Prevalence of diastasis of the rectus abdominis muscles in postpartum women among primipara and multipara

Thesis
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بسم الله الرحمن الرحيم
وَمَا أُوتِيتُم مِّنَ الْعِلْمِ إِلَّا قَلِيلًا
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List of Abbreviations

BMI: Body mass index.

DL: Duration of labour.

D.M: Diabetes mellitus.

DRAM: Diastasis of recti abdominis muscles.

GA: Gestational age.

HR: Heart rate.

IR: Infrared.

IRD: Inter- rectus distance.

NELIP: Nutrition and Exercise Life Intervention Program.

PDL: Pulsed dye laser

RF: Radiofrequency.

SG: Striae gravidarum.

SLR: Straight- leg raising.

Introduction

The main musculoskeletal problems encountered in postnatal women are low back pain, pelvic girdle pain, diasstasis recti abdominis and poor control of abdominal muscles **(Nahas et al., 2005).**

The anterior abdominal wall consist primarily of four paired muscles; rectus abdominis, external oblique, internal oblique and transversus abdominis. The fibers of these muscles are directed vertically, obliquely and horizontally. The muscles have skeletal attachments on thoracic cage and pelvis and via broad aponeurosis to both the thoracolumbar fascia and the rectus sheath **(Gilleard and Brown 1996).**

During pregnancy, hormonal changes caused by relaxin, progesterone and estrogen combined with uterine growth may cause stretching of the abdominal muscles, affecting mainly the rectus abdominis muscle. Also it is common to get anterior pelvic tilt with or without lumbar hyperlordosis. These postural changes can affect the angle of insertion of pelvic and abdominal muscles, influencing postural biomechanics **(Spitznagle et al., 200**7).

As pregnancy progress the weight and dimensions of the uterus and its content increase, influencing maternal trunk morphology. The maternal inferior thoracic diameter is increased thus altering the spatial relationship between the superior and inferior abdominal muscles attachments. In addition, anterior and lateral dimensions of the abdomen during pregnancy increase the distance between muscles attachment producing increase in

muscle length. Increasing anterior abdominal dimensions may alter the angle of abdominal muscles attachments in the sagittal plane **(Artal et al., 2003).**

The biochemical changes and stretching of these muscles facilitate the appearance of diastasis of rectus abdominis muscles (DRAM) **(Spitznagle et al., 2007).** The DRAM is defined as a midline separation at the linea alba of the recti muscles of the abdominal wall **(Anderson, 2002).**

The functional roles of the abdominal mucles during pregnancy appear to be similar to those in the non pregnant state and include trunk movement, pelvic stabilization, and restraint the abdominal content. Also the main function of rectus abdominis is to flex the pelvis on a fixed trunk (**Gilleard and Brown 1996).**

The separation of the rectus abdominis muscles can cause array of problems. without the dynamic stabilization that abdominal wall muscles normally provide, weakness in the abdominal wall can affect trunk stability and mobility; contribute to back pain, compromising posture, pelvic floor dysfunction, hernia and cosmetic defects **(Spitznagle et al., 2007).**

In healthy women, there is synergism between abdominal muscles and pelvic floor muscles, thus in women who have some impairment in abdominal muscles may present mechanical changes of the fascia which form the rectus sheath and this may damage the pelvic floor muscles **(Sapsford, 2004).**

Aim of Work

1) To assess the prevalence of diastasis of rectus abdominis muscles among primiparae and multiparae immediately after vaginal delivery.

2) To make a review of literature about the abdominal wall changes during pregnancy and their postpartum management.

Anatomy of the anterior abdominal wall

The anterior abdominal wall extends from the costal margins and xiphoid process superiorly to the iliac crest, pubis and pubic symphysis inferiorly (It overlaps and is connected to both the posterior abdominal wall and paravertebral tissue). It forms a continuous but flexible sheet of tissue across the anterior and lateral aspects of the abdomen. The anterior abdominal wall is composed of skin, soft tissue, lymphatic, vascular structures, segmental nerves, muscles and connective tissue lining the peritoneal cavity. It has an important role in maintaining the form of the abdomen and is involved in many physiological activities.

Skin and soft tissue

The outer layer is formed from the skin and subcutaneous fat, the skin is non specialized and variably hirsute, depending on the sex and race. The subcutaneous fat of the abdominal wall is highly varible in thickness and is one of the area where excess fat is stored during periods of obesity **(Cromack et al., 1994).**

Vascular supply

The anterior abdominal wall receives its blood supply from paired superior and inferior epigastric arteries running vertically through the tissue, and from paired posterior intercostal, subcostal and lumbar vessels running obliquely around the anterolateral aspects of the abdomen **(Cromack et al., 1994).**

Lymphatic drainage

The lymphatic vessels of the anterior abdominal wall lie both superficial and deep to the deep fascia.

Segmental nerves

The 7th to 12th lower thoracic ventral rami continue anteriorly from the intercostal spaces into the abdominal wall. The 7th and 8th nerves supply the skin of the epigastrium,the 9th intercostal nerve supply the skin above the umbilicus, the 10^{th} nerve supply the skin which include the umbilicus, the 11th nerve supply the skin below the umbilicus, the 12th thoracic(subcostal) nerve supply the anterior gluteal skin reaching down to the greater trochanter.The 7th to 12th intercostal nerves supply intercostal, subcostal and abdominal muscles, all six nerves also provide sensory fibers to the costal parts of the diaphragm and related parietal pleura and peritoneum **(Cromack et al., 1994).**

Soft tissue

Superficial fascia

The superficial fascia of the abdominal wall consists mostly of a single layer that contains a variable amount of fat. It lies between the skin and muscles of the anterior abdominal wall. In the lower part, the fascia differentiates into superficial and deep layers between which lie superficial vessels and nerves .

The superficial layer of superficial fascia

It is thick areolar in texture and contains a variable amount of fat. It is often greatly thickened in obese individuals. Inferiorly, it lies superficial to the inguinal ligament and is continuous with the superficial fascia of the thigh **(Rizk, 1990).**

Deep (membranous) layer of superficial fascia

It is a distinct entity where the deep layer of the fascia is more membranous than the superficial, and contains elastic fibers. It is loosely connected by areolar tissue to the aponeurosis of external oblique, but in the midline it is intimately adherent to the linea alba and symphysis pubis **(Rizk, 1990).**

Transversalis fascia

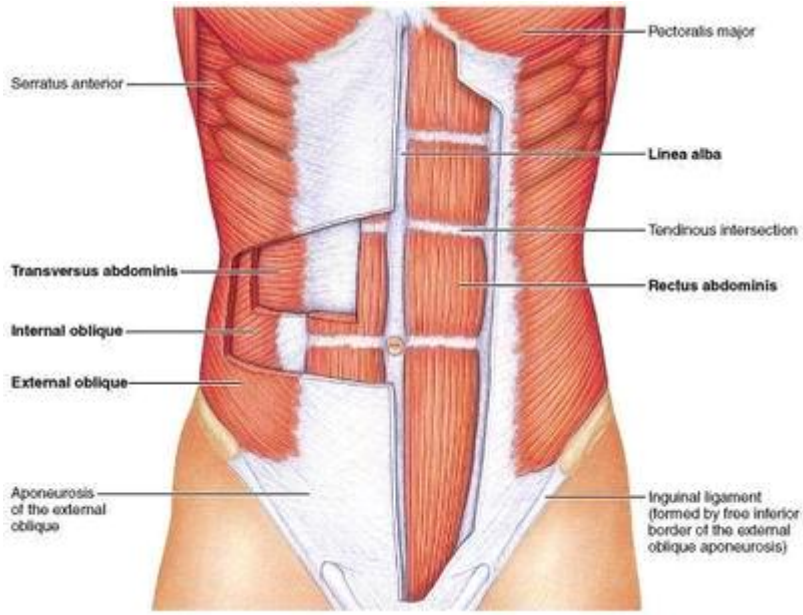
The transversalis fascia is a thin layer of connective tissue lying between the inner surface of transversus abdominis and the extraperitoneal fat. It is part of general layer of fascia between the peritoneum and the abdominal wall. Posteriorly, it is continuous with the anterior layer of the thoracolumbar fascia, and it forms a continuous sheet anteriorly. Inferiorly, it is continuous with the iliac and pelvic fascia, and superiorly it blends with the fascia covering the inferior surface of the diaphragm **(Rizk, 1990).**

Extraperitoneal connective tissue

The extraperitoneal connective tissue is a layer of areaolar tissue laying between the peritoneum and the fascia linning the abdominal and pelvic cavities. The amount of extraperitoneal tissue varies. It is abundant on the posterior wall of the abdomen

particulary around the kidney, where it contains much adipose tissue. It is variable in thickness on the anterolateral wall, where it is thin in children and normal in adults but often thickened in the obese. Extraperitoneal tissue is continuous with the epimysium of muscles of the abdominal wall **(Rizk, 1990).**

Anterolateral muscles of the abdomen



Figure(1): Muscles of the anterolateral abdominal wall.

Rectus abdominis, pyramidalis, extrernal oblique, internal oblique and transversus abdominis constitute the anterolateral muscles of the abdomen, they act together to perform range of functions. Active contraction of the muscles provides an important role in the maintenance of abdominal wall tone when the intra- abdominal pressure is increased.