ANATOMICAL ASPECT OF AGE DETERMINATION UP TO 25 YEARS AGE IN LIVING AND IN DEAD BODY

[1]*Dr. Sanjay Goswami and [2]Dr. Madhavi Goswami

[1]Associated Professor & Head, Dept. of Rachana Shareer, MSM Institute of Ayurveda BPS Women University, Sonipat, Haryana.

[2]Professor & Head, PG Dept. of Rachana Sharir, Rishikul Parisher, Uttarakhand Ayurved University.

*Corresponding Author

Dr. Sanjay Goswami

Associated Professor & Head, Dept. of Rachana Shareer, MSM Institute of Ayurveda BPS Women University, Sonipat, Haryana.

ABSTRACT

Paper deals with the determination of age in living and in dead. It is done by recognizing certain features mainly anatomical structures in an individual because according to age anatomical changes occurs and are unique to the particular age. This age determination actually helps in establishing the identity of a person living or dead. Data for identification consists many factors which help in establishing the identification of an individual, but age is an important factor for establishing identity. The identity is required in medico-legal cases both in living or dead person. Medico-legal cases are civil cases as well as criminal. Many factors helps in identification of an individual, some important factors are age, sex, religion, raw, teeth, DNA, foot prints, finger prints. But in this study we are describing age determination of an individual. How we can estimate age with the help of anatomical structures of an individual.

KEYWORD: Age Determination.

INTRODUCTION

Age of an individual is determined at different stages. Such as in foetus, children, adults, dead persons, decomposed bodies and skeletal remains. In practice of an doctor different types of medico-legal are found. In which fixation of age of victim is needed.

a. The identification of person in living means knowing positively who a given person is. In life of a doctor a situation, when a person claims that he is someone who actually he is not called as impersonation.

Impersonation is done in living.

i. To assume the identity of a person messing for a long time and stake claim the property of the person which he claims to be.

ii. To appears in an exam on behalf of the other.

iii. To giving evidence on behalf of the other.

iv. Concealing his identity for escaping from law (e.g. thief)

v. For claiming insurance on behalf of other.

vi. Identification in court as accused of any big crime.

vii. Mix up of new born babies in hospitals.

viii. Absconding soldiers.

b. Identification is dead may be essential in following situations:

I. Identification is important to identify the individuals who died in mass disaster, air crash accidents and fire victims etc.

II. During medico-legal examination doctor may provide help by supplying certain facts or data in which age is also a main factor provide doctors with help of anatomical study of skeleton etc.

The identification data contain mainly following factors.

i. Race & Religion

ii. Sex

iii. Age

iv. Complexion and facial features

v. Heir

vi. Tattoos, finger prints (Dactylography)

vii. Occupation marks

viii. Speech voice, bone comparison

ix. Skull sutures, frontal sinus pattern

x. IRIS scan retina scans

Here we are describing (studying) only age determination methods for identifying a particular age of an individual.

Age: It is the most important factor in determining the true identify of an individual. The age can be determined from anatomical changes in:

i.   Age of foetus

ii. Teeth

iii. Ossification of bones

iv. Secondary sex character

MATERIAL AND METHOD

Determination of age we will study on the basis different age status of living and in dead person decomposed bodies and in case of skeletal remains. Different tables we will use the show changes of a part of body at different age label.

DISCUSSION

A. Age estimation in foetus

It can be assessed by

1. Length

2. Crown rump length

3. Weight

4. Physical feature

5. Appearance of ossification center

Refer table no. (1-4)

Table: 1.

Fetal age estimation by crown-rump length	
CRL in mm	**Age in weeks**
5-8	5
10-14	6
17-22	7
28-30	8

Table: 2.

Appearance of ossification centers	
Appearance	**Ossification centers**
5-6 weeks	Two primary centers for clavicle and fuse together at about 45 days
6 weeks	Center for mandible appears Center for maxilla appears
7 weeks	Primary center for shaft of femur Primary center for shaft of tibia
8 weeks	Primary center for body of scapula Primary center for shaft of Humerus Primary center for shaft of radius Primary center for shaft of ulna Primary center for ilium Primary center for shaft of fibula Center for squamous part of temporal bone appears Center for frontal bone appear Center for greater wing of sphenoid bone appears
9 weeks	Center for lesser wing of sphenoid bone appears
11 weeks	Center for sphenoid body appears (pre-sphenoidal part)
12 weeks	Center for tympanic part of temporal bone appears
16 weeks	Primary center for pubis appears Centers for ishium appears 2 primary centers for sphenoid body (post-sphenoidal part) Centers for lower segment of sacrum Ear ossicles ossified
20 weeks	Center for petrous part of temporal Center for manubrium and first and second segment of sternum Center for calcanium appears
16-20 weeks	Center for ethmoid bone appears
28 weeks	Center for talus appears
36 weeks	Center for lower end of femur Center for cuboid appears

Table: 3.

Dental feature	
Age	**Features**
6 weeks	Development of dental lamina
8 weeks	Dental papilla forms
3 months	Bud or germination centers for permanent teeth appears
4-5 months	Calcification of temporary teeth occurs

Table: 4.

Determination of age from hand and foot length
Formula for fetal age
<u>Using foot-length</u> PG = 8.8649 + 3.4863 × FL Standard error = 0.75 of the estimate <u>Using hand-length</u> PG = 8.0514 + 4.8824 × HL Standard error = 1.04 of the estimate PG = period of gestation in weeks FL = foot length in cm HL = hand length in cm

B. Age estimation in infants, children, adult < 25 years

It can be assessed by

1. Physical examination

2. Secondary sexual characters

3. Morphology and number of teeth

4. Radiological examination – appearance of ossification center

Refer table no. (5-10)

Table: 5.

Head circumference at different age	
Age	**Head circumference**
Birth	35 cm
3 month	40 cm
1 year	45 cm
2 year	48 cm
7 year	50 cm
10 year	52 cm

Table: 6.

Tanner staging for pubic hairs in male and female			
SMR stage	**Age**	**Male (pubic hairs)**	**Female (pubic hairs)**
1	< 12 years	Pre-adolescent stage. No pubic hairs	Pre-adolescent stage. No pubic hairs
2	12-13 years	Scanty, sparse, long, lightly pigmented, at base of penis	Sparse, lightly pigmented, straight, not extending on to mons pubis
3	13-14 years	Darker, starts to curl, small amount, begins to spread laterally	Pigmentation in hair increases and becomes darker, increase in amount, begins to curl, grows over ones pubis

| 4 | 14-15 years | Resembles adult type but less in quantity, coarse, curly, covering most part but not going up to thighs | Coarse in texture, curly, abundant, covering most part but not going up to thighs |
| 5 | > 15 years | Adult distribution, spared to medial part of thighs | Adult distribution. Triangular spread, mature pubic hairs, spreads to medial part of thighs |

Table: 7.

SMR stage	Age	Penis	Scrotum & testis
Tanner staging for genital development in male			
1	< 12 years	Pre-adolescent, small size penis	Pre-adolescent, small size testis and scrotum
2	12-13 years	Slight enlargement	Testis enlarge, enlarged scrotum, pink texture altered
3	13-14 years	Longer	Testis and scrotum enlarge further
4	14-15 years	Larger, thicker (breadth increase in size), glans penis is developed	Testis and scrotum larger, scrotum becomes darker
5	> 15 years	Adult size	Adult size, mature testis and scrotum

Table: 8.

SMR stage	Age	Breast development
Tanner staging for breast development in female		
1	9-10 years	Pre-pubertal. Elevated papilla, small fat areola
2	10-11 years	Papilla forms a palpable nodule (breast bud)
3	13 years	Breast and areola enlarged, contour of breast not defined
4	13-14 years	Contour of breast well defined, more breast development with elevation of the areola and papilla forming second mound
5	15-16 years	Mature breast – papilla projects as nipple, areola part of general breast contour

Table: 9.

Features	Temporary teeth	Permanent teeth
Difference between temporary and permanent teeth		
Number	20 (8 incisor, 4 canine, 8 molars)	32 (8 incisor, 4 canine, 8 premolars, 12 molars)
Premolars	Absent	Present
Size & weight	Smaller and lighter, more delicate	Larger and heavier, stronger
Colour	China white	Ivory white
Placement	Anterior teeth are vertically placed	Anterior teeth are inclined or projected forwardly
Neck	More constricted	Less constricted
Presence of ridge	Present between neck and body	No ridge

Root of molars	Smaller and more divergent	Longer and less divergent
Replaced by	Permanent teeth	Not replaced
x-ray	Reveals bud or germination center of permanent teeth	No such features noted

Table: 9.

Eruption and calcification of root of temporary teeth		
Teeth	**Eruption**	**Calcification of root**
Medial incisor lower	6-8 months	1.5-2 years
Medial incisor upper	7-9 months	1.5-2 years
Lateral incisor	10-12 months	1.5-2 years
Lateral incisor upper	7-9 months	1.5-2 years
First molar	12-14 months	2-2.5 years
Canine	17-18 months	2.5-3 years
Second molar	20-30 months	3 years

Table: 10.

Ossification centers as observed in Indian subjects		
Bone	**Female**	**Male**
Humerus Head	A† - year F # - 14-16 years	A – 1 year F – 14-18 years
Greater tubercle	A – 7 month F – (with head) 2-4 years F – (with lesser tubercle) 5-7 years	A – 7 month F – (with head) 2-4 years F – (with lesser tubercle) 5-7 years
Trochlea	A – 7-10 years F – (with capitellum) 9-13 years	A – 9-11 years F – (with capitellum) 11-15 years
Lateral epicondyle	A – 10 year F – (with capitellum) 10-12 years	A – 12 year F – (with capitellum) 11-16 years
Medial epicondyle	A –5 year F – 14 years	A –7 year F – 16 years
Radius Head	A –6 year F – 14 years	A –8 year F – 16 years
Distal end	A –1 year F – 16.5 years	A –1 year F – 18 years
Carpal bones Capitates	A – 6 months	A – 6 months
Hamate	A – 8-14 months	A – 8-14 months
Triquertrum	A – 2-3 years	A – 3-4 years
Lunate	A – 5 years	A – 5 years
Trapezium	A – 5-6 years	A – 7 years
Trapezoid	A – 5-6 years	A – 4-7 years
Scaphoid	A – 6 years	A – 7-11 years
Pisiform	A – 9-12 years	A – 12-17 years
Metacarpals 1st metacarpal	A – 3 years F – 14-16 years	A – 4 years F – 16-18 years
2,3,4 and 5th	A – 2-3 years	A – 3-4 years

metacarpal	F – 14-15 years	F – 16-18 years
Phalanges (hand) Proximal row Middle row Terminal row	A – 1.5 years F – 14-15 years A – 2-3 years F – 14-16 years A – 3 years F – 15 years	A – 2-4 years F – 17-18 years A – 3 years F – 16-18 years A – 3-5 years F – 17-18 years
Hip bone Crest of ilium Disappearance of Triradiate cartilage Ichium and pubis Ischial tuberosity Femur Head Greater trochanter Lesser trochanter Distal end	A – 14 years F – 17-19 years 13-14 years F – 8.5 years A – 14-16 years F – 20 years A – 1 year F – 14-15 years A – 3 years F – 14 years A – 1 year F – 15-17 years A – before birth F – 14-17 years	A – 17 years F – 19-20 years 15-16 years F – 8.5 years A – 16-18 years F – 20 years A – 1 year F – 16-17 years A – 3 years F – 17 years A – 1 year F – 15-17 years A – before birth F – 14-17 years
Tibia Proximal end Distal end Patella	A – shortly before birth F – 14-15 years A – 1 year F – 14.1-14.4 years 4 years	A – shortly before birth F – 16-17 years A – 1 year F – 14-16 years 3-7 years
Tarsal bones Calcaneum Talus Cuboid Internal cuneiform External cuneiform Middle cuneiform Navicular	At birth At birth At birth A – 1-3 years A – 1-3 years A – 1-3 years A – 1-3 years	At birth At birth At birth A – 1-4 years A – 1-4 years A – 1-4 years A – 1-4 years
Metatarsals 1st metatarsal 2,3,4 and 5th Metatarsal	A – 3 years F – 14-15 years A – 3 years F – 14-15 years	A – 4-5 years F – 16-18 years A – 4-5 years F – 16-18 years
Phalangs (foot) Proximal row Middle row Distal row	A – 1-3 years F – 13-15 years A – 3-4 years F – 14-15 years A – 4-6 years F – 13-14 years	A – 3-4 years F – 16-18 years A – 3-4 years F – 16-18 years A – 4-6 years F – 15-17 years

Clavicle	A – 14-16 years F – 20 years	A – 15-19 years F – 22 years
Scapula Base of coracoids	A – 2.5 months F – 2.5 years	A – 2.5 months F – 2.5 years
Coracoids tip	A – 10-11 years F – 16 years	A – 10-11 years F – 16 years
Angle of coracoids	A – 8-10 years F – 16 years	A – 10-14 years F – 17-18 years
Acromion*	A – 12-14 years F – 16 years	A – 15-16 years F – 19 years
* Majority of cases exhibited appearance and fusion as mentioned by Galstaun, Pg.No. 280 of references † A = denotes appearance of ossification center # F = denotes fusion of center		

CONCLUSION

Age of an individual is determined at different stages. Such as in foetus, children, adults, dead persons, decomposed bodies and skeletal remains. Age is an important factor for establishing identity. The identity is required in medico-legal cases both in living or dead person. Medico-legal cases are civil cases as well as criminal. Many factors helps in identification of an individual, some important factors are age, sex, religion, raw, teeth, DNA, foot prints, finger prints.

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