



Prevalence of Pulmonary Hypertension in Thiruvananthapuram District: Community Based Cross Sectional Study

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ABSTRACT

Background: Pulmonary hypertension is a dreaded disease associated with considerable morbidity and mortality. The importance of early detection of this complication has been realized worldwide, and recently, the definition of pulmonary hypertension was revised to set the cutoff of mean pulmonary artery pressure (mPAP) at 20 mmHg instead of 25 mmHg at rest. Population-based studies into pulmonary hypertension are scarce and little is known about its prevalence in the general population. We aimed to estimate the prevalence of pulmonary hypertension, and to identify associated factors

Methods

A community-based cross-sectional study conducted in the Trivandrum district and Government Medical

College, Thiruvananthapuram from September 2019 to March 2023 through randomly selected population from Trivandrum District using multi-stage cluster sampling

Results

Out of 61200 screened patients, the mean age of the patients is 48.0 ± 16.8 with male: female ratio of 46:54. 51 % belonged to urban population and 49 % belonged to rural population. 15.5 % were screened positive of HF of which 1.6 % were diagnosed with HF. 0.8 % of the population had pulmonary hypertension .Pulmonary hypertension in HF subtypes is HFpEF-48%(200), followed by HfrEF 150 (30.6 %)and HFmrEF 140 (28.5%)

Conclusion

Prevalence of pulmonary hypertension in thiruvananthapuram district is 0.8%.

INTRODUCTION

Pulmonary hypertension encompasses a heterogeneous group of disorders with the common feature of elevated pulmonary artery pressures.(1) Pulmonary hypertension can occur as an isolated disease or as a consequence of a number of underlying diseases and conditions, such as heart failure and chronic obstructive pulmonary disease (COPD). Although higher levels of pulmonary pressure have been associated with increased mortality both in patients and in the general populations, general population prevalence estimates are scarce. (2,3)

The diagnostic method of choice for PH is right-heart catheterization. However, its invasive nature renders it unsuitable in population-based studies. Transthoracic Doppler echocardiography is a non-invasive tool used in clinical practice for screening and monitoring of PH progression.(4,5) We aimed to describe the distribution of echocardiographic pulmonary artery systolic pressure (ePASP) and to estimate the prevalence of pulmonary hypertension measured by echocardiography (ePH) in the general population. Furthermore, we sought to identify factors independently associated with ePASP.(6,8)

MATERIALS & METHODS

Study Design

Community-based cross-sectional study

Study Setting

Trivandrum district and Government Medical College, Thiruvananthapuram

Study Period

September 2019 to March 2023

Selection Criteria

Randomly selected population from Trivandrum District using multi-stage cluster sampling

Sample size

The Sample size was estimated based on evidence from the INDUS (INDia UKieri Study) study. Sample size calculation was based on the final projected nationwide prevalence of heart failure. From the study, it was observed that the prevalence of heart failure in the local community was 1.2/1000 but if the data is projected to the population at the national level the prevalence of heart failure is expected to be around 0.9%.

Substituting this, the sample size was calculated based on the formula for calculating sample size i.e.

$$n=4PQ/d^2$$

n = sample size; P = expected prevalence or proportion & d = precision.

Using the precision of 0.03% (25% of prevalence), desired confidence level 95% and accounting 20% for attrition, it was estimated to be 65,000 approx. (63,922 exact) for a prevalence of 0.12% in the population based on the estimates of INDUS study.

Study Setting and Sampling Technique

We adopted an uncontrolled quota sampling technique that is proportional to the size of both the urban and rural population in the Trivandrum district. The population size in urban and rural areas are almost equal. We have therefore recruited around 61200 participants from urban and an equal number of participants from rural areas.

In rural areas, we randomly selected 73 of the total 73 Grama Panchayats (GP) in Trivandrum. We followed the same sampling strategy as in the urban wards to identify the participants for the proposed study in the

selected rural wards. The originally planned ratio of recruitment from urban and rural areas and the gender ratios were maintained as were planned before the beginning of the study even after covid-19 challenges

RESULTS

A total of 612000 patients were enrolled in the study with mean age of subjects recruited during the screening was 48 with an SD of 16.86 years and the median age of subjects was 48 years. Gender

distribution shoed that majority of the patients enrolled were females 33048 (54 %) followed by males 28152 (46 %). Community wise evaluation showed that 31212 (51%)subjects were from urban areas. And subjects recruited from rural areas were 29988 (49%)in number. As mentioned in Table:1 15.5 % of the enrolled patients were screened positive for HF.

Table 1: Baseline Characteristics

Study Characteristics		Study Population N=61200
Age		48.0 ± 16.8
Gender	Male	28152 (46 %)
	Female	33048 (54 %)
Community	Rural	29988 (49%)
	Urban	31212 (51%)
Screened for POSITIVE for HF		9486 (15.5 %)
Heart Failure		1034 (1.6%)
Pulmonary Hypertension		490 (0.8 %)

During screening by the ASHAs, a total of 9486 (15.5 %)subjects were screened positive for the questionnaire. Out of these 4767 (7.79%), subjects were from rural areas and 4694 (7.67%) subjects were

from urban areas and the difference in responses was not statistically significant between the two groups. Also, of the total subjects responding positively to the questionnaire 1034 (1.6 %) had Heart Failure.

Table 2: Prevalence of PAH in HF Patients

	Total N=490
Prevalence of PAH	490 (0.8%)
Prevalence based on EF group	
<40 (HFrEF)	150 (30.6 %)
40-49.9 (HFmrEF)	140 (28.5%)
> 50 (HFpEF)	200 (40.8 %)

DISCUSSION

The Trivandrum Heart Failure Registry (THFR) recruited consecutive patients admitted for acute HF among 16 hospitals in Trivandrum, Kerala. THFR is the first organized HF registry in India to report 5-year outcomes of participants hospitalized for HF. In THFR study, a community study done by Dr Himanshu under the guidance of Prof Dr Sunitha viswanathan a total of 61200 patients were screened and studied from different areas of Trivandrum and they identified 1034 patients with heart failure from that community, a prevalence of 1.69%.

Prevalence of Pulmonary Hypertension

In our substudy the prevalence of PAH was seen in 490 patients which constituted 0.8 % of the population. According to Leber et al studies which is a systematic analysis showed that In adults, the range of estimates per million was approximately 20-fold for pulmonary arterial hypertension incidence (1.5–32) and prevalence (12.4–268). Our study was in line with these five national systematic registries, eight non-systematic registries, five claims/administrative databases and three clinical databases (Scotland, the USA and South Korea). (9,10)

Heart failure is associated with comorbidities like pulmonary hypertension and it was seen that majority PAH patients had HFpEF (48 %) followed by HFrfEF and HFmrEF as discussed above. This is in line with various systematic review and meta-analysis conducted which showed a similar result. (9,10) Further evaluation showed that the prevalence of PAH was more common in female population (57 %) as compared to males which shows gender propensity within PAH.

No major differences were noted for demographic distribution of the populations observed in the selected studies. Confirmation of PH/PAH diagnosis by RHC is the gold standard as per the current ESC/ERS guidelines. There were very few studies in Africa, Eastern Europe, South America, and Asia, and papers from low- and middle-income countries often reported survival, not prevalence or incidence. Additionally, geographic comparison could provide insights into possible risk factors for PAH, as well as health system effectiveness, and location and comorbidity impacts on treatment. The inclusion of PAH in future iterations of the GBD study may provide the impetus for broader data collection efforts. More sophisticated proteomic and metabolomic approaches to classification may help guide future efforts to assess its true burden. (9,10)

CONCLUSION

The present study represents the Asian cohort for which estimates are considered most valid, based on objective criteria. This is particularly important given that the highest estimates identified in many previous systematic reviews create confusion on whether PAH are rare diseases. Populations from Asia, Africa and South America were under-represented in the literature. This study gives a better idea on the Asian population

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