



**PROGRAMA DE PÓS-GRADUAÇÃO EM DESENVOLVIMENTO HUMANO E
TECNOLOGIAS**

**EFEITO DE DIFERENTES CORRENTES DE ELETROESTIMULAÇÃO NO
NERVO TIBIAL EM MULHERES COM INCONTINÊNCIA URINÁRIA: ENSAIO
CONTROLADO ALEATORIZADO**

RAISSA ESCANDIUSI AVRAMIDIS



**PROGRAMA DE PÓS-GRADUAÇÃO EM DESENVOLVIMENTO HUMANO E
TECNOLOGIAS**

**EFEITO DE DIFERENTES CORRENTES DE ELETROESTIMULAÇÃO NO
NERVO TIBIAL EM MULHERES COM INCONTINÊNCIA URINÁRIA: ENSAIO
CONTROLADO ALEATORIZADO**

RAISSA ESCANDIUSI AVRAMIDIS

Dissertação apresentada ao Instituto de Biociências do Câmpus de Rio Claro, Universidade Estadual Paulista, como parte dos requisitos para obtenção do título de Mestre em Desenvolvimento Humano e Tecnologias do título de Mestre em Desenvolvimento Humano e Tecnologias.

Orientadora: Cristiane Rodrigues Pedroni
Coorientadora: Angélica Mércia Pascon Barbosa

Rio Claro – SP

2022

A963e Avramidis, Raissa
Efeito de diferentes correntes de eletroestimulação no nervo tibial em mulheres com incontinência urinária: ensaio controlado aleatorizado / Raissa Avramidis. -- Rio Claro, 2022
62 p. : tabs.

Dissertação (mestrado) - Universidade Estadual Paulista (Unesp), Instituto de Biociências, Rio Claro
Orientadora: Cristiane Pedroni
Coorientadora: Angélica Barbosa

1. Bexiga Hiperativa. 2. Estimulação Elétrica Nervosa Transcutânea. 3. Reabilitação. 4. Ensaio Clínico. I. Título.

Sistema de geração automática de fichas catalográficas da Unesp. Biblioteca do Instituto de Biociências, Rio Claro. Dados fornecidos pelo autor(a).

Essa ficha não pode ser modificada.

CERTIFICADO DE APROVAÇÃO

TÍTULO DA DISSERTAÇÃO: EFEITO DE DIFERENTES CORRENTES DE ELETROESTIMULAÇÃO NO NERVO TIBIAL EM MULHERES COM INCONTINÊNCIA URINÁRIA: ENSAIO CONTROLADO ALEATORIZADO

AUTORA: RAISSA ESCANDIUSI AVRAMIDIS

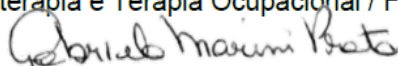
ORIENTADORA: CRISTIANE RODRIGUES PEDRONI

COORDINADORA: ANGÉLICA MÉRCIA PASCON BARBOSA

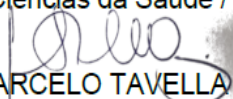
Aprovada como parte das exigências para obtenção do Título de Mestra em DESENVOLVIMENTO HUMANO E TECNOLOGIAS, área: Tecnologias nas Dinâmicas Corporais pela Comissão Examinadora:

A handwritten signature in blue ink, reading "Pedroni".

Profa. Dra. CRISTIANE RODRIGUES PEDRONI (Participação Virtual)
Depto. de Fisioterapia e Terapia Ocupacional / FFC/Marília - Unesp

A handwritten signature in blue ink, reading "Gabriela Marini Prata".

Profa. Dra. GABRIELA MARINI PRATA (Participação Virtual)
Centro de Ciências da Saúde / USC- Universidade do Sagrado Coração - SP

A handwritten signature in blue ink, reading "Marcelo Taveila Navega".

Prof. Dr. MARCELO TAVELLA NAVEGA (Participação Virtual)
Departamento de Fisioterapia e Terapia Ocupacional / UNESP - Faculdade de Filosofia e Ciências de Marília - SP

Rio Claro, 26 de fevereiro de 2021

“Ninguém nasce mulher: torna-se.”

(Simone de Beauvoir)

AGRADECIMENTOS

Desde pequena pensava em cuidar e que ensinar é uma forma de cuidado. Quando criança, olhava as pessoas de jaleco dentro de clínicas ou em hospitais com admiração e meus professores como inspiração. Quando conheci a Fisioterapia, optei por seguir o caminho da saúde, para cuidar dos próximos. Durante a faculdade, me apaixonei ainda mais pela área de saúde, principalmente pela fisioterapia, e meus professoras continuaram a ser inspiração para mim. Então pude perceber que, apesar de ter feito a escolha certa, eu também queria ensinar. Terminei a faculdade com o sonho de ser Mestre para poder gerar conhecimento e construir um futuro melhor para cada um e todos nós. Assim, agradeço primeiramente à todas e todos que, direta ou indiretamente, passaram e contribuíram para que minha vida tomasse esse rumo.

Agradeço especialmente a minha família, meu pai, minha mãe e irmã, que sempre me acompanharam, respeitaram e apoiaram, nos melhores e nos piores momentos. Além disso, me ensinaram o que é o amor e que amar faz toda a diferença. O nosso amor é o que nos move e nosso companheirismo nos dá força. A união de nossa família foi fundamental para que eu alcançasse mais essa conquista. Além de agradecer, dedico essa dissertação a vocês. Espero um dia retribuir tudo o que fazem por mim.

Aos meus amigos, agradeço por estarem comigo durante essa jornada (que não foi fácil) e por fazerem tanto por mim. Alguns estiveram desde o início, ainda na faculdade ou até mesmo antes, outros acompanharam o início de um novo ciclo. Agradeço a cada um pelo companheirismo, conversas, risadas, trocas de informações relevantes ou não e até as discussões. Tudo o que vivemos foi e é muito importante para minha construção como pessoa. Serei eternamente grata por nossos caminhos terem se cruzado e por fazerem parte da minha família longe de casa.

Agradeço à Danielle Hikaru e ao Guilherme Navas, que participaram diretamente deste estudo, sendo imprescindíveis para que pudéssemos concluir em tempo as coletas de dados. Agradeço também à Caroline Baldini e ao Gabriel Magalhães, que além de amigos foram tutores e companheiros de trabalho, fundamentais para o andamento do estudo e para que o ambiente de trabalho fosse de respeito e cuidado, onde o trabalho pesado ficava mais leve.

À minha coorientadora Profa. Dra. Angélica Barbosa, agradeço por todos os ensinamentos passados e principalmente por acreditar em mim. À minha orientadora Profa. Dra. Cristiane Pedroni, agradeço pela disponibilidade e proximidade durante esses anos, nossa relação como docente e discente me ensinou muito além de fisioterapia. As duas são mulheres incríveis que me inspiram e me ensinam todos os dias, que colocam o amor e respeito em primeiro lugar, e que cativam por cuidarem de maneira tão genuína. Foi uma honra trabalhar com vocês durante esses anos e serei sempre grata pela oportunidade.

Quero agradecer também a equipe da Clínica Especializada em Reabilitação (CER) da Unesp – Marília, desde profissionais da limpeza até a coordenação, que direta ou indiretamente tornaram possível a realização deste estudo. E por fim, agradeço imensamente à cada voluntária que acreditou em nosso trabalho e compareceu nas sessões de tratamento. Apreendi muito com as histórias de vida, com as conversas e trocas de experiências, e essa aprendizagem não consta em artigos ou livros. Conhecer e interagir com as voluntárias foi uma experiência extremamente valiosa que pra sempre carregarei comigo.

RESUMO

INTRODUÇÃO: Essa dissertação é um requisito obrigatório para obtenção do título de Mestre em Desenvolvimento Humano e Tecnologias, pós-graduação oferecida pelo Instituto de Biociências – Universidade Estadual Paulista “Júlio de Mesquita Filho” – UNESP. Serão apresentados, separadamente, dois artigos. O primeiro artigo produzido foi um protocolo de estudo, que visa instruir metodologicamente novos estudos com eletroterapia na incontinência urinária por urgência. O segundo artigo redigido foi um Ensaio Controlado Aleatorizado, onde a metodologia foi baseada no primeiro artigo e no Consort. **OBJETIVOS:** Comparar os efeitos da aplicação de correntes de baixa frequência e média frequência e verificar qual corrente é mais eficaz para reduzir os sintomas e aumentar qualidade de vida durante o tratamento de mulheres com incontinência urinária por urgência. **METODOLOGIA:** Este é um ensaio clínico randomizado, avaliador e estatístico cego. Todas as 105 participantes foram submetidas a um protocolo de anamnese que incluiu coleta de dados pessoais e clínicos, aplicação de questionários específicos para incontinência urinária e qualidade de vida e avaliação física do assoalho pélvico. O protocolo foi realizado em três diferentes momentos: antes da intervenção, durante e na última sessão. As participantes foram alocadas em um dos 5 grupos (Transcutaneous Tibial Nerve Stimulation – Low Frequency, Transcutaneous Tibial Nerve Stimulation – High Frequency, Aussie Medium Frequency, Interferential Medium Frequency e High Voltage Stimulation) de maneira aleatorizada. Todos os grupos receberam a intervenção elétrica transcutânea para estimulação do nervo tibial por 30 minutos, por meio de um canal com dois eletrodos, um posicionado posteriormente ao maléolo medial e o outro 10 cm acima dele, por 20 sessões de 2 a 3 vezes por semana. **RESULTADOS:** Este estudo demonstrou que todas as cinco correntes utilizadas foram capazes de reduzir a gravidade da incontinência urinária e aumentar a qualidade de vida, com maiores ganhos observados entre a primeira e segunda avaliação. Não houve diferença significativa entre a segunda e a terceira avaliação ($p > 0,005$). Também não houve diferença significativa em relação à comparação entre os grupos ($p > 0,005$). **CONCLUSÃO:** O tratamento com correntes de baixa frequência obteve resultados similares aos da média frequência para a redução da severidade da incontinência urinária por urgência e aumento da qualidade de vida. Nenhuma modalidade de corrente foi superior para o tratamento da incontinência urinária por urgência.

Palavras chave: Bexiga Hiperativa, Reabilitação, Estimulação Elétrica Nervosa Transcutânea, Ensaio Clínico.

ABSTRACT

INTRODUCTION: This dissertation is a mandatory requirement to obtain the title of Master in Human Development and Technologies, postgraduate offered by the Institute of Biosciences - Universidade Estadual Paulista “Júlio de Mesquita Filho” - UNESP. Two articles will be presented separately. The first article produced was a study protocol, which aims to methodologically instruct new studies with electrotherapy in urinary incontinence by urgency. The second article written was a Randomized Controlled Trial, where the methodology was based on the first article and the Consort. **OBJECTIVES:** To compare the effects of applying low frequency and medium frequency currents and to see which current is most effective in reducing symptoms and increasing quality of life during the treatment of women with urinary incontinence. **METHODOLOGY:** This is a randomized clinical trial, evaluator and blind statistic. All 105 participants underwent an anamnesis protocol that included collection of personal and clinical data, application of specific questionnaires for urinary incontinence and quality of life and physical assessment of the pelvic floor. The protocol was performed at three different times: before the intervention, during and in the last session. The participants were randomly allocated to one of the 5 groups (Transcutaneous Tibial Nerve Stimulation - Low Frequency, Transcutaneous Tibial Nerve Stimulation - High Frequency, Aussie Medium Frequency, Interferential Medium Frequency and High Voltage Stimulation). All groups received transcutaneous electrical intervention to stimulate the tibial nerve for 30 minutes, through a channel with two electrodes, one positioned posteriorly to the medial malleolus and the other 10 cm above it, for 20 sessions 2 to 3 times a week. **RESULTS:** This study demonstrated that all five streams used were able to reduce the severity of urinary incontinence and increase quality of life, with greater gains observed between the first and the second assessment. There was no significant difference between the second and third assessments ($p > 0.005$). There was also no significant difference in comparison between groups ($p > 0.005$). **CONCLUSION:** Treatment with low frequency currents obtained results similar to those of medium frequency for reducing the severity of urinary incontinence due to urgency and increasing quality of life. No current modality was superior for the treatment of urinary incontinence by urgency.

Keywords: Overactive Bladder, Rehabilitation, Transcutaneous Electric Nerve Stimulation, Clinical Trial.

SUMÁRIO

1. CONTEXTUALIZAÇÃO.....	10
2. TRAJETÓRIA ACADÊMICA.....	10
3. REVISÃO DE LITERATURA.....	13
4. Artigo 1 - EFFECT OF DIFFERENT ELECTROSTIMULATION CURRENTS ON FEMALE URINARY INCONTINENCE: A PROTOCOL OF A RANDOMIZED CONTROLLED TRIAL.....	18
5. Artigo 2 - LOW FREQUENCY CURRENTS VERSUS MEDIUM FREQUENCY CURRENTS AS TREATMENT FOR URGE URINARY INCONTINENCE: RANDOMIZED CONTROLLED TRIAL.....	34
6. ANEXOS.....	55
6.1 Parecer Consubstanciado do Comitê de Ética em Pesquisa.....	55
6.2 International consultation on incontinence questionnaire overactive bladder (ICIQ- OAB).....	58
6.3 Overactive bladder questionnaire (OAB-V8).....	59
6.4 International consultation on incontinence questionnaire overactive bladder (ICIQ- OAB).....	60
6.5 Incontinence Severety Index.....	61

1. CONTEXTUALIZAÇÃO

Essa dissertação é um requisito obrigatório para obtenção do título de Mestre em Desenvolvimento Humano e Tecnologias, pós-graduação oferecida pelo Instituto de Biociências – Universidade Estadual Paulista “Júlio de Mesquita Filho” – UNESP. Inicialmente apresentarei minha Trajetória Acadêmica, com o intuito de evidenciar os trabalhos realizados durante a realização do Mestrado Acadêmico. Posteriormente, traremos a Revisão de Literatura para contextualizar os leitores sobre os temas que serão abordados em seguida.

Também serão apresentados, separadamente, dois artigos redigidos em inglês para posteriormente publicá-los em revistas internacionais. O primeiro artigo produzido foi um protocolo de estudo, que visa instruir metodologicamente novos estudos com eletroterapia na incontinência urinária por urgência. Protocolos de estudo estão se demonstrando muito interessantes para a construção e aplicabilidade de metodologias eficientes, minimizando vieses.

O segundo artigo redigido foi um Ensaio Controlado Aleatorizado, onde a metodologia foi baseada no primeiro artigo e no Consort (Padrões consolidados de relatórios). Nesse tipo de estudo, os grupos devem ser separados aleatoriamente, o avaliador não pode ter contato com a intervenção de tratamento e as variáveis são controlados para diminuir efeitos externos associados ao tratamento. Assim, estudos deste tipo são bastante eficazes para resultados terapêuticos e apresenta bastante fidedignidade clínica. Os resultados do estudo serão encontrados nesse artigo, assim como a conclusão.

2. TRAJETÓRIA ACADÊMICA

Ingressei no curso de fisioterapia na UNESP – Faculdade de Filosofia e Ciências, Campus Marília, em 2014, e desde então fui cativada por essa profissão. Durante os anos de

graduação, conheci e aprendi sobre diversas áreas de atuação fisioterapêutica, sendo a Saúde da Mulher a que me despertou maior interesse.

No ano de 2018, em contato com a Profa. Dra. Angélica Mércia Pascon Barbosa, desenvolvi atividades de captação e avaliação física de gestantes junto ao Grupo de Estudos em Fisioterapia em Saúde da Mulher e participei do Projeto do Núcleo de Ensino “Prevenção de Problemas Uroginecológicos: Vivência e Capacitação Prática de Exercícios Pélvicos”. A expertise da Profa. Angélica nesta área de concentração foi muito importante para que eu compreendesse melhor meu desejo pela busca de conhecimento na fisioterapia da mulher.

Após minha titulação acadêmica, com muito prazer recebi o convite concomitante da Profa. Angélica Barbosa e Profa. Dra. Cristiane Rodrigues Pedroni para participar de um projeto de pesquisa sobre eletroterapia e incontinência urinária de urgência. Futuramente, que futuramente desenvolveu-se como meu projeto de mestrado, com ingresso em 2019 no programa de Desenvolvimento Humano e Tecnologias, UNESP – Instituto de Biociências, Campus Rio Claro.

Durante a Pós-Graduação, tive a oportunidade de assistir aulas presenciais e online, tanto teóricas quanto práticas, que foram extremamente importantes para minha formação tanto profissional quanto acadêmica. Também realizei dois estágios docência onde pude aprender mais sobre ensinar. Dentro da sala de aula, no Estágio Docência em Fisioterapia em Ortopedia, a experiência de acompanhar e ministrar aulas foi enriquecedora. Já no Estágio Supervisionado em Saúde Coletiva (Anexo 3), pude acompanhar e participar da supervisão de Estágio em Saúde da Mulher, ajudando na organização de setor, assim como avaliação e tratamento das pacientes, obtendo maior contato com a prática clínica dessa área incrível, além de auxiliar na aprendizagem dos estagiários.

Pude participar da elaboração, como coautora, de 1 artigo científico, além de participar como ouvinte de 5 eventos científicos, 1 congresso nacional e 1 congresso internacional. Estes me geraram novos conhecimentos e atualizações sobre a fisioterapia em geral. No VIII Congresso de Fisioterapia da Unesp de Marília, obtive uma publicação em anais como autora e quatro como coautora, e realizei apresentação em banner. Pude também apresentar oralmente em formato de banner na IV Semana Acadêmica de Fisioterapia – FAIP. No 5º Congresso ALLAP, tive autoria em trabalho apresentado por minha orientadora Profa. Cristiane. As considerações levantadas durante esse evento foram muito importantes para que pudéssemos abranger a discussão sobre o assunto.

Ainda como pós-graduanda, também procurei me atualizar na teoria e na prática de maneira mais ampla e geral, finalizando 10 cursos de curta duração, sendo 2 presenciais.

Em 2019, carinhosamente recebi o convite da Profa. Angélica para integrar o Projeto Temático Diamater-FAPESP, FMB-UNESP, como bolsista de Treinamento Técnico. Neste grupo, são realizadas pesquisas multidisciplinares, experimentais, clínicas e revisões sistemáticas. O projeto temático é referência internacional no debate na pesquisa sobre a tríade incontinência urinária, hiperglicemia gestacional e miopatia diabética. Os conhecimentos adquiridos vão desde a parte prática - com captação de voluntárias, avaliação, tabulação de dados e manutenção de vínculo entre terapeuta e paciente - até a teórica, por encontros científicos semanais para discussão de artigos relacionados ao projeto de extensão, aulas e palestras com convidados especiais. Utilizamos as ferramentas Eletromiógrafo, Ultrassom, Palpação Digital e Questionários para efetuar as avaliações. Assim, tive a oportunidade de realizar uma capacitação sobre ultrassonografia funcional 3D muscular e um minicurso online de ultrassonografia na reabilitação da diástase abdominal.

Em 2020, participei de encontros acadêmicos através do Laboratório de Pesquisa em Ortopedia e Recursos Terapêuticos na FFC – UNESP, onde pude acompanhar revisões, discussões e atualizações sobre as áreas de Ortopedia e Desportiva, com extrema importância para a aplicação acadêmica e na prática clínica.

Por fim, vale ressaltar que as atividades da pós-graduação me ensinaram a pesquisar e discernir informações, mas principalmente me contemplou com experiência. As coletas de dados deste projeto duraram cerca de 12 meses, onde tive contato diário com mais de 100 mulheres. Durante as coletas, então, criamos importante vínculo entre terapeuta e voluntárias/pacientes e também entre o grupo como um todo, o que possibilitou uma troca incrível de experiências. O entrosamento entre o grupo com certeza influenciou para que a adesão ao tratamento ocorresse de maneira tão espontânea. A rotina diária com essas mulheres me ensinou inúmeras lições, entre elas o cuidado e o amor ao próximo. Serei grata eternamente pela oportunidade de ter conhecido e convivido com mulheres tão fortes e de ter auxiliado para a melhora da qualidade de vida delas.

3. REVISÃO DE LITERATURA

A eletroterapia é uma opção terapêutica que modifica a atividade neuromuscular, amplamente utilizada como tratamento para dor, artrite reumatoide, dor lombar ou dor crônica em geral e atualmente na síndrome da dor miofascial(1,2). Dentre suas modalidades podemos citar a Estimulação Elétrica Nervosa Transcutânea (TENS) e Estimulação Elétrica Nervosa Percutânea (PENS) que se comportam de maneira parecida, com o diferencial de que a TENS utiliza como meio de aplicação eletrodos na superfície da pele e não agulhas como a PENS (3). As duas também apresentam resultados similares na prática clínica, com a vantagem de que a TENS é um procedimento não-invasivo, de fácil aplicação e garante maior conforto durante sua aplicação (4).

Existe variedade de correntes que apresentam diferentes forma de aplicação e comprovações científicas. A escolha do melhor recurso pode levar ao sucesso do tratamento e, a depender do contexto, a variedade entre as correntes pode ser relevante também ao paciente (1). A corrente bifásica simétrica e pulsada também leva o nome de TENS, apesar de ser um meio de estimulação dentro da técnica utilizada. É normalmente utilizada com frequência entre 100 e 150 Hz e comprimento de onda de 100 ms (5). Outras correntes que também são frequentemente utilizadas para tratamento de diversas alterações sensoriais e motoras são a Correntes Australiana, também conhecida como Aussie(5,6), Corrente Interferencial (CI) (5,7)e Eletroestimulação de Alta Voltagem (EAV) (8,9)Mesmo que estas tenham aplicações semelhantes, apresentam características bastante distintas.

A Corrente Aussie utiliza frequência carreadora de 1 ou 4 kHz; burst de curta duração, 2 ou 4 milissegundos; frequência de modulação dos Bursts de 100 a 120Hz para analgesia e intensidade que pode variar de 1 a 180 mA, conforme a sensibilidade do paciente (10). Trata-se de corrente pouco descrita na literatura da fisioterapia, entretanto, tem sido apontada para a sua utilização como uma forma de se conseguir diminuição de dor, bem como aumentar o aporte sanguíneo na musculatura (6,10)

A Corrente Interferencial é forma de estimulação elétrica nervosa transcutânea que tem como princípio a produção de duas correntes de média frequência que interferem entre si e produzem frequência denominada de frequência modulada pela amplitude (AMF). É comumente utilizada na faixa de 100 Hz e estudos apontam que um de seus principais efeitos, assim como as correntes de baixas frequências, é a redução da dor pelo aumento significativo do limiar algico (7,11,12).

A Corrente Alta Voltagem é corrente monofásica e pulsada, com pico duplo (9). Também é forma de estimulação elétrica transcutânea, com duração de pulso que pode variar entre 5 a 10 microssegundos, elevada amplitude de pico e voltagem acima de 100 V, que é considerada alta. Esta corrente atinge fibras nervosas sensoriais, motoras e também aquelas responsáveis pelos impulsos nociceptivos, e possibilita sensação agradável durante a eletroestimulação (9).

Embora não haja consenso sobre sua recomendação nem aplicação, a TENS se demonstra mais eficaz em comparação com a corrente interferencial em relação a dor lombar (13); já as correntes interferencial, Aussie e TENS quando comparadas se demonstram eficazes para redução do limiar doloroso e garantem hipoalgesia segmentar, sem diferença significativa entre elas (14). A estimulação elétrica de alta voltagem, por sua vez, aumenta o fluxo sanguíneo o que pode ser uma alternativa importante para a diminuição da dor muscular, é bastante utilizada no tratamento para Disfunção Temporomandibular (8).

Alguns meios de eletroestimulação têm sido utilizados na prática clínica relacionadas ao tratamento da IUU, sendo a corrente TENS atualmente a mais utilizada (4). Normalmente é aplicada em baixa frequência (10Hz) e alto comprimento de onda (200us) e é considerada como primeira linha de tratamento para a IUU (15). Apesar de correntes de baixa frequência poderem estar relacionados com efeitos desagradáveis, como dor e irritação da pele (16), é um recurso que apresenta poucas contraindicações, além de ser seguro, de fácil aplicação e de baixo custo (17).

Em geral, a aplicação da eletroterapia para tratamento da IUU é realizada através do nervo tibial, com raízes nervosas em L5-S3 onde também se originam fibras do sistema nervoso parassimpático que inervam a bexiga (18,19), cujo objetivo é a reorganização do sistema nervoso central e inibição do músculo detrusor por meio da eletroestimulação do nervo tibial (20,21), já que a IUU caracteriza-se por contrações involuntárias da bexiga durante sua fase de enchimento junto ao aumento de pressão, com perda involuntária de urina associada à urgência miccional, policiúria e noctúria (22).

Sabe-se que a eletroestimulação deste nervo ativa reflexos inibitórios pelos aferentes dos nervos pudendos, onde ocorre ativação das fibras simpáticas nos gânglios pélvicos e no músculo detrusor, também gera inibição central de eferentes motores para a bexiga e de aferentes pélvicos e pudendos provenientes da bexiga (23). Portanto, os efeitos são decorrentes do estabelecimento de mecanismos inibitórios, e a atividade vesical fica inibida por meio da despolarização somática das fibras aferentes sacral e lombar, via nervo tibial,

considerado nervo misto que projeta-se na mesma região sacral medular do centro sacral da micção, que é proveniente de ramificação do nervo isquiático (21,23).

Apesar dos resultados favoráveis da eletroterapia como tratamento para IUU, as evidências não apontam se a melhora dos sintomas são relacionados com o tipo de corrente, forma de aplicação ou com os parâmetros adotados. A hipótese deste estudo é que as correntes de media frequência podem ser mais efetivas (considerando os parâmetros adotados) já que estas podem reduzir a impedância da pele e atingir tecidos mais profundos. Além disso, o objetivo do nosso estudo será comparar o efeito das correntes de baixa e media frequência em relação à melhora de qualidade de vida e severidade da IUU.

REFERÊNCIAS

1. Ahmed S, Haddad C, Subramaniam S, Khattab S, Kumbhare D. The Effect of Electric Stimulation Techniques on Pain and Tenderness at the Myofascial Trigger Point: A Systematic Review. *Pain Med (United States)*. 2019;20(9):1774–88.
2. Takla MKN. Low-frequency high-intensity versus medium-frequency low-intensity combined therapy in the management of active myofascial trigger points: A randomized controlled trial. *Physiother Res Int*. 2018;23(4):1–9.
3. Wu LC, Weng PW, Chen CH, Huang YY, Tsuang YH, Chiang CJ. Literature Review and Meta-Analysis of Transcutaneous Electrical Nerve Stimulation in Treating Chronic Back Pain. *Reg Anesth Pain Med*. 2018;43(4):425–33.
4. Ramírez-García I, Blanco-Ratto L, Kauffmann S, Carralero-Martínez A, Sánchez E. Efficacy of transcutaneous stimulation of the posterior tibial nerve compared to percutaneous stimulation in idiopathic overactive bladder syndrome: Randomized control trial. *Neurourol Urodyn*. 2019;38(1):261–8.
5. Almeida CC de, Silva VZM da, Júnior GC, Liebano RE, Durigan JLQ. Transcutaneous electrical nerve stimulation and interferential current demonstrate similar effects in relieving acute and chronic pain: a systematic review with meta-analysis. *Brazilian J Phys Ther* [Internet]. 2018;22(5):347–54. Available from: <https://doi.org/10.1016/j.bjpt.2017.12.005>
6. Ward AR, Chuen WLH. Lowering of Sensory, Motor, and Pain-Tolerance Thresholds With Burst Duration Using Kilohertz-Frequency Alternating Current Electric Stimulation: Part II. *Arch Phys Med Rehabil* [Internet]. 2009;90(9):1619–27. Available from: <http://dx.doi.org/10.1016/j.apmr.2009.02.022>
7. Gundog M, Atamaz F, Kanyilmaz S, Kirazli Y, Celepoglu G. Interferential current therapy in patients with knee osteoarthritis: Comparison of the effectiveness of different amplitude-modulated frequencies. *Am J Phys Med Rehabil*. 2012;91(2):107–13.
8. Rampazo da Silva ÉP, Silva VR da, Bernardes AS, Matuzawa F, Liebano RE. Segmental and extrasegmental hypoalgesic effects of low-frequency pulsed current and modulated kilohertz-frequency currents in healthy subjects: randomized clinical trial. *Physiother Theory Pract* [Internet]. 2019;0(00):1–10. Available from: <https://doi.org/10.1080/09593985.2019.1650857>
9. Davini R, Guirro E, Paulista B, Guirro R. Estimulação Elétrica de Alta Voltagem: Uma Opção de Tratamento. *Brazilian J Phys Ther*. 2005;9(3):249–56.
10. Ward AR, Oliver WG. Comparison of the hypoalgesic efficacy of low-frequency and burst-modulated kilohertz frequency currents. *Phys Ther*. 2007;87(8):1056–63.
11. Bjordal JM, Johnson MI, Lopes-Martins RAB, Bogen B, Chow R, Ljunggren AE. Short-term efficacy of physical interventions in osteoarthritic knee pain. A systematic review and meta-analysis of randomised placebo-controlled trials. *BMC Musculoskelet Disord*. 2007;8:1–14.
12. Ozcan J, Ward AR, Robertson VJ. A comparison of true and premodulated interferential currents. *Arch Phys Med Rehabil*. 2004;85(3):409–15.
13. Albornoz-Cabello M, Maya-Martín J, Domínguez-Maldonado G, Espejo-Antúnez L, Heredia-Rizo AM. Effect of interferential current therapy on pain perception and disability level in subjects with chronic low back pain: A randomized controlled trial. *Clin Rehabil*. 2017;31(2):242–9.
14. Gomes NCMC, Berni-Schwarzenbeck KCS, Packer AC, Rodrigues-Bigaton D. Efeito da estimulação elétrica de alta voltagem catódica sobre a dor em mulheres com DTM. *Brazilian J Phys Ther*. 2012;16(1):10–5.

15. Marques ADA, Herrmann V, Ferreira NDO, Guimraes RV. Eletroterapia como primeira linha no tratamento da bexiga hiperativa (BH). Arq Medicos [Internet]. 2009;54(2):66–72. Available from: http://www.fcmsantacasasp.edu.br/images/Arquivos_medicos/2009/54_2/vlm54n2_6.pdf
16. Barbosa AMP, Parizotto NA, Pedroni CR, Avila MA, Liebano RE, Driusso P. How to report electrotherapy parameters and procedures for pelvic floor dysfunction. *Int Urogynecol J*. 2018;29(12):1747–55.
17. Garcia MBS, Pereira JS. Electrostimulation of the posterior tibial nerve in individuals with overactive bladder: a literature review. *J Phys Ther Sci*. 2018;30(10):1333–40.
18. Bhide AA, Tailor V, Fernando R, Khullar V, Digesu GA. Posterior tibial nerve stimulation for overactive bladder—techniques and efficacy. *Int Urogynecol J*. 2020;31(5):865–70.
19. Slovak M, Chapple CR, Barker AT. Non-invasive transcutaneous electrical stimulation in the treatment of overactive bladder. *Asian J Urol* [Internet]. 2015;2(2):92–101. Available from: <http://dx.doi.org/10.1016/j.ajur.2015.04.013>
20. Jacomo RH, Alves AT, Lucio A, Garcia PA, Lorena DCR, de Sousa JB. Transcutaneous tibial nerve stimulation versus parasacral stimulation in the treatment of overactive bladder in elderly people: A triple-blinded randomized controlled trial. *Clinics*. 2020;75(7):1–5.
21. de Wall LL, Heesakkers JPFA. Effectiveness of percutaneous tibial nerve stimulation in the treatment of overactive bladder syndrome. *Res Reports Urol*. 2017;9:145–57.
22. Padilha JF, Avila MA, Seidel EJ, Driusso P. Different electrode positioning for transcutaneous electrical nerve stimulation in the treatment of urgency in women: A study protocol for a randomized controlled clinical trial. *Trials*. 2020;21(1):1–11.
23. Wolff GF, Krlin RM. Posterior Tibial Nerve Stimulation. In: *Adult and Pediatric Neuromodulation*. Cham: Springer International Publishing; 2018. p. 131–41.

4. ARTIGO 1 –

EFFECT OF DIFFERENT ELECTROSTIMULATION CURRENTS ON FEMALE URINARY INCONTINENCE: A PROTOCOL OF A RANDOMIZED CONTROLLED TRIAL

Raissa E. Avramidis, PT^{1, 2}, Angélica M. P. Barbosa, PhD^{2,3}, Guilherme T. de A. Nava, MS¹,
Caroline B. Prudencio, MS², Cristiane R. Pedroni, PhD^{1,3}

1 Department of Physical Education, Institute of Biosciences of Rio Claro, São Paulo State University (UNESP), Rio Claro, São Paulo, Brazil

2 Department of Gynecology and Obstetrics, Botucatu Medical School, São Paulo State University (UNESP), Botucatu, São Paulo, Brazil

3 Department of Physiotherapy and Occupational Therapy, Faculty of Philosophy and Sciences, São Paulo State University (UNESP), Marília, São Paulo, Brazil

Corresponding Author

Cristiane Rodrigues Pedroni

cristiane.pedroni@unesp.br

Phone: 3402-1300

Hygino Muzzi Filho avenue, 737, Mirante, Zip Code 17525-900, Marília, São Paulo, Brazil

Conflict of interest: None.

Keywords: Urinary Incontinence; Therapeutics; Transcutaneous Electric Nerve Stimulation; Quality of Life

ABSTRACT

Aims: Urgent urinary incontinence (UUI) is characterized by involuntary urine loss associated with urinary urgency. Electrostimulation has been considered as the first line of treatment for UUI although there is still no consensus on which parameters are more efficient in electrical stimulation. Therefore, the objective of the study will be to compare the effects of applying low frequency versus medium frequency currents on urinary incontinence severity and quality of life at baseline and after treatment, at 10, 14 and 22 weeks in women with UUI.

Methods: It will be a randomized controlled trial with 5 arms, assessor and statistician will be blind. This randomized trial was designed following the standard protocol items for randomized interventional trials. Results will be reported consistent with the consolidated standards of reporting trials guidelines. One hundred and five participants will be randomized to receive transcutaneous tibial nerve stimulation - low frequency, transcutaneous tibial nerve stimulation - high frequency, aussie median frequency, interferencial median frequency and high voltage stimulation. **Conclusion:** There is still no consensus on which parameters are more efficient in

electrical stimulation due to the fact that studies present heterogeneity in interventions. This study will help determine which parameters are more efficient in electrical stimulation for the improvement of UUI.

Keywords: Urinary Incontinence; Therapeutics; Transcutaneous Electric Nerve Stimulation; Quality of Life

INTRODUCTION

Female urinary incontinence (UI) is a public health problem and affects millions of women worldwide (1). Defined as involuntary loss of urine (2) urinary incontinence can have a negative impact on the social, economic, familiar and sexual life of these women (3,4). Urgent urinary incontinence (UUI) is characterized by involuntary urine loss associated with urinary urgency (2) and, in addition to the negative impacts already mentioned, it also causes embarrassment (4). The prevalence of UUI varies between 5 to 50% of the world population, and may increase in elderly women (1,5).

Electrostimulation has been considered as the first line of treatment for UUI (1). One of the therapeutic modalities mentioned in the literature is neuromodulation delivered by transcutaneous electric nerve stimulation (TENS), which is widely used for being efficient, easy to handle, good acceptance and with minimal contraindications (5, 8, 10). TENS can be performed by placing electrodes in the suprapubic, perineal, tibial or sacral region, however the application in the region of the tibial nerve is undoubtedly the most used (5,8). Commonly, the parameters used in TENS are low pulse width (200 μ s) and low frequency (10 Hz) (7).

There is still no consensus on which parameters are more efficient in electrical stimulation due to the fact that studies present heterogeneity in interventions, such as duration and frequency, work cycle, current, form of administration and type of electrodes, which has different effects due to different mechanisms, although some therapeutic possibilities have scientific proof of their beneficial effects (11,12). Medium frequency currents, such as Aussie and Interferential, are modulated to offer the effect of low frequency current with the benefit of not being associated with unpleasant effects, such as pain or skin irritation (13–16).

The Aussie current has been suggested as an option due to its comfort during application, as well as reducing the impedance of the skin and thus ensuring that the pulse of the current reaches the deeper tissues (17). The Interferential current is based on the

production of two medium frequency currents that interfere with each other and produce a frequency called amplitude modulated frequency. Its main effects are the significant increase in the pain threshold, which can make the current more pleasant (18–20) and allow the current to reach deeper tissues by the generation of (21). The High Voltage current is also single-phase and pulsed, with double peak and reaches sensory, motor nerve fibers and also those responsible for nociceptive impulses, in addition, it allows a pleasant sensation during low frequency modulated application (22), although not very used for this purpose.

Despite the electrostimulation options described in the literature for improving UUI, the evidence is not overwhelming, it is unknown whether the improvement in symptoms occurs due to the application of a specific type of electric current or if the parameters applied are responsible for the improvement. Therefore, the objective of the study will be to compare the effects of applying low frequency currents versus medium frequency currents on quality of life at baseline and after treatment, at 10, 14 and 22 weeks in women with UUI. Our hypothesis is that medium frequency currents may be more effective in the treatment of UUI when compared to low frequency currents, considering that higher frequencies allow to reduce the skin's impedance for the passage of electric current and, thus, could reach deeper tissues

METHODS

It will be a randomized controlled trial with 5 arms, assessor and statistician will be blind. The study is registered in the Brazilian Registry of Clinical Trials as RBR-8bkp6 and has the universal number U1111-1233-2201.

Ethical approval and consent

The study was approved by the Research Ethics Committee of São Paulo State University, Faculty of Philosophy and Sciences - Campus of Marília (CAAE: nº 40418215.8.3001.5406). All participants will be informed about the research and will sign a consent form.

Participants

Women from the sector of Specialized Center for Women's Health Rehabilitation of the Faculty of Philosophy and Sciences who meet the study's inclusion criteria will be automatically referred for physical therapy evaluation. Inclusion criteria will be: women aged between 18 and 80 years and complaint of IUU. Non-inclusion criteria: cognitive impairment, psychiatric disorders, pregnancy, diagnosis of neurogenic bladder, pelvic organ prolapse above grade II, ongoing urinary tract infections (diagnosis by excluding signs and symptoms) and use of anticholinergic drugs, antagonist calcium, beta-antagonists and dopamine antagonists; and the exclusion criterion will be women who leave the treatment, do not obtain minimum results in the questionnaires and do not sign the consent form.

Physiotherapeutic evaluation

The protocol will include anamnesis and physical assessment, lasting a total of 30 minutes. The physical examination will be performed by a physiotherapist with 8 years of experience in the urogynecological area (CBP), and supervised by a physiotherapist with 32 years of experience in the urogynecological area (AMPB). The pelvic floor muscles (PFM) will be assessed through the digital palpation exam in the PERFECT scheme (23). Data collection will take place between September/2019 and December/2020 and will happen in a clean, reserved and adequate room. Before starting the first treatment session, the participants will be randomized, will receive the voiding diary, along with the appropriate instructions to

complete at home. In addition, they will answer the questionnaires related to UI, among them the International Consultation on Incontinence Questionnaire - short form (ICIQ-SF) (24), Overactive Bladder Questionnaire (OAB-V8) (25), International Consultation on Incontinence Questionnaire Overactive Bladder (ICIQ-OAB) (26) and the Incontinence Severity Index (ISI) (27).

Sample size and power analysis

A priori sample size calculation was performed using the G * Power software. Power of 0.80 was used, α error probability of 0.05, effect size of 0.3, which estimated the recruitment of 105 participants, 21 per group.

Randomization, allocation and blinding

The participants who met all inclusion criteria and the presence of IUU is defined will be randomly assigned to receive: 1) Transcutaneous Tibial Nerve Stimulation - Low Frequency (TTNS – LF), 2) Transcutaneous Tibial Nerve Stimulation - High Frequency (TTNS – HF), 3) Aussie Median Frequency (AMF), 4) Interferencial Median Frequency (IMF) and 5) High Voltage Stimulation (HVS). Participants will be allocated to each group according to block randomization to ensure homogeneous distribution between groups. The randomization sequence will be done through the website www.sealedenvelope.com through an author unrelated to the treatment or data collection. Participants will be informed about which group they will be allocated by one of the authors not involved in the evaluation process, but the difference between the groups won't be mentioned. At this point, the participants will sign the consent form and be able to resolve all doubts regarding the project.

Currents

TTNS-LF: Symmetrical biphasic pulsed current with 10Hz frequency, pulse width of 200 μ s (7). Neurodyn Portable Ibramed[®] equipment will be used.

TTNS-HF: Symmetrical biphasic pulsed current with 150Hz frequency, 100 μ s pulse width (21). Neurodyn Portable Ibramed[®] equipment will be used.

AMF: Medium frequency sinusoidal alternating current, with 4kHz carrier frequency and 4ms bursts with 100Hz frequency (28,29). Aussie Sport Ibramed[®] equipment will be used.

IMF: Biphasic pulsed current of medium frequency, with 4kHz with modulated frequency of 100Hz and with sweep of 10Hz (21). Neurovector Ibramed[®] equipment will be used.

HVS: Single-phase pulsed current, with triangular (exponential) twin pulses, frequency of 100Hz (22). For this study, cathodic stimulation (negative pole) will be used and the equipment used will be Neurodyn Portable Ibramed[®].

Electrode placement

For all groups, the current will be applied through a channel with two electrodes, one positioned posterior to the medial malleolus and the other 10 cm above. Uniform and rectangular silicone-carbon electrodes with 6x4.5 centimeters will be used. In addition, gel will be used to interface with skin (16).

All groups will receive transcutaneous electrical stimulation through the tibial nerve for 30 minutes, however the high voltage group will have a third, dispersive, 13x9 centimeters electrode, which will be positioned above the popliteal fossa to ensure that the current remains in the tibial nerve path that relates to the path of the sciatic nerve. Before placing the electrodes, the skin will be cleaned with 70% alcohol.

Primary outcome measure

The primary outcome that will be assessed: 1) quality of life.

1) The ICIQ-SF is a questionnaire that assesses quality of life, ensures agility in the assessment, can be self-administered and qualifies urinary loss. It consists of questions about frequency, severity and impact of UI, including self-diagnosis questions about their perceptions of involvement. The higher the score obtained, the greater the involvement by the UUI (24).

1) The OAB-V8 will be used to assess the impact on quality of life, it is a questionnaire composed of 8 questions about the discomfort caused by the participants' symptoms. The responses range from 0 to 5 points and the result of the sum of all responses, when greater than or equal to 8, will be considered as a probable diagnosis for UUI (25).

1) The ICIQ-OAB questionnaire provides an assessment measure for urinary frequency, urgency, nocturia and UI. It makes use of six specific questions about voiding symptoms correlating with quality of life, and the higher the score the greater the impairment (26).

Secondary outcome measure

The study will have 2 secondary outcomes: 1) Assessment of PFM strength and 2) UI severity.

1) For assessment of the PFM, the bladder will be empty, and then the participants will be instructed to put on the apron, undress below the waist and position themselves in the supine position, with the lower limbs flexed and the feet on the stretcher (23). The Digital Palpation will be performed, explaining the sequence of the PERFECT evaluation scheme, described by Laycock e Jerwood (2001), which consists of an acronym of all the letters that form the word to evaluate four items related to the contraction of the pelvic floor muscles.

Data on the evaluation of Power (P) will be collected, measured from the Modified Oxford scale (30), that evaluates the maximum voluntary contraction and classifies the muscular response as opposed to the unidigital touch of the examiner as 0 = absence of muscle contraction, 1 = outline of tremulous contraction (not sustained), 2 = weak contraction (which is sustained with little intensity), 3 = moderate (compresses the examiner's fingers in a cranial direction), 4 = satisfactory (elevation of the vaginal wall with compression of the examiner's fingers towards the pubic symphysis) and 5 = strong (firm compression of the examiner's fingers towards the pubic symphysis) (31). Endurance (E), referring to muscle resistance and the duration of contraction support in a maximum of 10 seconds and Fast (F) which, within a maximum of 10 repetitions, will evaluate the number of rapid contractions obtained by the participants (32). The letter R of Repetitions, related to the ability to repeat the maximum sustained contraction in a maximum of 10 repetitions with an interval of four seconds between them, will not be performed. Finally, the letters ECT (Every Contraction Timed) will serve as a reminder to the assessor (23). The scores will be recorded according to the performance of the participants in each item (33). A stopwatch will be used to measure the contraction time.

2) Voiding diary is a self-assessment of voiding habit and allows participants to be active in treatment (34). It can be performed as a 24-hour or three-day test, the biggest difference between them is in relation to adherence, since it is lower in the three-day evaluation, although this is more effective for possible evaluative interpretations (3). It is a device where the participants will fill for three full days, in the morning, afternoon, night and dawn, if there is activity. The time of each activity will be indicated, any fluid intake (quantity), interval, urinary frequency and urine volume with each urination, involuntary loss of urine and pads changes (34).

2) ISI makes it possible to classify, according to the score obtained, into mild (one to two points), moderate (three to six points), severe (eight to nine) or very severe (total of 12 points) by multiplying two simple and brief questions about frequency and volume of urinary loss (27).

All outcomes will be evaluated at baseline and after the treatment weeks, on the 10th, 14th and 22th weeks.

Interventions

All interventions will last 10 weeks, with 2 weekly meetings, in groups of a maximum of 5 participants, totaling 20 sessions lasting 45 minutes. All participants will carry out the treatments in an air-conditioned environment suitable for the procedures and will remain seated comfortably throughout the treatment. All participants will have their tibial nerve stimulated, with the intensity adjusted to the highest possible sensory level, modified according to their habituation to the current, without reaching the motor threshold or causing pain (16).

STATISTICAL ANALYSIS

Statistical processing will be performed using SPSS software, version 17.0 (SPSS Inc, Chicago, IL). The data will be presented in means and 95% confidence interval for each variable. The Shapiro-Wilk test will be used to analyze the normality of the data. For normal distribution, parametric tests will be used to compare means, if not, their respective non-parametric tests will be used.

DISCUSSION

This study was designed to compare the use of low and medium frequency currents by transcutaneous electrical nerve stimulation for the treatment of UUI. The use of TTNS – LF current is well known in the literature and used in clinical practice for the treatment of UUI (8), although its mechanism is not yet widely known. In addition, studies are limited to a certain current modulation to achieve tibial nerve neuromodulation (7,10). Thus, it is necessary to study with other current options, such as medium frequency, for greater knowledge about which is the best treatment option. Medium frequency currents have the advantage of producing smaller pulses in a given time and thus reducing the impedance of the skin, which can generate greater current absorption in deeper tissues, in addition to being more comfortable (35).

The currents that will be used in the study were chosen due to their wide use in clinical practice in several areas of physical therapy, due to the characteristics of the currents (16) and the fact that they have similar results in other clinical situations (21,36). The TTNS-LF, which will be used with another modulation, may be more advantageous than the TTNS-HF, since the difference adopted between frequency and pulse width may guarantee greater intensity of current application (37). The AMF has the burst option, which divides the frequency pulses to ensure that the skin can absorb the high frequency offered, and can be an advantage of this current over the others (28,38).

The differential of the IMF is the production of two medium frequency currents that interfere with each other, which allows the tissue to absorb more deeply (21) and can be beneficial for the stimulation of the tibial nerve. The HVS has a third dispersive electrode and modulated at low frequency, thus ensuring greater comfort (22) and generating greater absorption (35).

Anamnesis and evaluations will be carried out in order to obtain the diagnosis and clinical picture of each participant. After the IUU is verified, the evaluation will have four questionnaires to assess the quality of life of the participants and also the severity of the condition. These questionnaires are widely used in clinical practice both to make the diagnosis and to quantify the signs and symptoms (27,39–41).

In order to maintain the highest level of methodological quality, this randomized controlled trial will be conformed to the standards of the consort group (42). Participants will be randomized by means of a blind evaluator in any of the five groups and will not receive information about the difference between them. The assessor won't have contact with the participants during the intervention period and will not have knowledge about the groups during the follow-up. Finally, to ensure the blindness of the study, the data will be analyzed by a blind assessor.

This study arose from the intention to cover the knowledge about electrotherapy at UUI. Although stimulation of the tibial nerve with TTNS is a treatment with favorable results, little is known whether the therapeutic success is related to the choice of the current used or the modulation used for the chosen current (43). The most accepted theory is that electrostimulation through the tibial nerve, which has nerve roots where parasympathetic fibers of the bladder originate, causes somatic depolarization of afferent fibers and generates inhibition of bladder activity (9).

FUNDING

The study did not receive any type of funding.

REFERENCES

1. Booth J, Connelly L, Dickson S, Duncan F, Lawrence M. The effectiveness of transcutaneous tibial nerve stimulation (TTNS) for adults with overactive bladder syndrome: A systematic review. **Neurourol Urodyn** [Internet]. 2018 Feb;37(2):528–41. Available from: <http://doi.wiley.com/10.1002/nau.23351>
2. Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An international urogynecological association (IUGA)/international continence society (ICS) joint report on the terminology for female pelvic floor dysfunction. **Neurourol Urodyn** [Internet]. 2010 Jan;29(1):4–20. Available from: <http://doi.wiley.com/10.1002/nau.20798>
3. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardisation of terminology in lower urinary tract function: report from the standardisation sub-committee of the International Continence Society. **Urology** [Internet]. 2003 Jan;61(1):37–49. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0090429502022434>
4. Prudencio C, Nava GT, Cardoso M, Marreto R, Sousa É, Valenti VE, et al. Evolution of female urinary continence after physical therapy and associated factors. **Int Arch Med** [Internet]. 2014;7(1):24. Available from: <http://www.intarchmed.com/content/7/1/24>
5. Jacomo RH, Alves AT, Lucio A, Garcia PA, Lorena DCR, de Sousa JB. Transcutaneous tibial nerve stimulation versus parasacral stimulation in the treatment of overactive bladder in elderly people: a triple-blinded randomized controlled trial. **Clinics** [Internet]. 2020 Jan 6;75. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6943254/>
6. Marques ADA, Herrmann V, Ferreira NDO, Guimaraes RV. Eletroterapia como primeira linha no tratamento da bexiga hiperativa (BH). **Arq Medicos** [Internet]. 2009;54(2):66–72. Available from: http://www.fcmsantacasasp.edu.br/images/Arquivos_medicos/2009/54_2/vlm54n2_6.pdf
7. Garcia MBS, Pereira JS. Electrostimulation of the posterior tibial nerve in individuals with overactive bladder: a literature review. **J Phys Ther Sci** [Internet]. 2018;30(10):1333–40. Available from: https://www.jstage.jst.go.jp/article/jpts/30/10/30_jpts-2018-212/_article
8. Ramírez-García I, Blanco-Ratto L, Kauffmann S, Carralero-Martínez A, Sánchez E. Efficacy of transcutaneous stimulation of the posterior tibial nerve compared to percutaneous stimulation in idiopathic overactive bladder syndrome: Randomized control trial. **Neurourol Urodyn** [Internet]. 2019 Jan;38(1):261–8. Available from: <http://doi.wiley.com/10.1002/nau.23843>
9. de Wall L, Heesakkers J. Effectiveness of percutaneous tibial nerve stimulation in the treatment of overactive bladder syndrome. **Res Reports Urol** [Internet]. 2017 Aug;Volume 9:145–57. Available from: <https://www.dovepress.com/effectiveness-of-percutaneous-tibial-nerve-stimulation-in-the-treatmen-peer-reviewed-article-RRU>
10. Wolff GF, Krlin RM. Posterior Tibial Nerve Stimulation. In: **Adult and Pediatric Neuromodulation** [Internet]. Cham: Springer International Publishing; 2018. p. 131–41. Available from: http://link.springer.com/10.1007/978-3-319-73266-4_10
11. Marcelissen T, Cornu J-N, Antunes-Lopes T, Geavlete B, Delongchamps NB, Rashid T, et al. Management of Idiopathic Overactive Bladder Syndrome: What Is the Optimal Strategy After Failure of Conservative Treatment? **Eur Urol Focus** [Internet]. 2018 Sep;4(5):760–7. Available from:

- <https://linkinghub.elsevier.com/retrieve/pii/S2405456918301214>
12. Stewart F, Gameiro LF, El Dib R, Gameiro MO, Kapoor A, Amaro JL. Electrical stimulation with non-implanted electrodes for overactive bladder in adults. **Cochrane Database Syst Rev** [Internet]. 2016 Dec 9; Available from: <http://doi.wiley.com/10.1002/14651858.CD010098.pub4>
 13. Maiya Ga, Samuel S. Application of low frequency and medium frequency currents in the management of acute and chronic pain-A narrative review. **Indian J Palliat Care** [Internet]. 2015;21(1):116. Available from: <http://www.jpalliativecare.com/text.asp?2015/21/1/116/150203>
 14. Kroeling P, Gross A, Graham N, Burnie SJ, Szeto G, Goldsmith CH, et al. Electrotherapy for neck pain. **Cochrane Database Syst Rev** [Internet]. 2013 Aug 26; Available from: <http://doi.wiley.com/10.1002/14651858.CD004251.pub5>
 15. Watson T. The role of electrotherapy in contemporary physiotherapy practice. **Man Ther** [Internet]. 2000 Aug;5(3):132–41. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1356689X00903631>
 16. Barbosa AMP, Parizotto NA, Pedroni CR, Avila MA, Liebano RE, Driusso P. How to report electrotherapy parameters and procedures for pelvic floor dysfunction. **Int Urogynecol J** [Internet]. 2018 Dec 24;29(12):1747–55. Available from: <http://link.springer.com/10.1007/s00192-018-3743-y>
 17. Ward AR, Oliver WG. Comparison of the Hypoalgesic Efficacy of Low-Frequency and Burst-Modulated Kilohertz Frequency Currents. **Phys Ther** [Internet]. 2007 Aug 1;87(8):1056–63. Available from: <https://academic.oup.com/ptj/article/87/8/1056/2742271>
 18. Bjordal JM, Johnson MI, Lopes-Martins RA, Bogen B, Chow R, Ljunggren AE. Short-term efficacy of physical interventions in osteoarthritic knee pain. A systematic review and meta-analysis of randomised placebo-controlled trials. **BMC Musculoskelet Disord** [Internet]. 2007 Dec 22;8(1):51. Available from: <http://bmcmusculoskeletdisord.biomedcentral.com/articles/10.1186/1471-2474-8-51>
 19. Gundog M, Atamaz F, Kanyilmaz S, Kirazli Y, Celepoglu G. Interferential Current Therapy in Patients with Knee Osteoarthritis. **Am J Phys Med Rehabil** [Internet]. 2012 Feb;91(2):107–13. Available from: <http://journals.lww.com/00002060-201202000-00003>
 20. Ozcan J, Ward AR, Robertson VJ. A comparison of true and premodulated interferential currents. **Arch Phys Med Rehabil** [Internet]. 2004 Mar;85(3):409–15. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0003999303004787>
 21. Almeida CC de, Silva VZM da, Júnior GC, Liebano RE, Durigan JLQ. Transcutaneous electrical nerve stimulation and interferential current demonstrate similar effects in relieving acute and chronic pain: a systematic review with meta-analysis. **Brazilian J Phys Ther** [Internet]. 2018 Sep;22(5):347–54. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S1413355517302836>
 22. Davini R, Guirro E, Paulista B, Guirro R. Estimulação Elétrica de Alta Voltagem: Uma Opção de Tratamento. **Brazilian J Phys Ther**. 2005;9(3):249–56.
 23. Laycock J, Jerwood D. Pelvic Floor Muscle Assessment: The PERFECT Scheme. **Physiotherapy** [Internet]. 2001 Dec;87(12):631–42. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S003194060561108X>
 24. Tamanini JTN, Dambros M, D’Ancona CAL, Palma PCR, Rodrigues Netto Jr N. Validação para o português do “International Consultation on Incontinence Questionnaire - Short Form” (ICIQ-SF). **Rev Saude Publica** [Internet]. 2004 Jun;38(3):438–44. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0034-

- 89102004000300015&lng=pt&tlng=pt
25. Acquadro C, Kopp Z, Coyne KS, Corcos J, Tubaro A, Choo M-S. Translating overactive bladder questionnaires in 14 languages. **Urology** [Internet]. 2006 Mar;67(3):536–40. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0090429505013907>
 26. Pereira SB, Thiel R do RC, Riccetto C, Silva JM da, Pereira LC, Herrmann V, et al. Validação do International Consultation on Incontinence Questionnaire Overactive Bladder (ICIQ-OAB) para a língua portuguesa. **Rev Bras Ginecol e Obs** [Internet]. 2010 Jun;32(6):273–8. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-72032010000600004&lng=pt&nrm=iso&tlng=pt
 27. Pereira VS, Santos JYC e, Correia GN, Driusso P. Tradução e validação para a língua portuguesa de um questionário para avaliação da gravidade da incontinência urinária. **Rev Bras Ginecol e Obs** [Internet]. 2011 Apr;33(4):182–7. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0100-72032011000400006&lng=pt&nrm=iso&tlng=pt
 28. Ward AR, Chuen WLH. Lowering of Sensory, Motor, and Pain-Tolerance Thresholds With Burst Duration Using Kilohertz-Frequency Alternating Current Electric Stimulation: Part II. **Arch Phys Med Rehabil** [Internet]. 2009 Sep;90(9):1619–27. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0003999309003335>
 29. Ward AR, Oliver WG, Buccella D. Wrist Extensor Torque Production and Discomfort Associated With Low-Frequency and Burst-Modulated Kilohertz-Frequency Currents. **Phys Ther** [Internet]. 2006 Oct 1;86(10):1360–7. Available from: <https://academic.oup.com/ptj/article/86/10/1360/2805227>
 30. Laycock J, Haslam J, editors. Therapeutic Management of Incontinence and Pelvic Pain: Pelvic Organ Disorders. 2nd ed. **Springer**; 2007. 301 p.
 31. Cassadó Garriga J, Pessarrodona Isern A, Espuña Pons M, Durán Retamal M, Felgueroso Fabregas A, Rodriguez-Carballeira M. Tridimensional sonographic anatomical changes on pelvic floor muscle according to the type of delivery. **Int Urogynecol J** [Internet]. 2011 Aug 6;22(8):1011–8. Available from: <http://link.springer.com/10.1007/s00192-011-1413-4>
 32. Franceschet J, Sacomori C, Cardoso FL. Força dos músculos do assoalho pélvico e função sexual em gestantes. **Brazilian J Phys Ther** [Internet]. 2009 Oct;13(5):383–9. Available from: http://www.scielo.br/scielo.php?script=sci_arttext&pid=S1413-35552009000500004&lng=pt&nrm=iso&tlng=en
 33. Messelink B, Benson T, Berghmans B, Bø K, Corcos J, Fowler C, et al. Standardization of terminology of pelvic floor muscle function and dysfunction: Report from the pelvic floor clinical assessment group of the International Continence Society. **Neurourol Urodyn** [Internet]. 2005;24(4):374–80. Available from: <http://doi.wiley.com/10.1002/nau.20144>
 34. Fonda D, Resnick NM, Colling J, Burgio K, Ouslander JG, Norton C, et al. Outcome measures for research of lower urinary tract dysfunction in frail older people. **Neurourol Urodyn** [Internet]. 1998;17(3):273–81. Available from: [https://onlinelibrary.wiley.com/doi/10.1002/\(SICI\)1520-6777\(1998\)17:3%3C273::AID-NAU12%3E3.0.CO;2-L](https://onlinelibrary.wiley.com/doi/10.1002/(SICI)1520-6777(1998)17:3%3C273::AID-NAU12%3E3.0.CO;2-L)
 35. Fuentes C J, Armijo-Olivo S, Magee DJ, Gross D. Does amplitude-modulated frequency have a role in the hypoalgesic response of interferential current on pressure pain sensitivity in healthy subjects? A randomised crossover study. **Physiotherapy** [Internet]. 2010 Mar;96(1):22–9. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0031940609000856>

36. Ward AR, Lucas-Toumbourou S, McCarthy B. A comparison of the analgesic efficacy of medium-frequency alternating current and TENS. **Physiotherapy** [Internet]. 2009 Dec;95(4):280–8. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0031940609000832>
37. Gorgey AS, Mahoney E, Kendall T, Dudley GA. Effects of neuromuscular electrical stimulation parameters on specific tension. **Eur J Appl Physiol** [Internet]. 2006 Aug 4;97(6):737–44. Available from: <http://link.springer.com/10.1007/s00421-006-0232-7>
38. Venancio RC, Pelegri S, Gomes DQ, Nakano EY, Liebano RE. Effects of Carrier Frequency of Interferential Current on Pressure Pain Threshold and Sensory Comfort in Humans. **Arch Phys Med Rehabil** [Internet]. 2013 Jan;94(1):95–102. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0003999312008817>
39. Angulo JC, Calderín MP, Fernández Y, González M, Gómez E, Herreros MB, et al. Estudio comparativo entre los cuestionarios CACV, OAB-V8 y OAB-V3 como herramientas de cribado de vejiga hiperactiva en la práctica clínica. **Actas Urológicas Españolas** [Internet]. 2017 Jul;41(6):383–90. Available from: <https://linkinghub.elsevier.com/retrieve/pii/S0210480617300104>
40. Karmakar D, Mostafa A, Abdel-Fattah M. A new validated score for detecting patient-reported success on postoperative ICIQ-SF: a novel two-stage analysis from two large RCT cohorts. **Int Urogynecol J** [Internet]. 2017 Jan 5;28(1):95–100. Available from: <http://link.springer.com/10.1007/s00192-016-3070-0>
41. Monteiro S, Riccetto C, Rocha AK, Santos K, Campos I, Pereira T, et al. The Brazilian Portuguese version of the ICIQ-OABqol: cross-cultural adaptation and reliability. **Int Urogynecol J** [Internet]. 2020 Mar 24; Available from: <http://link.springer.com/10.1007/s00192-020-04280-x>
42. Altman DG. The Revised CONSORT Statement for Reporting Randomized Trials: Explanation and Elaboration. **Ann Intern Med** [Internet]. 2001 Apr 17;134(8):663. Available from: <http://annals.org/article.aspx?doi=10.7326/0003-4819-134-8-200104170-00012>
43. BRUBAKER L. ELECTRICAL STIMULATION IN OVERACTIVE BLADDER. **BJU Int** [Internet]. 2000 May;85(S3):17–23. Available from: <http://doi.wiley.com/10.1111/j.1464-410X.2000.tb16934.x>

5. ARTIGO 2 – Elaborado seguindo as normas da Revista *Neurology and Urodynamics*

LOW FREQUENCY CURRENTS VERSUS MEDIUM FREQUENCY CURRENTS AS TREATMENT FOR URGE URINARY INCONTINENCE: RANDOMIZED CONTROLLED TRIAL

Raissa E. Avramidis, PT^{1, 2}, Angélica M. P. Barbosa, PhD^{2,3}, Guilherme T. de A. Nava, MS¹,
Caroline B. Prudencio, MS², Cristiane R. Pedroni, PhD^{1,3}

1 Department of Physical Education, Institute of Biosciences of Rio Claro, São Paulo State University (UNESP), Rio Claro, São Paulo, Brazil

2 Department of Gynecology and Obstetrics, Botucatu Medical School, São Paulo State University (UNESP), Botucatu, São Paulo, Brazil

3 Department of Physiotherapy and Occupational Therapy, Faculty of Philosophy and Sciences, São Paulo State University (UNESP), Marília, São Paulo, Brazil

Corresponding Author

Cristiane Rodrigues Pedroni

cristiane.pedroni@unesp.br

Phone: 3402-1300

Hygino Muzzi Filho avenue, 737, Mirante, Zip Code 17525-900, Marília, São Paulo, Brazil

Disclosure of Interest: The authors report no conflict of interest.

Keywords: Overactive Bladder, Rehabilitation, Transcutaneous Electric Nerve Stimulation, Clinical Trial.

ABSTRACT:

INTRODUCTION: Transcutaneous Electric Nerve Stimulation is a modality of electrotherapy used to delivery tibial nerve stimulation. Safe and non-invasive, TENS is considered a low frequency current and most commonly used for the Urge Urinary Incontinence. It is reported by the International Continence Society as involuntary loss of urine associated with urgency, usually combined with frequency and nocturia. There is still no consensus on the most efficient form of electrostimulation because of the different methodologies that cannot be compare. In addition, medium frequency currents are produced to perform as low frequencies and used to decrease the impedance of the skin turning the treatment more comfortable for the patient. **OBJECTIVES:** Compare the effects of applying low frequency currents with medium frequency currents and the secondary goal is to verify which current will be more effective to reduce symptoms and increase quality of life during treatment. **METHODS:** This is a randomized clinical trial with 5 arms, evaluator and blind statistician. All 105 participants were informed about the research and signed the consent form. The anamnesis protocol included collection of personal and clinical data, application of specific questionnaires for urinary incontinence and quality of life and physical assessment of the pelvic floor. The protocol was carried out in three different moments: before the intervention, during and in the last session. Participants were allocated to one of the 5 groups (TTNS-LF, TTNS-HF, AMF, IMF and HVS). All groups received the intervention of transcutaneous electrical stimulation on the tibial nerve for 30 minutes, through a channel with two electrodes, one positioned posteriorly to the medial malleolus and the other 10 cm above it. **RESULTS:** The variables were described by the mean and 95% confidence interval (95% CI). Shapiro-Wilk was used to analyze the normality of the data. Then, repeated measures ANOVA with Bonferroni's Post-Hoc was used. In total 105 womens were analysed and they showed similarity at anthropometric data and on sample characterization. This study demonstrates that all the five currents used were capable to reduce severity of urinary incontinence and increase quality of life. Regarding the comparison between the groups, there was no significant difference between them. **CONCLUSION:** Low frequency currents obtained results similar to those of medium frequency for reducing the severity of Urge Urinary Incontinence and increasing quality of life., All currents were effective for this treatment. However, there was no significant difference between them.

Keywords: Overactive Bladder, Rehabilitation, Transcutaneous Electric Nerve Stimulation, Clinical Trial.

INTRODUCTION

Electrotherapy is a way of administering electrical impulses, which modify neuromuscular activity (1). Neuromodulation can be performed using needles or electrodes attached to the skin surface (2). It is widely used as a therapeutic option to various sensory and motor modifications, including Urinary Incontinence (1–4). There is a variety of currents that presents different mechanisms of action and application that differ clinically so the choice of the best resource can lead to successful treatment (1).

Transcutaneous Electric Nerve Stimulation is a modality of electrotherapy used to delivery tibial nerve stimulation. Safe and non-invasive, TENS is considered a low frequency current and most commonly used for the UUI as a frequency of 10 Hz and a pulse width of 200 μ s (5). Although at very low frequencies nerve fibers relax muscle fibers, they can cause unpleasant effects such as pain (6). As there is still no consensus on the most efficient form of electrostimulation because of the different methodologies that cannot be compared, in this randomized controlled trial we tested another management of the TENS current, with a frequency of 150 Hz and a pulse width of 100 μ s.

In addition, medium frequency currents are produced to perform as low frequencies and used to decrease the impedance of the skin turning the treatment more comfortable for the patient (6). Ward and Lucas-Toumbourou (2009) compared the Australian Medium Current (AMF) to TENS and they showed similar results in muscular relaxation and decreasing pain, with the advantage that Aussie current was more comfortable (7). Aussie is a medium frequency current capable to increase blood supply and decrease pain with short bursts about 2 a 4 milliseconds and 100 to 120 Hz, carrier frequency of 1 or 4 kHz and a intensity that can reach up to 180 mA (8).

Another option of medium frequency is Interferential Medium Current (IMF). By increasing the pain threshold, it is able to decrease pain and also can reach deeper tissues by producing medium frequencies currents that interfere with each other to produces a frequency

called amplitude modulated frequency. Frequency generally remains between 100Hz (9). Silva et. al., (2019) comparing TENS, AMF and IMF demonstrated that the three are capable of lowering the pain threshold (10).

High Voltage Stimulation (HVS) is usually used as a resource for circulatory and regenerative action, however there is evidence for the use in pain control too (11). It is a single-phase current modulated as low frequency, with double peak and positive or negative polarity (11,12). The use of negative polarity (cathodic) is associated with the effect of reducing pain and has proven efficacy for the treatment of various conditions (12–14).

Urge Urinary Incontinence (UI) is reported by the International Continence Society (ICS) as involuntary loss of urine associated with urgency, usually combined with frequency and nocturia (15). Its caused from the detrusor overactivity during the bladder relaxing time (15). UI is a world-class problem that affects thousands of women's, damaging social and sexual life, familiar relationship and even domestic finances (16). Also, the patients reports UI as the most bothersome symptom of Overactive Bladder (OB) (2) and affects the quality-of-life (17). OB occurs between 5 to 50% of the world population and may increase during older age (18), which is worrying since we know that in older women's the Urinary Incontinence (UI) increases in 1.5 to 2.3 the possibility of fall (19).

Although the physiology of this dysfunction is not fully understood, the intention of treatment is to improve quality of life by reducing symptoms (20). The recommended treatment involves non-invasive methods such pelvic floor muscle training, bladder training and medication (21), but physiotherapy have been considered as first line treatment (2). Electrical stimulation is commonly used as a treatment because its effectiveness, low cost, easy application and few contraindications (5). Despite it can be applied in different ways, tibial nerve stimulation for sure is the most accepted (18). The application is carried out through the tibial nerve, with nerve roots in L5-S3 were also fibers from the parasympathetic

nervous system originate and innervate bladder, so the therapeutic mechanism consists of balancing the excitatory and inhibitory impulses that controls the bladder (18,22).

Thereby the hypothesis of this study was that medium frequency currents may be more beneficial for the treatment of UUI when compared to low frequency currents, since higher frequencies can reach deeper tissues and the currents tested here obtain favorable results for their use (6,9). Although countless studies have obtained good results from the use of electrotherapy in UUI, it is not known exactly which are the best parameters to be used or whether the chosen parameters dictate the success of the treatment or whether it is the chosen modality. So, the goal of this study is to compare the effects of applying low frequency currents with medium frequency currents and the secondary goal is to verify which current will be more effective to reduce symptoms during treatment.

METHODS

This randomized double-blind controlled trial with 5 arms was developed based on a study protocol that is in the submission phase. It was registered as RBR-8bkp6 in the Brazilian Registry of Clinical Trials with the universal number U1111-1233-2201 and the study was approved by the Research Ethics Committee of São Paulo State University (UNESP), Marília, São Paulo (CAAE: nº 40418215.8.3001.5406).

All participants were informed about the research and signed the consent form. The sample calculation, performed in G*Power, pointed to the number of 105 participants, 21 per group.

The participants were women referred to the Physiotherapy sector of Women's Health at UNESP - Marília. After screening of this sector, patients who met the study criteria were automatically referred for physical therapy evaluation. Inclusion criteria: women with complaints of UUI between 18 to 80 years old. The non-inclusion criteria were: psychiatric

disorders or cognitive deficits, pregnancy, diagnosis of neurogenic bladder, ongoing urinary tract infections (diagnosis by excluding signs and symptoms), prolapse of pelvic organs above grade II, use of drugs anticholinergics, calcium antagonists, beta-antagonists and dopamine antagonists. Finally, those who abandoned the treatment, didn't sign the consent form or didn't reach minimum score on questionnaires were excluded.

Physiotherapeutic Assessment

The evaluations lasted a total of 30 minutes. Were collected anamnesis, identification of signs and symptoms and then ended with a physical examination, which was supervised by two physiotherapists (CPB and AMPB) not involved in the intervention. Examination consisted of Digital Palpation in the PERFECT scheme (23).

Data collection took place in a Specialized Rehabilitation Center, between September/2019 to December/2020. After scheduling and before starting the first treatment session, participants were randomized to receive the following transcutaneous electric stimulation currents: 1) TTNS-Low Frequency, 2) TTNS-High Frequency, 3) Aussie, 4) Interferential and 5) High Voltage. Then, they will be allocated to each group according to block randomization to ensure homogeneous distribution between groups. The randomization was carried out through the web site www.sealedenvelope.com by an author unrelated to interventions. In another words, a person not involved in intervention (CPB) ran the randomization, allocated the participants and communicated them about their respective groups, without explaining the difference between them.

Finally, they responded to UI-related questionnaires, including the International Consultation on Incontinence Questionnaire - short form (ICIQ-SF) (24), overactive bladder questionnaire (OAB-V8) (25), international consultation on incontinence questionnaire overactive bladder (ICIQ-OAB) (26) and the Incontinence Severity Index (ISI) (27). They

were applied by another physiotherapist (GTAN) that was also not involved in intervention. Then, to start the first session, the participants received the Voiding Diary (28) to fill in at home for three days.

Primary Outcome Measures

One main outcome was adopted: 1) severity of UUI.

1) ISI makes it possible to classify, according to the score obtained, into mild (one to two points), moderate (three to six points), severe (eight to nine) or very severe (total of 12 points) by multiplying two simple and brief questions about frequency and volume of urinary loss (27). In addition to this, the ICIQ-OAB questionnaire provides measures for urinary frequency, urgency, nocturia and UI. It makes use of six specific questions about voiding symptoms correlating with quality of life, and the higher the score the greater the impairment (26).

Secondary Outcomes Measures

The study had two secondary outcomes: 1) Quality of Life and 2) Assessment of the strength of pelvic floor muscles (PFM).

1) Two questionnaires were applied to quantify the interference of UUI in the quality of life. The ICIQ-SF is a quality of life assessment questionnaire and qualifies urinary loss. It consists of questions about issues of frequency, severity and impact of UUI, including self-diagnosis questions about their perceptions of involvement. It does not have a cut score, but the higher the specified score, the greater the involvement by UUI (24). OAB-V8 consists of 8 questions about the discomfort caused by the participants' symptoms. The responses range from 0 to 5 points and the result of the sum of all responses, when greater than or equal to 8, is considered as a probable diagnosis for IUU (25).

2) Digital Palpation of pelvic floor muscles was performed, explaining the sequence of PERFECT scheme (23). Results were collected on the Power (P) assessment, measured from the Modified Oxford scale (29), evaluating the maximum voluntary contraction and classifying the muscular response as opposed to the examiner's unidigital touch as 0 = absence of muscle contraction, 1 = sketch of tremulous contraction (not sustained), 2 = weak contraction (which is sustained with little intensity), 3 = moderate (compresses the examiner's fingers cranially), 4 = satisfactory (elevation of the vaginal wall with compression of the examiner's fingers towards the pubic symphysis) and 5 = strong (firm compression of the examiner's fingers towards the pubic symphysis) (30). Endurance (E), referring to muscle resistance and the duration of contraction support in a maximum of 10 seconds and Fast (F) which, within a maximum of 10 repetitions, will evaluate the number of rapid contractions obtained by the participants (31). The obtained scores were recorded and the duration of contraction support was clocked.

Interventions

Intervention took place in groups of a maximum of 5 participants in a cozy room, where they were comfortably seated. It was done 2-3 times a week, for 20 sessions. The session had a maximum duration of 45 minutes, with the application of the current for 30 minutes. To all Groups, current was applied by tibial nerve through two uniforms and rectangular silicone-carbon electrodes (6x4.5 cm) at one channel, being one positioned behind the medial malleolus and the other 10 cm above the medial malleolus (6). High Voltage Group included a third electrode (dispersive: 13x9) which was placed above popliteal fossa to ensure that the current remains in the path of the tibial nerve.

TTNS-LF and TTNS-HF Groups are symmetrical biphasic pulsed current and used Neurodyn Portable Ibramed® equipment. It was also used for the HVS Group, which is a single-phase pulsed current, with triangular (exponential) twin pulses. The modulations were

respectively with frequencies of 10 Hz and 150 Hz and pulse width of 200 μ s and 150 μ s respectively (9,32), while HVS was modulated with direct current, negative polarity and a frequency of 100 Hz (11). The TTNS-LF group was used as a control group, since it is the most used and considered as the gold standard for this treatment (4,5,33).

AMF is a medium frequency sinusoidal alternating current and this group made use of Aussie Sport Ibramed® equipment, with 4ms bursts and 4KHz frequency, in continuous mode (8,34), whereas the IMF group used Neurovector Ibramed®, with a current frequency of 4KHz, modulated at 100Hz, with a sweep of 100Hz, in continuous mode (9). It is a biphasic pulsed current of medium frequency. Intensity of all equipment was adjusted to the highest possible sensory level, modified according to their habituation to the current, without reaching the motor threshold or causing pain (6).

Physiotherapeutic Revaluation

Aiming to compare the results of quality of life and severity of the UUI, the questionnaires were applied in three different moments. One before starting the sessions, as already mentioned, twice in the tenth and third at last session (twentieth). They were reapplied by the same physiotherapist who performed the first application and who was not involved during the intervention. However, Voiding Diary (28) was reapplied only once, between the 17th and 20th session. Digital Palpation in PERFECT scheme (23) also was performed by the same physiotherapist who supervised the assessment (CPB) and was not involved at interventions.

ANALYSIS STATISTICAL

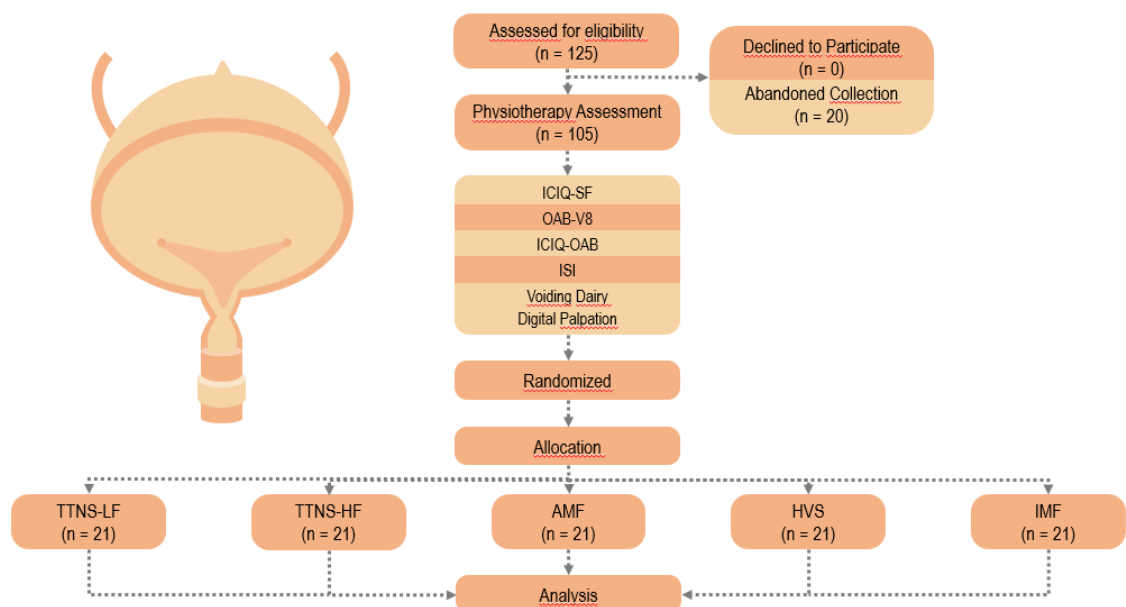
Statistical analysis was performed using SPSS software version 24.0 for Windows. The variables are described by the mean and 95% confidence interval (95% CI). The

distribution of normality was analysed by the Shapiro-Wilk test. To analyse the effect of group and currents, ANOVA for repeated measures was performed. The Mauchly's test was performed to test the hypothesis of sphericity and when this was violated, the analyses were based on the Greenhouse-Geisser test. Peer-to-peer comparisons were performed using the Bonferroni Post-Hoc test. The confidence level adopted was 5% ($p \leq 0.05$).

RESULTS

Were assessed 105 womens for eligibility to perform physiotherapeutic evaluation. After starting the intervention of treatment, 20 voluntaries left the study. We assessed another 20 voluntaries to eligibility and then they did the same physiotherapeutic evaluation as the others. At the end of study, we completed the total of 105 participants, 21 per group, as shown in flow diagram.

Flow Diagram.



In total 105 womens were analysed and they showed similarity at anthropometric data, with significant difference only on the variables *Smoker* ($p: 0,001$) and *Stress Urinary Incontinence* ($p: 0,035$), as shown on table 1.

Table 1. Anthropometric Data of 21 womens per 5 groups.

Anthropometric Data

	TTNS-LF		HVS		TTNS-HF		IMF		AMF		<i>p</i>
	n	%	n	%	n	%	n	%	n	%	
Ethnicity	6	28,6	0	0,0	5	23,8	8	38,1	8	38,1	<i>0,009</i> f
Marital Status	9	42,9	5	23,8	8	38,1	7	33,3	5	23,8	<i>0,641</i> f
Scholarity	10	47,6	11	52,4	8	38,1	10	47,6	10	47,6	<i>0,322</i> x2
Religion	20	95,2	21	100,0	21	100,0	21	100,0	20	95,2	<i>1,000</i> f
Alcoholism	5	23,8	2	9,5	3	14,3	4	19,0	3	14,3	<i>0,856</i> f
Smoker	4	19,0	0	0,0	0	0,0	1	4,8	2	9,5	<i>0,001</i> f
Perineoplasty	4	19,0	3	14,3	3	14,3	3	14,3	3	14,3	<i>0,39</i> x2
Episiotomy	13	61,9	12	57,1	11	52,4	12	57,1	14	66,7	<i>0,306</i> x2
Forcéps	3	14,3	0	0,0	0	0,0	1	4,8	1	4,8	<i>0,394</i> f
Menopause	15	71,4	16	76,2	15	71,4	12	57,1	17	81,0	<i>0,514</i> x2
UUI	21	100,0	21	100,0	21	100,0	21	100,0	21	100,0	<i>1,000</i> f
SUI	21	100,0	21	100,0	18	85,7	21	100,0	21	100,0	<i>0,035</i> f
Fecal Incontinence	2	9,5	1	4,8	0	0,0	0	0,0	1	4,8	<i>0,796</i> f
Nocturia	6	28,6	7	33,3	12	57,1	12	57,1	11	52,4	<i>0,173</i> x2

Table 1. UUI: Urgency Urinary Incontinence. SUI: Stress Urinary Incontinence.

Furthermore, they shown similarity on sample characterization too, showing significant difference only in the variables *Night Urination* ($p:0,003$) and *Fast*³ ($p: 0,039$), which was measured by digital palpation again at the third moment. This characterization is shown on the table below (Table 2).

Table 2. Sample Characterization per group.

	TTNS-LF					HVS					TTNS-HF					IMF					AMF					<i>p</i>
	mean	median	d	min	max	mean	median	d	min	max	mean	median	d	min	max	mean	median	d	min	max	mean	median	d	min	max	
Age	55,6	57,0	14,8	23,0	80,0	56,8	57,0	10,5	36,0	79,0	59,7	61,0	13,4	28,0	80,0	56,1	57,0	13,0	31,0	76,0	58,8	60,0	9,4	42,0	73,0	<i>,808</i>
Daytime Urination	8,5	6,0	5,4	4,0	20,0	7,1	7,0	4,1	3,0	20,0	7,6	7,0	4,2	2,0	20,0	8,3	8,0	3,4	3,0	15,0	7,0	5,0	4,1	3,0	20,0	<i>,506</i>
Night urination	1,5	1,0	1,3	0,0	4,0	2,0	2,0	1,3	0,0	5,0	3,0	3,0	2,3	1,0	10,0	2,5	3,0	1,5	0,0	4,0	3,3	3,0	1,5	0,0	6,0	<i>,003</i>
Pregnancies	2,2	3,0	1,4	0,0	4,0	2,8	2,0	1,3	1,0	6,0	3,6	3,0	1,9	2,0	9,0	3,1	3,0	1,9	0,0	8,0	2,7	3,0	1,5	1,0	6,0	<i>,279</i>
Cesarean	0,7	0,0	0,8	0,0	2,0	1,0	1,0	1,0	0,0	3,0	1,2	1,0	1,1	0,0	3,0	0,7	1,0	0,9	0,0	3,0	0,8	1,0	0,9	0,0	3,0	<i>,359</i>
Vaginal Delivery	1,6	1,0	1,4	0,0	4,0	1,8	2,0	1,7	0,0	6,0	2,4	2,0	2,7	0,0	9,0	2,5	2,0	2,2	0,0	8,0	1,9	1,0	1,9	0,0	6,0	<i>,835</i>
Ureteroceles	1,1	1,0	1,0	0,0	3,0	0,5	0,0	0,8	0,0	2,0	1,0	1,0	0,9	0,0	2,0	0,8	1,0	0,9	0,0	2,0	0,7	0,0	0,8	0,0	2,0	<i>,160</i>
Cystocele	1,2	1,0	0,8	0,0	3,0	1,0	1,0	0,8	0,0	2,0	1,4	2,0	0,7	0,0	2,0	1,0	1,0	0,7	0,0	2,0	1,1	1,0	0,9	0,0	3,0	<i>,351</i>
Uterine Prolapse	0,4	0,0	0,7	0,0	2,0	0,2	0,0	0,5	0,0	2,0	0,5	0,0	0,7	0,0	2,0	0,6	1,0	0,6	0,0	2,0	0,4	0,0	0,6	0,0	2,0	<i>,232</i>
Visceral Prolapse	0,0	0,0	0,2	0,0	1,0	0,0	0,0	0,0	0,0	0,0	0,1	0,0	0,5	0,0	2,0	0,1	0,0	0,3	0,0	1,0	0,0	0,0	0,0	0,0	0,0	<i>,382</i>
Rectal Prolapse	0,5	0,0	0,8	0,0	2,0	0,8	0,0	0,9	0,0	2,0	0,9	1,0	1,0	0,0	3,0	0,6	0,0	0,8	0,0	2,0	0,5	0,0	0,9	0,0	2,0	<i>,450</i>
Number of sessions	19,0	20,0	1,4	16,0	20,0	19,5	20,0	0,9	17,0	20,0	19,1	20,0	1,5	16,0	20,0	19,3	20,0	1,0	17,0	20,0	19,3	20,0	1,2	16,0	20,0	<i>,829</i>
Power¹	2,3	3,0	1,2	0,0	4,0	2,5	3,0	1,3	0,0	5,0	1,5	2,0	1,1	0,0	3,0	2,0	2,0	1,1	0,0	4,0	1,8	1,0	1,3	0,0	4,0	<i>,076</i>
Endurance¹	3,1	3,0	2,8	0,0	10,0	3,3	2,0	3,0	0,0	10,0	2,6	2,0	2,8	0,0	10,0	3,1	3,0	3,2	0,0	10,0	2,6	2,0	3,3	0,0	10,0	<i>,650</i>
Fast¹	7,9	10,0	3,8	0,0	10,0	5,7	5,0	4,1	0,0	10,0	5,1	6,0	4,5	0,0	10,0	6,5	10,0	4,2	0,0	10,0	4,7	4,0	4,7	0,0	10,0	<i>,119</i>
Power²	2,7	3,0	1,3	0,0	5,0	2,8	3,0	1,1	1,0	5,0	2,1	2,0	1,1	0,0	4,0	2,2	2,0	1,4	0,0	6,0	2,0	2,0	1,3	0,0	4,0	<i>,112</i>
Endurance²	2,4	3,0	1,4	0,0	5,0	4,1	2,0	3,8	0,0	10,0	2,4	2,0	2,0	0,0	7,0	3,4	3,0	3,3	0,0	10,0	2,6	2,0	2,8	0,0	10,0	<i>,680</i>
Fast²	7,0	8,0	3,5	0,0	10,0	6,5	10,0	4,1	0,0	10,0	5,0	5,0	4,1	0,0	10,0	4,6	5,0	3,8	0,0	10,0	3,8	3,0	3,7	0,0	10,0	<i>,039</i>

Table 2. Power, Endurance and Fast: variables of Digital Palpation, realized before began and after finished intervention.

This study demonstrates that all the five currents used were capable to reduce severity of urinary incontinence and increase quality of life. In the analysis of the ICIQ-SF (quality of life), ICIQ-OAB (quality of life and severity) and OAB-V8 (quality of life) questionnaires, all currents showed a significant difference between the first and second moments and between the first and third moments. In the OAB-V8, the TTNS-LF and AMF groups were the only ones who demonstrated a significant difference between the second and third moments. Analyzing only the ISI, we noticed that for all groups, except IMF, there was a significant difference again between the first and the second moment, but between the first and the third moment, the TTNS-LF and TTNS-HF groups did not reach the significant difference. Furthermore, high p_{GT} values suggest that the temporal evolution is similar between groups (p_{GT} : ICIQ-SF: 0,334; OAB-V8: 0,058; ICIQ-OAB: 0,396 and ISI: 0,244) Comfort was also analyzed during the application of the chain. The volunteers answered from 0 to 10, 0 being extremely uncomfortable and 10 being very comfortable. Only 40 volunteers answered the question about comfort. TTNS-LF and IMF groups obtained higher scores than other groups, with means of 10. The others reached means values of 9,1 (TTNS-HF), 8,2 (AMF) and 9,6 (HVS).

Regarding the comparison between the groups, it is important to note that there was no significant difference between them (ICIQ-SF¹, ICIQ-SF² and ICIQ-SF³ - p : 0,409, p : 0,622, p : 0,299; OAB-V8¹, OAB-V8² and OAB-V8³ - p : 0,101, p : 0,143 and p : 0,299; ICIQ-OAB¹, ICIQ-OAB² and ICIQ-OAB³ - p : 0,374, p : 0,506 and p : 0,203; ISI¹, ISI² and ISI³ - p : 0,821, p : 0,705 and p : 0,335, respectively). All currents proved to be effective and behaved in a similar way both for decreasing the severity of UII and improving quality of life. This result was repeated for the four questionnaires used at the three different times, as we can see in detail on table 3.

Table 3. Three-moments-evaluation per groups.**Three-Moments-Evaluation per Groups**

	TTNS-LF					HVS					TTNS-HF					IMF					AMF					p
	mean	median	dp	min	max	mean	median	dp	min	max	mean	median	dp	min	max	mean	median	dp	min	max	mean	median	dp	min	max	
ICIQ-SF ¹	13,1	13,0	4,1	6,0	21,0	13,6	14,0	4,5	6,0	21,0	13,4	14,0	4,3	4,0	19,0	14,8	15,0	3,4	6,0	19,0	15,4	15,0	3,8	9,0	21,0	,409
OAB-V8 ¹	25,2	28,0	9,0	9,0	38,0	22,7	24,0	9,6	4,0	40,0	25,1	27,0	7,7	12,0	36,0	27,1	29,0	8,3	8,0	40,0	30,2	29,0	6,6	20,0	40,0	,101
ICIQ-OAB ¹	8,0	8,0	3,1	3,0	14,0	8,0	8,0	3,9	2,0	16,0	7,6	8,0	3,3	2,0	15,0	9,3	10,0	4,1	1,0	16,0	9,3 ^a	9,0	3,2	5,0	15,0	,374
ISI ¹	5,7	6,0	2,4	2,0	8,0	6,1	6,0	2,2	2,0	8,0	5,3	4,0	2,1	2,0	8,0	5,9	6,0	2,0	2,0	8,0	6,0	8,0	2,4	2,0	8,0	,821
ICIQ-SF ²	9,0 ^a	11,0	5,8	0,0	18,0	10,7 ^a	11,0	5,4	0,0	21,0	9,6 ^a	10,0	4,5	0,0	20,0	10,4 ^a	11,0	5,3	0,0	18,0	11,6 ^a	12,0	4,9	0,0	20,0	,622
OAB-V8 ²	20,0 ^a	18,0	10,1	4,0	36,0	15,9 ^a	13,0	10,7	2,0	37,0	15,1 ^a	12,0	10,5	0,0	36,0	18,9 ^a	15,0	11,6	2,0	38,0	22,3 ^a	23,0	8,6	5,0	36,0	,143
ICIQ-OAB ²	5,1 ^a	5,0	3,1	0,0	10,0	4,7 ^a	4,0	3,4	1,0	14,0	5,4 ^a	5,0	2,5	2,0	10,0	6,28 ^a	5,0	4,2	0,0	14,0	6,2	5,0	3,8	1,0	13,0	,506
ISI ²	3,2 ^a	2,0	2,5	0,0	8,0	4 ^a	4,0	2,4	0,0	8,0	4,0 ^a	3,0	2,4	1,0	8,0	4,0	3,0	2,7	0,0	8,0	3,6 ^a	2,0	2,7	0,0	8,0	,705
ICIQ-SF ³	7,9 ^a	7,0	4,7	0,0	18,0	8,7 ^a	8,0	5,7	0,0	19,0	9,9 ^a	11,0	5,2	0,0	18,0	11,1 ^a	12,0	6,7	0,0	24,0	10,4 ^a	10,0	5,6	0,0	21,0	,299
OABV8 ³	14,4 ^{a°}	11,0	11,4	0,0	37,0	13,6 ^a	14,0	11,1	0,0	32,0	17,7 ^a	18,0	10,3	0,0	33,0	18,1 ^a	19,0	11,7	0,0	38,0	17,6 ^{a°}	16,0	11,6	0,0	38,0	,516
ICIQ-OAB ³	4,1 ^a	4,0	2,8	0,0	9,0	3,6 ^a	4,0	2,8	0,0	13,0	5,3 ^a	4,0	2,7	2,0	9,0	6,2 ^a	5,0	4,3	1,0	12,0	5,2 ^a	4,0	3,8	0,0	16,0	,203
ISI ³	3,3	3,0	2,2	0,0	8,0	3,3 ^a	3,0	2,3	0,0	8,0	4,4	4,0	2,2	0,0	8,0	4 ^a	3,0	2,7	0,0	8,0	3,2 ^a	3,0	3,2	0,0	8,0	,335

Table 3. ICIQ-SF: International Consultation on Incontinence Questionnaire - short form, OAB-V8: Overactive Bladder Questionnaire, ICIQ-OAB: International Consultation on Incontinence Questionnaire Overactive Bladder, ISI: Incontinence Severity Index. The ^a and ^o symbols refer to the statistical difference between the moments of the intragroup questionnaires. ^a: difference between the first moment; ^o: difference between the second moment.

These results can also be evidenced through the visualization of the graphs (Figure 1), where we can observe the decrease in the average score for the four questionnaires, however without significant difference between the results of the different groups. In addition, the results pointed to a greater decrease in symptoms during the first 10 sessions. After the tenth, the results continue to improve, but less effectively.

Figure 1. Graphs of three-moments-evaluation per groups.



Figure 1. Graphical analysis of the results of the questionnaires by group in the three moments.

DISCUSSION

The hypothesis of this study was that medium frequency currents that medium frequency currents would be effective or may be more beneficial for the treatment of UUI when compared to low frequency currents. A significant difference was found between groups, but not within groups. Thereby, medium frequency currents are effective, but do not guarantee a better result than low frequency currents.

In general, we observe that all the groups tested obtained good results for the treatment of UUI, reducing severity and increasing quality of life. Intragroup results are encouraging. The TTNS-LF group obtained similar results to those already found in the literature. The

decrease in the results of ICIQ-SF and ICIQ-OAB questionnaires were also described by Souto et. al., (2014), which also noted that TTNS-LF prolongs symptom reduction, and by Jacomo et. al., (2020), that also showed the reduction of urgency and urge urinary incontinence (18,35). Reviews such as that by Bhide et. al. (2019) also point to the effectiveness of treatment for UUI with TTNS-LF when comparing to the use of percutaneous tibial nerve stimulation and implantable devices (4). These results are in line with other findings where OAB-V8 was also applied and over again demonstrate the reduction in results (36,37). The findings of this randomized controlled trial are related to the previous findings with the difference that new currents ensured the improvement of the condition.

Electrostimulation of the tibial nerve today is the most common form of application and also most recommended by the literature (5,38). The best results may be associated with the fact that, if properly applied, we can observe a rhythmic motor response of the fingers (18). Thus, we can be sure of the correct place of application aiming at the depolarization of this nerve. If the correct application can guarantee the best treatment or not, perhaps the primordial for the success of the application is the depolarization of the tibial nerve and not how it depolarizes it. That is, if the current is able to depolarize the nerve, it may be effective in reducing UUI symptoms.

As we demonstrated in this study, the groups behaved in a very similar way and the greatest rate of improvement between the groups occurred until the tenth session. There was no significant difference between the groups when comparing the three-moments-questionnaires, notwithstanding both have been effective. The similarity between the results already found for these currents also shows similarity between them.

AMF, IMF and TTNS-HF seem similar to reduce the painful threshold and guarantee segmental hypoalgesia, with no significant difference between it (10). In addition, TTNS-LF and AMF are also similar for pain reduction and muscle relaxation. The greater difference

between them is apparently related to comfort, with AMF being more comfortable (7). The TTNS-LF and IMF currents also have similar effects in the control of ischemia-induced pain (39) and did not present a significant difference in increasing the pressure pain threshold (40). To date, no studies have been found comparing the effect of different types of currents for the UUI treatment.

The IMF produces two currents that interfere with each other, in order to reach deeper tissues (9). AMF, on the other hand, divides the frequency pulses so that the skin is able to absorb the high frequency offered (41). Within our hypothesis, we believed that these characteristics could be effective and beyond that make the electrical stimulation of the tibial nerve more effective. Even if the medium frequency currents reach deeper tissues and are more comfortable (6), these characteristics did not benefit the results of these currents. They also did not benefit from comfort, as pointed out in the results. Even so, the use of medium frequency is still an important tool in the variety for clinical use and better patient's adaptation.

High voltage electrical stimulation is also shown to be similar to other currents when compared to neuro-muscular applications because increases blood flow which can be an important alternative for decreasing muscle pain, such as chronic pain, although the IMF current obtains more significant results (13). However, this is the current that differs most in clinical practice (12) and its greatest clinical application is still for the treatment of wounds. For this, the positive polarity is used closest to the wound and the negative polarity, most distant (14). In this study, negative polarity was used for local stimulation of the tibial nerve and the third electrode was placed above the popliteal fossa, so that the current is not lost and follows the path of the tibial nerve. In our view, the third electrode could be an advantage of this current, since it could guarantee greater stimulation of the tibial nerve's neural path. However, the results showed no difference between currents.

The tibial nerve has nerve roots in L5-S3, where originate fibers from the parasympathetic nervous system that innervate the bladder (4,32). The effects of electrostimulation on the tibial nerve are due to the establishment of inhibitory mechanisms through the somatic depolarization of the afferent sacral and lumbar fibers (42). As already shown in the literature, the application of TTNS-LF is capable of depolarizing the tibial nerve (38). There is still no consensus on which tool and how to use it, however in this study we were able to demonstrate that other currents were also able to depolarize the tibial nerve (19,43). This means that if the current is able to depolarize this nerve, it can be beneficial for the treatment of UUI.

It is worth mentioning that the improvement was greater between the first and tenth sessions than between the tenth and twentieth sessions. There is an habituation effect of the body to the current (6), which probably explains this decrease in improvement. As most studies conducted 8 to 12 sessions, it is important to analyze a larger number of sessions to better understand treatment physiology. These results should draw attention to complementary therapies for UUI treatment.

This randomized controlled trial was designed as standards of the consort groups (44) to maintain the highest level of methodological quality. Participants were randomized by a blind evaluator and they did not received any information about the difference between the groups. Evaluators had no contact with the intervention, only carrying out the evaluations, and the data was carried by a blind assessor.

The evaluation method was a limitation of the study, although specific questionnaires were used for UI and UUI and Digital Palpation was also performed as a control factor. The questionnaires that were used evaluate through self-perception and the presence of the mixed UI may have confused the results of the treatment. As a solution, we point to the inclusion of women with the presence of UUI only or to conduct tests such as the Urodynamic Study. We

also draw attention to the need for further studies in this regard to better understand the mechanisms of electrotherapy as a treatment for UUI.

CONCLUSION

All currents tested in this randomized controlled trial were able to depolarize the tibial nerve, with a consequent reduction in the severity of symptoms and an increase in quality of life. Low frequency currents obtained similar results to those of medium frequency for reducing the severity of UUI and increasing quality of life., All currents being effective for the treatment of UUI. However, there was no significant difference between them.

REFERENCES

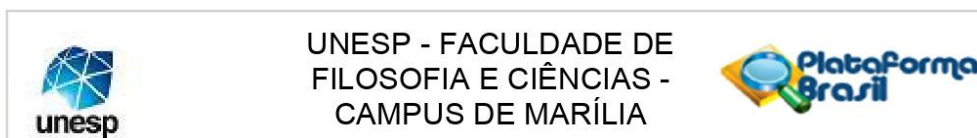
1. Ahmed S, Haddad C, Subramaniam S, Khattab S, Kumbhare D. The Effect of Electric Stimulation Techniques on Pain and Tenderness at the Myofascial Trigger Point: A Systematic Review. *Pain Med (United States)*. 2019;20(9):1774–88.
2. Booth J, Connelly L, Dickson S, Duncan F, Lawrence M. The effectiveness of transcutaneous tibial nerve stimulation (TTNS) for adults with overactive bladder syndrome: A systematic review. *Neurourol Urodyn*. 2018 Feb;37(2):528–41.
3. Takla MKN. Low-frequency high-intensity versus medium-frequency low-intensity combined therapy in the management of active myofascial trigger points: A randomized controlled trial. *Physiother Res Int*. 2018;23(4):1–9.
4. Bhide AA, Tailor V, Fernando R, Khullar V, Digesu GA. Posterior tibial nerve stimulation for overactive bladder—techniques and efficacy. *Int Urogynecol J*. 2020;31(5):865–70.
5. Ramírez-García I, Blanco-Ratto L, Kauffmann S, Carralero-Martínez A, Sánchez E. Efficacy of transcutaneous stimulation of the posterior tibial nerve compared to percutaneous stimulation in idiopathic overactive bladder syndrome: Randomized control trial. *Neurourol Urodyn*. 2019;38(1):261–8.
6. Barbosa AMP, Parizotto NA, Pedroni CR, Avila MA, Liebano RE, Driusso P. How to report electrotherapy parameters and procedures for pelvic floor dysfunction. *Int Urogynecol J*. 2018;29(12):1747–55.
7. Ward AR, Lucas-Toumbourou S, McCarthy B. A comparison of the analgesic efficacy of medium-frequency alternating current and TENS. *Physiotherapy*. 2009 Dec;95(4):280–8.
8. Ward AR, Oliver WG. Comparison of the hypoalgesic efficacy of low-frequency and burst-modulated kilohertz frequency currents. *Phys Ther*. 2007;87(8):1056–63.
9. Almeida CC de, Silva VZM da, Júnior GC, Liebano RE, Durigan JLQ. Transcutaneous electrical nerve stimulation and interferential current demonstrate similar effects in relieving acute and chronic pain: a systematic review with meta-analysis. *Brazilian J Phys Ther* [Internet]. 2018;22(5):347–54. Available from: <https://doi.org/10.1016/j.bjpt.2017.12.005>
10. Rampazo da Silva ÉP, Silva VR da, Bernardes AS, Matuzawa F, Liebano RE. Segmental and extrasegmental hypoalgesic effects of low-frequency pulsed current and modulated kilohertz-frequency currents in healthy subjects: randomized clinical trial. *Physiother Theory Pract* [Internet]. 2019;0(00):1–10. Available from: <https://doi.org/10.1080/09593985.2019.1650857>
11. Davini R, Guirro E, Paulista B, Guirro R. Estimulação Elétrica de Alta Voltagem: Uma Opção de Tratamento. *Brazilian J Phys Ther*. 2005;9(3):249–56.
12. Gomes NCMC, Berni-Schwarzenbeck KCS, Packer AC, Rodrigues-Bigaton D. Efeito da estimulação elétrica de alta voltagem catódica sobre a dor em mulheres com DTM. *Brazilian J Phys Ther*. 2012;16(1):10–5.
13. Rajfur J, Walewicz K, Dymarek R. Efficacy of Selected Electrical Therapies on Chronic Low Back Pain : A Comparative Clinical Pilot Study. 2017;85–100.
14. Franek A, Taradaj J, Polak A. High-Voltage Pulsed Current Electrical Stimulation in Wound Treatment. 2014;3(2):104–17.
15. Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An international urogynecological association (IUGA)/international continence society (ICS) joint report on the terminology for female pelvic floor dysfunction. *Neurourol Urodyn*. 2010 Jan;29(1):4–20.
16. Prudencio C, Nava GT, Cardoso M, Marreto R, Sousa É, Valenti VE, et al. Evolution

- of female urinary continence after physical therapy and associated factors. *Int Arch Med*. 2014;7(1):24.
17. Stewart F, Gameiro LF, El Dib R, Gameiro MO, Kapoor A, Amaro JL. Electrical stimulation with non-implanted electrodes for overactive bladder in adults. *Cochrane Database Syst Rev*. 2016 Dec;
 18. Jacomo RH, Alves AT, Lucio A, Garcia PA, Lorena DCR, de Sousa JB. Transcutaneous tibial nerve stimulation versus parasacral stimulation in the treatment of overactive bladder in elderly people: A triple-blinded randomized controlled trial. *Clinics*. 2020;75(7):1–5.
 19. Lukacz ES, Santiago-Lastra Y, Albo ME, Brubaker L. Urinary Incontinence in Women. *JAMA*. 2017 Oct;318(16):1592.
 20. Bykoviene L, Kubilius R, Aniulienė R, Bartuseviciene E, Bartusevicius A. Pelvic Floor Muscle Training With Or Without Tibial Nerve Stimulation and Lifestyle Changes Have Comparable Effects on The Overactive Bladder. A Randomized Clinical Trial. *Urol J*. 2018;15(4):186–92.
 21. Abrams P, Andersson KE, Birder L, Brubaker L, Cardozo L, Chapple C, et al. Fourth international consultation on incontinence recommendations of the international scientific committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. *Neurourol Urodyn*. 2010 Jan;29(1):213–40.
 22. Slovak M, Chapple CR, Barker AT. Non-invasive transcutaneous electrical stimulation in the treatment of overactive bladder. *Asian J Urol* [Internet]. 2015;2(2):92–101. Available from: <http://dx.doi.org/10.1016/j.ajur.2015.04.013>
 23. Laycock J, Jerwood D. Pelvic Floor Muscle Assessment: The PERFECT Scheme. *Physiotherapy*. 2001 Dec;87(12):631–42.
 24. Tamanini JTN, Dambros M, D’Ancona CAL, Palma PCR, Rodrigues Netto Jr N. Validação para o português do “International Consultation on Incontinence Questionnaire - Short Form” (ICIQ-SF). *Rev Saude Publica*. 2004 Jun;38(3):438–44.
 25. Acquadro C, Kopp Z, Coyne KS, Corcos J, Tubaro A, Choo M-S. Translating overactive bladder questionnaires in 14 languages. *Urology*. 2006 Mar;67(3):536–40.
 26. Pereira SB, Thiel R do RC, Riccetto C, Silva JM da, Pereira LC, Herrmann V, et al. Validação do International Consultation on Incontinence Questionnaire Overactive Bladder (ICIQ-OAB) para a língua portuguesa. *Rev Bras Ginecol e Obs*. 2010 Jun;32(6):273–8.
 27. Pereira VS, Santos JYC e, Correia GN, Driusso P. Tradução e validação para a língua portuguesa de um questionário para avaliação da gravidade da incontinência urinária. *Rev Bras Ginecol e Obs*. 2011 Apr;33(4):182–7.
 28. Fonda D, Resnick NM, Colling J, Burgio K, Ouslander JG, Norton C, et al. Outcome measures for research of lower urinary tract dysfunction in frail older people. *Neurourol Urodyn*. 1998;17(3):273–81.
 29. Laycock J, Haslam J, editors. *Therapeutic Management of Incontinence and Pelvic Pain: Pelvic Organ Disorders*. 2nd ed. Springer; 2007. 301 p.
 30. Cassadó Garriga J, Pessarrodona Isern A, Espuña Pons M, Durán Retamal M, Felgueroso Fabregas A, Rodriguez-Carballeira M. Tridimensional sonographic anatomical changes on pelvic floor muscle according to the type of delivery. *Int Urogynecol J*. 2011 Aug;22(8):1011–8.
 31. Franceschet J, Sacomori C, Cardoso FL. Força dos músculos do assoalho pélvico e função sexual em gestantes. *Brazilian J Phys Ther*. 2009;13(5):383–9.
 32. Garcia MBS, Pereira JS. Electrostimulation of the posterior tibial nerve in individuals with overactive bladder: a literature review. *J Phys Ther Sci*. 2018;30(10):1333–40.
 33. Marques ADA, Herrmann V, Ferreira NDO, Guimaraes RV. Eletroterapia como

- primeira linha no tratamento da bexiga hiperativa (BH). Arq Medicos [Internet]. 2009;54(2):66–72. Available from: http://www.fcmsantacasasp.edu.br/images/Arquivos_medicos/2009/54_2/vlm54n2_6.pdf
34. Ward AR, Chuen WLH. Lowering of Sensory, Motor, and Pain-Tolerance Thresholds With Burst Duration Using Kilohertz-Frequency Alternating Current Electric Stimulation: Part II. Arch Phys Med Rehabil [Internet]. 2009;90(9):1619–27. Available from: <http://dx.doi.org/10.1016/j.apmr.2009.02.022>
 35. Souto SC, Reis LO, Palma T, Palma P, Denardi F. Prospective and randomized comparison of electrical stimulation of the posterior tibial nerve versus oxybutynin versus their combination for treatment of women with overactive bladder syndrome. World J Urol. 2014;32(1):179–84.
 36. Perissinotto MC, D'ancona CAL, Lucio A, Campos RM, Abreu A. Transcutaneous tibial nerve stimulation in the treatment of lower urinary tract symptoms and its impact on health-related quality of life in patients with parkinson disease: A randomized controlled trial. J Wound, Ostomy Cont Nurs. 2015;42(1):94–9.
 37. Lúcio A, D'Ancona CAL, Perissinotto MC, McLean L, Damasceno BP, De Moraes Lopes MHB. Pelvic floor muscle training with and without electrical stimulation in the treatment of lower urinary tract symptoms in women with multiple sclerosis. J Wound, Ostomy Cont Nurs. 2016;43(4):414–9.
 38. Lightner DJ, Gomelsky A, Souter L, Vasavada SP. Diagnosis and Treatment of Overactive Bladder (Non-Neurogenic) in Adults: AUA/SUFU Guideline Amendment 2019. J Urol [Internet]. 2019 Sep;202(3):558–63. Available from: <http://www.jurology.com/doi/10.1097/JU.0000000000000309>
 39. Volunteers P, Johnson MI, Tabasam G. An Investigation Into the Analgesic Effects of Interferential Currents and Stimulation on Experimentally Induced Ischemic Pain in Otherwise. 2003;83(3).
 40. Alves-Guerreiro J, Noble JG, Lowe AS, Walsh DM. The effect of three electrotherapeutic modalities upon peripheral nerve conduction and mechanical pain threshold. Clin Physiol. 2001;21(6):704–11.
 41. Venancio RC, Pelegrini S, Gomes DQ, Nakano EY, Liebano RE. Effects of Carrier Frequency of Interferential Current on Pressure Pain Threshold and Sensory Comfort in Humans. Arch Phys Med Rehabil. 2013 Jan;94(1):95–102.
 42. Wolff GF, Krlin RM. Posterior Tibial Nerve Stimulation. In: Adult and Pediatric Neuromodulation. Cham: Springer International Publishing; 2018. p. 131–41.
 43. BRUBAKER L. ELECTRICAL STIMULATION IN OVERACTIVE BLADDER. BJU Int. 2000 May;85(S3):17–23.
 44. Shamseer L, Hopewell S, Altman DG, Moher D, Schulz KF. Update on the endorsement of CONSORT by high impact factor journals: a survey of journal “Instructions to Authors ” in 2014. Trials [Internet]. 2016;1–8. Available from: <http://dx.doi.org/10.1186/s13063-016-1408-z>

6. ANEXOS

6.1 Parecer Consubstanciado do Comitê de Ética em Pesquisa



PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: Efeito de diferentes correntes de eletroestimulação no nervo tibial em mulheres com incontinência urinária: Ensaio Clínico Randomizado

Pesquisador: CRISTIANE RODRIGUES PEDRONI

Área Temática:

Versão: 1

CAAE: 11479119.9.0000.5406

Instituição Proponente: Faculdade de Filosofia e Ciências/ UNESP - Campus de Marília

Patrocinador Principal: Financiamento Próprio
FUNDACAO DE AMPARO A PESQUISA DO ESTADO DE SAO PAULO

DADOS DO PARECER

Número do Parecer: 3.272.572

Apresentação do Projeto:

INTRODUÇÃO: A Incontinência Urinária é definida como queixa de qualquer perda involuntária de urina. Pode ser classificada em três principais tipos, a de esforço, a de urgência e a mista. A Incontinência urinária de urgência caracteriza-se por perda involuntária de urina associada à urgência miccional, policiúria e noctúria. Alguns tipos de eletroestimulação de baixa frequência têm sido utilizadas na prática clínica relacionada ao tratamento da incontinência urinária de urgência, porém ainda não se sabe se as correntes de média frequência podem ter efeitos semelhantes aos das correntes de baixa frequência. **OBJETIVO:** O objetivo do estudo será verificar os efeitos da aplicação das correntes de média frequência em mulheres que apresentam incontinência urinária de urgência e comparar os efeitos com os das correntes de baixa frequência. **MÉTODO:** Participarão desta pesquisa 105 voluntárias com idades entre 18 e 80 anos, que apresentarem queixas de hiperatividade vesical (frequência urinária aumentada, nocturia ou urge/incontinência. Serão aplicados os questionários ICIQ-SF, ICIQ-OAB, OAB-V8 e ISI, e também o diário miccional para avaliar os sintomas da hiperatividade vesical. Serão compostos 5 grupos, que serão nomeados de acordo com o tipo de corrente que será aplicada: G-TENS Uroginecológico e G-TENS Convencional serão tratados com TENS, G-Ausie receberá corrente Ausie, G-Interferencial receberá a corrente interferencial e o G-Alta Voltagem. Todas as voluntárias realizarão tratamento com eletroestimulação entre duas a três vezes por semana, totalizando 20

Endereço: Av. Hygino Muzzi Filho, 737

Bairro: Campus Universitário

UF: SP

Município: MARILIA

Telefone: (14)3402-1346

CEP: 17.525-900

E-mail: cep.marilia@unesp.br



UNESP - FACULDADE DE
FILOSOFIA E CIÊNCIAS -
CAMPUS DE MARÍLIA



Continuação do Parecer: 3.272.572

sessões de 30 minutos cada. O processamento estatístico será realizado por meio do software SPSS, versão 18.0 (SPSS Inc, Chigaco, IL). Os dados serão apresentados em médias e intervalo de confiança a 95% para cada variável. O teste de Shapiro-Wilk será utilizado para analisar a normalidade dos dados. Para distribuição normal serão utilizados os testes paramétricos para comparação das médias, se não, serão utilizados seus respectivos testes não-paramétricos.

Objetivo da Pesquisa:

Objetivo Geral

O objetivo do estudo será verificar os efeitos da aplicação das correntes de média frequência em mulheres que apresentam incontinência urinária de urgência.

Objetivos Específicos

Verificar se a estimulação com corrente elétrica de média frequência produz efeitos benéficos no sentido de diminuir a frequência e o volume de perda urinária em mulheres com incontinência urinária de urgência, bem como melhorar a qualidade de vida dessas mulheres.

Comparar os efeitos das correntes de média frequência com os efeitos das correntes de baixa frequência utilizadas para o tratamento da incontinência urinária de urgência.

Avaliação dos Riscos e Benefícios:

Não se aplica. Não terá ônus para o participante e o mesmo receberá atendimento, se necessário, e orientações que lhe ajudarão em sua saúde.

Comentários e Considerações sobre a Pesquisa:

A pesquisa encontra-se dentro dos critérios éticos.

Considerações sobre os Termos de apresentação obrigatória:

Foram apresentados e analisados os termos solicitados pelo Comitê de ética em Pesquisa com seres humanos.

Conclusões ou Pendências e Lista de Inadequações:

Aprovado.

Considerações Finais a critério do CEP:

O CEP da FFC da UNESP de MARÍLIA, em reunião ordinária de 17/04/2019, após acatar o parecer do membro relator previamente aprovado para o presente estudo e atendendo a todos os dispositivos das resoluções 466/2012, 510/2016 e complementares, bem como ter aprovado o Termo de Consentimento Livre e Esclarecido como também todos os anexos incluídos na pesquisa,

Endereço: Av. Hygino Muzzi Filho, 737

Bairro: Campus Universitário

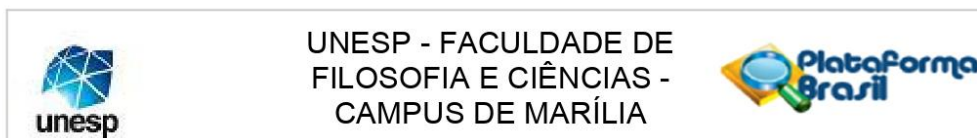
UF: SP

Município: MARÍLIA

Telefone: (14)3402-1346

CEP: 17.525-900

E-mail: cep.marilia@unesp.br



Continuação do Parecer: 3.272.572

resolve APROVAR o projeto de pesquisa Efeito de diferentes correntes de eletroestimulação no nervo tibial em mulheres com incontinência urinária: Ensaio Clínico Randomizado

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1313429.pdf	09/04/2019 11:51:49		Aceito
Cronograma	Cronograma_ECR_corrigido.docx	09/04/2019 11:51:30	CRISTIANE RODRIGUES PEDRONI	Aceito
Projeto Detalhado / Brochura Investigador	projeto_pesquisa_corrigido.doc	09/04/2019 11:50:07	CRISTIANE RODRIGUES PEDRONI	Aceito
Declaração de Instituição e Infraestrutura	declaracao.pdf	29/03/2019 16:08:22	RAISSA ESCANDIUSI AVRAMEIDIS	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	tcle.pdf	19/03/2019 21:03:15	RAISSA ESCANDIUSI AVRAMEIDIS	Aceito
Folha de Rosto	folha_rosto.pdf	19/03/2019 21:01:15	RAISSA ESCANDIUSI	Aceito

Situação do Parecer:

Aprovado

Necessita Apreciação da CONEP:

Não

MARILIA, 18 de Abril de 2019

Assinado por:
CLAUDIO ROBERTO BROCANELLI
(Coordenador(a))

Endereço: Av. Hygino Muzzi Filho, 737
Bairro: Campus Universitário
UF: SP **Município:** MARILIA
Telefone: (14)3402-1346

CEP: 17.525-900

E-mail: cep.marilia@unesp.br

6.2 International consultation on incontinence questionnaire - short form (ICIQ-SF)

Nome do Paciente: _____ Data de Hoje: ____/____/____																							
Muitas pessoas perdem urina alguma vez. Estamos tentando descobrir quantas pessoas perdem urina e o quanto isso as aborrece. Ficaríamos agradecidos se você pudesse nos responder às seguintes perguntas, pensando em como você tem passado, em média nas ÚLTIMAS QUATRO SEMANAS.																							
1. Data de Nascimento: ____/____/____ (Dia / Mês / Ano) 2. Sexo: Feminino ☐ Masculino ☐																							
3. Com que frequência você perde urina? (assinale uma resposta) <table style="width: 100%; margin-top: 10px;"> <tr> <td>Nunca</td> <td>☐</td> <td>0</td> </tr> <tr> <td>Uma vez por semana ou menos</td> <td>☐</td> <td>1</td> </tr> <tr> <td>Duas ou três vezes por semana</td> <td>☐</td> <td>2</td> </tr> <tr> <td>Uma vez ao dia</td> <td>☐</td> <td>3</td> </tr> <tr> <td>Diversas vezes ao dia</td> <td>☐</td> <td>4</td> </tr> <tr> <td>O tempo todo</td> <td>☐</td> <td>5</td> </tr> </table>		Nunca	☐	0	Uma vez por semana ou menos	☐	1	Duas ou três vezes por semana	☐	2	Uma vez ao dia	☐	3	Diversas vezes ao dia	☐	4	O tempo todo	☐	5				
Nunca	☐	0																					
Uma vez por semana ou menos	☐	1																					
Duas ou três vezes por semana	☐	2																					
Uma vez ao dia	☐	3																					
Diversas vezes ao dia	☐	4																					
O tempo todo	☐	5																					
4. Gostaríamos de saber a quantidade de urina que você pensa que perde (assinale uma resposta) <table style="width: 100%; margin-top: 10px;"> <tr> <td>Nenhuma</td> <td>☐</td> <td>0</td> </tr> <tr> <td>Uma pequena quantidade</td> <td>☐</td> <td>2</td> </tr> <tr> <td>Uma moderada quantidade</td> <td>☐</td> <td>4</td> </tr> <tr> <td>Uma grande quantidade</td> <td>☐</td> <td>6</td> </tr> </table>		Nenhuma	☐	0	Uma pequena quantidade	☐	2	Uma moderada quantidade	☐	4	Uma grande quantidade	☐	6										
Nenhuma	☐	0																					
Uma pequena quantidade	☐	2																					
Uma moderada quantidade	☐	4																					
Uma grande quantidade	☐	6																					
5. Em geral quanto que perder urina interfere em sua vida diária? Por favor, circule um número entre 0 (não interfere) e 10 (interfere muito) <table style="width: 100%; margin-top: 10px; text-align: center;"> <tr> <td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td> </tr> <tr> <td colspan="5">Não interfere</td> <td colspan="6">Interfere muito</td> </tr> </table>		0	1	2	3	4	5	6	7	8	9	10	Não interfere					Interfere muito					
0	1	2	3	4	5	6	7	8	9	10													
Não interfere					Interfere muito																		
ICIQ Score: soma dos resultados 3 + 4 + 5 = _____																							
6. Quando você perde urina? (Por favor assinale todas as alternativas que se aplicam a você) <table style="width: 100%; margin-top: 10px;"> <tr> <td>Nunca</td> <td>☐</td> </tr> <tr> <td>Perco antes de chegar ao banheiro</td> <td>☐</td> </tr> <tr> <td>Perco quando tusso ou espiro</td> <td>☐</td> </tr> <tr> <td>Perco quando estou dormindo</td> <td>☐</td> </tr> <tr> <td>Perco quando estou fazendo atividades físicas</td> <td>☐</td> </tr> <tr> <td>Perco quando terminei de urinar e estou me vestindo</td> <td>☐</td> </tr> <tr> <td>Perco sem razão óbvia</td> <td>☐</td> </tr> <tr> <td>Perco o tempo todo</td> <td>☐</td> </tr> </table>		Nunca	☐	Perco antes de chegar ao banheiro	☐	Perco quando tusso ou espiro	☐	Perco quando estou dormindo	☐	Perco quando estou fazendo atividades físicas	☐	Perco quando terminei de urinar e estou me vestindo	☐	Perco sem razão óbvia	☐	Perco o tempo todo	☐						
Nunca	☐																						
Perco antes de chegar ao banheiro	☐																						
Perco quando tusso ou espiro	☐																						
Perco quando estou dormindo	☐																						
Perco quando estou fazendo atividades físicas	☐																						
Perco quando terminei de urinar e estou me vestindo	☐																						
Perco sem razão óbvia	☐																						
Perco o tempo todo	☐																						
“Obrigado por você ter respondido às questões”																							

Figura - Versão em português do ICIQ-SF.

6.3 Overactive bladder questionnaire (OAB-V8)

OAB Awareness Tool (OAB-V8)

INSTRUMENTO DE AVALIAÇÃO DA BEXIGA HIPERATIVA

As perguntas abaixo são sobre o quanto você tem sido incomodado/a por alguns sintomas de bexiga. Algumas pessoas são incomodadas por sintomas de bexiga e podem não se dar conta de que existem tratamentos para seus sintomas. *Por favor, faça um "X" no número da resposta que melhor descreve o quanto você tem sido incomodado/a por cada sintoma. Some o valor de todas suas respostas para obter o seu resultado e anote-o no quadrado abaixo.*

O quanto você tem sido incomodado por...	Nada 0	Quase nada 1	Um pouco 2	O Suficiente 3	Muito 4	Muitíssimo 5
1. Urinar frequentemente durante o dia?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
2. Uma vontade urgente e desconfortável de urinar?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
3. Uma vontade repentina ou urgente de urinar com pouco ou nenhum aviso prévio?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
4. Perdas acidentais de pequenas quantidades de urina?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
5. Ter que levantar durante a noite para urinar?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
6. Acordar durante a noite por que teve que urinar?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
7. Uma vontade incontrolável e urgente de urinar?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
8. Perda de urina associada a uma forte vontade de urinar?	Nada	Quase nada	Um pouco	O Suficiente	Muito	Muitíssimo
Você é do sexo masculino?	Se você for do sexo masculino, some 2 pontos ao seu resultado					

Por favor, some o valor de suas respostas às perguntas acima.

Por favor, entregue esta folha ao seu médico na hora da consulta.

Se o resultado for 8 ou mais de 8, você pode ter bexiga hiperativa. Existem tratamentos eficazes para esta condição. Talvez você queira conversar com um/a médico/a sobre seus sintomas.

6.5 Incontinence Severity Index

ISI

1- Com que frequência você experimenta perda urinária? 0 Nunca 1 Menos de 1 vez ao mês 2 Uma ou várias vezes por mês 3 Uma ou várias vezes por semana 4 Todo dia/noite
2- Quanto de urina perde em cada vez? 0 Nada 1 Gotas / pouco 2 Mais Escore: escore 1 x escore 2 = escore final:____ 0- seco 1-2 - leve 3-4 - moderado 6-8 - severo