Chapter 5
Massage Physiology: Research, Effects, Indications, Contraindications, and Endangerment Sites

Susan G. Salvo

Introduction
- Massage is effective for many ailments
- Massage is contraindicated for some conditions
- Massage must be done with care in certain regions known as endangerment sites

Skin and the Significance of Touch
- Sense of touch is the body’s main method of gathering information about itself
- Touching can affect us physiologically, cognitively, psychologically, and emotionally
- Touch is our first means of communication

Scientific Method
- Scientific method—dynamic process in which experiments are used to prove or disprove a hypothesis using a logical, rational method
- Theory—a hypothesis that has been verified by repeated experiments
- Two main types of research
  - Quantitative
  - Qualitative

The Scientific Method
1. Define the question: What are you trying to discover from your experiment? What do you hope to achieve?
2. Research the topic: Investigate what other scientists have learned about your question. This information will help you plan your experiment.
3. State the hypothesis: After conducting your research, you should have some idea about what you think will happen in your experiment. State your hypothesis in a way that is measurable (quantifiable).
4. Test the hypothesis by conducting an experiment: With the hypothesis in mind, create an experiment that will help determine if the hypothesis is true. The experiment serves as a method to test the hypothesis. You determine if your hypothesis is supported or not by conducting an experiment. It is best to test the hypothesis by only one variable. Scientists usually use the experiment several times to verify that the results are consistent. Each one an experiment is performed. It is called a run or a trial.
5. Analyze the results: This task involves analyzing the experiments and trying to determine what the experiment has shown.
6. Draw a conclusion: The conclusion explains the meaning of the results. Did the experiment support or disprove the hypothesis? Does additional research need to be conducted?
7. Communicate the findings: Publish an article or present the findings to the audience or professional meeting.
Scientific Method

• Types of quantitative research
  – Descriptive research
  – Correlational research
  – Quasiexperimental
  – Experimental
• Quantitative research is reductive: data are collected and coded with numbers

• Qualitative research—method in which phenomena are examined in a holistic manner
  – Phenomena examined from subjects’ points of view
  – Scientist does not remain objective—being subjective is desirable

Scientific Method

• Types of qualitative research
  – Phenomenological
  – Grounded theory
  – Ethnographic
  – Historical
• Qualitative research involves observation and open-ended interviews
• Data analysis involves words not numbers

Foundational Touch Research

• Rene Spitz
  – Pioneer in touch deprivation research
  – Studied development of institutionalized children
  – Observed that children in orphanages experienced physical and mental delay
  – Found that tactile stimulation is essential to normal development

Foundational Touch Research

• Wayne Dennis
  – Published findings on infant and child retardation
  – Researched children in orphanage who failed to thrive even though physical needs were met
  – Concluded deaths and deformities resulted from touch deprivation

Foundational Touch Research

• Harry Harlow
  – Pioneer in touch research
  – Experiments involved isolation of monkeys during early development stages
  – Findings suggested lack of touch left infant monkeys disturbed and socially inept
  – Observed that infant monkeys valued tactile stimulation more than nourishment
Foundational Touch Research

- Bernard Grad
  - Conducted touch research on mice and barley seedlings
  - Mice study: Of three groups of injured mice, group held by faith healer recovered fastest
  - Barley seed study: Of three groups of seedlings, group watered by faith healer grew fastest

Foundational Touch Research

- Abraham Maslow
  - Placed human needs in sequential order
  - Developed Theory of Human Motivation: needs direct all human behavior; as basic needs are met, others emerge until individual reaches self-actualization
  - Basic model later developed into more comprehensive list of human needs

Foundational Touch Research

- Delores Krieger
  - Research revealed a tangible relationship between touching and healing
  - Found measurable increase in hemoglobin content of blood that corresponded to levels of touching

HERARCHY OF HUMAN NEEDS
1. Survival
2. Safety
3. Touching, skin contact
4. Attention
5. Mirroring and echoing
6. Guidance
7. Listening
8. Being real
9. Participating
10. Acceptance
11. Opportunity to grieve losses and to grow
12. Support
13. Loyalty and trust
14. Accomplishment
15. Altering one’s state of consciousness, transcending the ordinary
16. Sexuality
17. Enjoyment or fun
18. Freedom
19. Nurturing
20. Unconditional love (including connection with a Higher Power)

Foundational Touch Research

- Tiffany Field
  - Studied effects of massage on premature babies
  - Found that premature babies who were massaged gained more weight, spent less time in the hospital, and were more active and alert
  - Established the Touch Research Institute

How Safe Is Massage?

- Massage is one of the safest modalities of physical therapy
- Less than 0.1% of medical liability claims filed were against massage therapists
  - Some related to minor injuries such as bruising
  - Most related to sexual misconduct
- National average for training required by states—500 hours
Mechanical and Reflexive Responses to Massage

- Mechanical response—result of pressure, force, or range of motion
- Reflexive response—result of nerve stimulation
- Mechanical and reflexive responses are related and often occur together

Effects of Massage

- Most effects described here are linked to massage techniques using moderate to deep pressure—Swedish massage or therapeutic massage
- Some effects related to touch
- Other sources of effects: time spent in relaxing atmosphere, attention of therapist, increased body awareness, education

Effects of Massage

- Most effects tend to cease after massage sessions are terminated
  - Some physical effects (e.g., reduction of scar tissue formation) can be long-lasting
- Lifestyle education and self-care techniques produce long-term benefits
- Nearly all body systems are affected by massage therapy

Effects on the Cardiovascular System

- Dilates blood vessels
- Improves blood circulation
- Decreases blood pressure

Effects on the Cardiovascular System

- Creates hyperemia—often visible on skin surface
- Stimulates release of acetylcholine and histamine for sustained vasodilation
- Replenishes nutritive materials
- Promotes rapid removal of waste products

Effects on the Cardiovascular System

- Reduces ischemia
- Reduces heart and pulse rates
- Increases stroke volume—more blood pushed through heart with each contraction
- Increases red blood cell count
Effects on the Cardiovascular System
- Increases oxygen saturation in blood
- Increases white blood cell (WBC) count—protection against disease
- Enhances the adhesion of mitigating WBCs
- Increases platelet count

Effects on the Lymphatic/Immune System
- Promotes lymph circulation
- Reduces edema (swelling)
- Decreases the circumference of an area affected with edema
- Decreases weight in patients with edema
- Increases lymphocyte count
- Increases number and function of natural killer cells, CDC cells, and CD4/CD8 ratio

Effects on the Skin and Related Structures
- Increases skin temperature—indicates stress reduction
- Improves the condition of skin
- Stimulates oil glands—reduces skin dryness
- Improves skin conditions

Effects on the Nervous and Endocrine Systems
- Modifies brain wave activity associated with relaxation
  - Decreases beta wave activity
  - Increases delta wave activity
  - Increases alpha wave activity
- Increases dopamine levels—reduces stress and depression
- Increases serotonin levels—reduces stress, depression, and pain
- Reduces cortisol levels
Effects on the Nervous and Endocrine Systems

- Reduces norepinephrine levels
- Reduces epinephrine levels
- Reduces feelings of depression

Effects on the Nervous and Endocrine Systems

- Decreases pain
  - Increased circulation reduces ischemia
  - Stimulates release of endorphins and other pain-reducing neurochemicals
  - Interrupts pain cycle

Effects on the Nervous and Endocrine Systems

- Reduces analgesic use
- Activates sensory receptors
  - Tapotement stimulates muscle spindles—activates contraction
  - Slow, passive stretch—inhibits contraction
  - Activation of sensory pressure receptors—reduces pain

Effects on the Nervous and Endocrine Systems

- Faster and more elaborate development of the hippocampal region of the brain—related to superior memory performance

Effects on Muscles

- Relieves muscular tension
- Relaxes muscles
- Reduces muscle soreness and fatigue
Effects on Muscles

- Reduces trigger point formation
- Manually separates muscle fibers—reduces spasms
- Increases range of motion
- Improves performance (balance and posture)
- Lengthens muscles

Effects on Muscles

- Increases flexibility
- Tones weak muscles
- Reduces creatine kinase in the blood—helps decrease muscle contraction
- Decreases electromyography (EMG) readings

Effects on Connective Tissues

- Reduces keloid formation
- Reduces excessive scar formation
- Decreases adhesion formation
- Releases fascial restrictions—Pressure and heat from massage make fascia more elastic

Effects on Connective Tissues

- Increases mineral retention in bone
- Promotes fracture healing
- Improves connective tissue healing—Effect noted only with deep pressure massage
- Reduces surface dimpling of cellulite

Effects on the Respiratory System

- Reduces respiration rate
- Strengthens respiratory muscles
- Decreases the sensation of dyspnea (shortness of breath or difficulty breathing)
- Decreases asthma attacks

Effects on the Respiratory System

- Reduces laryngeal tension
- Increases fluid discharge from the lungs
- Improves pulmonary functions—Increased vital capacity
  – Increased forced vital capacity
Effects on the Respiratory System

- Improves pulmonary functions
  - Increased forced expiratory volume
  - Increased forced expiratory flow
  - Improved peak expiratory flow

Effects on the Digestive System

- Promotes evacuation of the colon
- Relieves constipation
- Relieves colic and intestinal gas
- Stimulates digestion

Effects on the Urinary System

- Increases urine output
- Promotes the excretion of nitrogen, inorganic phosphorous, and sodium chloride (waste products) in urine

Miscellaneous Effects

- Reduces fatigue and increases vigor
- Improves sleep patterns
- Reduces job-related and posttraumatic stress
- Improves mood
- Decreases feelings of anger

Miscellaneous Effects

- Improves body image
- Improves self-esteem
- Promotes communication and expression
- Improves lifestyle habits
- Increases physical well being

Miscellaneous Effects

- Reduces touch and sense aversion (in victims of rape and abuse)
- Increases academic performance
- Increases mental alertness
- Satisfies emotional needs
Indications for Specific Conditions and Populations

• Most individuals can benefit from massage therapy
• Next list contains conditions for which benefit has been scientifically documented

Conditions that Benefit from Massage

• Alzheimer’s disease—massage decreased agitation and improved sleep
• Anemia—increased RBCs and blood oxygen saturation
• Asthma—improved pulmonary function and reduced incidence of asthma attacks
• Attention deficit hyperactivity disorder (ADHD)—decreased fidgeting and more attention to assigned tasks

Conditions that Benefit from Massage

• Burns—decreased pain and itching; reduced anxiety, depression, and anger
• Cancer—reduced edema, pain, anxiety, anger, depression; increased lymphocyte and killer cell counts
• Cerebral palsy (CP)—blood and lymph circulation increased; relieved muscular tension

Conditions that Benefit from Massage

• Edema—reduced swelling (if not related to inflammation or disease)
• Fibromyalgia—reduced stress, anxiety, depression; decreased pain, stiffness, and insomnia
  – Massage rated more effective than standard physical therapy or prescription drugs
• Headaches—relief from pain, reduction in frequency and duration

Conditions that Benefit from Massage

• Chronic fatigue syndrome (CFS)—reduced depression, anxiety, fatigue; improved muscle and grip strength
• Constipation—relieves problems
• Diabetes—reduced blood glucose levels, anxiety, depression; increased dietary compliance
• Eating disorders—reduced depression; improved body image

Conditions that Benefit from Massage

• High blood pressure—decreased systolic and diastolic pressures
• Patients with HIV infection—increased number and effectiveness of killer cells, CD4 cells, and CD4/CD8 cell ratio; improved relaxation
• Hospitalized patients—increased relaxation, provided sense of well-being, produced positive mood
**Conditions that Benefit from Massage**

- **Hospice patients**—reduced pain, heart rate, blood pressure
- **Infants**—less colic, less repetitive crying, improved feeding, more weight gain
  - Effective for preterm, cocaine-exposed, HIV-exposed, and full-term infants
  - Massage more effective than rocking for inducing infant sleep

**Conditions that Benefit from Massage**

- **Injuries**—more rapid healing of overuse injuries, sprains, strains
- **Insomnia**
- **Low back pain**
  - Reduced medical cost and analgesic use
  - Increased range of motion
  - Improved feeling of patient well-being
  - Massage rated more effective than standard physical therapy or drugs

**Conditions that Benefit from Massage**

- **Lung disease (COPD)**—strengthened respiratory muscles, reduced heart rate, decreased shortness of breath, improved pulmonary function
  - Respiratory drainage increased through cupping tapotement and vibration
- **Lung disease (cystic fibrosis)**—also decreased anxiety and improved mood

**Conditions that Benefit from Massage**

- **Multiple sclerosis (MS)**—reduced anxiety and depression; improved self-esteem, body image, healthy lifestyle
- **Nerve entrapment**
  - Carpal tunnel syndrome, thoracic outlet syndrome, sciatica, relieved by myofascial release

**Conditions that Benefit from Massage**

- **Pervasive development disorder (PDD)**—increased social behavior and reduced touch aversion
- **Pain (chronic)**—decreased levels of pain, depression and anxiety lessened
- **Poor circulation**

**Conditions that Benefit from Massage**

- **Pregnancy and postpartum**
  - Massaged pregnant women—fewer complications, shorter and less painful labor, fewer days in hospital
  - Massage of perineal area reduced tearing and injury during fetal delivery
  - Massage improved postpartum depression and depression among adolescent mothers
Conditions that Benefit from Massage

- Premenstrual syndrome (PMS)—reduced swelling, pain, anxiety; improved mood
- Psychiatric patients (all ages)
  - Better clinical progress
  - Decreased depression, anxiety; reduced cortisol, norepinephrine, increased dopamine
  - Decreased self-destructive behavior (some patients)

Conditions that Benefit from Massage

- Rheumatoid arthritis (RA)—reduced trigger point formation, pain, anxiety, morning stiffness
- Stress and anxiety—reduced by activation of parasympathetic nervous system
- Temporomandibular joint (TMJ) dysfunction—reduced pain and dysfunction

Contraindications for Massage Therapy

- During intake process, therapist interviews client to establish goals, note precautions, and determine preexisting conditions
- It is the duty and obligation of the therapist to rule out presence of any conditions in which massage may have harmful effects
- If client refuses to disclose medical history, therapist has the right to refuse treatment

Categories of Contraindications

- Absolute—massage is inappropriate, is not advised, and may be harmful to client
  - Contagious diseases
  - Chronic ailments (postpone until ailment is in remission)
- Local—massage can be performed while avoiding the affected area

Handling Contraindications

- Other treatment options may be available for cases in which contraindications exist
- Therapist should draw on experience and critical thinking skills when making decision about treatment

Handling Contraindications

- Basic guidelines:
  - Tailor massage to client’s vitality and stamina
  - Position client for comfort
  - Obtain physician clearance before initial treatment
### Endangerment Sites

**Definition:** Areas of the body that contain superficial delicate anatomical structures

- Merit caution during treatment
- Often managed by adjusting pressure or avoiding sustained pressure during massage

### Features of Endangerment Sites
- **Nerves**—compression can cause numbness, tingling, burning or shooting pain
  - If prolonged—temporary loss of motor control
- **Blood vessels**—pressure can cause temporary reduction in blood flow
  - Avoid prolonged pressure over pulse points
  - Apply gliding movements toward body center to enhance venous blood flow

### Locations of Endangerment Sites
- **Abdomen**—abdominal and descending aorta, liver, linea alba, lumbar plexus, vagus nerve, xiphoid process
- **Axilla**—nerves and blood vessels
- **Elbow**—nerves and blood vessels
- **Face**—eyeball, facial arteries, transverse facial arteries

### Features of Endangerment Sites
- **Bony structures**—compression can cause pain, bruising, or fracture
- **Organs/glands**
  - Pressure or tapotement to kidney or eye can cause bruising, pain, nausea, or dysfunction
  - Avoid pressure on swollen lymph nodes

---

<table>
<thead>
<tr>
<th>Treat as a Local Contraindication If</th>
<th>Treat as an Absolute Contraindication</th>
</tr>
</thead>
<tbody>
<tr>
<td>The condition is due to an injury that is less than 72 hours old (e.g., whiplash, ankle sprain)</td>
<td>If there is widespread inflammation or if the condition is acute or exacerbated (e.g., rheumatoid arthritis, lupus)</td>
</tr>
<tr>
<td>Pressure causes unwarranted pain (e.g., corn, callous, bunion)</td>
<td>If the condition is due to an infectious agent (e.g., fungi, virus) or disease (e.g., shingles, pneumonia, scabies)</td>
</tr>
<tr>
<td>The area is inflamed (e.g., carpal tunnel syndrome, acute bursitis)</td>
<td>Until his or her physician can be consulted if the client’s symptoms become more severe for any or no apparent reason (Parkinson’s disease, scleroderma). This is revealed during the pre-massage assessment process. Make sure the client has signed a medical release form.</td>
</tr>
<tr>
<td>The area in question is confined to a small space that can be easily avoided (e.g., athlete’s foot [foot or feet], irritable bowel syndrome [abdomen])</td>
<td>The condition is due to an injury that is less than 72 hours old  (e.g., whiplash, ankle sprain)</td>
</tr>
<tr>
<td>It is an abnormal finding such as suspicious lumps, masses, or moles.</td>
<td></td>
</tr>
</tbody>
</table>
Locations of Endangerment Sites

- Femoral triangle/medial thigh—femoral arteries and nerves, great saphenous veins, obturator nerves
- Low back—floating ribs and kidneys  
  - Be careful with striking tapotements or electrical massager
- Popliteal (behind the knee)—common peroneal and tibial nerves, popliteal arteries

Locations of Endangerment Sites

- Throat  
  - Anterior cervical triangle—common and external carotid arteries, hyoid bone, internal jugular veins, thyroid gland, trachea, vagus nerve  
  - Posterior cervical triangle—brachial plexus, external jugular veins, facial nerve, subclavian artery, styloid process

Summary

- The massage therapist inspires client confidence by demonstrating understanding of anatomy, physiology, and pathology
- Attention and caution regarding endangerment areas demonstrate therapist’s commitment to acting in the best interest of the client
- “When in doubt, don’t.”