International Journal of Science and Healthcare Research
[Indexed, Peer-Reviewed Journal]
Vol. 11; Issue: 1; Jan.-March 2026
Website: ijshr.com
Original Research Article *ISSN: 2455-7587*

Practice Behavior of Physical Therapists of Haryana Regarding Measurement of Blood Pressure

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DOI: https://doi.org/10.52403/ijshr.20260101

ABSTRACT

Blood pressure (BP) is a fundamental component of vital signs and physiotherapists (PTs) should regularly check patient's blood pressure before or after exercise, as abnormal rise in BP during exercise can lead to adverse cardiac events. Therefore, the present study aims to assess the attitude, practice behaviors and knowledge of PTs practicing in Haryana regarding BP measurement. This cross-sectional study included 354 registered physical therapists from Haryana with academic grade of at least bachelor's degree in physical therapy. A 28-items online questionnaire-survey tool to assess outpatient physical therapists' attitudes and behaviors towards BP measurement was used to obtain required data and the questionnaire was distributed through google forms. The mean age of participants was 24.87±2.08years, with 68.9% females and most (78.5%) were working in urban area. 79.7% (282) and 69.5% (246) felt it important to measure BP before and after physical therapy treatment, respectively, but only 27.2% (96) and 22.3% (79) reported actually performing BP measurement prior to and after treatment. Knowledge of Pre-HTN and HTN criteria was correctly reported by only 36.1% (128) and 32.2% (114), respectively. Significant positive but weak correlation was found between attitude and practice behavior (r=0.148) and moderate correlation between attitude and knowledge (r=0.319). The findings showed that despite favorable attitude towards BP measurement, practice behavior of PTs did not consistently align with their attitude and lack of knowledge was observed in physical therapists. Hence, initiatives must be taken to address the misinformed attitude and practice behavior among PTs and Orientation programs should be conducted to address this gap among PTs regarding BP measurement.

Keywords: blood pressure, screening, physical therapists, practice behavior

INTRODUCTION

Hypertension (HTN) or high blood pressure is the consistent rise in normal blood pressure values, putting extra strain on heart and blood vessels, leading to serious health issues and is often referred as the "silent killer" due to its typically asymptomatic nature and frequent incidental diagnosis. [1,2]

Global prevalence of HTN is estimated to be 26% of world's population and this prevalence is expected to be increase to 29% by 2025.[3] The latest non communicable disease risk factor collaboration study revealed that the global trend in absolute number of hypertensive individuals doubled between 1990 and 2019.[4] In India prevalence of hypertension is 22.6%, with men (24.1%) having a higher prevalence than women (21.2%).[5] Prevalence of hypertension in Haryana is 26.2% and only 33.4% of the patients are aware of their condition and 26.3% are on treatment.[6] Prevention is significant key of controlling hypertension. This can be done by educating people, changing their attitudes and modifying their behavior.[2]

Blood pressure has conventionally been measured through auscultatory method, using a sphygmomanometer in combination with a stethoscope during physical examinations, outpatient visits, hospital stays- often daily in inpatient settings and prior to most medical procedures. [7,8]

Physical therapists (PTs) should consistently screen patients' blood pressure as part of their clinical practice and should screen blood pressure before, during and post exercise with standardized procedure as it provides physical therapists insight into the physiological status of a patient's cardiovascular and pulmonary system and is instrumental in exercise prescription, monitoring and minimizing the risk of cardiac complications such as left ventricular hypertrophy, stroke, and cardiovascular mortality during exercise sessions.[9-11]

Although blood pressure is a fundamental component of vital signs, many physiotherapists do not routinely assess BP in their clinical practices and reason behind this is still unknown.[4] Recent studies have concluded that majority of the physical therapists were not measuring heart rate (HR) and BP during clinical assessment and showed variability in physical therapists' knowledge, attitude, and actual clinical practices related to BP measurement.[2,12-15] Although participants reported being skilled for blood pressure measurement, half of the PTs did not feel importance in measuring BP during evaluation.[2] Initiatives to address misinformed attitudes and behaviors as well as gaps in knowledge may lead to optimization of the health and wellness of individuals under the care of PTs.[12]

Demographic factors like age, gender, qualification, experience level, area of practice and type of practice also affect attitudes and perspective of PTs. Some studies showed that attitude towards BP measurement decreases as years of experience increases. [2,12] Identifying gaps in knowledge, attitude and practice behavior will help to develop targeted educational strategies, improve clinical decision-making, enhance patient safety, and ultimately reduce the risk of exercise-induced cardiovascular events.[16]

There is dearth of studies conducted amongst Indian physiotherapists evaluating their knowledge, perspective and current practices towards BP assessment and also various demographic factors affecting these knowledge, attitude and practice behavior regarding bp measurement. Thereby present study aimed to test the hypothesis that whether there is significant level of attitude, practice behavior and knowledge in physical therapists of Haryana regarding measurement of blood pressure and also to find out the correlation of these variables with each other and with demographic factors including age, gender, qualification, experience, type and area of practice.

MATERIALS & METHODS

Study design: This study was a cross-sectional survey study undertaken from July 2024 to June 2025 in Haryana, India. Non-

probability sampling, specifically convenience sampling method was used. The ethical clearance was taken from the institutional biomedical research ethical committee of Pandit Bhagwat Dayal Sharma University of Health Sciences, Rohtak with reference to letter No. BREC/24/716.

Sample size: 350

Study participants: Subjects were registered physical therapists from Haryana practicing in hospital-based or private practice outpatient setting, inpatient rehabilitation centre, in an academic institution, acute care, home health care or school system. Physical therapists participated in this study must had at least undergraduate/BPT (Bachelor of Physiotherapy) degree. Subjects who were not willing to participate, physical therapy assistants and undergraduate physiotherapy students including interns were excluded. The required sample size was 350, using formula $N=[(Z_{1-\alpha/2})^2 \times p(1-p)] /d^2$, $(Z_{1-\alpha/2})$ is standardized value for the corresponding level of confidence (at 95⁄ Cl, it is 1.96), d = margin of error or rate of precision.[17] Taking prevalence(p)=0.35 based on the study conducted by the Jadhav RA et al. in 2019 among physiotherapists of India.[18]

Outcome measures: To accomplish aims and objectives of the study a 28-item questionnaire (Table-1) "survey tool to assess outpatient physical therapists' attitudes, behaviors and knowledge of blood pressure measurement" was used. This survey tool has been previously used by Arena SK et al. (2018) in their study to describe and determine correlations among blood pressure attitudes, practice behaviors, and knowledge among physical therapists practicing in the outpatient settings in America. The survey tool has been previously tested for expert and face validity and reliability.[12]

The survey tool was a 28-item questionnaire including

a. Attitudes questions = 05; (Question 1 to 5),
b. Practice behaviors questions = 08; (Question 6 to 11, Question 15 & 16),
c. Knowledge questions= 06; (Question 18 to 23),
d. Miscellaneous items questions = 04; (Question 12 to 14 & 17);
e. Demographics questions = 05; (Ques. 24 to 28) were encompassed within the survey.

Table 1: Questionnaire- survey tool to assess outpatient physical therapists' attitudes, behaviors and knowledge of blood pressure measurement.

A. Attitudes, Knowledge, and Practice Behaviours Regarding Blood Pressure Readings. Circle the response that best describes you:
1. I feel it is important to take a blood pressure reading on every patient/client during an evaluation or re-evaluation a) Strongly disagree b) Disagree c) Neutral d) Agree e) Strongly agree
2. I feel it is important to take a blood pressure reading on every patient/client PRIOR to physical therapy treatment a) Strongly disagree b) Disagree c) Neutral d) Agree e) Strongly agree
3. I feel it is important to take a blood pressure reading on every patient/client AFTER physical therapy treatment a) Strongly disagree b) Disagree c) Neutral d) Agree e) Strongly agree
4. I feel I am able to take an accurate blood pressure reading a) Strongly disagree b) Disagree c) Neutral d) Agree e) Strongly agree
5. I feel confident in my ability to educate patients/clients about blood pressure related findings a) Strongly disagree b) Disagree c) Neutral d) Agree e) Strongly agree
6. A physical therapy assistants, technician, or other health care provider obtains the blood pressure measurement in my practice setting a) Never b) Seldom c) Less than half the time d) More than half the time e) Always
7. I measure blood pressure during patient/client evaluation or re-evaluation a) Never b) Seldom c) Less than half the time d) More than half the time e) Always
8. I measure blood pressure on a patient/client PRIOR to physical therapy treatment a) Never b) Seldom c) Less than half the time d) More than half the time e) Always

9. I measure blood pressure on a patient/client AFTER physical therapy treatment
   a) Never b) Seldom c) Less than half the time d) More than half the time e) Always
10. I inform a patient/client of their blood pressure reading after each measurement
   a) Never b) Seldom c) Less than half the time d) More than half the time e) Always
11. I standardize the patient/client position each time I perform a blood pressure measurement
   a) Never b) Seldom c) Less than half the time d) More than half the time e) Always
12. I have the following blood pressure measurement tools available to me at my place of employment (Circle all that apply)
   a) Manual blood pressure cuff b) Automated or electronic blood pressure cuff c) Mercury blood pressure cuff d) Ultrasound/Doppler e) Unknown f) None g) Other (Please specify): _____
13. I have the following blood pressure cuff sizes available to me in my clinic: (*Circle all that apply*)
   a) Infant b) Child c) Small Adult d) Adult e) Large Adult f) Thigh Cuff g) Other (Please specify): _____
14. My clinical site performs yearly retraining of blood pressure measurement techniques
   a) Yes b) No c) Unknown
15. I use a different size blood pressure cuff depending on the measurement site used for each patient/client
   a) Yes b) No c) Unknown
16. I measure the maximal cuff inflation level prior to taking a blood pressure measurement
   a) Yes b) No c) Unknown
17. There are barriers to measuring blood pressure in my patient/client practice setting
   a) Yes: (Please describe) _____ b) No Please legibly fill in the blank(s) or circle "unknown" if applicable for questions 18 to 23
18. Blood pressure value(s) considered to indicate pre-hypertension:
   a) Systolic_____ b) Diastolic_____ c) Unknown
19. Blood pressure value(s) considered to indicate hypertension:
   a) Systolic_____ b) Diastolic_____ c) Unknown
20. It is contraindicated to start exercise with a blood pressure reading of:
   a) Systolic_____ b) Diastolic_____ c) Unknown
21. It is recommended to terminate exercise with a blood pressure reading of:
   a) Systolic_____ b) Diastolic_____ c) Unknown
22. It is recommended to inform a physician or similar health care provider of a blood pressure reading BELOW: a) Systolic_____ b) Diastolic_____ c) Unknown
23. It is recommended to inform a physician or similar health care provider of a blood pressure reading ABOVE: a) Systolic_____ b) Diastolic_____ c) Unknown

B. Demographic Information Circle the response that best describes you:

1. I am a a) Male b) Female
   How many years have you worked as a licensed physical therapist?
2. a) Not Applicable b) Less than 3 years c) 3 to 5 years d) 6 to 10 years e) 11 to 15 years f) 16 to 20 years g) More than 20 years
   What is your highest physical therapy degree obtained?
3. a) Baccalaureate degree b) Master's degree c) PhD (or equivalent, eg. EdD or ScD) d) DPT e) tDPT f) Other (please specify): ___
4. Which of the following best describes the practice setting in which you primarily work?
   a) Hospital based outpatient b) Private practice outpatient c) Inpatient rehabilitation d) Skilled nursing facility e) Acute care f) Home health care g) School system h) Other (please specify): _____
5. Which of the following best describes the patient population for which you provide physical therapy services? (circle all that apply)
   a) Integumentary b) Musculoskeletal c) Cardiopulmonary d) Neurological e) Other (Please specify): _____

PROCEDURE

After receiving the ethical clearance from institutional ethical committee of Pt. B. D. Sharma, University of health sciences, Rohtak study was initiated. A 28-item questionnaire (Table-1) was used to collect required data. The permission was taken from author to use the questionnaire in our study. Questionnaire was generated through web based google docs surveyor and distributed through digital platforms using google form link. Questionnaire was sent

only after confirmation of eligibility on telephonic conversation, to registered and eligible physiotherapists around Haryana. A total of 371 physiotherapists were assessed for the eligibility, but only 354 PTs fulfilled the inclusion criteria, so 17 PTs were excluded. Comprehensive description of the study was also explained along with google form through both physical mode and telephonic conversation. Informed consent was taken through google form, along with demographic details of the participants. Their response towards attitude, practice behavior and knowledge questions was obtained through this questionnaire. Reminder was sent to the physiotherapists who did not respond after a week. Scoring of self-reported questionnaire of 354 participants was done and compiled for further statistical analysis.

Scoring: Responses for all questions were captured using ordinal data on a Likert-type scale and then converted to metric value (table-2) for statistical analysis.

a) **Attitude:** Attitude questions (1to5), were scored ranged from "1" for the most negative to "5" for the most positive response. A metric value representing attitude was compiled as the sum of recoded response of questions 1 to 5.
b) **Practice behavior:** For practice behavior questions (6to11), responses were similarly scored from "1" (most negative) to "5" (most positive). For questions 15 and 16, responses were scored as "0" for unknown, "1" for no, and "2" for yes. The total practice behavior score represented by the sum of responses to questions 6–11 and 15–16.
c) **Knowledge:** Questions 18–23 assessed knowledge related to pre-hypertension (P-HTN), hypertension (HTN), and blood pressure (BP) guidelines for exercise initiation, termination, and physician referral. Correct definitions followed JNC7 (Seventh Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure) [19] for P-HTN (SBP 120–139 mmHg, DBP 80–89 mmHg) and HTN (SBP ≥ 140 mmHg, DBP ≥ 90 mmHg). Correct response for contraindications for exercise based on Ghadieh AS et al. (2015), identifying absolute contraindications to aerobic and resistance training at BP ≥ 180/110 mm Hg.[20] Exercise termination and referral criteria followed ACSM's (American College of Sports Medicine) Guidelines for Exercise Testing and Prescription, 11th Edition (2021): exercise termination at SBP > 250 mmHg or DBP > 115 mmHg; referral for resting BP ≥ 180/110 mmHg or BP < 90/60.[21] Response that aligned exactly with these definitions marked as correct (scored "2"), response that partially matched the criteria was considered partially correct (scored "1"), and response that did not correspond to the criteria was classified incorrect (scored "0"). The scores for questions 18 to 23 were summed to form the knowledge score.
d) **Miscellaneous and Demographics:** Questions 12-14 and 17 gathered additional data on equipment, training and barriers. These questions were excluded from correlational statistical analyses but evaluated for their descriptive value. Questions 24-28 collected demographic information such as gender, experience, qualifications, and practice setting.

STATISTICAL ANALYSIS

Data obtained was compiled on a MS Office Excel Sheet (v 2019) statistical analysed using Statistical package for social sciences (SPSS v 26.0, IBM). Data were depicted using descriptive statistics like frequency(n) and percentages (%) for categorical data, mean±SD (standard deviation) for numerical. Normality of numerical data was checked using Shapiro-Wilk test & was found that the data was not normally distributed, so non-parametric tests were

used for comparisons and further analysis. Comparison between mean scores of attitude, practice behavior and knowledge regarding BP measurement of male and female PTs, BPT and MPT degree holders and of PTs practicing in rural and urban area was done using Mann-Whitney U test. Comparison between mean scores of attitude, practice behavior and knowledge regarding BP measurement of participants on the basis of experience level and area of clinical practice was done using Kruskal-Wallis ANOVA. Correlation analysis was done using Spearman's correlation coefficient. For all the statistical tests, $p<0.05$ was considered to be statistically significant and $p<0.01$ as statistically highly significant.

RESULT

Total 354 physiotherapists filled the questionnaire including 68.9% female with mean age of participants 24.87± 2.08 years. Majority of respondents were working in urban area (78.5%). Further details of demographic data given in table-2.

Table 2: Demographic details of participants

Respondents' demographics		**Frequency (%)**
1. Gender	Male	110 (31.1)
	Female	244 (68.9)
2. Age (in years)	Less than 25	164
	25 & More than 25	190
3. Education level	BPT	209(59)
	MPT	144(40.7)
	Ph.D.	1(0.3)
4. Experience level	Less than1 year	200(56.5)
	1 to 3 years	129(36.4)
	3 to 5 years	20(5.6)
	6 to 10 years	3(0.8)
	More than 10 years	2(0.2)
5. Region of practice	Rural	76(21.5)
	Urban	278(78.5)
6. Area of clinical practice	Musculoskeletal	160(45.2)
	Cardiopulmonary	25(7.1)
	Neurological	42(11.9)
	Other (Sports, paediatrics)	127(35.8)
7. Type of clinical practice	Inpatient	18 (5.1)
	Outpatient	240 (67.8)
	Combination	96 (27.1)

Blood pressure attitude- Nearly two third 57.3% (283) of respondents agreed or strongly agreed in regard to importance of BP assessment on every patient during an evaluation or re-evaluation. Similarly, 79.7% (282). and 69.5% (246) reported agreed or strongly agreed on that it is important to measure BP before and after physical therapy treatment, respectively. Response of all attitude questions are given in table-3 and figure-1.

Blood pressure practice behavior- Respondents reported never or seldom on regard to performing BP measurement during patient evaluation/re-evaluation, prior and after to physical treatment at rate of 50.8% (180), 50.2% (178) and 54.8% (194), respectively. For the same questions agree and more than half the time responses were at rate of 26.5% (94), 27.2% (96) and 22.3% (79). Details of all response for practice behavior questions are given in table-3 and figure-2.

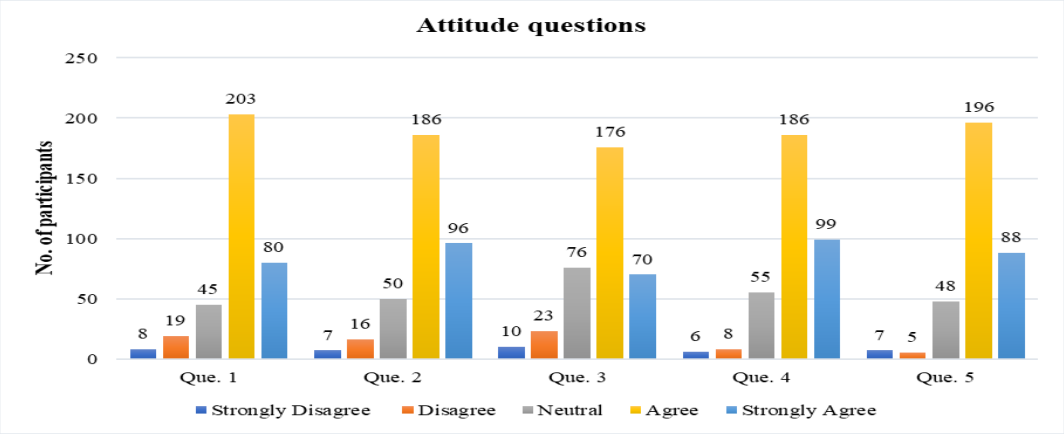

Figure 1: Response of participants towards attitude questions.

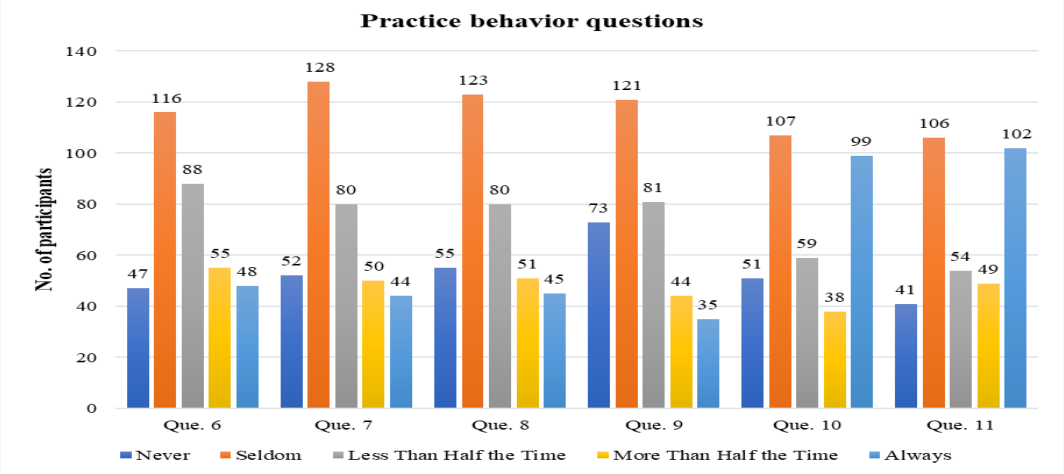

Figure 2: Response of participants towards practice behavior questions.

Response of participants towards blood pressure knowledge and miscellaneous questions: BP knowledge-Knowledge of Pre HTN and HTN criteria was correctly reported by only 36.1% (128) and 32.2% (114) respectively. Correct responses for bp reading for contraindication and termination of exercise were correctly reported at rate of 38.4% (136) and 29.9% (106), respectively and further detailed in table 3 and figure 3.

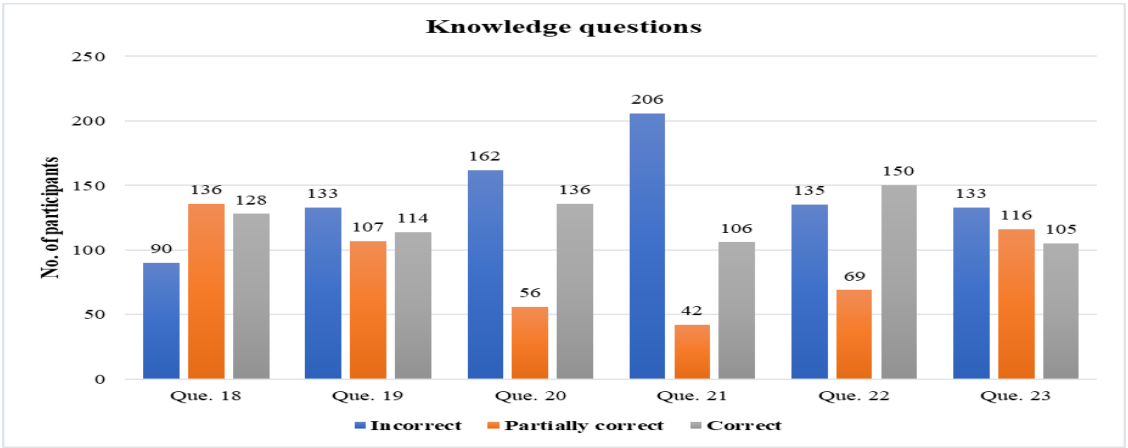

Figure 3: Response of participants towards knowledge questions.

Data shows PTs use different types of BP measurement tool to measure BP, majority of them uses manual (30.38%), automated (36.23%) and mercury (24%) BP cuff. Also, PTs uses different cuff sizes for different patients. Further details of miscellaneous

and BP knowledge questions are given in table-3.

Table 3: Responses of PTs towards attitude, practice behavior, knowledge and miscellaneous questions.

Attitude Questions					
Questions	**Strongly Disagree n (%)**	**Disagree n (%)**	**Neutral n (%)**	**Agree n (%)**	**Strongly Agree n (%)**
1. I feel it is important to take a blood pressure reading on every patient/ client during an evaluation or re-evaluation.	7(1.97)	19(5.36)	45(12.71)	203(57.34)	80(22.35)
2. I feel it is important to take a blood pressure reading on every patient/ client PRIOR to physical therapy treatment.	6(1.69)	16(4.51)	50(14.12)	186(52.54)	96(27.11)
3. I feel it is important to take a blood pressure reading on every patient/ client AFTER physical therapy treatment.	9(2.54)	23(6.49)	76(21.46)	175(49.71)	70(19.77)
4. I feel I am able to take an accurate blood pressure reading.	6(1.69)	8(2.25)	55(15.53)	186(52.54)	99(27.96)
5. I feel confident in my ability to educate patients/clients about blood pressure related findings.	7(1.97)	5(1.41)	48(13.55)	196(55.36)	98(24.85)
Mean ±SD	7 ± 1.22	14.2 ± 7.53	54.8 ± 12.4	189.4 ± 10.38	88.6 ± 12.95
Practice Behavior Questions					
	Never n (%)	**Seldom n (%)**	**Less Than Half the Time n (%)**	**More Than Half the Time n (%)**	**Always n (%)**
6. A physical therapy assistant, technician, or other health care provider obtains the BP measurement in my practice setting.	47(13.27)	116(32.76)	88(24.85)	55(15.53)	48(13.55)
7. I measure blood pressure during patient/client evaluation or re-evaluation.	52(14.68)	128(36.15)	80(22.59)	50(14.12)	44(12.42)
8. I measure blood pressure on a patient/client PRIOR to physical therapy treatment.	55(15.53)	123(34.74)	80(22.59)	51(14.4)	45(12.71)
9. I measure blood pressure on a patient/client AFTER physical therapy treatment.	73(14.4)	121(34.18)	81(22.89)	44(12.42)	35(9.88)
10. I inform a patient/client of their blood pressure reading after each measurement.	51(20.62)	107(30.22)	59(16.66)	38(10.73)	99(27.96)
11. I standardize the patient/client position each time I perform a blood pressure measurement.	43(11.58)	106(29.94)	54(15.25)	49(13.84)	102(28.81)
Mean ±SD	53.5 ± 10.43	116.83 ± 8.89	73.67 ± 13.72	47.83 ± 5.98	62.17 ± 30.02

	Manual BP Cuff n (%)	**Automated/Electronic BP Cuff n (%)**	**Mercury BP Cuff n (%)**	**Ultrasound/ Doppler n (%)**	**Unknown/ None/Other n (%)**
12. I have the following BP measurement tools available to me at my	192 (30.38)	229 (36.23)	152 (24.05)	10 (1.58)	49 (7.75)

place of employment:					
	Infant n (%)	**Child n (%)**	**Small Adult n (%)**	**Adult n (%)**	**Large Adult n (%)**
13. I have the following BP cuff sizes available to me in my clinic:	26 (4.2)	79 (13.03)	76 (12.5)	314 (51.81)	73 (12.04)

	Yes n (%)	**No n (%)**	**Unknown n (%)**
14. My clinical site performs yearly retraining of blood pressure measurement techniques.	130(36.72)	200(56.49)	24(6.78)
15. I use a different size blood pressure cuff depending on the measurement site used for each patient/client.	130(8.47)	200(56.49)	24(6.77)
16. I use a different size blood pressure cuff depending on the measurement site used for each patient/client.	193(54.51)	125(35.31)	36(10.16)
17. There are barriers to measuring blood pressure in my patient/client practice setting.	193(54.51)	125(35.31)	36(10.17)
Knowledge Questions			
	Incorrect % (n)	**Partially Correct % (n)**	**Correct % (n)**
18. Blood pressure value(s) considered to indicate prehypertension	90(25.42)	136(38.41)	128(36.35)
19. Blood pressure value(s) considered to indicate hypertension:	133(37.57)	107(30.22)	114(32.20)
20. It is contraindicated to start exercise with a blood pressure reading of:	162(45.67)	56(15.81)	136(38.41)
21. It is recommended to terminate exercise with a blood pressure reading of:	206(58.19)	42(11.86)	106(29.94)
22. It is recommended to inform a physician or similar health care provider of a blood pressure reading BELOW:	135(38.13)	69(19.49)	150(42.37)
23. It is recommended to inform a physician or similar health care provider of a blood pressure reading ABOVE:	133(37.57)	116(32.76)	105(29.66)
Mean ±SD	143.17 ± 38.48	87.67 ± 37.28	123.16 ± 17.98

Correlation between blood pressure attitude, practices and knowledge of PTs- There was a statistically highly significant, positive & weak correlation ($r = 0.148$, $p<0.01$) seen between BP attitude and PB. Statistically highly significant, positive & moderate correlation ($r = 0.319$, $p<0.01$) seen between BP attitude and knowledge whereas there was a statistically highly significant negative & weak correlation ($r = -0.230$, $p<0.01$) seen between BP knowledge & PB showing as detail given in table 4.

Comparison of Attitudes, Practice Behaviors and Knowledge to Respondent Demographics

No significant association seen on comparison between attitude, practice behavior and knowledge on the basis of gender, education qualification, experience level and region of practice. Only statistically significant difference seen for practice behavior ($p<0.05$) between the area of work with higher values of participants practicing in urban area. There was a statistically significant difference ($p>0.05$) seen for the values of total score of PB and knowledge with higher value in participants practicing in inpatient clinical setting for PB and with higher value participants practicing in combined clinical settings for knowledge. Details of Comparative analysis between mean ± SD score of attitude, practice behavior and knowledge with reference to demographic factors is given in table 5.

Table 4: Correlation between attitude, practice behavior and knowledge of PTs regarding BP measurement.

Variable		Attitude	Practice behavior
Practice behavior	r value	0.148**	
	p value	0.005	
	N	354	
Knowledge	r value	0.319**	-0.23**
	p value	0.005	0.00
	N	354	354

****indicates statistically highly significant p<0.01.**

Table 5: Comparison between mean ± SD score of attitude, practice behavior and knowledge regarding BP measurement of participants with reference to demographic factors.

Demographics		A1	A2	A3	A4	A5	A total	PB 6	PB 7	PB 8	PB 9	PB 10	PB 11	PB 15	PB 16	PB total	K 18	K 19	K 20	K 21	K 22	K 23	K total
Gender	Male	3.89 ±0.922	3.92 ±0.987	3.56 ±1.027	4.03 ±0.851	4.07 ±0.786	19.47±3.303	2.72 ±1.307	2.73 ±1.241	2.71 ±1.229	2.5± 1.24	3.15 ±1.581	3.29 ±1.442	1.35 ±0.532	1.53 ±0.586	19.97±6.494	0.91 ±0.724	0.74 ±0.786	0.93 ±0.896	0.61 ±0.836	0.95 ±0.844	0.9± 0.789	5.03 ±3.562
	Female	3.95 ±0.835	4.02 ±0.804	3.87 ±0.858	4.03 ±0.813	4.05 ±0.813	19.92±3.118	2.89 ±1.205	2.74 ±1.233	2.75 ±1.259	2.6± 1.222	3.04 ±1.39	3.12 ±1.428	1.28 ±0.612	1.41 ±0.705	19.82±6.602	1.2± 0.787	1.04 ±0.84	0.93 ±0.927	0.77 ±0.92	1.09 ±0.919	0.93 ±0.831	5.95 ±4.075
	U-value	-0.369	-0.402	-2.613	-0.057	-0.224	-1.077	-1.207	-0.049	-0.174	-0.722	-0.58	-1.071	-0.766	-1.234	-0.477	-3.307	-3.164	-0.046	-1.38	-1.411	-0.281	-1.951
	Z-value	-0.369	-0.402	-2.613	-0.057	-0.224	-1.077	-1.207	-0.049	-0.174	-0.722	-0.58	-1.071	-0.766	-1.234	-0.477	-3.307	-3.164	-0.046	-1.38	-1.411	-0.281	-1.951
	P-value	0.712#	0.687#	0.009**	0.954#	0.823#	0.281#	0.228#	0.961#	0.862#	0.470#	0.562#	0.284#	0.444#	0.217#	0.634#	0.001**	0.002**	0.963#	0.168#	0.158#	0.779#	0.051#
Academic qualification	BPT	3.89 +0.876	4.01 +0.826	3.72 +0.882	4+0.812	4.06 +0.751	19.69+2.946	2.8+ 1.254	2.72 +1.197	2.73 +1.212	2.54 +1.164	3.09 +1.42	3.16 +1.394	1.31 +0.582	1.44 +0.642	19.79+6.261	1.15 +0.827	0.94 +0.847	0.92 +0.937	0.78 +0.918	1.03 +0.898	0.95 +0.854	5.78 +4.073
	MPT	3.99 +0.842	3.96 +0.92	3.86 +0.979	4.06 +0.843	4.05 +0.877	19.91+3.494	2.88 +1.218	2.75 +1.288	2.76 +1.303	2.61 +1.313	3.06 +1.499	3.19 +1.491	1.29 +0.6	1.44 +0.716	19.97+6.988	1.05 +0.701	0.95 +0.819	0.93 +0.887	0.62 +0.859	1.06 +0.899	0.88 +0.763	5.49 +3.749
	U-valu	14355.5	14903.5	13646.5	14398	14891.5	139667	14672.5	14997.5	15016	14866.5	14870	15046	14980.5	14867.5	148779	13929.5	15042.5	15033.5	13782.5	14849.5	14465.5	14614

	e																					
	Z-value	-0.942	-0.288	-1.716	-0.875	-0.307	-1.263	-0.523	-0.169	-0.149	-0.312	-0.307	-0.116	-0.207	-0.338	-0.289	-1.377	-0.123	-0.137	-1.644	-0.345	-0.771	-0.571
	P value	0.346#	0.773#	0.086#	0.382#	0.759#	0.206#	0.601#	0.865#	0.882#	0.755#	0.758#	0.908#	0.836#	0.735#	0.772#	0.168#	0.902#	0.891#	0.100#	0.730#	0.441#	0.568#
Experience level	< 1 year	3.91+0.834	4.03+0.805	3.86+0.863	3.95+0.843	3.93+0.836	19.68+3.167	2.93+1.223	2.78+1.209	2.79+1.276	2.64+1.2	3.11+1.387	3.13+1.393	1.31+0.588	1.41+0.658	20.07+6.613	1.12+0.793	1.03+0.832	0.86+0.914	0.68+0.907	1.02+0.899	0.91+0.818	5.61+4.15
	1-5 years	3.95+0.903	3.95+0.94	3.68+0.988	4.13+0.791	4.21+0.731	19.93+3.19	2.7+1.255	2.66+1.266	2.66+1.211	2.46+1.255	3.01+1.531	3.22+1.483	1.3+0.587	1.51+0.674	19.52+6.45	1.1+0.769	0.86+0.83	1.03+0.918	0.79+0.887	1.1+0.891	0.95+0.825	5.84+3.667
	6-10 years	4.33+1.155	3.67+1.155	3.67+1.155	4.33+1.155	4.33+1.155	20.33+5.033	3.33+1.528	3.33+1.528	3.33+1.528	3.33+1.528	3.33+1.528	2.67+1.528	1.33+0.577	1+1	19.52+6.45	1+0	0+0	0.67+0.577	0.33+0.577	0.67+1.155	0.33+0.577	3+2
	>10 years	4+0	3.5+0.707	3+1.414	4+0	4+0	18.5+2.121	2.5+0.707	3+1.414	3+1.414	3+1.414	5+0	5+0	0.5+0.707	1+1.414	23+7.071	0.5+0.707	0.5+0.707	0+0	0+0	0+0	1+0	2+1.414
	χ^2 value	1.564	1.924	4.355	4.439	11.38	1.624	3.767	2.068	1.411	3.883	4.072	3.951	3.022	4.405	1.359	1.44	8.153	5.378	3.849	3.974	1.883	3.607
	P value	0.668#	0.588#	0.226#	0.218#	0.010*	0.654#	0.288#	0.558#	0.703#	0.274#	0.254#	0.267#	0.388#	0.221#	0.715#	0.696#	0.043*	0.146#	0.278#	0.264#	0.597#	0.307#
Region of practice	Rural	3.88+0.848	4.08+0.796	3.79+0.943	4+0.864	4.04+0.855	19.79+3.259	2.74+1.33	2.62+1.275	2.62+1.285	2.49+1.16	2.75+1.396	2.76+1.384	1.28+0.58	1.33+0.737	18.58+6.31	1+0.816	0.84+0.834	1.01+0.945	0.76+0.936	1.08+0.935	1.08+0.935	5.68+4.361
	Urban	3.95+0.867	3.96+0.882	3.77+0.921	4.04+0.814	4.06+0.79	19.78+3.162	2.86+1.213	2.77+1.222	2.77+1.238	2.59+1.245	3.17+1.455	3.28+1.428	1.31+0.592	1.47+0.651	20.22+6.593	1.14+0.767	0.97+0.834	0.9+0.908	0.71+0.887	1.03+0.889	0.9+0.793	5.65+3.826
	U-value	10033	9900	10312.5	10380	10437	102005	9804	9719	9692.5	10147	8903	8459	10266	9515	8951.5	9595	9625	9909	10296	10252	10029	10437
	Z-value	-0.752	-0.921	-0.343	-0.256	-0.179	-0.458	-0.991	-1.106	-1.138	-0.545	-2.165	-2.744	-0.43	-1.49	-2.043	-1.307	-1.262	-0.902	-0.385	-0.425	-0.67	-0.161
	P	0.45	0.35	0.73	0.79	0.85	0.64	0.32	0.26	0.25	0.58	0.03	0.00	0.66	0.13	0.04	0.19	0.20	0.36	0.70	0.67	0.50	0.87

	value	2#	7#	1#	8#	8#	7#	2#	9#	5#	6#	0*	6**	7#	6#	1*	1#	7#	7#	0#	1#	3#	2#
Type of clinical practice	Combination	4.01+0.827	4.02+0.833	3.82+0.94	4.1+0.703	4.11+0.724	20.07+2.758	2.8+1.166	2.75+1.223	2.75+1.205	2.54+1.264	3.36+1.488	3.49+1.322	1.38+0.603	1.51+0.649	20.58+5.95	1.2+0.776	1.06+0.779	1.05+0.899	0.71+0.857	1.25+0.846	1.13+0.715	6.4+3.31
	Inpatient	3.33+0.97	3.56+0.784	3.39+0.979	3.72+1.018	4+0.97	18+3.498	3.5+1.098	3.06+1.11	2.78+1.06	2.89+1.023	3.67+1.237	3.83+1.043	1.33+0.485	1.17+0.786	22.22+4.387	0.94+0.802	0.72+0.895	0.83+0.985	0.67+0.907	0.67+0.97	0.39+0.778	4.22+4.453
	Outpatient	3.95+0.854	4.01+0.877	3.79+0.911	4.02+0.851	4.03+0.823	19.8+3.28	2.8+1.266	2.7+1.248	2.73+1.282	2.55+1.226	2.92+1.426	3+1.468	1.27+0.589	1.44+0.669	19.4+6.875	1.08+0.777	0.92+0.849	0.88+0.916	0.73+0.914	0.99+0.899	0.88+0.837	5.48+4.094
	χ^2 value	9.871	6.298	3.299	1.962	0.429	5.136	6.243	1.969	0.3	2.344	10.114	12.535	2.529	3.601	7.569	2.344	3.665	2.631	0.068	9.006	15.239	7.769
	P value	0.007**	0.043*	0.192#	0.375#	0.807#	0.077#	0.044*	0.374#	0.861#	0.310#	0.006**	0.002**	0.282#	0.165#	0.023*	0.310#	0.160#	0.268#	0.966#	0.011*	0.000**	0.021*

A is attitude, PB is practice behavior, K is knowledge.

DISCUSSION

Physical therapy has been evolving as an independent and autonomous practice and now patients can directly approach to a physical therapist without referral from another healthcare professional. So, it is responsibility of a physical therapist to do complete patient evaluation including comprehensive vital signs assessment with proper diagnosis to provide competent management to the patient.[22] This study investigated the knowledge attitude, and practice behavior of physical therapists of Haryana regarding BP measurement and also compared the demographic details of the participants for the same. Results from current study found that large portion of participants, 78.5% were practicing in urban areas, supported by previous study conducted by Bala T et al. (2021) who analyzed disparities in health in state of Haryana and concluded that the health care facilities are more centered in urban area of Haryana.[23]

BP attitude: findings showed majority of PTs think they should measure BP on evaluation/re-evaluation of each patient, before and after each therapy session. For all attitude questions, the total mean ± SD scores of Q1- Q5 were higher for agree (189.4 ± 10.38) and strongly agree (88.6 ± 12.95) response compared to neutral (54.8 ± 12.4), disagree (14.2 ± 7.53) and strongly disagree (7 ± 1.22) scores. Nearly 80% of the participants responded 'agree' or 'strongly agree' for all attitude questions. Most of the respondents agreed (n=203) or strongly agreed (n=80) on attitude question stating "importance of BP assessment during patient evaluations" and 283 participants reported agree or strongly agree, on importance of BP assessment before PT treatment and 246 reported agree or strongly agree on BP assessment after physical therapy treatments. Results showed more than 80% participants feet confident in their ability to take accurate BP readings.

These findings are consistent with previous research conducted among physiotherapists practicing in USA by Arena SK et al. (2018) who concluded 94.2% participants reported agree or strongly agree for question stating "feeling able to take an accurate BP reading".[12] Another study conducted by Sana A et al. (2023) concluded 60.47% PTs practicing in twin cities of Pakistan have positive attitude towards the importance of BP evaluation during assessment.[13] One other study conducted by Faletra A et al. (2022) on Italian physiotherapists highlighted that cardiovascular assessment is considered relevant by 80% of Italian physiotherapists.[2]

BP practice behavior: Findings of present study showed that even the BP assessment is important for patient safety and effective treatment planning, practice behavior of PTs did not consistently match with their attitude. For all practice behavior questions the total mean ± SD scores of Q6- Q11, Q15 and Q16 is also higher for seldom (116.83 ± 8.89) and less than half the time (73.67 ± 13.72) questions as compared to more than half the time (47.83 ± 5.98), always (62.17 ± 30.02) and never (53.5 ± 10.43). Results of present study found that in Haryana, around 54% of the PTs responded 'seldom' or 'less than half of the time' for practice behavior questions. Around 58% PTs reported that they seldomly or less than half of the time measure BP on evaluation of patient, before and after physical therapy sessions. 64% reported that they do not use different cuff sizes for different patients. These results are consistent with work of Arena SK et al. (2018) who reported 85% PTs responded 'less than half the time', 'seldom' or 'never' for performing BP measurements during a patient evaluation or re-evaluation.[12] Results of another study conducted by Severin et al. (2019) in Saudi Arabia showed only 4.8% of respondents reported measuring resting HR and BP on the initial examination for every new patient, 63.74% reported measuring HR and BP 'less than half of the time' and 13.0% reported 'never' measuring HR and BP.[14] Faletra A et al. (2022) also concluded that only 50% of the PTs reported that they

routinely include cardiovascular assessment in their initial examination.[2]

BP knowledge: In present study, therapists in Haryana showed some knowledge gaps. For all knowledge questions, the total mean ± SD scores of Q18- Q23 were higher for incorrect answers (143.17 ±38.48), mean ± SD for partially correct answer was 87.67±37.28 and for correct response was 123.17±17.98. For all knowledge questions, 40% of participants reported incorrect answer, whereas 25% reported partially correct answers and only 35% reported correct answers. Only 36.1% PTs could accurately define pre-hypertension values and only 32.2% PTs could define correct hypertension values. For ques. reporting BP values to contraindicate and terminate exercise, 61% and 70% PTs respectively, could not define BP values. Similar gaps have also been reported in previous studies conducted by Arena SK et al. (2018) who found that knowledge of correct BP values indicative of P-HTN or HTN reported correctly only by 17.9% and 23.6% PTs, respectively.[12] In other study conducted by Faletra et al. (2022) found 72.2% of PTs were not familiar with the fundamentals of cardiovascular measurements.[2] Albarrati AM (2019) also concluded that only 20% of the therapists who measured BP did not know BP value at which exercise should be terminated.[15]

Correlation between BP attitude, practice behavior and knowledge of PTs: The results of present study showed positive but weak correlation (r=0.148, p=0.005) between attitude and practice behavior of PTs, showing their attitude for BP assessment frequently does not correspond to their regular practice behavior. Results of study conducted by Arena SK et al. (2018) also found a positive correlation (r=0.44) between attitude and practice behavior regarding BP assessment of outpatient PTs practicing in America. There was a moderately positive correlation seen between attitude and knowledge (r=0.319, p=0.005), indicating that therapists who value BP measurement in regular practice do have better knowledge. However, findings by Arena SK et al. (2018) found no statistically significant spearman correlations between attitude and knowledge (r = 0.11, p=0.069).[12]

Present study found negative correlation between knowledge and practice behavior (r = -0.230, p=0.00) of PTs regarding BP assessment suggesting that as the PTs gains knowledge in their field they do not think it necessary to measure blood pressure. Concluding that increased theoretical knowledge does not assure BP monitoring by PTs into daily routines, as confirmed by prior studies. [2,12] However, in study conducted by Arena SK et al. (2018) no statistically significant Spearman correlations (r=-0.11, P=.089) were identified between practice behavior and knowledge of BP assessment of outpatient PTs practicing in America.[12]

Comparison to Respondent Demographics: The non-parametric tests did not reveal any significant differences (p>0.05) for the demographics (i.e., gender, qualification level, experience level and region of practice). Study by Arena et al. (2018) and Faletra et al. (2022) also concluded that advanced degrees do not necessarily result in better BP assessment skills.[2,12] In another study by Albarrati AM (2019) also concluded that there is no association (p = 0.536) between the measurement of HR/BP and years of experience.[15] In present study, significant difference was seen in the total practice behavior score (p=0.023) and total knowledge scores (p=0.021) showing physiotherapists working in multiple practice settings- such as outpatient, inpatient, home health care, or rehabilitation centres, had better practice behavior and knowledge compared to those practicing in a single setting. These findings are consistent with Arena et al. (2018), who reported that PTs working in hospital-based outpatient clinics demonstrated significantly more positive behaviors (p=0.030).[12]

This gap may be due to many reasons. One is the lack of standardized guidelines and training specific to physical therapy settings,

an issue discussed by Faletra et al. (2022) and Severin et al. (2020) in their study.[2,18] Another factor is the misconception of PTs that BP measurement is not a core responsibility or job of physical therapists and it does not add value to their treatment plan as discussed by Albarrati AM (2019) in their study.[15] Thus, lack of institutional support, misconception of PTs and insufficient guidelines show the difference between what therapists know, what they believe and what they actually do during clinical practices.[2,24]

CONCLUSION

The findings of present study demonstrated that physical therapists hold favourable attitude toward blood pressure assessment and recognize its importance in ensuring patient safety and effective treatment planning. However, these attitudes were not consistently shown in their daily practice, as many therapists reported infrequent or irregular assessment of blood pressure during routine clinical sessions. Furthermore, lack of knowledge, particularly regarding blood pressure classification, exercise contraindication values, and referral thresholds were observed in physical therapists.

In conclusion, the findings of present study led us to accept the null hypothesis for attitude, that there is significant attitude among PTs of Haryana regarding BP measurement. For practice behavior and knowledge, the study accepted the alternative hypothesis, that there is no significant level of practice behavior and knowledge among PTs of Haryana regarding BP measurement.

Despite its contributions, the study has limitations. Majority of the participants were young therapists and had less experience, which could affect the results. In addition, the study focused only on BP assessment, while assessment of heart rate could be included. These limitations should be addressed in future studies to provide a more comprehensive understanding of physiotherapists towards assessment practices. This study provides future scope for execution of this survey in other state/regions of India.

Declaration by Authors

Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

1. Iqbal AM and Jamal SF. Essential Hypertension. StarPearls [Internet]. Treasure Island (FL): StatPearls Publishing. 2025, PMID: 30969681.
2. Faletra A, Bellin G, Dunning J, et al. Assessing cardiovascular parameters and risk factors in physical therapy practice: findings from a cross-sectional national survey and implication for clinical practice. BMC Musculoskelet. Disord. 2022; 23(1): 1-3.
3. Dreisbach AW and Kirchner KA. Epidemiology of Hypertension. Medscape. 2024.
4. Zhou B, Carrillo-Larco RM, Danaei G, et al. Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. The Lancet. 2021; 398(10304): 957-80.
5. Mohammad R and Bansod DW. Hypertension in India: a gender-based study of prevalence and associated risk factors. BMC Public Health. 2024; 84: 2681.
6. Thakur JS and Nangia R. Prevalence, Awareness, Treatment, and Control of Hypertension and Diabetes: Results from Two State-Wide STEPS Survey in Punjab and Haryana, India. Front Public Health. 2022; 10: 768471
7. Giles TD, Materson BJ, Cohn JN et al. Definition and classification of hypertension: an update. J Clin Hypertens (Greenwich). 2009;11(11): 611-4.
8. Prabhakaran D, Jeemon P, Sharma M, et al. The changing patterns of cardiovascular diseases and their risk factors in the states of India: The Global Burden of Disease Study 1990–2016. Lancet Glob. Health. 2018; 6(12): e1339-5.

9. Fletcher GF, Balady GJ, Amsterdam EA, et al. Exercise standards for testing and training: a statement for healthcare professionals from the American Heart Association. Circulation. 2001; 104:1694-740.
10. Laukkanen JA, and Kurl, S. Blood pressure responses during exercise testing-is up best for prognosis? Annals of Medicine. 2011; 44(3): 218-224.
11. Smith RG, Rubin SA and Ellestad MH. Exercise hypertension: an adverse prognosis. J Am Soc Hypertens. 2009; 3: 366-73.
12. Arena SK, Reyes A, Rolf M et al. Blood pressure attitudes, practice behaviors, and knowledge of outpatient physical therapists. Cardiopulm. Phys. Ther. J. 2018; 29(1): 3-12.
13. Sana A, Obaid S, Saleem M et al. Knowledge, attitude and practice behavior regarding blood pressure among physical therapists of twin cities. T Rehabili. J. 2023; 7(01): 488-94.
14. Severin R, Wang E, Wielechowski A et al. Outpatient physical therapist attitudes toward and behaviors in cardiovascular disease screening: a national survey. Phys. Ther. 2019;99(7):833-48.
15. Albarrati AM. Outpatient physical therapy cardiovascular assessment: physical therapist perspective and experience. Physiother. Theory Pract. 2019; 35(9): 843-50.
16. Magder SA. The highs and lows of blood pressure: toward meaningful clinical targets in patients with shock. Crit. Care Med. 2014; 42(5): 1241-5.
17. Charan J, and Biswas T. How to calculate sample size for different study designs in medical research? Indian J Psychol Med. 2013; 35(2):121-6.
18. Jadhav RA, Gupta G, Nataraj M et al. Knowledge, attitude and practice of physical activity promotion among physiotherapists in India during COVID 19. J. Bodyw. Mov. Ther. 2021; 26: 463-70.
19. Chobanian AV, Bakris GL, Black HR et al. The seventh report of the joint national Committee on prevention, detection, evaluation, and treatment of high blood pressure: The JNC 7 report. JAMA. 2003; 289: 2560-2571.
20. Ghadieh AS and Saab B. Evidence for exercise training in the management of hypertension in adults. Can Fam Physician. 2015; 61(3): 233-9.
21. Wolters Kluwer. ACSM 21, American College of Sports Medicine. (2021). ACSM's guidelines for exercise testing and prescription (11th ed.).
22. Galloway R and Dabade T. The importance of assessing vital signs in physical therapy outpatients. World J Yoga Phys Ther Rehabil. 2021; 3(2) :1-5.
23. Bala T, Singh K and Yadav A. Disparities in health in state of Haryana: an inter-district analysis. Haryana: Government of Haryana; 2021. Report.
24. Severin R, Sabbahi A, Albarrati A et al. Blood pressure screening by outpatient physical therapists: a call to action and clinical recommendations. Phys Ther. 2020; 100: 1008-1019.

How to cite this article: Sheetal, Gitanjali Sikka, Vikram Singh Yadav, Jaspreet Kaur, Sushma, Hemlata. Practice behavior of physical therapists of Haryana regarding measurement of blood pressure. *Int. J. Sci. Healthc. Res.* 2026; 11(1): 1-16. DOI: *10.52403/ijshr.20260101*

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