3	-	--
	Wednesday	Workout – 12	3	8Rep
	Thursday	HYP -3	-	--
	Fri	Workout – 11	3	8Rep

TABLE 3.13
EXPERIMENTALGROUP – 2
PHYSICAL EDUCATION PROGRAMME SCHEDULE (PEPWOHYP)

Weeks	Days	Schedule	Set	Sec/Rep
1	Monday	Workout – 1	2	5Rep
	Tuesday	Workout – 2	2	5Rep
	Wednesday	Workout – 1	2	5Rep
	Thursday	Workout – 3	2	5Rep
	Fri	Workout – 2	2	5Rep
2	Monday	Workout – 1	2	5Rep
	Tuesday	Workout – 3	2	5Rep
	Wednesday	Workout – 4	2	5Rep
	Thursday	Workout – 2	2	5Rep
	Fri	Workout – 1	2	5Rep
3	Monday	Workout – 4	2	5Rep
	Tuesday	Workout – 2	2	5Rep
	Wednesday	Workout – 3	2	5Rep
	Thursday	Workout – 1	2	5Rep
	Fri	Workout – 4	2	5Rep

Weeks	Days	Schedule	Set	Sec/Rep
4	Monday	Workout – 3	2	5Rep
	Tuesday	Workout – 1	2	5Rep
	Wednesday	Workout – 4	2	5Rep
	Thursday	Workout – 2	2	5Rep
	Fri	Workout – 3	2	5Rep
5	Monday	Workout – 5	3	6Rep
	Tuesday	Workout – 6	3	6Rep
	Wednesday	Workout – 5	3	6Rep
	Thursday	Workout – 7	3	6Rep
	Fri	Workout – 6	3	6Rep
6	Monday	Workout – 5	3	6Rep
	Tuesday	Workout – 7	3	6Rep
	Wednesday	Workout – 8	3	6Rep
	Thursday	Workout – 6	3	6Rep
	Fri	Workout – 5	3	6Rep
7	Monday	Workout – 8	3	6Rep
	Tuesday	Workout – 6	3	6Rep
	Wednesday	Workout – 7	3	6Rep
	Thursday	Workout – 5	3	6Rep
	Fri	Workout – 8	3	6Rep
8	Monday	Workout – 7	3	6Rep
	Tuesday	Workout – 5	3	6Rep
	Wednesday	Workout – 8	3	6Rep
	Thursday	Workout – 6	3	6Rep
	Fri	Workout – 7	3	6Rep
9	Monday	Workout – 9	3	8Rep
	Tuesday	Workout – 10	3	8Rep
	Wednesday	Workout – 9	3	8Rep
	Thursday	Workout – 11	3	8Rep
	Fri	Workout – 10	3	8Rep
10	Monday	Workout – 9	3	8Rep
	Tuesday	Workout – 11	3	8Rep
	Wednesday	Workout – 12	3	8Rep
	Thursday	Workout – 10	3	8Rep
	Fri	Workout – 9	3	8Rep
11	Monday	Workout – 12	3	8Rep
	Tuesday	Workout – 10	3	8Rep
	Wednesday	Workout – 7	3	8Rep
	Thursday	Workout – 9	3	8Rep
	Fri	Workout – 12	3	8Rep
12	Monday	Workout – 11	3	8Rep
	Tuesday	Workout – 9	3	8Rep
	Wednesday	Workout – 12	3	8Rep
	Thursday	Workout – 10	3	8Rep
	Fri	Workout – 11	3	8Rep

3.14 PHYSICAL - TEST ADMINISTRATION

3.14.1 "Cardiovascular Endurance (12 Minute Running/Walking Tests)

Purpose: To measure cardiovascular endurance or to assess aerobic capacity.

Facilities and Equipments: Flags are planted around the track at 40 yard intervals, an indoor or outdoor track, cones, a stopwatch, a Whistle, a score sheet and helpers.

Procedure:

The partner is instructed to count the number of laps that are run within the allotted time. When 11 minutes have elapsed, the instructor calls out the time let to run. At the end of 12 minutes, the instructor blows a blast on his whistle and the runner notes the flag he/she has just passed.

Scoring:

The observing partner gives the runner the number of completed laps he/she has run. The runner then reports the score in terms of number of laps plus the number of flags passed on the last lap" **(Yobu, 2010).**

3.14.2 “Muscular Strength (Pull-Ups)

Purpose:

To measure arm and shoulder strength.

Facilities and Equipments:

A metal or wooden bar approximately 1 and half inches in diameter is placed at a convenient height. However, for the lower age levels a doorway gym bar can be used. At times it may be necessary to improvise by using such equipment as a basketball goal support or a ladder. A score sheet and few assistants are also needed.

Procedure:

The bar is adjusted to such height that the student can hang free of the floor. The student should grasp the bar with his palms facing away from his body (overhead grasp). The student should then raise his body until his chin is over the bar and then lower it again to the starting position with his arms fully extended.

Instruction:

Do not lift your knees or assist your pull-up by kicking. You must return to the hang position with the arms fully straight. You will not be permitted to swing or snap your way up

Scoring:

One point is scored each time the student completes a pull-up. Part scores do not count, and only 1 trail is permitted unless it is obvious that the student did not have a fair chance on his first trail.

Testing Personnel:

One trained tester and few assistants can administer this item; count the score and record results" **(Yobu, 2010).**

3.14.3 "Muscular Endurance (Sit-Ups)

Purpose:

To measure muscular endurance

Facilities and Equipments:

Mats may be used if they are available otherwise the floor is satisfactory, one score sheet, one stopwatch and few helpers.

Procedure:

The student lies flat on the back with knees bent and feet on the floor with the heels no more than 1 foot from the buttocks. The knee angle should be no less than 90 degrees. The fingers are interlocked and placed behind the neck with the elbows touching the floor. The feet are held securely by a partner. The student then curls up to a sitting

position and touches with the elbows the knees. This exercise is repeated as many times as possible in the time requirement.

Instruction:

Fingers must remain interlocked and in contact with the back of your neck at all times. You curl up from the starting position, but you may not push off the floor with an elbow. When return to the starting position, your elbows must be flat on the floor or mat.

Scoring:

One point is scored for each correct sit-up. The score is the maximum number of sit-ups completed in 60 seconds" **(Yobu, 2010).**

3.14.4 "Flexibility (Sit & Reach)

Purpose:

To evaluate flexibility of the lower back and hamstring muscles.

Facilities and Equipment:

Sit and Reach Box, a specially constructed box with a measuring scale with a 23 cm mark in line with the surface for the examinee's feet. One score sheet and some assistants.

Procedure:

Students should warm up by stretching the low back and hamstrings by performing slow, sustained, steady (no bobbing) stretches.

Have students remove shoes and sit at the test apparatus with knees fully extended; heels should be about a shoulder-width apart, and feet should be flat against the box. Arms are extended forward, palms down, with one hand on top of the other. Students the lean forward, extending the fingertips along the ruler as far forward as possible. Four trials are taken; the fourth trial should be held for at least one second.

The trial is invalid and should be re-administered if the knees fail to remain fully extended, or if the hands reach unevenly. The test, administrator may place one hand lightly on the student's knees to encourage that knees stay extended.

Scoring:

The score, measured to the nearest centimeter, is the most distant point reached on the fourth trial by both hands and held for one second" **(Yobu, 2010).**

3.15 PSYCHOSOCIAL – TEST ADMINISTRATION

3.15.1 QUALITY OF LIFE SCALE

Questionnaire: (Jamila Warrier and Sananda Raj, 1999)

Purpose: To assess the Quality of Life

Instruction: "Some statements relating to certain aspects of your life are given below. Read each statement carefully and indicate how much you agree with each statement. Your response can be strongly agree, agree, undecided, disagree or strongly disagree. Indicate your choice by placing a ✓ mark on any of the five alternatives as A, B, C, D or E so as to indicate the extent of your agreement with the statement A- stands for strongly

agree, B- agree, C- undecided, D- disagree and E- Strongly disagree. The response undecided should be selected when you can't say clearly either you agree or disagree with the situation. Please do not omit item. Your responses will be used strictly to research purpose and will be kept confidential. This test has 3 sub tests measuring Physical aspects (Section-A), Psychological aspects (Section- B), and the Social aspects (Section C) of Quality of life. It is a five point scale, consisting of 30 items" **(Jamila Warrier and Sananda Raj, 1999).**

3.15.2 SELF-ESTEEM

Questionnaire: Rosenberg 1965 Self-Esteem Scale

Purpose: To measure the Self-Esteem.

Instruction: "Rosenberg Self-Esteem scale have 10 statements. It is a 4 point scale, 'Strongly Disagree', 'Disagree', 'Agree' and 'Strongly Agree', scoring as follows 0,1,2,3,4 respectively. After counting the total score lower score indicates low Self-Esteem, higher score indicates higher Self-Esteem" **(Rosenberg, 1965)**.

3.15.3 DEPRESSION

Questionnaire: Beck Depression

Purpose: To measure the Depression.

Instruction: "Interpreting the Beck Depression Inventory Now that you have completed the questionnaire, add up the score for each of the twenty-one questions by counting the number to the right of each question you marked. The highest possible total for the whole test would be sixty-three. This would mean you circled number three on all twenty-one

questions. Since the lowest possible score for each question is zero, the lowest possible score for the test would be zero. This would mean you circles zero on each question. You can evaluate your depression according to the Table below.

Total Score _____Levels of Depression

1-10_____These ups and downs are considered normal

11-16_____ Mild mood disturbance

17-20_____Borderline clinical depression

21-30_____Moderate depression

31-40_____Severe depression

over 40_____Extreme depression" **(Beck, et al. 1961).**

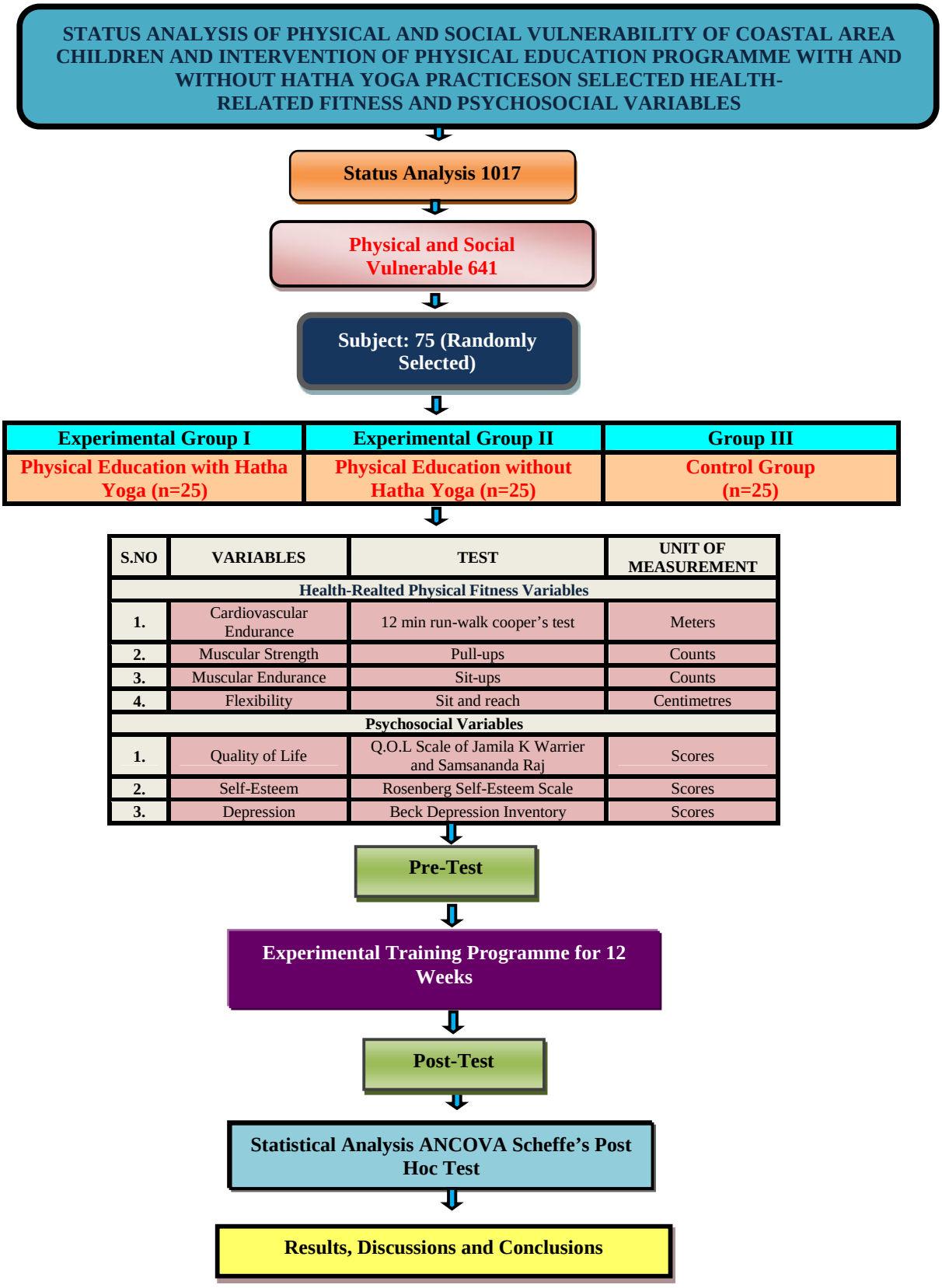
3.16 STATISTICAL PROCEDURES

The collected data from the Physical Education Programme with Hatha Yoga Practices, Physical Education without Hatha Yoga Practices and Non-Experimental Group (NEG) prior to and immediately after the training program on selected criterion variables were statistically analyzed with suitable statistical procedures. The Normality of the data for the all selected variables was analyzed.

Descriptive and Analysis of covariance (ANCOVA) was used to find out the significant difference between experimental groups and Non-Experimental Group (NEG). When the F-ratio indicated that there are significant differences between the means, scheffe's post-hoc test was applied to identify which means are significantly different from each other. For this study,95% level of confidence was fixed to test the research hypotheses.

FIGURE – 1

FLOW CHART SHOWING THE METHODOLOGY ADOPTED IN THE STUDY



CHAPTER – IV

RESULTS AND DISCUSSION

4.1 PREAMBLE

The prime focus of this research work was to evaluate the presence of physical and social vulnerability of coastal area children and to quantify the impact of adopted experiment in the research. To achieve the purpose of the study One Thousand and Seventeen (1017) children were taken for analysis from the Chennai Coastal Area (CCA). The children age range was fixed from 10 to 14 years. They were analysed through a Physical and Social Vulnerability (PSV) checklist made for this research purpose. From the investigation Six Hundred and Forty-One (641) children were identified with Physical and Social Vulnerability (PSV). Among the social vulnerable children 75 subjects were selected for this experiment by random selection. They were assigned into three equal groups. Two experiment groups and one Non-Experiment Group (NEG), each group consists of 25 children at random. Group-I Physical Education Programme with Hatha Yoga Practices (PEPWHYP), Group-II Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Group-III Non-Experiment Group (NEG). A pre-test was accompanied for all the 75 subjects on selected Health-related Physical Fitness (HRPF) variables namely Flexibility, Muscular Endurance, Muscular Strength, Cardio-

Vascular Endurance and Psychosocial variables namely Depression (DP), Quality of Life (QOL), Self-Esteem (SE). The two experimental training groups underwent scheduled experimental training for a period of twelve weeks, five days a week. Non-Experiment Group (NEG) was not exposed to training, other than their regular activities. After the 12 weeks' experiment schedule all the three groups were measured on the above mentioned variables. The experiment training programme duration 5 day a week for 12 weeks scheduled at 4.00 pm to 5.15 pm for both the experimental training groups. The pre-test and post-test scores were analyzed using a statistical package.

4.2 TEST OF SIGNIFICANCE

This is the important part of the thesis to arrive the conclusion by examining the hypotheses. The test of significance is valuable to test whether the changes among groups or inside group's scores are significant or not.

4.3 LEVEL OF SIGNIFICANCE

The data collected from pre-test and post-test experiments were subjected to statistical analysis. Analysis of Covariance (ANCOVA) used to find out significant differences between groups on selected variables with 5% level of significance.

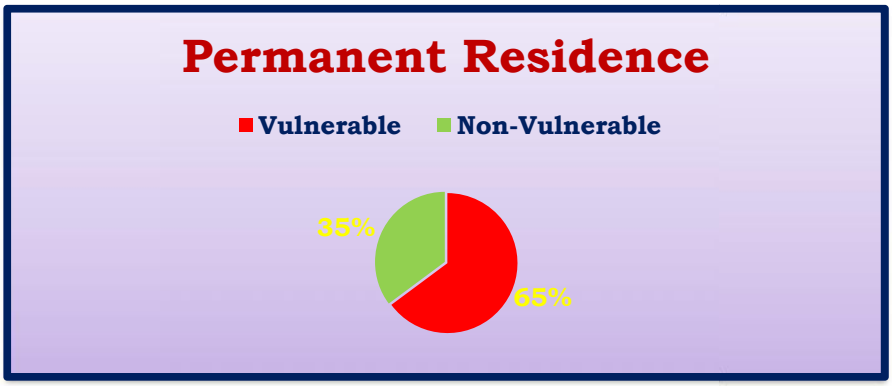
4.4 RESULTS ON PHYSICAL AND SOCIAL VULNERABILITY CHECK-LIST PIE-CHART

Physical and Social Vulnerability have thirty (30) statements of checklist, all have 'Yes' or 'No' type only so that they can answer either 'Yes' or 'No'. Checklist has First fifteen (1-15) as Physical Vulnerability and last fifteen (16-30) as Social Vulnerability.

Status Analysis conducted for One Thousand and Seventeen Coastal Area Children (1017) collected data were recorded and analyzed with pie chart for each checklist from One to Thirty (1-30).

CHECKLIST No. 1

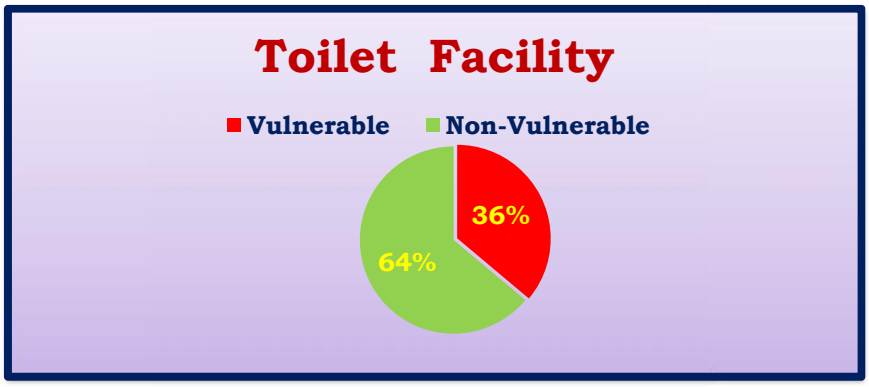
Figure - 2



The above displayed pie-chart checklist no.1 clearly indicated that 65% of Coastal Area Children were Vulnerable and 35% were Non-Vulnerable in permanent residence.

CHECKLIST No. 2

Figure - 3



The above displayed pie-chart checklist no.2 clearly indicated that 36% of Coastal Area Children were Vulnerable and 64% were Non-Vulnerable in a toilet facility at their home.

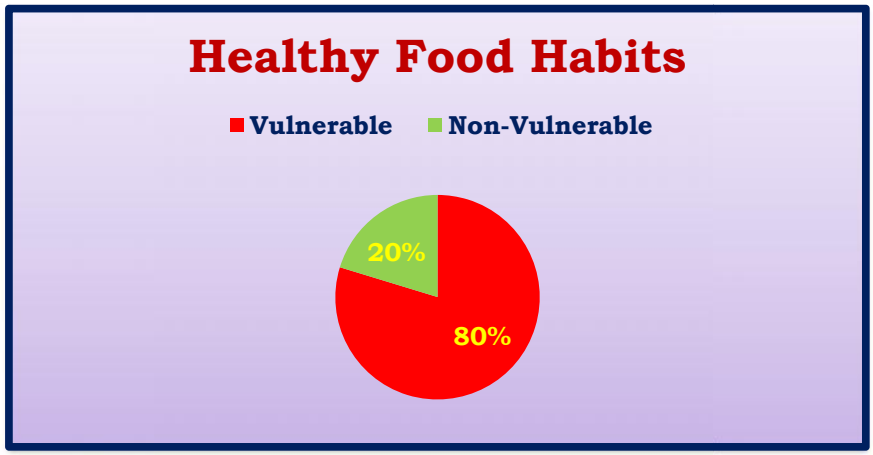
CHECKLIST No. 3

Figure - 4

The above displayed pie-chart checklist no.3 clearly indicated that 74% of Coastal Area Children were Vulnerable and 26% were Non-Vulnerable in washing hands before taking food.

CHECKLIST No. 4

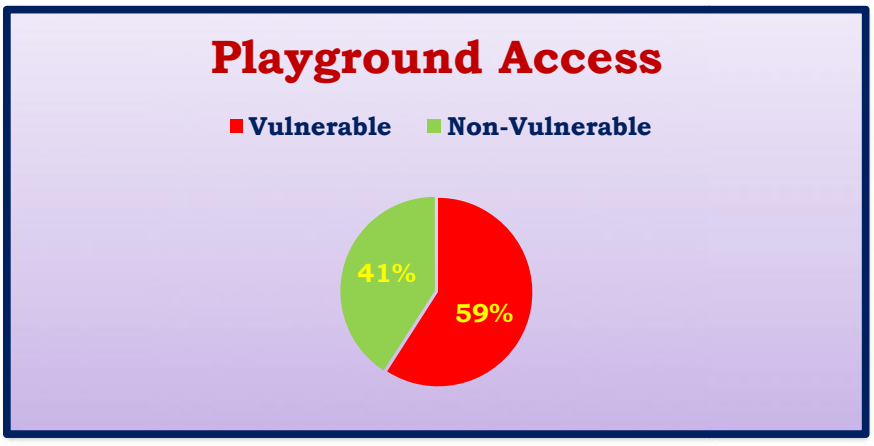
Figure - 5



The above displayed pie-chart checklist no.4 clearly indicated that 80% of Coastal Area Children were Vulnerable and 20% were Non-Vulnerable in healthy food habits.

CHECKLIST No. 5

Figure - 6



The above displayed pie-chart checklist no.5 clearly indicated that 59% of Coastal Area Children were Vulnerable and 41% were Non-Vulnerable in access to playground.

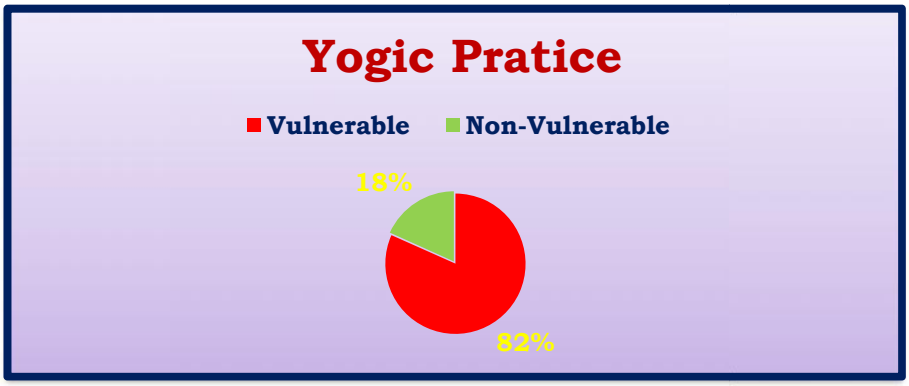
CHECKLIST No. 6

Figure - 7

The above displayed pie-chart checklist no.6 clearly indicated that 40% of Coastal Area Children were Vulnerable and 60% were Non-Vulnerable for Play/Exercise.

CHECKLIST No. 7

Figure - 8



The above displayed pie-chart checklist no.7 clearly indicated that 82% of Coastal Area Children were Vulnerable and 18% were Non-Vulnerable in yogic practice.

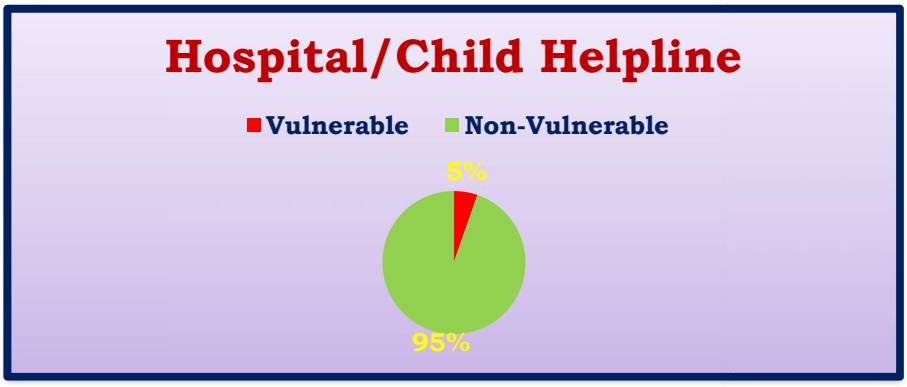
CHECKLIST No. 8

Figure - 9

The above displayed pie-chart checklist no.8 clearly indicated that 45% of Coastal Area Children were Vulnerable and 55% were Non-Vulnerable in proper sleeping habit.

CHECKLIST No. 9

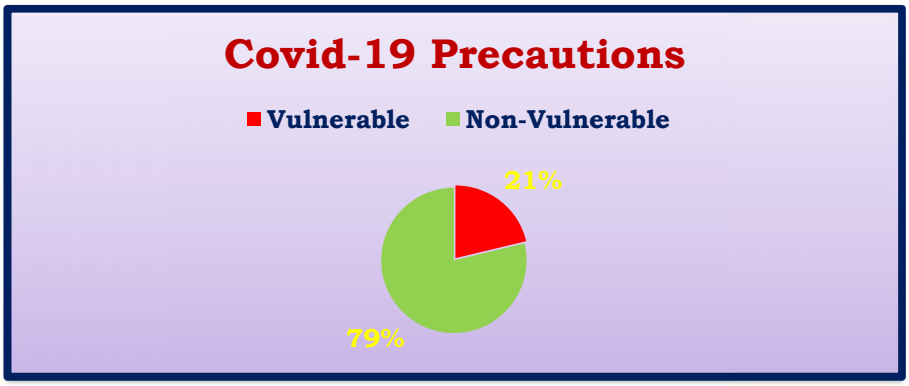
Figure - 10



The above displayed pie-chart checklist no.9 clearly indicated that 5% of Coastal Area Children were Vulnerable and 95% were Non-Vulnerable for access to hospital/ Child helpline number.

CHECKLIST No. 10

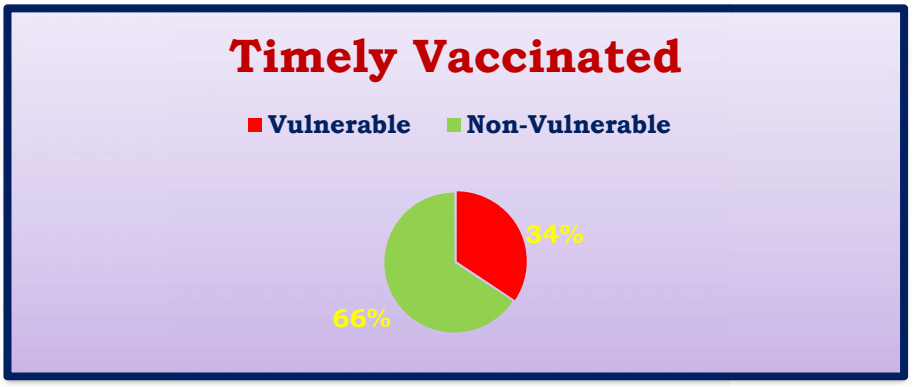
Figure - 11



The above displayed pie-chart checklist no.10 clearly indicated that 21% of Coastal Area Children were Vulnerable and 72% were Non-Vulnerable for Covid-19 Precautionary measures.

CHECKLIST No. 11

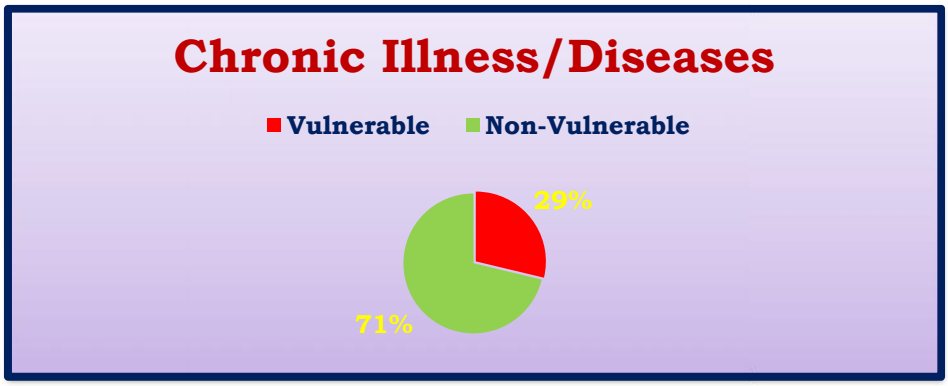
Figure - 12



The above displayed pie-chart checklist no.11 clearly indicated that 34% of Coastal Area Children were Vulnerable and 66% were Non-Vulnerable .for timely vaccination.

CHECKLIST No. 12

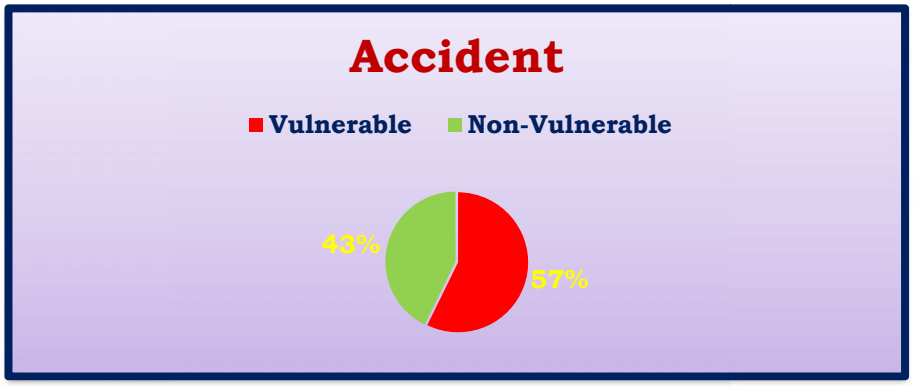
Figure - 13



The above displayed pie-chart checklist no.12 clearly indicated that 29% of Coastal Area Children were Vulnerable and 88% were Non-Vulnerable for chronic illness / diseases.

CHECKLIST No. 13

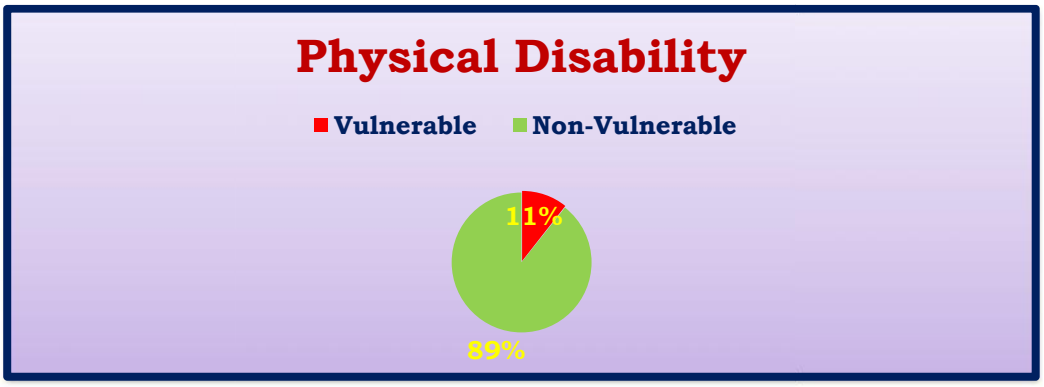
Figure - 14



The above displayed pie-chart checklist no.13 clearly indicated that 57% of Coastal Area Children were Vulnerable and 43% were Non-Vulnerable for meet an accident in the pasts.

CHECKLIST No. 14

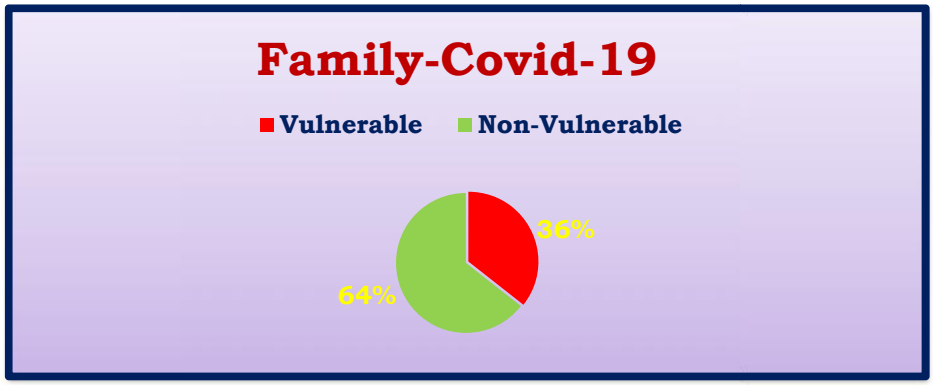
Figure - 15



The above displayed pie-chart checklist no.14 clearly indicated that 82% of Coastal Area Children were Vulnerable and 11% were Non-Vulnerable for Physical Disability / reformative in their body.

CHECKLIST No. 15

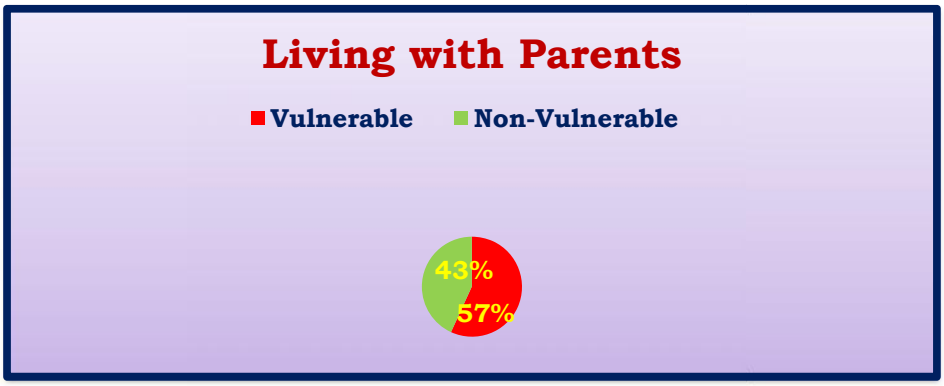
Figure - 16



The above displayed pie-chart checklist no. 36 clearly indicated that 82% of Coastal Area Children were Vulnerable and 64% were Non-Vulnerable for their family member affected by Covid-19.

CHECKLIST No. 16

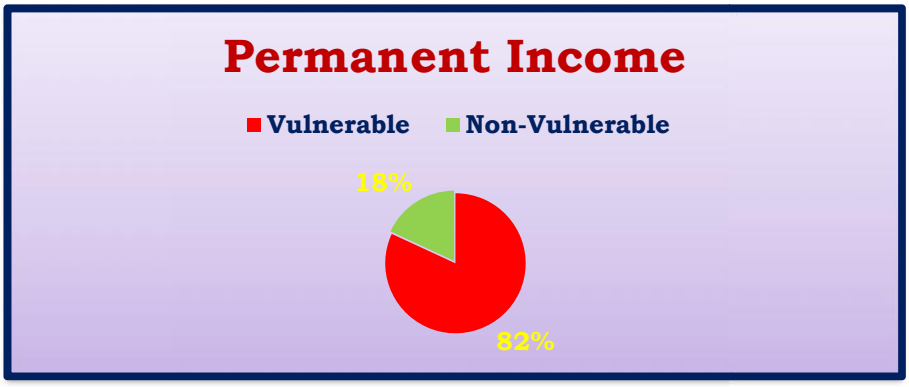
Figure - 17



The above displayed pie-chart checklist no.16 clearly indicated that 57% of Coastal Area Children were Vulnerable and 43% were Non-Vulnerable for living with parents.

CHECKLIST No. 17

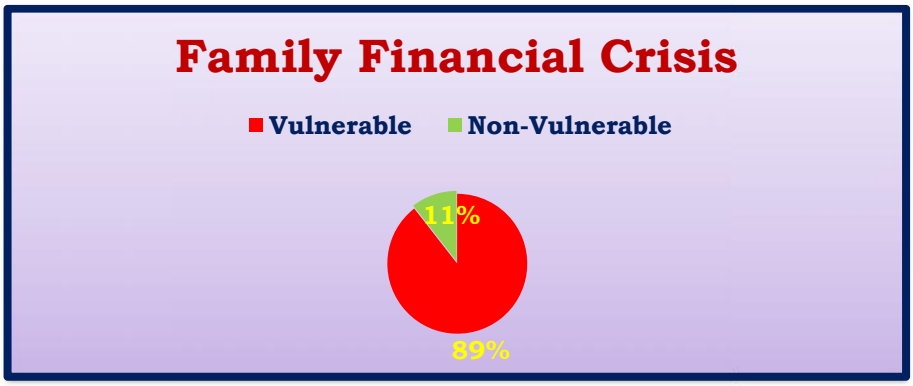
Figure - 18



The above displayed pie-chart checklist no.17 clearly indicated that 82% of Coastal Area Children were Vulnerable and 18% were Non-Vulnerable for permanent income of their parents.

CHECKLIST No. 18

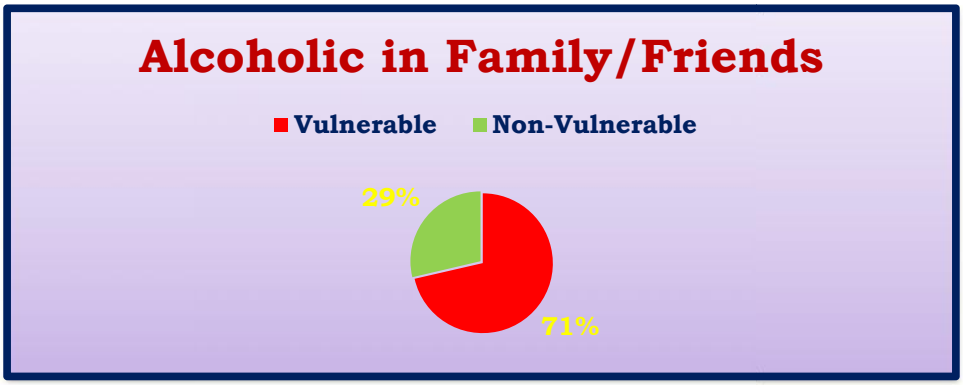
Figure - 19



The above displayed pie-chart checklist no.18 clearly indicated that 89% of Coastal Area Children were Vulnerable and 11% were Non-Vulnerable for their families financial crisis.

CHECKLIST No. 19

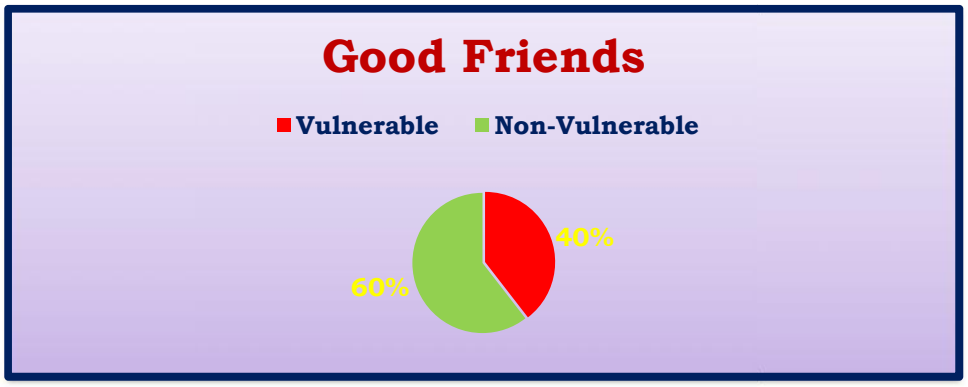
Figure - 20



The above displayed pie-chart checklist no.19 clearly indicated that 71% of Coastal Area Children were Vulnerable and 29% were Non-Vulnerable .for alcoholic person in family/friends.

CHECKLIST No. 20

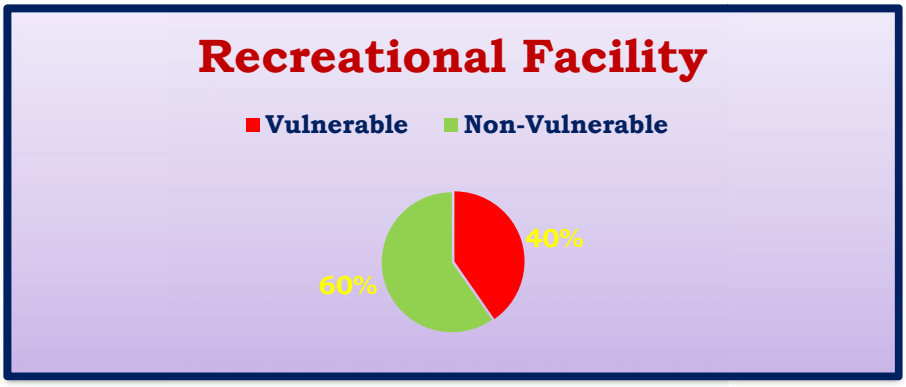
Figure - 21



The above displayed pie-chart checklist no.20 clearly indicated that 60% of Coastal Area Children were Vulnerable and 40% were Non-Vulnerable for had good friends.

CHECKLIST No. 21

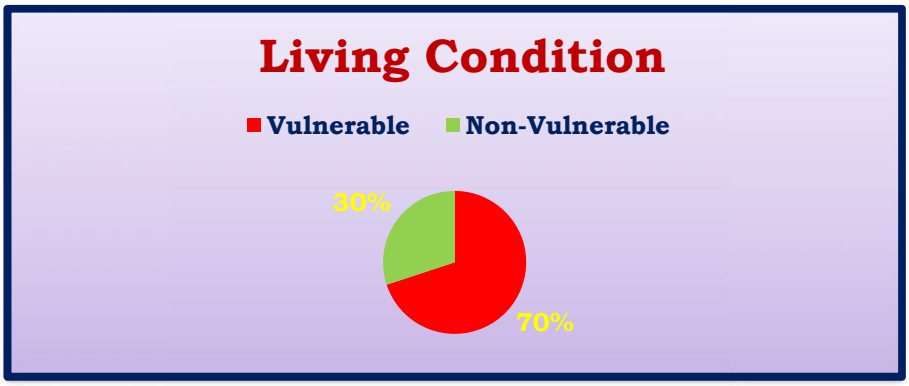
Figure - 22



The above displayed pie-chart checklist no.21 clearly indicated that 40% of Coastal Area Children were Vulnerable and 60% were Non-Vulnerable in yogic .for recreational facility.

CHECKLIST No. 22

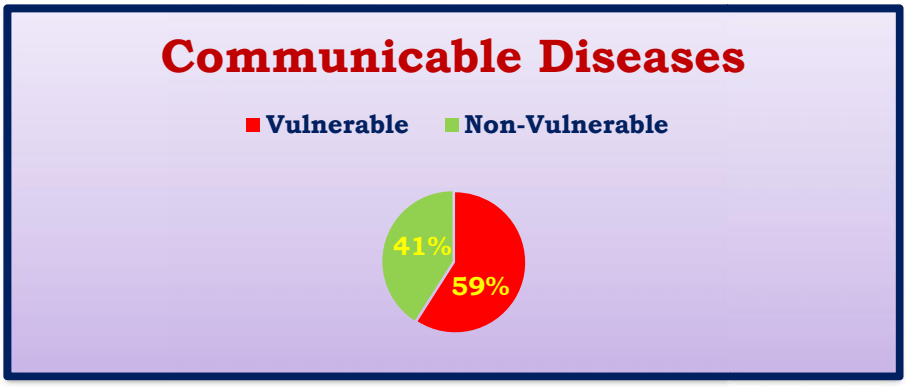
Figure - 23



The above displayed pie-chart checklist no.22 clearly indicated that 70% of Coastal Area Children were Vulnerable and 30% were Non-Vulnerable for their present living condition.

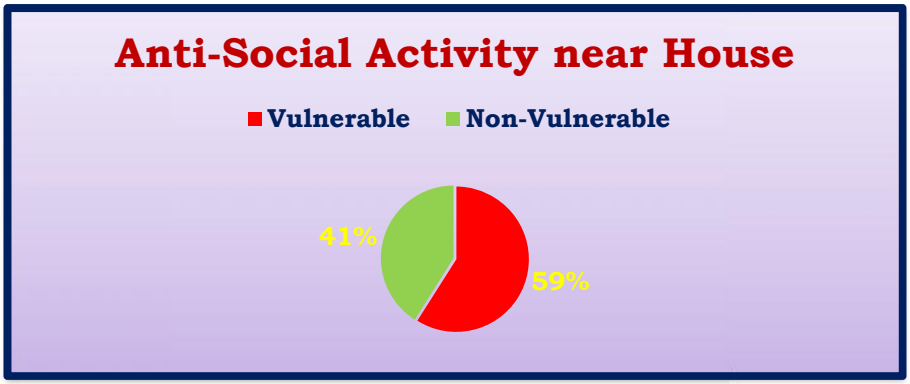
CHECKLIST No. 23

Figure - 24



The above displayed pie-chart checklist no.23 clearly indicated that 59% of Coastal Area Children were Vulnerable and 41% were Non-Vulnerable for free from hazardous communicable diseases.

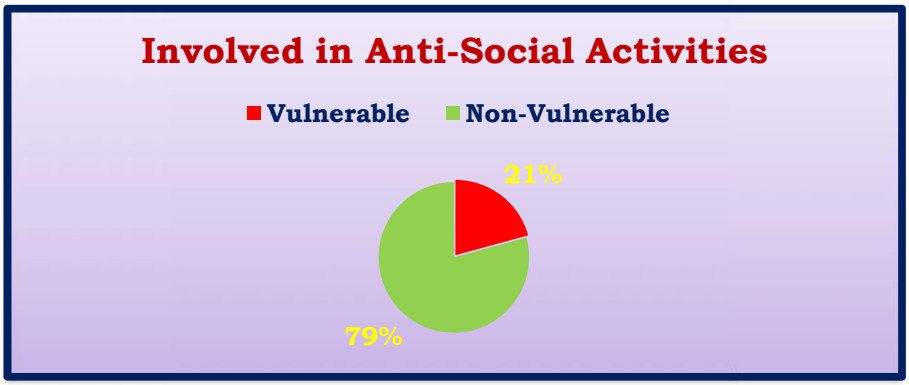
CHECKLIST No. 24



The above displayed pie-chart checklist no.24 clearly indicated that 59% of Coastal Area Children were Vulnerable and 41% were Non-Vulnerable .for anti-social activity around their house.

CHECKLIST No. 25

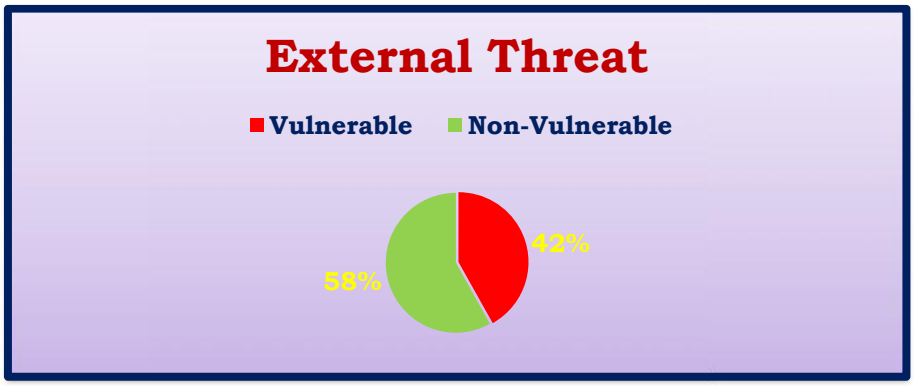
Figure - 25



The above displayed pie-chart checklist no.25 clearly indicated that 21% of Coastal Area Children were Vulnerable and 79% were Non-Vulnerable for anti-social activity involvement.

CHECKLIST No. 26

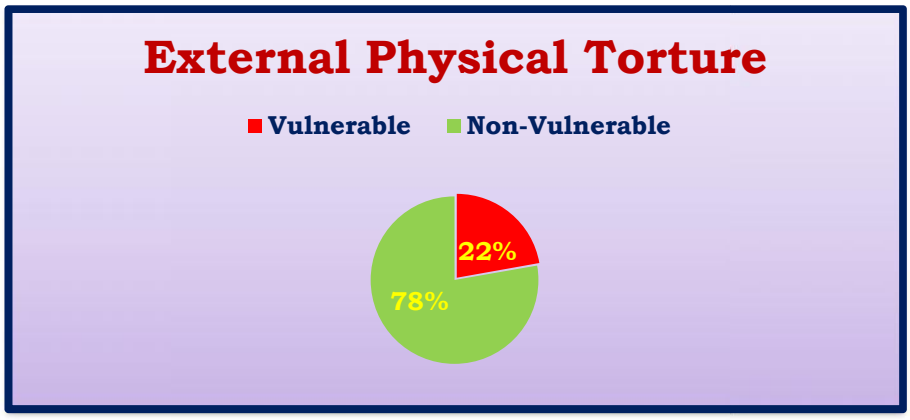
Figure - 26



The above displayed pie-chart checklist no.26 clearly indicated that 42% of Coastal Area Children were Vulnerable and 58% were Non-Vulnerable for threat from external persons/other sources.

CHECKLIST No. 27

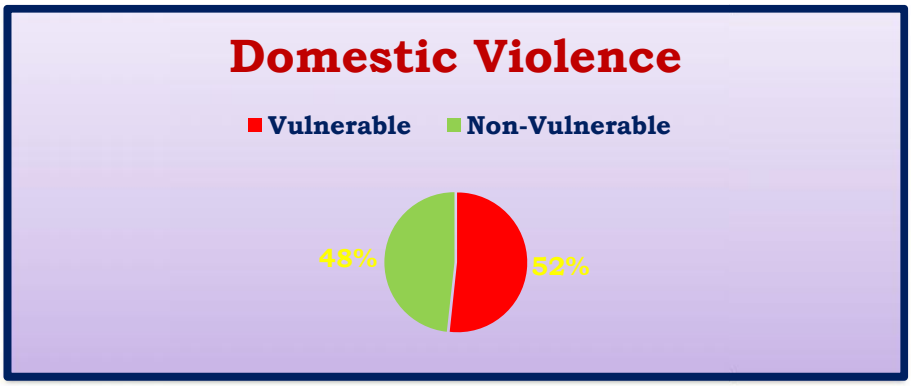
Figure - 28



The above displayed pie-chart checklist no.27 clearly indicated that 22% of Coastal Area Children were Vulnerable and 78% were Non-Vulnerable for faced physical torture from external forces.

CHECKLIST No. 28

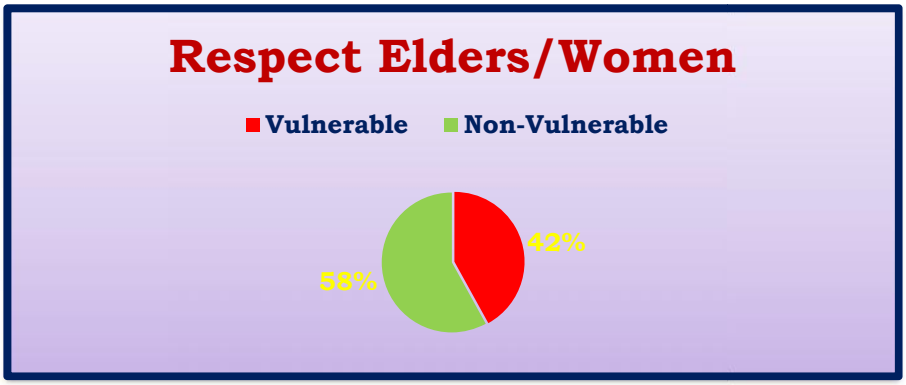
Figure - 29



The above displayed pie-chart checklist no.28 clearly indicated that 52% of Coastal Area Children were Vulnerable and 48% were Non-Vulnerable for domestic violence or torture from their family.

CHECKLIST No. 29

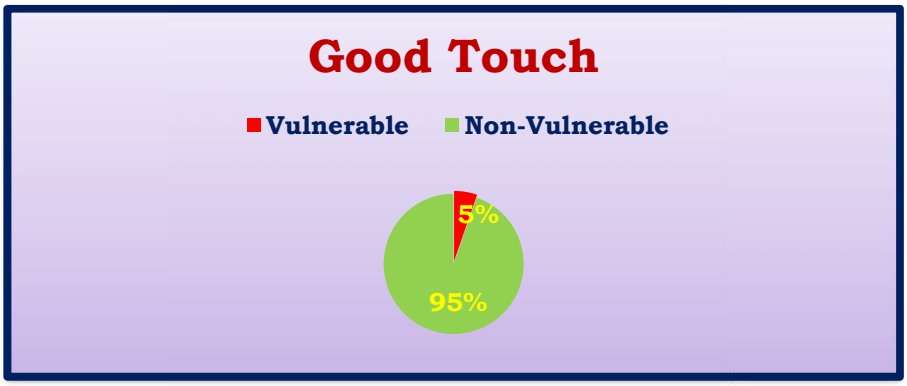
Figure - 30



The above displayed pie-chart checklist no.29 clearly indicated that 42% of Coastal Area Children were Vulnerable and 58% were Non-Vulnerable .for giving respect to elders/women.

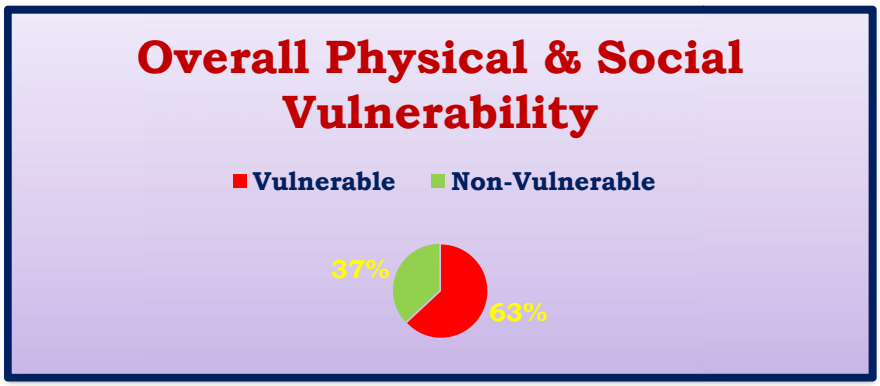
CHECKLIST No. 30

Figure - 31



The above displayed pie-chart checklist no.30 clearly indicated that 5% of Coastal Area Children were Vulnerable and 95% were Non-Vulnerable for difference between good touch and bad touch.

Figure - 32



The above displayed pie-chart clearly indicated that 63% of Coastal Area Children were living their live hood in Physical & Social Vulnerability and 37% were Non-Vulnerable.

From this assessed status analysis of coastal area children, 63% were physically and socially vulnerable among them 75 children randomly selected for the experiment training. They were assigned into three equal groups namely Group-I Physical Education Programme with Hatha Yoga Practices (PEPWHYP), Group-II Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Group-III Non-Experiment Group (NEG).

4.5 COMPUTATION OF ANALYSIS OF COVARIANCE AND POST-HOC TEST

The following tables illustrate the statistical results on physical education programme with and without hatha yoga practices on selected health-related fitness and psychosocial variables among coastal area children.

4.5.1 Results on Health-Related Physical Fitness Variables

4.5.1.1 Result on Cardiovascular Endurance

TABLE – 4.1
COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST POST-TEST AND ADJUSTED POST- TEST ON CARDIOVASCULAR ENDURANCE FOR EXPERIMENTAL GROUPS AND NON-EXPERIMENTAL GROUP
(Scores in Meters)

Test	Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	Source of Variance	Sum of Square	Df	Mean Square	"F"
Pre	1486.00	1480.00	1482.00	BG	466.66	2	233.33	0.138
				WG	122000.00	72	1694.44	
Post	1592.00	1533.60	1480.80	BG	154698.66	2	77349.33	**43.45***
				WG	128160.00	72	1780.00	
Adjusted	1589.37	1535.70	1481.32	BG	145684.55	2	72842.27	**99.05***
				WG	52209.28	71	735.34	

*significant at 0.05 level of confidence. (Table value required for significant at 0.05 level of confidence with df (2,72) was 3.12 and df (2, 71) was 3.12correspondingly).

BG - Between Groups, WG - Within Groups, df – Degrees of Freedom

The above table depicts the comparison of experiment groups and non-experiment group on Cardiovascular Endurance. The attained pre-test 'F' value of 0.138 was established to be non-significant as it was lesser than the compulsory 'F' value of 3.12.

Further, the 'F' assessment of 43.45 and 99.05 correspondingly for post and adjusted tests were found to be Significant as they were greater than the required 'F' value of 3.12 and 3.13 correspondingly.

The analysis of covariance (ANCOVA) on cardiovascular endurance and the pre-test means of experimental physical education programme with hatha yoga practices (PEPWHYP), experimental physical education programme without hatha yoga practices

(PEPWOHYP) and Non-Experiment Group (NEG) were 1486.00, 1480.00 and 1482.00 correspondingly. The acquired F value was 0.138. As a result, it was lesser than the table value of 3.12; it confirmed that there was no significant change.

The post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 1592.00, 1533.60 and 1480.80 correspondingly. The acquired F value was 43.45. As a result, it was higher than the table value of 3.13; it confirmed that there was a greater significant change due to the experiment training among coastal area children.

The adjusted post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 1589.37, 1535.70 and 1481.32correspondingly. The attained F value was 99.05. As a result, it was higher than the table value of 3.12; it confirmed that there was a greater significant change due to the experiment training among coastal area children.

Scheffe's mean difference test has been adapted to post hoc analysis. The results are displayed in below Table 4.2.

TABLE – 4.2
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES – CARDIOVASCULAR ENDURANCE
(Scores in Meters)

Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	MD	CI
1589.37	1535.70		**53.67***	**19.15**
1589.37		1481.32	**108.1***	
	1535.70	1481.32	**54.38***	

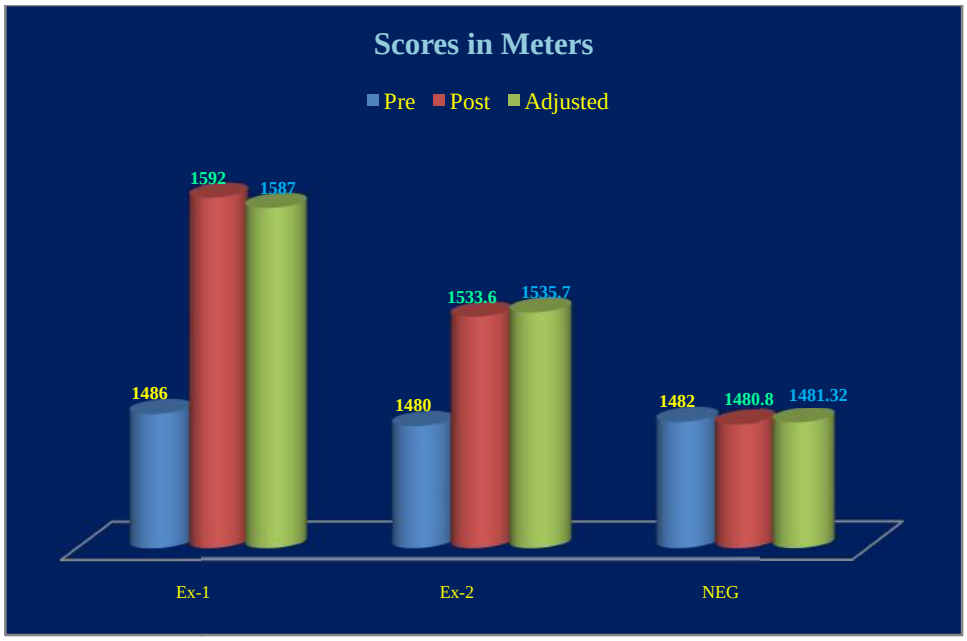
***Significant at 0.05 level of confidence**

The above table clearly depicts the difference in the paired comparison as the 53.67, 108.1 and 54.38 were greater than the confidence interval of 19.15.

The comparisons in between the groups displayed in the table proved that there existed significant differences between the adjusted means of Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) was 53.67; Physical Education Programme with Hatha Yoga Practices (IPEPWHYP) and Non-Experiment Group (NEG) was 108.1; and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Non-Experiment Group (NEG) was 54.38 at 0.05 level of confidence with the confidence interval value of 19.15.

The pre-test, post-test and adjusted post-test means were displayed through bar outline for better comprehension of the after effects of the investigation on the factor of cardiovascular endurance in the figure 33.

FIGURE - 33
BAR DIAGRAM SHOWING PRE-TEST POST-TEST AND ADJUSTED POST-TEST MEANS ON CARDIOVASCULAR ENDURANCE



4.5.1.1.1 DISCUSSION ON THE FINDINGS OF CARDIOVASCULAR ENDURANCE

The result displayed in the above two tables and graphs indicates that the experimental groups namely Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) had shown significant improvement on cardiovascular endurance and all the training groups were better than the non-experiment group. Further, it was proved

that Physical Education Programme with Hatha Yoga Practices (PEPWHYP)better than the Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) on improving the cardiovascular endurance and this research also corroborates with Das, Konai, & Ghosh, (2021) observed the relationship between motor fitness and motor creativity of different groups of Rhythmic Activity, and also Seabra et al. (2020) suggested that a six-month school-based soccer interference program represents an effective strategy to reduce cardiovascular and metabolic risk factors in overweight children prepared to participate in the soccer program.

4.5.1.2 Result on Muscular Strength

TABLE – 4.3
COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST POST-TEST AND ADJUSTED POST- TEST ON MUSCULAR STRENGTH FOR EXPERIMENTAL GROUPS AND NON-EXPERIMENTAL GROUP
(Scores in Numbers)

Test	Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	Source of Variance	Sum of Square	df	Mean Square	"F"
Pre	2.72	2.88	2.88	BG	0.43	2	0.21	0.50
				WG	30.32	72	0.42	
Post	5.64	5.00	3.60	BG	54.43	2	27.21	**49.28***
				WG	39.76	72	0.55	
Adjusted	5.71	4.96	3.56	BG	59.16	2	29.58	**84.60***
				WG	24.83	71	0.35	

*significant at 0.05 level of confidence. (Table value compulsory for significant at 0.05 level of confidence with df (2,72) was 3.12 and df (2, 71) was 3.12respectively).

BG - Between Groups, WG - Within Groups, df – Degrees of Freedom

The above table depicts the comparison of experiment groups and non-experiment group on Muscular Strength. The computed attained pre-test 'F' value of 0.50 was found to be non-significant as it was lesser than the required 'F' value of 3.12.

Further, the 'F' value of 49.28 and 84.60 correspondingly for post and adjusted tests were found to be Significant as they were greater than the required 'F' value of 3.12 and 3.13 respectively.

The analysis of covariance (ANCOVA) on muscular strength and the pre-test means of physical education programme with hatha yoga practices (PEPWHYP), physical education programme without hatha yoga practices (PEPWOHYP) and experiment Group (NEG) were 2.72, 2.88 and 2.88 correspondingly. The achieved F value was 0.50. As a result, it was lower than the Table value of 3.12; it was established that there were no significant changes among the pre-test means of coastal area children.

The post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 5.64, 5.00 and 3.60 respectively. The achieved F value was 49.28. As a result, it was superior to the table value of 3.12; it was established that there were significant changes between the post-test means of coastal area children.

The adjusted post-test means experiment training group-I of physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 5.71, 4.96 and 3.56 correspondingly. The attained F value was 84.60. As a result, it was superior to the table assessment of 3.13; it confirmed that there were significant changes between the adjusted post-test means of coastal area children.

Scheffe's mean difference test has been adapted to post hoc analysis. The results are displayed in following Table 4.4.

TABLE – 4.4
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES – MUSCULAR STRENGTH
(Scores in Numbers)

Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	MD	CI
5.71	4.96		**0.75***	**0.42**
5.71		3.56	**2.15***	
	4.96	3.56	**1.40***	

***Significant at 0.05 level of confidence**

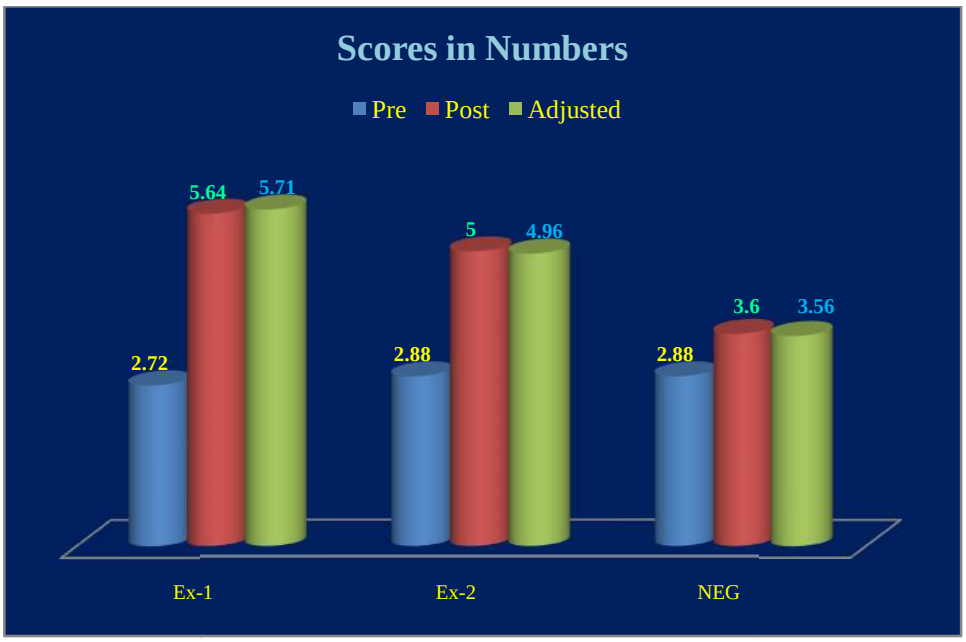
The above table clearly depicts the difference in the paired comparison as the 0.75, 2.15 and 1.40 were greater than the confidence interval of 0.42.

The comparisons showed in the table proved that there existed significant differences between the adjusted means of Physical Education Programme with Hatha

Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) was 0.75; Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Non-Experiment Group (NEG) was 2.15; and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Non-Experiment Group (NEG) was 54.38 at 0.05 level of confidence with the confidence interval value of 1.40.

The pre, post and adjusted post-test means were displayed through bar outline for better comprehension of the impacts of the examination on the factor of muscular strength in the accompanying figure 34.

FIGURE - 34
BAR DIAGRAM SHOWING PRE-TEST POST-TEST AND ADJUSTED POST-TEST MEANS ON MUSCULAR STRENGTH



4.5.1.2.1 DISCUSSION ON THE FINDINGS OF MUSCULAR STRENGTH

The result displayed in the above two tables and graphs indicates that the experimental groups namely Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) had revealed significant improvement on muscular strength in the two training groups were better than the Non-Experiment group. Further, it was proved that Physical Education Programme with Hatha Yoga Practices (PEPWHYP) better than the Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) on improving the muscular strength . This research also corroborates with Cabeo, & Lopez, (2020) proved that muscle strength can be a determining factor in the perception of body image of children. It is suggested to bring out involvement programs with the goal of improving strength, as this will have optimistic effects on the body image. Further, Burns, & Brusseau, (2017) explained that Muscular strength has a relevant role in attenuating the association between physical idleness and metabolic danger in children; a further, advantage was identified in children with great physical activity and great muscular strength".

4.5.1.3 Result on Muscular Endurance

TABLE – 4.5
COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST POST-TEST AND ADJUSTED POST- TEST ON MUSCULAR ENDURANCE FOR EXPERIMENTAL GROUPS AND NON-EXPERIMENTAL GROUP
(Scores in Numbers)

Test	Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	Source of Variance	Sum of Square	Df	Mean Square	"F"
Pre	20.28	20.32	20.48	BG	0.56	2	0.28	0.11
				WG	178.72	72	2.48	
Post	25.72	24.44	20.64	BG	349.04	2	174.52	**64.45***
				WG	194.96	72	2.70	
Adjusted	25.78	24.47	20.55	BG	369.09	2	184.54	**138.14***
				WG	94.85	71	1.33	

*significant at 0.05 level of confidence. (Table value mandatory for significant at 0.05 level of confidence with df (2,72) was 3.22 and df (2, 71) was 3.13respectively).

BG - Between Groups, WG - Within Groups, df – Degrees of Freedom

The above table depicts the comparison of experiment groups and non-experiment group on Muscular Endurance. The achieved pre-test 'F' assessment of 0.11 was found to be non-significant as it was lesser than the required 'F' value of 3.12.

Further, the 'F' value of 64.45 and 138.14 correspondingly for post and adjusted tests were found to be Significant as they were greater than the required 'F' value of 3.12 and 3.13 correspondingly.

The analysis of covariance (ANCOVA) on muscular endurance and the pre-test means of physical education programme with hatha yoga practices (PEPWHYP), physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 20.28, 20.32 and 20.48 correspondingly. The attained F

value was 0.11. As a result, it was lower than the Table value of 3.12; it confirmed that there were no significant changes among the pre-test means of coastal area children.

The post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 25.72, 24.44 and 20.64correspondingly. The attained F assessment was 64.45. As a result, it was higher than the table value of 3.12; it confirmed that there were greater significant changes among the post-test means of coastal area children.

The adjusted post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 25.78, 24.47 and 20.55 correspondingly. The attained F value was 138.14. As a result, it was higher than the table value of 3.13; it confirmed that there were significant changes among the adjusted post-test means of coastal area children.

Scheffe's mean difference test has been adapted to post hoc analysis. The results are demonstrated in subsequent Table 4.6.

TABLE – 4.6
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES – MUSCULAR ENDURANCE
(Scores in Numbers)

Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	MD	CI
25.78	24.47		**1.31***	**0.81**
25.78		20.55	**5.23***	
	24.47	20.55	**3.92***	

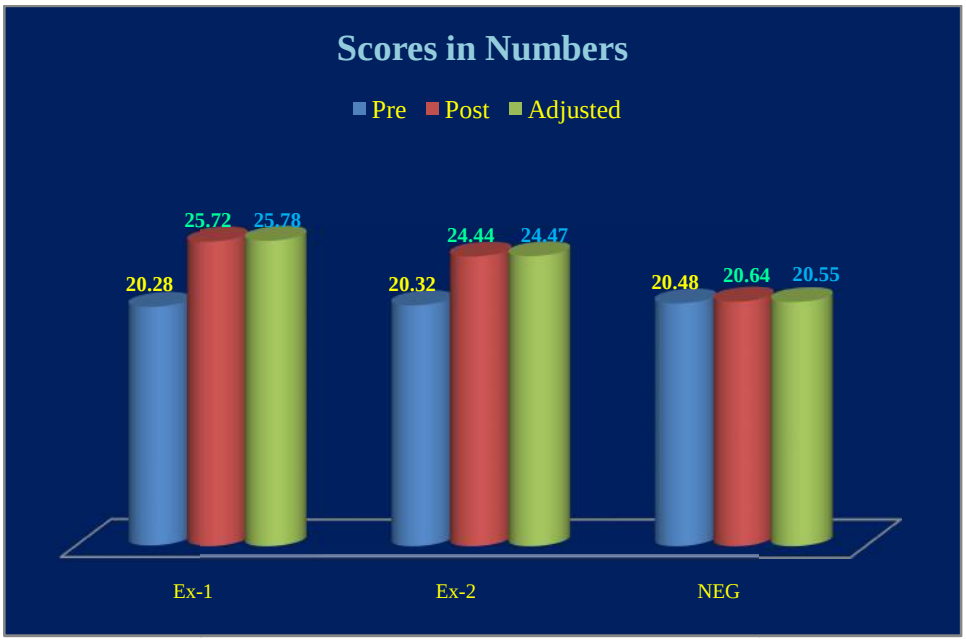
***Significant at 0.05 level of confidence**

The above table clearly depicts the difference in the paired comparison as the 1.31, 5.23 and 3.92 were greater than the confidence interval of 0.81.

The comparisons showed in the table proved that there existed significant differences between the adjusted means of Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) was 1.31; Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Non-Experiment Group (NEG) was 5.23; and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Non-Experiment Group (NEG) was 3.92 at 0.05 level of confidence with the confidence interval value of 0.81.

The pre, post and adjusted post-test means were displayed through bar outline for better comprehension of the after effects of the investigation on the factor of muscular endurance in following figure-35.

FIGURE-35
BAR DIAGRAM SHOWING PRE-TEST POST-TEST AND ADJUSTED POST-TEST MEANS ON MUSCULAR ENDURANCE



4.5.1.3.1 DISCUSSION ON THE FINDINGS OF MUSCULAR ENDURANCE

The result displayed in the above two tables and graphs indicates that the experimental groups namely Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) had shown significant improvement on muscular endurance and all the training groups were better than the non-experiment group. Further, it was proved that Physical Education Programme with Hatha Yoga Practices (PEPWHYP) better than the Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) on improving the muscular endurance. This research also corroborates with Chang, Tsai, Lee, & Liang, (2020) dynamic core group showed significant improvements in all

outcome measurements compared with the general physical-exercise training group. These statistics provide a reference for integrating further core-stability exercises in the warm-up routine of physical education classes in school-aged children in the and also Blagojevic et al. (2017) proved that the circuit training program made significantly greater gains compared to the control group on bent-arm hang, sit-ups and sit and reach.

4.5.1.4 Result on Flexibility

TABLE – 4.7
COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST POST-TEST AND ADJUSTED POST- TEST ON FLEXIBILITY FOR EXPERIMENTAL GROUPS AND NON-EXPERIMENTAL GROUP
(Scores in Centimetres)

Test	Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	Source of Variance	Sum of Square	df	Mean Square	"F"
Pre	14.36	14.40	14.36	BG	0.02	2	0.01	0.01
				WG	89.52	72	1.24	
Post	18.08	16.60	14.88	BG	128.24	2	64.12	**54.64***
				WG	84.48	72	1.17	
Adjusted	18.09	16.57	14.89	BG	128.13	2	64.06	**155.88***
				WG	29.17	71	0.41	

*significant at 0.05 level of confidence. (Table value required for significant at 0.05 level of confidence with df (2,72) was 3.22 and df (2, 71) was 3.13correspondingly).

BG - Between Groups, WG - Within Groups, df – Degrees of Freedom

The above table depicts the comparison of experiment groups and non-experiment group on Flexibility. The acquired pre-test 'F' value of 0.01 was found to be non-significant as it was lesser than the required 'F' value of 3.12.

Further, the ‘F’ value of 54.64 and 155.88 correspondingly for post and adjusted tests were found to be Significant as they were greater than the required ‘F’ value of 3.12 and 3.13 correspondingly.

The analysis of covariance (ANCOVA) on flexibility and the pre-test means of physical education programme with hatha yoga practices (PEPWHYP), physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 14.36, 14.40 and 14.36 correspondingly. The attained F value was 0.01. As a result, it was lower than the Table value of 3.12; it confirmed that there were no significant changes among the pre-test means of coastal area children.

The post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 18.08, 16.60 and 14.88 correspondingly. The succeeded F assessment was 54.64, it was higher than the table value of 3.12; it was confirmed that there were greater significant changes among the post-test means of coastal area children.

The adjusted post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-

Experiment Group (NEG) were 18.09, 16.57 and 14.89 correspondingly. The achieved F assessment was 155.88. As a result, it was higher than the table value of 3.13; it confirmed that there were significant changes among the adjusted post-test means of coastal area children.

Scheffe's mean difference test has been adapted to post hoc analysis. The results are displayed in following Table 4.8.

TABLE – 4.8
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES - FLEXIBILITY
(Scores in Centimetres)

Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	MD	CI
18.09	16.57		**1.52***	**0.44**
18.09		14.89	**3.20***	
	16.57	14.89	**1.68***	

***Significant at 0.05 level of confidence**

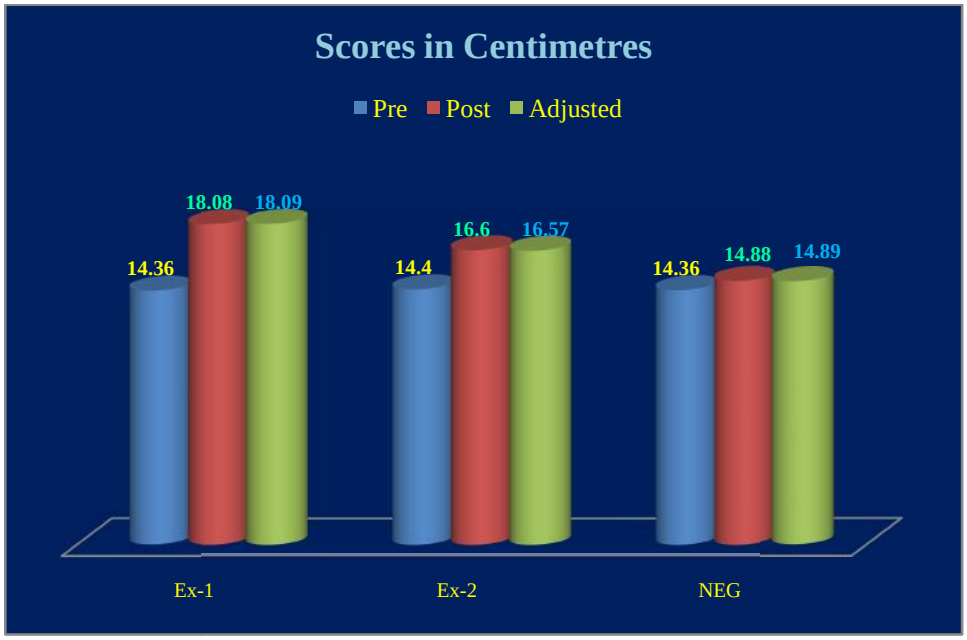
The above table clearly depicts the difference in the paired comparison as the 1.52, 3.20 and 1.68 were greater than the confidence interval of 0.44.

The comparisons showed in the table proved that there existed significant differences between the adjusted means of Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) was 1.52; Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Non-Experiment Group (NEG) was 3.20; and Physical

Education Programme without Hatha Yoga Practices (PEPWOHYP) and Non-Experiment Group (NEG) was 1.68 at 0.05 level of confidence with the confidence interval value of 0.44.

The pre, post and adjusted post-test means were displayed through bar outline for better comprehension of the after effects of the investigation on the factor of flexibility in following figure 36.

FIGURE - 36
BAR DIAGRAM SHOWING PRE-TEST POST-TEST AND ADJUSTED POST-TEST MEANS ON FLEXIBILITY



4.5.1.4.1 Discussion on the Findings of Flexibility

The result displayed in the above two tables and graphs indicates that the experimental groups namely Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) had shown significant improvement on flexibility and all the training groups were better than the Non Non-Experiment group (NEG). Further, it was proved that Physical Education Programme with Hatha Yoga Practices (IPEPWHYP) better than the Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) on improving the flexibility. This research also corroborates with Chang et al. (2020) proved that the differences in posterior chain flexibility and trunk mobility between school-age children who underwent Pilates Mat work exercises and the control. However, children who participated in the exercise program showed improvement in some results of flexibility and also Sivanandha et al. (2021) study was found that there was a significant improvement on muscular strength and flexibility for bear walk and frog jump group when compared with the non-training group.

4.5.2 Results on Psychosocial Variables

4.5.2.1 Result on Quality of Life

TABLE – 4.9
COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST POST-TEST AND ADJUSTED POST- TEST ON QUALITY OF LIFE FOR EXPERIMENTAL GROUPS AND NON-EXPERIMENTAL GROUP
(Scores in Numbers)

Test	Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	Source of Variance	Sum of Square	df	Mean Square	"F"
Pre	50.48	50.84	51.16	BG	5.78	2	2.89	1.78
				WG	116.96	72	1.62	
Post	56.00	54.84	51.00	BG	342.42	2	171.21	**67.97***
				WG	181.36	72	2.51	
Adjusted	56.18	54.83	50.82	BG	372.31	2	186.15	**89.23***
				WG	148.11	71	2.08	

*significant at 0.05 level of confidence. (Table value required for significant at 0.05 level of confidence with df (2,72) was 3.22 and df (2, 71) was 3.13correspondingly).

BG - Between Groups, WG - Within Groups, df – Degrees of Freedom

The above table depicts the comparison of experiment groups and non-experiment group on Quality of Life. The attained pre-test 'F' value of 1.78 was found to be non-significant as it was lesser than the required 'F' value of 3.12.

Further, the 'F' value of 67.97 and 89.23 correspondingly for post and adjusted tests were found to be Significant as they were greater than the required 'F' value of 3.12 and 3.13 correspondingly.

The analysis of covariance (ANCOVA) on quality of life (QOF) and the pre-test means of physical education programme with hatha yoga practices (PEPWHYP),

physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 50.48, 50.84 and 51.16 correspondingly. The achieved F assessment was 1.78. As a result, it was lower than the Table value of 3.12; it confirmed that there were no significant changes among the pre-test means of coastal area children.

The post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 56.00, 54.84 and 51.00 correspondingly. The achieved F assessment was 67.97. As a result, it was higher than the table value of 3.12; it confirmed that there were significant changes among the post-test means of coastal area children.

The adjusted post-test means experiment training group-I of physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 56.18, 54.83 and 50.82 correspondingly. The achieved F assessment was 89.23. As a result, it was higher than the table value of 3.13; it confirmed that there were greater significant changes among the adjusted post-test means of coastal area children.

Scheffe's mean difference test has been adapted to post hoc analysis. The results are displayed in the following Table 4.10.

TABLE – 4.10
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES - QUALITY OF LIFE
(Scores in Numbers)

Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	MD	CI
56.18	54.83		**1.35***	1.01
56.18		50.82	**5.36***	
	54.83	50.82	**4.01***	

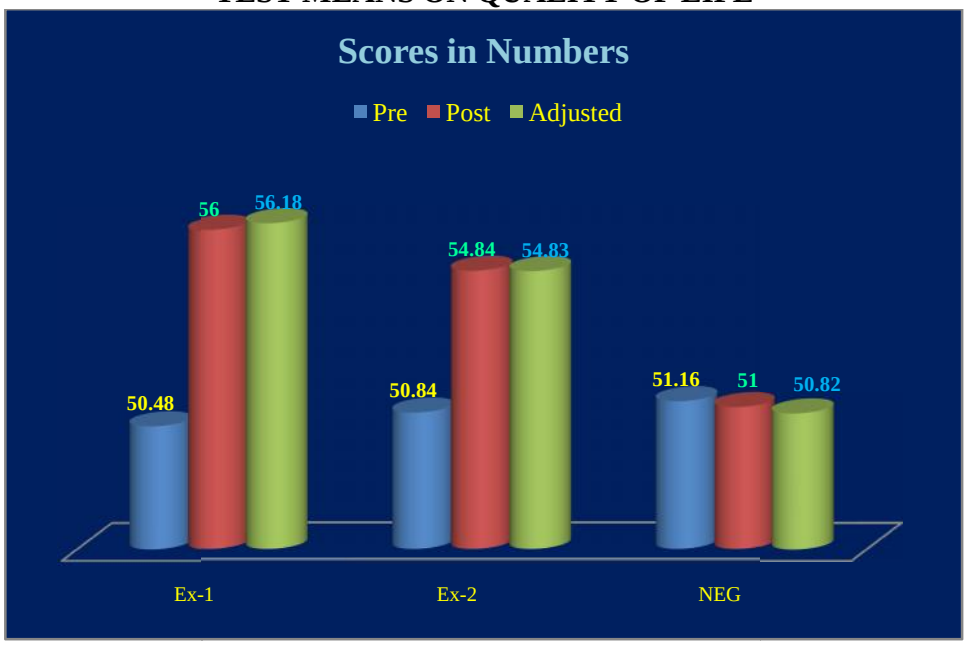
***Significant at 0.05 level of confidence**

The above table clearly depicts the difference in the paired comparison as the 1.35, 5.36 and 4.01 were greater than the confidence interval of 1.01.

The comparison showed in the table proved that there existed significant differences between the adjusted means of Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and of Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) was 1.35; Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Non-Experiment Group (NEG) was 5.36; and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Non-Experiment Group (NEG) was 4.01 at 0.05 level of confidence with the confidence interval value of 1.01.

The pre, post and adjusted post-test means were displayed through bar outline for better comprehension of the after-effects of the investigation on the factor of quality of life in the following figure 37.

FIGURE - 37
BAR DIAGRAM SHOWING PRE-TEST POST-TEST AND ADJUSTED POST-TEST MEANS ON QUALITY OF LIFE



4.5.2.1.1 DISCUSSION ON THE FINDINGS OF QUALITY OF LIFE

The result displayed in the above two tables and graphs indicates that the experimental groups namely Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) had shown significant improvement on quality of life and all the training groups were better than the Non-Experiment group (NEG). Additionally, it was verified that Physical Education Programme with Hatha Yoga Practices (PEPWHYP) was better

than the Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) on improving the quality of life. This research also corroborates with Karras et al. (2019) proved that development coordination disorder appears to contribute to lower perceived health-related quality of life. These findings update therapeutic targets for children with development coordination disorder, beyond motor skill intervention. and also Kouzegaran et al. (2018) proved that children with asthma have a suggestively lower quality of life associated with healthy children. And also, in investigating the different traits of quality of life, these children had a poorer quality of life in physical performance, emotional performance, and performance at school, and were at the level as that of healthy children only in social performance.

4.5.2.2 Result on Self-Esteem

TABLE – 4.11
COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST POST-TEST AND ADJUSTED POST- TEST ON SELF-ESTEEM FOR EXPERIMENTAL GROUPS AND NON-EXPERIMENTAL GROUP
(Scores in Numbers)

Test	Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	Source of Variance	Sum of Square	df	Mean Square	"F"
Pre	8.80	9.12	8.68	BG	2.58	2	1.29	1.78
				WG	52.08	72	0.72	
Post	13.16	11.36	9.04	BG	213.30	2	106.65	**98.34***
				WG	78.08	72	1.08	
Adjusted	13.20	11.17	9.18	BG	202.39	2	101.19	**147.18***
				WG	48.81	71	0.68	

*significant at 0.05 level of confidence. (Table value required for significant at 0.05 level of confidence with df (2,72) was 3.22 and df (2, 71) was 3.13correspondingly).

BG - Between Groups, WG - Within Groups, df – Degrees of Freedom.

The above table depicts the comparison of experiment groups and non-experiment group on Self-Esteem. The attained pre-test 'F' value of 0.178 was found to be non-significant as it was lesser than the required 'F' value of 3.12.

Further, the 'F' value of 98.34 and 147.18 correspondingly for post and adjusted tests were found to be Significant as they were greater than the required 'F' value of 3.12 and 3.13 correspondingly.

The analysis of covariance (ANCOVA) on self-esteem and the pre-test means of physical education programme with hatha yoga practices (PEPWHYP), physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 8.80, 9.12 and 8.68 correspondingly. The achieved F assessment was 1.78, it was lower than the table value of 3.12; it confirmed that there were no significant changes among the pre-test means of coastal area children.

The post-test means of experimental group I physical education programme with hatha yoga practices (PEPWHYP), experimental group II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 13.16, 11.36 and 9.04correspondingly. The achieved F assessment was 98.34. As a result, it was higher than the table value of 3.12; it confirmed that there were significant changes among the post-test means of coastal area children.

The adjusted post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 13.20, 11.17 and 9.18 correspondingly. The attained F value was 147.18. As a result, it was higher than the table value of 3.13; it confirmed that there were significant changes among the adjusted post-test means of coastal area children.

Scheffe's mean difference test has been adapted to post hoc analysis. The results are displayed in the following Table 4.12.

TABLE – 4.12
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES –SELF-ESTEEM
(Scores in Numbers)

Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	MD	CI
13.20	11.17		**2.03***	**0.58**
13.20		9.18	**4.02***	
	11.17	9.18	**1.99***	

***Significant at 0.05 level of confidence**

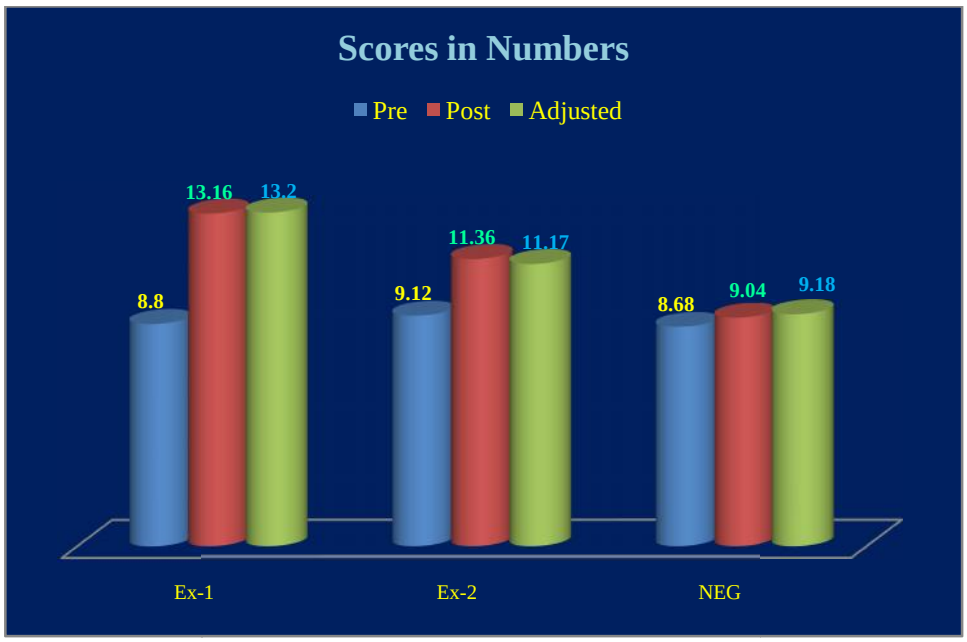
The above table clearly depicts the difference in the paired comparison as the 2.03, 4.02 and 1.99 were greater than the confidence interval of 0.58.

The comparison showed in the table proved that there existed significant differences between the adjusted means of Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga

Practices (PEPWOHYP) was 2.03, Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Non-Experiment Group (NEG) was 4.02; and of Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Non-Experiment Group (NEG) was 1.99 at 0.05 level of confidence with the confidence interval value of 0.58.

The pre, post and adjusted post-test means were displayed through bar outline for better comprehension of the after effects of the investigation on the factor of quality of life in the following figure 38.

FIGURE - 38
BAR DIAGRAM SHOWING PRE-TEST POST-TEST AND ADJUSTED POST-TEST MEANS ON SELF-ESTEEM



4.5.2.2.1 Discussion on the Findings of Self-Esteem

The result displayed in the above two tables and graphs indicates that the experimental groups namely Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) had shown significant improvement on self-esteem and all the training groups were better than the Non-Experiment group (NEG). Further, it was proved that Physical Education Programme with Hatha Yoga Practices (PEPWHYP)better than the Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) on improving self-esteem. This research also corroborates with Yook et al. (2017) proved that effects of physical activity intervention combing with hatha yoga on psychological characteristics in adolescents improved Self-Esteem (F=3.47, p=0.49), Resilience and happiness. And also Biddle et al. (2019) proved that physical activity and mental health on children reduce anxiety and improvement in self-esteem. It Improved fitness and physical activity associated with better cognitive health and performance.

4.5.2.3 Result on Depression

TABLE – 4.13
COMPUTATION OF ANALYSIS OF COVARIANCE OF PRE-TEST POST-TEST AND ADJUSTED POST- TEST ON DEPRESSION FOR EXPERIMENTAL GROUPS AND NON-EXPERIMENTAL GROUP
(Scores in Numbers)

Test	Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	Source of Variance	Sum of Square	df	Mean Square	"F"
Pre	27.40	27.12	27.20	BG	1.04	2	0.52	0.41
				WG	90.64	72	1.25	
Post	22.96	24.76	26.84	BG	188.50	2	94.25	74.67
				WG	90.88	72	1.26	
Adjusted	22.84	24.84	26.86	BG	201.45	2	100.72	166.55
				WG	42.93	71	0.605	

*significant at 0.05 level of confidence. (Table value required for significant at 0.05 level of confidence with df (2,72) was 3.22 and df (2, 71) was 3.13correspondingly).

BG - Between Groups, WG - Within Groups, df – Degrees of Freedom

The above table depicts the comparison of experiment groups and non-experiment group on Depression. The attained pre-test 'F' value of 0.138 was found to be non-significant as it was lesser than the required 'F' value of 3.12.

Further, the 'F' value of 43.45 and 99.05 correspondingly for post and adjusted tests were found to be Significant as they were greater than the required 'F' value of 3.12 and 3.13 correspondingly.

The analysis of covariance (ANCOVA) on self-esteem and the pre-test means of physical education programme with hatha yoga practices (PEPWHYP), physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment

Group (NEG) were 27.40, 27.12 and 27.20 correspondingly. The attained F value was 0.41, it was lower than the table value of 3.12; it confirmed that there were no significant changes among the pre-test means of coastal area children.

The post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 22.96, 24.76 and 26.84 correspondingly. The attained F value was 74.67, it was higher than the table value of 3.12; it was confirmed that there were significant changes among the post-test means of coastal area children.

The adjusted post-test means of experiment training group-I physical education programme with hatha yoga practices (PEPWHYP), experiment training group-II physical education programme without hatha yoga practices (PEPWOHYP) and Non-Experiment Group (NEG) were 22.84, 24.84 and 26.86 respectively. The achieved F value was 166.55. As a result, it was higher than the table value of 3.13; it was confirmed that there were significant changes among the adjusted post-test means of coastal area children.

Scheffe's mean difference test has been adapted to post hoc analysis. The results are displayed in the following Table 4.14.

TABLE – 4.14
SCHEFFE'S CONFIDENCE INTERVAL TEST SCORES - DEPRESSION
(Scores in Numbers)

Ex-I PEPWHYP	Ex – 2 PEPWOHYP	NEG	MD	CI
22.84	24.84		2.00*	**0.54**
22.84		26.86	4.02*	
	24.84	26.86	2.02*	

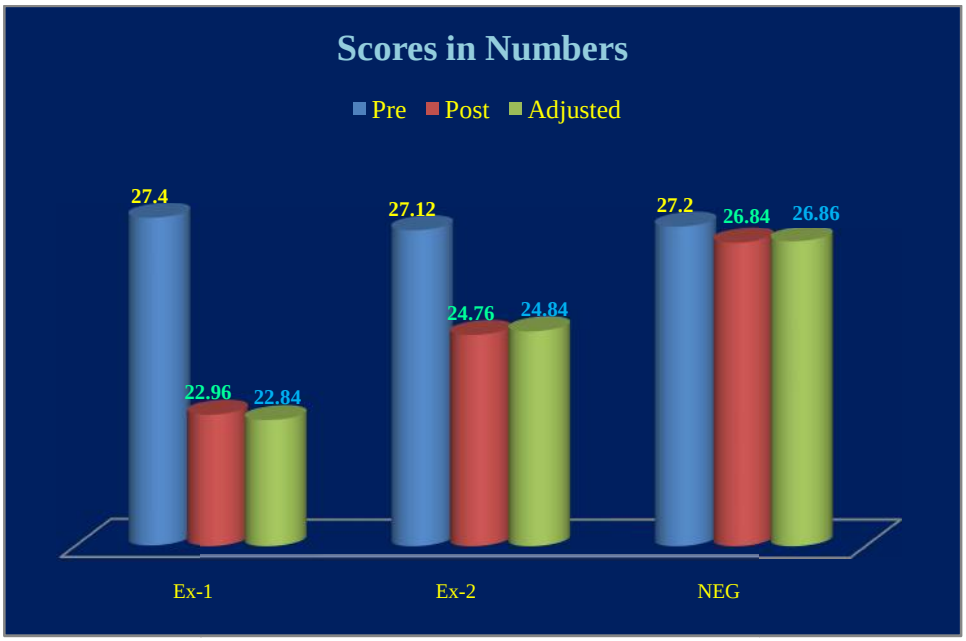
***Significant at 0.05 level of confidence**

The above table clearly depicts the difference in the paired comparison as the 2.00, 4.02 and 2.02 were greater than the confidence interval of 0.54.

The comparison showed in the table proved that there existed significant differences between the adjusted means of Physical Education Programme with Hatha Yoga Practices (PEPWHYP) Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) was 2.00; Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Non-Experiment Group (NEG) was 4.02; and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Non-Experiment Group (NEG) was 2.02 at 0.05 level of confidence with the confidence interval value of 0.54.

The pre, post and adjusted post-test means were displayed through bar outline for better comprehension of the after effects of the investigation on the factor of quality of life in the following figure 39.

FIGURE - 39
BAR DIAGRAM SHOWING PRE-TEST POST-TEST AND ADJUSTED POST-TEST MEANS ON DEPRESSION



4.5.2.3.1 Discussion on the Findings of Depression

The result displayed in the above two tables and graphs indicates that the experimental groups namely Physical Education Programme with Hatha Yoga Practices (PEPWHYP) and Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) had shown significant improvement on depression and all the training groups were better than the non-experiment group. Further, it was proved that Physical Education Programme with Hatha Yoga Practices (PEPWHYP) was better than the Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) on improving the depression. This research also corroborates with Lindberg et al. (2020) proved that Obesity remained a significant risk factor for anxiety and depression in

children after adjusting for Nordic background, neuropsychiatric disorders, family history of anxiety/depression, and socioeconomic status. And also Fernandez et al. (2019) initial support for the immediate effects of super skills of life, suggesting that it is an important asset for the early decrease of anxiety and depressive symptoms in young Spanish talking children and also Bressington et al. (2019) proved that yoga-based social-emotional wellness promotion program significant changes in adolescent emotional distress, pro-social behavior, and school functioning.

4.6 DISCUSSIION OF HYPOTHESES

1. The first research hypothesis stated that coastal area children could be successfully selected at random and their physical and social vulnerability status could be assessed. The study successfully assessed the physical and social vulnerability status through the checklist. Hence, the first research hypothesis was accepted.
2. The second research hypothesis stated that there would be a significant improvement on selected health-related fitness variables among coastal area children due to physical education programme with hatha yoga practices (PEPWHYP). The results of the study confirmed that physical education programme with hatha yoga practices (PEPWHYP) have enhanced significant

improvement on selected health-related fitness variables among coastal area children. Hence, the second research hypothesis was accepted.

3. The third research hypothesis stated that there would be a significant improvement on selected health-related fitness variables among coastal area children due to physical education programme without hatha yoga practices (PEPWOHYP). The results of the study confirmed that physical education programme without hatha yoga practices (PEPWOHYP) have produced significant improvement on selected health-related fitness variables among coastal area children. Hence, the third research hypothesis was accepted.
4. The fourth research hypothesis stated that there would be a significant improvement on selected psychosocial variables among coastal area children due to physical education programme with hatha yoga practices (PEPWHYP). The results of the study confirmed that physical education programme with hatha yoga practices (PEPWHYP) have significant improvement on selected psychological variables among coastal area children. Hence, the fourth research hypothesis was accepted.
5. The fifth research hypothesis stated that there would be a significant improvement on selected psychosocial variables among coastal area children due to physical education programme without hatha yoga practices (PEPWOHYP). The results of

the study confirmed that physical education programme without hatha yoga practices (PEPWOHYP) have produced significant improvement on selected psychological variables among coastal area children. Hence, the fifth research hypothesis was accepted.

6. The sixth research hypothesis stated that the physical education programme with hatha yoga practices (PEPWHYP) would produce a better significant improvement than the of physical education programme without hatha yoga practices (PEPWHOYP) on the selected health-related fitness and psychosocial variables among coastal area children. The results of the study proved that hatha yoga practices (PEPWHYP) would produce better significant improvement than the physical education programme without hatha yoga practices (PEPWHOYP) on the selected health-related fitness and psychosocial variables among coastal area children. Hence, the sixth research hypothesis was accepted.

CHAPTER – V

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY

The main effort of this research work was to assess the presence of physical and social vulnerability of coastal area children and to quantify the impact of adopted experimental training in the research. To achieve the purpose of the study One Thousand and Seventeen (1017) children were taken for analysis from the Chennai Coastal Area (CCA). The children age range was fixed from 10 to 14 years. They were analysed through a Physical and Social Vulnerability (PSV) checklist made for this research purpose. From the investigation, Six Hundred and Forty-One (641) children were identified with Physical and Social Vulnerability (PSV). Physical and social Vulnerability checklist with Thirty (30) statements was made for this research to assess the Vulnerability of Coastal Area Children (CAC), a score greater than 15 as fixed as Vulnerability. Among the Six Hundred and Forty-One (641) Vulnerable children Seventy-five (75) subjects were selected randomly for this Experimental training and they were assigned into three groups. Two experimental training groups and Non-Experimental Group (NEG), each group consist of 25 children at random. Group-I Physical Education Programme with Hatha Yoga Practices (PEPWHYP), Group-II

Physical Education Programme without Hatha Yoga Practices (PEPWOHYP) and Group-III Non-Experimental Group (NEG). Pre-test was accompanied for all the 75 subjects on selected Health-Related Physical Fitness (HRPF) variables namely Flexibility (FX), Muscular Endurance (ME), Muscular Strength (MS), Cardio-Vascular Endurance (CVE) and Psychosocial variables namely Quality of Life (QOL), Self-Esteem (SE), Depression (DP). The two Experimental groups underwent scheduled experimental training for a period of twelve weeks, five days a week scheduled from 4.00 pm to 5.15 pm. Non-Experimental Group (NEG) was not exposed to experimental training, other than their regular activities. Afterward, the Experimental training all the three groups was measured on above mentioned Health-Related Physical Fitness and Psychosocial variables. The pre-test and post-test scores were analyzed using statistical package of Analysis of covariance (ANCOVA), to find out the significant difference between the two experimental groups and the Non-Experimental Group (NEG). When the F-ratio indicated significant difference between the means, scheffe's post-hoc test was applied to identify which means are significantly different from each other. For this study, 95% confidence was fixed to test the stated hypotheses.

5.2 CONCLUSIONS

By the results and within the boundaries of this study that the following conclusions were drawn:

1. It was concluded that adopted experimental training of physical education programme with hatha yoga practices (PEPWHYP) was established appropriate to improve selected health-related fitness variables of this research such as cardiovascular endurance, muscular strength, muscular endurance and flexibility among Chennai coastal area children.
2. It was also concluded that experimental training of physical education programme without hatha yoga practices (PEPWOHYP) was found suitable to improve on particular health-related fitness variables of this research such as cardiovascular endurance, muscular strength, muscular endurance and flexibility among Chennai coastal area children.
3. It was determined that the adopted experimental training of physical education programme with hatha yoga practices (PEPWHYP) was established appropriate to improve on selected psychological variables of this research such as quality of life, self-esteem and depression among Chennai coastal area children.
4. It was concluded that experimental training of physical education programme without hatha yoga practices (PEPWOHYP) was found suitable to improve on

selected psychological variables such as psychological variables of this research such as quality of life, self-esteem and depression among Chennai coastal area children.

5. It was determined that the adopted Physical education programme with hatha yoga practices (PEPWHYP) were established to be enhanced in improving the selected health-related fitness and psychosocial variables of this research than the (PEWHOYP) in Chennai coastal area children.

5.3 RECOMMENDATION

The findings of the study proved that experimental training of physical education programme without hatha yoga practices (PEPWOHYP) and experimental training of physical education programme without hatha yoga practices (PEPWHOYP) on the selected health-related fitness and psychosocial variables among Chennai coastal area children. Further, it was confirmed that hatha yoga practices (PEPWHYP) would produce a better significant improvement than the experimental training of physical education programme without hatha yoga practices (PEPWHOYP) on the selected health related fitness and psychosocial variables among Chennai coastal area children. In the light of these above conclusions, the subsequent commendations are prepared.

1. The study revealed that 63% of Chennai coastal area children were vulnerable to Physical and Social hazards. The Government and Non-Government organization Agencies may make effort to remove these hazards.
2. Efforts may be taken by physical educationists, yoga experts, psychologists, scientists and educational authorities to include the suggested schedules for experimental training of physical education programme with and without hatha yoga practices for children.
3. Fitness trainers and physical directors may implement the training protocols suggested in this study may be highly recommended for the benefit of children for their healthful living.
4. The experimental training of physical education programme with and without hatha yoga practices protocols suggested in this study may be included in the curriculum of school students to improve their overall fitness.
5. The research proved that the experimental training of physical education programme with and without hatha yoga practices outcomes that could be applied and tested on children, so that we can improve the children's health and psychological through physical education programme with and without hatha yoga practices.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

During the course of the study, the investigator comes across a number of new concepts, some of which few essential ones are planned for future researchers.

1. Further research maybe extended by choosing anthropometric, and other physical, physiological, psychological factors.
2. Further research may be designed at different levels of age groups to discover the effect of experimental training of physical education programme with and without hatha yoga practices.
3. The present covered the coastal area children only, similar research may be undertaken among other area children.
4. This research concept may be elaborated by the addition of physical, physiological and psychological parameters.
5. This proven training modules may applied for other age groups based on the need and nature.

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APPENDIX - A

QUALITY OF LIFE SCALE QUESTIONNAIRE

Dr. Jamila .k. Warrier & Dr. H. Sam Sananda Raj

INSTRUCTION

Some statements relating to certain aspects of your life are given below. Read each statement carefully and indicate how much you agree with each statement. Your response can be strongly agree, agree, undecided, disagree or strongly disagree. Indicate your choice by placing a ✓ mark on any of the five alternatives as A, B, C, D or E so as to indicate the extent of your agreement with the statement A- stands for strongly agree, B- agree, C- undecided, D- disagree and E- Strongly disagree. The response undecided should be selected when you can't say clearly either you agree or disagree with the situation. Please do not omit item. Your responses will be used strictly to research purpose and will be kept confidential.

Section – A (Physical Aspects)

S. No.	Statement					
1	I feel that I am generally healthy					
2	I am satisfied with the conditions of my living place					
3	I am not satisfied with my diet					
4	I have adequate means of transportation					
5	I often suffer from physical pain and discomfort					
6	I am unable to work hard					
7	So far I have got the important things I want if in life					
8	Physical illness often restrict me to do things which I would like to do					
9	If I would live my life once again, I would not change anything					
10	I am not satisfied with my sleep patterns					

Section – B (Social Aspects)

S. No	Statement					
1	Now I am enjoying my life					
2	I have a feeling that I am a burden to others					
3	I don't find it difficult to cope with the modern lifestyle					
4	I am often haunted by irrational fears					
5	In most ways my life is close to my ideal					
6	My life has become monotonous					
7	I often feel that my life is worthless					
8	I have an adequate level of general awareness					
9	I feel that I am a lucky person					
10	I am not able to concentrate on anything					

Section – C (Socical Aspects)

S. No	Statement					
1.	I have friends with whom I can talk about my personal matters					
2.	I often feel inferior in my social status					
3.	I find out difficult to trust others					
4.	I am happy with my financial conditions					
5.	I am not as social as I want to be					
6.	There is a feeling of togetherness in our family					
7.	I feel that nobody trust me					
8.	My family cares for me very much					
9.	I have lost my interest in other people					
10.	I have strong bond with my friends					

Name…… Age…… Code No……..

(Dr. Jamila .k. Warrier & Dr. H. Sam Sananda Raj, Department of Psychology, University of Kerala, Trivandrum, 1999)

For measuring quality of life, the psychological test namely, quality of life scale constructed and standardized by Jamila Warrier and Sananda Raj, (1999) has been used. This test has 3 sub tests measuring Physical aspects (Section-A), Psychological aspects (Section- B), and the Social aspects (Section C) of Quality of life. It is a five point scale, consisting of 30 items.

APPENDIX - B

ROSENBERG'S (1965) SELF-ESTEEM SCALE QUESTIONNAIRE

S.No.	Statement	Strongly Disagree	Disagree	Agree	Strongly Agree
1	At times I think I am no good at all	0	1	2	3
2	I take a positive view of myself	0	1	2	3
3	All in all, I am inclined to feel that I am a failure	0	1	2	3
4	I wish I could have more respect for myself	0	1	2	3
5	I certainly feel useless at times	0	1	2	3
6	I feel that I am a person of worth, at least on an equal plane with others	0	1	2	3
7	On the whole, I am satisfied with myself	0	1	2	3
8	I feel I do not have much to be proud of myself	0	1	2	3
9	I feel that I have a number of good qualities	0	1	2	3
10	I am able to do things as well as most other people	0	1	2	3

To determine score, first reverse the scoring for the five negatively worded items (1,3,4,5 and 8) as follows 0 = 3, 1=2,2=1, 3=0. Then, add up scores across the 10 items. Your total score should fall between 0 and 30. Higher numbers indicate higher self-esteem. Source: Rosenberg 1965, Society and the adolescent self-image. Princeton, NJ: Princeton University press.

APPENDIX - C

DEPRESSION QUESTIONNAIRE – (BECK, 1971) QUESTIONNAIRE

S.No.	Statement	Always	Often	Sometimes	Never
1.	Sadness				
2.	Pessimism				
3.	Sense of Failure				
4.	Dissatisfaction				
5.	Guilt				
6.	Expectation of Punishment				
7.	Dislike of Self				
8.	Self-accusation				
9.	Suicidal Ideation				
10.	Episodes of Crying				
11.	Irritability				
12.	Social Withdrawal				
13.	Indecisiveness				
14.	Feeling Unattractive				
15.	Lack of Energy/ Drive				
16.	Insomnia				
17.	Fatigability				
18.	Loss of Appetite				
19.	Loss of Weight				
20.	Somatic Preoccupation				
21.	Low Level of Energy				

APPENDIX-D

RAW DATA ON SUBJECT OF VULNERABLE NON-VULNERABLE			
Sl. No	**Vulnerable**	**Non-Vulnerable**	**Total**
1	659	358	1017
2	367	650	1017
3	265	752	1017
4	811	206	1017
5	601	416	1017
6	411	606	1017
7	831	186	1017
8	501	616	1017
9	54	963	1017
10	216	801	1017
11	349	668	1017
12	321	796	1017
13	639	478	1017
14	108	909	1017
15	362	655	1017
16	578	439	1017
17	833	184	1017
18	910	107	1017
19	726	291	1017
20	402	615	1017
21	410	607	1017
22	711	306	1017
23	600	417	1017
24	600	417	1017
25	211	806	1017
26	426	591	1017
27	226	791	1017
28	526	491	1017
29	447	590	1017
30	54	963	1017

APPENDIX - E

RAW DATA ON CARDIOVASCULAR ENDURANCE (12 MIN COOPERS TEST)						
Sl. No	IPEPWHYP		IPEPWOHYP		CG	CG
	Pre	Post	Pre	Post	Pre	Post
1	1480	1570	1500	1550	1460	1450
2	1470	1580	1470	1530	1470	1460
3	1500	1600	1540	1590	1400	1420
4	1470	1580	1500	1560	1450	1460
5	1540	1640	1460	1500	1550	1500
6	1500	1610	1470	1520	1500	1510
7	1460	1550	1400	1450	1550	1530
8	1470	1550	1450	1500	1450	1470
9	1400	1500	1550	1600	1500	1510
10	1450	1550	1500	1550	1480	1500
11	1550	1500	1550	1610	1470	1500
12	1500	1620	1450	1520	1400	1390
13	1550	1670	1500	1570	1450	1430
14	1450	1580	1470	1520	1550	1500
15	1500	1600	1540	1600	1500	1520
16	1480	1580	1500	1520	1550	1530
17	1470	1630	1460	1500	1450	1440
18	1500	1630	1470	1530	1500	1490
19	1470	1600	1500	1550	1470	1560
20	1540	1630	1470	1530	1550	1530
21	1500	1620	1460	1540	1450	1430
22	1460	1600	1470	1550	1400	1420
23	1470	1590	1400	1460	1500	1510
24	1500	1620	1450	1490	1550	1530
25	1470	1600	1470	1500	1450	1430

APPENDIX - F

RAW DATA ON MUSCULAR STRENGH (Pull-up)						
Sl. No.	IPEPWHYP		IPEPWOHYP		CG	CG
	Pre	Post	Pre	Post	Pre	Post
1	3	6	3	5	3	4
2	4	7	2	4	2	4
3	2	5	3	5	3	4
4	3	5	3	5	2	4
5	2	5	2	4	2	4
6	3	6	3	5	3	4
7	2	5	3	5	3	3
8	3	6	4	6	2	4
9	3	5	2	4	3	4
10	2	4	3	5	3	4
11	3	6	3	6	2	4
12	4	8	2	4	3	4
13	3	5	4	6	4	3
14	3	5	3	5	3	3
15	3	6	3	5	2	3
16	2	5	4	6	3	3
17	3	6	3	5	3	3
18	2	5	2	4	4	4
19	2	5	3	5	3	3
20	3	6	2	4	2	2
21	3	6	2	5	3	3
22	2	5	3	6	3	3
23	3	6	4	6	4	4
24	2	6	3	5	3	4
25	3	7	3	5	4	5

APPENDIX - G

RAW DATA ON MUSCULAR ENDURANCE (Sit up test)						
Sl. No.	IPEPWHYP		IPEPWOHYP		CG	CG
	Pre	Post	Pre	Post	Pre	Post
1	20	25	23	28	21	24
2	18	23	22	26	20	20
3	22	26	19	25	19	19
4	20	26	18	24	20	20
5	23	26	21	25	18	19
6	22	26	20	24	22	22
7	19	25	18	23	20	20
8	18	24	20	24	20	22
9	21	26	19	24	23	23
10	20	28	22	25	22	21
11	18	24	20	24	19	18
12	20	25	19	23	21	22
13	20	26	23	27	19	19
14	19	24	22	26	18	18
15	22	26	20	24	20	20
16	18	24	19	23	20	20
17	23	26	20	22	18	19
18	22	26	20	22	21	20
19	20	25	21	25	20	21
20	19	24	20	24	23	23
21	20	28	18	22	22	23
22	19	28	20	24	20	18
23	20	28	20	25	22	21
24	23	29	20	24	22	23
25	21	25	24	28	22	21

APPENDIX - H

RAW DATA ON FLEXIBILITY (Sit & Reach test)						
Sl. No.	IPEPWHYP		IPEPWOHYP		CG	CG
	Pre	Post	Pre	Post	Pre	Post
1	14	16	15	17	16	15
2	15	18	14	16	14	14
3	13	17	13	15	13	14
4	14	18	14	16	14	15
5	15	19	13	15	15	16
6	12	16	14	16	12	13
7	14	17	15	17	14	16
8	15	18	12	15	15	15
9	13	16	14	17	14	14
10	16	19	15	17	16	17
11	15	20	13	16	14	15
12	14	19	15	17	14	14
13	15	19	14	17	15	15
14	16	20	16	18	13	14
15	14	18	14	16	16	16
16	13	17	14	17	15	15
17	15	18	15	17	14	15
18	14	18	13	16	14	14
19	16	18	16	18	14	15
20	14	19	15	17	15	15
21	15	20	14	16	12	13
22	14	18	16	18	14	14
23	13	17	14	16	15	15
24	14	18	15	16	16	17
25	16	19	17	19	15	16

APPENDIX - I

RAW DATA ON QUALITY OF LIFE						
Sl. No.	**IPEPWHYP**		**IPEPWOHYP**		**CG**	**CG**
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
1	49	55	52	58	50	50
2	51	56	51	53	52	52
3	52	57	53	55	51	52
4	48	55	50	55	52	52
5	52	58	52	55	50	50
6	51	56	50	54	49	50
7	50	55	51	53	51	51
8	52	57	50	54	53	52
9	51	56	51	53	52	52
10	49	54	50	53	51	51
11	48	54	49	52	49	50
12	52	57	51	53	50	51
13	51	56	52	55	52	52
14	53	58	50	63	51	51
15	49	55	52	54	52	51
16	52	57	50	53	50	50
17	50	56	52	60	49	49
18	51	55	51	56	51	51
19	49	55	52	55	52	52
20	50	56	50	55	50	50
21	48	55	49	56	52	52
22	51	57	50	55	50	50
23	50	55	52	55	51	51
24	51	57	51	55	52	52
25	52	58	50	54	50	51

APPENDIX - J

RAW DATA ON SELF ESTEEM						
Sl. No.	**IPEPWHYP**		**IPEPWOHYP**		**CG**	**CG**
	Pre	**Post**	**Pre**	**Post**	**Pre**	**Post**
1	9	14	9	11	9	10
2	8	13	8	10	10	11
3	9	12	10	12	8	11
4	9	13	9	11	7	8
5	10	14	8	10	9	9
6	9	13	10	12	9	10
7	8	12	9	11	7	7
8	10	14	9	11	8	8
9	9	13	8	11	8	9
10	8	13	9	12	10	10
11	10	14	10	12	9	9
12	8	12	10	11	7	6
13	8	12	11	13	9	8
14	9	13	9	12	8	8
15	9	14	9	11	10	11
16	8	15	9	12	8	8
17	9	14	10	12	8	7
18	10	14	8	12	10	9
19	8	12	9	11	8	9
20	9	13	9	11	9	9
21	9	12	9	12	8	9
22	8	13	10	12	9	10
23	10	13	8	11	10	11
24	8	13	9	11	9	8
25	8	14	9	10	10	11

APPENDIX - K

RAW DATA ON DEPRESSION						
Sl. No.	IPEPWHYP		IPEPWOHYP		CG	CG
	Pre	Post	Pre	Post	Pre	Post
1	29	25	28	25	26	26
2	27	23	29	26	28	28
3	26	23	27	25	27	27
4	29	25	29	26	28	27
5	28	24	28	25	29	28
6	26	22	29	27	27	26
7	27	23	26	24	26	26
8	26	23	27	25	27	27
9	27	24	26	24	29	28
10	27	23	25	23	26	26
11	28	23	27	25	28	27
12	27	24	26	24	29	28
13	28	23	27	25	28	28
14	26	22	27	25	25	25
15	27	22	28	23	26	26
16	28	24	26	24	27	26
17	27	22	27	25	28	29
18	26	21	27	25	25	26
19	28	22	26	24	26	25
20	29	24	27	23	29	28
21	28	22	25	24	28	27
22	27	21	27	23	27	26
23	28	23	29	28	26	26
24	28	23	27	25	28	28
25	28	23	28	26	27	27