

Osteopathic Manipulative Medicine During Pregnancy

Outline

1. Discuss physiologic changes during pregnancy.
2. Discuss typical somatic dysfunction found during pregnancy.
3. Present latest research regarding benefits of utilizing OMT during pregnancy.

Hormonal Changes

- Relaxin: Starts to be released 10th-12th week and causes laxity within the SI joints and pubic symphysis.
- Progesterone: Increased levels during pregnancy cause increases in fluid retention.

Hemodynamic Changes

- Increased Cardiac Output
- Sodium Retention
- Water Retention
- Expansion in blood volume
- Reduction in Systemic Vascular Resistance
- Decrease in Venous and Lymphatic Return

*These changes begin early in pregnancy, reach their peak during second trimester and remain relatively constant until delivery.

Autonomic Nervous System

- Sympathetic Innervation to the pelvic structures derives from nerves at the spinal levels of T10-L2.
- Parasympathetic Innervation to the pelvic structures arises from sacral levels of S2-S4 through the pelvic splanchnic nerve.

Structural Changes

- Anterior or forward tilting of the pelvis.
- Increased lumbar lordosis – thoracic kyphosis – cervical lordosis – cranio-sacral strains.
- Postural stresses shift from ligamentous and disk-oriented balance TO strenuous muscle-controlled balance and continued distension of the abdomen decreases the muscular capacity to counterbalance.
- Muscles get stretched beyond their capacity to contract efficiently.

All of these physiologic changes put stress on:

1. Transitional levels of the spine: C/T, T/L and L/S junctions.
2. Iliopsoas muscle: very important in column support, is a prime mover of L/S junction and can strongly influence sacral motion.
3. Sympathetic and Parasympathetic Nervous System
4. Respiratory and Circulatory function can be altered: Diaphragm/Rib restriction, Constipation, Edema, Varicosities, Cramps, Back/Pelvis/Hip pain.

Muscles that tighten during pregnancy

1. Iliopsoas
2. Rectus femorus
3. Quadratus Lumborum
4. Pectorals
5. Rhomboids
6. Levator Scapulae
7. Upper Trapezius

Muscles that are over stretched during pregnancy

1. Gluteals
2. Hamstrings
3. Abdominals
4. Lower Trapezius
5. Neck Flexors
6. Pelvic Floor Muscles

Want to address with OMT

1. Gravitational Strains.
2. Optimize pulmonary respiration.
3. Facilitate drainage of venous and lymphatic systems.
4. Optimize autonomic nervous system function.
5. Reset or quiet myofascial strains.
6. Decrease mom's pain and optimize her function so she enjoy her pregnancy and be as emotionally stable as possible.

Contraindication to Manipulation During Pregnancy

1. Premature Labor
2. Abruptio Placenta
3. Membrane Rupture
4. Incompetent Cervix
5. Eclampsia
6. Ectopic Pregnancy

Retrospective Study

- Osteopathic Manipulative Treatment in Prenatal Care: A Retrospective Case Control Design Study
- Hollis H. King, DO, PhD; Melicien A. Tettambel, DO; Michael D. Lockwood, DO; Kenneth H. Johnson, DO; Debra A. Arsenault, DO; Ryan Quist, PhD
- JAOA, Vol 103, No 12, December 2003.

Purpose

- A retrospective study: compare group of women who received prenatal OMT with matched group that did not receive prenatal OMT.
- Purpose: obtain data appropriate for statistical analysis to test hypothesis that prenatal OMT has a beneficial effect on the outcomes of pregnancy, labor and delivery.

Study Design

- Medical records of 160 women from 4 different cities who received prenatal OMT were reviewed for the occurrence of:
 1. Meconium-stained amniotic fluid
 2. Pre-term delivery
 3. Umbilical cord prolapse
 4. Forceps use
 5. Cesarean section

4 centers were involved in the study

1. Ravenwood Hospital, Chicago, IL: (50/50)
Dr. Tettambel (1/1997-6/1998)
2. Northeast Regional Medical Center, Kirksville, MO: (44/44) Physicians on staff at Kirksville College to Osteopathic Medicine (2/1997-5/1998)
3. Balboa Naval Medical Center, San Diego, CA: (45/46) Dr. King vs. others randomly selected who delivered at same center (7/1990-8/1996)
4. Eastern Maine Medical Center, Bangor, ME: (21/21) Dr. Johnson (6/1997-3/1998)

Random Selection Process

- Reviewers randomly selected every second or third record from a list of births during the same time period.

Types of OMT Varied Depending on Needs of the Patient

Techniques Documented:

1. Muscle Energy
2. Myofascial Release
3. Ligamentous Articular Strain
4. Balanced Membrane Tension
5. High Velocity, Low Amplitude Thrust
6. Strain Counter-Strain
7. Osteopathy in the Cranial Field

Who Administered OMT

Ravenswood Hospital (Chicago): Dr. Tettambel

Balboa Naval Medical Center (California):

Dr. King

Northeast Regional Medical Center (Missouri)

Eastern Maine Medical Center (Maine)

OMM administered by different staff physicians
and residents.

Table 1
Average Age, Number of Times Received Osteopathic Manipulative Treatment (OMT),
Male-Female Child Ratio, and Percentage of Primagravida Women
by Center for Each Condition for Women Who Did and Did Not Receive OMT

Center	No. of Women	Average Age, y	Avg No. of Times Received OMT	Male-Female Ratio	Primagravida, No. (%)
Group Who Received OMT					
Chicago	50	28.5 (16-40)	2.8 (1-4)	22/28 (M = 44%)	14 (28)
Kirksville	44	26.6 (19-38)	4.3 (1-11)	21/23 (M = 48%)	17 (39)
Maine	21	24.7 (18-33)	≈ 1	12/9 (M = 57%)	9 (43)
San Diego	45	31.5 (16-42)	5.0 (1-18)	29/16 (M = 64%)	19 (42)
Total	160	28.32 (16-42)	4.0	84/76 (M = 52%)	59 (37)
Group Who Did Not Receive OMT					
Chicago	50	27.8 (18-37)	0	22/28 (M = 44%)	14 (28)
Kirksville	44	26.5 (16-42)	0	21/23 (M = 48%)	15 (34)
Maine	21	23.3 (19-31)	0	14/7 (M = 67%)	9 (43)
San Diego	46	27.7 (17-36)	0	26/20 (M = 57%)	28 (60)
Total	161	26.89 (16-42)	0	82/79 (M = 51%)	66 (41)

Comparison of subjects who received OMT vs. No OMT

- No significant differences in sex of new born or primagravida status.
- However, those who received OMT were significantly older than those who did not receive OMT:
- Average Age: 28.32 vs. 26.89

Prevalence of Outcomes in Both Groups

Table 2
Number of Deliveries with Osteopathic Manipulative Treatment, Prenatal Care, and Postnatal Care by Center

Center	N	MSAF, No. (%)	PTD, No. (%)	UCP, No. (%)	Use of Forceps, No. (%)	CSD, No. (%)
Received OMT						
Chicago	50	3 (6)	2 (4)	0 (0)	0 (0)	9 (18)
Kirkville	44	4 (9)	3 (7)	0 (0)	5 (11)	5 (11)
Maine	21	3 (14)	0 (0)	0 (0)	2 (10)	3 (14)
San Diego	45	2 (4)	1 (2)	0 (0)	3 (7)	9 (20)
Total	160	12 (8)	6 (4)	0 (0)	10 (6)	26 (16)
Did Not Receive OMT						
Chicago	50	13 (26)	6 (12)	0 (0)	1 (2)	3 (6)
Kirkville	44	6 (14)	4 (9)	0 (0)	6 (14)	15 (34)
Maine	21	4 (19)	2 (10)	0 (0)	2 (10)	1 (5)
San Diego	46	11 (24)	7 (15)	0 (0)	8 (17)	10 (22)
Total	161	34 (21)	19 (12)	0 (0)	17 (11)	29 (18)

OMT indicates osteopathic manipulative treatment; MSAF, meconium-stained amniotic fluid; PTD, preterm delivery; UCP, umbilical cord prolapse; CSD, cesarean section delivery.

Table 3
Logistic Regression Analysis of the Association Between Osteopathic Manipulative Treatment During Pregnancy and Outcomes of Labor and Delivery

Factor	B	SE	Wald Test	Odds Ratio	95% CI for Odds Ratio	
					Lower	Upper
Age	.05	.02	5.5*	1.10	1.01	1.09
MSAF	1.32	.36	13.20†	3.76	1.84	7.68
PTD	1.61	.50	9.91‡	4.72	1.80	12.42
Use of forceps	.79	.43	3.28§	2.20	0.94	5.15
CSD	.29	.32	0.84	1.34	.72	2.48
(Constant)	-4.91	1.05	21.66†			

* $P < .05$.

† $P < .001$.

‡ $P < .01$.

§ $P = .07$.

MSAF indicates meconium-stained amniotic fluid; PTD, preterm delivery; CSD, cesarean section delivery.

Results

- Logistic Regression coefficients were strong for:
 - meconium-stained amniotic fluid $P < .001$
 - Pre-term Delivery: $P < .01$
- Significance remarkable given that OMT group was on average older.

Conclusions

1. “As the increased likelihood of meconium-stained amniotic fluid, PTD, and use of forceps ranges from between two and four times greater without prenatal OMT, the argument becomes even more compelling for greater application of prenatal OMT in training and practice settings involved with women’s health.”
2. “Regional diversity and multiple practitioners give further validity to the findings and confidence in the application of OMT in prenatal care.”

Previous Pilot Study Published by Hollis H. King, DO, PhD, FAAO

- The AAO Journal, Vol. 10, #2, Summer 2000
- Same centers involved and same outcomes compared for 155 charts.
- Compared charts of those who received OMT during pregnancy for 5 outcomes of labor and delivery with National outcomes data.

Results

	<u>National Ave.</u>	<u>OMT</u>
MSAF:	14.6%	7.1%
PTD:	10.0%	3.2%
UCP:	1.5%	0.0%
Forceps:	19.5%	6.4%
C-section:	21.6%	16.1%

OMT of Back Pain and Related Symptoms during Pregnancy: A Randomized Controlled Trial

- John C. Licciardone, DO, MS, MBA; Steve Buchanan, DO; Kendi L. Hensel, DO; Hollis H. King, DO, PhD; Kimberly G Fulda, PhD; and Scott T. Stoll, DO, PhD.
- American Journal of Obstetrics and Gynecology, 2010 January; 202(1):43.e1-43.e8
- Study was done by The Osteopathic Research Center of North Texas Health Science Center between 7/2003-12/2005.

Objective

- To study OMT of back pain and related symptoms during the third trimester of pregnancy.

Study Design

- Phase II randomized controlled trial carried out from 7/2003 to 12/2005.
- Subjects enrolled were between the 28th and 30th weeks of pregnancy.
- Exclusion Criteria:
 1. Intent to deliver at a non-designated hospital
 2. High risk pregnancy as determined by the attending obstetrician. (gestational DM, preeclampsia, placenta previa, & abruptio placenta)

Study Design

Randomized to one of three groups:

1. Usual obstetrical care + OMT (49)
2. Usual obstetrical care + Sham US treatment (48)
3. Usual obstetrical care only (49)

Also divided patients age and gravida status into four groups prior to randomization:

1. Age <24 and primagravida
2. Age <24 and multigravida
3. Age >25 and primagravida
4. Age >25 and multigravida

Study Design

- UOBC+OMT and UOBC+SUT patients received treatment every two weeks starting at week 30.
- Once per week from week 36 through delivery
- Treatments were scheduled for 30 minutes.

OMT

- Provided by faculty within the OMM dept. at the University of North Texas Health Science Center.

- Protocol included any of the following:

Soft tissue, Muscle Energy, Myofascial Release, and ROM mobilization.

Protocol Prohibited: HVLA and CV4

Sham Ultra-Sound Treatment

- Provided by same physicians who did OMT.
- Protocol adapted from previous RTC's of manual therapy.
- Non-functional US unit that was modified for research purposes to provide both visual and auditory cues that could potentially elicit a placebo response.
- Physician placed applicator head over clothing & applied enough pressure for tactile stimulation in the same anatomical distributions as OMT.

Study Design

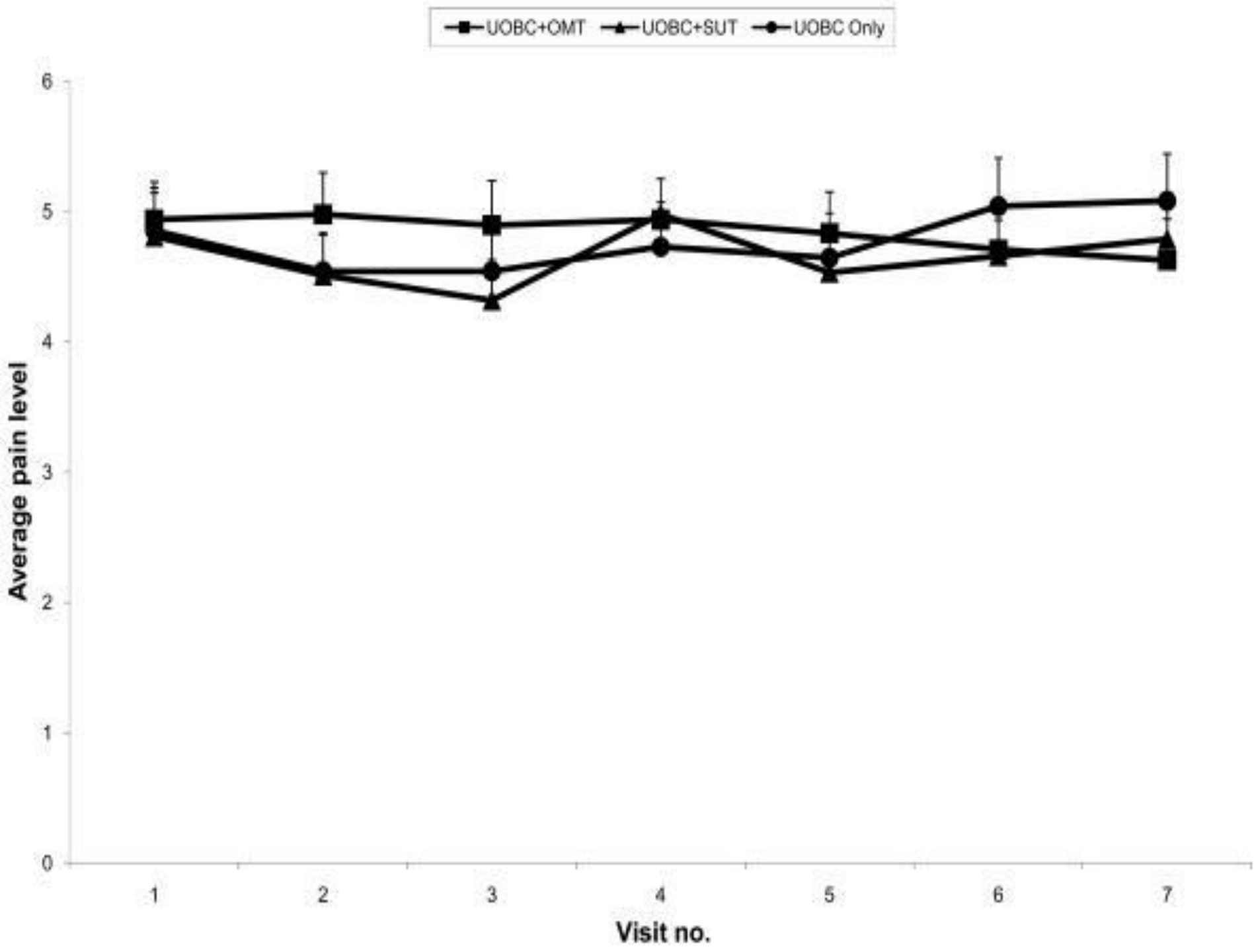
- Data for subjects in each of the 3 treatment groups were collected by blinded clinical research personnel at the time of randomization and at each third trimester visit.

Two Outcome Measures:

1. Visual Analogue Pain Scale
 2. Roland-Morris Disability Questionnaire
- Analyses based on Intention-to-Treat Principle.
 - Missing Data were imputed using the last observation carry forward method.

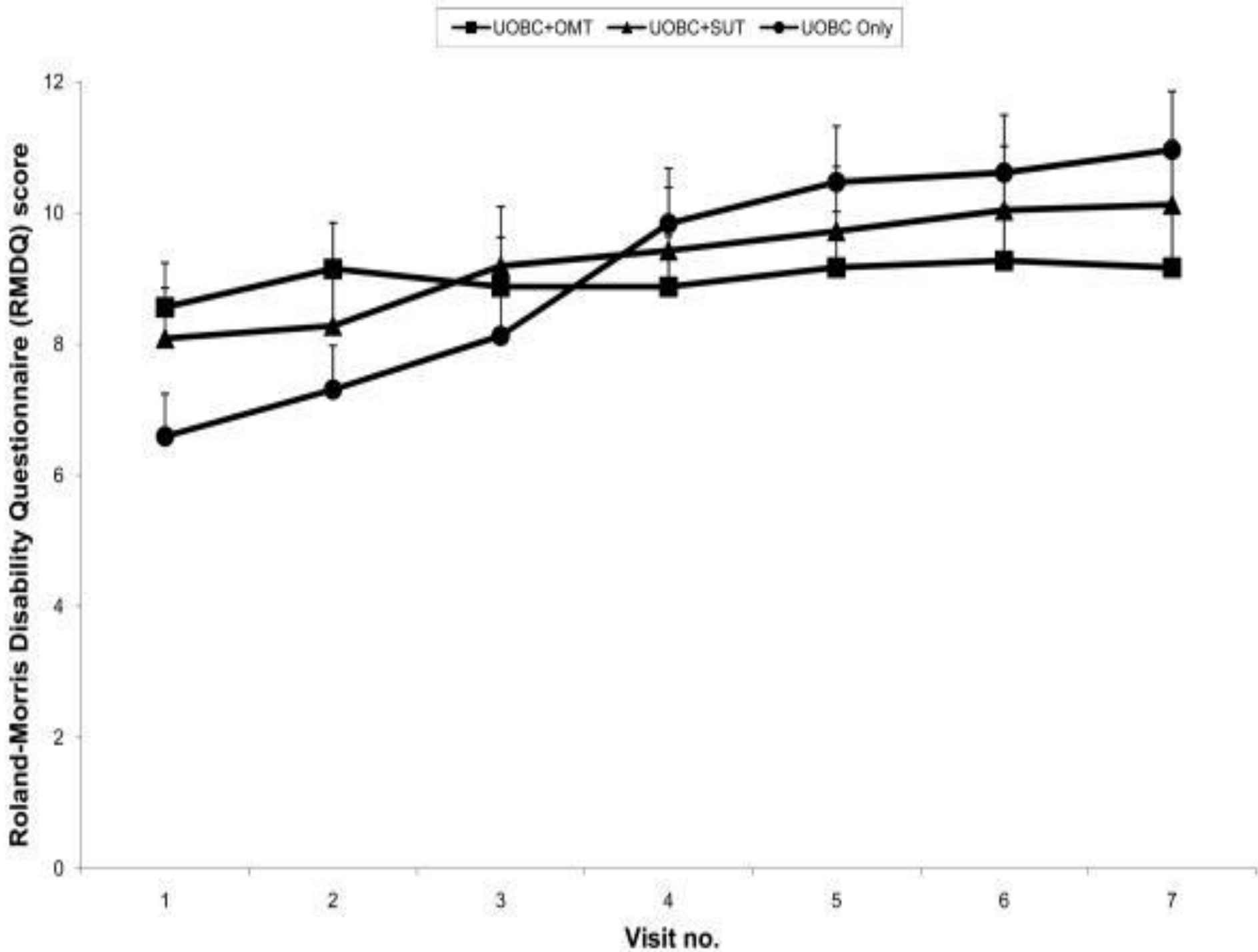
Results

- Mean Back Pain levels decreased in the UOBC+OMT group and remained unchanged in the UOBC+SUT and UOBC groups; but this did not reach statistical significance.



Statistically Significant Result

- Roland-Morris Disability Questionnaire scores increased over time in all groups, but the back-specific functioning deteriorated less in the UOBC+OMT group than in the UOBC+SUT and the UOBC groups.



The PROMOTE Study

- PROMOTE= Pregnancy Research in Osteopathic Manipulation Optimizing Treatment Effects
- Based on pilot study completed by John Licciardone, DO, MS, MBA and published in Am. Journal of Obstetrics and Gyn.
- Kendi Hensel, DO, PhD received NIH-funded K23 Mentored Patient-Oriented Research Career Development Award to carry out this study.

- “Pregnancy Research on Osteopathic Manipulation Optimizing Treatment Effects: the PROMOTE study”; American Journal of Obstetrics and Gynecology; July 25, 2015; DOI: <http://dx.doi.org/10.1016/j.ajog.2014.07.043>.

The Promote Study

- 400 subjects
- Third largest RTC ever done on OMT.
- Completed all subject visits July 2011.

Objectives

- Evaluate the influence of OMT on self-reported pain and back-related functioning.
- Secondary objective:
corroborate earlier study finding that OMT during the third trimester decreased complication of meconium-stained amniotic fluid.

Methods

- Randomized Controlled Trial:
pregnant women 18-35 years old who had reached gestational week 30 were randomly assigned to one of 3 groups:
 1. Osteopathic Manipulative Treatment + Usual Obstetric Care (OMT)
 2. Placebo Ultrasound Treatment + Usual Obstetric Care (PUT)
 3. Usual Obstetric Care Only (UCO)
- *Seven study visits were scheduled to correspond with ongoing routine prenatal care at weeks 30, 32, 34, 37, 38, 39.

PROMOTE Protocol

OMT techniques applied:

- Seated thoracic articulation
- Cervical soft tissue
- OA decompression
- Thoracic inlet myofascial release
- Lateral recumbent scapulothoracic soft tissue
- Lateral recumbent lumbar soft tissue
- Abdominal diaphragm myofascial release
- Pelvic Diaphragm myofascial release
- Sacroiliac articulation
- Pubic symphysis decompression
- Frog-leg sacral release
- Compression of the fourth ventricle (CV4)

- Sample size = 110 subjects per treatment group
- estimated for 80% power at a 5% significance ($P < .05$) to detect a 62% reduction in the incidence of meconium staining.

Results

Intention-to-treat model:

- changes in pain and back-related functioning for each group across the study (n=400).
- significant treatment effects for both pain as assessed by CPI and back-related functioning as assessed by Roland-Morris Low Back Pain and Disability Questionnaire ($P < .001$ for both).
- OMT was effective for progression of pain and deterioration of back-related functioning compared with the UCO group alone.

Results

- OMT was statistically better than UCO.
- important to note that OMT outcomes did not differ significantly from those of the PUT group

Analyses of Secondary Outcomes

329 women with available delivery information:

- only 61 women (18.5%) had meconium staining documented. Logistic regression indicated meconium staining was not influenced by treatment group ($P=.611$).
- Conversion to high-risk status occurred for 12.5% of the women (OMT=11, PUT=19 and UCO=20).
- Statistically there was no higher likelihood of conversion to high risk based on treatment group ($P=.141$)

Conclusions

- “Our results show that OMT has benefits compared to usual obstetric care only and demonstrate clinically and statistically improvements in pain and back-related functioning scores.”

Conclusions

- Incidences of conversion to high-risk status and meconium staining were not higher in the OMT group proving that there is no additional risk associated with OMT for pregnant women in the third trimester.

- “PROMOTE has confirmed earlier findings of safety and the slowing of progression of back-related disability and demonstrated significance for pain outcomes. With few options for safely treating LBP during pregnancy, these findings are clinically meaningful. Based on these finding, obstetric providers should consider adding body-based treatments for LBP into the care of pregnant women.”

Summary

- Review of physiologic changes that occur during pregnancy.
- Review of typical somatic dysfunction that occurs during pregnancy.
- Review of the research that shows benefit to utilizing OMT during pregnancy.

Resources

- Foundations for Osteopathic Medicine, second edition, chapter 31: obstetrics, Lippincott Williams & Wilkins, 2003, pp. 450-461.
- King, Hollis H., D.O.; Osteopathic manipulative treatment in prenatal care: Evidence supporting improved outcomes and health policy implications; The AAO Journal, Vol. 10, #2, Summer 2000.
- Hollis H. King, DO, PhD; Melicien A. Tettambel, DO; Michael D. Lockwood, DO; Kenneth H. Johnson, DO; Debra A. Arsenault, DO; Ryan Quist, PhD; “Osteopathic Manipulative Treatment in Prenatal Care: A Retrospective Case Control Design Study”; JAOA, Vol 103, No 12, December 2003.
- Lavelle, John M.; “Osteopathic Manipulative Treatment in Pregnant Women”; JAOA; Vol. 112; #6, June 2012, pp. 343-346.
- John C. Licciardone, DO, MS, MBA; Steve Buchanan, DO; Kendi L. Hensel, DO; Hollis H. King, DO, PhD; Kimberly G Fulda, PhD; and Scott T. Stoll, DO, PhD.; “OMT of Back Pain and Related Symptoms during Pregnancy: A Randomized Controlled Trial”; American Journal of Obstetrics and Gynecology, 2010 January; 202(1): 43.e1-43.e8.

OMT Techniques

- Lateral Sym's Articularatory Technigue
- Sacral Rocking/Myofascial Technigue
- Frog Leg Maneuver
- Strain Counterstrain Points

Sacral Mechanics

Mitchell Model vs. Strachan Model

