

## Awareness, Knowledge, Attitude And Practice Of Physiotherapist Towards Diaphragmatic Breathing Techniques on Balance In Obese Individuals.

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### ABSTRACT:

Obesity is linked with impaired postural stability, alters respiratory mechanism, contributing to balance dysfunction and increased risk of fall. Diaphragm plays a major role in stabilizing the trunk by regulating intra abdominal pressure. Although literature supports role of diaphragmatic breathing exercises in improving balance, the extent to which physiotherapist are aware, knowledgeable and practicing these technique in obese individuals remains unclear.

Objective: To evaluate the awareness, knowledge, attitude and practice of physiotherapists regarding the use of diaphragm breathing technique for balance rehabilitation in obese individuals. Methodology: A structured questionnaire survey was conducted amongst 117 licensed physiotherapists based on inclusion/exclusion criteria. Results: 98.3% of physiotherapist's demonstrated awareness of diaphragmatic breathing as a therapeutic technique and 92.3% recognized that obesity affects balance and stability; only 29% reported applying this intervention specific for balance rehabilitation in obese population. Lack of standardized protocol and time constraints were reported barriers to implementation. Conclusion: In spite strong awareness and positive attitudes, clinical application of diaphragmatic breathing technique for balance rehabilitation in obese individuals remains suboptimal amongst physiotherapists.

**Key words:** Diaphragmatic breathing, Balance control, Postural Stability, Obesity

### INTRODUCTION:

Obesity is a measure of health concern which is affecting over 650million adults and causing morbidity and mortality <sup>[1]</sup>. Due to weight gain and altered movement patterns obese individuals find it difficult to maintain balance. Increase in fat accumulation specially in abdomen region results in shift of body's centre of mass anterior and superior thereby causing less base of support and instability. Excess Adiposity interferes with altered proprioceptive feedback, delayed postural responses to perturbations which lead to diminished postural stability. Compared to normal individuals, obese populations show elevated fall risk which leads to increased injury prevalence and healthcare usage <sup>[2]</sup>.

Recent research evidence has quoted that apart from respiratory function, diaphragm muscle is a key contributor for postural regulation and core stabilization<sup>[3]</sup>. The diaphragm works symbiotically with core muscle to support the spine by regulating intra abdominal pressure. During pre-emptive postural adjustment, diaphragm demonstrates early

activation before limb movements , thus supporting trunk stabilization and force transmission. Techniques like electromyography and ultrasonography has shown an association between reduced diaphragm function and postural stability<sup>[4]</sup>.

A well designed diaphragmatic breathing program has drawn attention towards rehabilitative approach enhancing postural control and balance performances. Individuals with chronic low back pain and stroke survivors, studies have shown that diaphragm breathing exercises reduces postural sway, improve dynamic balance and center of pressure parameters<sup>[5]</sup>. These benefits may contribute to the synergistic effect on lumbopelvic stability, effective neuromotor control execution. Despite of substantial evidence showing biomechanical and neuromuscular contribution of diaphragmatic breathing into balance rehabilitation, a notable gap exists between evidence and practice in physiotherapy especially amongst obese population.

Surveys evaluating physicians' Awareness, knowledge, attitude and practice are crucial tools for determining training gaps, finding obstacles to the application of evidence-based practice, and guiding focused continuing education programs. Physiotherapists attitudes and treatment practices regarding diaphragmatic breathing for balance impairment in obesity have not yet been examined. Effective information is hampered by this knowledge gap, which delays the incorporation of research into clinical guidelines and sustains inadequate management practices for such population with increased fall risk.

It is important to comprehend the existing situation of physiotherapists' Awareness Knowledge Attitude and practice for several reasons. At first particular knowledge gaps that can be filled by curriculum improvement and focused educational interventions in both entry-level and graduate training programs. Second, it identifies the barriers and enablers of attitudes that impact clinical decision-making, which helps shape implementation frameworks and tactics for behavior modification. Third, it describes real-world practice patterns and contextual elements that influence the delivery of interventions, such as institutional support, time restrictions, and resource availability. Lastly, these data serve a base for the creation of quality improvement programs and evidence-based clinical practice guidelines that support the best possible balance rehabilitation for obese people.

In order to inform future educational strategies and scope to improve the adoption of evidence-based practice, thus this cross-sectional survey attempts to assess physiotherapists' awareness, knowledge, attitudes, and practice regarding diaphragmatic breathing techniques for balance rehabilitation in obese populations. Therefore the current study aims to study Awareness, Knowledge, Attitude and Practice of Physiotherapist towards Diaphragmatic Breathing Techniques on Balance in Obese Individuals.

## RESULTS: TABLES

**Table 1: Baseline Characteristics of the study population**

| Characteristics | Category      | N  | %    |
|-----------------|---------------|----|------|
| Gender          | Female        | 97 | 82.9 |
|                 | Male          | 20 | 17.1 |
| Occupation      | Post Graduate | 90 | 76.9 |
|                 | Graduate      | 15 | 12.8 |

## MATERIAL & METHODS:

### Study Design

This study was a descriptive cross sectional survey to access Awareness Knowledge, Attitude and Practice of Physiotherapist towards Diaphragmatic Breathing Techniques on Balance in Obese Individuals.

### Study setting and Participants:

The study was conducted amongst 117 licensed physiotherapist , post graduate physiotherapy students, academicians and practitioners across academic and clinical settings. Participants were recruited from educational institutes, rehabilitation centres, and private clinical practice. Undergraduate students and other health professionals were excluded from the study.

**Development of Questionnaire:** A self-structured questionnaire was developed by reviewing existing literature on diaphragmatic breathing, balance rehabilitation and awareness, knowledge, attitude and practice based survey methodologies. The questionnaire consisted of 5 domains, demographics, awareness, knowledge, attitude and practice. The questionnaire was reviewed several times to improve the clarity by the experts in the field of a physiotherapist. Relevance, clarity and clinical applicability were evaluated. The whole questionnaire was further converted into Google forms for the respondents to respond.

**Ethical Considerations:** Prior ethical clearance was obtained from the Institutional Ethical Committee and Informed consent was obtained from all the participants.

**Procedure:** All the study participants have filled the survey voluntarily without any incentives. The responses collected were converted into a Microsoft excel sheet for data analysis.

|  |              |    |     |
|--|--------------|----|-----|
|  | Academician  | 09 | 7.7 |
|  | Practitioner | 3  | 2.6 |

| Table 2: Awareness towards diaphragmatic breathing technique                       |          |     |      |
|------------------------------------------------------------------------------------|----------|-----|------|
| Statement                                                                          | Category | n   | %    |
| 1.Are you aware of Diaphragmatic breathing as a therapeutic technique              | Yes      | 115 | 98.3 |
|                                                                                    | No       | 2   | 1.7  |
| 2.Are you aware that breathing patterns can affect posture control & stability     | Yes      | 107 | 91.5 |
|                                                                                    | No       | 4   | 3.4  |
|                                                                                    | Maybe    | 6   | 5.1  |
| 3.Are you aware that obesity can impair respiratory mechanics & diaphragm movement | Yes      | 102 | 87.2 |
|                                                                                    | No       | 2   | 1.7  |
|                                                                                    | Maybe    | 13  | 11.1 |
| 4.Are you aware that obesity can affect balance and stability                      | Yes      | 108 | 92.3 |
|                                                                                    | No       | 4   | 3.4  |
|                                                                                    | Maybe    | 5   | 4.3  |
| 5.Are you aware that diaphragm excursion is associated with trunk stability        | Yes      | 94  | 80.3 |
|                                                                                    | No       | 23  | 19.7 |
| 6.Are you aware that specific breathing exercises can target diaphragm muscle      | Yes      | 112 | 95.7 |
|                                                                                    | No       | 0   | 0    |
|                                                                                    | May be   | 5   | 4.3  |

Table 3: Knowledge towards diaphragmatic breathing technique

| Statement                                               | Category                                 | n  | %    |
|---------------------------------------------------------|------------------------------------------|----|------|
| 1.Obesity affects balance because                       | It shifts the body centre of mass        | 93 | 79   |
|                                                         | It weakens core muscle                   | 19 | 16.2 |
|                                                         | It reduces respiratory muscle efficiency | 4  | 3.4  |
|                                                         | Don't Know                               | 1  | 0.8  |
|                                                         | Enhancing trunk stability                | 09 | 7.6  |
| 2.Diaphragm breathing techniques may improve balance by | Improving postural control               | 16 | 13.6 |
|                                                         | Reducing accessory muscle use            | 14 | 11.9 |
|                                                         | All of the above                         | 78 | 66.6 |
|                                                         |                                          |    |      |

|                                       |                     |      |
|---------------------------------------|---------------------|------|
| 3.Diaphragm excursion refers to       | Movement of89       | 76.1 |
|                                       | diaphragm during    |      |
|                                       | breathing           |      |
|                                       | Amount of air14     | 12   |
|                                       | exhaled             |      |
|                                       | Chest wall4         | 3.4  |
|                                       | expansion           |      |
|                                       | Don't Know 10       | 8.5  |
| 4.Diaphragmatic breathing can help    | Improving 9         | 7.7  |
| improve limits of stability by        | proprioceptive      |      |
|                                       | feedback            |      |
|                                       | Increasing trunk10  | 8.5  |
|                                       | muscle endurance    |      |
|                                       | Enhancing 10        | 8.5  |
|                                       | postural control    |      |
|                                       | All of the above 88 | 75.2 |
| 5.Diaphragmatic excursion is measured | Ultra Sonography 43 | 50.4 |
| using                                 | X ray 6             | 6.8  |
|                                       | MRI 3               | 3.4  |
|                                       | Spirometer 34       | 39.3 |

**Table 4: Attitude towards diaphragmatic breathing technique**

| Statement                                                                                                 | Strongly Disagree n(%) | Disagree | Neutral  | Agree    | Strongly Agree |
|-----------------------------------------------------------------------------------------------------------|------------------------|----------|----------|----------|----------------|
| 1.Diaphragmatic training is an essential component of rehabilitation                                      | 0                      | 0        | 8(6.8)   | 38(32.4) | 71(60.6)       |
| 2.Diaphragmatic breathing can be an effective tool for improving balance in obese individuals             | 0                      | 13(11.1) | 36(30.7) | 44(37.6) | 22(18.8)       |
| 3.Healthcare professionals should be trained in teaching diaphragmatic breathing technique                | 0                      | 15(12.8) | 14(11.9) | 36(30.7) | 52(44.4)       |
| 4.Diaphragmatic breathing techniques are easy to teach and implement in clinical practice                 | 0                      | 3(2.5)   | 18(15.3) | 49(41.8) | 47(40.1)       |
| 5.Diaphragmatic breathing techniques should be incorporated into exercises programs for obese individuals | 0                      | 1(0.8)   | 24(20.5) | 54(46.1) | 38(32.4)       |
| 6.I feel confident recommending diaphragm breathing program for balance training                          | 0                      | 0        | 59(50.4) | 30(25.6) | 28(23.9)       |

**Table 5: Practice of Diaphragmatic breathing technique**

| Statement | Category | n | % |
|-----------|----------|---|---|
|-----------|----------|---|---|

|                                                                                                             |                                   |     |      |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------|-----|------|
| 1. Do you teach diaphragmatic breathing to your clients/patients                                            | Yes                               | 114 | 97.4 |
|                                                                                                             | No                                | 3   | 2.2  |
| 2.Frequency of use in clinical practice                                                                     | Daily                             | 52  | 44.4 |
|                                                                                                             | 3-4/week                          | 48  | 41   |
|                                                                                                             | Sometimes                         | 17  | 14.5 |
| 3.Which of the following do you combine diaphragm breathing with                                            | Core activation                   | 103 | 88   |
|                                                                                                             | Gait training                     | 4   | 3.4  |
|                                                                                                             | Postural Correction               | 10  | 8.5  |
|                                                                                                             | Balance training                  | 0   | 0    |
| 4.Have you used diaphragmatic breathing technique specifically in obese individuals with balance complaints | Yes                               | 34  | 29   |
|                                                                                                             | No                                | 83  | 70.9 |
| 5.Have you observed improvement in balance after incorporating diaphragmatic breathing                      | Yes                               | 48  | 41   |
|                                                                                                             | No                                | 2   | 1.8  |
|                                                                                                             | Unsure                            | 67  | 57.2 |
| 6.Barriers in using Diaphragmatic breathing technique clinically                                            | Not gone through recent evidences | 04  | 3.4  |
|                                                                                                             | Time Consuming                    | 08  | 6.8  |
|                                                                                                             | Lack of awareness                 | 45  | 38.4 |
|                                                                                                             | Not integrated into the protocol  | 60  | 51   |

**DISCUSSION:**

As per the current study it was found that despite a high level of professional awareness and knowledge about diaphragmatic breathing, its limited use into clinical practice of obese individuals with balance problems highlights the key findings of the study. 98.3% of physiotherapists demonstrated awareness of diaphragmatic breathing as a therapeutic technique and 92.3% recognized that obesity affects balance and stability, only 29% reported applying this intervention specific for balance rehabilitation in obese population. Apart from favorable attitudes and biomechanical understandings, evidence based practice in this area faces a significant implementation gap.

As per experimental and clinical evidence , diaphragm function contributes to postural control and balance through various physiological mechanisms. While performing diaphragmatic breathing exercises, the abdominal pressure increases which activates pelvic floor and abdominal wall muscles, thereby improving spine stability during static and dynamic balance exercises.

Recent evidence has confirmed improvements in static and dynamic balance following diaphragmatic breathing exercises in athletes with chronic low back pain and elderly women<sup>[6]</sup>. Furthermore, a study comparing active recovery modalities in sedentary employees demonstrated that

diaphragmatic breathing exercises were superior to foam rolling in restoring postural stability after core muscle fatigue, with significant reductions in center of pressure velocity ( $p < 0.001$ ) [7].

The untapped diaphragmatic breathing in obese population is causing concern since this population's biomechanical changes affect respiratory function and postural control. Recent ultrasound studies have revealed that individuals with obesity exhibit greater diaphragm thickness at end-inspiration but reduced diaphragmatic excursion and lower thickening fraction during both quiet and forced breathing indicating that despite compensatory hypertrophy, diaphragmatic mechanical efficiency remains compromised [8]. Another study stated that individuals with high Body Mass Index (BMI) have preserved static stability but impaired dynamic balance control in the Antero-Posterior direction reflected through higher centre of pressure amplitude and velocity [9]. This information may assist with development of balance rehabilitation strategies for individuals with high BMI.

As per our study findings the primary problems are systemic rather than knowledge based. 51% participants responded lack of protocol integration, 38.4% reported awareness deficit regarding condition specific application and 6.8% for time constraints. It suggests that conventional awareness raising interventions may not be suffice without protocols and implementation framework. Even though there is a strong theoretical knowledge, a high percentage of respondents expressed uncertainty about clinical effectiveness and have inadequate measurement practices when applied.

In this study comprehensive assessment of awareness, knowledge, attitude and practice were assessed, it is understood that evidence translation falls short in real world clinical workflow which has remained unexplored in research of the diaphragm.

#### LIMITATIONS:

The cross sectional study precludes casual interference about knowledge domains and practice behaviours. There is potential bias in self reporting practice and lack of objective clinical outcome measure limits the conclusion. The sampling approach and geographic approach may reduce the generalizability of the findings to other clinical settings and health care systems.

#### FUTURE SCOPE OF STUDY:

Future research should adopt implementation frameworks which should include

- Development of standard protocols for assessing diaphragm function and balance in obese individuals.

- Diaphragmatic breathing interventions with appropriate dosages
- Incorporating objective outcomes for balance and postural control in obese individuals
- 97.4% of respondents reported already teaching diaphragmatic breathing to patients, focused educational interventions emphasizing condition-specific application and objective outcome measurement may be more impactful than broad awareness-based approaches. Such initiatives should incorporate interactive case-based learning, structured clinical decision-support tools, and hands-on training, which have demonstrated effectiveness in facilitating evidence-based practice translation in healthcare settings.

#### CONCLUSION:

This study shows a gap between physiotherapist Knowledge of Diaphragmatic breathings theoretical benefits and its application for balance rehabilitation in obese population.

The main challenge lies not in professional understanding but implementation readiness due to lack of standardized protocols, insufficient condition specific training.

Supported by mechanistic rationale, favorable safety profile, and low resource burden, Diaphragmatic breathing shows a highly feasible intervention; targeted implementation strategies addressing systemic barriers may improve clinical practice and patient outcomes in this population.

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