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Urinary Incontinence Treatment and Prevention among Women

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Thesis abstract

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Urinary incontinence (UI) defined as involuntary loss of urine affects the quality of life among women. The types of UI found among women are stress urinary incontinence, mixed urinary incontinence, overflow urinary incontinence, urge urinary incontinence. The main risk factors of UI are pregnancy, child delivery, overweight, ageing. Maintaining adequate weight and engaging in physical activity with balanced diet is used as preventive measure for UI. The pelvic floor muscle training is used among pregnant women from first trimester to prevent UI. The risk group must be educated about UI, preventing and treating UI requires self-care, self-monitoring, support and goal setting.

The conservative treatment for UI is behavioral therapy which includes bladder training, pelvic floor muscle training, weight loss, using mechanical devices. Anticholinergic drugs in combination with behavioral therapy may bring positive result. The second line treatment includes colposuspension (retropubic and laparoscopic), mid-urethral slings (Tension free vaginal tape and Transobturator tape), single slings. Retropubic colposuspension is more expensive than TOT, beneficial in long run. Studies states that TOT and TOT has same efficacy. Single sling procedure is minimally invasive but requires further studies.

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| Keywords: Urinary incontinence, treatment, prevention, women |
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TABLE OF CONTENTS

| | |
|--|----|
| Thesis abstract | 2 |
| TABLE OF CONTENTS | 3 |
| Abbreviations | 4 |
| 1 INTRODUCTION..... | 5 |
| 2 HISTORY OF URINARY INCONTINENCE AND TREATMENT | 6 |
| 3 TYPES OF URINARY INCONTINENCE | 8 |
| 3.1 Stress urinary incontinence | 8 |
| 3.2 Urge urinary incontinence | 8 |
| 3.3 Overflow urinary incontinence | 8 |
| 3.4 Mixed urinary incontinence..... | 9 |
| 4 RISK FACTORS OF URINARY INCONTINENCE | 10 |
| 5 IMPLEMENTATION OF THE THESIS AND POSSIBLE OUTPUT | 12 |
| 5.1 Goal and purpose of the thesis | 12 |
| 5.2 Literature review as a research method | 12 |
| 5.3 Search for information..... | 13 |
| 6 RESULT OF THE STUDY | 14 |
| 7 CONCLUSION | 20 |
| 7.1 The study's ethicality and reliability | 20 |
| 7.2 The process of thesis writing..... | 20 |
| 7.3 Author's conclusion and implications for future research | 21 |
| 8 BIBLIOGRAPHY | 23 |
| BIBLIOGRAPHY OF LITERATURE REVIEW..... | 25 |
| Attachments..... | 27 |

Abbreviations

UI- Urinary incontinence

SUI-Stress urinary incontinence

UUI-Urge urinary incontinence

TVT-Tension free vaginal tape

TOT- Transboturator tape

MUS-Midurethral sling

PFMT- Pelvic floor muscle training

BMI- Body mass index

1 INTRODUCTION

Urinary incontinence (UI) is a worldwide known medical condition, which affects men and women during different stages of life. It is known that women are more vulnerable to urinary incontinence than men. Urinary incontinence affects the quality of life of women, and not everyone receives medical attention. Urinary incontinence is defined according to International Continence Society (2019) as the 'complaint of involuntary loss of urine'. Also, 'Urinary incontinence is unintentional loss of urine that is sufficient enough in frequency and amount to cause physical and/or emotional distress in the person experiencing it' according to The free dictionary by Farlex. 2012.

According to Virtsankarkailu naiset (2017) 1 out of 4 Nordic woman population experienced some form of urinary incontinence, 7% of them is quite significant and urinary incontinence can also be transient. The probability of an annual spontaneous improvement varies between 6 and 38%. A Norwegian population-based study indicates that women experienced some form of urinary leakage and 7% of urinary incontinence was significant' according to Virtsankarkailu naiset (2017). Terveystalo (2010) argues that about 1/5 Finnish women are affected by different incontinence in their lifetime.

Urinary incontinence is not just a medical condition. It has significant impact on the mental, physical and social life of a woman. Urinary incontinence can limit a woman from many activities on a daily basis. Dealing with symptoms on a daily basis is frustrating for any human being trying to maintain a normal life. Yet, the good news is that this disease can be managed with proper care according to the individual needs of the patient. The holistic approach of care is vital for treating urinary incontinence. This thesis will discuss about the types of urinary incontinence and its risks in the theoretical background. By keeping theoretical background as the foundation, the aim is to answer the following question:

1. What are the treatment methods and role of prevention for urinary incontinence among women?

2 HISTORY OF URINARY INCONTINENCE AND TREATMENT

Ancient reports on urinary incontinence are rather rare and mainly address the cases of extra urethral (e.g.: fistula acquired during the childbirth) or overflow incontinence, for example in males with urinary retention or after spinal cord injury according to Dirk Schulethiss according in *The Brief History of Urinary Incontinence and Its Treatment*. The writings related to urinary incontinence are poorly mentioned in Egyptian (from 2nd millennium BC) and Greek ancient medicine manuscripts. The practice of medical and surgical measures in the management of urological ailments prevailed in ancient India from the Vedic era around 3000 BC according to Das (2007).

Conservative treatment (from 18th –19th century) was carried out in ancient times, such as empiric therapy, hydrotherapy, reflectory therapy, sacral epidural injections, lumbar puncture and drainage of cerebrospinal fluid. External devices were also used for the treatment, such as Indian rubber to prevent micturition for standing position. In 1896, according to *The Brief History of Urinary Incontinence and Its Treatment* by Dirk Schulethiss, Brown designed a sophisticated self-retaining instrument made from ivory that fitted anatomically to the female urethral orifice avoiding urinary leakage, and a removable stopper at the end of hollow device-controlled emptying of the bladder without removing the whole device. Heister introduced perineal compression but later renewed by S.A Vincent in 1960's. Modern medicine replaced the usage of external devices partially by the method of surgery.

Electrotherapy was introduced in the 19th century to treat bladder dysfunction for adults and children. Later, the treatment line just concentrated on vesicovaginal fistula surgery to treat UI, and later it involved also transvaginal fistula surgery among women. In 1825, James Marion Sims, founder of urinary fistula surgery, carried out 42 failed surgical procedures in three African slaves in a duration of 4 years. The procedure was successful when the silver wires were used to close the defect. Later, Gustav Simon introduced a modified procedure by using double row of sutures, one for the bladder and another one for the vagina. This method is called as 'German technology'. In 1890, Fredrick Trendelenburg published the first transvesical fistula

correction. Friedrich also introduced the surgery position 'Trendelenburg', which is still relevant during these days.

Injection therapy was also introduced at the end of the 19th century with provided short term healing for urinary incontinence. In 1938, cod liver oil containing sodium morrhuate was used for therapy purposes, and later paraffin sclerosing agents. Polytetrafluoroethylene and collagen were used for treatment purposes. Treatment history of UI also provides information about sphincters used such as penile clamp. The pioneer artificial sphincter introduced into UI treatment was placed via surgical method. Later, perineal acrylic implants, internal penile clamp, Scott-sphincter were used in the treatment of UI.

3 TYPES OF URINARY INCONTINENCE

3.1 Stress urinary incontinence

Stress urinary incontinence (SUI) is defined as the leakage of urine due to weakened or damaged pelvic floor muscle or urinary sphincter (Overview urinary incontinence 2019). The physical activity can put bladder under strain, the stretching of pelvic muscle occurs and the urine leaks. The leakage may occur during physical activity, walking, bending, lifting, or even sneezing and coughing, and it can be a few drops of urine to a tablespoon or more (What is urinary incontinence 2019). The levels of SUI can be mild, moderate or severe, and most common UI diagnosed among women. The prevalence of SUI is 24 to 45 % in women older than 30 years according to Khandelwal and Kistler (2013).

3.2 Urge urinary incontinence

Urge urinary incontinence occurs when detrusor muscles, on duty of controlling the bladder, happen to be hyper in activity. Urge urinary incontinence is when urine leaks as you feel a sudden, intense urge to pass urine, or soon afterward (Urinary Incontinence 2019). The origin of urge urinary incontinence could be neurogenic, non-neurogenic or idiopathic. Symptoms appear at day and night frequently (Virtsankarkailu naiset 2017). The prevalence of 9 percent in women 40 to 44 years of age, 31 percent in women older than 75 years, according to Khandelwal and Kistler (2013).

3.3 Overflow urinary incontinence

Overflow urinary incontinence (UUI) or chronic urinary retention is often caused by a blockage or obstruction affecting the bladder (causes urinary incontinence 2019). This interference will leave the bladder partially emptied, and as a concurring event, the pressure inside the bladder frames up and propels urinary leakage. This type of

urinary incontinences is rare in women and common among men who have prostate problems or have had prostate surgery (What is urinary incontinence 2019). The prevalence of chronic OUI is 5 % according to the studies of Khandelwal and Kistler (2013).

3.4 Mixed urinary incontinence

Mixed urinary incontinence (MUI) is defined as complaints of both stress and urgency urinary incontinence, i.e. involuntary loss of urine associated with urgency and with effort or physical exertion including sporting activities, or on sneezing or coughing (Mixed urinary incontinence 2020). This definition may cause difficulties in diagnosis and determine proper treatment. MUI is the leading cause of incontinence in the community and hospital setting, according to the studies of Chughtai et al. (2015). According to Khandelwal and Kistler (2013), the prevalence of MUI is 20 to 30%.

4 RISK FACTORS OF URINARY INCONTINENCE

According to Saadia (2015), UI adversely affects the quality of life and loss of self-esteem. Therefore, it is necessary to find out the risk factors for its development so preventive measures can be taken on time. The occurrence possibility of urinary incontinence is more likely for women than men. According to Saadia (2015), risk factors can be short term or temporary UI, or they can cause long term or permanent UI. Childbearing and delivery can induce stress urinary incontinence and mixed urinary incontinence in fertile women (Virtsankarkailu naiset 2017).

According to Aukee and Tihtonen (2010), about 50% of women suffer from urinary incontinence after giving birth. These women are under the 5 times risk of recurrence of UI in one year, because of increased intra-abdominal pressure, muscle trauma, connective tissue damage caused by pregnancy and vaginal delivery effect. Pelvic floor dysfunction is more common in vaginal delivery than cesarean section, but after a long term follow up, the differences are less clear (Aukee and Tihtonen, 2010).

Overweight or obesity have a huge risk to develop urinary incontinence. The risk of severe urinary incontinence in obesity (BMI > 30) is more than three times higher than for people of normal weight (Virtsankarkailu naiset 2017). Education level in women is highly related to hygiene and urinary tract infections (Saadia, 2015). Women with diabetes have an increased risk of stress and mixed urinary incontinence, and urinary incontinence is often more severe than non-diabetic patients (Virtsankarkailu naiset 2017). In some cases, urinary incontinence might be related to neurological disturbance or disorder, such as spinal stenosis influences urinary incontinence when there is lumbar region pain and urinary incontinence constitutively.

Saadia (2015) states that age in women has the effect of bringing hormonal change especially after childbirth, raising the risk of urinary infections and subsequently UI. Saadia (2015) argues that older women are at a higher risk of urinary infections than their younger counterparts. According to Khandelwal and Kistler (2013), antihypertensive agents such as calcium channel blockers can cause OUI, diuretics can

cause UUI. Also, opioids and skeletal muscle relaxants cause OUI, while psychotherapeutics cause OUI according to Khandelwal and Kistler (2013). Alcohol is another risk for UI that can cause UUI and OUI, by increasing urine production or impairing nervous system function according to Khandelwal and Kistler (2013).

5 IMPLEMENTATION OF THE THESIS AND POSSIBLE OUTPUT

5.1 Goal and purpose of the thesis

The goal of the thesis is to explore the advanced knowledge in the treatment and prevention of urinary incontinence among women and bring it out in the form of a literature review. This goal includes finding the materials and organizing them according to the publication year and availability in different databases. One of the goals is to categorize the information according to the structure of literature review to find answers for the thesis question and follow the university instructions for writing a thesis. The byproduct of the thesis is a poster carrying out the results for Clarke University, in cooperation with Seinäjoki Central Hospital.

5.2 Literature review as a research method

According to Pautasso (2013), literature review requires skills of searching, evaluating, analyzing different information and using critical thinking for evaluation. Literature review starts with finding a topic and searching for materials (Pautasso 2013). Using an inclusion and exclusion criteria is necessary to find quality materials such as time period, assessment, scope, limitations, different approaches and conclusions (Pautasso 2013). Organizing the reading materials can help with the writing process.

The writing process is another rigid phase needing polishing of rewriting, restructuring, and rethinking and provide references to avoid scientific misconduct (Pautasso 2013). The analysing and writing process turned out to be the longest, which required significant consumption of time. Literature review needs focus to balance the information and it also requires critical approach identifying the achievements, debating, and problems (Pautasso 2013). In addition, literature review requires a good structure with the flow of information, which attracts the audience (Pautasso 2013).

5.3 Search for information

The materials used for the thesis are online materials. These materials were acquired from SeAmk Finna using the portal of SeAMK library. Ebsco database was used to search for material using Boolean method. Search words used were urinary incontinence or urinary leakage or urinary urgency AND female or women or girls AND prevention or intervention or treatment or program. The result occurred were 3527 articles, but the search was narrowed to the publication date from 2009-2019 (according to the instruction from the university) and the search result came down to 2023 articles. Only full text option was used to narrow the search. The unavailable articles in Ebsco database were found from google searching or from google scholar.

For the search of materials required for theoretical background, the search words used are national guidelines such as Käypähoito Suositus, Duodecim Terveyskirjasto. Also PubMed, NHS, ICS websites were very helpful while collecting information. The materials used for the thesis are valid and reliable sources of information. The materials used for articles are academic articles, guidelines which are only evidence based. The materials were selected according to the reliability to the subject and timeline. Search for the materials for literature review were chosen from Cochrane library using SeAMK library portal. The key words used were urinary incontinence, women, methods, prevention, medication, prevention, lifestyle.

6 RESULT OF THE STUDY

Prevention carries a huge role in many diseases, by a healthy way of living maintaining weight, by exercise and a balanced diet. Cera and Twiss (2018) state that risk factors for UI were modifiable and could be reduced through preventive efforts with effective health promotion programs to modify lifestyle, while using first line treatment as preventive measures. According to Sanders (2019), lifestyle changes can benefit in urinary incontinence treatment, for example reducing body weight, ceasing smoking, maintain a balanced diet. West et al. (2011) state that motivation is the key to the weight loss. Women must assert into self-confidence, behavioural change, while being educated about future outcomes.

According to Madjd et al. (2016), weight loss interventions that include physical activities are more effective than dietary instruction alone for promoting long-term weight loss. Physical activities on a weekly basis can help with weight loss. Madjd et al. (2016) state that recent guidelines recommend 30-60 minutes of daily exercise. According to West et al. (2011), reduced calorie diet and exercise goals, including skills such as self-monitoring, problem-solving with the help of social support, goal setting, restructuring and relapse prevention can be beneficial.

Madjd et al. (2016) state the diet must include low energy density food to achieve filling, low-fat dairy products, fiber rich products and controlled amount of high energy dense food. But this step requires setting of goals, self-monitoring with food diaries, self-assessment, and feedback on waist measurement (Madjd et al., 2016). The main strategies applied included assessing and discussing stages of change, goal setting, self-monitoring using food diaries, and giving feedback on waist measurement changes.

According to Aoki et al. (2017), through a weight loss programme patient lost at least 3–5% of their baseline weight, and 47% reduction in stress incontinence episodes was achieved, also UUI episodes were reduced. Also, fluid reduction, constipation management can be used as modifying methods in lifestyle (Aoki et al. 2017). Fluid

optimization by making changes in fluid intake, by avoiding temporarily caffeine, alcohol, carbonated drinks can improve the chances to determine improvement in symptoms (Aoki et al. 2017).

Education is required to increase women's knowledge related to female anatomy, risk factors, self-management, prevention, and treatments (Cera and Twiss 2018). These education packages should include behavioral training and counselling to improve UI symptoms, while using Pender's Model for a continence education program to motivate the patients to alter lifestyle into a healthier one. The patient should be motivated in order to help with the prevention strategies Broome Pelvic Muscle Self-Efficacy Tool (Cera and Twiss, 2018). Also, self-efficacy can be improved by providing oral verbal guidance, audiovisual tape, and written instructions.

According to Bartling and Zito (2016), during pregnancy, women must be encouraged to start PFMT in the first trimester. According to a study, pregnant women who considered PFMT were 56% less likely to develop UI during pregnancy, and 30% less likely occurrence of UI in postpartum, while comparing to women who did not undergo PFMT (Bartling and Zito 2016). They also state that this exercise can be carried out at home, in case of difficulties they can seek the help of a health care professional.

Assessment of urinary incontinence is a multidimensional process, which requires the cooperation of the patient and the health care team. According to Aoki et al. (2017) the diagnosis of UI requires medical history, physical examination, urinalysis, assessment of post-void residual volume and exclusion of conditions that require specialist referral. Health care professionals must take the medication history into account, because some medications increase UI, thus optimising the medication timing or replacing it with other alternatives can be useful (Aoki et al. 2017).

Health care professionals are obligated to ask the questions related to quality of life which includes activities of daily life, effects of incontinence at work, sexual life, interactions and overall health (Aoki et al. 2017). They also argue that enquiry will help to find the disturbing symptoms and easily pave the way to suitable treatment. A voiding diary is an aid used to assess bladder, by recording the frequency of UI

episodes, the situation (day or night) and three-day voiding diary is informative with good reliability (Aoki et al. 2017).

Once the initial assessment is taken, the professionals can proceed with the other examination. Physical examinations include abdomen palpation, bladder percussion to indicate the overflow, joint mobility test to indicate the functional incontinence, peripheral oedema to indicate the overloaded volume (Aoki et al. 2017). Aoki et al. (2017) state that each vaginal compartment is assessed using speculum examination, also examined the possibility of urethral fistula.

The cough test is another assessment taken to diagnose SUI, with a full bladder, patient on lithotomy position by coughing to see if there is a leak of urine. If the leak stops by cough cessation, it indicates the presence of SUI (Aoki et al. 2017). A measurement of post void residual (PVR) urine is recommended to diagnose overflow incontinence. This can be carried out either using ultrasound scanning or intermittent catheters (Aoki et al. 2017).

Urinary incontinence treatment is a stepped care approach, consisting of conservative treatment, pharmacological treatment, and surgical treatment according to Hersh and Salzman (2013). In general, the conservative line treatment also called behavioural therapy, includes pelvic floor muscle training (PFMT), bladder training, weight loss and mechanical devices. According to Lima et al. (2015), behavioural therapy is a mind-set or a treatment that is implemented before any other forms of treatment, and self-care is emphasised and kept as maintenance of functionality for holistic wellness. Furthermore, behavioural therapy has a benefit over the economy and positive effects on elderly women according to Lima et al. (2015).

According to Seshan and Sivaram (2012), pelvic floor exercises consist of repeated contractions of the muscles of the pelvic floor in order to build up strength of the muscles and improve control of micturition. Thus, muscle contraction reduces UI by producing urethral closure and decreasing central nervous system stimulation of detrusor muscle (Hersh and Salzman 2013). According to Seshan and Sivaram (2012), a study found 41% of women with UI performing PFM contractions for 9-12

weeks experienced a 100% resolution of UI symptoms, while another 20.5% experienced at least a 75% reduction in symptoms. In addition, treatment effect might be greater in middle aged women in their 40's and 50's. Intensive PTMT can be used as a preventive measure as well.

According to Aoki et al. (2017), women are taught to consciously contract their pelvic floor muscles before and during any increase in abdominal pressure, such as coughing, to avert leakage, and simultaneously to build up the support of the pelvic floor through regular muscle strength training. Emerging evidence supports unsupervised delivery of PFMT which could be cost-effectively delivered through e-training (Aoki et al. 2017).

Another method of conservative treatment is vaginal inserts, such as pessaries, cones, tampons used to treat urinary incontinence. According to Hersh and Salzman (2013), vaginal inserts compress the bladder neck and urethra, thus decreasing urine loss caused by stress incontinence. Sanders (2019) argues that vaginal cones strengthen pelvic floor muscles by providing muscle contractions, but may not be suitable for women with prolapsed pelvic organs. Pessary elevates the intra-abdominal pressure by packing urethra and pelvic bone closer, but exhibits the risk of vaginal infection and ulceration of mucosa (Sanders, 2019). Urethral bulking agents such as Durasphere, Macroplastique, Coaptitie have enhanced the healing process for 60%-70% women. This procedure suits patients who do not need surgical procedure, especially for elderly women.

By using bladder training program, women can retrain pelvic mechanisms and hinder the urge sensation between voids, by affecting the central nervous system (Hersh and Salzman, 2013). According to Gaikwad and Kanase (2020), bladder training program can be achieved by intermittent catheterization or timed voiding program, but the primary goal of bladder management is to minimize urinary tract complication. Structured bladder training program contains physiotherapy interventions, such as pelvic floor muscle strengthening, behavioral training, and surface electrical stimulation (Gaikwad and Kanase, 2020). Prompted voiding (urinating on a regular schedule) and scheduled voiding (voiding on a schedule) can be used as a part of bladder training (Hersh and Salzman, 2013).

Pharmacological therapy is available for the treatment for UI. According to Hersh and Salzman (2013), a combination of pharmacological therapy and behavioral treatment brings out the best result for UI treatment. Anticholinergic drugs, such as Fesoterodine, Oxybutynin, Tolterodine, and Darifenacin, are used to treat UI by reducing detrusor over activity by antagonizing M2/M3 muscarinic receptors in the bladder (Hersh and Salzman, 2013). They also argue that patients usually discontinue the use of medication, and it is not suitable for elderly group unless alternative options available.

According to Andersson et al. (2013), research has found drug therapy to show weak evidence and multiple adverse effects, according to the studies of Sanders (2019). Beta-Adrenergic Agonists can reduce UI into fewer episodes in a day, but cannot be used with uncontrolled hypertension patients (Hersh & Salzman, 2013). They also argue for urge UI, when the conservative line fails, OnabotulinumtoxinA injection can be administered, to improve the symptoms of UI, while boosting the aspects of sexual life.

Second line treatment is chosen only after the first line treatment is not suitable or brings no result. Most of the second line treatment involves the repair of the regions near pelvic area. According to Laptian et al. (2017), the aim of Open retropubic colposuspension, a surgical treatment, is to lift the tissues near the bladder neck and proximal urethra in the area behind the anterior pubic bones to correct deficient urethral closure to correct stress urinary incontinence.

While comparing anterior colporrhaphy and needle suspension therapy, the open retropubic suspension exhibits a better healing degree. Laptian et al. (2017) suggest that slings operation and laparoscopic colposuspension look promising, but need further research in a long run. Studies suggest that retropubic suspension is cheaper than laparoscopic colposuspension, but more expensive than Tension-free vaginal tape, beneficial in long run, and shows less probability for future surgical procedures.

According to Sanders (2019), the most common sling surgery used is mid-urethral sling, this procedure is less invasive and does not acquire stitches. She argues that

frequently used midurethral sling surgeries are retropubic and transobturator with equal efficacy. According to Ford et al. (2017), 80% of the women who went under midurethral sling operation have shown healing or symptoms improved from SUI and sustainability up to 5 years, despite the route of operation and the tape used.

Retropubic mid-urethral sling uses tension free vaginal tape (TVT), which is either inserted top-down or bottom-up, but studies have proven that bottom-up method is more productive than top-down (Ford et al 2017; Sanders 2019). The adverse effect of TVT might cause an injury in the bladder and of emptying the bladder completely after the surgery, but the groin pain level is short lived in this case (Ford et al., 2017). Because of these acceptable adverse effects, TVT is considered as the new standard for surgical treatment of stress incontinence according to Hersh and Salzman (2013).

According to Sanders (2019), transobturator midurethral sling uses Transobturator tape (TOT) which is placed inside out using a vaginal incision through the obturator membrane and piloted out into the genitocrural fold. Another method is to place the tape through genitocrural fold while it exits through vaginal incision. Ford et al. (2017) argues that a brief economic commentary (BEC) identified three studies suggesting that transobturator may be more cost effective compared with retropubic. They also state that patient with previous pelvic or incontinence surgery might be at a risk of bladder/urethral perforation.

According to Nambiar et al. (2017), the single sling is designed to reduce the risk related to MUS, while the procedure is short, minimally invasive, accompanied by brief postoperative pain, has become popular these days. Regardless the benefits, patients seem to suffer the reoccurrence of UI and the disadvantage of this procedure is another UI repair operation or a mesh exposure quite often. Nambiar et al. (2017) suggests that more studies are required to establish the benefits of single sling on long term use.

7 CONCLUSION

7.1 The study's ethicality and reliability

Ethics is the momentous element while carrying out scientific writing. Resnik (2015) defines ethics as a method, procedure, or perspective for deciding how to act and for analyzing complex problems and issues, and ethics focuses on the discipline of the study. According to Resnik (2015), several norms of ethics include avoidance of errors, knowledge and truth, accountability, mutual respect, and fairness that are essential for collaborative work. Research work must be accountable for the public, must carry social and moral values (Resnik, 2016).

Since the thesis is carried out in the method of literature review, there is no requirement of interview or survey for the collection or analysis of survey materials. The target remains to be the prevention of plagiarism and reduce scientific misconduct while writing the literature review. The citations and bibliography are provided according to the SeAMK writing instructions. Paraphrasing of borrowed information is used to avoid repetitive citations. The sources are validated and as recent as possible.

7.2 The process of thesis writing

The guidance of thesis writing started in spring 2019, with choosing the topic. Since the student's interest was taken into consideration, I had the opportunity to choose my own topic. With the help of the supervisors, we came to a mutual agreement on the thesis topic - 'Urinary incontinence treatment and prevention among women'. Before the writing process began, a considerable amount of reading about urinary incontinence was required. Furthermore, the aim, purpose and thesis questions required multiple alterations before they were set up for the plan. I presented the thesis plan to supervisors and fellow classmates. After the approval from the supervisors, the process of writing the thesis began.

The whole writing process took almost a year to finish. While looking at the demography of Finland, the age group of senior citizens is above any others. Thus, this subject is very important since a nurse will encounter UI patients in the work field. The nurse must know the basics of UI and reliable sources for guidance purposes. At some phases of writing the results, coordinating the information was difficult and it required multiple editing. Since the articles speak about different aspects related to UI, thorough reading and analyzing the results were justified.

7.3 Author's conclusion and implications for future research

Urinary incontinence is a condition which affects women's life, and which can be avoided to some extent by prevention. Prevention has a great significance in UI, and it can be implemented from a young age. UI education is required as the first step for prevention, because women of different age groups needed to be aware of the risk factors and sensitivity of UI. Having a healthy lifestyle, including regular exercise, balanced risk keeps UI away up to a certain level. Weight loss is a prevention method to reduce UI, by exercise and balanced diet. The pelvic floor exercises play a huge role especially for pregnant women, and other women as well, to increase the strength of pelvic floor muscles.

First line treatment of UI is pelvic floor muscle training, bladder training, vaginal inserts, and behavioral therapy. The conservative treatment needs cooperation between the patient and health care professionals. The treatment can be carried out together since it can provide better results. The second line treatment must be chosen for the patient when the first line treatment gave no result. The patient has the ultimate authority to choose the treatment methods. Nevertheless, health care professionals need to guide them according to evidence based knowledge, the pre- and post-operative risk factors, alternative treatment methods based on the symptoms and examinations. According to the results of the study, TOT and TVT is the most used surgical technique in Finland, as the procedures do show less complications and more probability of curing urinary incontinence.

While looking out for UI related articles, most of the studies were mainly focused on stress urinary incontinence. As a suggestion for future research, studying other incontinences will be excellent. In addition, there is a lack of studies in the field of prevention of urinary incontinence, since the writer faced difficulty in finding materials related to prevention of UI. Therefore, evidence-based studies in the field of prevention of UI is necessary for health care professionals and the other audience.

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Attachments

Attachment 1: Results of literature review

| Name of the article | Authors | Year | Summary |
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| Urinary Incontinence in Women | Yoshitaka Aoki Heidi Brown Linda Jean Nicolas Cornu Oliver Daly Rufus Cartwright | 2017 | This article discusses about the stress urinary incontinence, mixed urinary incontinence and urge urinary incontinence and its diagnosis and treatment. The diagnosis process includes physical examination, medical history, urinalysis, assessment of quality of life. Interventions include non-invasive procedures, lifestyle improvement such as pelvic floor muscle training, changing in fluid consumption, weight loss and information about surgical methods. |
| Overview of Pelvic Floor Dysfunction Associated with Pregnancy | Samantha Bartling Patrick Zito | 2016 | This article discusses the changes the pelvic floor goes through during pregnancy and its effects on incontinence. Because of the growth of uterus, abdominal pressure increases and leads |

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| | | | <p>to incontinence. Hormones play an important role in these changes. Pelvic floor muscle training can help with UI. Pregnant women are suggested to start pelvic floor muscle training during the first trimester as a prevention method for UI. Also, important to continue after pregnancy to regain the strength of pelvic floor muscles.</p> |
| <p>Focused integrative review of current continence care and prevention strategies: Expanding the role of the nurse practitioner</p> | <p>Jennifer Cera Janice Twiss</p> | <p>2018</p> | <p>This study focuses on the preventive methods by nurse practitioners to develop the skills for women with urinary incontinence. This article discusses the usage of different education models to develop knowledge of UI, pelvic floor exercise, self-efficacy, and self-management. Counselling and verbal guidance are used to motivate the patient to improve the symptoms of UI.</p> |

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| Mid-urethral sling operations for stress urinary incontinence in women | Abigail A Ford Lynne Rogerson June D Cody Patricia Aluko Joseph A Oga | 2017 | While analysing 81 different trials, the authors of this study concluded that the mid-urethral sling surgical intervention can be effective where the first line conservative has failed. This article found out that 80% of the women who went under this surgical procedure were healed, or the symptoms improved and sustained up to five years. |
| Effect of Structured Bladder Training in Urinary Incontinence | Asavari Gaikwand Suraj Kanase | 2020 | This study states that structured bladder training is an effective method for UI treatment. The study was carried out in patients with spinal cord injury of age above 20 years with incontinence issues. Group A received conventional therapy, while group B received structured bladder training for 4 weeks. As a result, structured bladder training provided |

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| | | | advancement in regulating UI in spinal cord injury. |
| Clinical Management of Urinary Incontinence | Lauren Hersh Brooke Salzman | 2013 | This article discusses the main treatment line of SUI, MUI, UUI. The first line treatment, also called behavioral modification, includes bladder training and pelvic floor muscle training. Nerve stimulation can be successful if behavioral therapy fails. Anticholinergic is used for UI, not widely used among older women due to its adverse effects. Mirabegron and OnabotulinumtoxinA are also used for UI treatment. Vaginal inserts and pessaries also belong to the first line treatment. For treating UI, sling surgery is widely used. |
| Open retropubic colposuspension for urinary incontinence in women | Marie Lapitan June Cody Atefeh Mashayekhi | 2017 | According to the researchers, the most practical surgical method for stress and urinary incontinence in women is |

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| | | <p>open retropublic colopsuspension, because the operation procedure provides long term benefits. By correlating needle suspension surgery and anterior colporrhapy, the healing counted out to be better. The sling operation and laparoscopic colopsuspension seems assuring for the future, but the authors argue that more research is required to look into long term achievements. A non-systemic review of economic studies suggests that the open retropublic colopsuspension is more costly than the tension-free vaginal tape (TVT), also cheaper than laprascopic colopsuspension.</p> <p>Open colopsuspension allows slow recovery, while laprascopic colopsuspension provides rapid healing, while in comparison with sling</p> |
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| | | | <p>surgery abnormal voiding was less. Authors state that a disadvantage of the study was limited data on unfavorable long term adverse effects of open colopsuspension and the effect on the quality of life.</p> |
| <p>Behavioral Therapy for the Urinary Incontinence of Elderly Women</p> | <p>de Maia Lima Célia Caldas Liana Trotte Antônio Ferreira Bárbara Silva</p> | 2015 | <p>Authors found out that behavioral therapy had a positive effect on elderly citizens. Using behavioral therapy, the life quality improved and there was a significant improvement in activities of daily life. The result was an economical benefit, since the use of diapers was reduced. According to the authors, behavioral therapy is required to implement before using any other treatment method. The importance of self-care is emphasized as a step for the maintenance of functionality regarding awareness and behav-</p> |

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| | | | <p>ioral change. The importance of self-care is emphasized as a step for the maintenance of functionality regarding awareness and behavioral change.</p> |
| <p>Effect of weekly physical activity frequency on weight loss in healthy overweight and obese women attending a weight loss program: a randomized controlled trial</p> | <p>Ameneh Madjd Maira Taylor Leila Neek Alireza Delavar Reza Malekzadeh Ian Macdonald Hamid Farshchi</p> | 2016 | <p>This article discusses the effect of physical activities for weight loss. Physical activity and balanced diet can help with weight loss. The authors argue that physical activity of short sessions during a longer period of time is effective for weight loss.</p> |
| <p>Single-sling operation for urinary incontinence in women</p> | <p>Arjun Nambiar June D Cody Stephen T Jeffery Patricia Aluko</p> | 2017 | <p>The purpose of this study is to figure out the competence of single-sling procedure for the treatment of MUI and urodynamic clinical stress. The focus of the study was on the progress of continence degree and parameter of life quality and disadvantages.</p> |

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| | | | <p>The study result was the procedure time is brief and post-operative pain is short compared to any other procedure. Regardless these benefits, the women suffered incontinence after use of inside-out transobturator tapes. The article points out that disadvantages of this procedure are another continence operation or a mesh exposure quite often.</p> |
| <p>Treatment for stress urinary incontinence in women: A medical surgical review</p> | <p>Kristen Sanders</p> | <p>2019</p> | <p>This study indicates that treatment of SUI begins with conservative line of treatment. Pelvic floor muscle training (PFMT) conduct and habit of living improvement, intravaginal devices are included in this treatment.</p> <p>Habit of living can be improved by using good exercise, reducing body weight, effective diet and by ceasing smoking. The higher the Body Mass Index (BMI), the more risk</p> |

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| | | <p>to have SUI. An appropriate diet can help with reducing body weight. Vaginal cones reinforce pelvic floor muscles by promoting muscle contractions. According to the authors, a Cochrane review supports the vaginal cones use to be superior to no treatment in women. But vaginal cones might cause restriction for women with prolapsed pelvic organs.</p> <p>Intravaginal devices, such as pessary, can help by elevating intra-abdominal pressure by compacting the urethra against the pelvic bone. The risk factors are vaginal infection and ulceration of the mucosa. Patient education is required for the removal and insertion of the device for cleansing and intercourse. In addition, the authors recommend</p> |
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| | | <p>follow-up for patients every 6 to 12 months.</p> <p>The research suggests that medication treatment has frail evidence for SUI treatment, and the American Urological Association does not propose the use of medications as method of treatment.</p> <p>Laser therapy such as Vaginal erbium ER: YAG laser (VEL) and CO2 laser are available, but the procedure requires further studies on long-term competence and safety, even though this method is pain free and slightly invasive.</p> <p>Urethral bulking agents such as Durasphere, Macroplastique, Coapti-tie enhance the healing process for 60%-70% women. This procedure suits patients who do not need surgical procedure,</p> |
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| | | | <p>especially elderly women.</p> <p>Surgical procedures are taken as second line treatment for UI. The Marshall-Marchetti – Krantz (MMK) procedure causes a risk of osteitis. Burch colopsuspension is considered as the standard procedure. It also reduces the risk of osteitis. According to a recent Cochrane review study, Retropubic colopsuspension is the best surgical procedure that cured about 85% to 90% women within one year of the treatment.</p> <p>Mid-urethral slings are a recent method to treat SUI, which consists of TVT & TOT tapes that are less invasive and effective with long term benefits.</p> |
| Urinary Incontinence & Kegel's Exercise. | Vidya Seshan Vidhya Sivaram | 2012 | Authors argue that the significance of lifestyle modifications can im- |

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| | | | <p>prove urinary incontinence. In young adult women, Kegel's exercise can be used as a preventive method. Also, the authors encourage nurses to provide instructions as they are in contact with different age groups of females. Authors suggest that the target group needs to be alerted about the sensitivity of matters related to urinary incontinence and its occurrence and importance of life style modifications and overall holistic wellness.</p> |
| <p>A motivation-focused weight loss maintenance program is an effective alternative to a skill-based approach</p> | <p>West D Gorin A Subak L Foster G Bragg C Hecht J Schembri M Wing R</p> | <p>2011</p> | <p>A weight loss program can help reduce weight, but maintaining the weight for long term is not an easy task. Lack of motivation can act as a risk factor for maintaining weight. This study focuses on motivation as the key for weight loss.</p> <p>Motivation skill approach strengthens satisfaction</p> |

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| | | <p>and self-regulation. This trial program had skill based approach and motivation based approach. After the study, both groups lost the same amount of weight. Motivation skills can be used as a new approach to weight loss which provides similar effects to skill based approach.</p> |
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