PHYSIOLOGY PRACTICAL NOTE BOOK

Submitted for the

Four Year/ Three Year B.A./B.Sc. Interdisciplinary Course Practical Examination (Under CCF, 2022), 2024

University roll number:

University registration number:

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Exp. No. 1 **Dated: _____**

MEASUREMENT OF SYSTOLIC AND DIASTOLIC BLOOD PRESSURE BY AUSCULTATORY METHOD USING A MERCURY SPHYGMOMANOMETER: CALCULATION OF PULSE & MEAN ARTERIAL PRESSURE

1. Principle:

Blood pressure is defined as the lateral pressure exerted on the walls of blood vessels by circulating blood. The systolic pressure is the maximum pressure on the arterial walls and diastolic pressure on the other hand is minimum pressure exerted on the arterial walls when the heart is in systole and diastole respectively. Pulse pressure is the arithmetic difference in systolic and diastolic blood pressure. Mean blood pressure is the average pressure which is exerted on the arterial walls during each cardiac cycle. These different components of blood pressure give us information regarding health of an individual. There are different methods for determination of blood pressure, *e.g.*, ***palpatory method***, ***auscultatory method***. Each of these methods employ use of *mercury sphygmomanometer* for classical and accurate measurement of blood pressure.

2. Requirements:

The apparatus which is universally used for determination of blood pressure is mercury sphygmomanometer. The apparatus measures the blood pressure by an inflatable armlet which obliterates the blood flow for some time and gives arterial blood pressure. Sphygmomanometer consists of an inflatable cloth covered rubber bag (cuff), which is fixed around the upper arm and is held in position by wrapping an extension of the cloth covering the bag like a bandage. The air above the mercury in the manometer is allowed to escape by opening the screw needle gradually and the pressure into the bag falls.

3. Procedure:

- The sphygmomanometer was kept at the level of heart of the subject sitting comfortably in a quiet room.
- The cuff was wrapped around the upper arm of the subject. The brachial artery was located just below the cuff and the stethoscope's mouthpiece was placed, raised fairly, quickly until the pulse at the wrist got obliterated.
- The pressure in the armlet was next gradually lowered by opening the valve. No sound was heard till the pressure has fallen to systolic levels as the blood was continually started to flow through the compressed artery.
- The systolic pressure in the manometer was accurately recorded in millimetre of mercury (mm Hg).
- The cuff pressure was continued to lower gradually and the sound changes in the stethoscope were heard carefully. The sounds became louder and gradually disappeared indicating diastolic pressure.
- The complete disappearance of the sounds indicated the second diastolic point, which was also noted.
- Since there is great difference in opinions among several scientists about the first and second diastolic pressure points, the arithmetic mean of two diastolic points may be accepted as true diastolic pressure.
- The difference between systolic and diastolic pressure gave the pulse pressure.
- The mean blood pressure was calculated from DBP and PP.

4. Observation:

a) Name of the subject:
b) Age:
c) Gender:
d) Height:
e) Weight:

SBP (mm Hg)	DBP (mm Hg)	Comment

5. Calculation of mean blood pressure and pulse pressure:

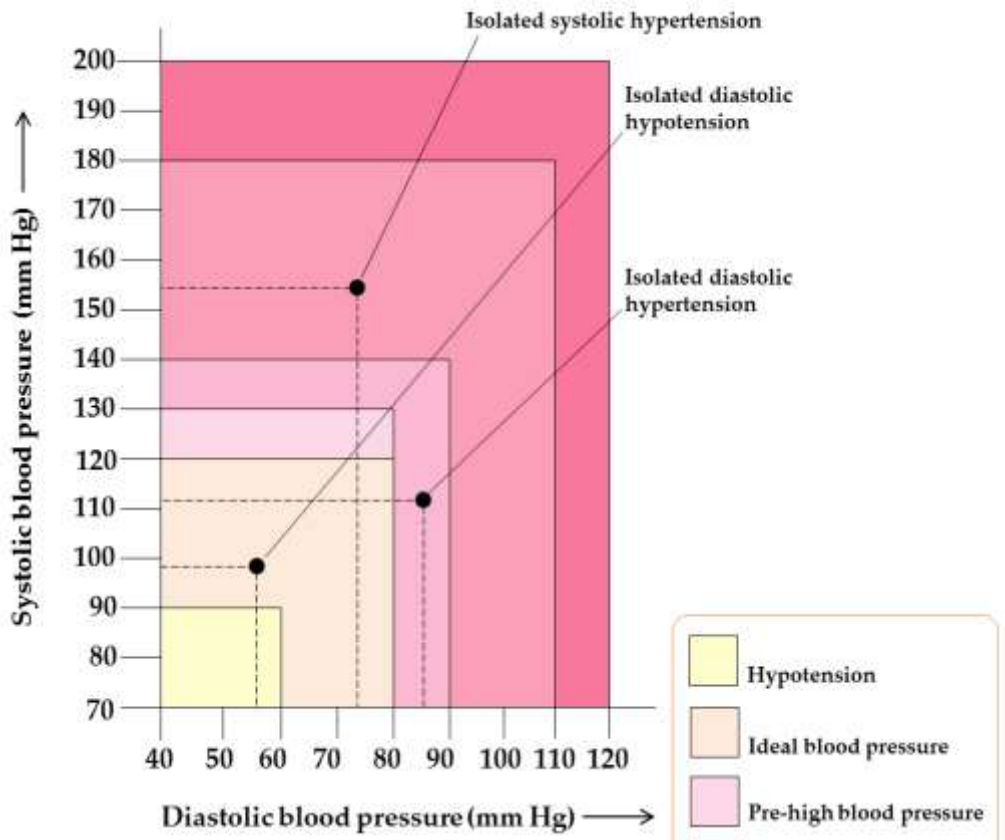
i) Pulse pressure was calculated as, **PP = (SBP - DBP)**

Therefore, pulse pressure of the subject is = = mmHg

ii) Mean arterial pressure was worked out using the formula: **MBP = DBP + $^1/_3$ PP**

Therefore mean arterial pressure of the subject is = = mmHg

6. Interpretation:



As per ICMR specifications following ranges of systolic and diastolic blood pressure values has been designated as hypotension (low blood pressure), ideal blood pressure and hypertension (high blood pressure)

	Blood pressure (mm Hg)	
	Systolic blood pressure	**Diastolic blood pressure**
Hypotension	60-90	40-60
Ideal blood pressure	90-120	60-80
Pre-high blood pressure	120-130	<90
Stage 1 hypertension	130-140	80-90
Stage 2 hypertension	140-180	90-110
Hypertensive crisis	180-200(+)	110-120(+)

The SBP and DBP values of the subject is mm Hg and mm Hg which indicates that the body surface area of the subject has an ideal blood pressure/ hypotension/ isolated diastolic hypotension / pre-high blood pressure/ isolated systolic hypertension / isolated diastolic hypertension / stage 1 hypertension / stage 2 hypertension / hypertensive crisis.

****Please note:** Isolated systolic hypotension is not possible physiologically.

Exp. No. 2 **Dated: _____**

DETERMINATION OF BODY MASS INDEX (BMI)

1. Principle:

Body mass index is an anthropometric tool which is used worldwide to determine fat mass of an individual in order to find out his/her physical fitness using body weight and height.

2. Requirements:

- Weighing machine
- Anthropometric scale

3. Procedure:

- The subject was asked to stand erect on the weighing machine without shoes and other gadgets. The body weight value was recorded in kgs.
- The subject was again asked to stand erect with the shoulder blades and heels should be at similar plane. The body height was measured using anthropometric scale.

4. Observation:

f) Name of the subject:
g) Age:
h) Gender:
i) Height:
j) Weight:

5. Calculation of body mass index:

Body mass index was calculated as, $\frac{\textbf{Body weight in kg}}{\textbf{Body height in m}^2} = \frac{\textbf{kg}}{\textbf{m}^2} =$ kg/m^2

6. Interpretation:

As per ICMR specifications BMI values in following ranges denote following physical conditions

	BMI value in kg/m^2
Underweight	**< 18.5**
Normal range	**18.5 – 24.9**
Overweight	**25.0 – 29.9**
Obese	**≥ 30.0**

The BMI value of the subject is kg/m^2 which indicates that the subject is underweight/ has normal fat mass / overweight / obese.

Exp. No. 3 **Dated: _____**

DETERMINATION OF BODY SURFACE AREA (BSA) USING A NOMOGRAM

1. Principle:

Body surface area is also another anthropometric tool which is used for determination and standardization of various physiological parameters such as cardiac index, basal metabolic rate, glomerular filtration rate etc. Several pharmacological parameters and selection of dosage of various pharmacological drugs also requires BSA data frequently.

2. Requirements:

- Weighing machine
- Anthropometric scale
- A nomogram chart

3. Procedure:

- The subject was asked to stand erect on the weighing machine without shoes and other gadgets. The body weight value was recorded in kgs.
- The subject was again asked to stand erect with the shoulder blades and heels should be at similar plane. The body height was measured using anthropometric scale.
- The body surface area of the subject was determined from the nomogram chart by simply putting the data on height scale and weight scale.

4. Observation:

k) Name of the subject:
l) Age:
m) Gender:
n) Height:
o) Weight:

5. Calculation of body surface area:

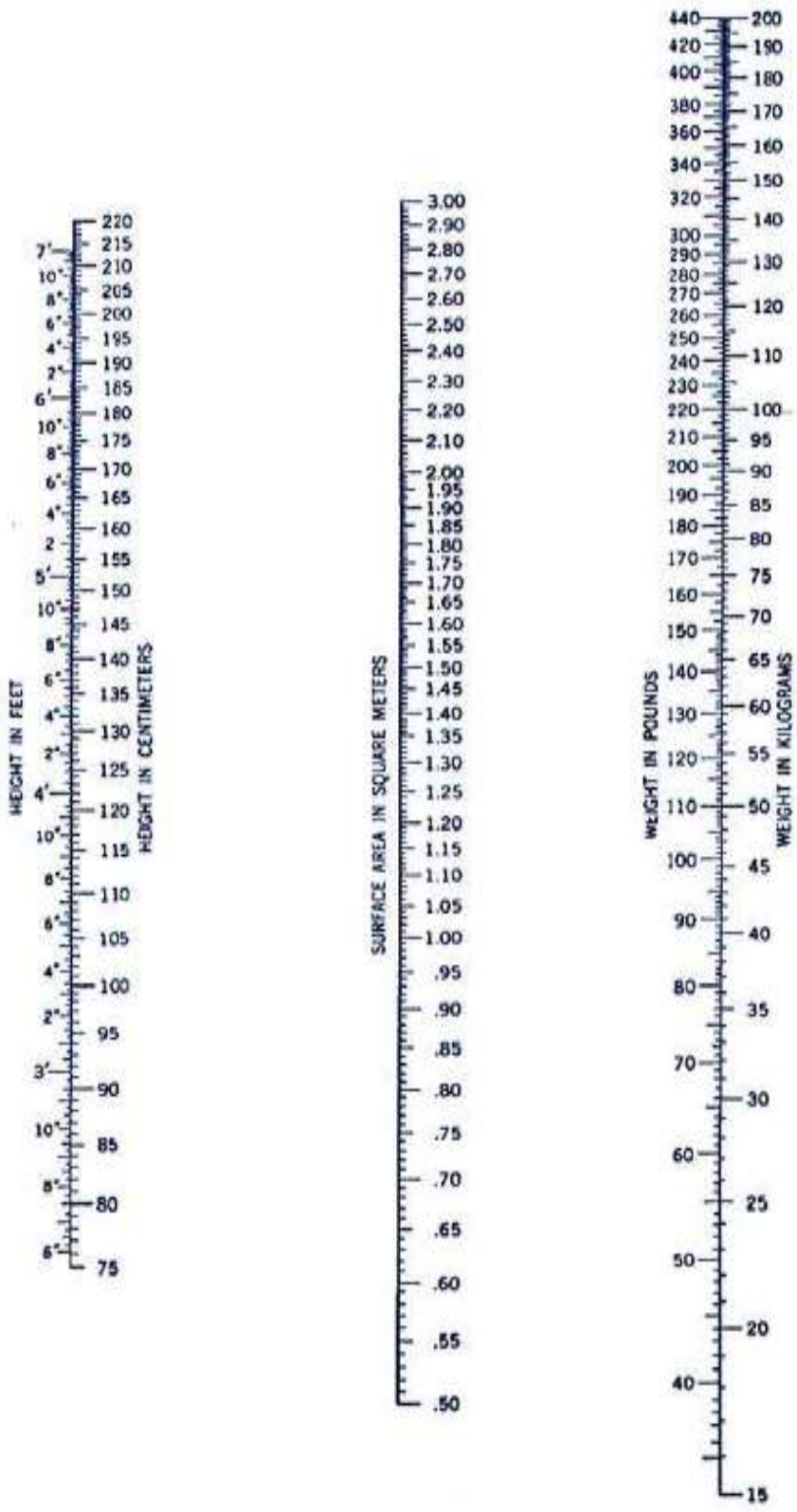
From the body surface area scale on nomogram it was found that body surface area of the subject is m^2.

6. Interpretation:

As per ICMR specifications ideal BSA values for adult male and female are as follows:

	BSA value in m^2
Adult male	**1.9**
Adult female	**1.6**

The BSA value of the subject is m^2 which indicates that the body surface area of the subject is ideal / more than normal/ less than normal value.



Nomogram chart