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ЕЖЕМЕСЯЧНЫЙ НАУЧНЫЙ ЖУРНАЛ

Медицинские новости Грузии

საქართველოს სამედიცინო სიახლენი

GEORGIAN MEDICAL NEWS

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GMN: Georgian Medical News is peer-reviewed, published monthly journal committed to promoting the science and art of medicine and the betterment of public health, published by the GMN Editorial Board since 1994. GMN carries original scientific articles on medicine, biology and pharmacy, which are of experimental, theoretical and practical character; publishes original research, reviews, commentaries, editorials, essays, medical news, and correspondence in English and Russian.

GMN is indexed in MEDLINE, SCOPUS, PubMed and VINITI Russian Academy of Sciences. The full text content is available through EBSCO databases.

GMN: Медицинские новости Грузии - ежемесячный рецензируемый научный журнал, издаётся Редакционной коллегией с 1994 года на русском и английском языках в целях поддержки медицинской науки и улучшения здравоохранения. В журнале публикуются оригинальные научные статьи в области медицины, биологии и фармации, статьи обзорного характера, научные сообщения, новости медицины и здравоохранения. Журнал индексируется в MEDLINE, отражён в базе данных SCOPUS, PubMed и ВИНИТИ РАН. Полнотекстовые статьи журнала доступны через БД EBSCO.

GMN: Georgian Medical News – საქართველოს სამედიცინო სიახლენი – არის ყოველთვიური სამეცნიერო სამედიცინო რეცენზირებადი ჟურნალი, გამოიცემა 1994 წლიდან, წარმოადგენს სარედაქციო კოლეგიისა და აშშ-ის მეცნიერების, განათლების, ინდუსტრიის, ხელოვნებისა და ბუნებისმეტყველების საერთაშორისო აკადემიის ერთობლივ გამოცემას. GMN-ში რუსულ და ინგლისურ ენებზე ქვეყნდება ექსპერიმენტული, თეორიული და პრაქტიკული ხასიათის ორიგინალური სამეცნიერო სტატიები მედიცინის, ბიოლოგიისა და ფარმაციის სფეროში, მიმოხილვითი ხასიათის სტატიები.

ჟურნალი ინდექსირებულია MEDLINE-ის საერთაშორისო სისტემაში, ასახულია SCOPUS-ის, PubMed-ის და ВИНИТИ РАН-ის მონაცემთა ბაზებში. სტატიების სრული ტექსტი ხელმისაწვდომია EBSCO-ს მონაცემთა ბაზებიდან.

WEBSITE

www.geomednews.com

К СВЕДЕНИЮ АВТОРОВ!

При направлении статьи в редакцию необходимо соблюдать следующие правила:

1. Статья должна быть представлена в двух экземплярах, на русском или английском языках, напечатанная через **полтора интервала на одной стороне стандартного листа с шириной левого поля в три сантиметра**. Используемый компьютерный шрифт для текста на русском и английском языках - **Times New Roman** (**Кириллица**), для текста на грузинском языке следует использовать **AcadNusx.** Размер шрифта - **12**. К рукописи, напечатанной на компьютере, должен быть приложен CD со статьей.

2. Размер статьи должен быть не менее десяти и не более двадцати страниц машинописи, включая указатель литературы и резюме на английском, русском и грузинском языках.

3. В статье должны быть освещены актуальность данного материала, методы и результаты исследования и их обсуждение.

При представлении в печать научных экспериментальных работ авторы должны указывать вид и количество экспериментальных животных, применявшиеся методы обезболивания и усыпления (в ходе острых опытов).

4. К статье должны быть приложены краткое (на полстраницы) резюме на английском, русском и грузинском языках (включающее следующие разделы: цель исследования, материал и методы, результаты и заключение) и список ключевых слов (key words).

5. Таблицы необходимо представлять в печатной форме. Фотокопии не принимаются. **Все цифровые, итоговые и процентные данные в таблицах должны соответствовать таковым в тексте статьи**. Таблицы и графики должны быть озаглавлены.

6. Фотографии должны быть контрастными, фотокопии с рентгенограмм - в позитивном изображении. Рисунки, чертежи и диаграммы следует озаглавить, пронумеровать и вставить в соответствующее место текста **в tiff формате**.

В подписях к микрофотографиям следует указывать степень увеличения через окуляр или объектив и метод окраски или импрегнации срезов.

7. Фамилии отечественных авторов приводятся в оригинальной транскрипции.

8. При оформлении и направлении статей в журнал МНГ просим авторов соблюдать правила, изложенные в «Единых требованиях к рукописям, представляемым в биомедицинские журналы», принятых Международным комитетом редакторов медицинских журналов - http://www.spinesurgery.ru/files/publish.pdf и http://www.nlm.nih.gov/bsd/uniform_requirements.html
В конце каждой оригинальной статьи приводится библиографический список. В список литературы включаются все материалы, на которые имеются ссылки в тексте. Список составляется в алфавитном порядке и нумеруется. Литературный источник приводится на языке оригинала. В списке литературы сначала приводятся работы, написанные знаками грузинского алфавита, затем кириллицей и латиницей. Ссылки на цитируемые работы в тексте статьи даются в квадратных скобках в виде номера, соответствующего номеру данной работы в списке литературы. Большинство цитированных источников должны быть за последние 5-7 лет.

9. Для получения права на публикацию статья должна иметь от руководителя работы или учреждения визу и сопроводительное отношение, написанные или напечатанные на бланке и заверенные подписью и печатью.

10. В конце статьи должны быть подписи всех авторов, полностью приведены их фамилии, имена и отчества, указаны служебный и домашний номера телефонов и адреса или иные координаты. Количество авторов (соавторов) не должно превышать пяти человек.

11. Редакция оставляет за собой право сокращать и исправлять статьи. Корректура авторам не высылается, вся работа и сверка проводится по авторскому оригиналу.

12. Недопустимо направление в редакцию работ, представленных к печати в иных издательствах или опубликованных в других изданиях.

При нарушении указанных правил статьи не рассматриваются.

REQUIREMENTS

Please note, materials submitted to the Editorial Office Staff are supposed to meet the following requirements:

1. Articles must be provided with a double copy, in English or Russian languages and typed or compu-ter-printed on a single side of standard typing paper, with the left margin of **3** centimeters width, and **1.5** spacing between the lines, typeface - **Times New Roman** (**Cyrillic**), print size - **12** (referring to Georgian and Russian materials). With computer-printed texts please enclose a CD carrying the same file titled with Latin symbols.

2. Size of the article, including index and resume in English, Russian and Georgian languages must be at least 10 pages and not exceed the limit of 20 pages of typed or computer-printed text.

3. Submitted material must include a coverage of a topical subject, research methods, results, and review.

Authors of the scientific-research works must indicate the number of experimental biological species drawn in, list the employed methods of anesthetization and soporific means used during acute tests.

4. Articles must have a short (half page) abstract in English, Russian and Georgian (including the following sections: aim of study, material and methods, results and conclusions) and a list of key words.

5. Tables must be presented in an original typed or computer-printed form, instead of a photocopied version. **Numbers, totals, percentile data on the tables must coincide with those in the texts of the articles.** Tables and graphs must be headed.

6. Photographs are required to be contrasted and must be submitted with doubles. Please number each photograph with a pencil on its back, indicate author's name, title of the article (short version), and mark out its top and bottom parts. Drawings must be accurate, drafts and diagrams drawn in Indian ink (or black ink). Photocopies of the X-ray photographs must be presented in a positive image in **tiff format**.

Accurately numbered subtitles for each illustration must be listed on a separate sheet of paper. In the subtitles for the microphotographs please indicate the ocular and objective lens magnification power, method of coloring or impregnation of the microscopic sections (preparations).

7. Please indicate last names, first and middle initials of the native authors, present names and initials of the foreign authors in the transcription of the original language, enclose in parenthesis corresponding number under which the author is listed in the reference materials.

8. Please follow guidance offered to authors by The International Committee of Medical Journal Editors guidance in its Uniform Requirements for Manuscripts Submitted to Biomedical Journals publication available online at: http://www.nlm.nih.gov/bsd/uniform_requirements.html
http://www.icmje.org/urm_full.pdf
In GMN style for each work cited in the text, a bibliographic reference is given, and this is located at the end of the article under the title "References". All references cited in the text must be listed. The list of references should be arranged alphabetically and then numbered. References are numbered in the text [numbers in square brackets] and in the reference list and numbers are repeated throughout the text as needed. The bibliographic description is given in the language of publication (citations in Georgian script are followed by Cyrillic and Latin).

9. To obtain the rights of publication articles must be accompanied by a visa from the project instructor or the establishment, where the work has been performed, and a reference letter, both written or typed on a special signed form, certified by a stamp or a seal.

10. Articles must be signed by all of the authors at the end, and they must be provided with a list of full names, office and home phone numbers and addresses or other non-office locations where the authors could be reached. The number of the authors (co-authors) must not exceed the limit of 5 people.

11. Editorial Staff reserves the rights to cut down in size and correct the articles. Proof-sheets are not sent out to the authors. The entire editorial and collation work is performed according to the author's original text.

12. Sending in the works that have already been assigned to the press by other Editorial Staffs or have been printed by other publishers is not permissible.

Articles that Fail to Meet the Aforementioned Requirements are not Assigned to be Reviewed.

ავტორთა საყურადღებოდ!

რედაქციაში სტატიის წარმოდგენისას საჭიროა დავიცვათ შემდეგი წესები:

1. სტატია უნდა წარმოადგინოთ 2 ცალად, რუსულ ან ინგლისურ ენებზე,დაბეჭდილი სტანდარტული ფურცლის 1 გვერდზე, 3 სმ სიგანის მარცხენა ველისა და სტრიქონებს შორის 1,5 ინტერვალის დაცვით. გამოყენებული კომპიუტერული შრიფტი რუსულ და ინგლისურენოვან ტექსტებში - **Times New Roman (Кириллица)**, ხოლო ქართულენოვან ტექსტში საჭიროა გამოვიყენოთ **AcadNusx.** შრიფტის ზომა – 12. სტატიას თან უნდა ახლდეს CD სტატიით.

2. სტატიის მოცულობა არ უნდა შეადგენდეს 10 გვერდზე ნაკლებს და 20 გვერდზე მეტს ლიტერატურის სიის და რეზიუმეების (ინგლისურ, რუსულ და ქართულ ენებზე) ჩათვლით.

3. სტატიაში საჭიროა გაშუქდეს: საკითხის აქტუალობა; კვლევის მიზანი; საკვლევი მასალა და გამოყენებული მეთოდები; მიღებული შედეგები და მათი განსჯა. ექსპერიმენტული ხასიათის სტატიების წარმოდგენისას ავტორებმა უნდა მიუთითონ საექსპერიმენტო ცხოველების სახეობა და რაოდენობა; გაუტკივარებისა და დაძინების მეთოდები (მწვავე ცდების პირობებში).

4. სტატიას თან უნდა ახლდეს რეზიუმე ინგლისურ, რუსულ და ქართულ ენებზე არანაკლებ ნახევარი გვერდის მოცულობისა (სათაურის, ავტორების, დაწესებულების მითითებით და უნდა შეიცავდეს შემდეგ განყოფილებებს: მიზანი, მასალა და მეთოდები, შედეგები და დასკვნები; ტექსტუალური ნაწილი არ უნდა იყოს 15 სტრიქონზე ნაკლები) და საკვანძო სიტყვების ჩამონათვალი (key words).

5. ცხრილები საჭიროა წარმოადგინოთ ნაბეჭდი სახით. ყველა ციფრული, შემაჯამებელი და პროცენტული მონაცემები უნდა შეესაბამებოდეს ტექსტში მოყვანილს.

6. ფოტოსურათები უნდა იყოს კონტრასტული; სურათები, ნახაზები, დიაგრამები - დასათაურებული, დანომრილი და სათანადო ადგილას ჩასმული. რენტგენოგრამების ფოტოასლები წარმოადგინეთ პოზიტიური გამოსახულებით **tiff** ფორმატში. მიკროფოტოსურათების წარწერებში საჭიროა მიუთითოთ ოკულარის ან ობიექტივის საშუალებით გადიდების ხარისხი, ანათალების შეღებვის ან იმპრეგნაციის მეთოდი და აღნიშნოთ სურათის ზედა და ქვედა ნაწილები.

7. სამამულო ავტორების გვარები სტატიაში აღინიშნება ინიციალების თანდართვით, უცხოურისა – უცხოური ტრანსკრიპციით.

8. სტატიას თან უნდა ახლდეს ავტორის მიერ გამოყენებული სამამულო და უცხოური შრომების ბიბლიოგრაფიული სია (ბოლო 5-8 წლის სიღრმით). ანბანური წყობით წარმოდგენილ ბიბლიოგრაფიულ სიაში მიუთითეთ ჯერ სამამულო, შემდეგ უცხოელი ავტორები (გვარი, ინიციალები, სტატიის სათაური, ჟურნალის დასახელება, გამოცემის ადგილი, წელი, ჟურნალის №, პირველი და ბოლო გვერდები). მონოგრაფიის შემთხვევაში მიუთითეთ გამოცემის წელი, ადგილი და გვერდების საერთო რაოდენობა. ტექსტში კვადრატულ ფჩხილებში უნდა მიუთითოთ ავტორის შესაბამისი N ლიტერატურის სიის მიხედვით. მიზანშეწონილია, რომ ციტირებული წყაროების უმეტესი ნაწილი იყოს 5-6 წლის სიღრმის.

9. სტატიას თან უნდა ახლდეს: ა) დაწესებულების ან სამეცნიერო ხელმძღვანელის წარდგინება, დამოწმებული ხელმოწერითა და ბეჭდით; ბ) დარგის სპეციალისტის დამოწმებული რეცენზია, რომელშიც მითითებული იქნება საკითხის აქტუალობა, მასალის საკმაობა, მეთოდის სანდოობა, შედეგების სამეცნიერო-პრაქტიკული მნიშვნელობა.

10. სტატიის ბოლოს საჭიროა ყველა ავტორის ხელმოწერა, რომელთა რაოდენობა არ უნდა აღემატებოდეს 5-ს.

11. რედაქცია იტოვებს უფლებას შეასწოროს სტატია. ტექსტზე მუშაობა და შეჯერება ხდება საავტორო ორიგინალის მიხედვით.

12. დაუშვებელია რედაქციაში ისეთი სტატიის წარდგენა, რომელიც დასაბეჭდად წარდგენილი იყო სხვა რედაქციაში ან გამოქვეყნებული იყო სხვა გამოცემებში.

აღნიშნული წესების დარღვევის შემთხვევაში სტატიები არ განიხილება.

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COMPARISON OF ABDOMINAL EXERCISES AND NEUROMUSCULAR ELECTRICAL STIMULATION ON DIASTASIS RECTI ABDOMINIS MUSCLE IN POSTNATAL FEMALES WITH CAESAREAN SECTION

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Abstract.

Introduction: The separation of the two rectus abdominis muscles along the linea alba is termed diastasis of recti abdominis muscles (DRAM). DRAM is a common health problem in people that are both pregnant and postpartum. With a 100% frequency at gestational week 35, it is extremely frequent during pregnancy. Control and function of the trunk are greatly influenced by the musculature of the abdomen. The existence, extent, and duration of DRAM have been connected to low back and pelvic discomfort however the relationship is not conclusive. It has been proven to weaken abdominal muscles and impair their functioning in lumbo-pelvic stability. Additionally, DRAM has been linked to pelvic floor dysfunction. The mechanical control and function of the abdomen can be compromised by diastasis recti, which compromises the abdominal muscles. This study examined the impact of abdominal exercises and neuromuscular electrical stimulation on the DRAM in postnatal females who underwent Caesarean section.

Material and Method: A total of 208 individuals, aged between 20 and 34, who had recti diastasis measuring more than 2.5 cm, underwent screening. They were split into two groups at random. Group B only received abdominal exercises, whereas Group A received NMES in addition to their activities. For a period of 12 weeks, the intervention was given to both groups three times a week. Changes have been recorded before and after the intervention. The pressure biofeedback unit, measuring tape, and vernier caliper were employed to evaluate the outcome measures of inter-recti distance, abdominal muscle strength, and waist-hip ratio, respectively.

Result: In every outcome, both groups had a highly significant ($p<0.05$) improvement. Furthermore, after 12 weeks, group A had improved in all measures with highly significant ($p<0.05$) intergroup comparisons.

Conclusion: In comparison to MNES alone, NMES can have a more significant effect on reducing DRAM in postpartum women when paired with abdominal Exercise.

Key words. Abdominal exercises, Diastasis recti abdominis muscle, Neuromuscular electrical stimulator, Postnatal females.

Introduction.

A diastasis of the rectus abdominis muscles (DRAM) occurs when the two rectus abdominis muscles split at the linea alba [1]. The uterine growth and hormonal changes that occur during pregnancy can cause the abdominal muscles, particularly the rectus abdominis muscles, to stretch. DRAM is a prevalent health issue among postpartum and pregnant individuals. The DRAM is more common in situations of repeated pregnancies, obesity, fetal macrosomia, flaccid abdominal muscles, and polyhydramnios in multiparous women [2,3]. Due to the baby's anterior location during pregnancy, women who have had numerous births, are multiparous, or have a narrow pelvis are more likely to experience DRAM [4]. At gestational week 35, it has a 100% global frequency, making it extremely frequent during pregnancy. It can persist for six weeks after delivery when the prevalence is between 50% and 60%, and for up to six months, when it is between 39% and 45%. [1]. The incidence of DRAM in Maharashtra is 68%, whereas it is 61.36 in India [4,5].

Reduced muscle strength and endurance, a diminished ability of the abdominal musculature to stabilize the pelvis, lumbopelvic, related pelvic floor dysfunction, and abnormal posture, and discomfort have all been linked to DRAM [2]. Severe DRAM has been linked to lumbar spine susceptibility and pelvic injury, as well as altered trunk mechanics, decreased altered posture, and pelvic stability [1].

Research has demonstrated that engaging in regular exercise before becoming pregnant, during pregnancy, and after giving birth can help lower the danger of having diastasis recti, as well as its size and likelihood of recurrence. This study's main objective is to identify the impact of abdominal muscular strengthening and facilitation training on the decrease of diastasis recti in postnatal women. By performing this, problems will be reduced, and functional status will be enhanced [6]. Despite the fact that DRAM is a severe and prevalent clinical disease, nothing is referred to as prevention or treatment [7]. Regular activity in the antenatal and prenatal phases of pregnancy helps to minimize the possibility of DRAM development and DRAM size, as well as helping to reduce the issues relating to the DRAM. Women with DRAM who are postpartum are also often advised abdominal workouts. In addition, cardiovascular workouts, external support (such as a tubigrip or corset), and posture and back care education are frequently utilized non-surgical therapies for women with DRAM [7]. NMES application has also increased dramatically in recent years. A small number of research look into how NMES affects the muscles of the abdomen. According to Alon et al. and colleagues, NMES to the

abdominal musculature strengthened the muscles by roughly 14% to 22% and was well tolerated [1]. Additional measures, like belly bracing, have been used to assist in lowering DRA in postpartum females [8]. Kamal D.M. and Yousif A.M. have said that the postpartum population's DRAM recovery will be aided more by the use of NMES in the DRAM rehabilitation program. According to G. Alon et al., strengthening abdominal muscles may be best achieved by combining the effects of exercise and stimulation.

Thus, the primary objective of the research is to determine how neuromuscular electrical stimulation, in addition to abdominal exercises, affected the diastasis recti abdominis muscle in postnatal females who had Caesarean sections.

Methodology.

A randomized clinical trial was chosen for the study. Participants were selected from the OPD of obstetrics and gynecology from YCRH Hospital, Latur. A total of 208 participants were screened. Using straightforward selection proforma appropriate to the inclusion and exclusion criteria, 198 individuals were selected. Multiparous women with parity not exceeding four times, aged between 20 to 34 years with lower segment caesarean section, having more than 2.5 cm in diastasis recti measured by vernier caliper were included. Participants having abdominal or back surgeries and pregnancy-related complications, such as fetal macrosomia, polyhydramnios, hypertension or diabetes, spinal disorders, and abdominal skin diseases, were excluded.

A total of 198 participants who were selected as per inclusion criteria were randomized into two groups using sealed opaque envelopes after obtaining written informed consent from each participant. Group A contained 96 subjects, and Group B had 102 subjects. The number of follow-ups in group A was 6, and in group B was 4 due to some reasons like illness, hospitalization, and loss of interest. Therefore, a total of 188 participants were analyzed at the end. Before starting the intervention, the participants signed consent forms and were given explanations of all the procedures involved in this investigation. The measurement was done for Inter-recti distance using a vernier caliper, abdominal strength using pressure biofeedback, and the waist-hip ratio using an inch tape prior to beginning the intervention. The abdominal exercise program was administered to group B, while the abdominal exercise program, along with neuromuscular electrical stimulation, was administered to group A. An abdominal exercise program was administered to subjects thrice a week for 12 weeks, and neuromuscular electrical stimulation was applied to subjects thrice a week for 30 minutes for 12 weeks.

Abdominal exercise program:

The subjects of this program were split up into two groups, A representing the experimental group and B representing the control group. They were given exercise illustrations to ensure that they could perform the workouts at home on subsequent days. The exercises were provided in the supine position. The exercises included in the program were static abdominal exercises, sit-ups, u-seat exercises, reverse sit-ups, and pelvic clock exercises. Every workout was done 20 times during the interventions with each repetition increasing by four every week.

Neuromuscular Electrical Stimulation:

A NMES unit was employed only to (group A) experimental group. In order to benefit from the enhanced muscle activation, the NMES was applied first, then abdominal workouts followed. For comfort and relaxation, each woman was instructed to empty her bladder prior to the start of the therapy session. Before applying NMES, the abdomen area is cleansed with alcohol. The rectus abdominis was stimulated bilaterally using the four large rectangular electrodes. The muscle's insertion was located at the outermost layer of costal cartilages number five, six, and seven as well as the anterior surface of the xiphoid process, whereas the muscle's origin was located in front of the symphysis pubis and at the anterior surface of the pubic crest. The electrodes were fastened in place using the sticky tape. The parameters of the study were as follows: a on: off ratio of 5s:10s, a frequency of 80 pulses/min, a pulse width of 0.1–0.5 ms, and a total stimulation time of 30 minutes. Increasing the intensity gradually until a strong, pleasurable muscle contraction was noticed. When using NMES, the individuals were advised to let their abdomen muscles relax. After intervention again, abdominal muscle strength by waist-hip ratio, pressure biofeedback unit, and inter-recti distance by vernier caliper were measured.

Statistical analysis:

A structural proforma was used to collect the data. Data entered into an MS Excel spreadsheet was examined using IBM USA's SPSS 23.0 edition. Poisson data was used to express qualitative data. Standard deviation and mean were used to express quantitative data. In order to determine whether or not the mean difference between groups is significant, the mean and SD between the pre and post-intervention in the same groups were compared using a paired t-test. To ascertain whether or not the mean difference between the groups is significant, the unpaired t-test was utilized to compare the mean and SD between two different groups. Standard deviation, mean, and standard error of mean were used to provide the descriptive statistics for each variable. A p-value of < 0.05 was deemed statistically significant, while a p-value of < 0.001 was considered highly significant. In group A, 6 dropouts and in group B, 4 dropouts were recorded. Therefore, 90 were analyzed in group A, and 98 were analyzed in group B.

Results.

Changes in the inter-recti distance of subjects are summarized in Table 1. The paired sample t-test results show that there is a significant change in the inter-recti distance at 12 weeks in both groups ($p<0.05$). However, group A, which is the experimental group, performed better than group B, the control group. The table also shows the change of score at 10 weeks is 47.12% in Group A and 27.69% in Group B, indicating Group A improved more significantly than Group B.

Changes in the waist-hip ratio of subjects are summarized in Table 2. Results of the Paired sample t-test show that there is a significant improvement in the waist-hip ratio in both groups at 12 weeks ($p<0.05$). However, the improvement in Group A is better than Group B. The change of scores from baseline to 12 weeks is 7.6% in Group A and 2.22% in Group B, which indicates that group A improved more significantly than Group B.

Results of the Paired sample t-test of abdominal muscle strength for groups A and B are presented in Table 3. The paired sample t-test results show that there is a significant improvement in abdominal muscle strength in both the groups at 12 weeks ($p<0.05$). However, the improvement in Group A is better than Group B. The change of scores from baseline to 12 weeks is 19.01% in Group A and 15.87% in Group B, which indicates that group A improved more significantly than Group B.

Table 4 represents the results of the unpaired t-test, which explains the comparison between the Post Intervention Measures of Groups A and B (Graph 4). However, the experimental group was found to be more significant ($p<0.05$) than the control group in all the outcome measures at the end of 12 weeks.

Table 1. *Comparison between Pre and Post intervention measures of Inter-Recti Distance.*

GROUP	Pre	Post	P-VALUE	% CHANGE
A	3.31±0.43	1.75±0.33	0.0001	47.12
B	3.25±0.20	2.35±0.30	0.0001	27.69

Table 2. *Comparison between Pre and Post intervention measures of Waist-Hip Ratio.*

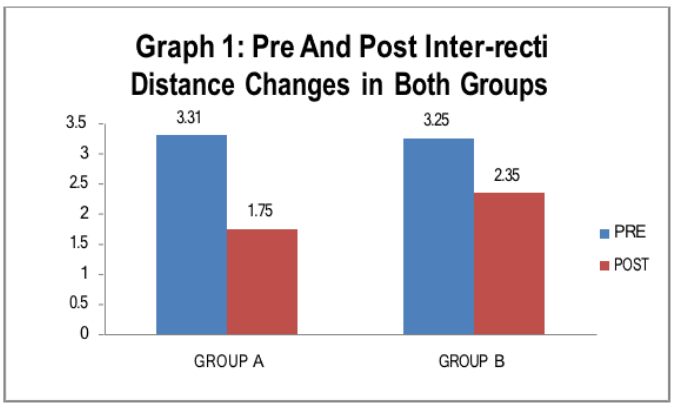
GROUP	Pre	Post	P-VALUE	% CHANGE
A	0.91±0.02	0.84±0.02	0.0001	7.6
B	0.90±0.02	0.88±0.02	0.0001	2.22

Table 3. *Comparison between Pre and Post intervention measures of Abdominal Muscle Strength.*

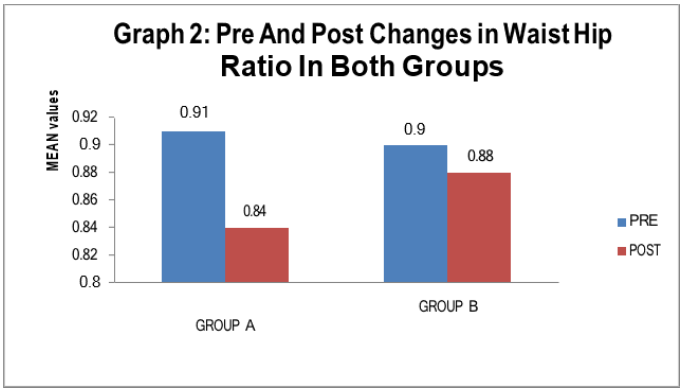
GROUP	Pre	Post	P-VALUE	% CHANGE
A	**45.49±2.77**	**36.84±1.72**	**0.0001**	**19.01**
B	**45.22±2.32**	**38.04±1.62**	**0.0001**	**15.87**

Table 4. *Comparison Between the Post Intervention Measures of Group-A And B.*

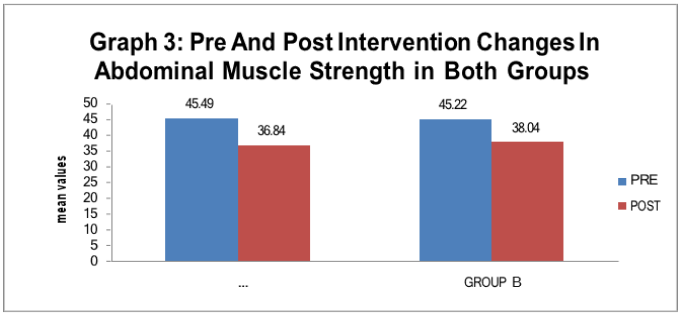
OUTCOME MEASURE	A	B	t	p-value
Inter-recti distance	1.75±0.33	2.35±0.30	-11.19	0.0001
Waist-hip ratio	0.84±0.02	0.88±0.02	-11.37	0.0001
Abdominal muscle strength	36.84±1.72	38.04±1.62	-4.90	0.0001



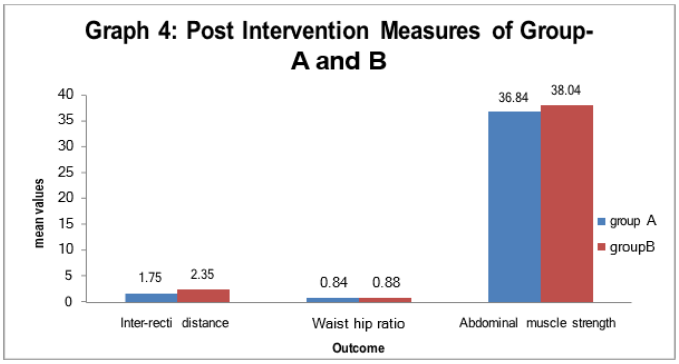
Graph 1. *Shows Comparison of Pre and Post Intervention Measures of Inter-Recti Distance.*



Graph 2. *Shows Comparison of Pre and Post-Intervention Measures of Waist-Hip Ratio.*



Graph 3. *Shows Comparison of Pre and Post Intervention Measures of abdominal muscle strength.*



Graph 4. *Shows Comparison between the post-intervention measures of Group A and B.*

Discussion.

During postpartum and the pregnancy period, diastasis recti abdominis is a prevalent medical issue [10,11] which eventually affects the ability of the abdominal muscles to produce force and work efficiently and would be the origin of certain illnesses, including cosmetic defects, psychological discomfort, lumbopelvic pain, physical discomfort like low back pain, bulging of abdominal wall, decreased muscle strength [12-14]. The current study aimed to identify the effects of abdominal exercise and neuromuscular electrical stimulation in reducing DRAM in postpartum women with lower segment caesarean section. When compared to the control group (group B), which underwent only abdominal exercises, the experimental group (group A), which received NMES in addition to abdominal workouts, revealed a highly significant improvement in inter-recti distance, abdominal muscle strength, and waist-hip ratio.

Wendy L. Gilleard et al. stated in their study that the intervention for reducing inter-recti distance in postnatal LSCS women should be started after 8 weeks postnatal period to increase the ability of abdominal muscles to stabilize the pelvis, which has reduced during pregnancy and also during 8 weeks post-partum [14]. By taking reference to this study, we have conducted the treatment protocol 8 weeks post birth in our study. Along with this, DRAM heals best from the first day of life to eight weeks postnatally, after which time healing reaches a plateau [15]. Since it takes eight to twelve weeks to notice muscular growth after starting resistance training, the intervention process was prolonged for a total of twelve weeks for both the experimental and control groups [16].

The result of this investigation validates the theory of Dalia M. Kamel et al., who evaluated the impact of neuromuscular electrical stimulation (NMES) on postnatal women with DRAM who are recovering the strength of their abdominal muscles. Additionally, they discovered that the postnatal healing of the abdominal muscle benefited from the inclusion of NMES in the DRAM rehabilitation program. First of all, this study lends support to the hypothesis that examined and contrasted the effects of a program effects exercise of the abdominal muscles and/or faradic electrical stimulation on the intra-recti distance and pulmonary ventilation functions in women who had experienced diastasis recti after childbirth. They discovered that the combination of an abdominal muscle exercise program and neuromuscular electrical stimulation significantly reduced the postnatal women's inter-recti distance in comparison to the application of each treatment modality alone [16]. Alon G et al. Found when abdominal exercises and electrical stimulation combined together may prove the most effective method in improving abdominal muscle strength [11,17,18].

Alternatively, some contradictory results have been demonstrated. Agata Michalska et al. evaluated various treatment methods for diastasis recti abdominis. Numerous interventions were covered in these trials, such as education, training on appropriate lifting and postural training and mobility techniques, Tupler's method workouts with or without abdominal splinting, Pilates, functional training, manual therapy involving myofascial release, soft tissue mobilization, and abdominal taping and bracing, as well as an abdominal exercise program that included strengthening the transversus abdominis and the rectus abdominis muscles. There is currently no evidence pertaining to the most appropriate and successful regimen for therapeutic abdominal workouts. The author stated that it is impossible to prove a connection between DRA and ailments such as lumbopelvic discomfort or pelvic floor dysfunction. Taking into view there is still insufficient understanding regarding risk factors, possible repercussions, efficient means of preventative therapy, and the need to perform future studies in this sector.

Since type II fibres are only recruited during high intensity voluntary contraction, it is known that electrical stimulation-induced muscular contraction helps to activate a large proportion of type II muscle fibres in comparison to voluntary activities at comparable intensity [19]. As well as the reduction in waist circumference and, accordingly, in waist-hip ratio after the application of neuromuscular electrical stimulation along with abdominal exercise program as therapeutic exercises results in the burning of glycogen, fat as well as other nutrients stored in the muscle [20,21]. Pascoal AG et al. stated that the improvement in inter-recti distance was significantly higher in the experimental group, including postpartum women who performed isometric contraction of abdominal muscles as compared to a control group with rest [22]. Taking into account the above references, the experimental group shows highly significant improvement in all the outcome measures as compared to the control group.

This study included 188 postnatal women with lower-segment caesarean section. The mean age of the control group in our study was found to be 25.38, and the mean age of the experimental group was 25.31, as prevalence is found to be higher between the age group of 20-25 [5]. The BMI of the control group was found to be 26.73, and the experimental group was 27.06. Highly Significant difference was found within and between the experimental group and the control group by the independent t-test and paired t-test, respectively. Results showed that NMES with abdominal exercises was responsible for improving inter-recti distance, waist-hip ratio, and abdominal muscle strength. The hypothesis that NMES assists in activating the larger (type II) nerve fibers at comparatively modest levels of stimulation can account for the experimental group's superiority over the control group [15] and influences the motor cortex excitability [21]. Moreover, because NMES stimulates nerve fibres spread throughout the muscle, it helps to activate deep muscle fibres at comparatively lower training intensities. In addition, electrical stimulation of the muscles helps to activate a greater percentage of type II muscular fibres than does voluntary exercise at a same intensity [19], because only high-intensity voluntary contractions help to activate type II muscle fibers [14]. As electrical stimulation has the ability to improve muscle performance, It is well acknowledged and consistently shown in both clinical practice and research studies [22]. Patricia Mota et al., hypothesized that abdominal muscle contraction helps to reduce the horizontal abdomen diameter that ultimately generates horizontal force, causing approximation of both rectus abdominis [12].

For further discussion to summarize, neuromuscular electrical stimulation with abdominal exercises is an effective treatment protocol with respect to inter-recti distance, abdominal muscle strength, and waist-hip ratio.

Conclusion.

This study's findings demonstrated that integrating neuromuscular electrical stimulation into abdominal exercises can significantly enhance postpartum women's abdominal muscle strength, decrease the waist-hip ratio, and reduce the inter-recti distance. It assists in the recovery of postpartum abdominal efficiency and the strengthening of abdominal muscles. According to our findings, the recovery of the abdominal muscles will benefit from the inclusion of neuromuscular electrical stimulation in the Diastasis Recti Abdominis Muscle Rehabilitation program and useful in reducing complications regarding diastasis recti postnatally.

REFERENCES

1. Kamel DM, Yousif AM. Neuromuscular Electrical Stimulation and Strength Recovery of Postnatal Diastasis Recti Abdominis Muscles, Faculty of Physical Therapy, Cairo University, Giza. Egypt Ann Rehabil Med. 2017;41:465-474.
2. Chiarello CM, Mcauley JA. Concurrent Validity of Calipers and Ultrasound Imaging to Measure Interrecti Distance. Journal of orthopedic & sports physical therapy. 2013;43:495-503.
3. Porcari JP, Miller J. The Effects of Neuromuscular Electrical Stimulation Training on Abdominal Strength, Endurance, and Selected Anthropometric Measures, Department of Exercise and Sports Science. Journal of Sports Science and Medicine. 2005:66-75.
4. Demartini E, Deon KC. Diastasis of the rectus abdominis muscle prevalence in postpartum. Fisioter Mov. 2016;29:279-86.
5. Adkitte RG, yewle U, Gokhale P. Prevalence of diastasis of rectus abdominis muscle in immediate post-partum women, European Journal of Pharmaceutical and Medical Research. 2016;3:460-462.
6. Khandale SR, Hande D. Effects of Abdominal Exercises on Reduction of Diastasis Recti in Postnatal Women. Int J Health Sci Res. 2016;6:182-191.
7. Benjamin DR, Peiris CL. Effects of exercise on diastasis of the rectus abdominis muscle in antenatal and postnatal periods: a systematic review. Physiotherapy. 2014;100:1-8.
8. Walton LM, Costa A. The effects of a 6-week dynamic core stability plank exercise program compared to a traditional supine core stability strengthening program on diastasis recti abdominis closure, pain, oswestry disability index (ODI) and pelvic floor disability index scores PFDI. Phys Ther Rehabil. 2016;3:38.
9. G. Alon, A. Bosworth, M.M. Parent. Comparison of the Effects of Electrical Stimulation and Exercise on Abdominal Musculature. J Orthop Sports Phys Ther. 1987;8:567-573.
10. Agata Michalska. Diastasis recti abdominis - A review of treatment methods. Ginekologia Polska. 2018;89:97-101.
11. Alon G, Mc Combe SA. Comparison of the effects of electrical stimulation and exercise on abdominal musculature. J Ortho Sports Phys Ther. 1987;8:567-73.
12. Patricia Mota, Kari Bø. Diastasis Recti Abdominis in Pregnancy and Postpartum Period. Risk Factors, Functional Implications and Resolution. Current Women's Health Reviews. 2015;11:1.
13. Jill Mantle, Pauline Walsh. Physiotherapy in Obstetrics and Gynaecology. 2004.
14. Coldron Y, Stokes MJ. Postpartum characteristics of rectus abdominis on ultrasound imaging. Man The. 2008;13:112-21.
15. Keijo Hakkinen, Robert U. Changes in Muscle Morphology, Electromyographic Activity, and Force Production Characteristics During Progressive Strength Training in Young and Older Men, Journal of Gerontology: Biological Sciences. 1998;53A:B415-B423.
16. David M Selkowitz. Improvement in Isometric Strength of the Quadriceps Femoris Muscle after Training with Electrical Stimulation. Physical Therapy. 1985;65:186-196.
17. John Porcari, Abigail Ryskey. The Effects of High Intensity Neuromuscular Electrical Stimulation on Abdominal Strength and Endurance, Core Strength, Abdominal Girth, and Perceived Body Shape and Satisfaction, IJKSS. 2018;6:19-25.
18. George Somjen. Functional Significance of Cell Size in Spinal Motoneurons. Journal of Neurophysiology. 1965.
19. John P. Porcari, Jennifer Miller. The Effects of Neuromuscular Electrical Stimulation Training On Abdominal Strength, Endurance, and Selected Anthropometric Measures. J Sports Sci Med. 2005;4:66-75.
20. Chris M Gregory, C Scott Bickel. Recruitment Patterns in Human Skeletal Muscle During Electrical Stimulation. Physical Therapy. 2005;85.
21. Tinazzi M, Zarattini S. Long Lasting Modulation of Human Motor Cortex Following Prolonged Transcutaneous Electrical Nerve Stimulation of Forearm Muscles: Evidence of Reciprocal Inhibition and Facilitation. Exp Brain Res. 2005;161:457-64.
22. Sinacore DR. Type 2 Fibre Activation with Electrical Stimulation: A Preliminary Report. Phys Ther. 1990;70:416-22