



REVIEW ARTICLE



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Therapeutic Approaches in the Management of Plantar Warts by Human Papillomaviruses: A review

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Abstract

Warts are generally small, painless growths on the skin caused by a virus called Human Papilloma Virus (HPV). HPV are DNA viruses of the papovavirus family, there are more than 120 types already described. They are also called as verrucas; there are different types of warts, which include common warts, genital warts and plantar warts. These warts are classified based on the area they are present. Plantar warts are usually seen on the soles of the feet causing severe pain while walking or running. This article describe about the causes, symptoms, treatment and prevention methods for plantar warts.

Keywords: Plantar warts, Human Papilloma Virus (HPV), complications and treatment options.

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1. INTRODUCTION

A plantar wart (also known as *Verruca plantaris*) is a wart caused by Human papilloma virus (HPV) which enters the human body through tiny cuts and breaks through the skin, occurring on soles or toes of the feet^[4]. The most common location for plantar warts include: a) Soles of the feet, especially the weight bearing areas like heels and balls of the feet. b)

Undersides of the toes. Plantar warts may occur singly or in cluster in the form of mosaic warts. They appear as thick, rough callus like thickening on the soles of the feet. In addition they often have multiple small black "dots" at the surface which are actually tiny blood vessels. Because the incubation period for warts is from 1-20 months, it is introduced into the body.

Types of Infection

The infections with plantar warts can be described as follows: 1) Small plantar warts – One or few small, painless lesions. 2) Moderate plantar warts – multiple lesions which may be uncomfortable. 3) Giant plantar warts – warts cover a large part of the sole of the feet and may cause significant discomfort and pain (Figure 1-3).



Small plantar wart

Moderate plantar warts

Giant warts

Signs and symptoms

The signs and symptoms of plantar warts include small, fleshy and grainy bumps on the soles of the feet. Gray or brown lumps with one or more black pinpoints, which are small, clotted blood vessels also pain and or tenderness while walking.

Causes

The warts are acquired through direct contact with HPV. There are more than 120 types of HPV. Plantar warts are caused by HPV type 1, 2, 4 and 63. The virus that causes plantar warts is not highly contagious but it thrives in warm and moist environment. So it may be acquired by walking bare foot in public places. Like other infectious diseases, HPV may also pass from person to person. Each person's immune system responds to warts differently, so not everyone who comes in contact with HPV develops warts. Even people in the same family react to the virus differently^[2].

Risk factors

Plantar warts are more likely to appear on the feet of the person with damaged/cut skin weakened immune system. Children and teenager tend to be especially vulnerable to warts^[3].

Incidence

HPV is one of the most common infections in the world, infecting about 40 percent of the population^[4]. Warts represent one of the most common skin diseases, affecting about 7 to 10 percent of the world population^[5]. Warts can affect person of any age, but are most common in 12 – 16 years old^[6]. Those with HIV or organ transplants or on chemotherapy have a higher incidence of warts due to their weakened immune system.

Complications

Plantar warts can be persistent; they can shed the virus into the skin of the foot before they are treated, prompting new warts to grow as fast as the old once disappear. The best defense is to treat new warts as quickly as possible, so that they have little time to spread. If left untreated warts will enlarge and spread, developing in to clusters of warts called mosaic warts. They may also become extremely painful. If a person has lots of plantar warts, the pain may make it difficult for the person to walk or run. The complications of being affected by plantar warts are as follows a) Spread of warts b) Return of warts that disappeared c) Minor scar formation if the wart is removed d) Formation of keloids after removal.

Treatment options

The options for treating plantar warts are as follows a) Freezing with liquid nitrogen (Cryosurgery) b) Burning with an electric needle (electrocautery) c) Using a laser to disrupt the blood supply of the warts d) Application of Cantharidin, Podophylline, Tretinoin or Salicylic acid. e) Injecting Candida antigen (allergy causing protein) or Bleomycin (Chemotherapy drug) directly in to warts.

Freezing

(Cryotherapy or liquid nitrogen) therapy is the application of liquid nitrogen with spray canister to freeze and destroy the wart. The chemical causes a blister to be formed around the wart and the dead tissue sloughs off within a week. Freezing therapy may be painful so not recommended for young children^[7].

Heat treatment is done using infra-red heat producing device which heats the warts to 44° C (111 ° F) without touching the patients skin^[8]. This approach is called local hypothermia.

Minor surgery (electrocautery) involves cutting away the wart or destroying the wart by using an electric needle using anesthesia. This process is called electro desiccation.

Debridement: In this technique, a scalpel is used to cut the warts off under anesthesia. The virus is killed and warts are preventing from re-growing^[9].

Laser surgery: Several types of lasers are used to eliminate stubborn warts. Laser surgery is expensive

and painful and may require multiple sessions to treat the warts.

Duct tape therapy: In duct tape treatment, warts are covered in duct tape for six days, and then warts are soaked in water and rubbed with emery board or pumice stone^[10]. This therapy is often combined with salicylic acid. Duct tape is commonly used to treat warts, especially in children who may find freezing painful or scary^[11].

Application of Salicylic acid: 40 percent of salicylic acid solution should be applied once or twice daily. This acts by peeling off the infected skin. Since it is counter irritant over application of the product can irritate the skin with burning sensation^[12]. In between the applications, the dead skin and wart tissues should be removed using a pumice stone. This process is continued for several weeks to completely eliminate warts.

Treatment of plantar warts using drugs: Cantharidin, is a terpenoid, which is a chemical compound secreted by many species of blister beetle, and most notably by the Spanish fly. It can be applied on the plantar warts. Cantharidin also combined with salicylic acid and applies on the warts covered with bandage.

Immunotherapy: This helps to harness body's natural rejection system to remove tough to treat warts. The warts are injected with Interferon, that boosts the instinct of the immune system to reject warts, or the warts are injected with mumps antigen^[13] that stimulates the immune system. Hence the antigen sets off an immune reaction that may fight off warts.

Imiquimod: Imiquimod (Cream preparation) is used for treatment for genital and perianal warts and also for common warts and plantar warts^[14]. It acts by releasing cytokines from immune system to ward off warts. Side effects include muscle weakness, fever, swelling, pain etc.

Bleomycin: In severe cases, the warts are not removed by other therapies; wart may be injected with Bleomycin which kills the virus^[15].

20 % Formalin A mixture of 20% formalin in aqueous solution is applied daily after showering.

Home Remedies for Removal of Plantar Warts

Raw Garlic: Garlic has antiviral, antibacterial; actions that may help to remove warts more rapidly. Apply little volume of castor oil or olive oil to the wart, and follow with a thin slice of garlic. Tape the garlic in place with surgical tape, and leave on overnight. Repeat every night for up to two weeks or until the wart disappears.

Tea Tree Oil, Aloe Vera Gel: Apply a small volume of these "antiviral" herbs on the wart two-three times a day until the wart is disappears. If irritation persists, dilute the oil or extract with water or any vegetable oil^[16].

Banana peel: Take small piece of banana peel and place it on the wart area and tape it and leave overnight, repeat about two to three weeks for better result.

Lemon oil: Dip cotton in the lemon (essential) oil, and tap it with surgical tape, take this treatment for about four to five weeks to get rid of warts.

Turmeric: Paste of fresh-scraped turmeric roots applied on the warts.

Ayurvedic approach in the management of warts

a) Lekhana karma (scraping procedure) - Mixture of lime and copper sulfate is applied on the wart, after it is rubbed by the stalk of the betel leaf (Piper betle) ^[17] from the base continuously till cutting of the full base of the wart. b) Rubbing the thick paste of the Changeri leaves (Oxalis corniculata on the wart^[18]. c) Application of the Kshara Jala (alkali) - The concentrated solution alkali should be applied only over the warts for about 4-5 h till it will get fall. d) Horse hair or Kshara sutra is tied around the base of wart. e) Thermal cauterization (Agnikarma) - the warts are excised by red hot Shalaka (sharp or pointed metallic rod) or electro cautery.

Prevention: The risk of acquiring plantar warts can be reduced by following the measures given below 1) Feet should be kept clean and dry 2) Always avoid direct contact with warts, including one's own warts 3) Not to walk bare foot in public places 4) Avoid picking warts, as it may spread the virus^[19].

Discussion: In the management of the warts, the procedures described are beneficial in specific type of the wart. The above discussed procedures may destroy the viral colonies and recurrence can be conveniently avoided. If excision procedure is used then proper dressing of the wart area is very important to prevent recurrence. An internal medication also helps to avoid recurrence. Number of wart treatment has been attempted but choosing the best wart treatment can be difficult. Invasive methods are always painful and needs long recovery period. Topical treatment and other applications are usually dependent on the patient compliance and needs long application periods.

Conclusion: Plantar warts, though not very serious or cancerous in nature, and are unwanted growths that occur on sole, heel or ball of the foot. Anyone can be infected by HPV virus that causes plantar warts. The treatment should not be delayed or ignored, as they can be extremely painful, if left untreated. Some of the parasurgical methods described in Ayurveda are effective and can avoid recurrence of warts.

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