

Standard operating procedure of age estimation of the living in Nepal

Goal of the Protocol:

In the absence of any protocol on age estimation, there has been lack of uniformity among the age estimation procedure in Nepal. The fact that forensic medicine experts are not the only personnel coordinating and performing age estimation and the procedure is being performed by medical officers and the physicians of any specialities, the formulation of the standard operating protocol can be helpful to perform age estimation more scientifically and uniformly throughout the nation.

It has been recognized that age estimation needs multidisciplinary coordination to the success of the exam. The protocol also includes the responses of other professionals, as they relate to the exam process.

Authorisation of reporting:

Age estimation should be commenced after getting a requisition letter from the court or any public institutions. The examiner should check the emphasis on particular age limit that the requesting authority has put.

Comprehensive report to be provided by a coordinator

The physician who takes the responsibility of age estimation can act as a coordinator and take help of professionals of other disciplines like qualified dentist, radiologist, anthropologist etc. He has to compile the reports or opinions provided by those professionals but he has to prepare the final comprehensive reports.

Separate age estimation register to be maintained.

A register mentioning the particulars of the examinee for age estimation should be maintained. This should also include the requesting office along with the reference letter, date of requisition and dispatch of the report.

Name of the accompanying Police Personnel or other representing the office requesting age estimation should be noted.

Informed consent:

The examinee should understand the full nature of their consent to the procedure. This can be accomplished by presenting them with all the relevant information in a language they can easily understand. Informed consent should be taken from the individual prior to undergoing for age estimation. The additional consent of the representative of the examinee may be needed if the individual is not in the capacity to provide valid consent due the mental condition or tenderness of age. The individual and/or the representative should sign on the consent paper. If they are unable to sign, fingerprint impressions of both the thumbs should be taken.

Details of the examinee

Note down the:

1. Name of the individual. If the requesting authority has mentioned the code name, the examiner should also note down the same and maintain confidentiality.
2. The age (in years, months and days) as alleged by the individual and/or the representative.
3. The age if it has been alleged by the requesting authority.
4. The sex of the examinee.
5. The address of upbringing and residence.
6. Socioeconomic status (Using Modification of Kuppuswamy's Socioeconomic Status Scale in context to Nepal)
7. Accompanying person at the time of examination.
8. Person identifying the examinee.
9. Date, time and the place of examination.

Selection of methods:

Though there are many published papers on age estimation and several methods developed, the appropriate one should be chosen considering the specific conditions of each case.

The age diagnosis examination should include:

1. A physical examination which also records anthropometric data, signs of sexual maturation and any age-relevant developmental disorder.
2. An X-ray examination of the left hand. Additional X rays of other bones eg. Shoulder (including medial ends of the clavicle), elbow joint, pelvis, hip joint, knee, ankle and foot etc. may be needed depending on the age group of the examinee.
3. A dental examination which records dentition status (including erupted primary and permanent teeth) and evaluates X-ray examination of the dentition.

These methods should be used in combination in order to increase accuracy in age estimation as well to the identification of age associated developmental disorders.

General physical examination

The physician who has to examine the examinee of opposite sex, he/she should do so only in the presence of any person unrelated to the physician of the same sex as that of the examinee and record the name of the person.

1. Height: Should be measured by portable/wall mounted stadiometer with movable head piece, or measuring rod. Height should be recorded in centimetres.
 - a) Participants are asked to remove their shoes, heavy outer garments, and hair ornaments.
 - b) The participant is asked to stand with his/her back to the height rule. The back of the head, back, buttocks, calves and heels should be touching the upright, feet together. The top of the external auditory meatus (ear canal) should be level with the inferior margin of the bony orbit.

- c) The participant is asked to look straight. The head piece of the stadiometer or the sliding part of the measuring rod is lowered so that the hair (if present) is pressed flat.
- d) Height is recorded to the resolution of the height rule (i.e. nearest millimetre).
- e) If the participant is taller than the measurer, the measurer should stand on a platform so that he/she can properly read the height rule.

Calibration of height rule: The height rule should be checked with standardized rods every month and corrected if the error is greater than 2 mm.

2. Weight:

- a. The weighing machine (scale) should be placed on a hard-floor surface.
- b. Participants are asked to remove their heavy outer garments (jacket, coat, trousers, skirts, etc.) and shoes.
- c. The participant should stand in the centre of the platform and weight distributed evenly to both feet.
- d. Self-reported weights should not be accepted, even if the participant is immobile or refuses to be weighed.

Calibration of scale: Calibration be done at least once a month.

- 3. Voice: Ask the examinee some simple questions and note the type of voice either high or low pitched. Also note the voice whether it is childish or mature.
- 4. Scalp hair: Note the colour of the hair, length and baldness (if present)
- 5. Moustache: Mention whether it is present, absent or shaved. Note the colour, length, distribution if present
- 6. Beard: Mention whether it is present, absent or shaved. Note the colour, length, distribution if present
- 7. Ask the date of menarche (in females) and note.
- 8. Use Marshal and Tanner's classification of the breast development and Pubic hair growth stages in females and Genital development and Pubic hair stages in males.
- 9. Note any findings (if present) related to developmental disorders and analyse the potential impact of various pathological conditions on the status of maturation derived by other methods.

Dental Examination: (to be done by a trained dentist if possible)

- A. Intraoral examination to observe the presence/absence of the teeth:
 - a) Use FDI (Federation Dentaire Internationale) method of teeth notation.
 - b) Make a note on the teeth present, both deciduous and permanent teeth.
 - c) Mention whether third molars are erupted. If not, note the presence of space and/or bulge distal to the second permanent molars.
 - d) Mention whether any tooth if it is absent and note the cause of its absence.
- B. Perform an orthopantomogram if available. If not, perform intraoral periapical X ray. Note the stage of development of the teeth and note the status of root closure. Use established dental age estimation methods using the X rays (Eg. Eight stages of development (Demirjian's) method, third molars maturation etc) if possible. The

methods should be used to compute the range of age based on the reference population (if such researches are available) to which the examinee resembles closely.

Radiological examination

- a) Perform X- ray of left hand and wrist including the lower portions of radius and ulna (PA view). The X- ray should contain all the phalanges, metacarpals, carpals and lower end of radius and ulna in a single plate.
- b) Perform X-ray of other parts Eg. Shoulder (including medial ends of clavicle, PA view), elbow joint (PA and lateral view), pelvis and hip joint (PA view), knee (PA view), ankle and foot (PA and lateral view) depending on the suspected age range of the examinee in question.

X-ray of different regions as mentioned should be taken as population bases studies based on the standard methods are currently unavailable in Nepalese context.

- c) If possible, use either Greulich and Pyle or Tanner-Whitehouse (TW2 or TW3) method to calculate the skeletal age of the person. Use reference studies corresponding to the origin of the examinee if available.
- d) The report of the radiographs should be prepared by a trained radiologist if possible.

Chain of custody during radiography

When the examinee is taken to perform radiographs, at least one responsible person (eg. Police, staff of the hospital etc.) should accompany the examinee and the name of the person mentioned.

Use of reference studies

The collected findings and the determined stages of radiographs are to be presented in detail in the expert report. The used stage classifications and reference studies, if used in the report, are to be mentioned.

Reference studies used for forensic age estimation should meet the following requirements:

- a. Adequate sample size
- b. Proven age of subjects
- c. Even age distributions of subjects
- d. Analysis separately for both sexes
- e. Information on the time of examination
- f. Clear definition of the examined features
- g. Detailed description of the methods
- h. Data on the reference population regarding ethnicity, socioeconomic status, state of health
- i. Data on the sample size, mean value, and range of scatter for each examined feature

Examples of reference studies are Greulich and Pyle (1959), Gunst et al. (2003), Kahl and Schwarze (1988), Mincer et al. (1993), Schmeling et al. (2004) and Tanner et al. (2001).

Expert reports

The coordinating expert should compile the reports from the other referred experts (if sent) and provide comprehensive report.

The objective of the expert forensic report is to provide the most probable age of the individual and/or the probability that the stated age is the actual age or that the individual's age is above the penal age limit.

The expert report has to quote the methods and the reference studies (if used) or source eg books, guidelines etc. on which the age estimation is based on. The influence of ethnicity, geographic origin, nutrition, socioeconomic status and any development disorders should be discussed in the report and possibly, a quantitative assessment of any such factors should be given.

The age should be given in range.