Ergonomic Considerations for Practicing Massage Therapists

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The physical demands and repetitive movements performed by massage therapists during a treatment increase the risk for work-related musculoskeletal disorders. While massage therapy meets the level of heavy physical demand, the ergonomic risk of performing a massage was previously unknown. The Massage Therapy Foundation undertook a job task analysis to be used by educators, employers, and clinicians to create an optimal work environment. Data collected via survey were used to create the protocol for an onsite data collection where massage therapists were evaluated on the ergonomic risk factors by trained ergonomists. The results of the job task analysis found the highest variability in movement when the massage therapist was treating the neck prone, neck supine, and leg prone. When the massage therapists did not change positions during a stroke, there was increased forward flexion of the trunk which increased postural stress on the extensors of the back and neck. Strokes such as effleurage which can span the entire length of the body part had the highest cumulative load, requiring postures that put mild biomechanical stress on the shoulders (90% of the time), neck (70% of the time), and trunk (60% of the time). The forward-bending posture of the massage therapist increases the eccentric demands of the therapist's neck and back musculature, thereby increasing fatigue and leading to an increase in the chance of overuse injury. The job task analysis recommends the massage therapist monitor the duration of application in an unsupported position, take more time between sessions, work in an optimum environment, including correct table height, and have a healthy, active lifestyle to maintain career longevity.

KEYWORDS: Ergonomic risk factors; massage therapy practice; injury risk

INTRODUCTION

While massage can be considered relaxing for those who receive treatment, for massage therapists, performing the massage is a physical task. The varied tasks, constant posturing, repetitive movements, and physical demands of performing massage strokes, like the skills of other healthcare professionals, increases the risk for work-related musculoskeletal disorders (WRMD).[1,2] Massage therapists spend a significant amount of treatment time in positions of mild trunk flexion and shoulder flexion, positions that are non-neutral, placing a mild amount of stress on the body.[3] During a treatment, the number of postures that are more severe, involving greater trunk flexion as well as more shoulder and neck flexion, can be minimal based on the strokes selected to match the goals of the session; however, they are still present and put the therapist at risk for WRMD.[3,4] Though the postures which elicit lower levels of stress are predominant throughout a treatment and those with higher levels are kept to a minimum, the low stress postures are repeated with some higher stress postures; therefore, the risk of cumulative stress to the body over the course of one massage puts the therapist in a category of increased work-related stress.[2,3]

Ergonomics is the scientific discipline concerned with the interactions between those performing a task and the various aspects of the environment in which those tasks are performed.[5] From an ergonomic standpoint, massage therapy meets the criteria for a heavy physical demand level.[5] And while the environment of the workstation for a massage therapist is uncomplicated, if the area is too small to allow for proper full-body mechanics or if the table height is not adjusted so the various positions of the client allow for reduced neck, trunk, and

shoulder flexion, there is an increased risk of stress to the body.[3,4] In a study of health-care professionals, factors reported to increase the rates of WRMD included "working in the same position for a long time," "working in an awkward/cramped position," and "performing the same task over and over," all common factors among massage therapists, who were not represented in the study.[2] The majority of massage therapists assessed reported experiencing work-related musculoskeletal complaints in at least one body part.[6] In a meta-analysis on the prevalence of WRMD in physiotherapists, the highest rate of prevalence of self-reported injury was with the lower back, thumb, neck, and shoulder.[7] When correct mechanics are used, massage involves very low levels of force from the hands; however, the torso, back, and neck may take more of the force.[3] While the massage techniques individually do not have high values compared to the risk thresholds, the cumulative effect of the massage session, some which can last 90 min or more, extrapolated over multiple massages in a given day create values that put massage therapists at risk for injury.[3]

The Massage Therapy Foundation completed the phase 1 of the Ergonomics Project in early 2020 with the resulting white paper being released in 2022. The project had the overall goal of creating a formal job task analysis (JTA) of massage therapy work to be used by educators, employers, and practitioners to create an optimal work environment. The JTA was deemed not a research study by institutional review board standards and was viewed from an ergonomic perspective, not the perspective of a massage therapist. Given this distinction, it is important to approach the recommendations from the white paper through the lens of an ergonomist and adopt the suggestions from the approach of a clinician to create an evidence-informed practice.[8]

METHODS

Project Background

To improve employee safety, health, and wellness, the Massage Therapy Foundation asked Briotix Health to study the ergonomic issues and risks associated with standard community massage practice, with the following objectives:

1. Identify the ergonomic risk profile of the essential tasks of massage therapy practice, in terms of the standard tasks performed by massage therapists in the community.
2. Establish, based on the data collected and ergonomic risk analysis performed, practical recommendations and best practices that community-based massage therapists can adopt to minimize their exposure to ergonomic risk in daily practice.

The development of the onsite data collection procedures originated with an electronic survey to gain more information about the massage therapists in the community. Following written consent, a survey was electronically completed by 755 massage therapists. Of those that responded to the question on age (n = 588), respondents were equally distributed between the ages of 36–45, 46–55, and over-55 age groups and those younger than 35 making up about 13%. The majority of the massage therapists surveyed (n = 666) were working under 30 h per week on massage tasks. The survey portion of the project revealed no single manual tool or technique preferred by the massage therapists who answered this question (n = 645). Approximately half of the respondents (n = 632) preferred medium pressure (21–40% tissue depth), followed by 44% preferring deep pressure, (41–60% tissue depth). Among the massage therapists who responded about discomfort when performing massage (n = 585), the most cited region was the neck at 59%, followed by the low back at 56%, with the cluster of neck, upper back, and shoulders being the most frequently cited area. Only 25% of respondents (n = 583) reported having reduced client load as a result of discomfort and another 25% because of musculoskeletal conditions of their own.[8]

Data Collection

Physical demands data were collected in two designated locations in Baltimore, MD and Portland, OR which was not the normal working environment for all of the massage therapists. Subjects (n = 16) were volunteer massage therapists from the community with a current clinical practice

and experience with massage. The pool of subjects reflected the age ranges and working hours of the survey participants to create a similar subset. The subjects were almost equally distributed among those 36–45, 46–55, and over 55 with fewer subjects under the age of 35. All but one of the subjects worked under 30 h a week on massage tasks. The subjects and clients signed a formal consent form with Briotix Health to participate in the project, which included consent to be recorded. No identifiable data were collected or shared and subjects were allowed to stop participation at any time. All subjects completed a survey prior to data collection. After performing a standard intake interview, the subject was instructed to perform 30 min of massage on volunteer clients to the following body regions: neck, back, and one whole leg (back and front). Subjects were not provided any additional guidelines or restrictions and were free to perform their session per their preference, in terms of techniques, sequencing, and time spent per body region. Each subject was free to adjust the height of the table based on their personal preference. In the Baltimore test location, therapists used a hydraulic, height-adjustable table, while therapists in the Portland test location used a fixed-height table that was adjusted only once prior to each massage session. The session was recorded in its entirety using both a stationary camera capturing whole-body movements, and handheld cameras capturing individual techniques. Data collected included sensory and postural data, manual materials handling data, and hand/foot movement information. The subject (massage therapist) was regularly asked to state the pressure utilized on a 10-point scale. Force matching was performed where appropriate when compression techniques were utilized, at a sampling rate selected to not excessively interrupt the flow of the massage.

Physical demands data were analyzed using the following procedure:

- The full-length, stationary whole-body videos were subdivided into individual sections of footage representing the following defined tasks:
    - **Neck supine**: Massage performed on the neck with the client supine.
    - **Neck prone**: Massage performed on the neck, shoulders, and thoracic aspect with the client prone.
    - **Neck and back prone**: Massage performed on the neck, shoulders, thoracic, and lumbar aspects with the client prone. This task is differentiated from "Back" by techniques covering both the neck/shoulder/thoracic spine and the lumbar spine without moving the feet.
    - **Back**: Massage performed on the lumbar aspect and buttocks, with the client prone.
    - **Leg supine**: Massage performed on the leg with the client supine.
    - **Leg prone**: Massage performed on the leg with the client prone.
    - **Other**: Massage performed on other body regions not mentioned above.
    - **Interval**: Tasks performed in the interval between massage application, such as draping, client repositioning, and obtaining massage lotion.

The sessions were analyzed by ergonomists trained and employed by Briotix Health. All ergonomists had a minimum of 1 year of experience analyzing repetitive stress and motion risks in the workplace. The sessions were analyzed using the Rapid Entire Body Assessment (REBA), a postural analysis system that is sensitive to musculoskeletal risks in a variety of tasks which allows for scoring muscle activity in static, dynamic, rapid changing, or unstable postures[9] and the Quick Exposure Checklist (QEC), which is used by ergonomists to assess the risk of a single work task for posture.[10] Both tools have strong measures for inter-rater and intra-rater reliability.[11,12]

The REBA scores the trunk, neck, legs, upper arms, lower arms, and wrist based on deviations from neutral in the sagittal plane, with additional changes to the score for transverse plane movements of the trunk, neck, upper arm, and wrist or frontal plane movements for the upper arm. In the case of REBA, a higher score shows a greater deviation from a neutral position and a greater risk of WRMD. The REBA score is then related to an action level based on the risk. Scores between 1 and 3 do not necessitate any further assessment while scores 11–15 are considered very high risk for WRMD.[9]

With the QEC, an observer records the postures adopted for the back, wrist/hand, shoulder/arm, and neck as well as the frequency of movement performing

TABLE 1. Quick Exposure Checklist

Exposure Level				
Score	*Low*	*Moderate*	*High*	*Very High*
Back (static)	8–15	16–22	23–29	29–40
Back (dynamic)	10–20	21–30	21–40	41–56
Shoulder/arm	10–20	21–30	21–40	41–56
Wrist/hand	10–20	21–30	21–40	41–56
Neck	4–6	8–10	12–14	16–18

The exposure levels are based on a score assigned to each body part of the highest risk scenario for each body part throughout the task.

a task. The back is scored based upon the amount of trunk flexion and rotation postures, with increased flexion or rotation putting the person at risk (Table 1). The shoulder/arm is scored based on elevation of upper arms and frequency of movement, with more elevation and movement putting the person at risk. The wrist/hand is scored based on flexion or deviation, with greater flexion and deviation representing a greater risk. The neck is rated similarly to the back, with greater flexion and rotation putting the person at greater risk. The number of exposures are then scored accordingly.[10]

Analysis was done in the following manner:

- Task durations for each client and each task were determined, based on the therapists' positional changes. Average task duration and task duration ranges were determined for each therapist.
- Two separate REBAs were performed on each task, representing the range (low to high) REBA score per therapist per task.
- One QEC assessment was performed for each task for each therapist. QEC scores were based on a six-clients-per-day workload, since only 8.2% of surveyed therapists reported performing massage tasks for more than 30 h per week.

RESULTS

During the physical data collection portion of the study, the following ergonomic risks were assessed as follows. The QEC assessed the back, shoulders and arms, hands and wrists, and neck with the exposure level as outlined in Table 2. When performing massage on the neck supine (1.76), neck prone (1.17), and neck plus back (1.13), the massage therapists (n = 16) averaged the greatest number of exposures. The REBA obtained postural assessment scores for both the high and low for each subject per task; as outlined in Table 3, the highest variability was noted for neck

TABLE 2. Summary of Exposures

Body Areas Treated	*Average*	*Minimum*	*Maximum*
Back	0.33	0.05	0.89
Neck prone	1.17	0.09	2.89
Neck supine	1.76	0.42	3.73
Neck plus back	1.13	0.20	3.32
Leg prone	0.83	0.37	1.73
Leg supine	0.50	0.04	0.78
Interval	1.20	0.36	2.42
Other	0.33	0.09	0.53

Metrics regarding task duration exposure as a component of the ergonomic risk profile and the potential driver of risk. This is based on an assumed client load of six 1-hour massages performed over 5 days in a calendar week.

TABLE 3. Range of Rapid Entire Body Assessment High and Low Scores

Body Areas Treated	*REBA High Range*	*REBA Low Range*
Back	4	3
Leg prone	4	4
Leg supine	6	3
Neck prone	7	4
Neck prone plus back	5	2
Neck supine	7	2

The REBA assesses the risk at a moment in time and is typically applied to the worst-case posture of a task on a scale from 1 (low) to 11+ (high). It can be used multiple times on the same task. The risk levels are described as: 1 = negligible risk; 2 or 3 = low risk indicating change may be needed; 4 to 7 = medium risk, further investigation needed or task needs to change soon; 8 to 10 = very high risk, investigate and implement change; 11+ = very high risk, implement change. REBA = Rapid Entire Body Assessment.

prone, neck supine, and leg prone. The highest of the low-range REBA scores was for neck prone, 4, and leg prone, 4. The highest of the high-range score was for neck prone, 7, and neck supine, 7. Scores of 4–7 on the REBA indicate a medium risk for WRMD and indicate action and further assessment are necessary.[9]

DISCUSSION

Based on the potential risk exposures identified through the physical data collection study, a massage therapist has the potential for a greater postural risk of injury as the number of exposures are increased with a full-time massage practice (defined as 30 h of massage a week).[8] The increase in potential risk in this study corresponds with the moderate risk of musculoskeletal disorders found when analyzing physiotherapists performing massage.[13] The forward-bending posture of the massage therapist creates an inherent postural risk by increasing the eccentric demands of the therapist's neck and back musculature, thereby increasing fatigue which leads to an increase in the chance of overuse injury.[3,6,8]

During the physical demands data collection it was observed that many massage therapists did not change position when performing massage to the neck/shoulders and lower back regions.[8] Not changing position can lead to increased forward flexion of the trunk by causing the massage therapist to reach across the patient's body, reaching over the patient's head, or overreaching with the hands—all positions that increase postural stresses on the extensors of the back and neck of the therapist.[3,8] As the erector spinae group, the primary neck and back extensors, serves to support the body in maintaining an upright position, this forward bending creates eccentric strain on the muscles, thereby increasing the biomechanical stress leading to fatigue and ergonomic risk, corresponding to biomechanical assessments which reveal that the trunk, shoulder, and neck postures of the massage therapist are in neutral posture for no more than 50% of the time during a massage session.[3] Based on the biomechanical assessment of common massage techniques, an effleurage technique applied to the back where the massage therapist is standing at the head of the table and reaching the entire length of the client's back, both pushing and pulling, has the highest cumulative load on the massage therapist's load during the massage. This technique to this area of the body requires a posture that would put mild biomechanical stress on the shoulder (90% of the time), neck (70% of the time), and trunk (60% of the time).[3] The recommendation is to consider limiting strokes which span the entire length of the spine, and when performing an effleurage across the back, the therapist is encouraged to shift their weight or move their feet to effectively maintain the neutral posture.[8]

Additional risks for injury included the wrist and hands, as the hands are the primary tool used by massage therapists and previous research has found massage therapists suffering from osteoarthritis-like symptoms in their hands.[14] The stress applied to the digits is the primary concern for those in the massage industry as repetitive motions with the application of force are two biomechanical factors involved in the development of WRMD.[13] Unfortunately, accurate data on the forces of the hand are difficult to assess as they interfere with the techniques applied by the therapist.[3] As a result, it is recommended to use techniques that support the interphalangeal, metacarpophalangeal, and carpometacarpal joints of the thumb, either with the same hand index finger or bracing both thumbs together.[8] This allows the massage therapist to continue using their own tactile response to evaluate the tissue of the client. Alternately, the massage therapist could use an adjunct tool, especially on more difficult tissue such as the plantar surface of the foot.

From an evidence-informed practice approach, it is important to recognize the limitations of the JTA and the research literature on massage biomechanics. While these documents call attention to postures that increase stress on the body, it is up to the individual massage therapists to make clinical decisions about the techniques to use in a given session. With this in mind, the JTA recommends the massage therapist monitor the duration of application in an unsupported position as opposed to eliminating a technique that may be warranted clinically.[8]

STUDY LIMITATIONS

In order to provide a snapshot of the ergonomic risks of the massage therapist,

each massage session was limited to 30 min and specific areas of the body were required to be addressed. The participants in the project were not limited in the manual therapy techniques used during the onsite data collection and the amount of time devoted to each area was not controlled; however, each of the areas needed to be addressed. While this may not directly align with the therapeutic needs of a massage client, it was determined to be the best way to assess the massage therapist for ergonomic risks. In addition, the JTA only examined risk exposures over a short period of time; therefore, the cumulative ergonomic risks can only be estimated. Additionally, the data were collected in clinical settings that were not the primary setting of practice for the massage therapists and one setting featured hydraulic tables that allowed for table adjustments during the treatment while the other did not.

FUTURE DIRECTIONS IN RESEARCH

One of the aspects the JTA could not examine is the effect of cumulative fatigue on the massage therapist. Physical exhaustion by practicing therapists has been identified as a variable affecting injury-forced work reduction.[15] The current research examines only a snapshot of the strokes for a controlled period of time or uses survey data to ask the massage therapist to recall their experiences.[3,6] What the JTA does is take the per task ergonomic risks and estimate the ergonomic risk threshold over an entire workday.[8] The Massage Therapy Foundation has therefore begun the steps for phase 2 of the ergonomics study which will examine the effects of fatigue over time from a biomechanical and physiological perspective using wearable technology as well as ask the therapist to provide information about the massage itself. This second study will also control for location of the massage treatment and table limitations, as the massage therapists will be using their own set-up for treatment. Massage therapists registered with the practice-based research network MassageNet have the opportunity to participate in this groundbreaking research study. The ability to present this information to not only the massage community but to other healthcare professions that also utilize manual therapy options creates an opportunity to decrease work-related injuries.

RECOMMENDATIONS

Based on the JTA, there are multiple steps a massage therapist can take to ensure correct mechanics, thereby decreasing the chance of overuse injury from biomechanical strain. Most importantly, the massage therapist should position themselves accordingly to best perform the intended stroke, including position of the table in the room to access the client appropriately and using a split stance to balance themselves accordingly. The massage therapist should avoid reaching across the client to access the contralateral side and when performing long strokes, move their feet instead of leaning over the body. To prevent overuse of the digits, the massage therapist should brace fingers together for support. The literature and the JTA emphasize the importance of the work environment of the massage therapist, including table height; however, when the height of the table cannot be adjusted mid-session for a particular technique, the therapist must either adapt their mechanics or risk inducing increased stress.[3,8] The ability to use a hydraulic table, though costly, could decrease the stress on the body and allow for a more effective session. It is also important to consider taking more time between massage sessions, especially if a session is more physically taxing.[15] This could allow the massage therapist to offset physical and mental fatigue without compromising the clinical needs of the clients. Lastly, to assist in recovery, the massage therapist should maintain an active lifestyle to promote career longevity.

AUTHOR CONTRIBUTION

PBR is the sole author of this manuscript and editor of this manuscript. Regarding the JTA, this is a secondary analysis of the information collected by Briotix Health on behalf of The Massage Therapy Foundation. The author was given permission by The Massage Therapy Foundation to disseminate this information in this format.

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CONFLICT OF INTEREST NOTIFICATION

The job task analysis serves as phase 1 of the ergonomics project funded by The Massage Therapy Foundation. Briotix Health was paid to complete phase 1 and is currently funded by The Massage Therapy Foundation to complete phase 2. The author, while not part of the phase 1 project, is currently the primary investigator of phase 2 and serves as a trustee for The Massage Therapy Foundation.

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