Prevalence of orthostatic hypotension in type 2 diabetic mellitus patients in Nashik city- *Descriptive study*.

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ABSTRACT:

Title: Prevalence of Orthostatic Hypotension in Type 2 Diabetic Mellitus Patients in Nashik City- Descriptive study.

Aim & Objectives: To investigate about the prevalence of orthostatic hypotension among type 2 DM patients.

Methodology: six month descriptive study was done at Motiwala College of Physiotherapy, Nashik. Patients who met the inclusion criteria were included in this study. Verbal consent was taken and the study was explained to all the patients and standard diabetic questionnaires were distributed. They were instructed to fill the form and return it back the very same day. Subjects were assessed and outcome measures were documented.

Results: The study showed that the prevalence of orthostatic hypotension in type 2 diabetic patient is 11%.

Conclusion: The prevalence rate of orthostatic hypotension in Type 2 diabetic patient is 11%. The Orthostatic hypotension in females is 4% while in males is 7.2%. Most of the patient had feel Dizziness, Lightheadedness, Weakness and fatigue after changing position.

Keywords: Prevalence**,** orthostatic hypotension, type 2 diabetes mellitus, SSS-OI questionnaire.

Abbreviation: OH, SSS-OI, SBP, DBP, BMI.

INTRODUCTION

Orthostatic blood pressure control involves complex compensatory mechanisms allowing the human body to stand upright[1] as the postural homeostasis is principally mediated by autonomic nervous system; its impairment may lead to BP fall after standing. The phenomenon, denominated as orthostatic hypotension (OH): fatigue, dizziness & fainting.[2-4]

Orthostatic hypotension was defined as a drop in SBP of ≥ 20 mm Hg from supine to the standing position at 3 minutes or drop in DBP of ≥ 10 mm Hg on standing or both.[5] When a normal individual stands up from a lying position, the baroregulatory reflex produces vagal inhibition and sympathetic stimulation, resulting an increase in heart rate and vasoconstriction to maintain the systemic blood pressure. Any impairment in the reflex arc, such as an efferent lesion with an inability to increase heart rate and vasoconstriction, may result in orthostatic hypotension.[6,7] Some patients become more symptomatic than others when their blood pressure drops. Patients who had experience few symptoms while hypertensive has a minimal decline in brain blood flow and good dilating blood vessels. Patients who become symptomatic when their blood pressure drops have a greater decline in blood flow to the brain.[8] Diabetes mellitus being a worldwide problem is still on the rise and its current estimated prevalence of 285 million people (6.4%) is expected to reach 438 million (7.8%) by 2030. OH caused by autonomic neuropathy in diabetic patients carries a high risk of cardiovascular mortality.[9] OH is one clinical manifestation of diabetic autonomic neuropathy and is also a significant risk factor for fall, syncope, cardiovascular disease, and all cause morality.[10-13] The prevalence of orthostatic hypotension in diabetic subjects varied extremely from 8.2 to 43%, depending on the diagnostic criterion and study subject selection.[11,14,15] In diabetes, the major deficit appears to be an impaired lower limb vasoconstriction[16] although in type 2 diabetes hypovolemia contributes to the genesis of OH.[17]

CRITERIA

Inclusion criteria:

- Type 2 diabetes mellitus patients.
- Age above 40 years.

Exclusion criteria:

- Type 1 diabetic patients.
- Hypertensive patients.
- Any medical red flags.

MATERIALS:

- Standard sphygmomanometer
- Stethoscope
- Stopwatch
- Weighing machine
- Inch tape
- SSS-OI questionnaire

PROCEDURE

Patients who met the inclusion criteria were included in this study. The patients were selected. Verbal consent was taken and the study was explained to all the patients and standard diabetic questionnaires were distributed. They were instructed to fill the form and return it back the very same day. Measurements were obtained at least 3 hours after a meal.

OUTCOME MEASURES

1. **BMI:** Weight was measured with the subject in light clothing without shoes in kilogram and height in centimeters was measured with the subject standing.
   BMI formula: Weight (kg) / Height (m) ^{2}
   Feelings of dizziness, lightheadedness, numbness to extremities, fainting, weakness, resting dyspnea, straining dyspnea were evaluated by questionnaire.
2. **Pulse rate measurement:** radial artery pulse measured initially in resting and then in standing every minute.
3. **Blood pressure:** the systolic & diastolic blood pressure and heart rate were measured by sphygmomanometer and Stethoscope at every 1, 2, and 3 minutes in standing.[5, 26] the subjects were asked about any feelings of dizziness, lightheadedness, or faintness during the standing procedure and a positive or negative response was recorded.
4. **SSS-OI questionnaire:** It is symptom questionnaire; the most common posture-related symptoms [12, 15] were included in a self-administered SSS-OI. The questionnaire evaluated the symptoms grouped into 7 items: Dizziness and Pre-syncope, Visual disturbances (including blurring, color changes, white-out, gray-out, enhanced brightness, darkening or blackening, and tunnel vision), Syncope, Hearing disturbances (including impaired hearing, crackles, and tinnitus), Pain in the neck (occipital/par cervical and shoulder region), Low back pain, or Primordial pain, Weakness, Fatigue, Lethargy, Palpitations and Hyper-hydrosis. The patients were asked to assess the severity of each of the aforementioned symptoms on a visual scale from 0 to 10. (10 maximum entity of the symptom). The sum of scores of the 7 items was the total symptom score (maximum score-70).

DATA ANALYSIS

The SSS-OI questionnaire was used to find out the percentage score of orthostatic hypotension. A prevalence of orthostatic hypotension in type 2 diabetic mellitus patients is calculated using the formula for prevalence rate. Prevalence rate was found out among total type 2 diabetic patients.

Results: Total 125 Type 2 diabetic patients were included in the study, out of which 74 were males and 51 were females.

Table no. 1- Males and females ratio

Ratio		
Males	74	59.2
Females	51	40.8

Description: Out of 125 subjects 59% are males and 41% are females.

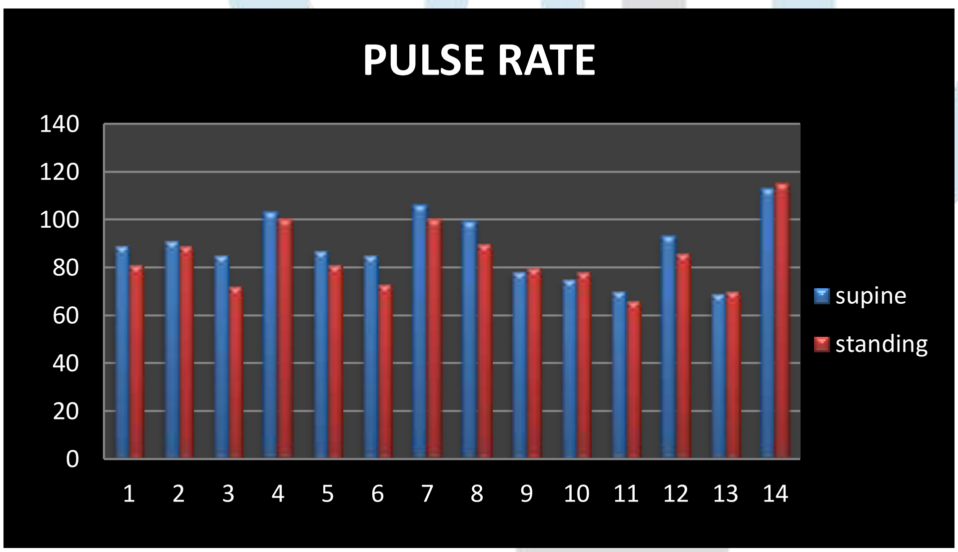
Table2. Availability of postural symptom

Postural symptoms	Yes	No
	36	89

Description: Out of 125 subjects postural symptoms were present in 29% and 71% were not present.

Table3. Pulse rate in supine and standing:

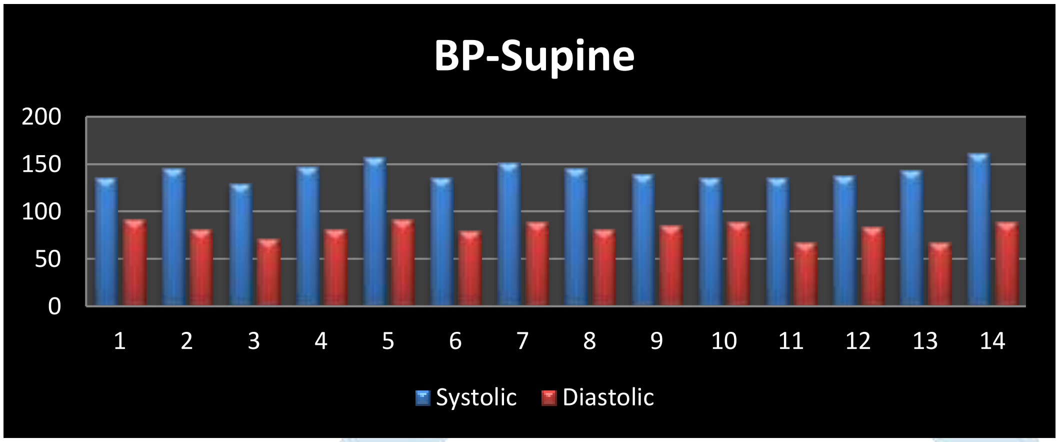
Pulse rate														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Supine	89	91	85	103	87	85	106	99	78	75	70	93	69	113
Standing	81	89	72	100	81	73	100	90	80	78	66	86	70	115



Description: Out of 125 patients 14 patients showed variations in their pulse rate in relation to orthostatic hypotension.

Table 4. Systolic and Diastolic BP in supine position

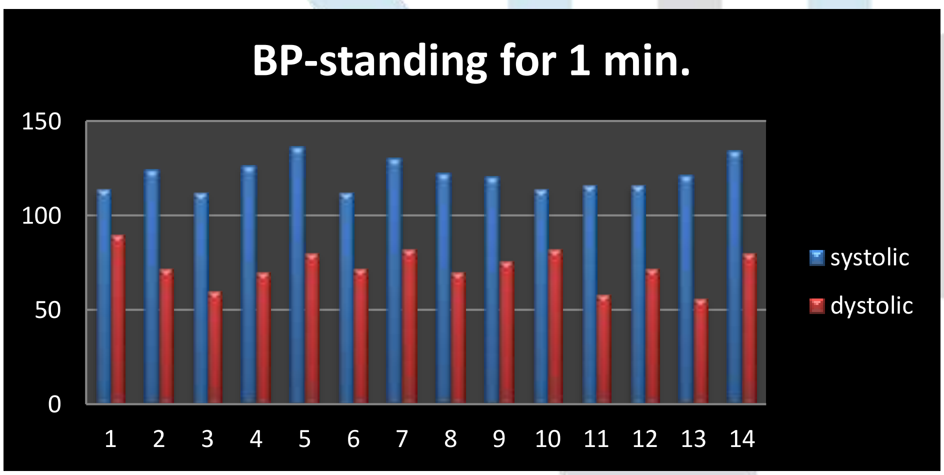
	Supine (BP)													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SBP	136	146	130	148	158	136	152	146	140	136	136	138	144	162
DBP	92	82	72	82	92	80	90	82	86	90	68	84	68	90



Description: Out of 125 patient 14 patient's normal blood pressure in relation to orthostatic hypotension.

Table no 5. BP measured after 1 min in standing

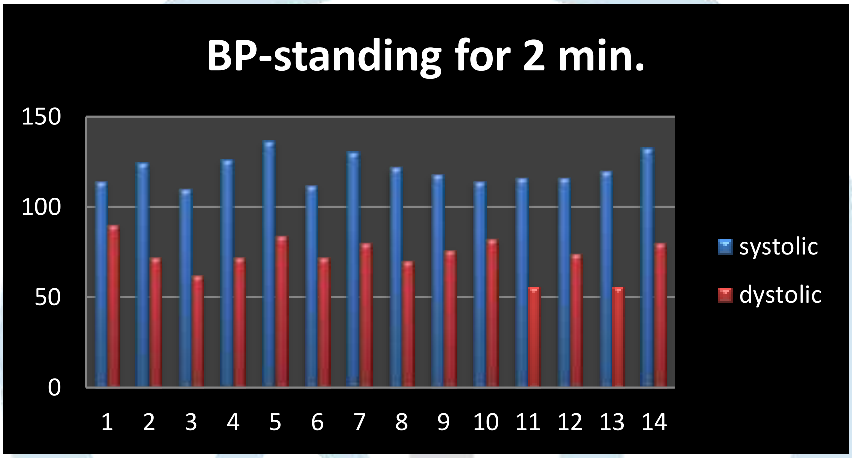
BP- standing for 1 min														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SBP	114	124	112	126	136	112	130	122	120	114	116	116	121	134
DBP	90	72	60	70	80	72	82	70	76	82	58	72	56	80



Description: Out of 125 patients 14 patients showed variation in blood pressure after 1 minute of standing.

Table no 6. BP in standing for 2 min

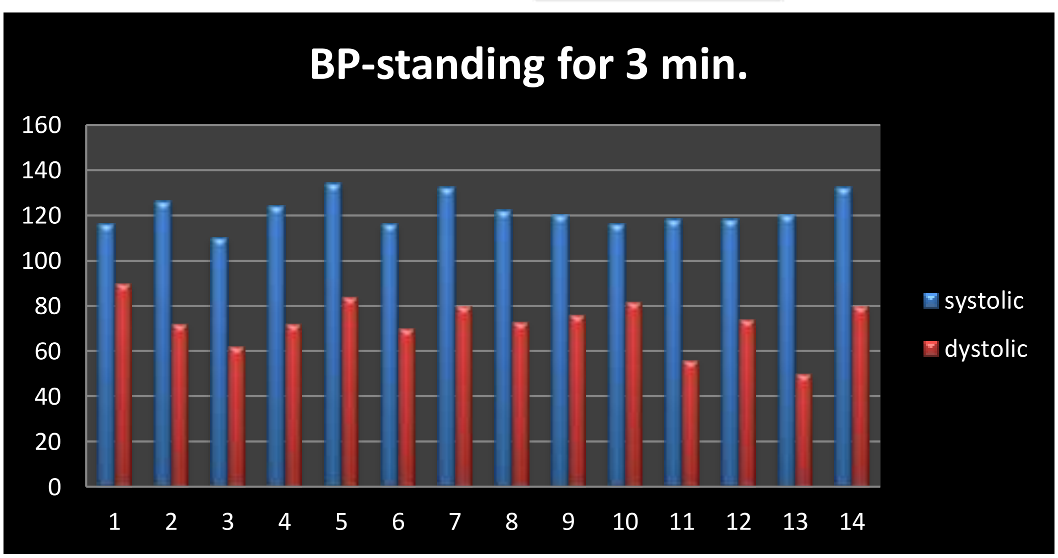
BP - standing for 2 min														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SBP	114	124	110	126	136	112	130	122	118	114	116	116	120	132
DBP	90	72	62	72	84	72	80	70	76	82	56	74	56	80



Description: Out of 125 patients 14 patients showed variation in blood pressure after 2 minute of standing.

Table no 7: BP measured for 3 min. in standing

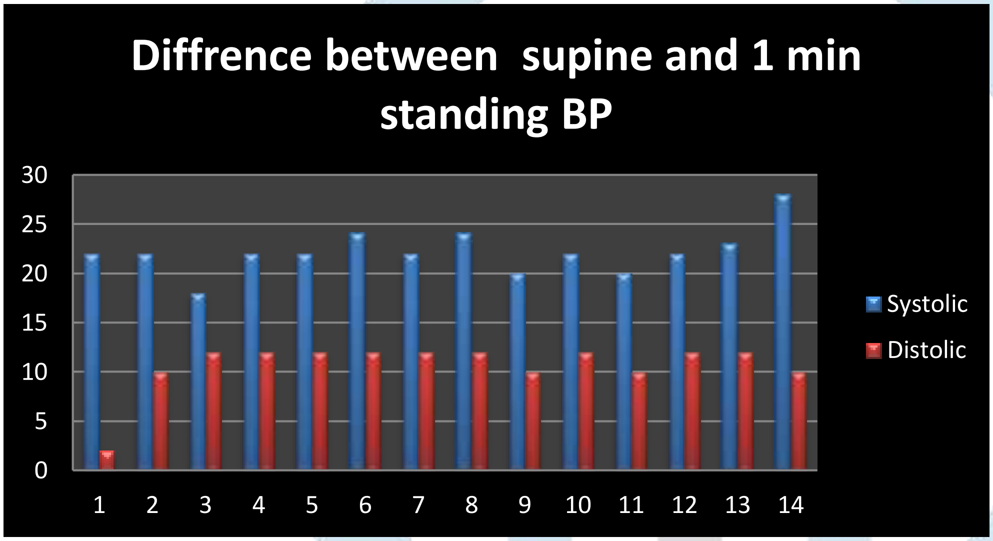
BP- Standing for 3 min														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SBP	116	126	110	124	134	116	132	122	120	116	118	118	120	132
DBP	90	72	62	72	84	70	80	73	76	82	56	74	50	80



Description: Out of 125 patients 14 patients showed variation in blood pressure after 3 minute of standing.

Table no 8 .Difference between supine and 1 min standing blood pressure.

Difference between BP -supine and 1 min standing														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
SBP	22	22	18	22	22	24	22	24	20	22	20	22	23	28
DBP	2	10	12	12	12	12	12	12	10	12	10	12	12	10



Description: The graph shows that difference between supine blood pressure and standing blood pressure for 1 minute so according to difference we diagnosed it as orthostatic hypotension. Systolic BP should less then 20mm/Hg and diastolic blood pressure should be less than 10 mm/Hg.

DISCUSSION

In the present study we have selected 125 participants having type 2 Diabetes out of which 74 male subjects and 51 female subjects with mean age of 59.2 and 40.8 years respectively. The study showed that the prevalence of orthostatic hypotension in type 2 diabetic patient is 11%. Orthostatic hypotension has been traditionally associated with neurodegenerative diseases (e.g. Parkinson's disease, multiple System atrophy, or autonomic neuropathies) elderly patient and chronic heart failure. The present study was conducted in a tertiary care hospital and we expected relatively higher prevalence of orthostatic hypotension. It revealed that poor glycogenic control can make diabetes mellitus more vulnerable to postural hypotension.

This can be explained because most of the subjects had poorly controlled diabetes due to which no effect occurred on mean blood glucose even after grouping. As diabetes is a well known cause of orthostatic hypotension, our findings would orthostatic hypotension.[10] however the possibility of the use of antihypertensive medications as another reason of comparatively higher occurrence of orthostatic hypotension was not considered in our study.

Orthostatic hypotension is not the only manifestation of autonomic dysfunction in people with diabetes. Other features include sweating disturbances, urinary control abnormalities, gastric distension, diarrhea, constipation and erectile dysfunction in males. Duration of diabetes and random blood glucose levels were also without any apparent effect.

In present study Male to female ratio was about 7.2:4. Mean age and mean diabetes duration was 63 years and 15 years respectively. Mean fasting blood glucose level was 194.5 mg/dl, smoking and past history also plays an important role (Table No.1) in our study. Also this study showed that even though there was no change in blood pressure of elderly patients then also they presented symptoms such as dizziness and fatigue.

Among 125 patients, 14 patients showed presence of orthostatic hypotension with mean systolic blood pressure of 121 and mean diastolic blood pressure of 77. Also the postural symptoms such as dizziness, weakness and fatigue were present in 36 patients with type 2 diabetes. From above study we can conclude that postural symptoms were present such as weakness and dizziness in almost all subjects with or without orthostatic hypotension.

CONCLUSION

The prevalence rate of orthostatic hypotension in Type 2 diabetic patient is 11%. The Orthostatic hypotension in females is 4% while in males is 7.2%. Most of the patient had feel Dizziness, Lightheadedness, Weakness and fatigue after changing position.

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