T.C.

YEDITEPE UNIVERSITY

INSTITUTE OF HEALTH SCIENCES

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AWARENESS OF PODOLOGICAL TREATMENT METHODS IN CASES OF INGROWN TOENAILS IN TURKEY AND DETERMINATION OF THE PREFERENCES AND TENDENCIES OF ADULTS BETWEEN THE AGES OF 18-60 ABOUT TREATMENT METHODS

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APPROVAL

This thesis has been approved by the above jury in accordance with the relevant articles of Yeditepe University Graduate Education and Examination Regulations and approved by the decision of the Board of Directors of the Graduate School dated ...../...../..... and numbered .....

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Director of Institute of Health Sciences

DECLARATION

I hereby declare that this thesis is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which has been accepted for the award of any other degree except where due acknowledgment has been made in the text.

Züleyha AKIN

18.12.2023

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To my loved ones and friends who have beautified my life with their presence, who have been a panacea for a thousand and one problems like dandelion flowers that spread their wisdom and love around them, and who have supported me during this thesis study,

And at every stage of my life; from the day I first picked up the pen, from my first syllables to today; endless thanks to my dear family; my dear mum and dad who have always been with me with their endless love and support...

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With my love and respect...

Züleyha AKIN

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LIST OF SYMBOLS AND ABBREVIATIONS

DM: DIABETES MELLİTUS

DF: DIABETIC FOOT

ITN: INGROWN TOENAILS

OHS: OCCUPATIONAL HEALTH AND SAFETY FOOTWEAR

ABSTRACT

Akın, Z. (2023). Awareness of podological treatment methods in cases of ingrown toenails in Turkey and determination of the preferences and conditions of adults between the ages of 18-60 about treatment methods. Yeditepe University Institute of Health Sciences, Department of Public Health, Master's Thesis. Istanbul.

This study was conducted among 1144 participants (mean age: 40.6 ± 10.97 years, M/F=502/642) who participated in Turkish language and online platforms to determine the preferences and tendencies of adults aged 18-60 years living in Turkey regarding ingrown toenail treatment. Statistical analysis was performed with SPSS version 29 (IBM SPSS Statistics for Windows, Version 29.0.1.0).

As a result of our study; the proportion of adults in Turkey who knew podology applications and had previously undergone a procedure in a podology centre was determined as 16.20% (n=186) among the general participants. Among the participants with ingrown toenails, the proportion of those who have had a podology procedure constitutes 7.018% (n= 80) of the general participation. The low percentage of application to podology for ingrown nail treatment among the general participants indicates that the awareness of podology in the society is insufficient. In our study, the recurrence rates of non-invasive orthonyxia techniques and invasive treatments were also compared and a significant difference was found in the direction of lower recurrence rate in orthonyxia techniques ($p<0.05$). In our study, all variables and ingrown toenail cases were examined in a causal relationship and statistically significant results were obtained in accordance with the literature, especially with diabetes, shoe preferences and genetic factors ($p<0.05$). As a result, low recurrence rates are obtained in stage 1 and stage 2 with orthonyxia techniques, which is the podological treatment method of ingrown toenail. By increasing the awareness of podology in the society and making treatment with orthonyxia techniques widespread, ingrown toenail cases will be treated in the early stages without progression and foot health and quality of life in the society will be increased.

Key Words: Podology, podiatry, ingrown toenails, onychocryptosis, orthonyxia techniques, ingrown toenails treatments.

ÖZET

Akın, Z. (2023). Tırnak batması vakalarında Türkiye'de Podolojik tedavi yöntemlerinin bilinirliği ve 18-60 yaş arası yetişkinlerin tedavi yöntemleri konusunda tercihleri ve eğilimlerinin saptanması. Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü, Halk Sağlığı ABD., Yüksek Lisans Tezi. İstanbul.

Bu çalışma, Türkiye'de yaşayan 18-60 yaş arası yetişkin bireylerin tırnak batması tedavisi konusundaki tercih ve eğilimlerini saptamak amacıyla Türkçe dilinde ve online platformlar üzerinden katılım sağlayan 1144 katılımcı arasında (yaş ort: 40,6 ± 10,97 yıl, E/K=502/642) yapılmıştır. İstatistiksel Analiz SPSS versiyon 29 (IBM SPSS Statistics for Windows, Version 29.0.1.0) ile yapılmıştır.

Çalışmamızın sonucunda; Türkiye'de yetişkin bireyler arasında Podoloji uygulamalarını bilen ve daha önce bir podoloji merkezinde işlem yaptırmış olanların oranı, genel katılımcılar arasında %16.20 (n=186))olarak belirlenmiştir. Tırnak batması yaşayan katılımcılar arasından Podoloji işlemi yaptırmış olanların oranı ise genel katılımın %7,018'ini (n=80) oluşturmaktadır. Genel katılımcılar içerisinde tırnak batması tedavisi amacıyla podolojiye başvuru yüzdesinin düşük olması, podolojinin toplumda bilinirliğinin yetersiz olduğunu göstermektedir. Çalışmamızda non-invaziv ortoniksi teknikleri ile invaziv tedavilerin nüks oranları da karşılaştırılmış ve ortoniksi tekniklerinde nüks oranının düşüklüğü yönünde anlamlı fark saptanmıştır ($p<0.05$). Araştırmamızda ele aldığımız tüm değişkenler ile tırnak batması vakaları nedensellik ilişkisi içerisinde incelenmiş ve özellikle diyabet, ayakkabı tercihleri ve genetik faktörler konusunda literatürle uyumlu ve istatistiksel olarak anlamlı sonuçlar elde edilmiştir ($p<0.05$). Sonuç olarak tırnak batmasının podolojik tedavi yöntemi olan ortoniksi teknikleri ile evre 1 ve evre 2'de nüks oranı düşük sonuçlar elde edilmektedir. Toplumda podolojinin bilinirliğinin artırılması, ortoniksi teknikleriyle tedavilerin yaygınlaştırılması ile tırnak batması vakaları erken evrelerde, ilerlemeden tedavi edilerek toplumda ayak sağlığı ve yaşam kalitesinin artması sağlanacaktır.

Anahtar Kelimeler: Podoloji, podiatri, tırnak batması, onikokriptoz, ortoniksi teknikleri, tırnak batması tedavileri

1. INTRODUCTION AND PURPOSE

Ingrown toenails (ITN) is a disease which occurs as a result of ingrowth of the nail plate into the lateral nail folds, which is characterised by inflammation, granulation tissue and pain and which causes prolonged morbidity and permanent nail and finger deformities when untreated or incorrect treatments are applied (1).

ITN, which forms the basis of our research subject, is also known as onychocryptosis and unguis incarnatus in the medical literature. ITN cases are nail pathologies which are commonly intervened in the fields of General Surgery, Orthopaedics and Traumatology and Dermatology. ITN cases treated by physicians with invasive interventions are also intervened with conservative interventions by Podologists in Podology centres, which have developed rapidly and become widespread in recent years in Turkey.

This study is a cross-sectional study including questionnaires to measure the incidence of ITN in adults aged 18-60 in Turkey, the perspective of individuals on the disease, the treatment methods they apply when the problem occurs, whether they have knowledge about Podology, which has been developing in our country in recent years, and the awareness and preference rate of Podological treatment methods (orthonyxia techniques) used in the treatment of ITNs.

As a result of the research, data on the general tendency and recurrence rate in ITN treatments will be revealed, and it will be possible to compare the preference rate and results of surgical techniques and conservative orthonyxia techniques.

It is possible to treat ITN cases, especially in Stages 1 and 2, with noninvasive podological care and orthony techniques such as wire systems and over-nail tape. In this way, the patient can continue his/her daily life without interruption and the progression of the case can be prevented. The increase in the awareness and preference rate of conservative and preventative procedures applied by podologists will reduce the workload of surgical branches, especially with the decrease in the need for invasive procedures in cases of ITNs, while the economic losses during and after the operation will be prevented and the patients' return to daily life after the procedure will be shortened and the quality of life will increase.

2.GENERAL INFORMATION

2.1.Podological science

Podology is a health branch that applies conservative-preventative procedures for foot skin and nail diseases. Health technicians performing this profession throughout the world is characterised as Podologists / Podology Technician in Turkey.

Podologists can carry out joint work with Dermatology, Orthopedics and Traumatology, General Surgery, Internal Medicine, Family Medicine, Endocrinology and Metabolism branches in a multidisciplinary framework on the prevention of foot skin and nail diseases, stopping pathological progression, mechanical cleaning and treatment of skin and nail deformations, elimination of problems due to foot bone and joint deformities, elimination of DF deformities, and performing gauze-bandage procedures when necessary.

Looking at the general history of podiatry, it is seen that its foundations as a branch of medicine date back to the early 19th century. The first foot care specialists were barbers who appeared in Germany in the 12th century with the title of "Bader" and performed "callus removal" procedures. The world's first podiatrists were dentists, also known as "chiropodists" in England. In the mid-19th century, these two disciplines were clearly separated. After 3 volumes of foot care books written by Rousselot in France in 1762, a book including pictures of the procedures (Figure 1) and drawings of the instruments used was published for the first time by Heymann Lion in England in 1802 (2).

Figure 1: Chiropodia, 1802, Edinburgh.(Heymann)(3)

Figure 2: First specialised medical foot care school in Germany.1932.(5)

In 1927, in Pforzheim, Germany, the first courses for medical foot care started to be given and the "Foot Specialists Association" was established. In 1928, the first professional newspaper for foot care, "Foot Care News" was published. (Figure 3) In 1929, the first private school for Medical Foot Care was established. (Figure 2) The science of Podology, whose development paused with the effect of World War II, has continued its development with the invention of new orthonyxia techniques since the 1980s (4).

In 1998, the first 2-year education model in the field of foot health was started to be applied in Baden Württemberg state of Germany and with the approval of this education model by the state in 2000, Podology education at associate degree level, which is also applied in Turkey today, has become widespread rapidly (4).

Figure 3: First professional newspaper for foot care. 1928, Germany. (5)

2.1.1. Podology in Turkey

In our country, according to the law numbered 6225 published in the Official Gazette dated 26.4.2011, Podologist: graduated from the podology programme of vocational schools; It is a health technician who provides services for the protection and care of individuals' foot health and performs foot treatment of patients depending on the diagnosis and treatment of the relevant specialist physician.

Podology in Turkey, since 2011, has started to reveal its academic presence with associate degree level education, but there is not enough scientific research on Podology in our country. This valuable field, which is not subject to academic researches due to the ongoing point of view only for the purpose of training health technicians, will facilitate the treatment processes of all health branches dealing with the treatment of foot skin and nail diseases, prevent many foot and nail pathologies with multidisciplinary work, and with the increase in conservative-preventative applications, many problems caused by incorrect applications in toenails and skin can be prevented.

2.2. NAIL ANATOMY

2.2.1. Nail and Nail Unit

The nail is a keratinised structure located on the dorsal side of the distal ends of the fingers and toes and its construction continues throughout life (6). The main function of the nail in humans is to protect the terminal phalanx of the fingers and toes. It also helps touching, holding small objects and scratching by pressing the fingertip (7).

The structures forming the nail unit are the nail plate, nail bed, nail matrix, lunula, proximal nail fold, lateral nail folds, hyponychium and eponychium (cuticle) (8,9) (Figure 4).

2.2.2. Structures Forming the Nail Unit

Nail plate (Corpus unguis)

The nail plate is a keratin layer produced from the matrix and extends along the nail bed. The nail plate formed by the germinal matrix has three layers including dorsal, intermediate and ventral plates (10). The proximal matrix forms the dorsal section and the distal matrix forms the intermediate section. The nail bed contributes to the formation

of the ventral section which is very thin. The length of the matrix determines the nail plate. (11).

The nail plate covers the nail bed and the intermediate matrix layer (10). The rectangular nail is tightly wrapped around the nail bed (12). Both longitudinal and transverse curvature of the nail plate provides strong adhesion and embedding into the nail folds from the proximal and lateral edges (10).

Nail Matrix (Radix unguis)

It is located in the ventral part of the proximal nail fold and continues distally until the end of the lunula (13). While the proximal matrix forms the superficial layers of the nail plate, the distal matrix forms the middle region of the nail plate. Damage that may occur in the matrix may cause permanent disorders in the nail (14).

Lunula

It is the half-moon shaped part of the distal nail matrix visible from the surface. It extends to the proximal nail fold. In contrast to the redness of the nail bed, the whitish appearance of the lunula can be explained by the fact that the epithelium in the lunula is thicker than the nail bed and the nail plate is thinner on the lunula. The main function of the lunula is to determine the shape of the nail plate. In addition, the distal end of the lunula shapes the free end of the nail plate (15).

Nail bed (Lectulus unguis)

It is a pink-coloured, soft, thin, non-rough, non-cornified epithelial surface under the nail plate, which does not contain granular layer and sebaceous gland (16). The nail bed extends from the distal part of the lunula to the hyponychium (17). As the nail extends distally, it is thickened by adding substances to the lower surface of the plate (18). In addition, a bumpy surface is formed due to the longitudinal epidermal ridges extending from the nail bed towards the lunula, and the nail plate is firmly placed on this corrugated surface (19, 10). Beneath the nail bed are connective tissue, periosteum and cortical bone of the distal phalanx (20).

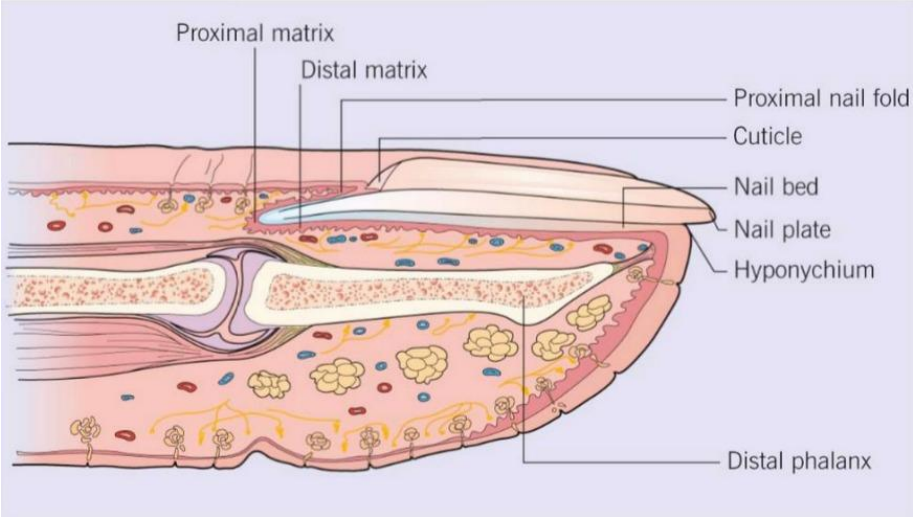


Figure 4: Structures forming the nail unit (9)

Hyponychium

It is the skin space under the free edge of the nail plate. It is adjacent to the volar surface of the fingertip. The nail bed also terminates in the hyponychium. The hyponychium acts as an adhesive seal to protect the nail unit (21). At the end of the hyponychium, the nail separates and forms a pale white band in that area, called the onychodermal band. The onychodermal band passes transversely along the distal part of the nail bed, just proximal to the free edge of the nail (22). Some authors consider the onychodermal band as a part of the hyponychium (13).

Eponychium (Cuticle)

It is the epidermis layer extending from the proximal nail fold and adhering to the dorsal surface of the nail plate (23). This epithelium is similar to the dorsal skin in the proximal part of the finger, but differently, it lacks dermatoglyphics and pilosebaceous units (13). Eponychium especially protects the germinal matrix from irritant, allergenic substances and pathogenic microorganisms (12).

Proximal and lateral nail folds (Vallum unguis)

If the nail plate is removed from the nail unit, three potential cavities are formed. These are two lateral and one proximal nail folds (10). The proximal nail fold has dorsal and ventral surfaces. Its ventral surface is firmly adhered to the dorsal surface of the nail plate and forms the cuticle. The dorsal surface clinically forms the skin in the proximal

nail (11). Since the proximal nail fold is affected in most nail diseases, this region is given more importance than the lateral nail fold (13).

2.2.3. Development and growth rate of the nail

There are many factors such as age, systemic diseases and medications affecting the rate of nail growth (24). It has been shown that characteristics such as young age, male gender (in early adolescence), height, trauma, nail biting habit, long fingers and nails have positive effects on nail growth (25). Nails grow more slowly in the non-dominant hand and in the elderly (26). While fingernails normally grow 0.2-0.3 millimetres (mm) per day, toenails grow more slowly (27). While it takes approximately 5-6 months for the complete regeneration of the fingernail from the matrix to the hyponychium, it may take 12-18 months for the toenails to grow completely (28). The average thickness of the nails is around 0.5-0.75 mm (19). The thickness of the nail plate increases as it grows distally (29). This thickening is not due to an increase in the number of cells, but rather due to mechanical traumas to which the distal part of the nail plate is exposed (30).

2.3. INGROWN TOENAILS (ITN)

ITN is a disease that occurs as a result of ingrowth of the nail plate into the lateral nail folds and is characterised by inflammation, granulation tissue and pain, and causes prolonged morbidity and permanent nail and finger deformities when untreated or incorrect treatments are applied. The most common type of ITN is distal lateral ITN and there are other types including neonatal, infantile, adolescent, adult, distal embedding, retronchi and pincer nail (1).

ITN pathologies were mentioned for the first time in history in the Ebers Papyrus, which was found to have been written around 1600 BC, and the treatment of ITNs and inflammation of the tissue around the nail was described (2).

2.3.1. Causes of Ingrown Toenails

The factors causing trauma can be listed as follows in general terms (31):

1) Exposure to trauma

2) Wrong choice of shoes (narrow, hard and flattened toe)

3) Wearing socks that squeeze the fingers

4) Failure to cut the nail correctly (incorrect pedicure application) (Figure 5)

5) Diseases causing peripheral neuropathy/vasculopathy such as diabetes

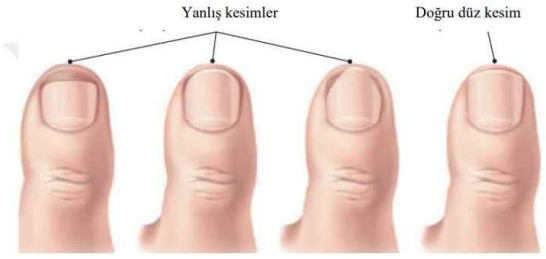
6) Diseases that disrupt nail and finger shape

7) Genetic predispositions

8) Nutritional deficiencies

9) Nail fungus (onychomycosis)

Disorders of foot biomechanics, obesity, subungual tumours, hyperhidrosis and some systemic drugs have also been reported to cause ITN.



Short cut *Oval cut* *V cut* *Flat cut*

Figure 5 : Correct and incorrect nail cutting (32)

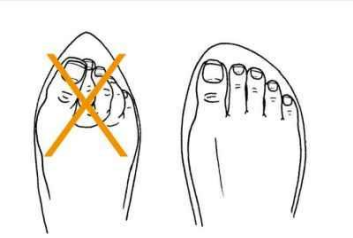


Figure 27: Incorrect shoe use (89)

2.3.2. Classification of ITN

Baran classified ITN as 5 main types in 1987 (33).

1 Subcutaneous ITN (Juvenile ITN)

2. Hypertrophy of the latearal nail fold

3. Inward distortion of the nail (transverse overbending, pincer nail, pipe nail, unguis costringens, omega nail)

4. Embedding in the distal nail

5. ITN in newborns

2.3.3. Stages of ITN

2.3.3.1. Heifitz Staging

Although there are different types of ITNs according to the factors causing the formation of the disease, the most common type is distal-lateral onychocryptosis. Heifitz divided distal-lateral onychocryptosis, which is the most common form, into three stages as a result of his study in 1937 (34).

- Stage I (mild): Erythema, oedema and pain when pressure is applied to the lateral fold

- Stage II (moderate): Increase in stage I symptoms with the addition of infection

- Stage III (severe): Development of abscess formation with prominent stage I symptoms, thickening of the lateral nail fold, granulation tissue, pyogenic granuloma formation.

Figure 6: Stages of Ingrown Toenails (35)

2.3.3.3.2. Mozena Staging

Mozena updated this classification in 2002 and divided it into four stages (36).

According to Mozena staging:

Stage I (Inflammatory stage): It is characterised by erythema, mild oedema and pain when pressure is applied to the lateral nail fold. The nail fold does not extend over the nail plate.

Stage II (Abscess stage): This stage is divided into two:

Stage IIA: There is increased pain, oedema, erythema, hyperesthesia. There may be discharge and/or infection. The nail fold extends less than 3 mm over the nail plate.

Stage IIB: Symptoms similar to stage IIA. The nail fold extends more than 3 mm above the nail plate.

Stage III (Hypertrophic stage): It is classified as chronic hypertrophy of the nail fold covering the granulation tissue and lateral nail plate (36).

Mozena staging was updated by Martinez-Nova et al. in 2007 by adding one more stage, but Heiftz staging is still preferred because it is simpler and more practical (37).

2.3.4. ITN Treatment Methods

The approach to the treatment of ITN is divided into 3 categories considering clinical and treatment options (38).

- Conservative approach: It is generally preferred for stage 1 patients.

- Conservative or surgical approach: It is preferred for stage 2/3 patients.

- Surgical approach: It is generally preferred for stage 3 patients.

The orthonyxia techniques used in podology can generally be applied to stage 1 patients with a conservative approach, and can also be applied to stage 2 patients when necessary.

Considering the widespread use of Podology applications, we can examine the techniques applied today in ITN treatments under 3 main headings:

2.3.4.1. Conservative treatments applied by the physician

2.3.4.2. Surgical treatments applied by the physician

2.3.4.3. Conservative treatments applied by the podologist

2.3.4.1.1. Conservative treatments applied by the physician:

2.3.4.1.1.1. Groove splint (cuff) technique

A groove splint is prepared by cutting a small appropriately cut, sterilised vinyl intravenous drip infusion tube from top to bottom and cutting one end diagonally for proper placement. Under local anaesthesia, the lateral edge of the nail plate containing the spicule is splinted with this longitudinally carved flexible plastic tube. The splint is pushed proximally until the nail spicule is completely covered by the split plastic tube. The plastic tube is then adhered with adhesive tape, cyanoacrylate adhesive or wound closure strips (32, 39, 40, 41).

2.3.4.1.2. Tamponade - cotton wick placement

Using a nail lifter or a small curette, cotton tufts are placed under the ingrown lateral nail edge. In an uncontrolled case series, a symptomatic improvement of 79% was seen using cotton swabs over an average follow-up period of 24 weeks (42).

2.3.4.1.3. Bandaging method

One end of the tape is glued to the lateral aspect of the ITN plate by placing it along the granulation tissue, and the rest of the tape is bent at an angle around the toe so that the start and end points overlap but do not cover the wound itself. The principle is that by physically pulling the edge of the nail bed away from the ITN plate, it can reduce pressure while simultaneously allowing drainage of accumulated pus and drying of the wound. There are no controlled studies on this technique (43).

2.3.4.1.4. Nail tip wire technique

In this technique, two holes are made with needles at the distal free end of the nail plate. An elastic wire is inserted until the degree of the nail plate is below 60°. The wire is bent forwards, cut with scissors so that it does not protrude beyond the tip of the nail and the small hole made by the needle is filled with ethyl 2-cyanoacrylate adhesive. The flexibility of the wire helps to improve the deformity of the ITN (44).

2.3.4.1.5. Flossing technique

This noninvasive technique is used in the early stages of ITN. Without local anaesthesia, a string of dental floss is placed obliquely under the corner of the ITN and pushed proximally. The lateral edge of the nail plate, including the spicule, is covered with it and separated. The technique is simple, easy to perform and easily reproducible by the patient and provides a very high chance for long-term healing of the ITN (45).

2.3.4.1.6. Silver nitrate cauterisation

Cauterisation of granulation tissue with silver nitrate may reduce inflammation (46). The advantages of this method such as being alternative, cheap, easy and patient-friendly are its advantages compared to surgical interventions (47).

2.3.4.2. Surgical treatments applied by the physician

2.3.4.2.1. Winograd Method

American surgeon Alvin M. Winograd first shared his surgical method related to ITN with the scientific community in 1929 in The Journal of the National Association of Chiropodists and Pedic Items (48). In the method described by Winograd, following tourniquet, sterilisation and anaesthesia, a small longitudinal incision is made on the eponychium and soft tissue in the lateral nail fold and the partial nail is curetted after the nail germinal matrix is completely excised together with the periosteum. In Winograd's original method, the wound was left open for secondary healing, whereas suturation is currently preferred. Studies show recurrence rates of 11-27% when this method is applied. (46, 49, 50, 51). However, complications such as pain, infection and delayed wound healing are common (52).

2.3.4.2.2.2. Zadik Method

It involves extraction of the entire nail, curing the infection and then excision of the matrix. Hypertrophic lateral nail folds are excised. A skin flap is prepared from the proximal nail folds. The proximal nail bed is excised up to the lunula border and the flap is sutured over the remaining part and the wound is closed. (49)

2.3.4.2.3. Emmert Method

It is similar to Winograd method. One leg of the scissors is inserted under the nail plate and nail bed, the nail plate is separated from the nail bed and excised. The granulation tissue together with the nail bed is excised up to the bone by wedge resection.

The eponychium is opened until the healthy tissue and the germinal matrix is curetted. Suturation is applied (53).

2.3.4.2.4. Spicule excision and partial matricectomy

It is performed in people with Stage I ITN affecting the nail plate without hypertrophy of the nail fold and in adult or elderly patients with reduced tissue regeneration capacity and low probability. The technique consists of excision of the affected part of the toenail and partial mechanical matricectomy (with curette or scalpel). Persichetti confirmed that simple excision of the matrix using mechanical procedures is most effective, leads to fewer complications and infections, and has a shorter recovery time (54). However, other studies have found no significant difference between mechanical resection of the matrix and phenolisation of the matrix, but the use of phenol was abandoned because it is toxic (55).

2.3.4.2.5. Chemical partial matricectomy: Phenol-alcohol technique

Phenolic ablation has a high success rate of up to 90%. It is less painful, less morbid and has a higher success rate than surgical removal of the matrix. There is likely to be some phenolic nerve damage at the site of surgery, which provides some degree of analgesia but does not result in any long-term deficit. Indications for phenolic ablation include stage I, stage II disease, young or adolescent patients as they have great tissue regeneration capacity, and diabetic patients with controlled type 1 or 2 diabetes. The phenol-alcohol technique is safe in diabetic patients without vascular risk and with well-controlled diabetes (37).

2.3.4.2.6. Wedge Excision

This procedure can be performed with the aesthetic reconstruction technique (54) or the Winograd technique (51). Both techniques are very similar and are indicated for stage II and stage III onychocryptosis. The techniques include excision of the affected portion of the nail plate, partial matricectomy and wedge extirpation of the hypertrophic

nail fold and nail bed. Winograd's technique is a type of wedge excision with more detailed attention to removal of the lateral matrix horn and better preservation of the lateral nail fold, whereas in an aesthetic reconstruction technique the aim is to reduce the convexity of the nail fold. More attention is paid to the lateral nail fold. The aesthetic reconstruction technique involves complete removal of the nail plate and debridement of the granulomatous tissue, followed by removal of the wedge-shaped ellipse of skin and subcutaneous tissue lateral to the affected nail fold (56).

2.3.4.2.7. Decompression technique

This procedure requires unilateral soft tissue resection of the nail fold in combination with a partial nail plate avulsion technique without permanent matricectomy (57). Although recurrences are common, no permanent injury to the matrix occurs.

2.3.4.2.8. Total matricectomy

This procedure is indicated for stage IV onychocryptosis, onychogriffosis, onychodystrophy and chronic hypertrophy of the distal and lateral folds in adult patients. Nail excision with phenol and total matricectomy is performed. (58,59)

2.3.4.2.9. Soft tissue nail fold excision technique

The procedure pioneered by Vandenbos and Bowers was based on the assumption that the nail is not the causal factor in the development of the ITN. This procedure does not touch the nail. After local anaesthesia, the soft tissue surrounding the nail is widely excised in the shape of an ellipse. It is important to remove all skin around the edge of the ITN. The wound is left open for secondary closure (60, 61).

2.3.4.2.10. Other Techniques

-In another method called lateral fold plasty, the skin and hyponychium are excised from the distal part of the nail fold and the treatment is completed by shifting the distal groove downwards with a flap (62).

- In the technique described as super U technique, not only the side walls but also the fingertip is excised and the wound lips are closed with primary suture (1).

-The Noel Method and the Howard-Dubois Method are used as "debulking methods" in which the granulation tissue is excised through different incisions and closed by suturing (63).

2.3.4.3. Conservative treatments applied by the podologist

2.3.4.3.1. Buffering

It is the process of placing a small piece of sterile material on the lateral nail with the help of a fine-tipped excavator. Although permanent results can also be seen when applied in stage 1, it is generally accepted as a temporary solution. The basic rationale is to lift the nail and prevent the progression of the ITN by creating a soft buffer zone between the nail and the lateral fold (64). Tampons, which are also used to facilitate the transfer of external substances such as ointment and tincture to the inner surface of the lateral folds, are also used as a support to increase the lifting effect of the wire in orthonyxial wire applications. Different types of tampons are applied for different purposes according to the type of material (65) (Figure 7).

2.3.4.3.1.1. Woven bumpers

Viscose, polyester, polyamide blend, fleece and processed wool materials are used as tampon material in different thicknesses and sizes. (Figure 8) Sterile tampons should be kept in a sterile box in clinics and should be used after disinfection or sterilisation when necessary.

Figure 7: Applying the woven buffer material (Process: Züleyha Akın)

2.3.4.3.1.2. Polyurethane foam

Polyurethane foam, due to its surface properties, locally increases blood circulation by applying a mechanical stimulus to the nail canals and skin in general. This promotes the cleaning of infected nail canal wounds or the healing of wounds (66). Polyurethane foams are a good alternative to traditional wool and woven tampons for drying the wound and healing the wound bed. (67) Care should be taken to ensure that the duration of stay on the nail is not more than 3 days.

2.3.4.3.1.3. Polyacrylate

Originally developed as an adhesive cushion and lining for dental prostheses, polyacrylate is also suitable for the treatment of podiatry, especially for long-lasting tampons. The material is available in sheets of 10 x 10 cm. Due to its very good adaptability, the material is suitable "for shaping, maintaining and expanding the nail canal" (67).

For application, a wedge-shaped piece suitable for the nail curve is cut and soaked in acetone to soften the material. The viscous elastic mass is then pressed into the nail fold for cushioning (68).

2.3.4.3.1.4. Sulci / Plastic tube

Sulci protectors are plastic tubes with slots on the sides, available in different wall thicknesses and lengths (Fig. 9). They are particularly suitable for sharp-edged nail edges

and can be used to expand, protect and shape the nail fold. To do this, the plastic tube is slid over the free edge of the nail, encircles the nail plate like a protective groove and widens the groove considerably (67).

When using Sulci protectors, the groove should not be painful, inflamed or moist. Also, there should be no nail fragments or calluses in the lateral canal. Too thick material should not be preferred because a sulci tube that is too large will compress the lateral canal and cause discomfort (67).

Sulci protectors can be turned into permanent tampons by fixing them with a suitable auxiliary material and can remain in the nail fold for up to four weeks with regular follow-up.

In a study by Nazari from our country, a flexible plastic tube was placed between the nail plate and soft tissue in 32 cases of ITN. After 6 months of follow-up, 6.25% recurrence rate was observed. It was stated that this method could be used especially in patients with early stage ITN (69).

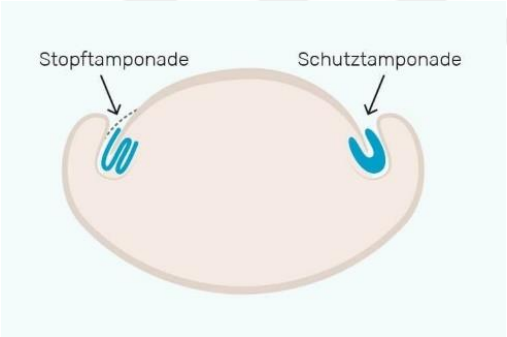


Figure 8: Buffering mechanism of action (65)

Figure 9: Sulci Buffer Technique

2.3.4.3.3.2. Kinesio Taping Application

One end of the flexible kinesio tape is placed on the side of the ITN, the rest is twisted around the toe. The aim is to move the edge of the nail fold away from the nail to reduce pressure. Taping is the safest and least painful procedure among conservative options (70). The ideal width of the tape should be 15-20 millimetres and its length should be 5 cm.(3) The tissue around the nail should be clean and dry for the tape to be applied

properly. Kinesio tapes may need to be renewed frequently because they are affected by moisture. The patient should be educated about bandaging and the tape should be renewed when it loses its activation. Hyperhidrosis and lesion-induced discharge cause the band to lift and limit the success of the method (71).

In cases of onychocryptosis, kinesio taping applications are suitable for stage 1 and stage 2a. It can be used for treatment alone, or it can be used to facilitate orthonyxia applications of the podologist by removing the nail lateral folds from the nail at the time of the procedure and to support the treatment with orthonyxia applications (Figure 10).

Figure 10: Kinesio taping application in ITN (Procedure: Züleyha Akın)

This method was first used by Nishioka et al. (87). It was later modified by Arai et al. (88). While fixing the bands during application, care should be taken to avoid restriction of movement and circular compression. Correct and regular practices show effect in cases of moderate and mild severity (1).

2.3.4.3.3.3. ORTHONYXIA TECHNIQUES

The word orthonyxia, which refers to the techniques commonly used by Podologists in the treatment of ITN, is a combination of words of Latin origin (4).

Ortho (straightening, correction) + Onyx (nail): Orthonyxie (Ortoniksi)

Orthonyxia techniques applied in Podology to correct the shape of the nail plate and nail bed in ITN and pincer nail deformities that occur in the nails are divided into 3:

Wire Techniques

Tape Techniques

Mixed Techniques

The orthonyxia techniques, which differ according to the type of material used, application method, indications and contraindications, have developed since 1873 and have reached their current diversity. (Table 1) The most commonly used orthonyxia techniques and principles of action by Podologists in Turkey are as follows:

2.3.4.3.3.3.1. Wire Techniques

2.3.4.3.3.3.1.1. Ross-Fraser (Omega) Technique

In the historical development process of orthonyxia techniques, orthonyxia techniques have been accepted as a scientific discipline in the medical world with this system put forward by Scottish scientist Alexander Ross-Fraser in 1962. In this method, which is also known as the omega system due to the omega-shaped support point in the middle of the hooks; one-piece steel wires with lever-action hooks on both sides are used, which are attached to the nail distally and advanced medially.

Omega wire, unlike other orthonyxia methods, is not applied directly to the nail, there is a labour-intensive preparation process. In the preparation phase, negative-positive moulds are removed from the nail with orthosis dough and acrylic material. The support point of the nail is determined on the nail mould obtained. The 0.5 mm steel wire cut in the appropriate width is prepared by giving the omega shape from the support point and the hook shape from the right and left ends. While preparing the wire, the parts forming the hooks are thinned by hammering with a hammer and the hooks are prevented from creating height and pressing on the lateral spaces of the nail. The arrangement of the wire continues until it is placed on the mould taken from the nail so that it completely wraps the nail without leaving any gap between the wire and the nail.

When the wire, which is arranged to fit the mould perfectly, is ready, it is inserted into the nail plate by advancing from distal to medial. Depending on the amount of tension

required by the nail plate, it is left as it is attached or the side hooks are activated by tightening at the omega point. In the last stage, it is fixed to the nail only over the omega with a small amount of acrylic or gel material.(4)

Figure 11: Stages of application of the Ross-Fraser Orthonyxia technique (72)

The area around the nail where Omega wire application is performed should be moisturised twice a day with a suitable solution and should be checked by a Podologist at intervals of 4-6 weeks. (73) In the control phase, the wire removed from the nail is re-opened and placed on the nail plate according to the changes in the stability and flexibility of the wire. As valid for Ross Fraser and all other wire applications, if there is no possibility to check the patient at an average interval of 4 weeks, wire application should be avoided and tape applications, which are risk-free adhesive systems, should be preferred.

2.3.4.3.3.3.1.2. Three-piece wire system

Among the orthotonychia techniques, three-piece wire systems are one of the most preferred methods due to their practical use and strong effect. Unlike the preparation process of Ross Fraser (Omega) wire, which involves long procedures and materials, three-piece wires can be applied directly by the Podologist by determining the support point of the nail and preparing lateral hooks in appropriate sizes (Figures 12 and 13). This system, which was first used in its present form in Germany in 1988, is produced by different brands as semi-ready-made products for Podologists and Podiatrists, but can also be prepared manually.

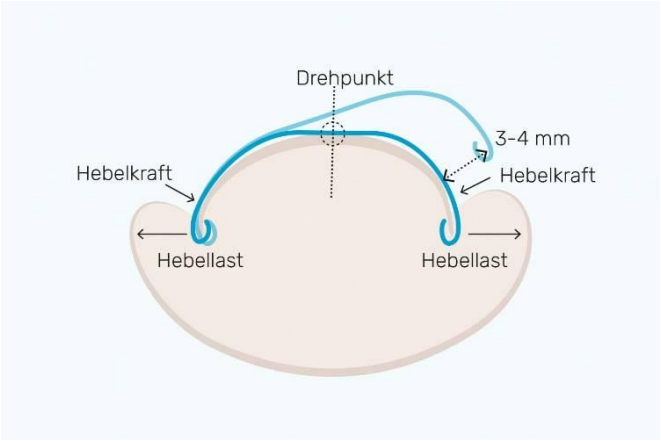


Figure 12: Mechanism of action of the orthonyxia string technique (65)

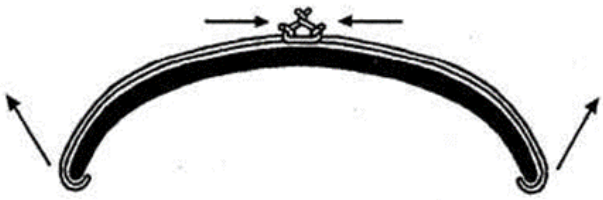


Figure 13: Spring principle of the three-piece string technique

2.3.4.3.3.3.1.2.1. Preparatory stages of the three-part wire

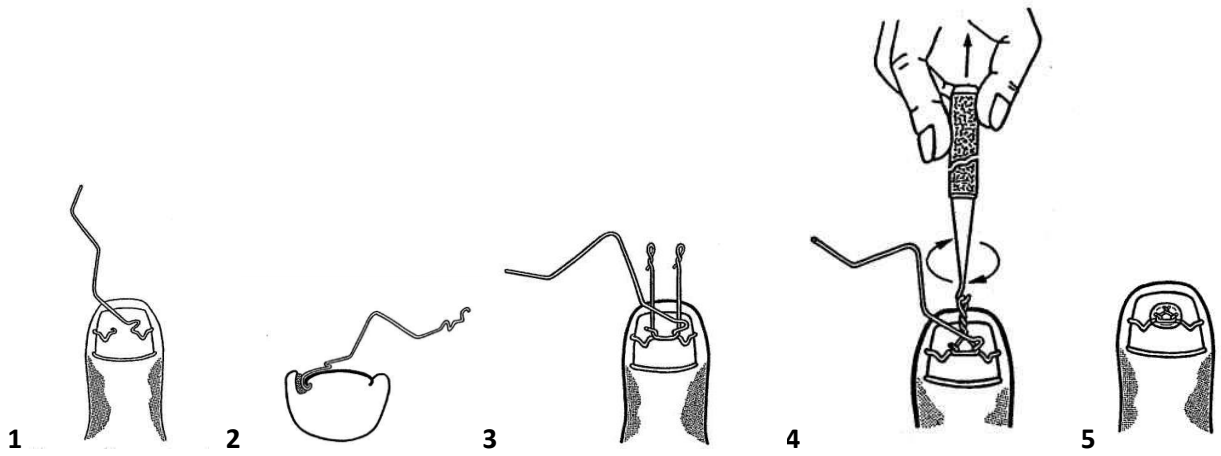
Before application, the lateral nail folds are disinfected and tamponaded several times with gauze 1-2 mm wide and then removed, thus creating space for the wire to be inserted. In the lateral grooves, the spikes that cause ingrowth are removed. If it is necessary to remove a large part of the nail, an onychoplastic procedure (completion of the missing part of the nail plate with artificial nail material) is performed to lengthen or extend the nail plate. Local anaesthesia is not necessary (53).

1st session Before Preparation and After Preparation 3rd session (after 3 months)

Figure 14: Case example of 3 pieces of wire application. Female, 29 age. (Procedure: Züleyha Akın)

2.3.4.3.3.3.1.2.2. Structure and application of three-piece wire

The wire system consists of three parts, two arms and a connecting ring (made of 0.3 to 0.5 mm thick chrome steel wire). The two arms of the wire are adapted to the shape of the nail plate and are applied on both sides. The connecting ring is then applied around the tiny "hooks" already present on the two arms and the two ends are twisted together. In this way, the three components of the wire are put under tension and the edges of the nail are lifted out of the nail fold, thus relieving pressure on the inflamed tissue. All excess wire is cut off and a drop of artificial nail material (acrylic, gel, etc.) is poured onto the exposed ends of the connecting wire and side wires (Figure 15). Temporary tampon is applied to the nail folds (53).



Stage 1: Inserting the first arm of the wire into the nail plate

Stage 2: Inserting the second arm of the wire

Stage 3: Fitting the connecting wire to the hooks of the side arms

Stage 4: Twisting the connecting wire with a twisting hook

Stage 5: Cutting off the excess ends of the wire, covering the centre with acrylic or gel

Figure 15: Stages of application of the three-part orthonyxia wire (53)

The interval between treatment sessions can be as long as several weeks and the wire should be left on the nail plate (53). In intermittent sessions, it is aimed to gradually correct the nail curvature by tightening the nail apparatus with the help of a new connecting wire and increasing the tension. It is recommended to continue the wire application for a while after the patient's pain is completely relieved (74, 75).

2.3.4.3.3.3.1.3. Super Elastic Over-nail wire system

It has become widespread as an orthony technique applied from the dorsal surface of the nail and used more safely in sensitive nails and nails of diabetics because it does not use lateral hooks. SEWO (Super Elastic Wire Orthonyxia) applications are mostly made by utilising the flexibility of Nickel-Titanium (Ni-Ti) alloy wires used in orthodontics. This system, which is applied by fixing Ni-Ti and derivative 0.3 - 0.5 mm thick wires to the nail surface using suitable composite material and blue light, does not require additional activation since it is based on the system of applying a pulling force to the nail in proportion to the elasticity of the wire itself.

Figure 16: Case example of super elastic wire application. Female, 47 age. (Procedure: Züleyha Akın)

2.3.3.4.3.3.1.4. Indications and Contraindications in Orthonyxia Wire Techniques

Indications

- Pincer nail without symptoms of inflammation (Unguis convolutus)

- ITNs (Unguis incarnatus)

- Deformed toenails (4)

Contraindications

- Thickening and brittle nails (e.g. in psoriasis)

- Nails with fungal infections on more than one third or on the lateral edges (onychomycosis)

- Separation of the nail from the nail bed, emptying under the nail (onycholysis)

- Impaired nail growth (onychodystrophy)

- Onychauxis

- Splitting of the nail plate into horizontal, layered plates (onychomadesis) (4)

2.3.4.3.3.3.2. Over Nail Tape Techniques (Adhesive systems)

Surgical approaches including nail extraction and chemical methods may cause cosmetic side effects by damaging the integrity of the normal tissue structure of the nail. There is also the possibility of secondary infection. Therefore, an effective noninvasive treatment is needed especially in geriatric and diabetic patients. Orthonyxia bands are made of a special synthetic fibreglass material, gold-plated flexible metal or flexible plastic derivatives and work like a spring, with both ends pulling the nail plate out of the corresponding nail groove according to a classical physical principle: less flexibility less force, more flexibility more force (76) (Figure 20). In addition, the orthonyxia technique with plastic strips is bloodless, painless, allows all kinds of movements to be performed and all kinds of shoes to be used; it is easy to apply and has a low economic cost (77).

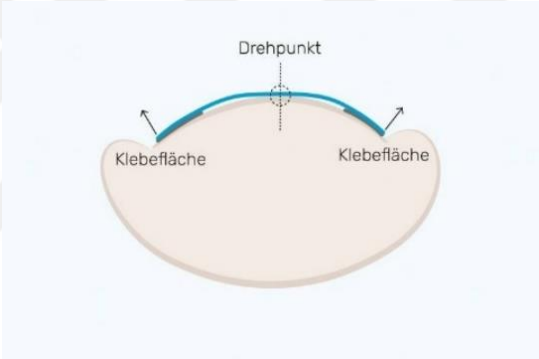


Figure 17: Principle of the orthonyxia tape system for lifting the nail (65)

2.3.3.4.3.3.2.1. Polyethylene - Fibreglass Orthonyxia tapes

Tape applications, which consist of semi-flexible materials applied by gluing technique on the nail surface, basically have the same function as wire techniques (66), but unlike wire, it can also be applied to thinner and more sensitive nails and to the nails of diabetic patients.

With the widespread use of the tape system based on the principle that the tape, which is attached to the dorsal nail plate with the help of a special adhesive and stretched, tends to return to its original state and partially lifts the nail, tape types have been produced from materials with different flexibility and resistance (fibreglass, polyethylene, metal).

Figure 18 : Medial over nail tape application and kinesio taping case example. Female, 38 age.

(Procedure: Züleyha Akın)

Figure 19: Proximal over nail tape application case example. Female, 21 age. (Procedure: Züleyha Akın)

Nail Tape application steps

The surface of the toenail plate is cleaned and mattified with the appropriate milling tips of the podology device. With the help of a cleanser that will not harm the skin, the nail surface and the tape to be applied are cleaned from factors such as oil, cream residue, etc. that may be on the surface. The length of the tape is measured to be compatible with the nail based on the lateral folds of the nail, and if necessary, it is adjusted according to the nail size by shortening it from the sides with the help of a milling cutter. With the help of a special adhesive suitable for the nail tissue and the material structure of the tape, it is adhered first to the support point of the nail determined during the measurement, then to the two lateral ends of the nail respectively by pressing with a

suitable applicator. Care should be taken to ensure that no air bubbles remain under the tape, as this may cause the procedure to fail. At the end of the process, the same adhesive material is applied to the upper surface of the tape and allowed to dry, thus minimising air and liquid permeability and prolonging the duration of the tape on the nail. It is checked every 3-4 weeks on average and replaced when necessary and this process continues until the treatment is completed.

Figure 20: Case example of ITN and granulation tissue formation. Proximal over nail tape application 18 Y. Male / 2 months result. (Procedure: Züleyha Akın)

2.3.3.4.3.3.3.2.2. Gold Tape / Gold plated strips

Gold bands, which have similar thickness, height and length with other band systems and have great similarities in terms of mechanism of action, differ from their derivatives in terms of anti-inflammatory and anti-allergic effects due to the effect of the coating material. Although the fact that gold is visually eye-catching and attractive affects the rate of preference by patients, it is medically preferred because it prevents allergic reactions and facilitates the treatment if there is an infection in the ITN, and if not, it prevents the formation of infection during ITN treatment (72).

Figure 21: Golden Band Orthonyxia technique (65)

2.3.4.3.3.3.3. Mixed Systems (Wire + Tape)

They are the 3rd type orthonyxia techniques that are the result of the use of plastic-derived orthonyxia tapes combined with steel or titanium wires. These systems, which are developed to respond to the treatment of different types of ITNs requiring different methods, are mostly fabricated in the form of a tape + wire combination and are applied to the nail plate by podologists / podiatrists with the necessary auxiliary equipment.

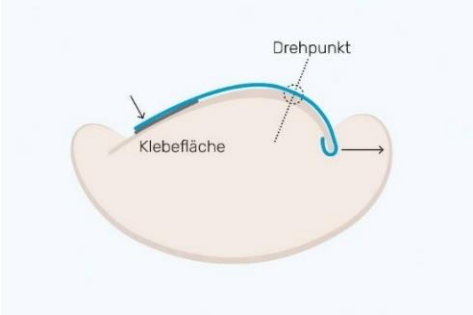


Figure 22: One end tape, one end wire mixed and one orthonyxia technique mechanism of action (65)

Figure 23: Mixed orthonyxis apparatus with one end of tape end of wire (72)

Figure 24: Steps of applying the mixed orthonyxia technique with one end of tape and one end of wire (72)

In cases such as ITN in only one of the two lateral spaces of the nail plate or onycholysis on one side, lifting the healthy or onycholysis area by attaching a hook wire, lifting the flexible tape material using the lifting force may cause damage to the healthy tissue or enlargement of the onycholysis. In such cases, a mixed orthonyxia method with one end firmly fixed in a plastic apparatus and the other end with a flat wire will provide an ideal solution for this case. (Figure 23) While applying buoyancy to that area by attaching a hook wire from the side where the nail is ingrown, the plastic apparatus at the other end of the wire is glued to the surface of the nail plate without touching the healthy or onycholysis area (Figure 24). In this way, the lateral region with healthy or onycholysis deformity is protected from mechanical effect.

Figure 25: Wire mixed orthonyxia technique in plastic tape and special twist spanner (72)

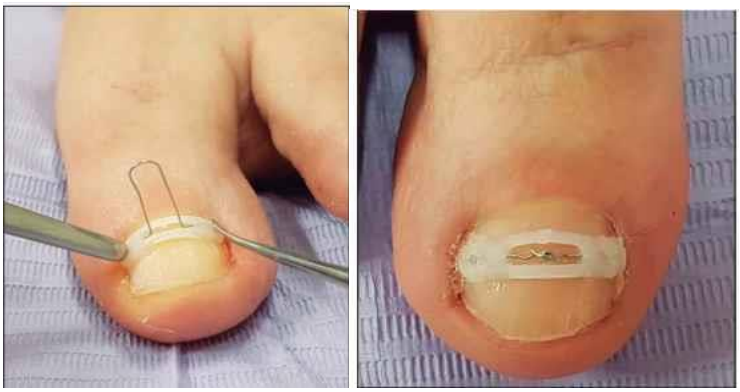


Figure 26: Example of wire technique application in plastic tape (78)

There are also mixed orthonyxia techniques that can be applied to both lateral parts of the nail plate without hook wires. This mixed orthonyxia technique, in which a steel or titanium wire is crimped into a plastic-derived tape in a single piece and a "U" shaped extension is left out from the midpoint of the tape for activation of the wire, was first used in Germany in 2007 (Table 1). During the application, the nail is prepared according to the procedure of standard over-nail bands and the band part fixed to the dorsal surface of the nail with the help of a special adhesive is allowed to dry. The "U" wire protrusion on the tape, which is securely fixed to the nail surface, is crimped with the help of a special wide-ended steel spanner and the elastic wire in the tape is stretched in each cycle and lifts the nail together with the tape (Figure 26). At the end of maximum 3-4 cycles, the wire breaks spontaneously from the centre point and the excess wire remains on the steel key apparatus. In cases where 1-2 cycles are sufficient, the excess wire is removed by cutting. At the end of the process, the exposed wire end at the midpoint is closed with a suitable composite material for both fixing and closing the end of the wire and dried. Its advantage is that it is a non-aggressive technique suitable for use in thin-sensitive nails, diabetics and children. Disadvantage; In cases where the standard dimensions in which it is produced are not compatible with the width of the nail, determination of the length is limited and cannot be used in all cases because the wire fixed in it should not be intervened.

TABLE 2.3.4.3.3.3.4. HISTORY OF ORTHONYXIES TECHNIQUES IN THE WORLD (1873-2021)

YEAR	INVENTION OWNER	COUNTRY	MATERIAL PROPERTIES AND MECHANISM OF ACTION
1873	Edward E. Stedmann	USA	0.6 mm flat bright wire material Reverse omega activation in the centre
1938	Rosenstein	USA	Stretching with thick catgut threads passed through holes on both sides of the nail plate
1946	Dr.William M. Scholl	United Kingdom	0.4 mm mild steel springs 2 silver wire with a centre ring
1950	Greppmayr	Germany	Plate prosthesis and acrylic 0.6 mm thick plates prepared by hand
1954	Södegard	Denmark	Stretching with 2 cm wide adhesive tape Mechanism for lifting the sides by clamping and stretching under the free end of the nail
1955	Alexander Ross-Fraser	Scotland	Sulci-protector - corrugated protective cover for nail edges Nail lateral edges protection from pressure
1960	Gifford	USA	3-piece flexible wire 0.4 mm flexible spring in the centre
1961	Alexander Ross-Fraser I	Scotland	Flat metal tape with hooks on one side The form in which the present gold band was developed

1962	Alexander Ross-Fraser II	Scotland	One-piece, front-to-nail wire with hooks on both sides Leverage effect with omega support point in the centre and hooks on both sides With this system, orthonyxis has been recognised as a scientific discipline in medicine.
1964	Waldmann I	Netherlands	2-piece tape made of soft plastic Activation with the help of a nail trimmer
1964	Waldmann II	Netherlands	Wavy (crimped) steel wire Activation with the help of a nail trimmer
1968	Rading	Sweden	Making centre ring in different sizes with crimping pliers instead of omega wire Collets to facilitate manual omega making
1969	Kitzka	Germany	Ready mass-produced Fraser wires (0.3-0.7 mm) Ready-made omega wires in 11-25 mm width
1977	Stanislaus Gorkiewicz	Austria	Flat flat, memory wire (0.4 mm x 0.2 mm) Flat, 36 mm strip without centre ring
1980	Plouchart	France	0.2 and 0.3 mm steel wire M-shaped, very flexible, rigid and versatile
1982	Erkodent	Germany	2 plastic hooks and a tyre in the middle Activation by gluing the hooks on the sides and stretching them with a tyre in the middle
1982	David E. Wilson	USA	Stainless steel spring-shaped wire

1987	Bernd Stolz BS-Bantları	Germany	3mm width, 14-24 mm length compressed glass fibre reinforced duroplast plastic tapes Transparent bonding system that works with 1mm thickness and flat spring logic
1988	Glor	Germany	Wide, soft gold band in the centre Gently removes the nail, has a high cost.
1988	Elvira Osthold, VHO	Germany	3-piece ready-made steel wire Ready-made omega wire system with interchangeable centre ring VHO (Virtuose Human Orthonoxy)
1990	Erkodent Onyclip	Germany	3mm wide 1 mm thick epoxy enamelled metal tape single hook or fully adhesive tape
1990	Hellmut Ruck, Goldstadt Gold Tape	Germany	Thin, gold-plated metal strip, 3mm wide Hook-and-loop or flat adhesive tape technique The gold coating protects against allergic reactions.
1992	Osthold, 3TO	Germany	3-piece ready-made steel wires, size options Hooks and sizes adjustable
2006	Brigitte Rathenow ORA	Germany	2-piece steel wire system 2-piece wire, fitted in a curve
2007	3TO GmbH Podofix	Germany	Flexible wire embedded in plastic material of different sizes Mixed orthonyxia technique

2010	Corectio Titan	Japan	Titanium wire It consists of hooks on both sides and auxiliary wire for bending. 3 types in 0.35 mm and 0.40 mm sizes and different widths.
2011	Combi Ped	Germany	One side glued-one side hooked wire Mixed orthonyxia technique
2012	Bernd Stolz BS-Magnet +	Germany	4 mm wide bands applied with magnetic applicator Easy application and strong lifting effect with wide bands
2014	PodoKlamra Podobrace	Poland	0.3 mm, 0.4 mm, 0.5 mm hard implant steel After the hardness of the wire is selected, it is designed in a structure that adapts to the nail without the need for change.
2015	Hellmut Ruck, Goldstadt Profesyonel Altın bant	Germany	The classic gold band has been developed in various sizes to accommodate nails of different sizes.
2015	Hellmut Ruck Ortogrıp	Germany	It is a medically advanced version of the VHO support. It was developed together with Elvira Osthold. The different coloured plastic handles each represent different wire sizes.
2015	Spiral Wire Jan Cyrulik	Poland	0.3 mm, 0.4 mm, 0.5 mm wire thickness Double-sided nail fixing hooks The wire is manually shaped into a flat spiral by hand

2017	Garboklamra Katarzyna Garbowska	Poland	Three-part bracket made of 0.4 mm, 0.45 mm and 0.5 mm thick hardened orthodontic wire. Registered in the Polish Medical Products database.
2017	Chain Wire Milena Skalska	Poland	The nail is lifted using flexible orthodontic coloured chains that are attached to lingual buttons attached to the surface of the lateral edges of the nails.
2021	Hellmut Ruck BlueLight	Germany	The hard gel material applied to the nail plate in a tape or wire-like manner is dried with blue light and hardened. The system called "Passivspange" is also suitable for diabetics as there are no hooks attached to the nail.

Table 1 : History of orthonyxia techniques in the world (1,15,79,80,81,82,83,84,85,86)

3. MATERIALS AND METHOD

ITN is considered as a common nail pathology in all ages and genders. Patients are confronted with this problem depending on many variables and each individual applies for treatment depending on different factors such as social environment, education level, financial opportunities, and access to health services.

Within the scope of this thesis research, we determined the awareness of podological treatment methods in Turkey in cases of ITN and the preferences and tendencies of adults aged 18-60 years about treatment methods.

This is a descriptive, cross-sectional study. "Survey" method was preferred to investigate the thesis topic.

The survey was conducted between 15 June and 17 October 2023 via Google Forms (social media channels and mail) and one-to-one contact persons, within the borders of Turkey and only in Turkish language. The targeted number of participants was minimum 1067 people, and the survey was terminated as 1144 people were reached on 17 October 2023, exceeding the target, and the participation that could obtain meaningful data occurred.

3.1. Independent variables of the study;

o Sociodemographic variables: Age, gender, educational status, marital status,

o Variables related to occupational characteristics: Whether or not to do a physical job, whether the job requires standing for a long time, the type of footwear used for the job,

o Variables related to health status: Diabetes diagnosis, genetic predisposition,

o The level of knowledge about podological treatments.

3.2. Dependent variables of the study

o Whether the individual has a diagnosis of ITN or not,

o Health behaviours in the case of ITN were determined.

3.3. Determining the number of participant

The population of Turkey in the age range of 18-60, which is the research population, was announced as 53,018,176 people according to 2021 TURKSTAT population statistics. The sample of the research; If the number of universe elements n is known, using the formula;

$n=(Nt^2pq)/(d^2(N-1)+t^2pq)$

$p=0,50$

$q=1-p=0,50$

$t=1,96$

$S(d)=0,03$ was taken as 1067 people.

SPSS system was used to evaluate the survey data and descriptive and inferential analysis methods were used in this context.

3.4. Evaluation methods of the parameters used

Age: Participants aged 18-60 years were included in the study.

Gender: The gender of the participants was recorded as male and female.

Education status: The educational status of the participants was recorded as primary school, high school and equivalent, associate degree, undergraduate, graduate and other.

Occupation: The occupations of the participants were labourer, civil servant, self-employed, private sector, housewife, retired, student and not working.

Marital status: Two options were recorded as married and single.

Duration of Employment and Survival Status: Participants were asked as separate questions whether they worked in a job requiring physical labour and whether they stood for a long time during the day.

Footwear Usage: Participants were asked about their use of shoes that are not suitable for their foot type (such as shoes, narrow, heeled, etc.) due to work (compulsorily) and were given the opportunity to answer with a third option as "rarely". As a separate question on the use of footwear, the use of occupational health and safety (OHS) footwear was evaluated.

Diabetes Diagnosis: The respondents were asked whether they had been diagnosed with diabetes with the options of "yes, no and don't know". The third option was considered so that participants who had not yet been diagnosed but were in doubt could also be included in the evaluation while evaluating the rapidly increasing number of diabetes cases.

ITN history: It was assessed whether the participants had ITN throughout their lives, and if they had ITN, whether it was chronic or rarely recurred.

Genetic predisposition: In order to evaluate the genetic factor in cases of ITN, the participants were asked about the presence of ITN in their family members or 2nd-3rd degree relatives. 2nd-3rd degree relatives were asked whether they had ITN complaints. The response options were determined as "very common, rarely or never" in order to provide an association with individual responses.

Awareness of Podology: Participants were asked whether they were aware of Podology applications and ITN treatments, and in order not to mislead the answers of those who knew Podology applications but did not know that this field was described as Podology as a term, it was stated in addition to the question that "nail wire, nail tape, buffering and procedures performed with podology machine and milling cutters" are in this field.

In order for the answers to measure not only the awareness of Podology but also the rate of preference in general, the answers were determined as 3 different options as "I have never heard of it, I have only heard of it and I have had a procedure at the Podology centre before".

Preferences and trends in ITN treatment: Participants were asked which method they would prefer when they experienced ITN complaints with 5 different response options. According to the percentage distribution of the answers given to the options "I intervene myself, I have a pedicure, I apply to podology, I apply to a physician and other", in

addition to the data on the awareness of podology, data supporting the preference rate were obtained, as well as the opportunity to compare podology with other methods.

ITN treatment results: In the last question of the questionnaire, the participants were asked which of the options was the most accurate description of their ITN problems, and 7 options plus the other alternative were presented. The data of this comprehensive question, which gave the opportunity to evaluate the data of those who applied for surgical solution and recurrence status, those who applied for podology and recurrence status, those who found a solution with their own methods, those who did not get any results from any method and those who did not experience any ITN problem in a single question, were proportioned within themselves and with other data and significant results were obtained.

3.5. Statistical Method

Statistical analysis of the data obtained was performed with SPSS version 29 (IBM SPSS Statistics for Windows, Version 29.0.1.0). Descriptive data on the sociodemographic status, medical characteristics and health behaviours of the participants were presented as number (n), ratio (%), mean and standard deviation values. The prevalence of ITN is shown in the tables. The relationships between the presence of ITN and the characteristics of the individuals (age, gender, occupation, working conditions, shoe use status, diabetes diagnosis, genetic factor, ITN treatment preferences and tendencies, and results of treatment preferences) were evaluated by Pearson chi-square test.

Statistical significance level was accepted as $p<0.05$ in all analyses.

3.6. Conflict of Interest

During the research process and the evaluation stages of the study; there is no financial interest that may directly or indirectly affect the data, results, statements or opinions expressed, and accordingly, there is no conflict of interest area.

4. RESULTS

Between 15 June 2023 and 17 October 2023, 1144 people who answered the research questionnaire (Appendix 1) online and in person, which included 15 questions to measure preferences and trends in ITN treatments, were included in the study. There were 178 (15.5%) participants with chronic ITN, 481 (42.04%) who rarely experienced ITN, and 484 (42.30%) who had never experienced ITN in their lives. As a result of the study, which mainly aimed to obtain data on the awareness of podological ITN treatments in the community, data on many factors related to ITN were obtained. For each patient, the parameters specified in the materials and methods section of the study were recorded separately and evaluated statistically. Accordingly, the following results were obtained:

4.1. Sociodemographic characteristics of patients/participants

The sociodemographic characteristics of the participants included in the study are listed in Table 4.1 as number (n) and percentage (%). In the study, in which a total of 1144 participants were included, the participants were sociodemographically grouped according to age, gender, educational status, marital status and occupation.

The participants were analysed in 5 groups between the ages of 18-60 years (Table 4.1) and the mean age was 40.6 ± 10.97 years (Table 4.1.2). The age range of 123 (10.9%) women and men was 18-25 years, 196 (17.4%) 26-33 years, 311 (27.6%) 34-42 years, 300 (26.6%) 43-51 years, 197 (17.5%) 52-60 years (Table 4.1.).

642 (56.1%) women and 502 (43.9%) men participated in the study. 189 (16.5%) had primary education, 253 (22.1%) high school and equivalent, 207 (18.1%) associate degree, 401 (35.1%) undergraduate and 94 (8.2%) postgraduate education (Table 4.1).

Of the participants, 687 (60.1%) were married, 457 (39.9%) were single and occupationally; 273 (23.9%) were workers, 222 (19.4%) were civil servants, 159 (13.9%) were retired, 132 (11.5%) were housewives, 75 (6.6%) were students, 197 (17.2%) were self-employed, 32 (2.8%) were private sector employees and 54 (4.7%) were not working (Table 4. 1.1).

Table 4.1.1. Sociodemographic characteristics of patients/participants

	n	%
AGE		
18-25	123	10,9
26-33	196	17,4
34-42	311	27,6
43-51	300	26,6
52-60	197	17,5
GENDER		
Female	642	56,1
Male	502	43,9
EDUCATION STATUS		
Primary education	189	16,5
High school and equivalent	253	22,1
Associate degree	207	18,1
Undergraduate	401	35,1
Graduate	94	8,2
MARITAL STATUS		
Married	687	60,1
Single	457	39,9
OCCUPATION		
Labour	273	23,9
Civil Servant	222	19,4
Retired	159	13,9
Housewife	132	11,5
Student	75	6,6
Self-employment	197	17,2
Private Sector	32	2,8
Not working	54	4,7

Table 4.1.2. Age Statistics

AGE		
n	**Total**	1144
	Missing	0
Mean		40,6
Std. Deviation		10,973
Min;Max		18;60

4.2. Relationship between ITN history and sociodemographic characteristics

4.2.1. Prevalence of ITN according to age

The participants were divided into 3 groups according to the history of ITN: those who rarely experienced ITN, those who frequently experienced recurrent chronic ITN, and those who did not have ITN; and 5 groups according to the age criterion in the age range of 18-60 years. A statistically significant difference was found between the two groups according to the Pearson Chi-square test performed according to age-ITN criteria ($p<0.001$).

In the age range of 18-25 years, 54 (43.90%), 20 (16.30%) and 49 (39.80%) patients with rare, chronic and no history of ITN, respectively.

In the 26-33 age range, 97 (49.50%), 15 (7.70%), and 84 (42.90%) of the 26-33 age group had a rare, chronic, and no history of ITN, respectively.

In the age range of 34-42 years, 125 (40.20%), 48 (15.40%), and 138 (44.40%) of the 34-42 age group had a rare, chronic, and never experienced ITN, respectively.

In the 43-51 age range, 122 (40.80%), 38 (12.70%), and 139 (46.50%) of the 43-51 age group had a rare, chronic, and never ITN history, respectively.

In the 52-60 age range, 75 (38.10%), 51 (25.90%), and 71 (36.00%) of the participants had a rare, chronic, and never-ITN history, respectively.

Table 4.2.1. Prevalence of ITN according to age

		ITN								
		RARELY			CHRONIC			NO		
		n	%	p	n	%	p	n	%	p
AGE RANGE	18-25	54	43,90	<0.001	20	16,30	<0.001	49	39,80	<0.001
	26-33	97	49,50		15	7,70		84	42,90	
	34-42	125	40,20		48	15,40		138	44,40	
	43-51	122	40,80		38	12,70		139	46,50	
	52-60	75	38,10		51	25,90		71	36,00	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.2.2. Prevalence of ITN according to gender

The study participants were evaluated in 2 groups as male and female according to gender, and in 3 groups as those who rarely experienced ITN, those who frequently experienced recurrent chronic ITN and those who did not have ITN according to ITN history. A statistically significant difference was found between the two groups according to the Pearson Chi-square test based on gender-ITN criteria (p<0.003).

Among the female participants, 242 (37.80%), 111 (17.30%), and 288 (44.90%) had a history of rare, chronic, and no history of ITN, respectively.

In male participants, 239 (47.60%) had a rare history of ITN, 67 (13.30%) had a chronic history and 196 (39.00%) had never experienced ITN.

Table 4.2.2. Prevalence of ITN according to gender

		ITN								
		RARELY			CHRONIC			NO		
		n	%	p	n	%	p	n	%	p
GENDER	Female	242	37,80	<0.003	111	17,30	<0.003	288	44,90	<0.003
	Male	239	47,60		67	13,30		196	39,00	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.3. The effect of occupations and working conditions on ITN

Participants were divided into 8 groups according to their occupations as labourer, civil servant, self-employed, private sector, housewife, retired, student and not working. According to the history of ITN, the participants were divided into 3 groups as those who rarely experienced ITN, those who frequently experienced recurrent chronic ITN and those who did not have ITN. A statistically significant difference was found between the two groups according to the Pearson Chi-square test based on occupational status and history of ITN (p<0.001) (Table 4.3.1).

According to the occupational groups, 109 (40.10%), 27 (27%) and 196 (39.00%) of the workers had a rare, chronic and no history of ITN, respectively. Among civil servants, 91 (41.00%), 22 (9.90%) and 109 (49.10%) had a rare, chronic and never

experienced ITN, respectively. In retired people, chronic ITN was the highest rate among all occupational categories with 45 people (28.30%), in the same category, rare ITN was found in 58 people (36.50%) and never experienced ITN in 56 people (35.20%). In housewives, the second category with the highest rate of chronic ITN after pensioners with 35 people (26.50%), the rate of rare ITN was 57 people (43.20%) and those who had never experienced ITN were 40 people (30.30%) (Table 4.3.1).

The self-employed group had the highest rate among all occupations with 97 (49.20%) people with rare ITN, 23 (11.70%) with chronic ITN and 77 (39.10%) with never ITN (Table 4.3.1).

In students, the rate of occasional ITN was the highest after the self-employed group with 36 (48%). Chronic ITN was detected in 16 people (21.30%) and 23 people (30.70%) who never had ITN.

Among the participants who were not employed, 23 people (42.60%) with rare ITN, 7 people (13%) with chronic ITN and 24 people with no ITN were identified. In private sector employees, where the overall participation rate was the lowest, it was determined that 19 people (59.40%) stated that they never experienced ITN, 10 people (31.30%) rarely and 3 people (9.40%) chronically experienced ITN. (Table 4.3.1)

Table 4.3.1. ITN rates according to occupation

	ITN								
	RARELY			CHRONIC			NO		
	n	%	p	n	%	p	n	%	p
LABOUR	109	40,10		27	9,90		136	50,00	
CIVIL SERVANT	91	41,00		22	9,90		109	49,10	
PENSIONER	58	36,50		45	28,30		56	35,20	
HOUSEWIFE	57	43,20		35	26,50		40	30,30	
STUDENT	36	48,00	<0.001	16	21,30	<0,001	23	30,70	<0,001
SELF-EMPLOYMENT	97	49,20		23	11,70		77	39,10	
NOT WORKING	23	42,60		7	13,00		24	44,40	
PRIVATE SECTOR	10	31,30		3	9,40		19	59,40	
Total	481	42,10		178	15,60		484	42,30	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.3.2. The effect of long hours of standing work on ITN

It was determined that 68 (15,70%) of the participants who worked long hours on their feet had chronic ITN, 197 (45,60%) rarely had ITN and 167 (38,70%) never had nail

fungus. Among the participants who stated that they did not work long hours on their feet, 110 (15.50%) had chronic ITN, 284 (39.90%) rarely had ITN and 317 (44.60%) never had nail fungus. According to Pearson Chi-square test, no statistically significant difference was found (p<0.117).

Table 4.3.2. The effect of long hours of standing work on ITN

		ITN								
		RARELY			CHRONİC			NO		
		n	%	p	n	%	p	n	%	p
LONG HOURS WORKING ON YOUR FEET	YES	197	45,6	<0.117	68	15,7	<0.117	167	38,7	<0.117
	NO	284	39,9		110	15,5		317	44,6	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.3.3. The effect of working with physical strength on ITN

It was determined that 63 (17.30%) of the participants working in jobs requiring physical labour had chronic ITN, 174 (47.80%) rarely had ITN and 127 (34.90%) never had nail fungus. Among the participants who stated that their profession did not require physical labour, 115 (14.80%) had chronic ITN, 307 (39.40%) rarely had ITN and 357 (45.80%) never had nail fungus. According to Pearson Chi-square test, a statistically significant difference was found (p<0.002).

Table 4.3.3. The effect of physical labour on ITN

		ITN								
		RARELY			CHRONİC			NO		
		n	%	p	n	%	p	n	%	p
Work with physical labour	YES	174	47,80	<0.002	63	17,30	<0.002	127	34,90	<0.002
	NO	307	39,40		115	14,80		357	45,80	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.4.The effect of footwear preferences on ITN

4.4.1.The effect of inappropriate/incorrect footwear use on ITN

Participants were asked about the use of shoes that are not suitable for the foot structure in daily life and were asked to answer with 3 options (yes, no, rarely) according

to the necessity of use. Of the 1144 participants, 677 (59.2%) answered no, 291 (25.4%) rarely and 176 (15.4%) yes (Table 4.4.1).

Table 4.4.1.1. Incorrect shoe usage

INCORRECT SHOE USAGE					
YES		**NO**		**RARELY**	
n	%	n	%	n	%
176	15.4	677	59,2	291	25,4

Of the 176 participants who answered yes to incorrect shoe use, 25 (14.30%) had a history of chronic ITN, 82 (46.90%) rarely experienced ITN, and 68 (38.90%) had no history of ITN in any period of their lives (Table 4.4.1.2).

Of the 677 participants who answered no to incorrect footwear use, 101 (14.90%) had a history of chronic ITN, 258 (38.10%) rarely experienced ITN, and 318 (47.00%) had no history of ITN at any period of their lives (Table 4.4.1.2).

Of the 291 participants who stated that they rarely used the wrong shoes, 52 (17.90%) had a history of chronic ITN, 141 (48.50%) rarely experienced ITN, and 98 (33.70%) had never had a history of ITN in any period of their lives (Table 4.4.1.2).

The difference between the groups was statistically significant (p<0.002).

Table 4.4.1.2. The effect of incorrect shoe use on ITN

ITN									
		RARELY			**CHRONİC**			**NO**	
		n	**%**	**p**	**n**	**%**	**p**	**n**	**%**	**p**
INCORRECT SHOE USAGE	YES	82	46,90	<0.002	25	14,30	<0.002	68	38,90	<0.002
	NO	258	38,10		101	14,90		318	47,00	
	RARELY	141	48,50		52	17,90		98	33,70	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.4.2.The effect of the use of Occupational Health and Safety (OHS) footwear on ITN

According to the occupational safety law, the use of OHS shoes is mandatory in some sectors as one of the measures taken to protect the employee at the maximum level

in occupational accidents. It was determined that 56 (4.90%) of the participants used safety shoes while 1088 (95.10%) did not use safety shoes (Table 4.4.2.1).

Table 4.4.2.1. Usage of OHS shoes

USAGE OF OHS SHOE			
YES		NO	
n	**%**	**n**	**%**
56	4,9	1088	95,1

Of the 56 participants who used safety shoes, 24 (42.90%) had a history of rare ITN, 23 (41.10%) had never had ITN and 9 (16.10%) had chronic ITN (Table 4.4.2.2).

Of the 1088 participants who did not use safety shoes, 457 (42.00%) had a history of rare ITN, 461 (42.40%) had never had a history of ITN, and 169 (15.50%) had chronic ITN (Table 4.4.2.2).

The difference between the groups was not statistically significant (0.980).

Table 4.4.2.2. OHS footwear use - ITN relationship

	ITN								
	RARELY			CHRONİC			NO		
OHS FOOTWEAR USAGE	**n**	**%**	**p**	**n**	**%**	**p**	**n**	**%**	**p**
YES	24	42,90%	0,98	9	16,10%	0,98	23	41,10%	0,98
NO	457	42,00%		169	15,50%		461	42,40%	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.5. Diabetes Mellitus - Ingrown toenails Relationship

DF complications due to diabetes are among the leading causes of ITN. Participants were asked whether they had been diagnosed with DM or not, and in order to evaluate the DM potential of participants who had DM in the community but were unaware of this condition but were suspicious because of some symptoms, the option of don't know was added to the answers in addition to the options of having DM and not having DM. Of the 1144 participants, 812 (71%) were non-diabetic, 218 (19.10%) had a diagnosis of diabetes and 114 (10%) did not know their diabetes status (Table 4.5.1).

Table 4.5.1. Diabetes Diagnosis

DM DIAGNOSIS					
YES		NO		UNKNOWN	
n	**%**	**n**	**%**	**n**	**%**
218	19,10	812	71,00%	114	10,00

(DM: Diabetes mellitus)

Among 218 participants who answered yes to the question of DM presence, 54 (24.80%) had a history of chronic ITN, 100 (45.90%) rarely experienced ITN and 64 (29.40%) had no history of ITN at any period of their lives (Table 4.5.2).

Among the 812 participants who answered no to the question about the presence of DM, 110 (13.60%) had a history of chronic ITN, 311 (38.30%) rarely experienced ITN and 390 (48.10%) had no history of ITN at any period of their lives (Table 4.5.2).

Among 114 participants who answered the question about the presence of DM as "don't know" and who had undiagnosed but suspected diabetes, 14 (12.30%) had a history of chronic ITN, 70 (61.40%) rarely experienced ITN and 30 (26.30%) had no history of ITN in any period of their lives (Table 4.5.2).

The difference between the groups was statistically significant (p<0.001).

Table 4.5.2. Diabetes Mellitus - Ingrown toenails Relationship

		ITN								
		RARELY			CHRONİC			NO		
		n	**%**	**p**	**n**	**%**	**p**	**n**	**%**	**p**
DM	YES	100	45,90	<0.001	54	24,80	<0.001	64	29,40	<0.001
	NO	311	38,30		110	13,60		390	48,10	
	UNKNOWN	70	61,40		14	12,30		30	26,30	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail) (DM: Diabetes mellitus)*

4.6.Genetic factor effect

The participants who evaluated their personal history of ITN with 3 different answers as chronic, rare and no ITN were asked to answer the history of ITN in their family and first-degree relatives according to the criteria of common, rare and no ITN.

Among 165 participants who answered the question about the frequency of ITN history in their family and relatives, 47 (28.50%) had a history of chronic ITN, 90 (54.50%) rarely experienced ITN and 28 (17.00%) had no history of ITN in any period of their lives (Table 4.6).

Of the 556 participants who answered the question about the frequency of ITN history in their family and relatives, 108 (19.40%) had a history of chronic ITN, 282 (50.70%) rarely experienced ITN, and 166 (29.90%) did not have a history of ITN in any period of their lives (Table 4.6).

Among 422 participants who stated that there was no history of ITN in their families and relatives, 23 (5.50%) had a history of chronic ITN, 109 (25.80%) rarely experienced ITN and 290 (68.70%) had never had a history of ITN in any period of their lives (Table 4.6).

The difference between the groups was statistically significant (p<0.001).

Table 4.6.Genetic factor effect in ITN

		ITN								
		RARELY			CHRONİC			NO		
		n	**%**	**p**	**n**	**%**	**p**		**%**	**p**
FAMILY AND RELATIVES ITN STORY	YAYGIN	90	54,50	<0.001	47	28,50	<0,001	28	17,00	<0,001
	RARELY	282	50,70		108	19,40		166	29,90	
	NO	109	25,80		23	5,50		290	68,70	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.7. Awareness and preference rate of Podology applications in the treatment of ITN

4.7.1. Awareness of orthonyxia treatments in adults aged 18-60 years in Turkey

Podology, which is rapidly becoming widespread as one of the newest health branches in Turkey, provides the opportunity to prevent ITN cases and to treat stage 1 and partially stage 2 ITN cases without the need for surgical intervention with orthonyxia

services offered in ITN treatments. The 1144 participants in the study were asked about the awareness of podology practices, orthonyxia techniques and whether they have had a procedure in a podology centre before. It was found that 591 (51.70%) of the participants had never heard of Podology and orthonyxia techniques, 367 (32.10%) had only heard of Podology and 186 (16.20%) had had a procedure at a Podology centre before.

Table 4.7.1. Awareness of Podology and Orthonyxia techniques in Turkey

PODOLOGY AWARENESS					
PROCEDURE		JUST HEARD OF		NEVER HEARD OF	
n	**%**	**n**	**%**	**n**	**%**
186	16,20%	367	32,10	591	51,70

4.7.2. Awareness of Podology practices in adults with a history of ITN

In order to evaluate the awareness of podological treatment methods and orthonyxia techniques in terms of ITN history, we compared the different responses given for the two conditions by cross-tabular analysis. Accordingly;

Of the 178 participants who stated that they had chronic ITN, 44 (24.70%) stated that they had never heard of Podology and orthonyxia techniques, 55 (30.90%) stated that they had only heard of them, and 79 (44.40%) stated that they knew about Podology and had previously undergone a procedure at a centre.

Of the 481 participants who stated that they rarely experienced ITN, 229 (47.60%) stated that they had never heard of Podology and orthonyxia techniques, 168 (34.90%) had only heard of them, and 84 (17.50%) knew Podology and had previously had a procedure at a centre.

Of the 484 participants who stated that they had never experienced ITN in any period of their lives, 317 (65.50%) stated that they had never heard of Podology and orthonyxia techniques, 144 (29.80%) had only heard of it, and 23 (4.80%) knew about Podology and had previously had a procedure at a centre.

The difference between the groups was statistically significant ($p<0.001$).

Table 4.7.2 Awareness of Podology in adults with a history of ITN

PODOLOGY AWARENESS									
		PROCEDURE			JUST HEARD OF			NEVER HEARD OF		
		n	**%**	**p**	**n**	**%**	**p**	**n**	**%**	**p**
ITN HISTORY	RARELY	84	17,50%		168	34,90%		229	47,60%	
	CHRONİC	79	44,40%	<0,001	55	30,90%	<0,001	44	24,70%	<0,001
	NO	23	4,80%		144	29,80%		317	65,50%	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail)*

4.7.3. Awareness of Podology in individuals with diabetes

With conservative-preventative foot health procedures applied in podiatry centres, it is possible to prevent some of the DF (DA) complications that may occur in individuals with diabetes before they occur and to stop the problems in the initial stage before they progress with early diagnosis and correct guidance. DA complications should be considered as problems that lead to lower extremity amputations and should be taken seriously. In this context, it is of great importance for patients diagnosed with DM to be under the supervision of a podologist in terms of foot health in a multidisciplinary framework in order to prevent DA complications.

Within the scope of our research, the participants who answered the question about the diagnosis of DM were asked whether they had information about Podology and orthonyxia techniques. According to this

Of the 218 participants who answered yes to the question of DM diagnosis, 130 (59.60%) stated that they had never heard of Podology and orthonyxia techniques, 33 (15.10%) stated that they had only heard of them, and 55 (25.20%) stated that they knew about Podology and had had the procedure performed in a centre before.

Of the 812 participants who answered no to the question of DM diagnosis; 387 (47,70%) stated that they had never heard of Podology and orthonyxia techniques, 312 (38,40%) stated that they had only heard of it, and 113 (13,90%) stated that they knew Podology and had previously had a procedure at a centre.

Of the 114 participants who answered the DM diagnosis question as "don't know", who had not been diagnosed but suspected diabetes; 74 (64.90%) stated that they had never heard of Podology and orthonyxia techniques, 22 (19.30%) had only heard of it, and 18 (15.80%) knew Podology and had previously had a procedure at a centre.

The difference between the groups was statistically significant (p<0.001).

Table 4.7.3. Awareness of Podology in individuals with diabetes

PODOLOGY AWARENESS									
		PROCEDURE			JUST HEARD OF			NEVER HEARD OF	
		n	**%**	**p**	**n**	**%**	**p**	**n**	**%**	**p**
DM	**YES**	55	25,2	<0.001	33	15,1	<0.001	130	59,6	<0.001
	NO	113	13,9		312	38,4		387	47,7	
	UNKNOWN	18	15,8		22	19,3		74	64,9	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (DM: Diabetes mellitus)*

4.7.4. Awareness of Podology by gender

The responses of 642 (56.1%) female and 502 (43.9%) male participants included in the study regarding the awareness of podological treatment methods and orthonyxia techniques were as follows;

Of the 642 female participants; 310 (48.30%) stated that they had never heard of podology and orthonyxia techniques, 215 (33.50%) stated that they had only heard of them, and 117 (18.20%) stated that they knew about podology and had been treated in a centre before.

Among 502 male participants; 281 (56,00%) stated that they had never heard of Podology and orthonyxia techniques, 152 (30,30%) stated that they had only heard of it, and 69 (13,70%) stated that they knew Podology and had previously had a procedure at a centre.

According to Pearson chi-square test, the difference between the groups was not statistically significant (p<0.022).

Table 4.7.4. Awareness of Podology according to gender

PODOLOGY AWARENESS									
		PROCEDURE			**JUST HEARD OF**			**NEVER HEARD OF**	
		n	%	p	n	%	p	n	%	p
GENDER	**FEMALE**	117	18,2	<0,022	215	33,5	<0,022	310	48,3	<0,022
	MALE	69	13,7		152	30,3		281	56	

*(*Statistical significance p<0.05 - Pearson Chi-square test)*

4.8. Statistics of methods that can be preferred in the treatment of ITN

The statistics of the methods that 1144 people who participated in the research stated that they would prefer if they had a ITN problem are as follows;

The highest response rate was 392 people (34.30%) who said that they would intervene myself (cutting out the ingrowth, tamponing with cotton, etc.). Those who stated that they would apply to the relevant branch physician were 337 people (29,50%), those who stated that they would have a pedicure were 247 people (21,60%) and those who stated that they would apply to podology were 168 people (14,70%).

Table 4.8. Statistics of the methods that may be preferred in treatment of ITN

TREATMENT PREFERENCE							
SELF-INTERVENTION		PEDICURE PROCESS		PODOLOGIST INTERVENTION		PHYSICIAN INTERVENTION	
n	**%**	**n**	**%**	**n**	**%**	**n**	**%**
392	34,30	247	21,60	168	14,70	337	29,50

(ITN: Ingrown toenail)

4.9. Preferred methods and outcome statistics in the treatment of ITN

Participants were asked to describe the treatment interventions they had used for their ITN problems and the results they received by choosing one of 7 different categories. All 1144 respondents answered the question and 497 (43.40%) answered that they had no history of ITN.

The responses of the participants who preferred surgical intervention were divided into 2 according to the recurrence status and it was found that 67 (5.90%) did not experience recurrence after surgery and 140 (12.20%) experienced recurrence after surgical intervention.

The responses of the participants who preferred podology applications and orthonyxia techniques were also evaluated in 2 groups according to the recurrence criteria. It was determined that 97 (8.50%) of the participants did not experience recurrence after treatment with orthonyxia techniques, while 39 (3.40%) experienced recurrence after orthonyxia.

Among the participants, 276 (24.10%) responded that they found a solution to their ITN problem by intervening themselves, while 28 (2.40%) responded that they could not find a solution despite trying all methods and their chronic ITN complaint continued.

Table 4.9.1. Preferred methods in the treatment of ITN and outcome statistics

TREATMENT PREFERENCE	RECURRENCE	n	%
SURGICAL INTERVENTION	NO	67	5,9
SURGICAL INTERVENTION	YES	140	12,2
PODOLOGICAL INTERVENTION (Orthonyxia)	NO	97	8,5
PODOLOGICAL INTERVENTION (Orthonyxia)	YES	39	3,4
SELF-INTERVENTION	-	276	24,1
TRYING ALL TECHNIQUES	-	28	2,4
NO ITN HISTORY	-	497	43,4

(ITN: Ingrown toenail)

4.9.2. Methods preferred by DM patients in ITN treatment and outcome statistics

Among the participants who answered yes to the DM diagnosis question, 39 (17.90%) preferred surgical intervention and ITN did not recur, 53 (24.30%) had ITN recurrence after surgery. Among the participants who preferred podology applications and orthonyxia techniques, 15 (6.90%) did not recurrence of ITN and 5 (2.30%) had ITN recurrence. 30 people (13.80%) found a solution to the ITN problem by intervening themselves, 2 (0.90%) could not find a solution despite trying all methods and chronic ITN complaint continued, and 74 people (33.90%) answered that they had no history of ITN.

Among the participants who answered no to the question of DM diagnosis, 27 (3.30%) preferred surgical intervention and ITN did not recur, while 74 (9.10%) had recurrence of ITN after surgery. Among the participants who preferred podology applications and orthonyxia techniques, 67 (8.30%) had no recurrence of ITN and 31 (3.80%) had recurrence of ITN. 221 (27.20%) responded that they found a solution to the ITN problem by intervening themselves, 23 (2.80%) could not find a solution despite trying all methods and their chronic ITN complaint continued, and 369 (45.40%) responded that they had no history of ITN.

It was found that 1 (0.90%) of the participants who answered "don't know" to the DM diagnosis question preferred surgical intervention and ITN did not recur, while

13 (11.40%) had recurrence of ITN after surgery. It was found that 15 (13,20%) of the participants who preferred podology applications and orthonyxia techniques did not recurrence of ITN, while 3 (2,60%) had ITN recurrence. 25 (21,90%) of the participants found a solution to the ITN problem by intervening themselves, 3 (2,60%) could not find a solution despite trying all methods and chronic ITN complaint continued, and 54 (47,40%) responded that they had no history of ITN.

The difference between the groups was statistically significant (p<0.001).

Table 4.9.2. Methods preferred by DM patients in the treatment of ITN and outcome statistics

			YES			NO			UNKNOWN		
		Recurrence	**n**	**%**	**p**	**n**	**%**	**p**	**n**	**%**	**p**
	SURGICAL PROCEDURES	**NO**	39	17,9		27	3,3		1	0,9	
TREATMENT PREFERENCE	SURGICAL PROCEDURES	**YES**	53	24,3	<0.001	74	9,1	<0.001	13	11,4	<0.001
	PODOLOGICAL INTERVENTION (Orthonyxia)	**NO**	15	6,9		67	8,3		15	13,2	
	PODOLOGICAL INTERVENTION (Orthonyxia)	**YES**	5	2,3		31	3,8		3	2,6	
	SELF-INTERVENTION	-	30	13,8		221	27,2		25	21,9	
	TRYING ALL TECHNIQUES	-	2	0,9		23	2,8		3	2,6	
	NO ITN HISTORY	-	74	33,9		369	45,4		54	47,4	

*(*Statistical significance p<0.05 - Pearson Chi-square test) (ITN: Ingrown toenail) (DM: Diabetes mellitus)*

5. DISCUSSION AND CONCLUSION

ITN is a common foot health problem that can be seen in all ages and genders. In our study, we examined the general tendencies and health behaviours of adult individuals in Turkey regarding ITN treatments. We also measured the knowledge and behaviours of the participants about podology and ITN treatments (orthonyxia techniques) applied in podology units. In general, non-invasive conservative methods are sufficient in stage 1 and 2 ITN cases, while surgical treatment methods are needed in more advanced stages (46).

Podology applications preferred in the non-invasive treatment of ITN, which is the subject of our research, and orthonyxie (orthonyxia) techniques in the literature are generally applied in stages 1 and 2. Of the 1144 people who participated in our research, 51.70% stated that they had no knowledge about podology. 32.10% had heard of podology procedures but had not had any procedure. Only 16.20% of the participants stated that they had previously undergone a procedure at a podology centre and 43.2% of these people applied to podology for ITN treatment. Since there is no data on podology awareness in the general literature, a comparison with the literature could not be made. The fact that the percentage of application to podology for the treatment of ITN among the general participants is low indicates that the awareness of podology in the society is insufficient and studies should be carried out to promote it. In the data on recurrence rates obtained from our study, it was found that the recurrence rate was 28.67% in orthonyxia treatments and 67.63% in surgical treatments. This significant difference can be attributed to the application of orthonyxia techniques in stage 1 and stage 2, that is, the effect of early intervention. However, it is important to apply to podology in the early stages, to form a basis for the prevention of ITN with the information and guidance provided by the podologist on issues such as correct nail cutting, correct shoe selection, foot hygiene. In our study, in which we examined factors such as ITN and DM in a cause and effect relationship with the awareness of podology, we obtained important statistical data not only on podology and orthonyxia techniques, but also on ITN in general. When we compared ITN with age and gender data, we reached unique data for Turkey, which are not compatible with the literature. In the comparison of ITN with shoe preference, DM factors, we obtained statistically significant and compatible with the literature. No literature data on genetic predisposition could not be reached, but we obtained highly statistically significant data.

Detailed interpretation of the data was made and conclusions and recommendations were explained.

ITN, which can be multifactorial and may occur for many different reasons, is perceived as a simple discomfort by patients in the first stage and the search for treatment is postponed. ITN cases, which reduce the quality of life in advanced stages, can be the trigger of processes leading to amputation, especially in DM patients.

In the treatment of ITN, conservative methods are generally preferred in early and mild cases and surgical methods are preferred in advanced cases, but there is no definite opinion about which treatment should be applied to which patient (46).

ITN treatment is planned according to the stage of the case (89,46). It has been reported that the speciality of the treating professional (dermatologist, general surgeon, orthopedist, podologist/podiatrist, etc.) is another important factor in the choice of treatment (1). In general, non-invasive conservative methods are sufficient in stage 1 and 2 ITN cases, while surgical treatment methods are needed in more advanced stages (46).

Podology applications preferred in the non-invasive treatment of ITN, which is the subject of our research, and orthonyxie (orthonyxia) techniques in the literature are generally applied in stages 1 and 2. Since Podology is a new branch that has started to develop in Turkey since 2011, there is no sociodemographic research conducted in this field in our country. In terms of case studies, there are few publications that include the examination of limited techniques.

It has been reported that 20% of patients presenting to family physicians in Turkey with a problem in their feet have ITN (90).In a national study conducted in 1990 in the normal population in the USA, the incidence of ITN was found to be 2.45% when evaluated for all age groups (91). In our study, the rate of chronic ITN in adults aged 18-60 years in Turkey in 2023 was found to be 15.2%.

In a study published in 2007, it was reported that ITN was common in adolescents and young adults and was more common in males than females. Although it is observed in all age groups, most of the patients were found to be in the first or second decade of life (37). The main reasons for this condition are that sweating, which causes the lateral fold of the nail to be softer, is more common in young people and sportive

activities, which cause spicule formation, increase. In the elderly, spicule formation is mostly associated with lack of self-care, which is secondary to decreased vision or mobility. Increasing nail thickness with age is another factor (92). In our study, the age categories with the highest rate of ITN were found to be 34-42 in the 3rd group and 43-51 in the 4th group. The rate of ITN was 15.12% in the 3rd group and 11.01% in the 4th group. In this respect, our data are not compatible with the age-ITN relationship in the literature.

According to the information in the literature on ITN cases according to gender, ITN is more common in males than females (93). It is also observed that the mean duration of the disease is longer in males than females. Although there is no statistically significant difference between gender and disease duration, it is attributed to the fact that men present to outpatient clinics for ITN later than women (94). Among the participants of our study, the prevalence of chronic ITN was found to be 13.30% in men and 17.30% in women. This rate increases when non-chronic cases are included. Although these rates are not compatible with the literature, it is thought that the fact that the studies accepted as a source were conducted outside Turkey and in old dates may be effective in this situation.

Among the causes of ITN, footwear preferences are considered to be one of the most important mechanical causes. In a study conducted in a normal population, it was found that narrow-fronted shoes increased the opposing pressure of the second toe against the first toe and caused a tendency to ingrowth at the lateral edge [95]. This pressure is transmitted directly to the medial nail edge and indirectly to the lateral nail edge and contributes to the development of ITN by pushing the thumb to the second toe (46). In our study, we analysed the effect of narrow, pointed toe, inappropriate footwear habits and the use of occupational health and safety footwear (OHS) on ITN. Of the participants, 4.9% used OHS shoes and 16.10% of these people reported chronic ITN. The proportion of those who rarely experienced ITN in OHS shoe users was 42.90%. In the light of this information, although the rate of OHS shoe use among the participants in our study was low, the percentage of ITN among the users was found to be significant. Since the areas of use of OHS shoes are especially in heavy industry, construction sites and factories, it should be taken into consideration that individuals who use this type of footwear also work in jobs that require physical strength and long periods of standing. OHS footwear can be considered as a safety apparatus, the use of which is mandatory by

law and which should not be neglected because it protects the foot from greater dangers even if it causes ITN.

The rate of use of shoes with narrow and pointed toes, which are used for work or personal preference in daily life, and which are not suitable for the foot structure, was 15.4% and 25.4% among the participants of our study. The fact that the rate of chronic ITN was 14.30% and the rate of occasional ITN was 46.90% among the people who frequently use the wrong shoes shows that 61.2% of the people who use the wrong shoes have mild or severe ITN problems. In the light of these data, we can conclude that correct shoe selection is one of the factors that should be considered for the prevention of ITN.

In a study examining the relationship between DM and ITN, the incidence was found to be higher in DM patients compared with non-DM patients (46,96). ITN is observed more frequently in diabetic patients (7.5-15.1%) compared to the general population (2.5%) (108). In a study on systemic diseases accompanying ITN, DM was found to be the most common disease affecting ITN with a rate of 7.5% (97), and fungal and bacterial infections frequently seen in the feet of diabetic patients also pave the way for the progression and spread of ITN (98,99). Diabetes is a risk factor for ITN and is associated with the presence of onychomycosis, subungal hyperkeratosis, onychogryphosis, hypertension, obesity, foot trauma, PAH and diabetic neuropathy and improper nail cutting (100,101). In a study, ITN was found in 17.5% of diabetics and no significant relationship was found between ITN and PAH and diabetic neuropathy (102).

According to the DM diagnosis statistics of our study, it was determined that 19.10% of the participants had a diagnosis of diabetes and a large group including 10% doubted DM and answered the question of DM diagnosis as "don't know". When we analysed the DM-ITN relationship, it was found that 24.80% of the 218 participants with a definite diagnosis of diabetes had a history of chronic ITN and 45.90% rarely had ITN complaints (Table 4.5.2). Considering the literature data and the results of our research statistics, which support and confirm each other, it can be concluded that there is a strong and significant link between DM and ITN, and considering these data, studies should be increased to educate and guide DM patients especially about ITN.

The presence of ITN in more than one family member is a sign that the disease is affected by genetic predisposition. It is common for patients presenting to clinics with ITN to report that their family members and close relatives also have chronic

ITN. In the literature, no study on the effect of genetic predisposition has been found in our country. In some foreign sources, genetic predisposition was determined in rare cases and familial cases were reported (46,103). In our study, the participants were asked about individual history of ITN and the degree of the disease (chronic - rare). The same group was asked about the presence of a history of ITN in family members and close relatives, and significant data on genetic predisposition in ITN cases in Turkey were obtained by comparing these data. Of the 165 participants who declared that they had a history of common ITN in their family and relatives, 47 (28.50%) were found to have a history of chronic ITN in themselves. In addition, among the 556 participants who had a history of rare ITN in their family, the rate of those who declared that they also had rare ITN was 50.70% (282), and the rate of those who declared that they had a history of chronic ITN was 19.40% (108). In the light of these data, we can say that the genetic factor is primarily effective in cases of ITN. Further investigation of these two factors, between which we found a high level of correlation, will make a great contribution to the determination of the causes of ITN.

It was determined that 51.70% of the 1144 participants in our study had never heard of Podology and orthonyxia techniques before, while 32.10% had only heard of Podology but had no detailed information about the procedures and had never had a procedure in this field. This large group, which corresponds to 83.80% of the general number of participants and has not met any procedure of the Podology branch in general, not only in orthonyxia techniques, expresses that Podology is insufficient in terms of awareness in our country. It was found that only 16.20% of the participants had previously undergone a procedure at a Podology centre (Table 4.7.1). Among the participants who chronically or rarely experienced ITN, the proportion of those who had undergone a Podology procedure was 7.018% of the overall participation (Table 4.7.2). This difference indicates that the number of respondents who had undergone a podological procedure was 1.3 times higher than the number of respondents who only consulted podology for the treatment of ITN. This shows that orthonyxia treatments were 43.32% of the reasons why patients applied to podology, and 56.68% of the patients preferred podology services for various skin and nail deformities such as onychomycosis, hyperkeratosis, callus treatments and DF procedures, which are other services of Podology apart from orthonyxia techniques. The fact that ITN treatment alone has a preference rate of 43.32% among the care and treatments applied in the Podology branch

shows that the preference rate is high among individuals with Podology knowledge and as the general awareness of the Podology branch in the society increases, the preference of orthonyxia techniques will increase both numerically and in percentage.

One of the most important problems in ITN treatments is the recurrence rates after treatment.

Total nail extraction, which was frequently used in the past, is no longer used except in compulsory cases because of the high recurrence rate. Recurrence rates in partial nail extraction alone are as high as those in total nail extraction (104). In the literature, recurrence rate in partial nail extraction alone is found to be between 73% and 83% (105). There have been studies indicating that matricectomy procedure reduces the recurrence rate in the treatment of advanced ITNs and should be added to the treatment. In a study published in 2010 in Turkey, it was reported that partial matricectomy using partial nail extraction and cryotherapy was an effective treatment method in the treatment of advanced stage ITN (106). There is limited data on invasive or non-invasive treatments performed by physicians of the relevant branch. No data on the recurrence rates of non-invasive ITN treatments (orthonyxia techniques) applied by podology and podologists, which is the main subject of our study, have been found in Turkey and in international publications. In our study, participants were asked about their preferences for ITN treatments and were asked to describe their current ITN status. In the current ITN status options, along with the preferred treatment method, the option of whether the disease had recurred or not was also presented. In this way, data on the preferred treatment modalities and outcomes (recurrence/non-recurrence) in Turkey were obtained. Of the 1144 participants in our study, 18.10% (207) were treated for ITN by consulting the relevant physician, while 11.90% (136) were treated with Podology applications and orthonyxia techniques. Of the 207 patients treated with surgical and chemical methods, 67.63% (140) reported that ITN recurred and the disease still persisted, while 32.36% (67) reported that there was no recurrence and the problem was permanently solved. Of the 136 patients who were treated for ITN with orthonyxia techniques, 71.32% (97) reported no recurrence, 28.67% (39) reported recurrence of ITN and the problem persisted. Based on this information, the recurrence rate in podological ITN treatments with orthonyxia techniques is 39% lower than other medical treatments. The reason for the low recurrence rates in podological applications may be that orthonyxia techniques are primarily applied in stage 1 and partially in stage 2.

The recurrence rate can be reduced in ITN cases that are diagnosed at early stages and intervened early non-invasively with orthonyxia techniques. Before and after the intervention, the patient, who is informed by the Podologist about the factors causing ITN (wrong nail cutting, correct shoe and sock selection, foot hygiene, stepping disorders and bone deformations, etc.), becomes more conscious about ITN. The person who is educated about the factors that cause ITN formation contributes to the prevention of new formations or recurrence situations by acting at a level of awareness that will protect himself and his family from ITN formation. In addition, this type of treatment will also have a positive socio-economic impact, as the patient who prefers ITN treatment with orthonyxia techniques involving only mechanical and applications without the need for surgical or chemical intervention will have the opportunity to return to daily life / work quickly. With the widespread use of podology applications and orthonyxia techniques, which are developing moderately in the world and very slowly in our country, foot health awareness will develop in the society and preventive-preventive services against the formation of many foot skin and nail diseases, especially DF cases, will reach larger masses.

Limitations of the study

In this study, the occupational categories of the participants were discussed in general terms. The fact that working hours, physical activity intensity and working conditions could not be addressed in detail for each occupation caused the aspect of this study that examines the relationship between occupations and ingrown toenails to remain weak. More detailed data can be presented by evaluating every aspect in a study that deals with the relationship between occupations and ingrown toenails or the relationship between occupations and foot diseases in general.

The relationship between factors such as active sports habits of the participants, BMI (body mass index) and ingrown toenails was not evaluated in this study. The relationship between BMI and ITN, especially in the context of obesity- ingrown toenail, and the relationship between sports habits and ingrown toenail are subjects that need to be evaluated in detail within the scope of sports podology, which is one of the sub-branches of Podology, each of which can constitute a research topic in itself.

In the literature search results, sufficient scientific studies and data in the field of Podology in Turkey and in the world could not be reached. This situation has been a limitation in terms of the possibility of comparing and comparing the data obtained from this study with different scientific research data.

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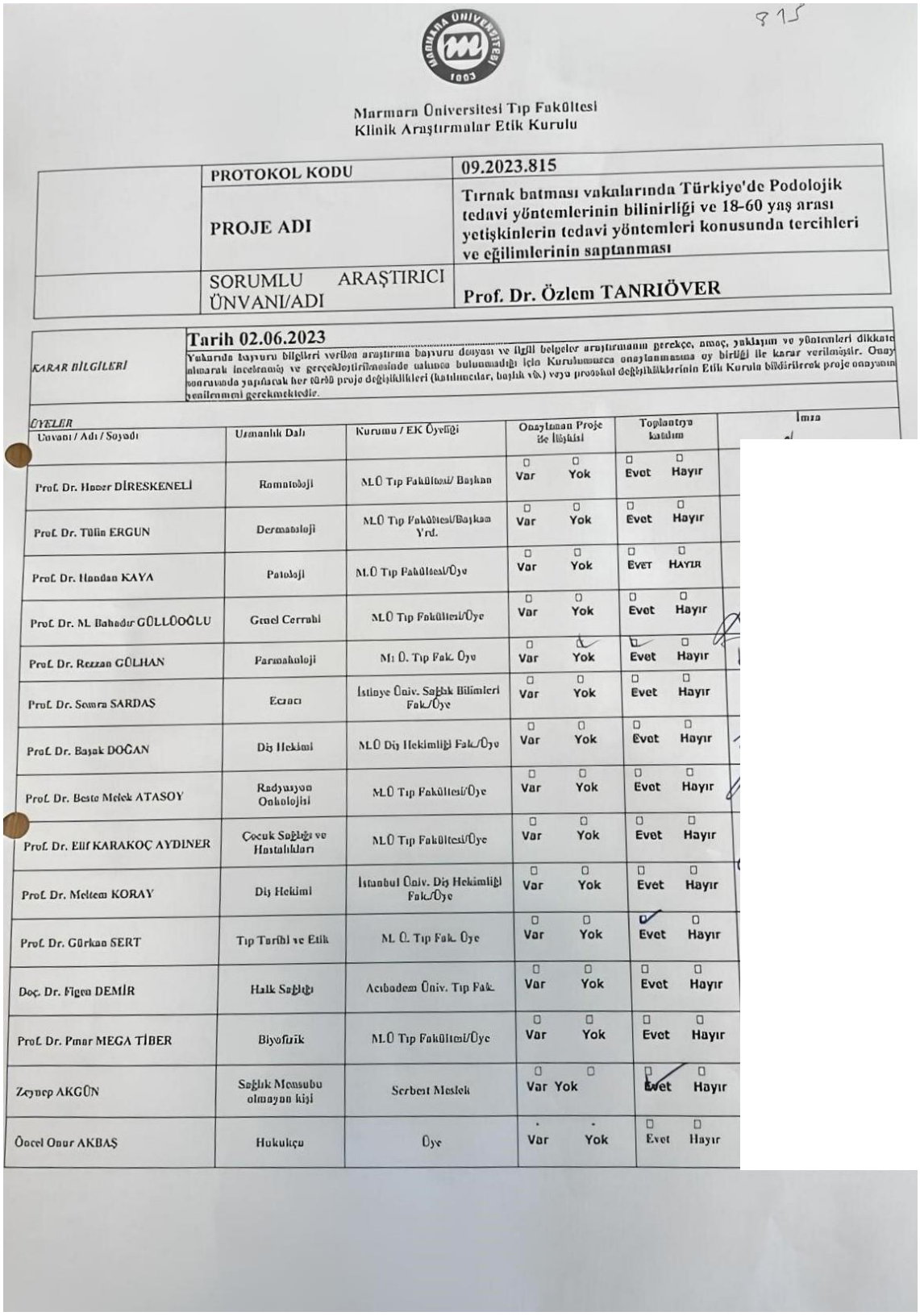
APPENDIX 1. ETHICS COMMITTEE DECISION



Marmara Üniversitesi Tıp Fakültesi
Klinik Araştırmalar Etik Kurulu

	PROTOKOL KODU	09.2023.815
	PROJE ADI	Tırnak batması vakalarında Türkiye'de Podolojik tedavi yöntemlerinin bilinirliği ve 18-60 yaş arası yetişkinlerin tedavi yöntemleri konusunda tercihleri ve eğilimlerinin saptanması
	SORUMLU ARAŞTIRICI ÜNVANI/ADI	Prof. Dr. Özlem TANRIÖVER

KARAR BİLGİLERİ	**Tarih 02.06.2023** Yukarıda başvuru bilgileri verilen araştırma başvuru dosyası ve ilgili belgeler araştırmanın gerekçe, amaç, yaklaşım ve yöntemleri dikkate alınarak incelenmiş ve gerçekleştirilmesinde sakınca bulunmadığı için Kurulumuzca onaylanmasına oy birliği ile karar verilmiştir. Onay sonrasında yapılacak her türlü proje değişiklikleri (katılımcılar, başlık vb.) veya protokol değişikliklerinin Etik Kurula bildirilerek proje onayının yenilenmesi gerekmektedir.

ÜYELER

Unvanı / Adı / Soyadı	Uzmanlık Dalı	Kurumu / EK Üyeliği	Onaylanan Proje ile İlişkisi	Toplantıya katılım	İmza
Prof. Dr. Hasan DİRESKENELİ	Romatoloji	MÜ Tıp Fakültesi/ Başkan	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Tülin ERGUN	Dermatoloji	MÜ Tıp Fakültesi/Başkan Yrd.	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Handan KAYA	Patoloji	MÜ Tıp Fakültesi/Üye	☐ Var ☐ Yok	☐ EVET ☐ HAYIR	
Prof. Dr. M. Bahadır GÜLLÜOĞLU	Genel Cerrahi	MÜ Tıp Fakültesi/Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Rezzan GÜLHAN	Farmakoloji	Mİ Ü. Tıp Fak. Üye	☐ Var ☑ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Semra SARDAŞ	Eczacı	İstinye Üniv. Sağlık Bilimleri Fak./Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Başak DOĞAN	Diş Hekimi	MÜ Diş Hekimliği Fak./Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Beste Melek ATASOY	Radyasyon Onkolojisi	MÜ Tıp Fakültesi/Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Elif KARAKOÇ AYDINER	Çocuk Sağlığı ve Hastalıkları	MÜ Tıp Fakültesi/Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Meltem KORAY	Diş Hekimi	İstanbul Üniv. Diş Hekimliği Fak./Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Gürkan SERT	Tıp Tarihi ve Etik	Mİ Ü. Tıp Fak. Üye	☐ Var ☐ Yok	☑ Evet ☐ Hayır	
Doç. Dr. Figen DEMİR	Halk Sağlığı	Acıbadem Üniv. Tıp Fak.	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Prof. Dr. Pınar MEGA TİBER	Biyofizik	MÜ Tıp Fakültesi/Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	
Zeynep AKGÜN	Sağlık Mensubu olmayan kişi	Serbest Meslek	☐ Var ☐ Yok	☑ Evet ☐ Hayır	
Ömcel Onur AKBAŞ	Hukukçu	Üye	☐ Var ☐ Yok	☐ Evet ☐ Hayır	

APPENDIX 2. SURVEY

Tırnak batması vakalarında Türkiye'de Podolojik tedavi yöntemlerinin bilinirliğive 18-60 yaş arası yetişkinlerin tedavi yöntemleri konusunda tercihleri ve eğilimlerinin saptanması

Sn. Katılımcı

Bu anket formu, Yeditepe Üniversitesi Sağlık Bilimleri Enstitüsü Halk Sağlığı Yüksek Lisans programı kapsamında, Prof. Dr. Özlem TANRIÖVER danışmanlığında, Türkiye'de bireylerin yaşadığı tırnak batması sorunlarını çözmek için başvurdukları yöntemleri, tercihkriterlerini ve sonuçlarını belirleyerek; tırnak batması vakalarının önlenmesi ve tedavilerin doğru seçiminin sağlanmasını amaçlayan YL. tez çalışmasına veri sağlamak amacıyla düzenlenmiştir. Araştırmaya katılım gönüllülük esasına dayanmaktadır. Anket formunda adınız/soyadınız istenmeyecektir. Araştırma sonucunda elde edilecek veriler bilimsel amaçlı olarak vesadece bu çalışma için değerlendirilecektir. Soruları yanıtlarken en net veya size en yakın olan yanıtı seçmeniz sonuçların sağlığı açısından önemlidir.

Züleyha Akın
YEDİTEPE ÜNİVERSİTESİ
SAĞLIK BİLİMLERİ ENSTİTÜSÜ
HALK SAĞLIĞI YL. PROGRAMI

* Zorunlu soruyu belirtir

1. Araştırma açıklama metnini okudum, anladım ve çalışmaya katılmayı onaylıyorum. *

Yalnızca bir şıkkı işaretleyin.

- ◯ Evet, onaylıyorum. *2. soruya gidin*
- ◯ Hayır, onaylamıyorum.

1) CİNSİYETİNİZ

Yalnızca bir şıkkı işaretleyin.

KADIN

ERKEK

Diğer:

2) YAŞINIZ (18-60 arası yaşınızı sayıyla yazınız)

3) EĞİTİM DURUMUNUZ

Yalnızca bir şıkkı işaretleyin.

İLKÖĞRETİM

LİSE VE DENGİ

ÖN LİSANS

LİSANS

LİSANS ÜSTÜ

Diğer:

4) MEDENİ DURUMUNUZ

Yalnızca bir şıkkı işaretleyin.

- EVLİ
- BEKAR

5) MESLEĞİNİZ

Yalnızca bir şıkkı işaretleyin.

- İŞÇİ
- MEMUR
- EMEKLİ
- EV HANIMI
- ÖĞRENCİ
- SERBEST MESLEK
- ÇALIŞMIYOR
- Diğer:

6) BEDEN GÜCÜ GEREKTİREN BİR İŞTE ÇALIŞIYORUM

Yalnızca bir şıkkı işaretleyin.

Evet

Hayır

7) UZUN SAATLER AYAKTA ÇALIŞIYORUM

Yalnızca bir şıkkı işaretleyin.

Evet

Hayır

8) İŞ GÜVENLİĞİ AYAKKABISI KULLANIYORUM

Yalnızca bir şıkkı işaretleyin.

Evet

Hayır

9) İŞİM NEDENİYLE, AYAK TİPİME ÇOK UYGUN OLMAYAN, RAHATSIZ AYAKKABILAR KULLANIYORUM

(Erkeklerde kundura tipi, kadınlarda topuklu ve dar ayakkabılar vb.)

Yalnızca bir şıkkı işaretleyin.

- Evet
- Hayır
- Nadiren

10) DİYABET (ŞEKER HASTALIĞI) TEŞHİSİM VAR

Yalnızca bir şıkkı işaretleyin.

- Evet
- Hayır
- Bilmiyorum

11) HAYATINIZ BOYUNCA TIRNAK BATMASI SORUNU YAŞADINIZ MI?

Yalnızca bir şıkkı işaretleyin.

- Evet, nadiren
- Evet, sıklıkla tekrar eden kronik batık sorunum var
- Hayır, hiç tırnak batması yaşamadım

12) AİLE BİREYLERİM VEYA 2.-3. DERECE AKRABALARIMDA DA TIRNAK BATMASI VAR

Yalnızca bir şıkkı işaretleyin.

- Evet, çok yaygın.
- Evet, nadiren var.
- Hayır, hiçbir akrabamda yok.

13) PODOLOJİ UYGULAMALARI İLE TIRNAK BATMASI TEDAVİLERİ KONUSUNDA BİLGİ SAHİBİ MİSİNİZ? (Tırnak teli, tırnak bantı, tampon, freze makinesiyle tırnak temizliği vb. işlemler Podoloji alanındadır)

Yalnızca bir şıkkı işaretleyin.

- Evet, daha önce Podoloji merkezinde işlem yaptırdım
- Evet, sadece duydum
- Hayır, hiç duymadım

14) TIRNAĞINIZ BATTIĞINDA AŞAĞIDAKİLERDEN HANGİSİNİ YAPARSINIZ?

Yalnızca bir şıkkı işaretleyin.

- Kendim müdahale ederim (batığı keserek çıkarma, pamuk koyma vb.)
- Pedikür yaptırırım
- Podolojiye başvururum (bakım, tel uygulama, bant uygulama, tampon vs.)
- Hekime başvururum (Ortopedi ve Travmatoloji, Genel Cerrahi, Dermatoloji vb)
- Diğer:

15) BATIK TIRNAK PROBLEMİNİZ HAKKINDA AŞAĞIDAKİ TANIMLARDAN HANGİSİ DOĞRUDUR?

Yalnızca bir şıkkı işaretleyin.

- Cerrahi çözüme başvurdum ve tekrar etmedi
- Cerrahi çözüme başvurdum ancak tekrar etti
- Podolojiye başvurdum ve tekrar etmedi
- Podolojiye başvurdum ancak tekrar etti
- Hiçbirini denemedim,kendim çözüm buldum.
- Hepsini denedim, çözüm bulamadım, problemim devam ediyor.
- Hiç tırnak batması problemi yaşamadım.
- Diğer:

APPENDIX 3. BIOGRAPHY

Personal Information				
Name: Züleyha				
Surname: Akın				
Education Status				
Associate degree : Podology / Acıbadem University / 2018				
Undergraduate degree : Sociology Istanbul University / 2014				
Work Experience				
Position Institution Duration				
Podolog / Podiclinic Foot Health Centre / 2018-Present				
Podolog / Kizilay Medical Centre Bakirkoy / 2016-2018				
Computer Information				
Ability to use the programme	**Very good**	**Good**	**Medium**	**Poor**
Microsoft Office	**x**			
SPSS		**x**		
Scientific Studies				
Projects/Certificates/Awards				

- March 2019 / Kinesio taping techniques in foot orthopaedic disorders / Workshop / Istanbul
- March 2019 / Personalised orthotics and insoles application course / Workshop / Istanbul
- September-May 2018 / Pedagogical Formation and Educational Sciences / Istanbul University
- April 2018 / Medical Aromatherapy Symposium / Kızılay Medical Centre
- May 2017 / 1. Podology Congress / Acibadem University
- March 2017 / Orthotic Prosthesis Symposium / Istanbul Aydın University
- September 2017 / Wound and Ostomy Symposium / İstanbul
- May 2015 / Medical Foot Care Instructor Training Course / Online
- May 2014 / Medical Foot Care Techniques Course / İstanbul