

Comparison between Mercury and Aneroid Sphygmomanometer in Accuracy of Reading among Faculty of Nursing Students, Fezzan University 2024

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ABSTRACT

Background: Blood pressure is one of the major problems facing society and causing death worldwide and its management requires accurate measurement as inaccurate reading leads to problems and wrong treatment for the patient. Aim: Comparison between mercury and aneroid sphygmomanometer in among accuracy of readings. Martial and method: This comparative descriptive study facility, that included 101 samples, the data was collected statistically using an interview questionnaire to collect information using statistical model

from then analysis using statistical analysis program version 20 then statistical calibrations were used such as frequency, percentage and arithmetic mean and degree of statistical significance was 0.05 and the result were presented in form tables. Results: A study was conducted in the Traghen region especially in the college of nursing, it included (101) samples whose ages ranged between (18-25) represented 52.5% years, the mercury sphygmomanometer was more accurate than aneroid sphygmomanometer, It was found that the average systolic readings of

mercury sphygmomanometer were 64.3 compared to readings of an aneroid sphygmomanometer of 64.7 and the average diastolic readings of mercury was 99.9 compared to readings of an aneroid sphygmomanometer of 102.8. Conclusion: In conclusion, it is concluded that the mercury sphygmomanometer are more accurate than the aneroid sphygmomanometer and that there is a slight differences between the measurements, The researchers recommended confirming the quality of measuring devices for each patient before accept readings.

Keywords: Comparison, mercury, aneroid sphygmomanometer, accuracy reading, students, faculty of nursing.

* Introduction

The diagnosis of mild hypertension and the treatment of hypertension require accurate measurement of blood pressure. Blood pressure readings are altered by various factors that influence the patient, the techniques used and the accuracy of the sphygmomanometer. The variability of readings can be reduced if informed patients prepare in advance by emptying their bladder and bowel, by avoiding over-the-counter vasoactive drugs the day of measurement and by avoiding

exposure to cold, caffeine consumption, smoking and physical exertion within half an hour before measurement. The use of standardized techniques to measure blood pressure will help to avoid large systematic errors. Poor technique can account for differences in readings of more than 15mm Hg and ultimately misdiagnosis. Most of the recommended procedures are simple and, when routinely incorporated into clinical practice, require little additional time. The equipment must be appropriate and in good condition. Nurses should have a suitable selection of cuff sizes readily available; the use of the correct cuff size is essential to minimize systematic errors in blood pressure measurement. Semiannual calibration of aneroid sphygmomanometers and annual inspection of mercury sphygmomanometers and blood (NR Cambell ,et al ,1990)

Cuffs are recommended accurate measurement is the most important thing at an early stage to diagnose a particular disease. Inaccurate measurement can lead to many major health problems such as high blood pressure. In order to get the most accurate reading, it is important to choose the right devices or monitor to measure human blood

pressure. In these research studies, two non-mercury measuring devices were used to compare the readings of mercury devices, AS they are claimed to be the most accurate devices in measuring blood pressure. Although it is the most accurate, this mercury device has the potential for harmful effects on health and the environment. Therefore, this device would not be usable in the future, which led to the proliferation of mercury-free sphygmomanometer in the market (MohdAshri ,IzzahSyaahra 2019). A mercury sphygmomanometer is a standard instrument that is used manually to monitor blood pressure in health care facilities. This method is considered the gold standard and has been used in practice for more than a hundred years. However, mercury-based devices have limitations due to environmental contamination and observer bias in measurement (Muniyand,M et al ,2022)

The aneroid sphygmomanometer is commonly used for the indirect measurement of blood pressure despite significant concerns about its accuracy. Although the mercury sphygmomanometer is highly accurate, there are concerns about the environmental toxicity of mercury. In response to various external pressures

to become essentially mercury free, replaced many mercury sphygmomanometers with aneroid devices. Since 1993, a maintenance protocol has been in place to ensure proper function and accuracy of these devices (James A Hodgkinson, 2020). Recommends checking the accuracy of home BP monitors used by patients. Previous research has highlighted that monitors used in surgeries and community pharmacies have shown variation in accuracy , several clinical protocols exist for the validation of BP measuring devices but these are, generally, undertaken on brand-new models and do not assess sustained accuracy thereafter. Typically, new monitors are assumed accurate for 2 years and then annual checks are undertaken in clinical practice. However, it is not clear whether this is appropriate, as the drift in accuracy, over time, of an automated sphygmomanometer is not known, and a study-investigating monitors in pharmacies suggested they decline in accuracy after 18 months (Br j Gen Pract, 2020).

*** Objectives**

*** General objective**

Comparison between mercury and aneroid Sphygmomanometer.

*** Specific objectives**

1- To assess the accuracy of systolic and diastolic blood pressure.

2- To determine whether the different methods produce the same reading.

* Materials and method:

This study was a comparative descriptive study facility-based study conducted during the period from January to July 2024. The study was conducted in faculty of nursing sciences. Study was included Students of college of nursing sciences Fezzan University, healthy adults (female) all students in faculty- Willing to participate. Exclude Researchers. Purposive sampling technique where used. sample size $n = 101$. The data was collected during period of study in gap for 3 weeks after explanation the purpose of the study. The data was collected and coded statistically using a statically model. It was analyzed using the statistical and analysis program excel (SPSS) version 20 .some statistical calibration was used, such as frequency, percentage, arithmetic mean. Results are presented the form of figures and tables. The study was approved by the faculty research committee; Agreement was taken from dean of faculty. Verbally and written consent was taken from the study group.

* Results

Table (1) Age of study group $n= (101)$

Item	Frequency	Percentage
18-20 years	53	52.5%
21-25 years	48	47.5%
Total	101	100.0%

Table (2) Aneroid Systolic blood pressure reading of study group

Item	Frequency	Percentage
less than normal (90 mm \hg)	11	10.9%
Normal 90-140 mm \hg	90	89.1%
Total	101	100.0%

Table (3) Aneroid Diastolic blood pressure reading of study group

Item	Frequency	Percent
less than normal 60mm\hg	24	23.8%
Normal 60-90 mm \ hg	77	76.2%
Total	101	100.0

Table (4) Mercury systolic blood pressure reading of study group

Item	Frequency	Percent
less than normal 90 mm hg	9	8.9
Normal 90-140 mm hg	92	91.1
Total	101	100.0

Table (5) Mercury Diastolic blood pressure reading of study group

Item	Frequency	Percent
less than normal 60 mm hg	24	23.8
Normal	77	76.2
Total	101	100.0

Table (6) Average of blood pressure reading between mercury and aneroid sphygmomanometer

Item		Average	Max	Min
Mercury	Systolic	99,9	130	70
	Diastolic	74,3	90	40
Aneroid	Systolic	102,8	130	70
	Diastolic	74,7	90	30

* Discussion

This study was conducted to assess measurement more accurate of

sphygmomanometer between mercury and aneroid and the study was carried among female nurses student in faculty of nursing, Fezzan University. The study revealed that the most of participant was age Between 18-20 represented 52.5% that means the most of participant is Young and in lowering level of education.

The result revealed that 46.5% of participants belonged to a normal body Mass index that means the participant is take healthy diet, and 29.7% they Are underweight, 13.9% are obese, and 9.9% overweight that means is Takeover of diet. The results of the study showed that the average systolic readings of a mercury Sphygmomanometer were (64.3 mm hg) compared to the average systolic Readings of an aneroid sphygmomanometer (64.7 mm hg). This finding indicated that mercury sphygmomanometer was more accurate in reading than aneroid this result was in agreement with the study in America by young and result analyzed data from 997 participants in 24 clinics who participated in this study and had valid data. The average of the two readings from the mercury sphygmomanometers was 74.6 mm Hg (range 47-110) for systolic blood pressure and 119.9 mm Hg (range 85-179) for systolic blood pressure.

Comparable aneroid blood pressure means were 73.8 mm Hg (range 44 115) for DBP and 119.8 mm. (Yong ma, et al, 2009).

and other study agreement conducted by Areebahqadir and Mohammed raze khan the aim was study establishing the type and accuracy of mercury free sphygmomanometers and was the result the difference studies of 5mm hg between mercury and aneroid device was 71.3% and 74.1% for systolic and diastolic BP respectively whereas the absolute difference of 5mm hg. (Areebahqadir ,2022). And other study disagreement with our study conducted by Farooq Ahmad Kumar et, in Kashmiri district of shopping and aim of the study assess the reliability of the blood pressure by three different apparatuses, on adult male population ,Was result according to the result, there is a mean difference in the blood pressure measurement instruments; mercury is systolic 118.10mm hg. The mercury diastolic blood pressure is 78.66mm hg, and the aneroid BP mean is 117.76mm hg and the diastolic at 78.43mm hg. (Farooqahmadkumar ,et al ,2024). We fine in this study that mercury readings are inaccurate compared to aneroid sphygmomanometer in diastolic and systolic readings and the study

compared in female student their ages between (18-25) years were as study compared in male ages between (15-25) years. In the maximum readings, we did not find any difference for both measurements. The readings were equal and there were no differences. The diastolic readings for both measurements were 90mm hg and the diastolic readings were 130mm hg. In minimum readings, we find a slight difference in systolic readings. The mercury sphygmomanometer was 40mm hg and the aneroid sphygmomanometer was 30mm hg, and the diastolic readings in both measurements were equal to 60mm\ hg.

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