Pak Heart J

IMPACT OF AGE AND GENDER ON THE OUTCOME OF HEAD-UP TILT TEST IN PATIENTS WITH UNEXPLAINED SYNCOPE

Syed Haseeb Raza Naqvi[1], Abdul Mueed[2], Muhammad Faisal Khanzada[3], Zubair Mumtaz[4], Muhammad Sohail Saleemi[5], Han Naung Tun[6]

[1-4]Department of Electrophysiology, National Institute of Cardiovascular Diseases, Karachi,Pakistan
[5]Chaudhry Pervaiz Elahi Institute of cardiology Multan, Punjab, Pakistan
[6]Heart And Vascular Center, Victoria Hospital, Yangon, Myanmar.

Address for Correspondence:

Syed Haseeb Raza Naqvi

Department of Electrophysiology, National Institute of Cardiovascular Diseases, Karachi, Pakistan

Emails: haseebraza51214@yahoo.com

Date Received: June 28, 2019

Date Revised: Sep 18, 2019

Date Accepted: Sep 24, 2019

Contribution

SHRN conceived the idea and designed the study. MFK, AM, ZM and MSS helped in data collection and analysis. While HNT did final review and manuscript writing. All authors sntributed equally to the submitted manuscript.

All authors declare no conflict of interest.

This article may be cited as: Naqvi SHR Mueed A, Khanzada MF, Mumtaz Z, Saleemi MS, Tun HN. helped in data collection and analysis. While Tun HN did final review and manuscript writing. Pak Heart J 2019; 52 (04):376-80

ABSTRACT

Objective: To determine the impact of age and gender on the outcome of head-up tilt test in patients with unexplained syncope.

Methodology: This quasi experimental study was done at National Institute of Cardiovascular diseases Karachi and Chaudhry Pervaiz Elahi Institute of Cardiology Multan Pakistan from January to December 2018. Patients presented with unexplained syncope were included. 64 syncope patients were included and HUTT was done. Outcome including positive HUTT, response to HUTT, phase of HUTT and the effect of age and gender in patients with unexplained syncope undergoing HUTT.

Results: The mean age of patients was 63.39±6.94 years. There were 51 (79.7%) male while 13 (20.3%) were females. HUTT was found to be positive in 37 (57.8%) patients while 27 (42.2%) patients had negative HUTT. Mixed HUTT response was observed in 18 (48.6%) patients, cardio-inhibitory reposes in 8 (21.6%) patients while vaso depressive response in 11 (17.2%) patients. Active HUTT phase was observed in 30 (81.1%) patients while 7 (18.9%) patients had passive HUTT phase. The age and gender were found to have insignificant impact on HUTT findings ($p>0.05$).

Conclusion: Thus the frequency of positive HUTT is high in unexplained syncope patients. No significant difference was found in the frequency of responses to HUTT between the gender groups. The trend of the HUTT result significantly changed with age.

Key Words: Syncope, Cerebral hypoperfusion, Hypotension, Head-up tilt test

INTRODUCTION

Syncope is a transitory unconsciousness owing to the cerebral hypo-perfusion. In about 40% adults belonging to any population, can experience syncope at least once in their life.[2-5] Neurologically mediated syndromes are one of the commonest reason for syncope in individuals of all ages. Most of the individuals who have high risk of syncope are young adults. These are few benign circumstances, which usually do not raise the risk of mortality, categorized by vagal driven bradycardia or asystole / vasodilatation, which may lead to intense systemic hypotension, dizziness, pre-syncope and syncope.[1-3]

Because of physiological changes in the body as the age increases and due to the associated comorbidities and also due to several medical therapies that may result in hypotension ,old age patients have high raised risk of syncope.[7] Nevertheless, a certain relationship in age & type of syncope has to be fully recognized yet, particularly in older individuals, whose clinical characteristics require further explanation.[8]

Head-up tilt test (HUTT) is the practical test, which can help in the diagnosis and appropriate therapy for the patients of syncope.[9] This study was planned to determine the usefulness of HUTT and relation of age and gender on the response of HUTT in patients presented with syncope. This would help us to implement the HUTT for assessment of syncope and plan better strategies to improve the prognosis.

The aim of the study was to determine the outcome of HUTT in patients with unexplained syncope and also to determine the impact of age and gender on outcome of HUTT inpatients with unexplained syncope

METHODOLOGY

This quasi experimental study was conducted at National Institute of Cardiovascular diseases Karachi and Chaudhry Pervaiz Elahi Institute of Cardiology Multan from January to December 2018. Patients presented with one or more episodes of unexplained syncope were included in the study. Then patients underwent complete examination, including clinical history, physical examination and supine and orthostatic blood pressure assessment, constant with European society of Cardiology Task Force on Syncope 1. Patients with orthostatic hypotension were excluded. HUTT was performed using the manually controllable tilt table with the foot board for weight-bearing. The BP, heart beat and heart rhythm were constantly monitored and noted according to the 2-stage tilt protocol with nitroglycerin. HUTT was applied after an initial examination of patient in supine position for 10minutes. This test has 2 consecutive stages. During Stage I (the Passive phase), patient was tilted at 70 degree for 20 minutes with out medication and controlling the heart beat and 3-lead electrocardiography. The BP was monitored continuously and non-invasively during the procedure. If syncope developed, test was terminated and patient was turned back into supine position. Or else, patient was taken towards the next stage i.e Stage II (the Active phase), where 400μg sublingual nitroglycerin was administered and procedure continued for further 20 minutes. If syncope developed in active phase, tilt table quickly dropped to put the patient in supine position, and study would be dismissed. Regarding the classification of collapse pattern, there were 5 possible responses of this test: 4 sub-classes of positive result while one negative result. Positive tests were classified as follows:

1) Mixed type: Heart rate reduced when syncope develops, but doesn't fall <40bpm for <10sec. BP reduced before heart rate decreased.

2) Cardio-inhibitory type:

Type IIA: Cardio-inhibition developed without asystole when heart rate reduced to the ventricular rate <40bpm for >10sec but without asystole of 3 sec or more. The BP drops before reduction in heart rate.

Type IIB: Cardio-inhibition developed with asystole for >3sec. Heart rate reduced corresponding to or following the reduction in blood pressure.

3) Type of Vasodepressor: Heart rate does not fall >10% from the peak value at time of syncope.

Outcome of HUTT was noted on proforma, designed for the study. Positive and negative HUTT, response and phases were recorded. SPSS v. 18, was used for data analyses. The categorical variables were calculated as frequency and percentage. The continuous variables were calculated as mean and standard deviation.

RESULTS

A total of 64 patients underwent HUTT in this study. The mean age of patients was 63.39±6.94 years. There were 51 (79.7%) male while 13 (20.3%) were females. HUTT was found to be positive in 37 (57.8%) patients while 27 (42.2%) patients had negative HUTT. Mixed HUTT response was observed in 18 (48.6%) patients, cardio-inhibitory response in 8 (21.6%) patients while vaso-depressive response in 11 (17.2%) patients. Active HUTT phase was observed in 30 (81.1%) patients while 7 (18.9%) patients had passive HUTT phase. (Table 1)

Data was stratified for age of patients. HUTT was found to be positive in 37 (57.8%) patients, out of which 15 (50%) were aged ≤60 years and 22 (64.7%) were aged >60 years while 27 (42.2%) patients had negative HUTT, out of which 15 (50%) were aged ≤60years and 12 (35.3%) were aged >60 years. The difference was insignificant (p>0.05). Mixed HUTT response was observed in 18 (48.6%) patients, out of which 9 (60%) were aged ≤60 years and 9 (40.9%) were aged >60 years, cardio-inhibitory response was observed in 8 (21.6%) patients, out of which 2 (13.3%) were aged ≤60 years and 6 (27.3%) were aged >60 years while vasodepressive response in 11 (17.2%) patients, out of which 4 (26.7%) were aged ≤60 years and 7 (31.8%) were aged >60 years. The difference was insignificant (p>0.05). Active HUTT phase was observed in 30 (81.1%) patients, out of which 12 (80.0%) were aged ≤60 years and 18 (81.8%) were aged >60 years while 7 (18.9%) patients had passive HUTT phase out of which 3 (20.0%) were aged≤60 years and 4 (18.2%) were aged >60 years. The difference was insignificant (p>0.05). (Table 2)

Data was stratified for gender of patients. HUTT was found to be positive in 37 (57.8%) patients, out of which 31 (61.8%) males and 6 (46.2%) females while 27 (42.2%) patients had negative HUTT, out of which 20 (39.2%) were male and 7 (53.8%) were females. The difference was insignificant (p>0.05). Mixed HUTT

response was observed in 18 (48.6%) patients, out of which 14 (45.2%) were male and 4 (66.7%) were females, cardio-inhibitory repose was observed in 8 (21.6%) patients, out of which 7 (22.6%) were male and 1 (16.7%) was female while vasodepressive response in 11 (17.2%) patients, out of which 10 (32.3%) were male and 1 (16.7%) were female. The difference was insignificant ($p>0.05$). Active HUTT phase was observed in 30 (81.1%) patients, out of which 24 (77.4%) were male and 6 (100%) were female while 7 (18.9%) patients had passive HUTT phase out of which 7 (22.6%) were male and 0 (0%) were female. The difference was insignificant ($p>0.05$). (Table 3)

Table 1: Demographic Variables of Study Population (n=64)

Variables	Frequency (n)	Percentage (%)
Age (years)	63.39±6.94	
Gender		
Male	51	79.7
Female	13	20.3
HUTT		
Positive	37	57.8
Negative	27	42.2
Response in HUTT (+)		
Mixed	18	48.6
Cardio inhibitory	8	21.6
Vasodepressive	11	17.2
Phase in HUTT (+)		
Active	30	81.1
Passive	7	18.9

Table 2: Comparison between both age strata regarding HUTT findings (n=64)

Outcome	Age		P-value
	≤60years	>60years	
n	30 (46.9%)	34 (53.1%)	
HUTT			
Positive	15 (50%)	22 (64.7%)	0.235
Negative	15 (50%)	12 (35.3%)	
Response in HUTT (+)			
Mixed	9 (60%)	9 (40.9%)	0.461
Cardio inhibitory	2 (13.3%)	6 (27.3%)	
Vasodepressive	4 (26.7%)	7 (31.8%)	
Phase in HUTT (+)			
Active	12 (80.0%)	18 (81.8%)	0.890
Passive	3 (20.0%)	4 (18.2%)	

Table 3: Comparison Between Both Age Strata Regarding HUTT findings (n=64)

Outcome	Gender		P-value
	Male	Female	
n	51 (79.7%)	13 (20.3%)	
HUTT			
Positive	31 (61.8%)	6 (46.2%)	0.340
Negative	20 (39.2%)	7 (53.8%)	
Response in HUTT (+)			
Mixed	14 (45.2%)	4 (66.7%)	0.616
Cardio inhibitory	7 (22.6%)	1 (16.7%)	
Vasodepressive	10 (32.3%)	1 (16.7%)	
Phase in HUTT (+)			
Active	24 (77.4%)	6 (100%)	0.470
Passive	7 (22.6%)	0 (0%)	

DISCUSSION

In our study, we recruited 64 patients having unexplained syncope. HUTT was applied and 57.8% patents were found to have positive HUTT. HUTT response was higher in age>60years, although the difference was insignificant. Also, there was no significant effect of gender on type of syncope and HUTT responses. Earlier, it was noticed that aging was controversially related to HUTT responses. Previously, syncope was believed as common condition in young adults, especially females. Increasing age and sex showed no association with positive response of HUTT.[10]

Whereas literature showed that cardio-inhibitory or mixed type of syncope occurs more frequently among young adults while vasodepressor syncope in the older ones, which was almost as similar as reported in our study.[11-12] While few studies did not found the age as the prognostic variable.[13] One of the most possible phenomena for age-dependent HUTT response can be low body negative pressure in older people than younger people, reduced movement of thoracic blood in lower peripheries.[14]

Furthermore, older people have the reduced control of low-frequency arrhythmias in response to orthostatic pressure.[15-16] In our study, the higher rate of vasodepressor response in old people may also imitate the inability of older heart and peripheral nervous system to make proper adjustment in heart beat to reimburse for HUTT induced stress.[17-20] Furthermore, Verheyden et al., proposed that age related differences of positive vasovagal HUTT episode depend on extent of underlying bradycardic reaction.[21] In our study, the 42.1% negative HUTT rate is not comparable to the rate reported in previous trials.[22-25] This may be because of racial or procedural differences. Also, few studies applied only passive HUTT, deprived of pharmacological aggravation. However, aging influenced the type of response significantly, and this was as similar as reported in our study.[23]

But, the specificity of HUTT ranges from 86-100%, with more notorious sensitivity in several trials.[26-28] Alternatively, in our study, the rate of cardio-inhibitory response of HUTT was gradually reduced from young ones to older ones. In other words, the rate of vasodepressor syncope raised with increasing age has been found in this study, which was as similar as reported in previous studies.[23,29,30]

The results of this study are noteworthy, as it help to provide the better vision for evaluation and management of the syncope for every age. There is a need to implement HUTT in OPD or emergency basis in order to evaluate and manage patients accordingly. But this study also had some limitations. Few parameters could not be studied as they were not routinely verified at the baseline presentation. Sample size was small and as patients were referred cases. So proper follow-up could not be established.

CONCLUSION

Thus the frequency of positive HUTT is high in unexplained syncope patients. Now in future, we can recommend to use HUTT for unexplained syncope patients for better prognosis and outcome. Also age and gender are not found to have any impact on HUTT findings. This showed that HUTT can be applied in any age and in both genders keeping in mind equal efficiency of test. Thus the HUTT is a valuable diagnostic tool for vasovagal syncope in all age and sex groups.

REFERENCES

1. Moya A, Sutton R, Ammirati F, Blanc J-J, Brignole M, Dahm JB, et al. Guidelines: Guidelines for the diagnosis and management of syncope (version 2009): The Task Force for the Diagnosis and Management of Syncope of the European Society of Cardiology (ESC). European heart journal 2009;30(21):2631.
2. Alboni P, Brignole M, Menozzi C, Raviele A, Del Rosso A, Dinelli M, et al. Diagnostic value of history in patients with syncope with or without heart disease. Journal of the American College of Cardiology 2001;37(7):1921-8.

3. Nordkamp LRO, van Dijk N, Ganzeboom KS, Reitsma JB, Luitse JS, Dekker LR, et al. Syncope prevalence in the ED compared to general practice and population: a strong selection process. The American journal of emergency medicine 2009;27(3):271-9.
4. Parry SW, Reeve P, Lawson J, Shaw FE, Davison J, Norton M, et al. The Newcastle protocols 2008: an update on head-up tilt table testing and the management of vasovagal syncope and related disorders. Heart 2009;95(5):416-20.
5. Parry SW, Tan MP. An approach to the evaluation and management of syncope in adults. Bmj 2010;340:c880.
6. Saedi S, Oraii S, Hajsheikholeslami F. A cross sectional study on prevalence and etiology of syncope in Tehran. Acta Med Iran 2013;51(10):715-9.
7. Bloomfield D, Maurer M, Bigger Jr JT. Effects of age on outcome of tilt-table testing. The American journal of cardiology 1999;83(7):1055-8.
8. Shafiee A, van Bodegom D. The necessity for research on the elderly in Iran. The Journal of Tehran University Heart Center 2012;7(1):40-.
9. Sandhu KS, Khan P, Panting J, Nadar S. Tilt-table test: its role in modern practice. Clinical Medicine 2013;13(3):227-32.
10. Day SC, Cook EF, Funkenstein H, Goldman L. Evaluation and outcome of emergency room patients with transient loss of consciousness. The American journal of medicine 1982;73(1):15-23.
11. Kochiadakis GE, Papadimitriou EA, Marketou ME, Chrysostomakis SI, Simantirakis EN, Vardas PE. Autonomic nervous system changes in vasovagal syncope: is there any difference between young and older patients? Pacing and clinical electrophysiology 2004;27(10):1371-7.
12. Kazemi B, Haghjoo M, Arya A, SADR AMELI MA. Predictors of Response to the Head Up Tilt Test in Patients with Unexplained Syncope or Presyncope. Pacing and clinical electrophysiology 2006;29(8):846-51.
13. Grubb BP, Temesy-Armos P, Hahn H, Elliott L. Utility of upright tilt-table testing in the evaluation and management of syncope of unknown origin. The American journal of medicine 1991;90(1):6-10.
14. EBERT TJ, HUGHES CV, TRISTANI FE, BARNEY JA, SMITH JJ. Effect of age and coronary heart disease on the circulatory responses to graded lower body negative pressure. Cardiovascular Research 1982;16(11):663-9.
15. Lipsitz LA, Mietus J, Moody GB, Goldberger AL. Spectral characteristics of heart rate variability before and during postural tilt. Relations to aging and risk of syncope. Circulation 1990;81(6):1803-10.
16. Simpson DM, Wicks R. Spectral analysis of heart rate indicates reduced baroreceptor-related heart rate variability in elderly persons. Journal of Gerontology 1988;43(1):M21-M4.
17. Pfeifer MA, Weinberg CR, Cook D, Best JD, Reenan A, Halter JB. Differential changes of autonomic nervous system function with age in man. The American journal of medicine 1983;75(2):249-58.
18. Korkushko O, Shatilo V, Plachinda YI, ShatiloShatilo T. Autonomic control of cardiac chronotropic function in man as a function of age: assessment by power spectral analysis of heart rate variability. Journal of the autonomic nervous system 1991;32(3):191-8.
19. Ziegler D, Laux G, Dannehl K, Spüler M, Mühlen H, Mayer P, et al. Assessment of cardiovascular autonomic function: age related normal ranges and reproducibility of spectral analysis, vector analysis, and standard tests of heart rate variation and blood pressure responses. Diabetic Medicine 1992;9(2):166-75.
20. Matsukawa T, Sugiyama Y, Mano T. Age-related changes in baroreflex control of heart rate and sympathetic nerve activity in healthy humans. Journal of the autonomic nervous system 1996;60(3):209-12.
21. Verheyden B, Gisolf J, Beckers F, Karemaker JM, Wesseling KH, Aubert AE, et al. Impact of age on the vasovagal response provoked by sublingual nitroglycerine in routine tilt testing. Clinical Science 2007;113(7):329-37.
22. Asensio E, Oseguera J, Lorı a A, Gómez Ma, Narváez R, Dorantes J, et al. Clinical findings as predictors of positivity of head-up tilt table test in neurocardiogenic syncope. Archives of medical research 2003;34(4):287-91.
23. McGavigan AD, Hood S. The influence of sex and age on response to head up tilt table testing in patients with recurrent syncope. Age and ageing 2001;30(4):295-8.
24. Oh JH, Kim JS, Kwon HC, Hong KP, PARK JE, Seo JD, et al. Predictors of positive head up tilt test in patients with suspected neurocardiogenic syncope or presyncope. Pacing and clinical electrophysiology 2003;26(2p1):593-8.
25. Guaraldi P, Calandra-Buonaura G, Terlizzi R, Cecere A, Solieri L, Barletta G, et al. Tilt-induced cardioinhibitory syncope: a follow-up study in 16 patients. Clinical Autonomic Research 2012;22(3):155-60.
26. Brignole M, Alboni P, Benditt D, Bergfeldt L, Blanc J, Bloch Thomsen P, et al. Guidelines on management (diagnosis and treatment) of syncope. European heart journal 2001;22(15):1256-306.
27. Benditt DG, Ferguson DW, Grubb BP, Kapoor WN, Kugler J, Lerman BB, et al. Tilt table testing for assessing syncope. Journal of the American College of Cardiology 1996;28(1):263-75.
28. Brignole M, Menozzi C, Gianfranchi L, Oddone D, Lolli G, Bertulla A. Carotid sinus massage, eyeball compression, and head-up tilt test in patients with syncope of uncertain origin and in healthy control subjects. American heart journal 1991;122(6):1644-51.
29. Kurbaan AS, Bowker TJ, Wijesekera N, Franzén A-C, Heaven D, Itty S, et al. Age and hemodynamic responses to tilt testing in those with syncope of unknown origin. Journal of the American College of Cardiology 2003;41(6):1004-7.
30. Schroeder C, Tank J, Heusser K, Diedrich A, Luft FC, Jordan J. Physiological phenomenology of neurally-mediated syncope with management implications. PloS one 2011;6(10):e26489