



The Blood Pressure Monitor

Handy as it comes

'India's blood pressure is skyrocketing. Hypertension is the most prevalent cardiovascular risk factor among Indian adults. Epidemiological studies have reported that the prevalence of hypertension is 25 per cent to 35 per cent in urban areas and 15 per cent to 20 per cent in rural areas. This is more than the prevalence of hypercholesterolemia (high cholesterol), metabolic syndrome or diabetes,' said experts at the 65th Annual Conference of the Cardiological Society of India (in collaboration with the European Society of Cardiology), in December 2013. Well, not pleasant news exactly, but its significance and relevance to this test report cannot be over-emphasized.

A Consumer Voice Report

The report released post-conference read, '...as the second-most populous country in the world with over 1.2 billion inhabitants, India's hypertension burden presents a major public health challenge. Indeed, India and China account for more cases of cardiovascular disease than all developed countries combined. This problem, say experts, can be tackled not by treatment, but by precaution beginning with creating awareness. You will be surprised to know

that in India just one-third of people with high blood pressure know they have it.'

Social Connect

That made us think how we could do our bit towards finding a solution. And as we could have only done that by testing the quality of a relevant product – which is our expertise – we rounded up the sphygmomanometer, commonly known as the blood pressure monitor. It is a device on which millions rely

to test their blood pressure, while many others can find out if they actually suffer from hypertension.

With millions suffering from blood-pressure problems across the country, the market potential of the sphygmomanometer is really staggering. No wonder we found nearly a dozen companies selling sphygmomanometers through regular retail networks, especially chemist shops.

Are all these devices trustworthy? Can these be as efficient as the doctor or the lab technician? Which one of these is best among the lot and which one gives value for money?

To answer all these and more such questions, we bought 10 most sold brands of blood pressure monitors and tested these in an NABL-accredited calibration laboratory.

Just in case you did not know, the contemporary home blood pressure monitors that we have tested are digital, lighter and, in many respects, better versions of the old bulky monitors with those large straps, balloon pumps and high vertical metres with mercury in them.

CV Recommendation | Top Performer | Value for Money

Rossmax

- Quite accurate
- On top in endurance and reliability tests
- Boasts of best digital display
- Has highest 'measured reading' availability

Home blood pressure monitors?

Home blood pressure monitors are convenient devices that help patients and their healthcare providers keep better track of fluctuations in blood pressure. Accurate records can help a medical professional determine which times of the day, which foods, and which activities make a patient most vulnerable to rises in blood pressure, and this in turn can be relevant to what type of and how much medicine to prescribe as well as to ascertain if certain foods or activities should be limited.

Either an aneroid or a digital device can be used conveniently at home by most patients. The main difference between the two is their ease of use: digital models usually self-inflate and provide a clear readout, while aneroid models must be operated manually.

Digital blood pressure monitors are perhaps the simplest variety to use. This type is especially convenient for anyone who is not used to testing their own blood pressure. Most come with self-inflating cuffs that operate automatically once the cuff has been secured and the device has been powered on. This feature, as well as the digital readout, helps the patient get a more accurate pressure reading.

Note to Users

As per our test findings, digital BP monitors are quite accurate (not perfect) and come in handy to quickly check blood pressure at home.

While making a purchase decision, do look for the one that has better battery as consumption of device is quite high due to motor and pump functions. You may also prefer one with AC adapter facility.

Look at size and weight if you are a frequent traveller. And do not forget to check the cuff circumference – it should fit your arm/wrist size.

Based on the overall test findings as well as convenience and ease of use, we have rated Rossmax as an intelligent buy. With retail price of Rs 1,550, the brand also gives value for money.



Comparative Product Test

KEY FINDINGS

- Vital shows the highest accuracy level with discrepancy of just ± 2 mm of Hg, followed by Royal Life Care, Dr. Morepen and AccuSure with ± 3 mm of Hg.
- Dr. Trust with discrepancy of ± 6 mm of Hg shows highest error level.
- AccuSure, Dr. Trust and Sara +Care have highest and lowest pressure measuring range – systolic -0 mm to diastolic -300 mm of Hg.
- All brands passed endurance and drop tests.
- Most of the brands give one-year manufacturer's warranty; Rossmax gives two-year warranty.



The Test Programme

Finding comparative testing parameters for digital blood pressure monitors was not an easy task as there was no set national standard for these. So, the Consumer Voice team referred to the standards (Standard IS: 13450-2-30: 2008) for conventional aneroid BP apparatus. The team analysed users' expectations vis-à-vis features and functionalities of the device.

This time, finding an accredited laboratory with enough facilities for testing such a delicate medical instrument was also not easy. With much difficulty we could find just one NABL-certified laboratory for testing the instruments.

TEST RESULTS FOR PERFORMANCE/TECHNICAL ASPECTS

Accuracy | Repeatability | Measuring range |
Display size

◆ Accuracy

Considering its usage for medical purpose, the blood pressure monitor must be as accurate and reliable as possible.

BRANDS TESTED

Rank	Total Score out of 100 (Rounded off)	Brand	Manufactured/Marketed by	MRP/Retail Price (in Rs)
1	86	Rossmax	Rossmax International	2,160/1,550
2	84	AccuSure	Microgene Diagnostic Systems	2,995/1,550
2	84	Royal Life Care	Royal Life Care Diagnostics	4,300/1,450
3	82	Vital	Shanghai International Trading	2,400/1,600
4	81	Omron	Omron Health Care	1,980/1,550
5	80	Infi Check	Oertel GBR	2,600/1,460
6	79	Citizen	Citizen Systems	2,499/1,550
7	78	Dr. Morepen	Morepen Labs	1,999/1,650
8	75	Dr Trust	Nectar Life Sciences	2,900/1,450
9	74	Sara +Care	Nikkei Electro Medical	2,600/1,400

Score Rating: >90: very good*****, 71-90: good****, 51-70: average***, 30-50: poor**, <30: very poor*

Blood Pressure Category	Systolic (mmHg)		Diastolic (mmHg)
Normal	less than 120	and	less than 80
Prehypertension	120 - 139	or	80 - 89
Stage 1 Hypertension	140 - 159	or	90 - 99
Stage 2 Hypertension	160 or higher	or	100 or higher

- *Vital was most accurate with error of ± 2 mm of Hg.*
- *Dr. Trust with discrepancy of ± 6 mm of Hg showed highest error level.*
- *Rest all brands had error level between ± 3 mm of Hg and ± 5 mm of Hg.*

◆ Repeatability

In order to check consistency of measurement, 10 readings on same volunteer at specific time intervals were taken.

- *All the brands showed slight variation, between ± 2 mm of Hg and ± 4 mm of Hg. This variation is not significant enough to matter.*

◆ Measuring range

The BP monitor should have an adequate range to measure the pressure in extreme cases – unexpectedly high or low.

- *AccuSure, Dr. Trust and Sara +Care showed better measuring range (on both lower and upper sides) and scored better.*

◆ Display size and digits height

Nobody, not at least in this large-screen smartphone age, will like to strain their eyes trying to figure out some numbers on a minuscule digital screen. So the display should be legible – in fact, larger the numbers, better the readability.

- *Rossmax and Royal Life Care have large displays with considerable character sizing for enhanced readability.*

◆ Time taken to measure | to see measurement on screen | to see stable measurement

The faster the measuring device, the better is its rating.



- *AccuSure and Omron (26 seconds) won the measuring duration race; Dr. Morepen finished last.*

However, the readings generally keep fluctuating – showing variations in reading – and should become stable at one digit in order to give the exact result. The faster this happens, the better for the user.

- *Readings on AccuSure and Infi Check stabled in the shortest time.*
- *Readings on Sara +Care took longest to become stable.*

Performance doesn't stop here. The final reading must also stay long enough for the user to note the reading, but not that long that it keeps consuming



Comparative Product Test

PERFORMANCE/

	Weightage	Rossmax	AccuSure	Royal Life Care	
Accuracy	30	24	25.5	25.5	
Repeatability and reproducibility	10	7.8	7.8	7	
Size of display and digits	5	4.94	3.3	4.57	
Measuring range	4	3.1	4	3.5	
Measuring reading stability	3	2.9	3.0	2.98	
Reading availability duration	3	3.0	3	3.0	
Measuring duration	2	1.84	2	1.94	
Circumference of cuff	2	1.71	1.64	1.69	

battery. Hence, one minute is the ideal time for the final reading display.

- Final display on AccuSure, Infi Check, Rossmax and Royal Life Care lasted one minute.
- Omron was a battery guzzler with its display remaining 'on' for five minutes.

FOR SAFETY

Endurance | Drop test | Battery life

◆ Endurance

Endurance test was conducted to examine the durability of the BP monitor as well as useful battery life. The test was carried out by comparing the average result of repeatability test and measurement taken on same volunteer after taking 200 measurements.

- Rossmax was found with lowest variation after the endurance test (200 measurements), and hence given higher score.
- Royal Life Care showed the maximum variation.

◆ Drop test

All samples were dropped from three feet on the carpet to see if any of them was vulnerable to such falls. The purpose was to examine the robustness of the BP monitor body as well as the built-in sub-units including display.

- All the brands remained intact and functioned with same effectiveness after the fall

◆ Battery life

The ability of battery (that came with the device) was checked by taking 200 measurements.



SAFETY

	Weightage	Rossmax	AccuSure	Royal Life Care	Vital	
Endurance and reliability test	15	13.5	12	11.25	12.75	
Drop test	4	4	4	4	4	

TECHNICAL TESTS

	Vital	Omron	Infi Check	Citizen	Dr. Morepen	Dr. Trust	Sara +Care
	27	24	22.5	24	25.5	21	22.5
	6.8	7.8	7.8	7.8	6.8	6.6	5.8
	3.3	3.24	3.25	2.98	2.96	4.57	2.76
	3.2	3.99	3.8	3.8	3.2	4	4.0
	2.29	2.75	3.0	2.69	2.1	2.51	1.2
	2.1	1.5	3.0	2.1	2.1	2.1	2.1
	1.37	2.0	1.77	1.22	1.0	1.27	1.98
	1.97	1.52	1.67	1.36	2.0	1.54	1.59

- Sara +Care had the worst battery life and needed new batteries after 45 measurements.
- Royal Life Care required battery replacement after 65 measurements.
- Dr. Morepen asked for a new battery after 75 measurements.

GENERAL TESTS

◆ Net weight

Considering portability of usage, the BP monitor should be light.

- Citizen is lightest.
- Royal Life Care is heaviest.

◆ Circumference of strap/cuff

For whatever reasons, we do have some oversized and undersized people in the country, so the circumference of the cuff/strap should be adjustable enough for their wrists or arms.

- All tested brands' strap circumference falls

between 31.5 cm and 40 cm. Citizen has the least circumference and Dr. Morepen the highest.

◆ User manual

We thoroughly read manuals to see if it is good enough for the layperson to understand and enables them to operate the device efficiently. The instructions of usage should be clear along with other significant information on handling, storage, care, battery, cautions, symbols and diagrams on device, etc.



TESTS

	Omron	Infi Check	Citizen	Dr. Morepen	Dr Trust	Sara + care
	11.25	11.25	10.5	12	11.25	12.0
	4	4	4	4	4	4

Comparative Product Test



- Dr. Trust manual contains least information. It does not have any warnings, instructions on overall usage, or anything about the display, symbols or battery.



- Vital misses out on LCD display symbols information.

◆ Marking/Labelling information

The packaging should have clear marking with rated voltage, symbol for nature of supply (AC/DC), country of origin, standards mark, and disposal instructions along with name of marketer or manufacturer, price as well as relevant technical information.

- Dr. Trust, Royal Life Care and Omron fulfil the marking/labelling requirements.
- Other brands have either missed out on disposal information or have not shared enough technical information or the standards logo.



Wrist-type BP Monitor

Additionally, we tested two regular selling brands (Citizen and Sanitas) of wrist-type digital BP monitors. The indicators of key test findings reveal quite encouraging results where primarily the measured reading was quite (more) accurate compared to the cuff type. They are handy and convenient to carry and use, and simple to read. The measuring duration was about 40 seconds and reading stability had also taken less time compared to the cuff type.

The battery life was quite high if using alkaline battery. However, the storage memory was lesser than the cuff type. The retail price of wrist-type BP monitors ranged from Rs 1,550 to Rs 1,750.