Clinical Report 1 (Acupuncture)

Two Cases of Low Back Pain in Pregnant Women Relieved Using Low Acupuncture and Moxibustion Stimulation Dose Evaluated with VAS and RDQ

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[Introduction]

Katai et al. reported that they used in Japan needles with a diameter of 0.16 mm for the acupuncture and moxibustion treatment of low back pain during pregnancy, inserting and retaining those into reactive sites verified through palpation to a depth of about 5 mm, thereby achieving definite results[1)].

On the other hand, multiple RCTs conducted abroad show a tendency that relevant evidence is about to be clarified[2)]. However, Lund et al. reported in 2006 that the comparison of the effects obtained in a deep needling group treated using the common deep insertion and a shallow needling group, where thin needles were inserted only superficially showed, that both treatment forms led to pain relief and no difference in the effectiveness could be found[3)]. After that no further reports examining the effectiveness of acupuncture and moxibustion treatment using a lighter than the usual stimulation are found.

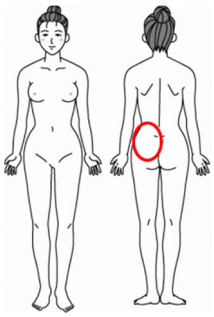
Accordingly, this study investigates the effects of acupuncture and moxibustion treatment for low back pain during pregnancy using only light stimulation.

[Cases]

In this study 2 pregnant women with the chief complaint of low back during the later half of their pregnancy visited an acupuncture and moxibustion clinic in a city on the outskirts of Tokyo with a population of 3.7 million.

Case No.1 was a multipara 29 weeks and 6 days pregnant with a single fetus, who complained of pain in the left buttock. Her age was 33 years, height 159 cm, weight 51 kg, weight before pregnancy 46 kg, BMI 18.2, weight increase was 5 kg and she had a history of low back pain (Figure 1).

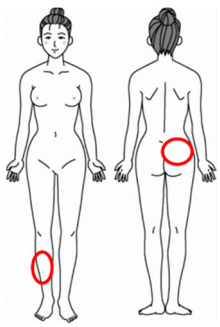
Case No. 2 was a primapara 28 weeks and 2 days pregnant with a single fetus, who complained of pain in the right buttock and the development of pain on the outside of the right lower leg associated with a diffuse feeling of discomfort upon walking for about 10 minutes. Her age was 33 years, height 154 cm, weight 56 kg, weight before pregnancy 47 kg, BMI 19.82, weight increase was 9 kg and she had a history of low back pain (Figure 2).



- Age: 33 years
- Height: 159 cm
- Weight: 51 kg☐
- Weight before pregnancy: 46 kg☐
- BMI before pregnancy: 18.20
- Weight increase: 5 kg
- Gestational week: 29th week +6 days
- Single fetus
- Multipara (1 delivery)
- LBP history: yes
- Blood pressure: 102/60 mmHg
- Blood pressure before pregnancy: 98/58 mmHg

○ indicates on a body surface map the painful

Figure 1: Profile of patient No. 1



- Age: 33 years
- Height: 154 cm
- Weight: 56 kg☐
- Weight before pregnancy: 47 kg☐
- BMI before pregnancy: 19.82
- Weight increase: 9 kg
- Gestational week: 28th week + 2 days
- Single fetus
- Primapara
- LBP history: yes
- Blood pressure: 100/60 mmHg
- Blood pressure before pregnancy: 100/60 mmHg

○ indicates on a body surface map the painful

Figure 2: Profile of patient No. 2

[Methods]

In both cases the trunk ROM test and sacroiliac stress test were performed as physical examination. Since patient No. 2 complained in addition to the pain in the right buttock about right lower leg symptoms, additionally sensory and muscle tests and the sciatic nerve stretch test were performed, deep tendon and pathologic reflexes and Kemp's sign checked as well as arterial pulses palpated[4-6] (Table 1).

Table 1: Physical examination

First visit	Lordosis, kyphosis
Trunk range of motion	Anteflexion (finger-floor distance), retroflexion, lateral bending, rotation
Sacroiliac joint stress test	Gaenslen test、Patrick test Newton test (compression test, distraction test)
Sciatica	Straight leg raising test (SLR test)
Muscle testing	Quadriceps femoris, anterior tibialis, extensor hallucis longus, flexor hallucis longus muscles
Deep tendon reflexes	Achilles tendon reflex, patella tendon reflex
Pathologic reflexes	Babinski reflex
Intermittent claudication	Neuronal (Kemp sign) Vasal (artery palpation: dorsal artery of the foot, posterior tibial artery)
Palpation	Tenderness, percussion pain

For the acupuncture treatment 40 mm stainless steel needles with a diameter of 0.14 mm were used and either singularly inserted to a depth between 3 and 8 mm or else retained for about 10 minutes.

For the moxibustion treatment moxa sticks were applied for 2 to 5 minutes to the extend, that patient experienced the heat as comfortable. Hot packs and far infrared irradiation were also applied as required (Table 2).

Table 2: Treatment

Acupuncture treatment
Used needles: length = 40 mm x diameter 0.14 mm
Stainless steel needles
Insertion depth: 3-8 mm
Insertion method: singular insertion, needle retaining (about 10 minutes)
Moxibustion treatment
Used moxa: stick moxa
Heat dose: so that the patient experiences it as comfortable
Stimulation duration: 2-5 minutes
Other: hot packs, far infrared irradiation

Under constant observation about 5 to 10 acupoints were selected from among Inkokku (KI10, Yingu), Chikuhin (KI9, Zhubin), Fukuryu (KI7, Fuliu), Taikei (KI3, Taixi), Suisen (KI5, Shuiquan), Yusen (KI1, Yongquan), Bokushin (BL61, Pushen), Taihaku (SP3, Taibai) and around the region of the chief complaint, or else into reactive spots marked by coolness, dampness, lack of power, muscle tension (Table 3).

Table 3: Used acupoints

Used acupoints
Inkokku (KI10, Yingu), Chikuhin (KI9, Zhubin), Fukuryu (KI7, Fuliu), Taikei (KI3, Taixi), Suisen (KI5, Shuiquan), Yusen (KI1, Yongquan), Bokushin (BL61, Pushen), Taihaku (SP3, Taibai), around the region of the chief complaint
Reactive spots marked by coolness, dampness, lack of power, muscle tension.
Selection of a total of 5-10 points.

For the evaluation we used a pain scale and a Visual Analogue Scale (below abbreviated VAS) as well as the lumbago specific QOL scale Roland-Morris Disability Questionnaire (below abbreviated RDQ). The VAS was implemented before each treatment and the RDQ during the first visit and 5 weeks later before treatment (Table 4).

Table 4: Evaluation method and measurements

Evaluation method
Pain scale: Visual analogue scale (VAS) 100 mm
Lumbago specific QOL scale: Roland-Morris Disability Questionnaire (RDQ)
Measurement
VAS: before each treatment
RDQ: during first consultation and 5 weeks later before treatment

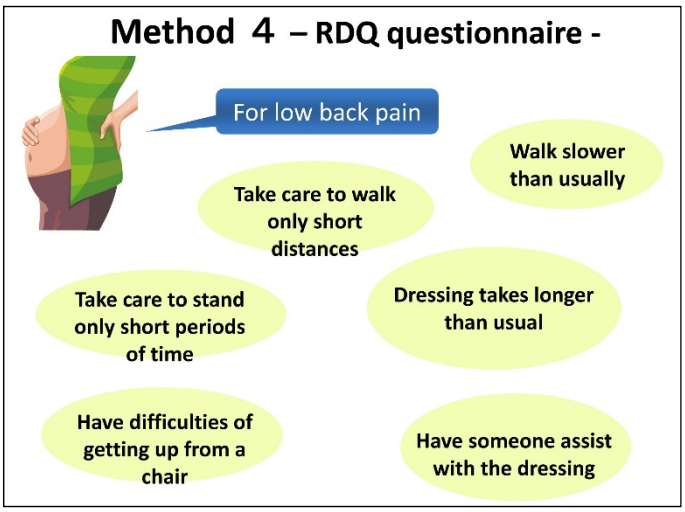


Figure 3: Main RDQ items

The VAS was recorded as a 100-mm long line on the questionnaire marked "no pain" on one end and "maximal pain" at the other end. The patients themselves marked the degree of pain on this line and this position was then measured from 0 mm, using the obtained numerical value as pain evaluation[8].

The RDQ is an evaluation method using a questionnaire inquiring after the presence of low back pain induced disability through 24 questions pertaining to daily life activities like "stand", "walk", "dress" etc., which the patients answer directly with either yes or no. It is used widely worldwide and expected to be employed for studies of therapies and low back pain related factors[9] (Figure 3). For an evaluation using the RDQ a score between 0 and 24 points is obtained and increasingly higher scores indicate a more severe impairment of daily life and low back pain induced reduction in QOL (Table 5).

[Results]

Multiple sacroiliac joint stress tests showed in patient No. 1 positive results and in the region of the chief complaint tenderness was also found. In patient No. 2 the lordosis of the spine was mildly pronounced and anteflexion slightly restricted. Although the straight leg raising test was both on the left and right negative, elevation on the right side to close to 70° elicited pain on the posterior side of the thigh. On the right side lateral to the interspinous spaces L3 to L5 and on the right buttock tenderness was found. However, the border of the region of slightly decreased sensation was indistinct and no anomalies were found for muscle strength, deep tendon reflexes, pathologic reflexes and similar neurologic tests. Moreover, arterial pulses could be palpated (Table 6).

Table 5: All 24 RDQ items and evaluation

1	Spend most of the time at home because of low back pain	13	It hurts almost always
2	Frequently changes body position to alleviate the low back pain	14	Turning over in bed is difficult because of the low back pain
3	Walk slower than usually because of low back pain	15	Has little appetite because of the low back pain
4	The usual house chores cannot be done at all because of low back pain	16	Have difficulties wearing socks or stockings because of the low back pain
5	Uses handrails to climb stairs because of low back pain	17	Take care to walk only short distances because of the low back pain
6	Spend more time resting by laying down because of the low back pain	18	Does not sleep well because of the low back pain (Please select "Yes" under "Use sleeping pills because of the pain")
7	Cannot get up from an armchair (a chair supporting the body for comfortable sitting, sit deeply back in a chair) without holding on to something because of the low back pain	19	Ask someone for help with the dressing because of the low back pain
8	Sometimes ask people for help because of the low back pain	20	Spend most of the day sitting because of the low back pain
9	Dressing takes longer than usual because of the low back pain	21	Take care not to exert oneself when doing the household chores because of the low back pain
10	Take care to stand only for short periods of time because of the low back pain	22	Get more easily irritated or angry at others because of the low back pain
11	Take care not bend from the waist or kneel because of the low back pain		Climb stairs slower than usual because of the low back pain
12	Have difficulties of getting up from a chair because of the low back pain	24	Spend most of the time in bed (futon) because of the low back pain

Evaluation method: Assigning scores between 0 and 24 points. The higher the score the higher is the degree of daily life impairment, indicating a decrease in QOL because of the low back pain.

Table 6: Results of the physical examination

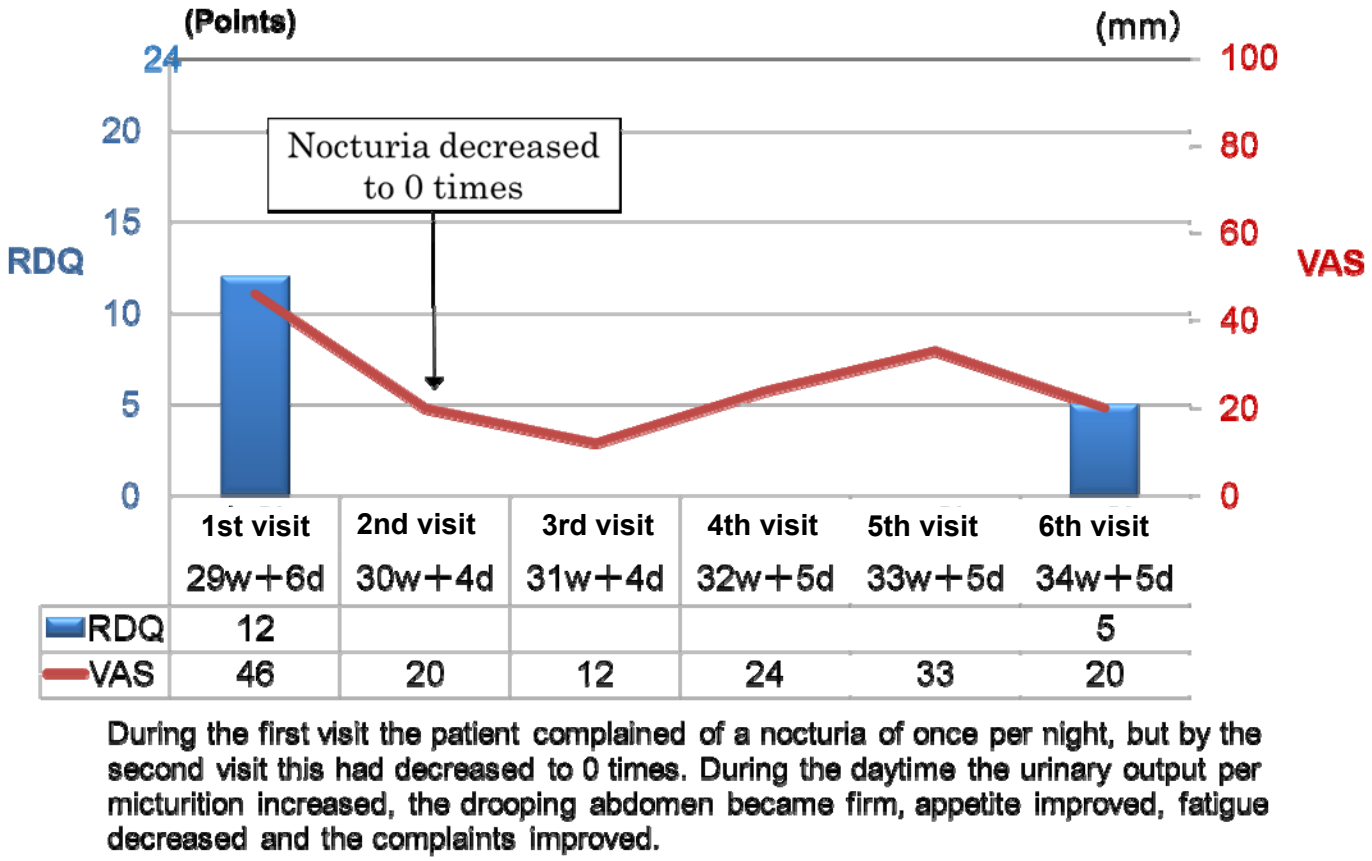
	Case No. 1	Case No. 2
Lordosis	**n.p.**	**mildly pronounced**
Trunk ROM anteflexion (finger-floor distance)	**n.p.**	**n.p. (30 cm)**
Gaenslen test	**both left and right (−)**	**both left and right (−)**
Newton test (compression test)	**left (+) right (−)**	**both left and right (−)**
Newton test (distraction test)	**both left and right (−)**	**(−)**
Patrick test	**both left and right on the left (+)**	**both left and right (−)**
Straight leg raising test (SLR test)		**(−) at 70° pain is triggered on the posterior side of the thigh**
Tenderness, percussion pain	**Tenderness around the left sacroiliac joint**	**Tenderness to the right of the spaces between the spinous processes of L3～L5 and on the right buttock**

1) Case No. 1 (Graph 1)

Gestational weeks are plotted on the abscissa of the graph, while the ordinate shows on the left side the RDQ score and on the right side the VAS value. In patient No. 1 the RDQ score decreased from 12 to 5 points and the VAS of 46 mm also gradually decreased to reach 5 weeks later 20 mm.

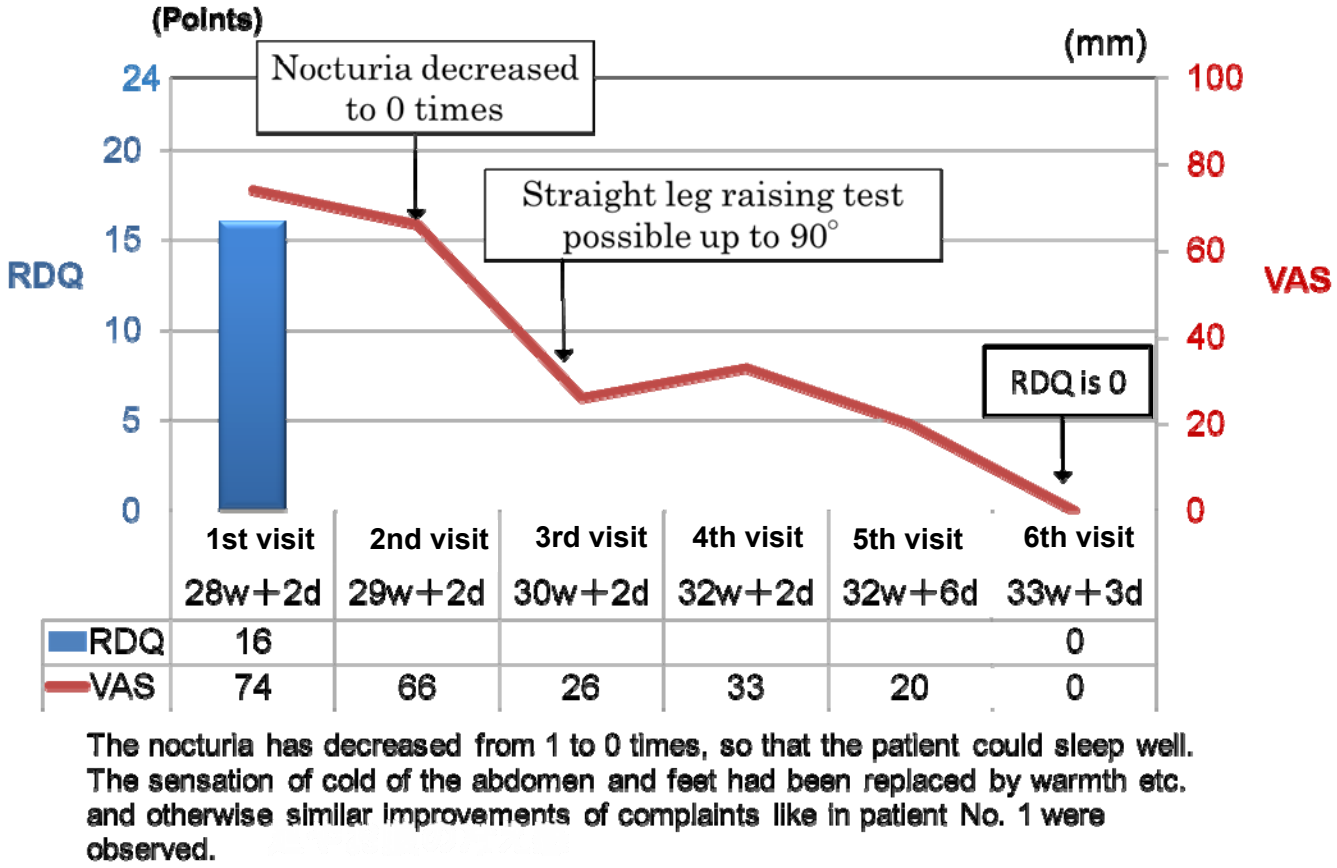
Also, the nocturia of once per night reported during the first visit had decreased by the second visit to 0 times. During the daytime the urinary output per micturition increased, the drooping abdomen became firm, appetite improved, fatigue decreased and the complaints improved.

Graph 1: Course of patient No. 1



2) Case No. 2 (Graph 2)

In patient No. 2 the RDQ score of 16 points obtained during the first visit decreased 5 weeks later, at a gestational age of 33 weeks + 3 days, to 0 points and the VAS of 74 mm gradually decreased to 0 mm. The straight leg raising test that induced pain during the first visit upon elevation to 70° on the posterior side of the thigh, but after the third visit this maneuver elicited pain any longer even at an angle of more than 90°.



Graph 2: Course of patient No. 2

Further, the nocturia of once per night reported during the first visit decreased to 0 and the patient could sleep well. The sensation of cold of the abdomen and feet had been replaced by warmth etc. and otherwise similar improvements of complaints like in patient No. 1 were observed.

[Discussion]

1) Clinical picture of low back pain during pregnancy

A Japanese study showed a prevalence of 50-70% for low back pain during pregnancy. The pain occurs first either during early gestation or the second trimester and reportedly tends to get worse during the course of the pregnancy. Most cases are comparatively mild, but severe cases of low back pain restricting activities daily living and significantly decreasing the QOL are also observed[10-14].

2) Pathology

Low back pain during pregnancy may conceivably be caused by (1) increased burden on the lumbodorsal muscles due to the increase in body weight, influence on posture because the enlarging uterus shifts the center of gravity forward (postural), (2) loosening of pelvic ligaments around the sacroiliac joint or the pubic symphysis through the action of sex steroid hormones or relaxin may increase their mobility of these joints, resulting in an instability of the pelvic ring (pelvic ring instability), (3) pregnancy induced increase in body weight and changes in posture may place severe stress on latent intervertebral disc degeneration and thus can cause a lumbar intervertebral disc to prolapse (lumbar intervertebral disk herniation) (Table 7). As opposed to the non-pregnant state there are limits to x-ray, CT or MRI imaging or physical examinations that can be performed during pregnancy, so that the differential diagnosis is made

relying on anamnesis and a minimum of physical examination[15].

Surmising the pathology from the anamnesis and physical examination the condition in patient No. 1 was considered to be due to pelvic ring instability and that in patient No. 2 a postural lumbago. However, low back pain treatment in recent years has shown, that not only biological factors, but also social and psychological factors may be involved[16]. Before the background of physiological changes caused by the pregnancy many factors are considered to contribute to low back pain during pregnancy, but the details of the condition are not yet clear (Figure 4).

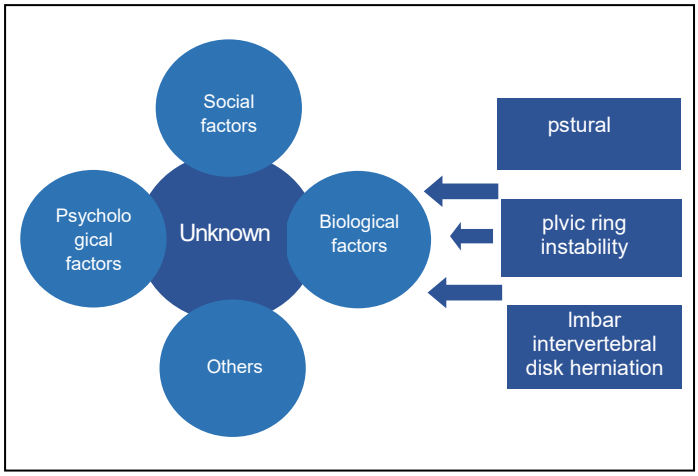


Figure 4: Factors for low back pain during pregnancy

Table 7: Biological factors for low back pain during pregnancy

Postural lumbago	Increased burden on the lumbodorsal muscles due to an increase in body weight. Then enlarging uterus shifts the center of gravity forwards and thus influences posture.
Pelvic ring instability	The action of sex steroid hormones or relaxin loosen pelvic ligaments of the sacroiliac joint and pubic symphysis, thereby increasing their mobility, resulting in pelvic ring instability.
Lumbar intervertebral disk herniation	The pregnancy induced increase in body weight and changes in posture may place severe stress on latent intervertebral disc degeneration and thus can cause a lumbar intervertebral disc to prolapse.

3) Acupuncture treatment

The acupuncture treatment for low back pain conceivably uses local treatment of the affected region, or else distant treatment sites exploiting channel sinews or channels. Lund compared the use of needles with a diameter of 0.3 mm to needle 3-4 points (on both sides) on the bladder channel with a stimulation dose strong enough to obtain the needling sensation for his treatment of a deep needling group and needles with a diameter of 0.2 mm inserted only superficially into the same sites to be retained there for the shallow needling group and found, that pain was alleviated in both groups and reported he did not find any differences in the effects[3]. (Table 8)

Table 8: Comparison of the treatment by Lund et al. and Katai et al.

Author Publication year	Treatment site	Number of treated acupoints	Therapeutic tools	Stimulation method	
Lundl et. Al 2006	Lumboscral region abdomen legs arms	10-14 (calculated)	Deep needling group	Diameter 0.3mm	Insertion into the muscles, twirling, needling sensation
Shallow needling group	Diameter 0.2mm	Insertion through the skin perpendicular needling			
Shuichi Katai et al. 2003	Legs (lumgosacral region)			Diameter 0.16mm	Retaining the needles at a depth of about 5mm, until the needle tip is brought in contact with the reation

*diameter 0.3 mm (No.8 needle), 0.2mm (No.3), 0.16mm (No.1 needle)

Both examined patients had apart from the chief complaint many indefinite complaints like abdominal distention, shoulder stiffness, chilling, leg cramps, nocturia, fatigue etc. Thus, regarding the acupuncture treatment we palpated with reference to the report by Katai et al. relevant channel sinews and channels and selected mainly reactive spots along those, using thin needles for singular insertion to a depth of about 3-8 mm or else needle retaining. For the moxibustion treatment we used stick moxa, applying it to the region of the chief complaint and the reactive spots on the legs confirmed through palpation, adjusting the amount of heat so that the patient experienced it as comfortable.

Watanabe et al. reported that their investigation of general patients with low back pain showed for lumbago patients consulting medical facilities a RDQ score of 7.4[17]. Comparing the score for the intensity of pain due to pelvic pain and the impairment of activity of daily life in the 28th and 36th gestational week Ando et al. reported, that in spite of instructions pertaining to posture during daily life, exercise for the expectant mothers and instructions in the proper use of pelvic belts the pain intensity did not vary and there was a high degree of impairment of activity of daily life[18].
The RDQ scores of the investigated patients during their first visit were 12 and 16 points respectively, each of which being higher than the mentioned 7.4 points, so that the QOL of these patients had been decreased by the low back pain.

The physical examinations performed in this study on patient No. 1 suggested pelvic pain and from the start of the acupuncture and moxibustion treatment in the 29th gestational week pain and impairment of activity of daily life gradually began to decrease, so that 5 weeks later the RDQ score had dropped to 5 points. Conversely, in patient No. 2 the nature of the pelvic pain dealt with by Ando et al. differed, but here too the RDQ score had decreased after 5 weeks to 0 points and improvements in the QOL were observed.
Thus the use of thin needles formerly often treated as placebo or sham acupuncture, provides a comfortable acupuncture treatment. If used elsewhere than locally, it offers a little invasive treatment and allowed to obtain patient satisfying therapeutic effects.

In recent years clinical and physiological studies pertaining to the use of press needles tend to clearly show that minimal stimulation elicits physiological activation[19-20]. For further developments of acupuncture and moxibustion medicine in the future investigation of the effects of low-invasive stimulation are considered to be required and further research in this field anticipated.
Likely many factors contribute to the development of low back pain during pregnancy, clinical symptoms are very diverse and there are patients in whom sufficient effects cannot be achieved. In conjunction with an elucidation of the pathology of low back pain during pregnancy the mechanisms of acupuncture and moxibustion are also expected to be clarified in the future.
The evidence for acupuncture and moxibustion using weak stimulation methods must be substantiated in the future through RCTs etc.

[Conclusion]
The results of this study examining two patients suggested, that acupuncture and moxibustion using low stimulation doses allows to alleviate the degree of low back pain during pregnancy and possibly improve the QOL.

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