

Science of hair

Objectives: At the end of this lesson you shall be able to

- define hair
- define structure of hair root and hair shaft
- describe chemical composition of hair
- determine PH knowledge of hair
- define hair growth cycle
- describe types of hair
- define hair texture, density, elasticity and porosity.

Hair

Hair is an appendage of the skin. It is a thread-like outgrowth of the skin and scalp of the human body.

The study of hair, technically called trichology.

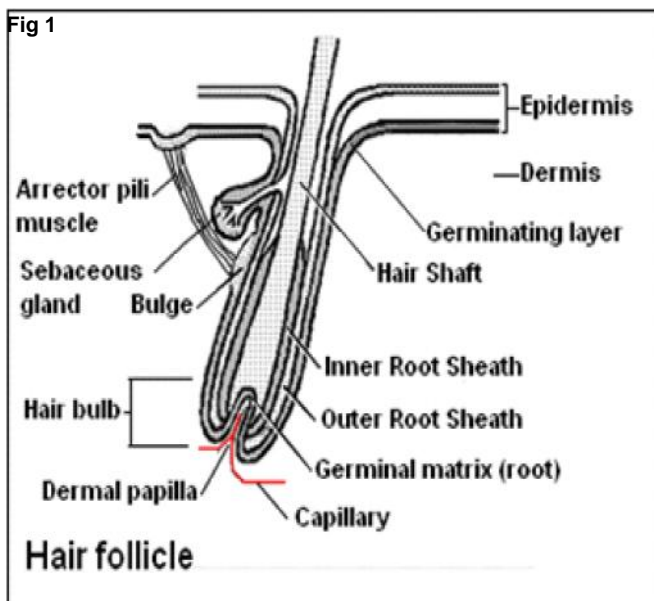
Structure of hair root and hair shaft

There are two main divisions of hair - hair shaft and hair root

- 1 **HAIR SHAFT** - the hair which is above the surface of the scalp and is seen, is termed as hair shaft.
- 2 **HAIR ROOT** - the portion of the hair which is beneath the skin, is termed as hair root. A variety of structures are connected with the hair root. They are the follicle, the hair bulb, and the hair papilla.

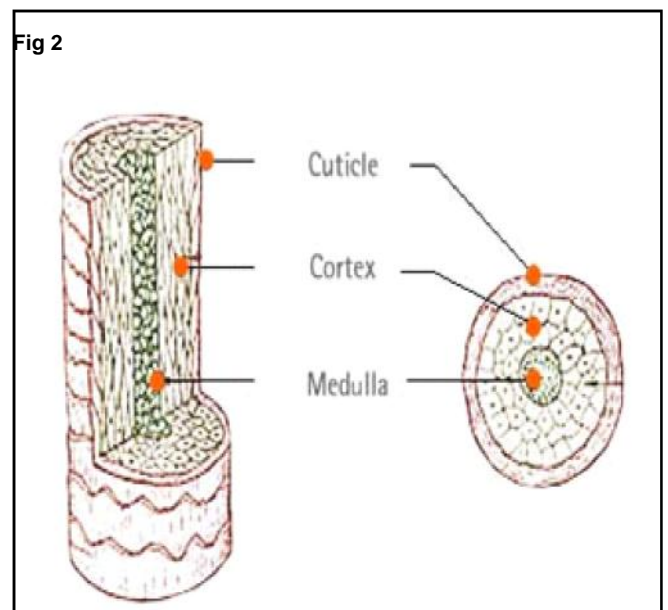
Structure connected with hair root (Fig. 1)

- 1 **HAIR FOLLICLE** - hair follicle is a pocket like tube in the skin or scalp that encases the hair root. Each hair has a follicle which varies with the situation and thickness of the skin and hair. Oil glands are attached to hair follicle for supply of sebum.



- 2 **HAIR BULB** - the hair root looks like a bulb as lowermost
- 3 **PAPILLA** - It is a cone shaped structure which fits into the hair bulb. Papilla is richly supplied by blood and nerves. Growth and regeneration of the hair takes place in this part. Once the papilla is damaged, new hair can never grow.
- 4 **ARRECTOR PILLI** - arrector pili is a small involuntary muscle attached to the underside of a hair follicle. Cold weather and sudden fear make the hair stand and in this situation arrector pili muscle controls the position of the hair follicle.
- 5 **SEBACIOUS GLAND** - These are sac type clusters of gland open into the hair follicle. The gland secretes sebum which spreads along the length of the hair then to the skin, keeping them (skin and hair) soft, supple and shiny.

Although hair looks very small to the naked eye, each strand of hair consists of 3 layers - (Fig. 2)



- CUTICLE** - The outermost layer of the hair consists of horny cells which look like fish scales and this layer is known as cuticle.
- CORTEX** - This layer lies just below the cuticle. This portion forms major part of the hair and gives strength and elasticity to the hair.
- MEDULLA** - This is the innermost part of the hair. Sometimes medulla may be absent in lanugo hair.

Chemical composition of hair

Hair is composed of a protein called keratin, which is present in all horny growths, such as nails.

The chemical composition of hair varies with its color.

The average hair is composed of:

- Carbon-50.65%
- Hydrogen-6.36%
- Nitrogen-17.14%
- Sulfur-5.0%
- Oxygen-20.85%

pH knowledge of hair

Hair reacts quite differently to two different chemical substances known as acids and alkalis. The test for finding out the different chemicals is done by a litmus paper. Red Litmus Paper turns blue in an alkaline solution whereas Blue Litmus Paper turns red in acid solution.

pH scale- The symbol pH means potential of Hydrogen.

The pH scale is a number scale used to measure acidity and alkalinity of a solution. The scale ranges from 0 - 14. pH 7 is neutral. pH values below 7 are acidic; the lower the number, the stronger the acid. pH value above 7 are alkaline; the higher the number, the stronger the alkali.

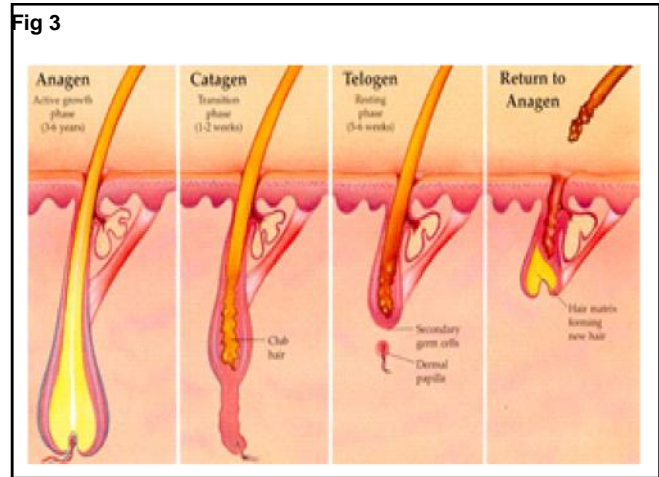
Although the precise neutral point on the scale is 7.0, the neutral range is considered to extend from pH 6.5 - 7.5. The pH of the skin's & hair's acid mantle ranges from 4.5 - 6.0 is most often referred to as 5.5.

Hair growth cycle

Hair follicles grow in repeated cycles. One cycle can be broken down into three phases. (Fig. 3)

- Anagen - Growth Phase
- Catagen - Transitional phase
- Telogen - Resting Phase

In healthy individuals each hair goes through a cycle of events, growth, and fall and is replaced by another hair.



As a result, a certain amount of hair is shed everyday. Old hair falls out to make place for new hair. In average, 60 - 100 hair is lost per day quite naturally. Average growth rate in each hair is 1/2 inch - 7/8 inch per month. A scalp hair continues to grow for 2 - 7 years. Eyebrows and eyelashes are replaced every 4 - 5 months

Types of hair

Types of hair are determined by the presence of sebum and pH condition of the hair.

There are three types of hair:-

- NORMAL HAIR:** a normal amount of sebum is secreted from the sebaceous gland of a person with normal hair. Normal hair should be kept in medium length.
- DRY HAIR:** a less amount of sebum is secreted from the sebaceous gland of a person with dry hair. Dry hair should be kept short to prevent it from damage.
- OILY HAIR:** excess amount of sebum is secreted from the sebaceous gland of a person with oily hair. Oily hair should be kept long, to prevent the scalp from seborrheic condition.

Hair texture, density, elasticity and porosity

Hair texture

Texture refers to the thickness or fineness and feel of the hair. Thickness depends on the diameter of the hair. Texture of hair is its size and quality. (Fig. 4)

- Thickness** - hair may be coarse and thick, medium, fine and very fine in texture.
- Feel of the hair** - according to feeling, hair maybe soft and smooth, harsh, rough and wiry in texture.
- Wave of hair** - according to wave present or absent in hair, it maybe straight, wavy and curly.

Fig 4



Hair density

Density refers to the number of hair per sq. inch. More the number of hair, more the density. Hair can have dense,

moderate and thin density. For dense hair smaller blocking and larger rods should be used. For thinner hair smaller blocking and smaller rods should be used.

Hair porosity

Porosity is the ability of the hair to absorb water. This ability is not connected with the thickness of the hair but is connected with the state of the cuticle layer. Hair can have poor, good or excessive porosity. Excessive porosity is connected with damaged hair and it should be handled carefully for chemical services.

Hair elasticity

Hair elasticity is the ability of the hair to stretch and go back to its normal length without breaking. Normal hair can be stretched to one-fifth of its length. Hair can have poor, good or normal elasticity. Hair with poor elasticity is not suitable for chemical services.

Common Hair Problems

Objectives: At the end of this lesson you shall be able to

- explain dandruff and its type
- state hair falling
- explain the spilt ends
- explain pediculosis.

Dandruff

Dandruff is one of the most common problem of hair. It can be recognised by small white flakes that appears on scalp. It is also known by the medical term of "pityriasis". (Fig 1)

Fig 1



The main cause of dandruff are poor blood circulation, infection, careless grooming habits and imbalance diet.

There are two types of dandruff:

Oily dandruff : it is also called waxy dandruff and it can be itchy. Medical treatment is the only way to control oily dandruff.

Dry dandruff: dry dandruff is characterised by small white scales. It is the result of poor blood circulation and uncleanliness. Use mild shampoo, regular scalp massage, and use antiseptic scalp lotion to cure dandruff.

Hair falling

Alopecia is the technical term for any abnormal form of hair loss. The natural falling out of hair should not be confused with alopecia. When hair has grown to its full length it comes out by itself and its replaced by a new one. On the other hand the hair lost by alopecia does not come back.

The most common forms of hair loss are:

- 1 **Alopecia senilis:** It is the form of baldness occurring in old age. this hair loss is permanent.(Fig.2)

Fig 2



- 2 **Alopecia premature:** It is the form of baldness, beginning any time before middle age with a slow thinning process.
- 3 **Alopecia areata:** It is the sudden falling out of hair in round patches, or baldness in spots, something caused by anemia, scarlet fever, typhoid fever, or syphilis. Affecter areas are slightly de-pressed, smooth, and very pale, due to a decreased blood supply.(Fig. 3)

Fig 3



Spilt ends: "Trichoptilosis" it is the technical name for split hair ends. The hair breaks easily and shows a brush-like spreading out of the fibers of the broken-off hair. Softening the hair with ointments may prove beneficial. The hair should be well oiled to soften and lubricate the dry ends. The ends also may be removed by cutting. (Fig. 4)

Fig 4



Pediculosis : It is a contagious condition caused by the head louse (animal parasite) infesting the hair of the scalp. As the parasites feed on the scalp, itching occurs and the resultant scratching may cause an infection. (Fig.5)

Fig 5



The head louse is transmitted from one person to another by contact with infested hats, combs, brushes, or other personal articles.

To kill head lice, advise patron to apply larkspur tincture, or other similar medication, to the entire head before retiring. The next morning, she should shampoo with germicidal soap. Treatment should be repeated as necessary. Never treat a head lice condition in the beauty salon.

Hair Cutting

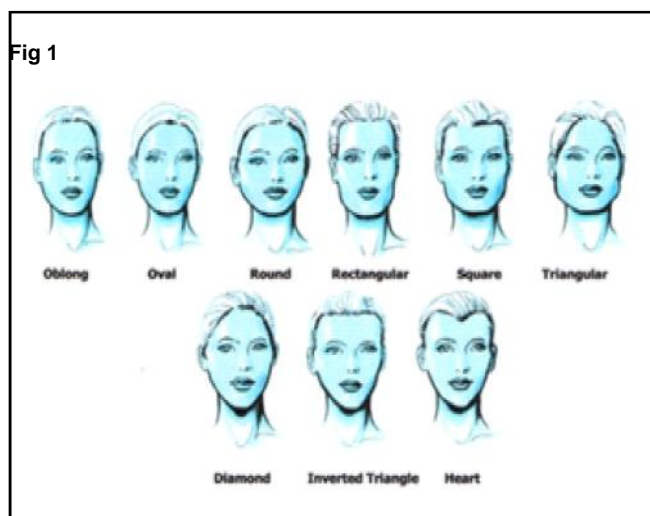
Objectives: At the end of this lesson you shall be able to

- identify the facial shape
- explain the sectioning & Elevation
- identify the tools use for hair cutting
- explain the hair cutting technique
- explain the techniques of blow drying.

Identify the facial shapes

The principles of modern hairstyling can be obtained when each of our patron's features is properly analyzed for hair styling and cutting. The key to success is to highlight a patron's best features (Positive) and down play the worst features (negative) and it should attractively frame the face to achieve best results in hair style

There are seven basic facial shapes: Oval, Round, square, oblong, triangle, inverted triangle and diamond. To get best hair style, generally try to create the illusion of an oval shaped face.



Oval shaped face: - In appearance the oval shape is about one and a half time longer than its width across the brow, the forehead is slightly wider than the chin. This type of face shaped patron can wear any hair style unless there are other consideration such as length and shape of nose or profile.

Round shaped face: - In appearance round hair line round chin line and wide face. Our aim should be to create the illusion of length to the face, which makes the face appear slimmer by giving volume on top and closeness at the sides.

Square shaped face: - In appearance face is wide at the temples, narrow at the middle third of the face, a

square off at the job. Our aim should be to offset or round out the square features by softening the hair around the temple and jaw, create volume around area between the temples and jaw, by adding width around the ear area.

Triangular (pear) shaped face:-In appearance face has narrow forehead, wide jaw and chin line. Our aim is to create the illusion of width in the forehead, by building volume at the temples and some height at the top to disguise the narrowness of the forehead with a soft fringe.

Judging hair cut for different face shapes

Oblong shaped face: - In appearance it is long, narrow face with hollow cheeks. Our aim is to give the appearance shorter and wider of the face, by keeping hair fairly close to the top of the head. At volume on the side to create the illusion of width. The hair should not be too long, as this would elongate the oblong shape of the face.

Diamond shaped face: - In appearance it has narrow forehead, extreme width the cheek bones and narrow chin. Our aim is to reduce the width across the cheek bone lines, by increasing the fullness across the jaw line and forehead while keeping the hair close to the head at the cheek bone line to create an oval appearances. Avoid hair styles that lift away from the cheeks or hair line on the sides near the ear area.

Inverted triangle shaped face: - In appearance it has wide forehead and narrow chin line. Our aim is to decrease the width of the forehead and increase the width in the lower part of the face, by reducing the width of the forehead and styling the hair close to the head with no volume. A fringe is recommended. In the cheek bones area near the ear keep the outline to its widest at the jaw and neck area.

Sectioning for hair shaping

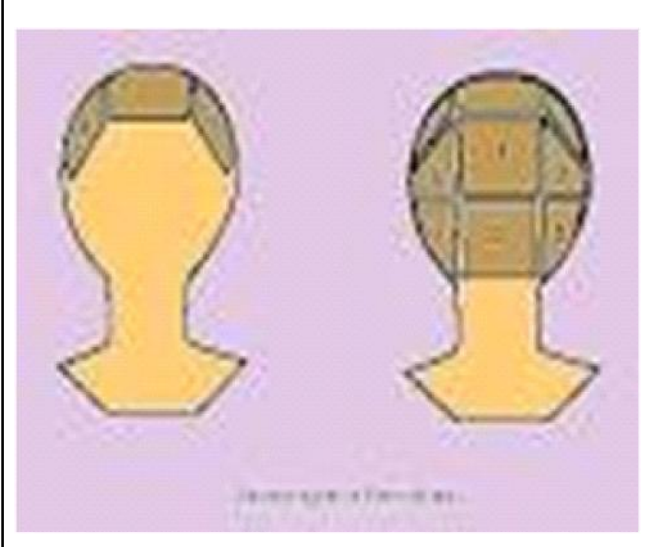
Sectioning helps you maintain control of the haircut while determining the bone structure and size of the head. This is important because you must know the distribution of hair at the top, sides, crown, and the nape. Sectioning is

depending on the style. The angle of the cut will vary in direction within the section.

Sectioning for the top

To decide the width of the frontal bone, place your fingers at the centre part of the top of your head. Noun your finger down the side of your head toward your ears. After determining the width, make two partings going toward the hairline and ending at a point.

Fig 2



Sectioning for the Crown

Behind the top section and between the parietal ridges on either side of the head, there is slight outline of the crown extend down to the base of the skull.

Sectioning for the Nape

With the crown section of the hair clipped up out of the way, You can find the width of the nape section by placing your fingers behind the ears and feeling for the ridge of the temporal bones. By using these bones as your guide, you will have the exact amount of hair for the nape.

Elevation

The angle or degree at which a subsection of hair is held, or elevated from the head when cutting is called elevation. Elevation is an action that occurs when you lift a subsection of hair above 0 degree.

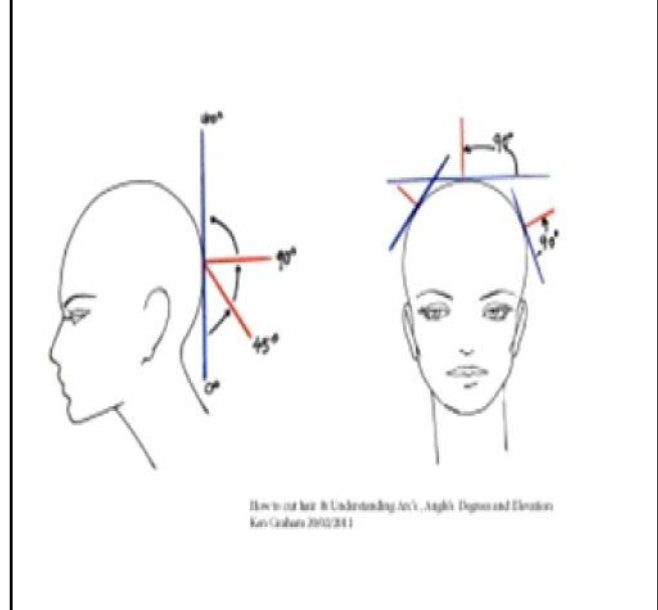
Elevation creates graduation and layers and is usually described in degree. The most commonly used elevation is 45 and 90 degrees. A general rule of hair cut is, the more you elevate the hair, the more graduation you create. When you elevate the hair below 90 degree, you are building weight. When you elevate the hair at 90 degree or higher, you begin to remove weight, or layer the hair.

Elevation define into three categories

1 Low elevation: The hair from the bottom third of the nape section is held at its lowest point, close to the neck. There is no elevation to the hair. The purpose

of the low elevation is to produce maximum bulk. This elevation is most effective when the hair is fine and thin.

Fig 3



2 High elevation: Hair that is lifted to the top of its section result in the highest elevation High elevation creates layers. A high elevation should be used on medium or thick hair, never on fine or thin hair.

3 Medium elevation: the hair lifted straight out from where it grows, and the fingers remain parallel to the head. The shears must follow the angle of the fingers. This cut gives you a perfect width of layered ends. A medium elevation can be used on blend hair.

Length and perimeter

Length is the distance from the scalp to the ends of the hair. Perimeter is the outer edge of the hair cut.

Angles and lines

A line a thin continuous mark used as a guide. Two basic lines are used in hair cutting-Straight and curved.

Three types of straight lines are commonly use in hair cutting.

Horizontal, Vertical, Diagonal.

Angles are most important elements in creating a strong base in hair cutting. This is a basic calculation. Angles are particularly important in two examples: elevation and cutting line.

Cutting line

Cutting line is known as finger angle, finger position, cutting position, and shears angle. This angle creates the end result of hair cut.

Guide line

The guide line is a section of hair that determines the length of hair will be cut.

Identify the tools used in hair cutting

- **Scissors:** Scissors are having two blades, and these blades are equally balanced, smooth and sharp at the tip and at the end. Scissor is mainly used to cut blunt or straight lines in hair. It may also be used to slide cut or point cut. They also remove 50% of the bulk from hair.
- **Section Clips:** These are in use for clipping the hair at the time of cutting.
- **Combs:** These are having less wide and narrow spaces on one edge, and larger speaks on the other side. The professional thumb and index finger are in use for keeping the comb. Different types of combs available in the market.
 1. **Wide Tooth comb:** It is mainly used to detangle the hair.
 2. **Barber Comb:** Barber comb is used for close tapers in the nape and side when using the shears over comb technique.
- **Thinning scissors:** These scissors are having single and double blades, and it's fully depending upon the quantity of thinning needed. These scissors are almost looking like hair cutting scissors. Its mainly used to remove bulk from the hair. Its also known as texturizing shears and tapering shears. Thinning shears also have on the straight edge blade & one that has to comb like teeth.

Fig 4



- **Razors:** There are two types of razors, one is in use for cleaning the neck hair and another is in use for tapering hair edges in outside cut. It is mainly used when a softer effect is desired on the end of the hair. Razor come in different shapes and sizes.
- **Apron:** Apron is in use for protecting your clothes from hair dust.

- **Edger:** Edger is a smaller version of clippers, it mainly used to remove excess or unwanted hair at the neckline and around the ears.
- **Clipper:** Clipper is used for given short taper in hair cut. Clipper can be used without a guard to shave the hair.

Explain the Hair cutting techniques

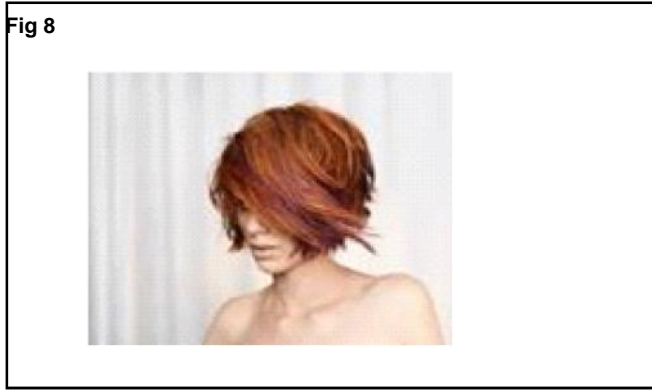
- 1 **Club cutting:** Club cutting is also known as blunt cutting and regularly used when cutting the sides and top of the hair. The section of hair is held out from the head and cut off at the points and tips of hair.
- 2 **Scissor over comb:** Scissor over comb is a hairdressing method using the comb as a guide for cutting in areas where the hair is too short for a finger grip, as in the nape area and around the ears.
- 3 **Graduating:** Graduation technique is use an effect or hair cut that result from cutting the hair with tension, low to medium elevation, or over direction.
- 4 **Thinning/ Slithering:** Thinning with scissors or razor the hair can be thinned to either, increase volume at the root by reducing the weight or to soften the features of a style.
- 5 **Texturizing:** In texturizing technique, the hair is cut to different lengths to produce a variety of different

Fig. 5



looks, short hair can be texturized to give a spiky look, long hair can be made to less consistent and using a combination of long and short hair more fashionable looks can be achieved.

- 6 **Point cutting.** Point cutting is a technique performs on the ends of the hair using the tips, points, of the shears. It is typically used on medium-length to longer hairstyles to soften the bluntness of the cut, add texture and interest or remove bulk. It is also good for texturing curly hair.
- 7 **Notching.** Notching works the same as point cutting; the difference is that it's used on shorter, straight styles to create a wild or spiky look.



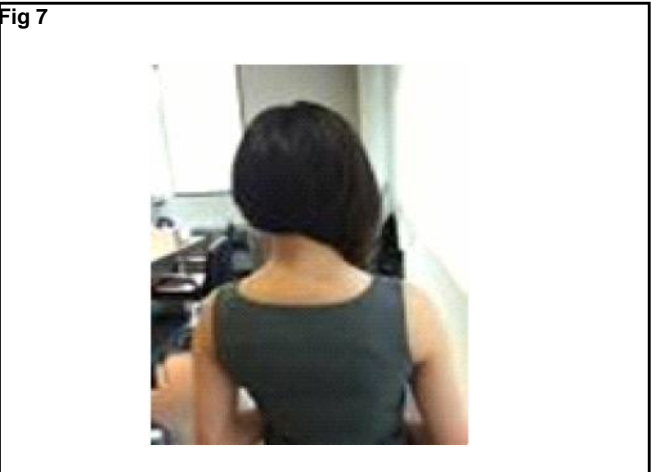
Basics of blow dry:

Purpose of blow Drying

This is the process of styling wet hair so that you achieve a particular shape when the hair is dry. The most popular way of drying hair today is the hand-held hair dryer (commonly called a blow-dryer).

Drying hair is the process of styling wet hair while blow drying it using hand held dryers various techniques and used to create different effects. While directing heated air on to the wet hair, you mould the hair with brushes, combs or your fingers.

Blow-styling works by changing the hair's structure. Heat softens it. The weaker links between the polypeptide chains (hydrogen bonds and salt bridges are broken, allowing the keratin to stretch & change from its alpha to its beta form. While hair is wet, and heat is applied it can be moulded into a chosen shape.



Types of Blow drying

Blow waving: Shaping the hair into waves, using directed heated air from a dryer, and combs, brushes or your hands. It achieves natural, soft fullness.

Blow drying: Simply drying the hair with the handheld dryer. It is usual to blow dry hair into a chosen shape, or in a required direction.

Scrunch drying: Gripping and squeezing clumps of hair while directing heated air into the hand. The process yields a casual, ruffled, moulded shape.

Finger or hand drying: Lifting, teasing, pulling and directing hair with the fingers or hands casual, soft and full shapes can be achieved.

Client & Trolley preparation

- 1 After shampooing, return the client to the seated position and comb out any tangle in the hair.
- 2 Remove excess moisture from by towel dries the hair,
- 3 Secure a neck strip around the client's neck
- 4 Arrange all concern tools and material in the trolley.

Basics of Blow Drying

After shampooing, towel-dry the hair (wet hair takes a lot longer to blow-dry);

Apply styling aid. eg mousse, gel, spray;

Mould the hair into the desired shape with your hands or a comb;

Mark out each section of hair cleanly and, starting at the bottom, work upwards using the angles of the cut to achieve the desired effect;

Direct the nozzle on the hair dryer down the hair shaft. This will smooth the cuticle down and give you a better finished look.

Work the hairdryer and brush in equally. Don't hold the dryer still over a section as this will burn the hair rather than shape it.

Use the cold feature on the hair dryer, if there is one, to fix the hair into shape. (hot air moulds the hair, cold air fixes it)

Precaution while performing a blow drying:-

- 1 Never hold the blow dryer too long in one place. Direct it from the scalp in the direction of the ends of the hair.
- 2 Always direct the hot air away from the clients scalp to avoid scalp burns.
- 3 Position the blow dryer about six inches away from hair at all times so that your hair do not burn with the strong heat at closer range.
- 4 Another thing to remember while blow drying hair is to blow dry in a downwards motion. Blow drying upwards causes a lot of damage to hair.
- 5 Do not blow dry in the same spot for too long as again there is a chance of damage due to heat. Keep moving the blow dryer around. However, do not wave it or jerk it around. Smooth movements along the part you are brushing are all that is required.
