MEASURING THE BLOOD PRESSURE DO WE REALLY NEED SLEEVES ROLLED UP?

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SUMMARY

Technical issues and techniques are very important while measuring the Blood Pressure. It has been recommended that blood pressure should be measured on bare arm. In Pakistani society especially in females this procedure becomes difficult to practice due to social and cultural issues.This study is carried out to check that measuring the Blood Pressure with cuff placed over the sleeve or without sleeve (bare arm) makes any difference.

Method
Two hundred subjects admitted in Civil Hospital Karachi, attending the OPD of CHK and their attendants were examined under standard conditions and Blood Pressure was measured by mercury sphygmomanometer.

Three readings were recorded first with cuff placed over sleeves and with cuff placed on bare arm. Mean of systolic and diastolic blood pressure with and without sleeve were analysis on SPSS Version 11.5

Result
Difference in means of systolic blood pressure between clothed and unclothed arm was 0.94 mmHg with a standard deviation of 4.32 and difference of means of diastolic blood pressure for the same was 0.58 mmHg with a standard deviation of 3.80. This was clinically insignificant.

Conclusion
The difference found in blood pressure with and without sleeve was not significant clinically.

KEY WORDS:
Blood pressure, with sleeve, without sleeve, measurements.

INTRODUCTION

Elevated Blood Pressure is a leading cause of morbidity and mortaliy[1,2]. So its correct measurement is very important[3,4]. An erroneous technique can result in a wrong reading leading to serious error. Many factors effect the accuracy of Blood Pressure .Few of them are position of arm, inadequate rest, smoking, tea intake before the examination, zero error, rapid deflation of pressure, inappropriate size of cuff [5,6,7]. So far it has been recommended that Blood Pressure should be checked on bare arm [8,9,10,11]. In Pakistani society especially in females this procedure becomes difficult to practice due to social and cultural issues. At times it may not be possible to rollup the sleeve due to type of clothing very commonly used in our population especially in females. Few studies are available showing no effect of clothing on Blood Pressure in a normal person [12,13,14]. However no data from Pakistan is available. Type of clothing used in different societies and regions is different so result of a study cannot be generalized. So this study was conducted to determine the effect of taking the Blood Pressure with cuff placed over sleeves and without sleeves (bare arm)

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Design of Study
It was an observational cross-sectional study.

Duration
It was conducted in November - December 2005

METHOD:

Two hundred individuals of either sex were recruited for the study. They were patients and attendants attending the OPD of Civil Hospital Karachi. An informed consent was taken.

Inclusion Criteria
1. Adults above the age of 14 years.
2. Patients consenting to participate.

Exclusion Criteria
1. Seriously ill and restless patients.
2. Patients not consenting to participate.
3. Patients under the age of 14 years.

PROCEDURE:

All the subjects were examined in a place of adequate privacy. They were asked not to smoke, eat or drink for 30 minutes before examination. Cuff size was selected according to patients arm circumference. Width of the inflatable bladder was 40% of arm circumference[15]. All the readings were taken by trained personnel with the subject seated and his/ her arm resting and elbow flexed at the level of heart. A mercury Blood Pressure apparatus of Yamasu Company was used. The Association of Advancement of Medical Instrumentation (AAMI) standard for comparison of blood pressure measurement methods requires a minimum of 85 patients and at least 225 measurements with each technique[16]. We recruited 200 patients and total 800 readings were taken.

Six readings were recorded 5 min apart on each patient. Three in each of the following situations:

1. Cuff placed over sleeves
2. Cuff placed on bare arm (without sleeve)

The first reading was not considered and mean of two readings of both sets with and without sleeves were compared.

Other parameters noted were:
Age, gender, BMI, thickness of clothing. Arm circumference was measured in mid of upper arm by measuring tape in centimeters. Difference of arm circumference was recorded by subtracting arm circumference with sleeves and without sleeves. This difference reflected the cloth thickness. Any concomitant medications that the patient may be taking were also noted.

All the readings were recorded in a Performa.

Statistical Analysis
Results were analyzed on SPSS 11.5. Paired T-test of significance was applied to see any statistically significant difference. The mean difference of the paired measurements were tested according to standard of Association of Advancement of Medical Instrumentation. According to measurements of test system and the comparison system shall be ±5 mmHg or less with standard deviation of 8 mmHg or less[16].

RESULTS:

Two hundred patients were included in the study. The male patients were 78 (39%)(Figure1). The mean age of patients was 32.29 years (SD = 12.98 years, R: 14 - 75 years) (Table 1).

The mean circumference of arm with sleeves was 26.83 cm (SD = 3.5) and without sleeves it was 26.00 cm (SD =3.4) (Table 2). The mean systolic pressure with sleeve was 113.83 mmHg (SD = 15.21 mmHg, R: 80 - 160 mmHg). The mean systolic pressure without sleeve was 112.89mmHg (SD = 15.04 mmHg, R: 80.0 - 156.5 mmHg) (Table 1). The mean diastolic pressure with sleeve was 74.64 mmHg (SD = 9.62 mmHg, R: 40 - 100 mmHg) and with out sleeve it was 74.07 mmHg (SD = 9.93, R: 40 - 95 mmHg) (Table 3) (Figure 2).

The mean difference of systolic pressure with and without sleeves in all cases was 0.94mmHg (SD = 4.32; 95% CI: 0.33 - 1.54 mmHg) and the mean difference of diastolic pressure was 0.58 (SD = 3.80 mmHg; 95% CI: 0.04 - 1.10 mmHg) (Table 4). These mean differences were statistically significant (p-values were 0.002 and 0.036, respectively).

The mean difference of systolic blood pressure of

Graph - 1 Gender Distribution of Subjects

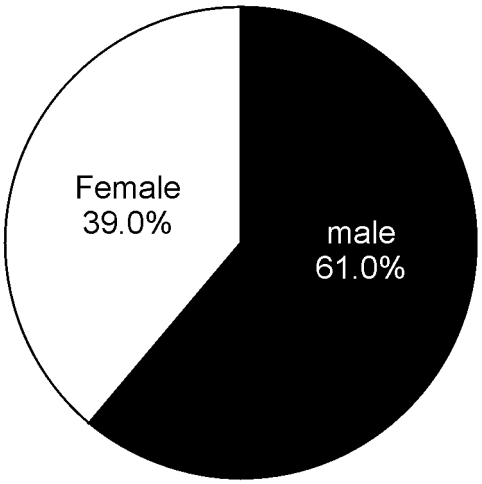

Figure 2 :
Mean Blood pressure of all cases and cases with less than 0.75cm and more than 0.75cm of cloth thickness

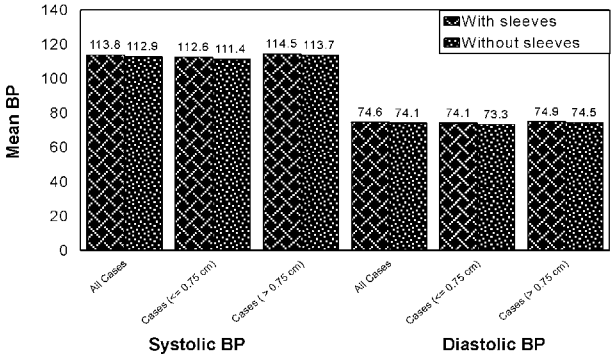

Table 1

	N	Min.	Max.	Mean	Std. Deviation
AGE	200	14	75	32.29	12.84
SBP with Sleeve	200	80.00	160.00	113.8325	15.2062
DBP with sleeve	200	40.00	100.00	74.6400	9.6279
SBP without sleeve	200	80.00	156.50	112.8925	15.0514
DBP without sleeve	200	40.00	95.00	74.0725	9.9369

SBP=Systolic Blood Pressure
DBP=Diastolic Blood Pressure

Table 2

		N	Min.	Max.	Mean	Std. Deviation
Pair 1	Circumference with sleeves	200	19.0	40	26.83	3.501
	Circumference without sleeves	200	18.2	39.0	26.00	3.435

Table 3
Comparison of Systolic and Diastolic Blood Pressure with and Without Sleeve

		No of Case	With Sleeves		With Out Sleeves	
			Mean	S.D	Mean	S.D
All Cases	SBP	200	113.83	15.20	112.89	15.04
	DBP	200	74.64	9.62	74.07	9.93
Cases with Sleeve <0.75 cm	SBP	70	112.60	16.25	111.49	16.56
	DBP	70	74.07	9.61	73.30	10.52
Cases with Sleeve >0.75 cm	SBP	130	114.49	14.63	113.67	14.17
	DBP	130	74.94	9.65	74.48	9.62

SBP=Systolic Blood Pressure
DBP=Diastolic Blood Pressure

Table 5
Mean Difference of Blood Pressure With and Without Sleeve

	B.P.	Mean Dif.	S.D.	95% Confidence Interval		P Value
				Lower	Upper	
All Cases	SBP	200	113.83	15.20	112.89	15.04
	DBP	200	74.64	9.62	74.07	9.93
Cases with Sleeve <0.75 cm	SBP	70	112.60	16.25	111.49	16.56
	DBP	70	74.07	9.61	73.30	10.52
Cases with Sleeve >0.75 cm	SBP	130	114.49	14.63	113.67	14.17
	DBP	130	74.94	9.65	74.48	9.62

SBP=Systolic Blood Pressure
DBP=Diastolic Blood Pressure

cases with arm circumference difference of less than 0.75 cms was 1.16mmHg (SD = 3.89 mmHg; 95% CI: 0.23 - 2.1 mmHG) and the mean difference of systolic blood pressure of cases with more than 0.75 cm arm circumference difference was 0.81mmHg (SD = 4.5 mmHg; 95 CI: 0.03 - 1.61 mmHg)). These differences were statistically significant with p-values of 0.015 and 0.042, respectively.

The mean difference of diastolic blood pressure for less than 0.75 cms arm circumference difference was 0.77mmHg (SD = 4.5 mmHg; 95% CI: -0.31 - 1.85 mmHg) and the mean difference for cases more than 0.75 cms arm circumference difference was 0.45 mmHg (SD = 3.37; 95% CI: -0.13 - 1.04 mmHg). These differences were not statistically significant ($p > 0.05$ in both the cases).

DISCUSSION:

The issue of comparing blood pressure readings with and without sleeve has been an issue of debate for years but only few studies have been done in this regard. Most of the studies recommend that blood pressure should be checked on bare arm[8,9,10,11]. However recently few studies from different countries have proved that there is no need to roll up the sleeve[12,13,14]. Our study demonstrated statistically significant difference in blood pressure on a arm with sleeves and without sleeves. According to the Association of Advancement of Medical Instrumentation (AAMI)[15] a good agreement is defined as a mean difference of less than 5 mmHg between measurements with a standard deviation of less than 8 is acceptable. So all readings of mean difference of blood pressures of all cases and subgroups falls under above mentioned criteria. So the differences of blood pressure recorded with and without sleeves were clinically insignificant. This confirms the findings of earlier studies done on this subject [12,13,14].

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