Overview

The significance of nails as indicators of health status has been recognised as early as the 5th century B.C. when Hippocrates first described clubbing as a symptom of disease. Nails are often referred to as the barometer of overall health. Everything one sees on the outside of the body is a reflection of something going on inside.

The colour, texture and shape of the nails reflect the general health of an individual, which may signify underlying systemic diseases. Trauma to the nails should always first be excluded, as well as a thorough physical examination to substantiate any health concerns. However, not every change in the colour or texture of the nails indicates a systemic disease. Old age causes nails to become drier, more brittle and less flexible, due to its loss of moisture and suppleness; damage to the nail changes the colour to purple/black; certain drugs and chemotherapy agents may also alter the colour of the nails, and heredity may also be a factor to consider.

Between the keratin layers are fat molecules and water, which give nails their pliability and shiny appearance. Nails which are too soft are more easily damaged and stained and are at risk of peeling or becoming pitted. Frequent exposure to water exposes the nail to becoming infected. Nail plates that become too flexible will lose their strength, whereas nail plates which are too hard will lose their flexibility. The strength of the nails must be balanced with flexibility.

The growth of the nails is also an indicator of health status, which is dependent on many factors, including illness, stress, age and biting or improper cutting. The average fingernail growth is 3 mm per month, or about 0.1 mm per day, which requires about 6 months for complete re-growth, thereby visually portraying the health of a person over this period of time. Toenails take about 12-18 months to regrow, which is two to three times as long as fingernails.

The Tibb perspective of nails as an indicator of health status considers the qualities of heat, moisture, coldness and dryness, as well as the individual temperament in determining the predisposition to certain conditions. General lifestyle factors, especially concerning diet and stress, play significant roles in determining the health status of an individual. Food intolerances and nutritional deficiencies, such as a depletion of sulphur in the amino acids, interfere with the binding of keratin, which is responsible for the hard covering of the nail. Emotional stress not only can result in the nails becoming brittle and developing ridges, it also impacts on all other areas of the body. Adequate water intake, exercise, stress reduction, sleep, fresh air and elimination of waste products from the body and retention of valuable nutrients all
contribute to health and wellbeing. A healthy and well balanced diet should contain the necessary vitamins and minerals to sustain a healthy mind and body.

**Anatomical Structures of the Nail.**

Nails, together with hair, sebaceous and sweat glands are considered to be appendages of the skin. Nails are part of the epidermis, the outer layer of the skin, and are composed of very small cells, called onychocytes, which are mainly made up of keratin, which is a fibrous protein. Nails are very absorbent; ten times more absorbent than skin.\(^1\)

The **nail bed** is part of the nail matrix, and is situated from the edge of the germinal matrix, or lanula, to the hyponychium. It contains blood vessels, nerves, and melanin-producing cells.

The **nail plate** is the hard cover of the nail, called **keratin**, which is situated on the dorsal aspect of the distal phalanx. The keratin is dead cells (also makes up hair and skin) which are produced by the lanula. The nail plate takes on the colour corresponding to the underlying vascular nail bed, and it receives its vascularity from the ulnar and radial digital arteries. The nail plate has many layers which arise from the germinal **matrix** epithelium (root) of the nail bed. The matrix contains blood vessels, nerves and lymph.

The **lateral nail fold**, or **perionychium**, is the epidermis which overlies the sides of the nail plate. It is the site of hangnails, ingrown nails, and an infection of the skin called paronychia.

The **cuticle**, or **eponychium**, is the dead skin at the base of the fingernail or toenail, and is situated between the skin of the finger and the nail plate fusing these structures together and providing a waterproof barrier.

The **hyponychium** is the bed of soft tissue just under the nail at the distal end of the finger, also known as the ‘**quick**’, which acts as a waterproof barrier to reduce the risk of infection, and is rich in white blood cells.

The **lanula** is the white semicircle (half-moon) of the proximal part of the nail plate, where the matrix extends just beyond the nail fold. This half-moon appearance is due to the nail bed being so tightly packed with keratin, that the capillaries (where the blood flows through) are masked by the amount of keratin. When the lanula is not
present, this may indicate an underactive thyroid; however, an overlarge lanula may indicate an over-active thyroid.²

The Tibb Perspective

From a Tibb perspective, the predisposition for certain conditions and status of the hydration of the nails is reflected by the temperament of an individual and its respective qualities of heat, moisture, coldness and dryness. The Melancholic and Bilious temperaments have the predisposition to have dry skin and hence dry and brittle nails because of their overall dry qualities; whereas the Sanguinous and Phlegmatic temperaments are more prone to moist skin and softer nails due to their overall moist qualities.

A balance of these qualities is necessary to prevent nails from becoming too dry or too soft, which can be achieved through lifestyle factors, especially a diet rich in the essential minerals and vitamins, which must be properly absorbed and assimilated by the body.

The Melancholic temperament is prone to conditions related to an increase in cold and dryness, such as brittle nails, which break easily due to lack of moisture and keratin. Keratin is derived from the Greek word, Kepas, meaning horn. The keratin is made up of protein, which is the major structural component making up the nails, hair and epidermal layer of the skin. In Tibb protein has an overall quality of dryness, with degrees of heat or coldness and the least amount of moistness. Thickening of the nails can also occur from psoriasis and dry eczema, which have qualities of coldness with dryness.

The Sanguinous temperament has qualities of heat and moisture, which, when in the correct proportion and quantity, has a balanced interaction of heat and moisture, which is necessary for the healthy growth of nails. The Bilious temperament is also prone to hard and brittle nails because of the predominance of heat and dryness; whereas the Phlegmatic temperament is prone to nails which may become too soft, due to the predominance of cold and moist qualities.

Nail Examination

Examination of the nails will not only reveal the overall vitality of the body and underlying pathology, it will also indicate the inner emotional state of the person, as well as occupation, hobbies, and nutritional status.³

All the fingernails and toenails must be examined, together with the skin, mucosa and the rest of the body, as any systemic disorders will reflect the overall health of the nails as well as the body itself. The capillary refill test as well as the Schamroth sign are standardised tests to exclude vascular changes and clubbing respectively. Blood tests or any other tests may have to be performed if systemic disorders or infections are suspected. Any obvious trauma or injuries must first be excluded.
Nails should be examined under natural light and without any protective shields, such as nail polish or nail extensions. Transillumination, using a pen torch placed against the pulp of the finger, helps in pointing out the abnormalities in the nail plate.\(^4\)

The hands must be placed on a surface, which is comfortable to the client so that he/she is relaxed. There must not be any pressure on the hands, as this could alter the vasculature of the nail bed, thereby changing the appearance of the nails. All the nails are examined to include all the anatomical structures, nail colour, textures, shape, thickness or thinness, separation from the nail plate, nail patterns, how many nails affected, as well as establishing nail growth.

The surrounding skin is also examined for any changes in skin texture, namely dryness, heat, moisture and any coldness, as well as any bleeding around the nails or signs of inflammation (red, hot swollen, or any pain).

History taking will include any trauma, recent severe illness, familiar nail disorders, medical background and the use of drugs. Occupational hazards will include people who work with their hands in water, or who work with hazardous materials and poisons.

Each fingernail and toenail is examined individually, and a comparative review is done according to the norm. Fingernails should be pink, with a slight sheen, warm, slightly pliable, with no cracks or ingrown nails. The skin around the nails should be slightly warm and moist, but not too dry. Nails should bend slightly when downward pressure is applied to the free edge, which indicates a balance of heat and moisture in the body.

**Nail Tests**

Nail tests include the *capillary refill test* (blanching), and the *Schamroth sign*, for clubbing. If a systemic disease, abnormality or any deficiency is suspected, additional blood tests or scans may be require to verify the findings and to determine the course of treatment. Referral to a specialist must always be considered where necessary. Nail cultures are necessary for fungal infections, so that cultures will determine the exact nature of the infection.

**Capillary Nail Refill Test**

Nail diagnosis has been recorded and described in detail in the 19\(^{th}\) century, Qing Dynasty, by Zhou Xuehai, who observed *blood circulation in the nail matrix*, by pressing the finger against the nail.\(^5\)

This test is used in clinical practice today which is known as the capillary nail refill test, also known as *blanching*. This is an indicator of nail perfusion. Pressure is applied to the nail bed until it turns white. This indicates that the blood has been forced from the tissue, also known as blanching. Once the tissue has blanched, pressure is removed. While the patient holds his hand above his heart, the practitioner measures the time it takes for blood to return to the tissue; the finger should return to
its pink colour in less than 2 seconds after the pressure has been removed. Blanch
time which is greater than 2 seconds may indicate dehydration, shock, peripheral
vascular disease or hypothermia.\textsuperscript{6}

\textbf{The Schamroth Sign}

The Schamroth sign, or the \textit{diamond test}, is defined as the absence of a closed
triangular space described by the nails of two index fingers when their distal
phalanges are held in dorsal opposition, as in clubbing.\textsuperscript{7} This is performed by putting
the dorsal aspects of the distal phalanges together, and looking at the space formed
by the nails. If there is \textbf{no diamond shape} visible, the test for clubbing is \textbf{positive}.\textsuperscript{8}

\textbf{Thickening, Breaking and Splitting of Nails}

Slowness in the growth of nails produces nail thickening. Nails which are dry, brittle
and which crack easily may be deficient on vitamins A, biotin, essential fatty acids,
and moisture. Eating disorders and chemotherapy may have chronic brittleleness due
to severe protein deficiency.

As the nails are very absorbent, water is easily absorbed into the nail, especially
after taking a long bath. The water then diffuses back out, and this constant change
in the water content in the nail causes the cells to expand and contract. This change
in size of the cells to accommodate more or less water puts a lot of stain on the
nails.\textsuperscript{1}

Seasonal weather changes, with fluctuating temperatures, from heated indoors to the
cold outdoors has variable changes in humidity, which also puts stain on the nails.
Chemical exposure, from overuse of nail hardeners, causes the nail to become dry,
hard, rigid and brittle, causing nail breakage.

Nails may become thicker with age, due to an increase in coldness and dryness, and
become drier due to decreasing nourishment and poor circulation. Both ageing and
repeated injuries reduce the amount of minerals of the nails, which keratin needs.

The University of Maryland report that nails can also become thicker from a \textit{lack of iron or zinc}.\textsuperscript{9} Splitting and cracking of the nails may be a sign of hyperthyroidism,
hypothyroidism, or anaemia. Heredity may also play a factor in brittle nails. Thin,
brITTLE nails may indicate osteopenia, or systemic amyloidosis – a yellow waxy
flaking.\textsuperscript{3}

\textbf{Soft nails}

Soft nails may occur as a result of keratin protein deficiency from a poor diet, which
can easily be resolved by consuming protein-rich foods, as this helps to build tissue,
in addition to minerals and vitamins. Frequent exposure to water also softens nails,
which makes them more susceptible to damage and infections. Nail hardeners can
be used to strengthen weak and thin nails.
The Colour of Nails

Nail dyschromia or chromonychia is defined as an abnormality in the colour of the substance or the surface of the nail plate or subungual tissue. The discoloration, specifically due to the deposition of melanin, is labelled as nail pigmentation. When the dyschromia is due to external factors, such as occupational exposure or dyes, such as henna, the nail discolouration will follow the shape of the proximal nail fold. When the dyschromia is due to internal factors, such as an over production or storage of nail pigments, the nail discolouration corresponds to the shape of the lanula. Certain drugs including minocycline, cancer chemotherapy agents, and antimalarial drugs may cause nail dyschromia.

The colour of fingernails should be a healthy pink colour and they represent a snapshot of a person’s health over the last six months, and may reveal diseases, usage of certain drugs, nutritional deficiencies or a reaction of the body to cold or trauma.

If the lanula is absent it may be indicative of anaemia, low cellular oxygen levels, poor circulation or malnutrition. A pale blue lanula may be suggestive of diabetes mellitus. In people with Wilson’s disease, the lanula takes on a blue colouration, called azure lunula, Silver poisoning will turn the nail itself a blue-grey colour, and tetracycline therapy can turn it yellow. A red discolouration of the lanula may either indicate cardiovascular disease, collagen vascular disease or hematologic malignancy.

Leukonychia

There are several types of Leukonychia, which represent different conditions, depending on the area on the nail where the pathology originates, namely: Leukonychia punctate, Mee’s lines, Muehrcke lines, Lindsay’s nails and Terry’s nails.

Leukonychia punctate

Leukonychia punctata are white spots or transverse streaks on the nail which may result from minor trauma to the cuticle or matrix of the nail. They are non-uniform, which can be single or multiple and which does grow out.
A true leukonychia is a defect in the nail matrix, causing the nail plate to take on an opaque white appearance, due to the diffraction of light and disorganisation of the keratin fibrils. This may also occur in psoriasis or in response to an excess consumption of refined sugars, which lead to deficiencies in trace minerals if the body does not receive these minerals elsewhere in the diet. This is because the body compensates by utilising the trace minerals from the tissues and organs of the body, thereby depleting its resources. This leads to domino effects of other deficiencies, such as zinc, thiamine and calcium. By reducing the intake of refined sugars and increasing the intake of zinc, normality will be restored if the cause is from nutritional deficiencies.

Green nails can be caused by allergies from cleaning agents, from bacterial and fungal infections, as well as advanced emphysema, due to a severe lack of oxygen in the bloodstream. In Tibb emphysema has qualities of coldness with dryness. Green-black nails may be caused by an overgrowth of bacteria, from pseudomonas, especially under loose nails. Fungal infections, also known as tinea unguium or onychomycosis, can be white, green, yellow or black in colour, and may occur with people who work with their hands immersed in water.

Blue nails may indicate constriction of blood supply due to coldness. They may be present with cyanosis, which is an inability of the body to supply oxygenated red blood to the extremities, due to cardiac-related conditions. Blue nails or pale nails may indicate iron deficiency (anaemia). A blue colour may indicate critical diseases, such as pulmonary obstruction, emphysema or other lung disease as well as arterio-venous malformation.

A blue discoloration of nails is most commonly drug induced, such as Minocycline, which a very small lanula, as well as cutaneous and mucosal discoloration. This may be due to dermal deposition of iron chelates. Anti-malarial drugs may cause a blue brown discoloration probably due to the deposition of melanin and hemosiderin.

A yellow-red patch on the nail gives the appearance of an oil drop spot, as in psoriasis. The colour can also change to yellow-brown, and crumbly nails often turn white.

In yellow nail syndrome, nails thicken and new growth slows, resulting in discoloration. It usually occurs on all the nails. There is a delay in nail growth with associated microvascular permeability. The lateral sides of the nail show an exaggerated convex shape, and the lanula disappears, and the nail has a yellow hue. It may be seen in patients with chronic bronchiectasis or sinusitis, pleural effusions, internal malignancies, immunodeficiency syndromes, and rheumatoid arthritis.

Yellow nails can also result from hypoalbuminaemia, as well as lymphoedema, jaundice, diabetes mellitus, amyloidosis, or median/ulnar nerve injury. Yellow nails
may also result from fungal infections, tetracycline drugs, rheumatoid arthritis, or hypoalbuminaemia.

Yellow nails are very typical of heavy smokers, due to nicotine stains, which is also referred to as quitter’s nails.

**White** nails may be indicative of anaemia, vascular conditions or oedema. Consideration should be given to diabetes mellitus, renal failure, cirrhosis or chemotherapy. White nails, which are crumbly and soft, may be the result of a fungal infection.

**Red** nails may occur as a result of Polycythemia (dark red), carbon monoxide (cherry red), angioma, or malnutrition.

**Purple** nails may be due to a deprivation of oxygen and circulatory problems.

**Black/brown grey** nails usually indicate trauma (red/purple/black), but may indicate a systemic diseases, such as anaemia, **vitamin B-12 deficiency**, bacterial infection, chronic kidney disease, adrenal gland problems, liver disease, breast cancer or melanoma, or silver deposits from heavy metals. Excessive fluoride ingestion can turn nails brown or black. Other conditions may also include diabetes mellitus, cardiovascular disease, or syphilis.

**Brown** nails may also indicate nicotine staining from smoking an excessive amount of cigarettes over a prolonged period of time. Reddish-brown spots can indicate a **deficiency of folic acid, protein or vitamin C**. Other conditions may also include diabetes mellitus, cardiovascular disease, or syphilis.

**Vascular changes of the nails**

**Terry’s nails**

Terry’s nails differentiate with Lindsay’s nails in that the **lunula extends to more than 75% of the nail**, with most of the nail plate being **opaque white**, obscuring the lunula, leaving only a **distal brown arc**. It usually occurs on all the nails. This is due to a decrease in blood supply and an increase in connective tissue in the nail bed. It occurs in states of stress, such as advanced age, liver diseases (cirrhosis), chronic renal failure, congestive heart failure, diabetes, hyperthyroidism and malnutrition.

**Lindsay’s nails**

Lindsay’s nails have a **distal brown transverse band** across the nail, as in kidney disease, from an increased pigment deposition. They are also called ‘**half and half**’ **nails**, which present, with the proximal part of the nail being dull white and opaque, and obscuring the lunula, and the distal half is normal pink in **colour**.
The *lunula extends to roughly 50%* of the nail. This is associated with chronic renal disease, uraemia, and renal transplant patients on haemodialysis, as well as HIV.¹⁶

**Periungal telangiectasia**

Telangiectasia presents with *distended blood capillaries* below and around the nail, especially at the nail base, with flushed skin. This commonly associated with connective tissue diseases, especially scleroderma.² It is also a sign of scurvy, which is a vitamin C deficiency disease.

**Splinter haemorrhages**

Splinter haemorrhages are red or brown streaks along the long axis of the nail after *rupture of the capillaries*, which *may move distally with the growth* of the nail. They are visible when capillaries within the epidermal ridges bleed and leak.²

Splinter haemorrhages are thought to be a more specific indicator of endocarditis if they are present proximally rather than distally on the nail plate, and they are more common in sub-acute than acute infection. If they are accompanies by a fever, a murmur, Roth’s spots, Osler’s nodes, Janeway’s lesions, further investigations are needed to be done.²

It may also occur as a response to nonspecific finding associated with trauma. When splinter haemorrhages occur simultaneously in multiple nails it may indicate an underlying systemic disease, such as rheumatoid arthritis, internal malignancy, mitral stenosis and systemic lupus erythematosus, peptic ulcer disease, and malignancies.¹⁷

Splinter haemorrhages *cannot be blanched*.

**Causes include (acronym – SPLINT):**

- Sepsis elsewhere.
- Polyarteritis nedosa (PAN), Systemic lupus erythematosus (SLE), rheumatoid arthritis (RA); psoriasis; pregnancy.
- Limey (*vitamin C deficiency*).
- Infective endocarditis (IE), also known as sub-acute bacterial endocarditis. When splinter haemorrhages occur with an unexplained fever, together with a heart murmur, one should suspect endocarditis.
- Neoplasm (haematologic).
- Trauma.
Transverse lines on the nails

Mee’s lines

A true Leukonychia presents as Mee’s lines, which are characterized usually by a single, transverse, narrow whitish line that runs the width of the nail plate and may be seen on single or multiple nails. It grows distally with time, and the width varies according to the extent of the problem. The lines do not disappear upon blanching. The pathology originates in the matrix and emerges in the nail plate. This occurs as a result of arsenic or thallium poisoning, or other heavy metals, or after an acute illness. They are also found in Hodgkin’s disease, congestive heart failure, and carbon monoxide poisoning.\(^\text{17}\)

Apparent Leukonychia presents with Muehrcke lines, Lindsay’s nails and Terry’s nails. The pathology originates in the nail bed.\(^\text{17}\)

Muehrcke’s Lines

Muehrcke lines are narrow double white transverse lines (not depressed, compared to Beau’s lines), which usually affect several. This signifies an abnormality in the vascular bed of the nail, either due to trauma, decreased protein synthesis or protein deficiency (hypoalbuminaemia), kidney disease (nephrotic syndrome), liver disease (cirrhosis), or chemotherapy. One possible theory for the appearance of Muehrcke’s lines is that these diseases lead to swelling in the nail bed. The swelling puts pressure on the blood vessels that run underneath the nail, causing colour changes.\(^\text{18}\)

Muehrcke’s lines disappear upon blanching. The nail bed looks healthy In between the lines, and the lines do not grow out because the lesion is in the nail bed. Albumin levels need to be checked to exclude hypoalbuminaemia.\(^\text{3}\) When albumin levels are normalised, the lines disappear.

Beau’s Lines

Beau’s lines are deep horizontal (transverse) depressions in the nail plate that run parallel to the lanula, which can be single or multiple. It does grow out. This arises from the sudden, transient interruption of nail growth (keratin). The extent of the problem determines the width of the groove; wider in severe cases. It usually occurs after a severe illness and infections, such as pneumonia, myocardial infarction, or even emotional stress. Beau’s lines can also be a sign of zinc deficiency.

Other causes may include Raynaud’s disease, trauma,\(^\text{2}\) chemotherapy, or exposure to cold. One can determine when the illness occurred by looking at the location of the line. As nails take six months to grow out, if the line is half way up the nail, the illness would have occurred three months previously. The interruption of nail growth may also occur after shock, malnutrition and weight loss.
Localised diseases involving the nail fold, present with the bands in a more linear fashion and resemble the contour of the proximal nail fold, and which do not spread across the entire breadth of the nail. If the lines are on all the nails, it is more likely to be the result of a systemic disease, with the lines spanning the entire breadth of the nail and with smoother borders. The reaction to chemotherapy drugs may also produce these lines. The width or depth of the depression reflects the duration or extent of the damage,\textsuperscript{19} and indicates that there may have been a previous severe illness.\textsuperscript{19}

**Onycholysis**, also known as Plummer’s nails, is the spontaneous separation of the fingernail or toenail from the nail bed at the distal end (tip) of the nail and/or on the lateral sides of the nail. There is inflammation of the nail bed causing the nail plate to separate from the nail bed, which is an ideal moist environment for organisms, such as yeast, to thrive. The causes are many causes, including trauma to the nails, eczema, psoriasis, hyperthyroidism (thyrotoxicosis), and pregnancy.\textsuperscript{22} In the absence of trauma or psoriasis, tests need to be done to exclude hyperthyroidism.\textsuperscript{2}

**Longitudinal lines**

**Melanonychia striata, or longitudinal melanonychia**

Melanonychia striata, or longitudinal melanonychia is referred to as nail plate pigmentation. There is either a dark brown or brown-black longitudinal band on a toenail or fingernail, which may be seen in dark-skinned people. The three most common variants include melanocytic nevus, melanotic macule, and melanoma *in situ*. There may be a relationship between solar exposure and a cutaneous melanoma.\textsuperscript{20}

One has to determine how long this pigmented band has been present, as a sudden change in appearance, or a new band can indicate pathology.

**Ridges on nails**

Ridges on nails may be either vertical or horizontal and are considered to be quite common. Lack of moisture dries out the nails, cuticles and hands, which can also result in ridges. It may be associated with a partial malfunction of the nail matrix, which causes the nail plate to become thin. Although ridges could occur as a result of heredity, trauma or ageing, it may also indicate systemic diseases, such as anaemia or kidney disease. With age, the natural oils of the skin are less, causing dryness of the nails and cuticle, resulting in ridges. A deficiency of vitamins A, B, especially biotin, C, and minerals, such as silica, phosphorus, sulphur, calcium and iron, can also result in ridges. Malnutrition as well as malabsorption, from an inability of the body to absorb essential nutrients, minerals and vitamins, can also result in nail ridges.\textsuperscript{21}
Longitudinal ridges may also be associated with deficiencies in the essential fatty acids, namely those of linoleic alpha-linoleic and arachidonic acids, formerly known as vitamin F.\textsuperscript{13}

A central nail ridge may indicate a deficiency of iron, folic acid or protein. However, a central nail canal (Heller’s line) may be associated with repetitive trauma, severe malnutrition, or peripheral vascular disease.\textsuperscript{3}

Other nail conditions

Koilonychia

Koilonychia is represented by transverse and longitudinal concavity of the nail, resulting in a concave or spoon-shaped nail, which becomes thin and gets lifted at the outer edges. It may even hold a drop of water. The two most common conditions associated with spoon nails are iron deficiency (Plummer-Vinson syndrome), from either insufficient iron, or poor absorption of iron; or too much iron (haemochromatosis), and with fatigue, arthralgia, and hepatomegaly. It is also associated with diabetes mellitus or protein deficiency, especially sulphur-containing amino acids.\textsuperscript{3}

Other conditions which give rise to spoon shaped nails may include Lupus disease, poor function of thyroid hormone, glossitis, Reynaud’s syndrome, Patella syndrome, or muscle skinning. Repeated use of soaps and detergents it can also affect the texture of nails. Individuals undergoing chemotherapy or radiation therapy for cancer can also get this condition. People can get this condition if the intestine is not properly absorbing the nutrients present in food properly. If the nail is subjected to injury or trauma it gets broken easily and comes out of nail-bed. The child may inherit this condition by birth and it can develop later if the child is malnourished.\textsuperscript{23}

Connective tissue disorders needs to be excluded, and blood tests need to be done to exclude anaemia and hemochromatosis.\textsuperscript{2}

Pitting of the nails

Pitting of the nails are tiny punctuated depressions on the surface of the nails, from loss of cells from the nail plate. Pits can vary in depth and in amount. This is usually present in psoriasis, but may also be associated with reactive arthritis or alopecia areata (patches of hair loss). Connective tissue disorders needs to be excluded.\textsuperscript{2}

Clubbing

Hippocrates first described digital clubbing in patients with empyema in 400 BC, and fingernail clubbing is also referred to as ‘Hippocratic fingers’.
Clubbing is a clinically descriptive term, referring to the bulbous uniform swelling of the soft tissue of the terminal phalanx of a digit, resulting in a convex curve of the nails. The nail base loses its firmness and becomes soggy. As clubbing progresses, the nail base becomes obviously swollen, and the angle between the nail and its base exceeds 180°, losing its diamond-shaped appearance, and resulting in a V-shape instead. Anaemia needs to be excluded in all cases of clubbing where a deficiency of oxygen is suspected, due to the oxygen-carrying haemoglobin content.

Causes of clubbing

- **Cardiac** – infective endocarditis; cyanotic congenital heart disease.
- **Pulmonary** – TB; bronchiectasis; chronic bronchitis, CPOD, emoyema; lung abscess, and carcinoma.
- **Subphrenic abscess**.
- **Hepatic** – chronic liver disease with cirrhosis.
- **Intestinal** – chronic diarrhoeal conditions, such as ulcerative colitis; parasites, such as trichuris trichuria. Turner,D. (1985). *Physical examination for Primary Clinical Nurse Practitioners*. Cape Town: US Printers, Stellenbosch. As well as inflammatory bowel disease, and fistulas.
- **Unilateral clubbing** is associated with hemiplegia and vascular lesions.
- **Bilateral clubbing** is associated with multi-systemic diseases, such as neoplastic, pulmonary, cardiac, gastrointestinal, infectious, endocrine, and vascular disease.\(^\text{25}\)

Paronychia

Local fungal infections, such as Paronychia is inflammation of the nail fold, which becomes red, hot, tender and swollen. Frequent immersion in water is a risk factor for chronic paronychia. This is often caused by infection, injury or irritation. This may result in nail thickening, as the infection develops along the edge of the fingernail or toenail.

Onychomycosis (tinea unguium),

Separation of the nail may also occur as a result of Onychomycosis (tinea unguium), which is a fungal infection, which is often associated with tinea pedis. Fungal nail culture is important to do to confirm the diagnosis.

Serious brittleness can cause ridges along the length of the nail, with fragmenting of the nail tips. This can also be caused by anaemia, hormonal problems and hardening of the arteries; the latter has qualities of coldness with dryness. The term onychoschizia, refers to splitting of the fingernails as well as brittle or soft nails.
**Lichen planus of the nail**

Lichen planus of the nail is an inflammatory disorder which can involve the nail as well as the skin, mucous membranes and/or the scalp.

**General Care and Nails**

Primary treatment is based on restoring balance via the addition of elements or through elimination of elements. In spite of individual organ temperaments, the body must be treated systemically to ensure overall balance is restored naturally. Focusing treatment on a specific organ is a wasted effort as the natural urge for homeostasis is the healer.\(^2^6\)

Nails and hands should be kept clean and dry, and with the application of a moisturiser for dry skin to strengthens nails and to prevent splitting. Moisture influences nail flexibility and durability by acting as a lubricant and a shock absorber.\(^2^7\)

Protect nails from trauma, which includes not picking or biting them, or using them as tools to pick up, poke or pry things, which causes abnormal nail growth or deformities. Bitter tasting nail polish or acrylic nails may help for nail biting; however, as this is usually associated with stress, measures to reduce stress should be considered. Protect hands from the cold by wearing gloves.

The cuticles must not be pushed back, or digging out ingrown nails, which damages the nails and increasing the risk of infection. A cuticle conditioner can be used, especially for hard nails, which should contain almond, jojoba, or olive oil, as the molecules which are contained in these oils are small enough to penetrate the skin. Oil slows down the passage of water through the nail plate and it does not evaporate as fast as water, which increases moisture content, thereby making nails more flexible and durable. Products which contain mineral oils are not readily absorbed into the skin and nails.\(^2^7\)

Soft nails become thin and bend easily, causing the nails to easily tear, making them difficult to grow. This is the result of too much moisture which causes the nail plate to become weak and easily damaged. A nail strengthened or hardener may ameliorate soft nails; however, this must only be used until the nails become stronger, as it will then dry out the nails, causing cracking and splitting.

Gloves should be worn when exposing the hands to water or chemicals. Care needs to be taken when chopping or peeling vegetables and fruit to avoid any injuries. Nails should be kept short, and cut after bathing, as they are softer and more pliable, to prevent chipping of the nails, especially when they are brittle. Nails should be cut in a square shape, by trimming them straight across the nail, so as to prevent damage as well as ingrown nails. An emery board will smooth off any rough edges, with a slight rounding off of the tip of the nail. Nails should be should be filed in one direction and
any chips must be filed as soon as possible to prevent them from catching onto things which would cause damage to the nail.

Shoes should not be worn too tight as this can cause ingrown nails.

Any abnormalities should be examined by a doctor or dermatologist as soon as is possible.

Adequate water intake is essential to properly hydrate the skin and nails, thereby optimising wellness and functioning of the body.

The nails should be regularly moisturised with a good cream after hand washing, including the cuticles, especially when they are brittle or frequent exposure to water, in order to prevent dehydration of the skin and nails. Moisturizing the nails with nail oil, vitamin E oil or even olive oil might help prevent ridges in the nails.

Cotton-lined rubber gloves will protect the hands and nails when exposed to water. Rubber cloves without an inner lining will increase sweating and moisture. Nail polish remover should contain a moisturiser in it, with no acetone or formaldehyde.

Essential fatty acids, such as omega, are found in fish oil, flaxseed oil, evening primrose oil and borage seed oil. These moisturise the nail bed, which increases nail flexibility, especially for thin and brittle nails. Omega fatty acids are an excellent source, from fish oil, flaxseed oil, and evening primrose oil and borage seed.

**Minerals and Herbs**

Minerals, such as silica, facilitate the absorption of calcium, which improves the strength of nails, and helps to reduce nail breakage, ingrown nails and softens nail ridges. Food sources of silica include whole grains, such as oats, millet, barley and wheat. Natural silica is found in nettle, horsetail, burdock root and oat straw, which can be used in herbal teas. Nettle, prickly ash and rue improve peripheral circulation.

Foods rich in phosphorus help to maintain and repair tissues and cells, and aids in the growth and hardening of nails. Food sources include fish, poultry, meat, eggs, whole grains and nuts.

**Sulphur** is an essential mineral that assist in the growth of nails and which is an important constituent of keratin, which strengthen nails. Food sources include fish, lean beef, eggs and garlic. Linseed, millet, yarrow and comfrey are good nutritional sources to grow healthy nails, bones and ligaments.

**Calcium** is essential for the formation of strong bones and nails, and it is useful for brittle nails and ragged cuticles. Food sources include plain, non-fat yogurt, cheese (romano, swiss),
Iron is an essential mineral used to transport oxygen to all parts of the body. Food sources include shellfish (clams, oysters), liver, soybeans, pumpkin seeds, white beans, blackstrap molasses, lentils, and spinach.

Zinc supports the body to utilise minerals and enzymes. It is needed in the body for maintaining optimum immune system, building proteins, triggering enzymes, transmitting neurons, and manufacturing DNA. A zinc deficiency will depress immune functioning, lead to stunted growth, hair loss, eye and skin lesions, diarrhoea, impotence and impaired appetite. Foods which are high in zinc include: oysters, beef and lamb; what germ, spinach; the seeds of pumpkin and squash and cashew nuts; cocoa and chocolate; pork and chicken; beans, and mushrooms.

Magnesium helps to assimilate calcium, and it is essential for building strong bones, maintaining normal functioning of the muscles, maintaining a healthy immune system and heart rhythm. Food sources include dark leafy greens (raw spinach), squash, pumpkin seeds, fish (mackerel), beans, soy beans and lentils, whole grains (brown rice), avocados, plain non-fat yogurt, bananas, figs, and dark chocolate.

Vitamins

Vitamin A assists in the formation of protein, which is necessary for tissue building, skin health, vision, and boosting the immune system. Food sources include sweet potato, carrots, dark, leafy vegetables (kale), squash, butternut, romaine lettuce, dried apricots, melons, sweet red peppers, fish (bluefin tuna), and mango.

All B vitamins help the body to convert food (carbohydrates) into fuel (glucose), which is used to produce energy. They also help to metabolise fats and protein, and assist in the functioning of the nervous system. Biotin is part of the B complex of vitamins, which helps to metabolise carbohydrates, fats and amino acids, which the building blocks of protein. Research from University of Maryland indicates the biotin may help to strengthen brittle or weak nails. Foods rich in biotin include swiss chard, carrots, nuts (almonds, walnuts and peanuts), eggs, cows or goat’s milk, berries and fruits (strawberries and raspberries), halibut, and root vegetables (onions, cucumbers and cauliflower).

Folic acid (Vitamin B9) is responsible for cellular growth and regeneration; DNA synthesis and repair, formation of red blood cells and prevention of anaemia. Foods high in folic acid include beans, lentils, spinach, asparagus, lettuce (cos or romaine), avocado, broccoli, tropical fruits, oranges, and wheat bread.

Vitamin B12 is essential for the production of DNA, which encodes the sequence of amino acid residues in proteins, as well as being a genetic instruction guide for life and all its processes. It is also linked to the production of serotonin, which controls mood. Foods high in vitamin B12 include shellfish (clams and crabs), liver, mackerel fish, and fortified soy products, such as tofu, bran, beef, skim milk, Swiss cheese and eggs.
**Vitamin C** is an antioxidant, which neutralises free radicals and facilitates better absorption of iron in the intestine. It also produces collagen which is the framework of the skin and bones. Vitamin C produces serotonin, a neurotransmitter, which maintains mood balance and prevents depression. Foods rich with vitamin C include bell peppers, guavas, dark green leafy vegetables, kiwis, broccoli, strawberries, oranges, tomatoes, peas and papaya.

**Vitamin D** is essential to the health of healthy bones and nails, and it helps the body to absorb calcium. It also assists in the control of cell growth, neuromuscular functioning, proper immune functioning, and alleviation of inflammation. Foods rich in vitamin D include cod liver oil, fish, especially if eaten raw (salmon, tuna), pork, milk, oysters, caviar, tofu eggs, cheese (ricotta), and mushrooms (shitake).

**Vitamin E** is useful for brittle nails. It helps to prevent oxidative stress and protects the body against heart disease, cancer and age-related eye damage (macular degeneration). Food sources include tofu, spinach, nuts (almonds, sunflower seeds), avocados, shellfish (shrimp), fish (rainbow trout), olive oil, broccoli, squash and pumpkin.

**Protein**

Healthy eating patterns and lifestyle habits play an integral role in metabolic efficiency and overall health, and its vitamin and mineral content must be absorbed and assimilated by the body. The diet should consist of fresh, minimally processed and refined foods. Vegetables and whole grains are particularly beneficial for strong and healthy nails. Adequate amount of water intake is essential for optimal functioning of the body.

Protein is a macro nutrient composed of amino acids that is necessary for the efficient growth and functioning of the body. The essential amino acids are found in animal proteins as well as in plant foods. A deficiency in proteins causes muscle atrophy and general impaired functioning of the body. As nails are composed of keratin and protein, nails require the tissue-building sources of protein. Foods which are high in protein include: turkey and chicken breast; tuna, salmon and halibut; cheese, pork, beef and veal; tofu, beans and mature soy beans; eggs and especially the white of eggs; yoghurt, milk and soymilk, and the seeds of pumpkin, watermelon, peanuts and almonds. Vegetarians can obtain good sources of protein through tofu, fish, beans and legumes.

**Foods to reduce stress**

Stress raises cortisol levels in the blood, which causes food cravings, especially sweet foods, and it causes mood swings. Foods to reduce stress include: Bananas are high in potassium which reduces tension as they are rich in tryptophan, an amino acid which boosts the formation of serotonin (feel-good hormone) and melatonin (sleep hormone). Spinach and broccoli replenish the body in times of stress, which
are rich in magnesium, which lowers stress, as well as stress-relieving vitamins B and folic acid, which relieves stress, anxiety, panic and depression. Milk and yogurt are high in calcium vitamin B, which is essential for the health of nerves, and tryptophan. A glass of warm milk before going to bed assists with sleep. Tuna and mackerel are rich in omega-3 fatty acids which control adrenalin and protect the heart from heart disease, which is linked to stress. It is a good source of tryptophan, zinc, vitamins B6 and B12 and Vitamin E. Blueberries are rich in antioxidants and vitamin C which are stress relievers.

Chicken and turkey contain amino acids and tryptophan which calms the mind and aids in relaxation. Turkey is rich in protein which stabilises blood sugar levels and thereby reduces stress. Citrus fruits have plenty of vitamin C, which replaces the loss thereof during stress. Dried apricots are rich in magnesium which relaxes the muscles. Whole grains contain vitamin B-complex, particularly pantothenic acid, which reduces stress. It also supplies serotonin-producing carbohydrates, which soothe and calm the body, as well as sustaining energy levels by stabilising blood sugar.33

**Conclusion**

The nails indicate one’s health status over a period of six months, during which time new nail growth appears. Many factors determine changes in the colour, texture and shape of the nails; from trauma, heredity, and systemic diseases, to nutritional imbalances and the inability of the body to absorb essential nutrients, minerals and fatty acids.

The temperament of an individual also determines what conditions predisposes one to get, due to the qualities of heat, moisture, coldness and dryness. Too much dryness will cause nails to become too hard, brittle and crumbly; whereas too much moisture will result in infections and weakness of the nails. The strength of the nails must be balanced with flexibility.

A healthy and well balanced diet should contain the necessary vitamins and minerals to sustain a healthy mind and body, together with adequate water intake, exercise, stress reduction, sleep, fresh air and elimination of waste products from the body and retention of valuable nutrients. These lifestyle factors are adjusted in accordance to the specific needs and requirements of the Biliary, Sanguinous, Phlegmatic and Melancholic temperaments.

A practitioner’s guide to nail diagnosis is included below. Please consult your doctor for any health concerns as this is not considered to be used to diagnose medical conditions.
<table>
<thead>
<tr>
<th>Condition</th>
<th>Description</th>
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<tbody>
<tr>
<td>Mee's lines</td>
<td>Single white transverse lines, not depressed</td>
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<tr>
<td></td>
<td>grows out, does not disappear upon blanching</td>
</tr>
<tr>
<td>Muehrcke's lines</td>
<td>Double white transverse lines, not depressed</td>
</tr>
<tr>
<td></td>
<td>not growing out, disappears upon blanching</td>
</tr>
<tr>
<td>Beau's lines</td>
<td>Deep horizontal depressions, depressed - grows</td>
</tr>
<tr>
<td></td>
<td>out, does not disappear upon blanching</td>
</tr>
<tr>
<td>Lindsay's nails</td>
<td>Half and half nails, lanula extends 50%</td>
</tr>
<tr>
<td>Terry's nail</td>
<td>Distal brown arc, lanula extends 75%</td>
</tr>
<tr>
<td>Splinter haemorrhages</td>
<td>Rupture of capillaries</td>
</tr>
<tr>
<td>Periungual telangiectasia</td>
<td>Distended blood capillaries at base</td>
</tr>
<tr>
<td>Pitting of the nail</td>
<td>Small dents on nail surface</td>
</tr>
<tr>
<td>Koilonychia</td>
<td>Spoon-shaped nails</td>
</tr>
<tr>
<td>Melanonychia</td>
<td>Nail plate pigmentation</td>
</tr>
<tr>
<td>Ridges on nails</td>
<td>Vertical or horizontal</td>
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<tr>
<td>Clubbing</td>
<td>Positive Schamroth's sign</td>
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<tr>
<td>Onycholysis</td>
<td>Separation of nail</td>
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<tr>
<td>Paronychia</td>
<td>Inflammation of nail fold</td>
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<tr>
<td>Onychomycosis</td>
<td>Fungal nail infection</td>
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</tbody>
</table>

Practitioner's Guide to Nail Diagnosis
Compiled by Linda Mayer
References


