International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Effectiveness of Muscle Strengthening Exercises on Joint Pain Among the Late Middle Age Group in Bordowali Health and Wellness Centre, Agartala, West Tripura

Diptanu Debbarma[1], Manaswi Debbarma[2], Lina Debbarma[3]

[1]Tutor, Dept. of Medical Surgical Nursing, Tripura College Of Nursing, Hapania, Agartala, West Tripura
[2]Assistant Professor Dept. of Medical Surgical Nursing, Tripura College Of Nursing, Hapania, Agartala, West Tripura
[3]Associate Professor cum HOD Dept. of Community Health Nursing, Tripura College Of Nursing, Hapania, Agartala, West Tripura

Abstract:
The researcher conducted a study on effectiveness of Muscle strengthening exercises on joint pain among the late middle age group in Bordowali Health and Wellness Centre, Agartala, West Tripura. Objectives: The objectives of the study were to assess the pre-existing level of joint pain among the late middle age group, to evaluate the effectiveness of Muscle strengthening exercises on joint pain among the late middle age group, and to find out the association between pre-existing level of joint pain among the late middle age group with their selected demographic variables. Method: The present study's conceptual framework was based on Modified Wiedenbach's Helping Art of Clinical Nursing Theory (1964). A quantitative evaluative research approach, pre-experimental one group pre-test post-test research design and purposive sampling technique were used for the study. Data collection: Data were collected from 40 late middle age group through interview technique by administering the socio-demographic proforma and Modified pain scale on joint pain, stiffness and quality of life. Active Muscle strengthening exercises were provided as an intervention for 35 minutes daily for 20 consecutive days. On 20th day, post-test was taken through interview technique by administering the Modified pain scale on joint pain, stiffness and quality of life. Result: The result showed that the mean post-test level of pain score of joint pain among the late middle age group (34.27±12.94) was lower than the mean pre-test level of pain score (63.15±16.92) with mean difference of 28.88. Paired 't' test value (8.59) was also found significant at 0.05 level of significance (df=39, table value=2.02). Analysis of Variance (ANOVA) 'F' value showed there was a significant association between pre-test level of joint pain among the late middle age group with their selected demographic variables - type of family ['F' value=3.86, table value=3.23, df between group – 2, within group – 37], total number of family members staying with you ['F' value=3.31, table value=3.23, df between group – 2, within group – 37], duration of suffering from joint pain ['F' value=5.52, table value=3.23, df between group – 2, within group – 37] which were significant at 0.05 level of significance. Conclusion: The findings of the present study concluded that Muscle strengthening exercises were an effective measure to reduce the level of joint pain among the late middle age group.

Keywords: Effectiveness, Muscle strengthening exercises, Joint pain, Late middle age group.

INTRODUCTION:

Ageing is a lifelong process of growing up and growing old. It begins at conception and ends with death. So, in this sense, we are all aging from the time of birth. In our teenage and young adult years, we refer to ageing as maturation. After age 30, our physical body begins to wear out and our functioning declines. Ageing is the most important factor that leads to a decrease in quality of life relevant to biological, social and psychological dimensions. The level of activity is restricted by disability as we get older. Restriction in daily life activities harms the quality of life.

According to The World Bank (United Nations Population Division, World Population Prospects: 2022 Revision) in 2021 India was the second most populated country in the world with the population of 1,407,563,842; in which male was – 7,26,503,429 and female was – 6,81,060,412. The percentage of population between the age group of 15-64 years was 63.6% (Male – 190,075,427 and Female – 359,802,209) and 65 years and over was 5.3% (Male – 29,364,920 and Female – 32,592,030).

According to Census 2011, the total population of Tripura was 3,673,917. The total population of middle age group (45-65 years) of Tripura was 5,81,658 sharing 15.82% of total population.

Joint pain results from cartilage damage that triggers a metabolic response at the level of chondrocytes. Progression of arthritis and osteoarthritis causes the normally smooth, white, translucent articular cartilage to become dull, yellow and granular. Affected cartilage gradually becomes softer, less elastic and less able to resist wear heavy use. The body's attempts at cartilage repair cannot keep up with the destruction that is occurring. Continued changes in collagen structure of the cartilage lead to fissuring and erosion of the articular surfaces. As the central cartilage becomes thinner, cartilage and bony growth (osteophytes) increase at the joint margins. The resulting incongruity in joint surfaces creates an uneven distribution of stress across the joint and contributes to a reduction in motion.

NEED OF THE STUDY:

Muscle strengthening exercises place tension on particular muscles with (isotonic) or without (isometric) moving the surrounding joints. By applying constant tension to the muscles, these exercises can be useful for improving physical endurance and posture by strengthening and stabilizing the muscles. Many strength building exercises involve concentric or eccentric movements. Concentric movements cause the muscle to shorten, and eccentric movements lengthen the muscle. Holding the muscle contraction allows the muscle tissue to fill with blood and create metabolic stress on the muscle. This can help improve strength and endurance.

ASSUMPTIONS:

This study assumes that,

1. Aging may rise to different joint pain.
2. Late middle age group may suffer from different joint pain.
3. Muscle strengthening exercises may be one of the measures to reduce joint pain among the late middle age group.

HYPOTHESES:

All hypotheses were tested at 0.05 level of significance.

H_1: The mean post-test level of pain score is significantly lower than the mean pre-test level of pain score.
H_2: There is a significant association between pre-test level of joint pain among the late middle age group with their selected demographic variables.

OPERATIONAL DEFINITIONS:

- **Effectiveness –** In this study, it refers to the extent to which the outcome measure of difference between pre-test and post-test pain scores after the administration of Muscle strengthening exercises and is assessed by Modified pain scale on joint pain, stiffness and quality of life.
- **Muscle Strengthening Exercises –** In this study, it refers to the active isometric and isotonic exercises, including Sit to stand, Knee extension, Squats, Wall push offs, Hip extension, Heel raises, Bicep curls, Upright rows, Arm punches. The duration of the exercises are 35 minutes per day daily for 20 consecutive days.
- **Joint pain –** In this study, it refers to the symptom of joint pain associated with Arthritis, Osteoarthritis, Rheumatoid arthritis and Tendinitis which is assessed by using the Modified pain scale on joint pain, stiffness and quality of life.
- **Late middle age group –** In this study it refers to the people, age group of 45-65 years of both male and female.

CONCEPTUAL FRAMEWORK:

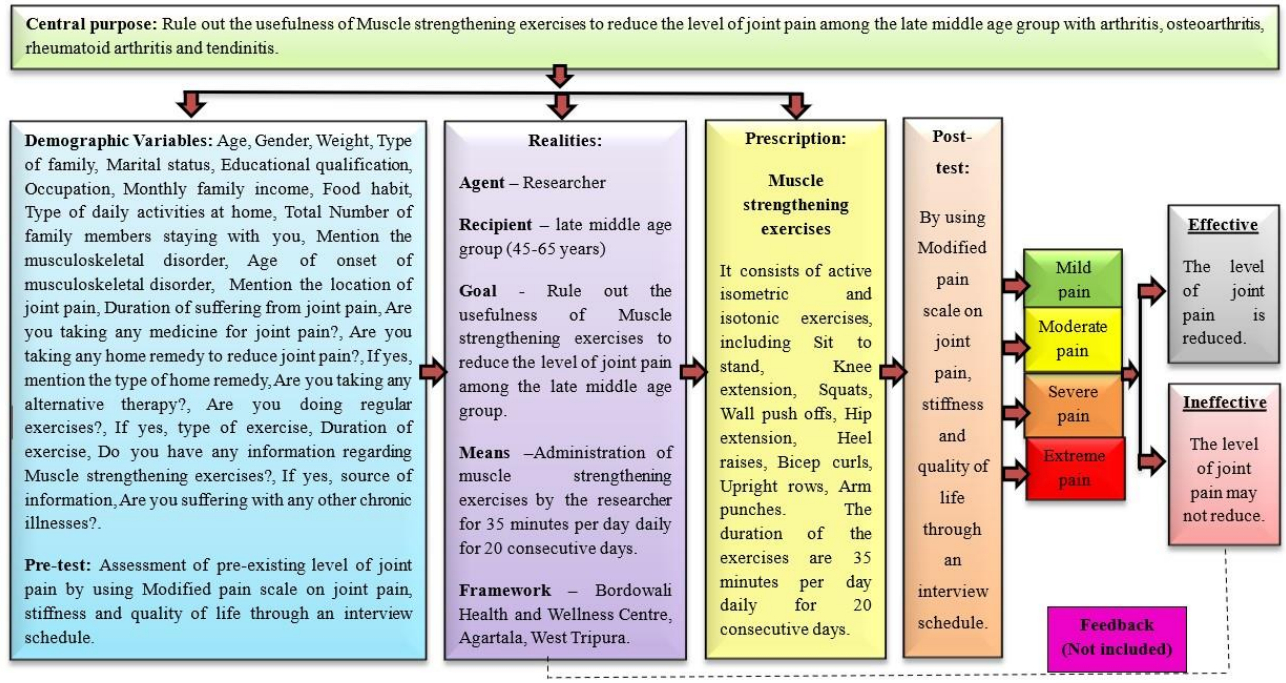

Fig-1: Conceptual framework based on Modified Wiedenbach's Helping Art of Clinical Nursing Theory (1964)

DELIMITATIONS:

1. The study was delimited to the late middle age group suffering from joint pain.
2. The study was delimited to the Bordowali Health and Wellness Centre, Agartala, West Tripura.

REVIEW OF LITERATURE:

Review of literature of the present study had been organized under the following sections. Section – I: Studies related to prevalence of joint pain among the middle age group. Section – II: Studies related to effectiveness of Muscle strengthening exercises in reduction of joint pain.

RESEARCH METHODOLOGY:

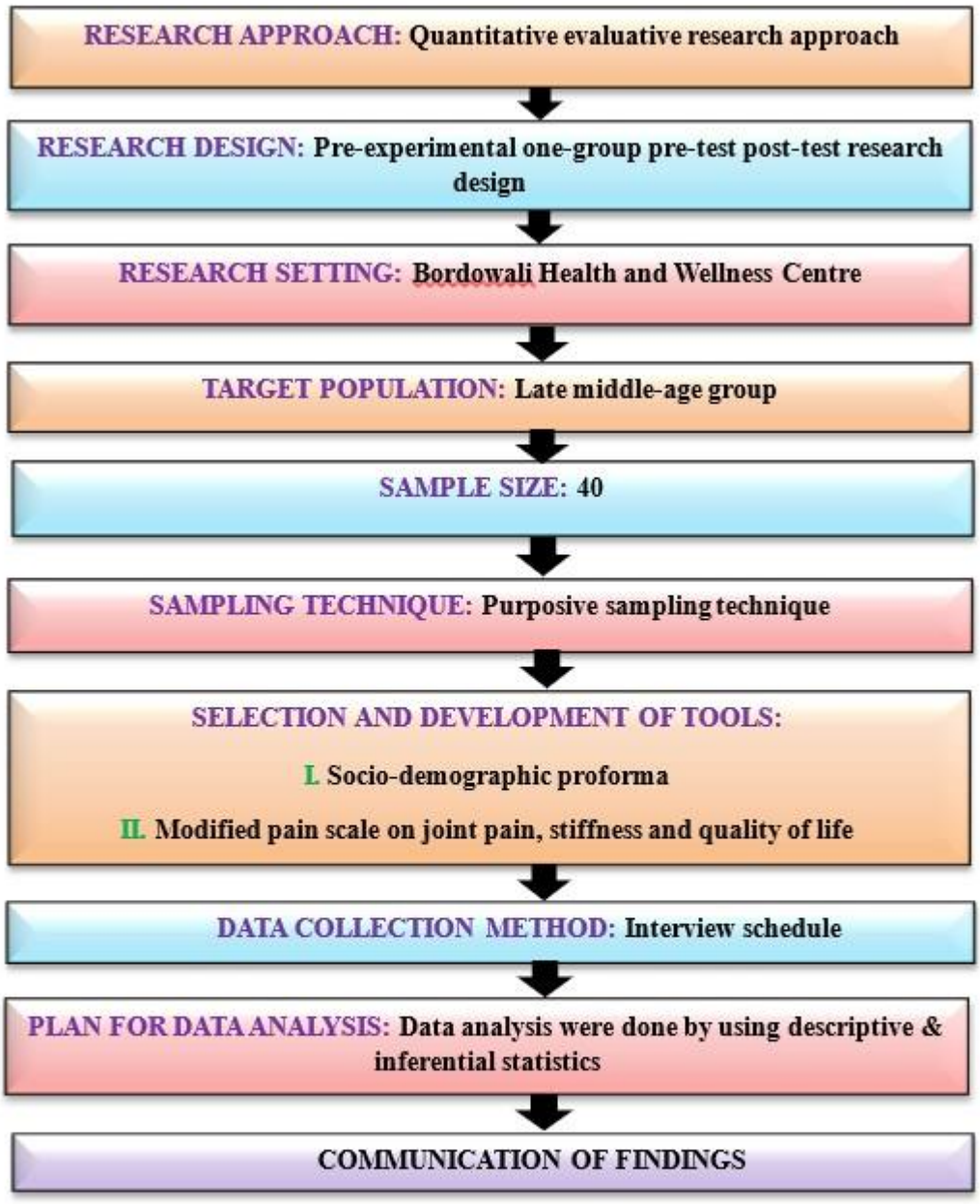

Fig-2: Schematic presentation of research methodology

CRITERIA FOR SAMPLE SELECTION:

Inclusion criteria – The late middle age group,

1. Have suffered with arthritis, osteoarthritis, rheumatoid arthritis and tendinitis and under pharmacological treatment.
2. Willing to participate in the study.

Exclusion criteria – The late middle age group,

1. Have joint pain with neurological disorders.
2. Have pain in neck area.
3. Have joint pain with medical conditions and restrictions in movements.
4. Who have under physiotherapy and yoga.

DESCRIPTION OF TOOLS:

TOOL – I: Socio-demographic proforma**.** It consists of 20 (twenty) items.

TOOL – II: Modified pain scale on joint pain, stiffness and quality of life. The sources of the tool were

1. **WOMAC index** (Western Ontario and McMaster Universities Osteoarthritis), developed at the Western Ontario and McMaster Universities in the year of 1982
2. **WOMAC index which was modified by CRD, Pune** (Center for Rheumatic Diseases), developed by Centre For Rheumatic Diseases (CRD), Pune, in the year of 1986 and
3. **KOOS** (Knee Injury and Osteoarthritis Outcome Score), developed by the Ewa M Roos and Colleagues at the Departments of Orthopaedics at Lund University, Sweden and at the University of Vermont, USA, in the year of 1995.

VALIDITY OF TOOLS: Validity of the tools were done by total 7 Experts of related fields on Master's in Medical Surgical Nursing Specialty (5), Physician of Orthopedics (1), Physiotherapist (1).

RELIABILITY OF TOOL:

Date: 27/3/2023 to 28/3/2023. **Setting:** Ujan Abhoynagar Health and Wellness Centre, Agartala, West Tripura. **Sample:** 20 late middle age group people. **Reliability of tool:** Reliability of the Tool – II: Modified pain scale on joint pain, stiffness and quality of life was tested by Karl Pearson's Correlation Coefficient (Test-retest method) formula on 20 samples. The reliability obtained by the method was **0.9**, which indicated that the tool was highly reliable.

PILOT STUDY:

The mean post-test level of pain score (41±10.48) was lower than the mean pre-test level of pain score (66±9.4) with the mean difference of 25. The paired 't' test value (5.61) was also found significant at 0.05 level of significance (df=9, table value=2.26). It indicated that the mean post-test level of pain score was significantly lower than the mean pre-test level of pain score. So, Muscle strengthening exercises were an effective measure to reduce the level of joint pain among the late middle age group.

PROCEDURE FOR DATA COLLECTION:

Table-1: Data collection method of main research study

Data collection procedure	Day	Number of participants	Duration
1. Socio-demographic proforma. 2. Pre-test with the use of Modified pain scale on joint pain, stiffness and quality of life. 3. Muscle strengthening exercises. 4. Post-test with the use of that same Modified pain scale on joint pain, stiffness and quality of life.	**Pre- test Day-1 (1st group)** 8/5/2023	20	20 X 10 mins = 200 mins (3 hours 20 mins)
	Pre-test Day-2 (2nd group) 10/5/2023	20	20 X 10 mins = 200 mins (3 hours 20 mins)
	Intervention Day-3rd to 22nd (11/5/2023 to 30/5/2023)	40	35 mins/day. 1st group – 10:30 am to 11:05 am 2nd group – 4:30 pm to 5:05 pm
	Post-test Day-22 (30/5/2023) **1st group**	20	35 mins + (20 X 5 mins) = 135 mins (2 hour 15 mins)
	2nd group	20	35 mins + (20 X 5 mins) = 135 mins (2 hour 15 mins)

ANALYSIS & INTERPRETATION OF DATA:

All hypotheses were tested at 0.05 level of significance.

- **H_1:** The mean post-test level of pain score is significantly lower than the mean pre-test level of pain score.
- **H_2:** There is a significant association between pre-test level of joint pain among the late middle age group with their selected demographic variables.

Null hypotheses –

- **H_{01}:** The mean post-test level of pain score is not lower than the mean pre-test level of pain score.
- **H_{02}:** There is no significant association between pre-test level of joint pain among the late middle age group with their selected demographic variables.

SECTION – 1: FINDINGS RELATED TO THE FREQUENCY AND PERCENTAGE DISTRIBUTION OF SOCIO-DEMOGRAPHIC PROFORMA

Out of the 40 samples of late middle age group – 45% of the samples were belongs to the age group of 59-65 years and only 17.5% of the samples were belongs to the age group of 52-58 years, mostly 80% of the samples of late middle age group were female and only 20% of the samples were male, 70% samples of late middle age group were belongs to nuclear family and only 2.5% of the samples were belongs to extended family, 55% of the samples of late middle age group, their type of daily activities at home were

cooking, dusting, moping, washing clothes, marketing and only 5% of the samples type of daily activities at home were marketing, washing clothes, 75% samples of late middle age group, the total number of family members staying with the sample were 1-5 nos. of family members and only 2.5% of the samples were staying with 11-15 nos. of family members, 60% of the samples of late middle age group, their musculoskeletal disorder were osteoarthritis and only 2.5% of the samples were having rheumatoid arthritis, 32.5% of the samples age of onset of musculoskeletal disorder were 37-42 years and only 12.5% of the samples age of onset of musculoskeletal disorder were 55-60 years, 27.5% of the samples location of joint pain were found both in knee joint, lower back and in knee joint, and only 2.5% of the samples had pain both in knee joint, shoulder joint and in knee joint, lower back, elbow joint, ankle joint, 52.5% of the samples of late middle age group, their duration of suffering from joint pain were from 8-13 years and only 12.5% of the samples duration of suffering from joint pain were from 14-19 years, 72.5% samples of late middle age group were not taking any medicine for joint pain and only 27.5% of the samples were taking medicine for joint pain, 72.5% samples of late middle age group were not doing regular exercises and only 27.5% of the samples were doing regular exercises where maximum 55% of the samples were doing walking for 30 minutes/day and only 45% of the samples were doing free hand exercise for 30 minutes/day, 47.5% of the samples were not suffering with any other chronic illnesses and only 2.5% of the samples had diabetes mellitus, hypertension, hyperthyroidism.

SECTION – 2: FINDINGS RELATED TO EFFECTIVENESS OF MUSCLE STRENGTHENING EXERCISES ON JOINT PAIN AMONG THE LATE MIDDLE AGE GROUP

Table-3: Frequency and percentage distribution of pre-test and post-test pain score of late middle age group

N=40

Level of pain	Score	Pre-test		Post-test	
		Frequency	Percentage	Frequency	Percentage
Mild pain	0-25 (25%)	3	7.5%	**14**	**35%**
Moderate pain	26-50 (50%)	12	30%	**18**	**45%**
Severe pain	51-75 (75%)	**19**	**47.5%**	8	20%
Extreme pain	76-100 (100%)	**6**	**15%**	0	00%
Total	100 (100%)	40	100%	40	100%

Minimum pain score – 0 **Maximum pain score** – 100

In post-test, out of 40 (forty) samples, 0% (0) had extreme pain, 20% (8) of the samples had severe pain, 45% (18) of the samples had moderate pain and 35% (14) of the samples had mild pain. The above findings revealed that Muscle strengthening exercises were able to reduce the level of joint pain from extreme pain to mild pain. So, it indicated that Muscle strengthening exercises were an effective measure to reduce the level of joint pain among the late middle age group.

Table-4: Mean, Median, Standard deviation, Mean difference, 't' value of pre-test and post-test pain score of late middle age group

N=40

Group	Mean	Median	SD	Mean difference	't' value (paired)
Pre-test	63.15	67.87	16.92	28.88	**8.59***
Post-test	34.27	31.41	12.94		

* = Significant at 0.05 level, (df = 39, table value = 2.02)

The mean post-test level of pain score (34.27) was lower than the mean pre-test level of pain score (63.15) with the mean difference of 28.88. The post-test median pain score (31.41) was also lower than the pre-test median pain score (67.87). The post-test standard deviation (12.94) was dispersed than the pre-test standard deviation (16.92). Paired 't' test value 8.59 (df=39, table value=2.02), which was significant at 0.05 level of significance. Hence, null hypothesis (H_{01}) was rejected and research hypothesis (H_1) was accepted, which indicated that the Muscle strengthening exercises were an effective measure to reduce the level of joint pain among the late middle age group.

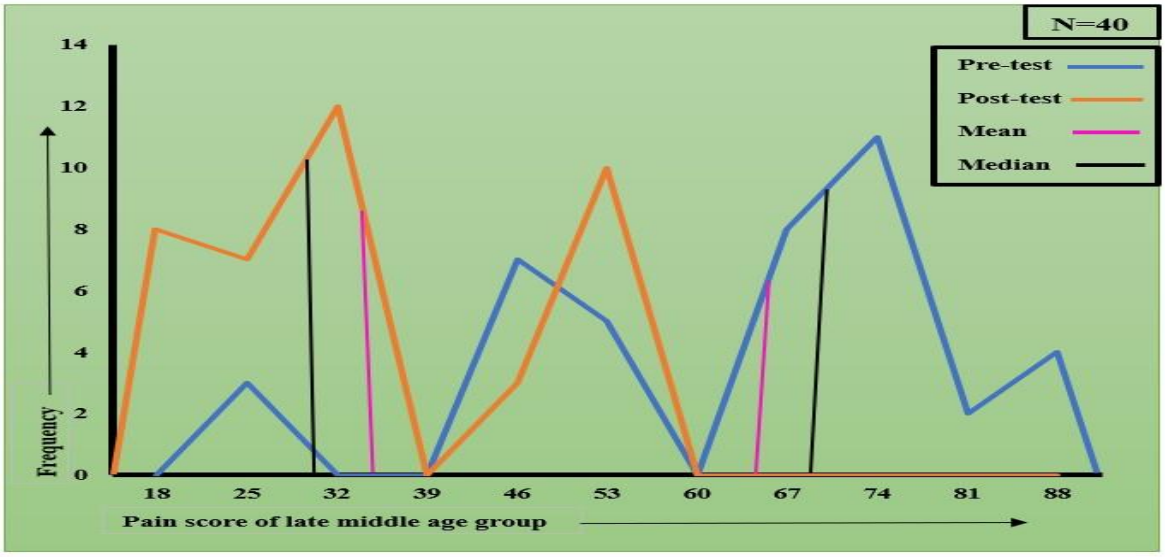

Fig-25: Frequency polygon on pre-test and post-test pain score of late middle age group

The post-test frequency polygon was lie down on the left side of the pre-test frequency polygon, which indicated that the post-test pain score was lower than the pre-test pain score. The skewness of the pre-test frequency polygon was negative (- 0.8), which revealed that the maximum samples of late middle age group had more pain score than the average pain score. The skewness of the post-test frequency polygon was positive (0.6). Positive skewness in the post-test indicated that the maximum samples of late middle age group had less pain score than the average pain score. So, it revealed that Muscle strengthening exercises were an effective measure to reduce the level of joint pain among the late middle age group.

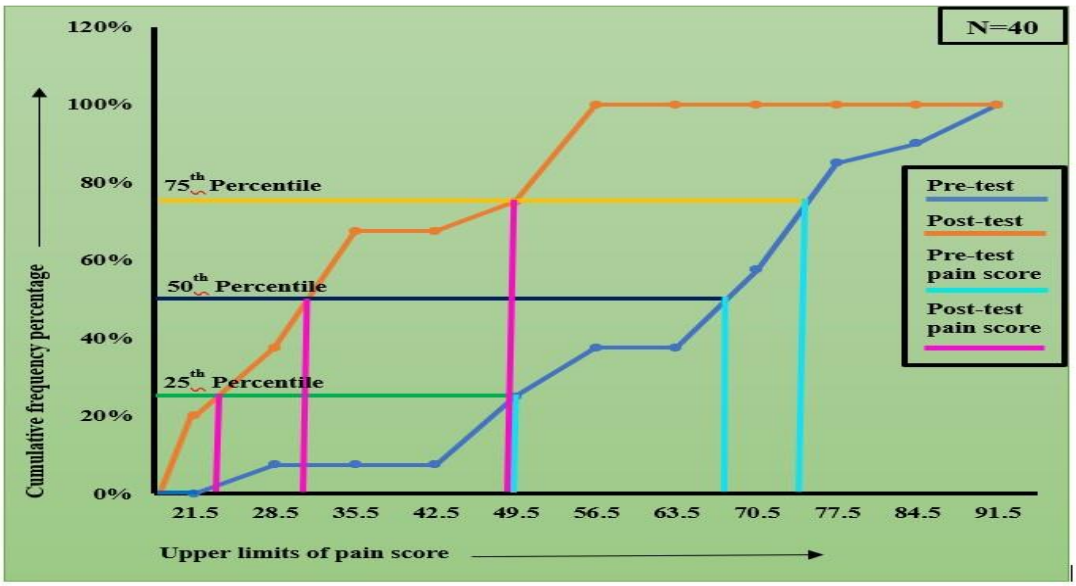

Fig-26: Ogive on pre-test and post-test pain score of late middle age group

In every percentile (25%, 50%, 75%), the post-test mean score lines were lie down in the left side of the pre-test mean score lines. Also, in every percentile (25%, 50%, 75%), the post-test pain scores were 22.9, 31.3, 49.5, which were lower than the pre-test pain scores 49.5, 67.7, 74.7. The reduction in the pain scores among the late middle age group after the administration of Muscle strengthening exercises were obvious by differences in pre-test and post-test pain scores at various levels of Ogive. So, it revealed that there was a reduction in the post-test pain score after the administration of the Muscle strengthening exercises.

SECTION – 3: FINDINGS RELATED TO THE ASSOCIATION BETWEEN PRE-EXISTING LEVEL OF JOINT PAIN AMONG THE LATE MIDDLE AGE GROUP WITH THEIR SELECTED DEMOGRAPHIC VARIABLES

There was a significant association between pre-test level of joint pain among the late middle age group with their selected demographic variables - type of family ['F' value=3.86, table value=3.23, df between group – 2, within group – 37], total number of family members staying with you ['F' value=3.31, table value=3.23, df between group – 2, within group – 37], duration of suffering from joint pain ['F' value=5.52, table value=3.23, df between group – 2, within group – 37] were significant at 0.05 level of significance. Hence, null hypothesis (H_{02}) was rejected and research hypothesis (H_2) was accepted, which indicated that the pre-test level of joint pain among the late middle age group was dependent on their selected demographic variables such as – type of family, total number of family members staying with you, duration of suffering from joint pain.

CONCLUSION:

The present study was conducted to evaluate the effectiveness of Muscle strengthening exercises on joint pain among the late middle age group in Bordowali Health and Wellness centre, Agartala, West Tripura. The statistical findings of the present study revealed that Muscle strengthening exercises were an effective measure to reduce the level of joint pain among the late middle age group. Analysis of variance (ANOVA) 'F' value also showed significant association between pre-test level of joint pain among the late middle age group with their selected demographic variables – type of family, total number of family members

staying with you, duration of suffering from joint at 0.05 level of significance, which indicated that the pre-test level of joint pain among the late middle age group was dependent on their selected demographic variables such as - type of family, total number of family members staying with you, duration of suffering from joint pain.

IMPLICATIONS:

- **Nursing education –**
  - Imparting the concept of Muscle strengthening exercises to nursing students by conducting workshop, seminar and conference.
  - The nursing students will learn regarding the Muscle strengthening exercises as an intervention to reduce joint pain and also include it in their syllabus.
- **Nursing practice –**
  - Nursing officers should perform Muscle strengthening exercises daily with their patients.
  - Those patients who are suffering from joint pain associated with arthritis, osteoarthritis, rheumatoid arthritis and tendinitis, they must be encouraged to participate in the Muscle strengthening exercises

  Nursing administration –
  - Nursing administrator can organize CNE program on Muscle strengthening exercises for reducing joint pain in all health sectors.
  - Nurse administrator can conduct successful in-service and public awareness program regarding Muscle strengthening exercises to reduce joint pain in every ward of the hospital as well as community area.
- **Nursing research –**
  - The study will serve as a valuable reference material for further investigations.
  - The findings of the study will serve as the basis for professionals and the students to conduct further studies.

LIMITATIONS OF THE STUDY:

1. The study was confined to only a single setting with experimental group.

RECOMMENDATIONS OF THE STUDY:

1. A similar study can be conducted among the patients with joint pain in hospital setting.
2. A comparative study can be conducted between different measures of strengthening exercises to reduce joint pain.
3. A similar study can be replicated on large sample there by findings can be generalized to a large population.
4. A quasi-experimental study can be conducted to evaluate the effectiveness of Muscle strengthening exercises on joint pain.

REFERENCES:

1. Chalise. H. Aging: Basic concept. American journal of biomedical science & research. [Internet]. 2019 – 1(1). Available from: https://www.researchgate.net/publication/330116948_Aging_Basic_Concept
2. Dyussenbayev. A. Age periods of human life. Advances in social sciences research journal. [Internet]. 2017 March 25; 4(6): 258-263. Available from: 2924-Article Text-7575-1-10-20170401

3. Middle age. Wikipedia. [Internet]. Available from: https://en.m.wikipedia.org/wiki/Middle_age
4. Zambon. V. What to know about joint pain. Medical News Today. [Internet]. 2020. Available from: https://www.medicalnewstoday.com/articles/joint-pain#symptoms
5. World population ageing 2019. United Nations Department of economic and social affairs. [Internet]. 2019. Available from: https://www.un.org/en/development/desa/population/publications/pdf/ageing/WorldPopulationAgeing2019-Highlights.pdf