

Treatment of dysfunctional breathing: MARM and NQ compared

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Dysfunctional breathing

- Symptom pattern
 - eg Nijmegen Questionnaire
- Ventilation parameters
 - Hypocapnia
- Breathing pattern
 - Small expiration pauses, thoracic dominance, irregularity

Conceptual definition

- Unnecessary tension in breathing: more difficult, effortful, less flexible, adaptive and more unevenly distributed than necessary under given circumstances
- Circumstances do not include a specific and satisfactory cause
- It responds to tension regulation

Symptom pattern

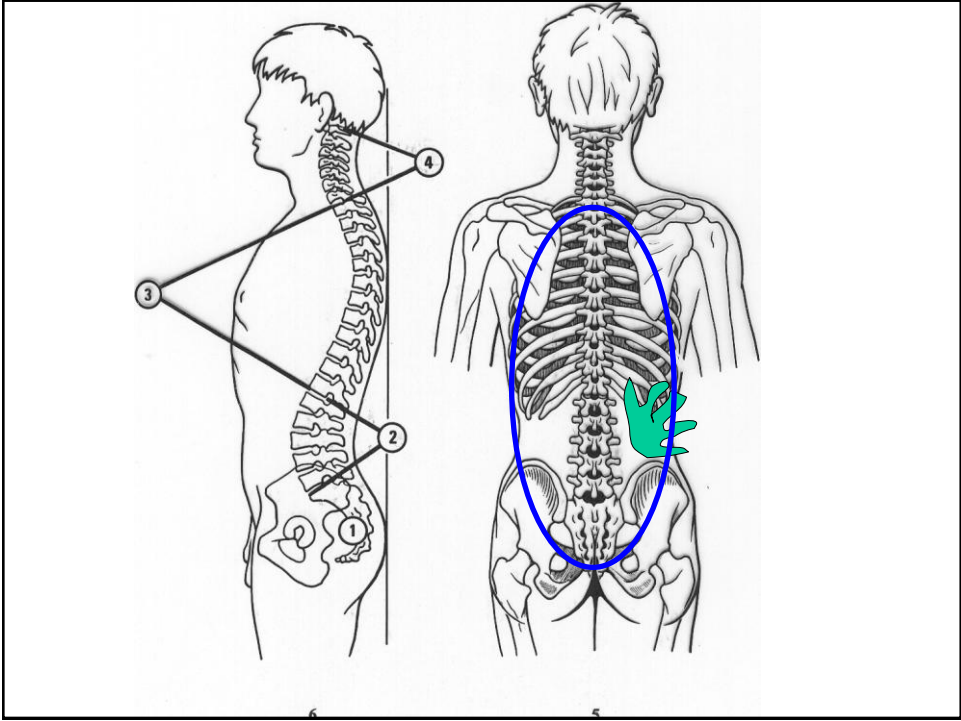
- May lead to subjective sensations as dyspnea (air hunger, breathing effort), hyperventilation symptoms, unrest and tension
- Nijmegen questionnaire summarizes hyperventilation complaints (tingling, dizziness), dyspnea, tension and anxiety

Breathing pattern

- MARM (Manual Assessment Respiratory Movement) quantifies palpatory experience of observer of distribution of breathing movement
- Size or area: how much of trunk is involved in breathing (large or small)
- Level: involvement of ribcage, upper chest, abdomen (high, low or middle)

Research questions

- Is breathing movement (thoracic dominance) related to symptoms?
- Are MARM and NQ related pre treatment?
 - Do MARM and NQ respond to treatment?
 - Does the response in complaints depend upon presence of breathing movement abnormalities (thoracic dominance)

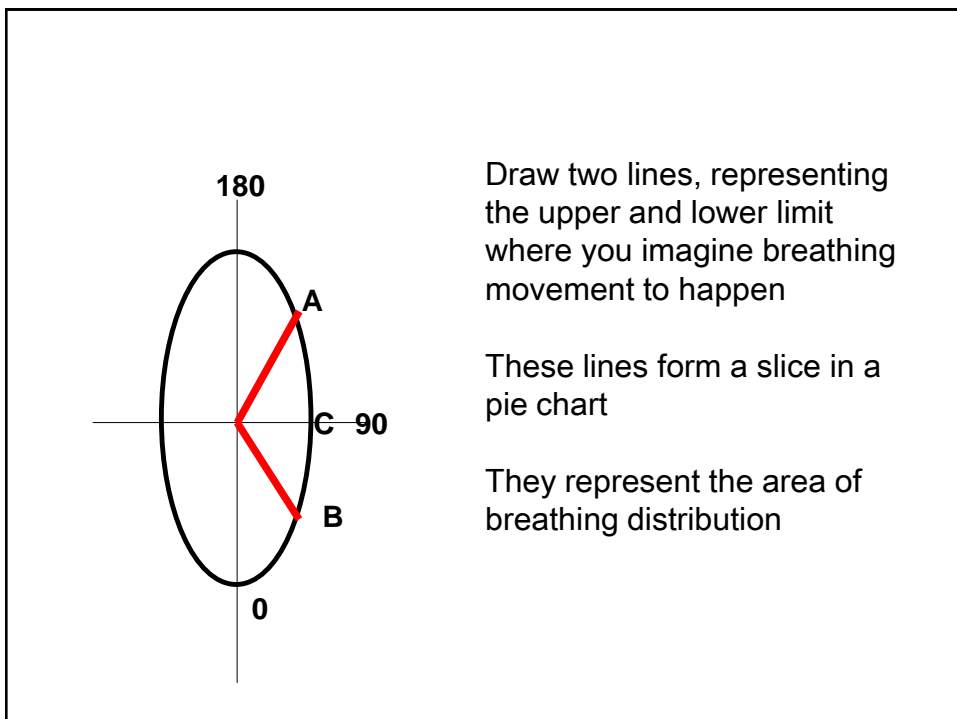
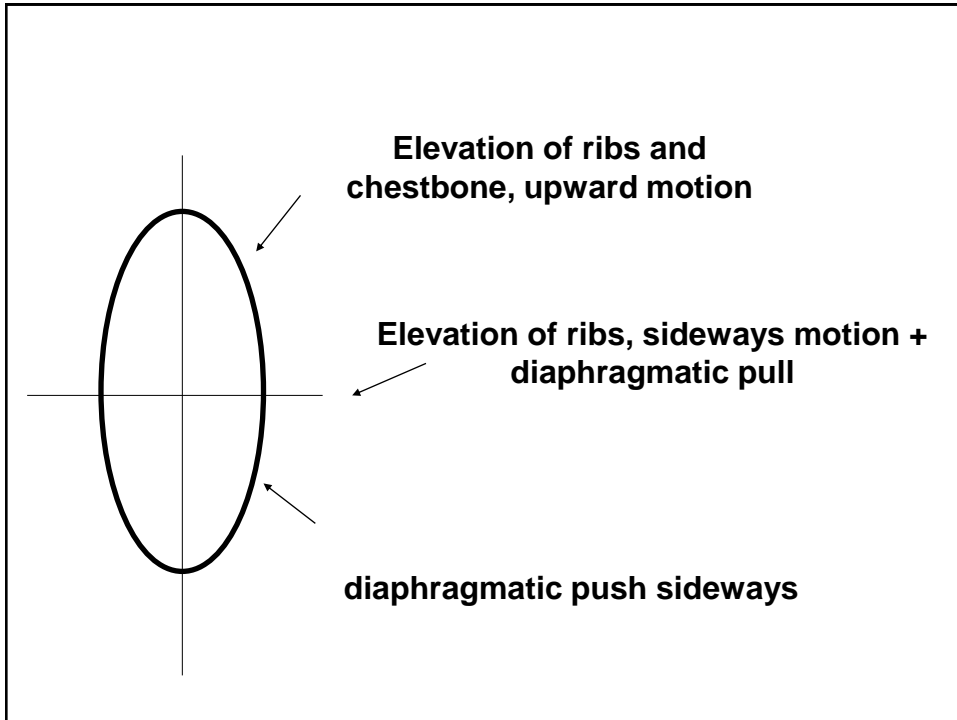


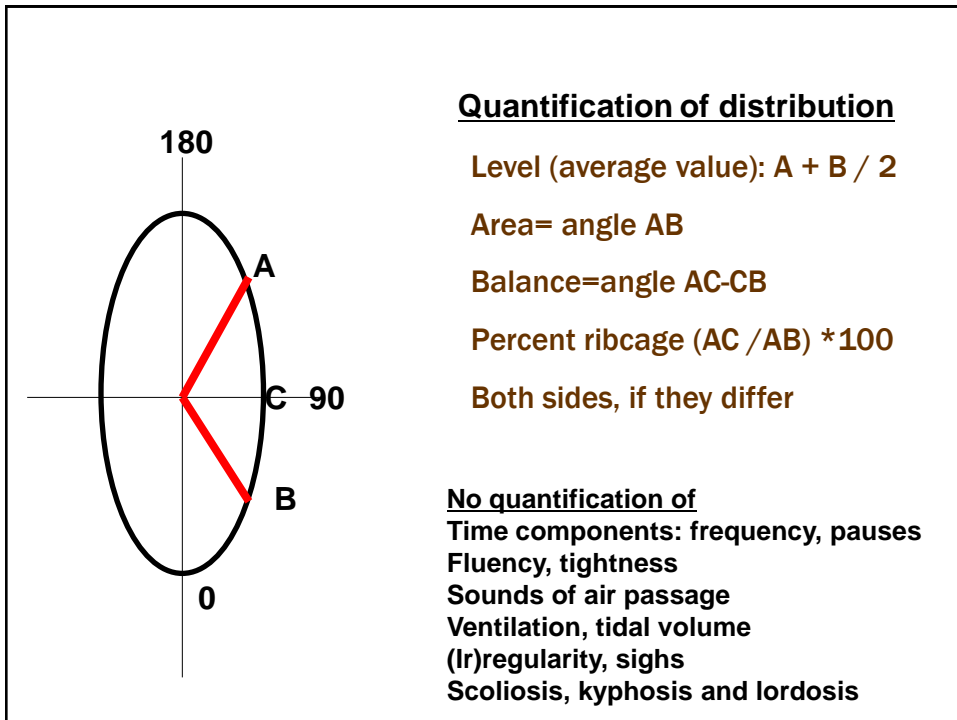
Procedure assessee

- Sit on a flat, horizontal stool, feet in front of knees, slightly separate
- Hands on upper legs, look straight ahead
- Move a few times front and back, to find the middle
- Sit comfortably, easily, not upright
- Notice the weight in the sitting bones

Procedure assessor

- Sit behind subject, on a lower stool
- Slide the fingers along the spinal column
- Put palms of the hands flat on the back, thumbs vertical and parallel to the spinal column, at the level of thoraco-lumbar junction, be neutral
- 2nd and 3rd finger on the ribs, 4th and 5th finger and hypothenar area below the ribs
- Notice sideways expansion during inhalation
- Form a mental picture of the area of expansion: how far above and below the horizontal line?





Reliability and validity

- 12 subjects, experienced in breath control, performed 9 different situations: sitting normal, slump and upright, each breathing normal, abdominal and thoracic
- Two assessors did MARM and they were monitored with life shirt

Courtney,R.; van,Dixhoorn J.; Cohen,M. Evaluation of Breathing Pattern: Comparison of a Manual Assessment of Respiratory Motion (MARM) and Respiratory Induction Plethysmography. Appl.Psychophysiol.Biofeedback, 2008, 33-2: 91-100

- Inter examiners reliability: high for MARM balance (0.85) and %ribcage (0.84), low for area (0.13), n.s.
- Correlations Lifeshirt and MARM: %ribcage 0.60; MARM balance 0.59; MARM area 0.21 ($p < 0.05$)
- Breathing and posture situations were differentiated well; MARM did better than Lifeshirt

Patients

- 62 consecutive patients with a wide range of complaints were referred or self-referred to a primary care practice for breathing therapy (16 men, 46 women, 39 years of age) to reduce tension
- Treatment was individual and took on average 6 sessions of about one hour

Measurements

- NQ and MARM were done at the start, at the fourth session and at the end of treatment
- Data were entered as part of an internet based survey of treatment outcome
- NQ subscores (including dyspnea) were entered at a later moment, available for 40 patients

Treatment

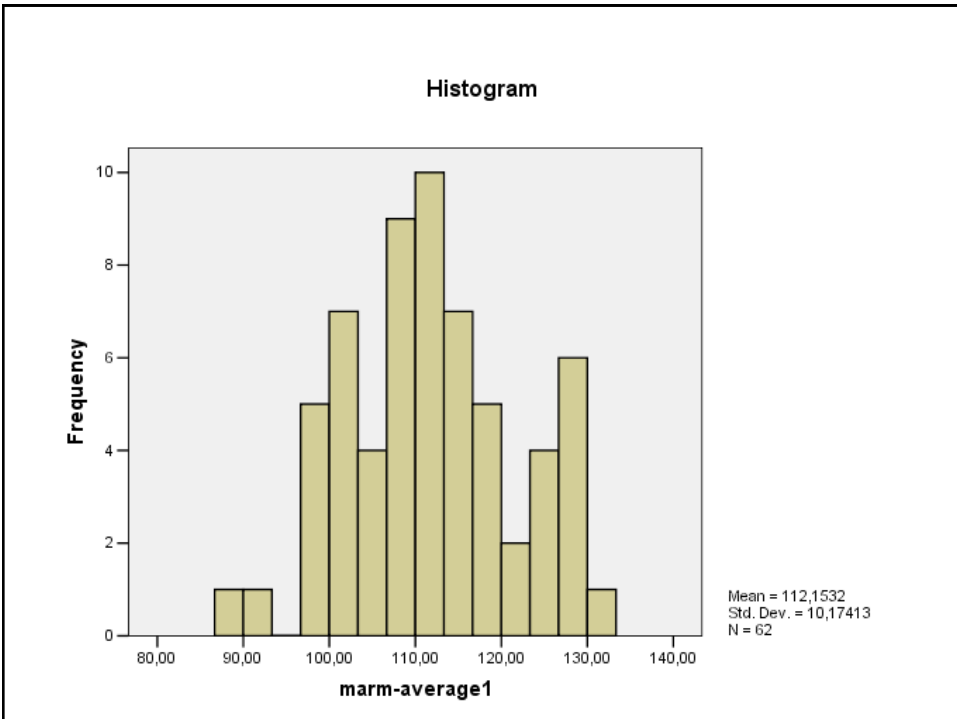
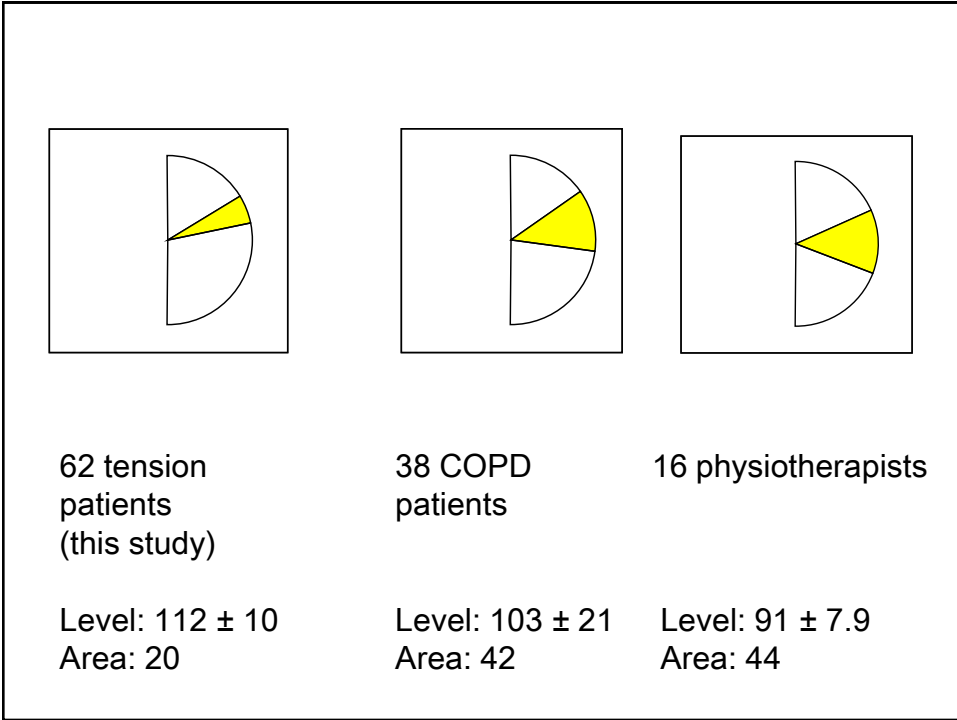
- ‘Whole body breathing’ is a process-driven therapy, including over 40 different interventions which are tailored to the individual
- Instructions use breathing, attention, imagery, movement and posture as well as manual techniques

J van Dixhoorn. Whole body breathing. In: P Lehrer et al ‘Principles and practice of stress management’. Guilford press, 2007; 291-232.

- Primary purpose is to discover unnecessary tension by assessing and enhancing the ability to regulate one's tension by oneself, using any modality, within 3-4 sessions.
- Complaints which are tension-related respond favourably
- When 3-4 sessions do not suffice, treatment is prolonged

Results

- MARM level was elevated (> 90) and showed a small, thoracic breathing pattern at the start, compared to normals and COPD patients
- Taking a value of 105 as cut-off point, 44 patients were classified with a dysfunctional breathing pattern
- Little differences between complaint categories (headache / sleep lower level)



Results symptoms

- Nijmegen score was elevated at the start (22.8 ± 8.3)
- Using a value of >20 as cut-off criterion 24 patients scores below and 38 were classified as dysfunctional breathing
- All subscores were elevated

Relation NQ - MARM

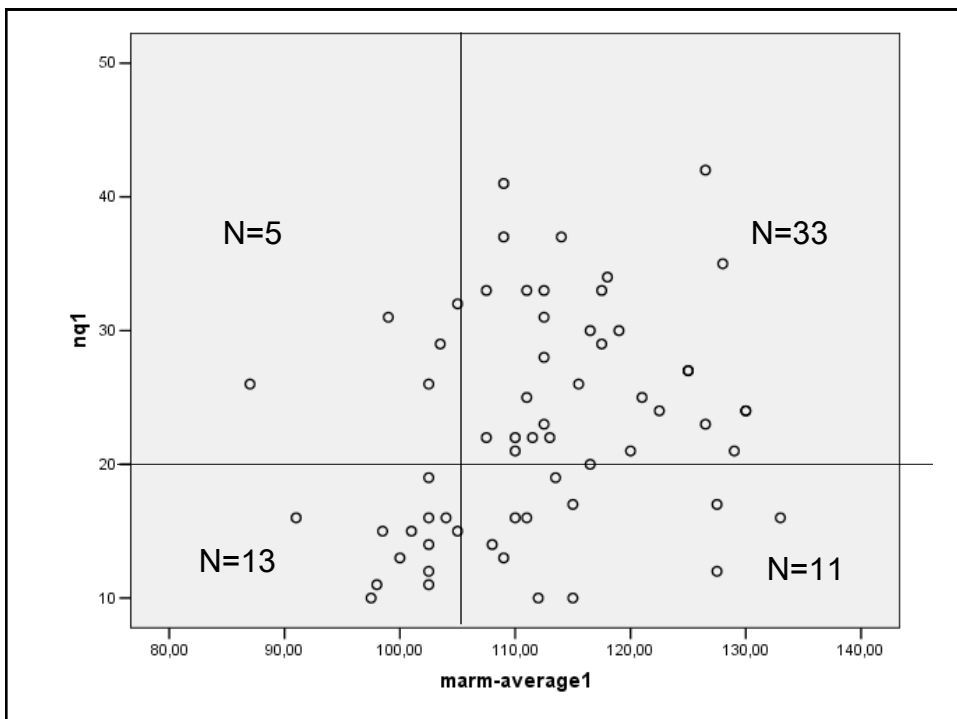
- There is a small correlation between MARM level and NQ ($r=0.26$, $p< 0.05$), but not with area.
- This correlation is mainly due to the subscore of dyspnea ($r=0.32$, $p<0.05$), no correlations with other subscores or with MARM area.

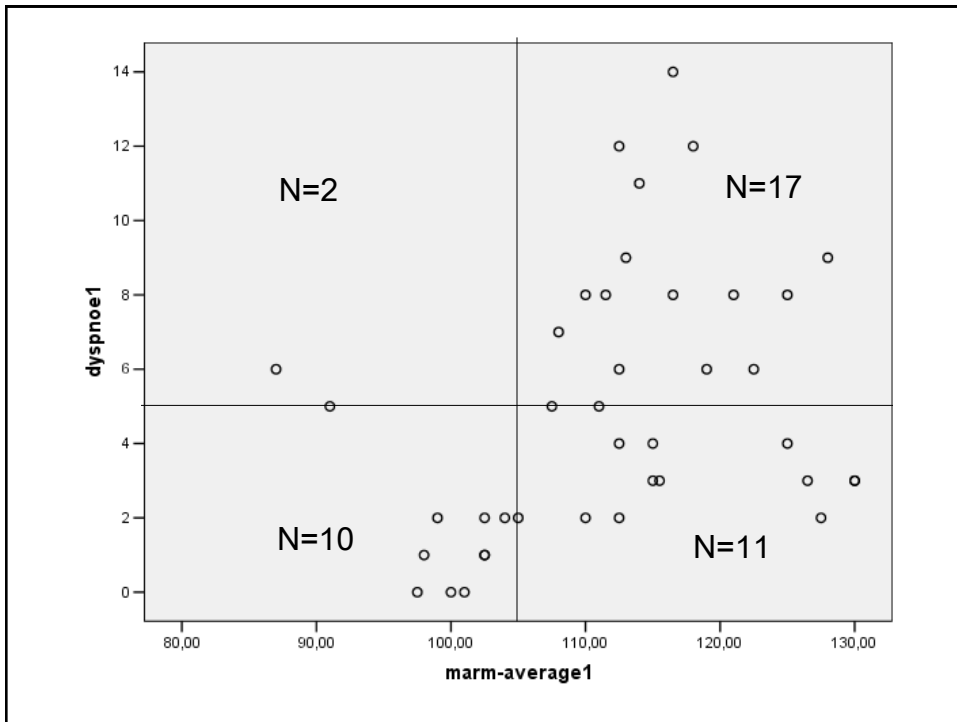
Dysfunctional breathing

- MARM and NQ high: n=33
- MARM and NQ low: n=13
- Agreement 46 / 62 = 74%

- MARM high and NQ low: n=11
- MARM low and NQ high: n=5

association: $p < 0.001$



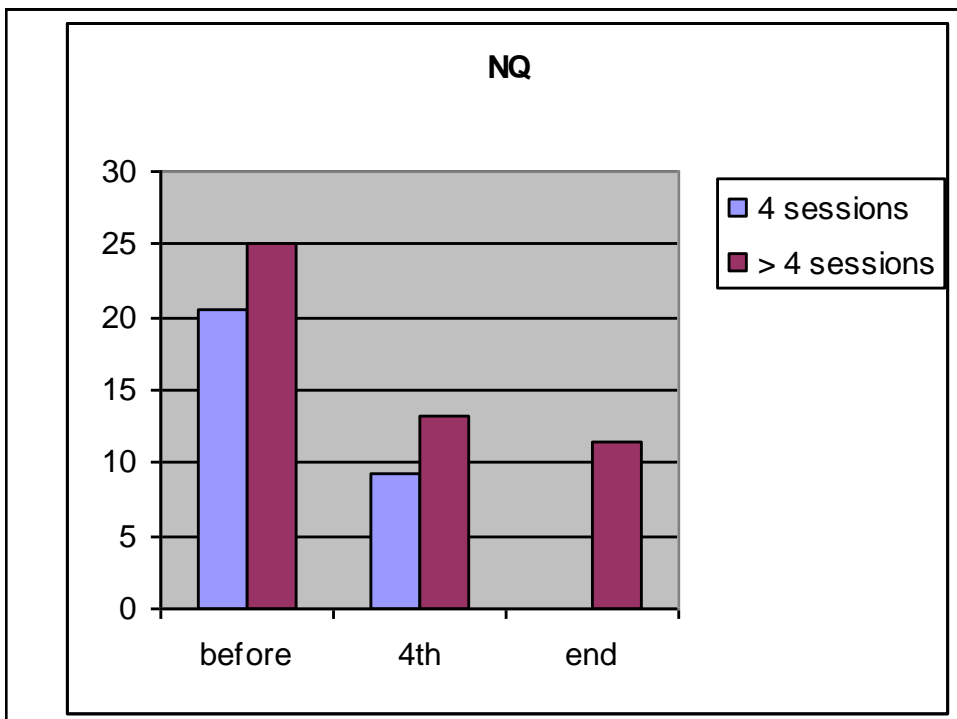


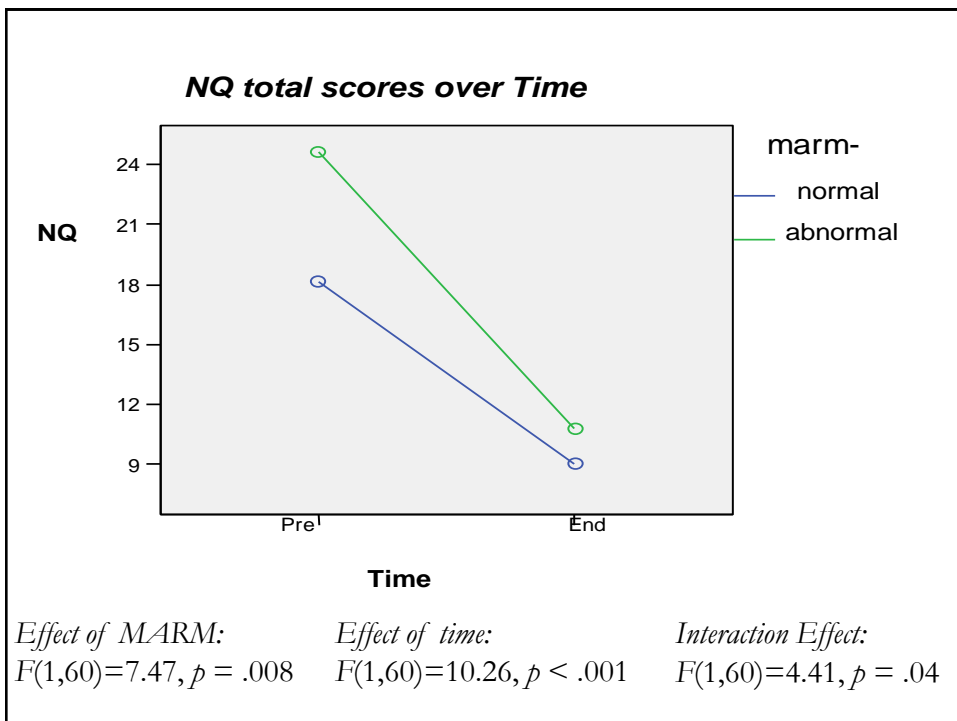
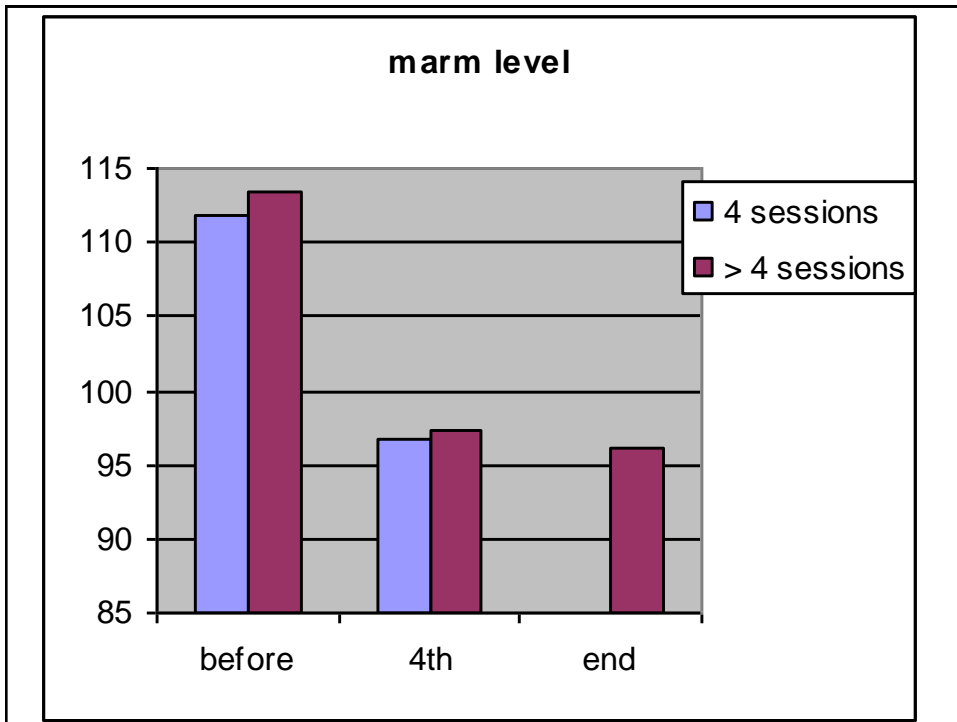
Dyspnea & MARM

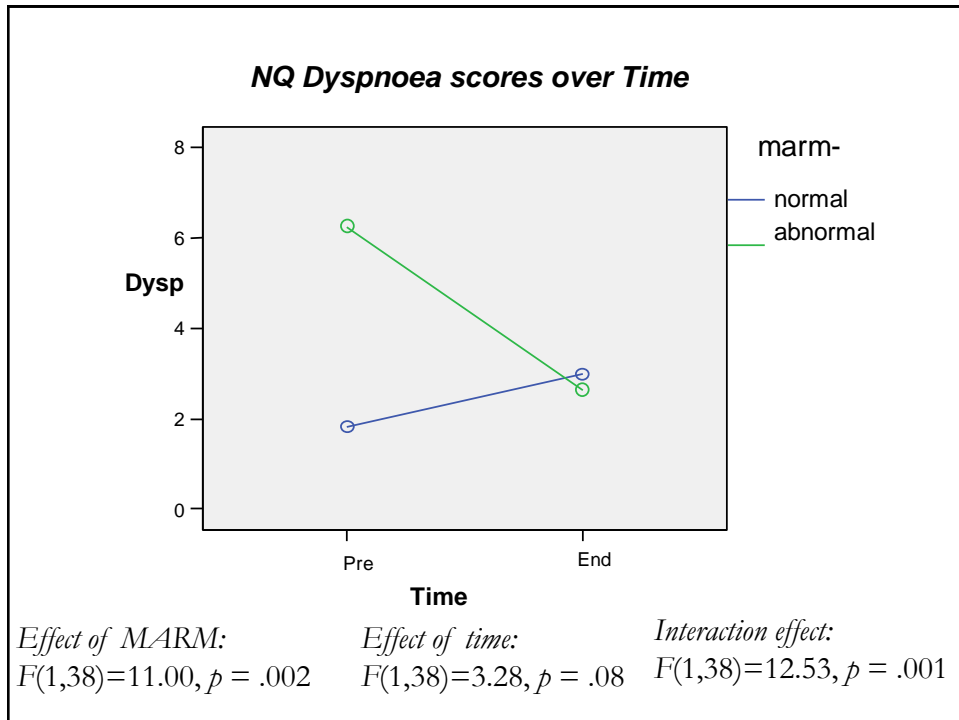
- High MARM level (thoracic dominance) seems a necessary condition for having dyspnea complaints, but not sufficient
- A substantial number of patients (25%) have high MARM level but low NQ-dyspnea

Result of treatment

- Half of the patients (n=31) required more than 4 sessions
- NQ decreased on average to normal range ($p < 0.001$)
- MARM level decreased to near normal values ($p < 0.001$)
- MARM area increased (20 \rightarrow 32) ($p < 0.001$)







Relation NQ change and MARM

- Reduction in NQ is greater for patients with high initial MARM level, mainly because of dyspnoe
- Decrease of elevated MARM level is important for the change in dyspnoe
- Increase in MARM area has no relation to any symptoms

Conclusion

- Dysfunctional breathing is present in about half of tense patients: 71% have thoracic dominance, 61% have high symptom score, 53% have both
- Symptoms and breathing pattern normalize after treatment, confirming that they were due to unnecessary tension