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Physiological determinant of health and disease in executive health check-up

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Abstract: *Background:* Early detection of the disease in its latent phase through executive health checkup facilitates timely therapeutic interventions, thereby significantly reducing the associated morbidity, mortality and economic burden. *Objectives:* To evaluate the physiological determinants of health and disease in executive health checkup. *Methods:* In this hospital-based, cross-sectional study, a total of 768 individuals aged >20 years, irrespective of their gender, reporting for an executive health check-up were included. Demographic parameters, radiological examinations and psychological wellbeing score were evaluated and compared. Data were analyzed using statistical software R version 3.6.3. *Results:* The study consisted of 768 patients (515 males and 253 females) and majority of them were aged >40 years, almost 75%. No significant difference was found between demographic variables and mean psychological wellbeing scores, environmental mastery and personal growth (P>0.05). A significant association was found between age and findings of ECT and TMT (P=0.001), between gender and findings of TMT (P=0.01). No positive relation was found between sub-categories of demographic variables with respect to psychological wellbeing. A significant difference was found only between different classes of socioeconomic status with respect to self-acceptance and purpose in life (P=0.08). *Conclusion:* Age and gender associated abnormal ECG and TMT findings are common physiological determinants found in this study. Executive checkups are integral to health promotion, especially in the current scenario of silent killer diseases; preventive health services reduce eventual demand for medical care, thus, enhancing the economic efficiency.

Keywords: Health, Disease, Demography, Preventive health services, Health promotion

Introduction

Health, according to the World Health Organization (WHO), is defined as a condition of complete physical, mental, and social well-being, rather than simply the absence of sickness or infirmity. Any deviation from this state of health is referred to as disease [1]. However, as a result of today's lifestyle, eating habits, lack of exercise, stress, and neglect, the risk of various diseases such as diabetes, hypertension, dyslipidemia, coronary artery disease, and cancer has skyrocketed [2-3].

Early detection of the disease in its latent phase facilitates timely therapeutic interventions, thereby significantly reducing the associated morbidity, mortality and economic burden. It also emphasizes prevention is better than cure [3-4]. Preventive health check-ups (PHC) have widely been adopted by many healthcare centers towards this goal which is also well supported by awareness among population [5]. Periodic health examinations also provide opportunities to review patients' ongoing medical issues, counsel them on preventive health and improve the physician-patient relationship [6]. Furthermore, due to a reduction in cardiovascular risk factors and prompt coronary heart disease (CHD) care, modeling analyses have revealed a considerable decrease in mortality related with CHD [7-9].

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However, there is uncertainty among the public as well as the healthcare professionals regarding the effectiveness and the feasibility of utilizing these services in a beneficial, judicious and cost-effective manner [10]. This concern has been countered by other researchers who reported higher mortality rates in the absence of regular PHC and increased survival in cases of routine PHC [10-11]. They also assert that preventive health services reduce eventual demand for medical care, thus, enhancing the economic efficiency [11].

Therefore, PHCs are integral to health promotion, especially in the current scenario of silent killer diseases [12]. Previous studies have evaluated various PHC parameters independently, correlating them to risk of various diseases and conditions. The need for a holistic PHC protocol motivated the designing of the present research that aimed to evaluate the physiological determinants of health and disease in executive health checkup, as well as to employ them for encouraging people to utilize preventive health services.

Material and Methods

This hospital-based, cross-sectional study was conducted at a tertiary care hospital in Belagavi, Karnataka, India, from July 2019 to January 2020, after obtaining ethical clearance from the Institutional Review Board. The minimum sample size required was calculated to be 664, based on a study by Ramesh et al, who found the prevalence of hypertension to be 52%, using the following formula [13].

$$n= (Z^2 x P^Q)/d^2$$

Z= standard normal variables (99% confidence)= 2.25;
P= prevalence = 52%;
Q=100-P = 100 - 52= 48%;
d= acceptable errors= 5%

Accordingly, the study enrolled 768individuals aged >20 years, irrespective of their gender, reporting for an executive health check-up to the afore-mentioned hospital, after obtaining written informed consent from them.Individuals with age <20 years, pre-existing disease or condition, and lack of will to participate in the study were excluded. The following parameters were recorded from all the participants and compared with psychological well-being [14].

Demographic determinants: A detailed history was recorded from all participants including demographic parameters, such as age, gender, social history (alcoholism and/or smoking habit), type of family, diet and socioeconomic status (SES).

Radiological determinants: All participants underwentradiological examination including chest x-ray (CXR), ultrasonography (USG), electrocardiography (ECG), treadmill stress test (TMT), and echocardiography (ECHO).

Statistical analysis: Data were compiled and analyzed using statistical software R version 3.6.3. Categorical variables were presented in the form of frequency table. Continuous variables were presented in mean ± SD form. Comparison of means was done using t-test or analysis of variance (ANOVA). The dependency between categorical variables was tested using Chi-square test. A *P*-value <0.05 was considered statistically significant.

Results

The study consisted of 768 patients (515 males and 253 females) and majority of them were aged >40 years, almost 75%. Table-1 depicts distribution of patients based on various baseline demographic characteristics and radiological findings. Mean psychological wellbeing scores and their components were compared with various demographic variables (Table 2); no significant difference was found between demographic variables and mean psychological wellbeing scores (*P*>0.05). Similarly, no significant difference was found between demographic variables and environmental mastery and personal growth (Table 3).

Table 4 presents the association of findings of ECT and TMT based on demographics; a significant association was found between age and findings of ECT and TMT, between gender and findings of TMT. No positive relation was found between sub-categories of demographic variables with respect to psychological wellbeing. A significant difference was found only between different classes of socioeconomic status with respect to self-acceptance and purpose in life (*P* = 0.08).

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Table-1: Baseline demographics and other various study parameters			
Variable category	**Variable**	**Sub-category**	**Number of participants (n=768); n (%)**
Demographics	Age (years)	20-29	42 (5.5%)
		30-39	145 (18.9%)
		40-49	239 (31.1%)
		50-59	207 (26.9%)
		≥ 60	135 (17.6%)
	Gender	Male	515 (67.1%)
		Female	253 (32.9%)
	Social history	Nil	384 (50%)
		Alcohol	77 (10.1%)
		Smoking	77 (10.1%)
		Both	230 (29.6%)
	Type of family	Joint	538 (70.1%)
		Nuclear	230 (29.9%)
	Diet	Vegetarian	88 (11.5%)
		Mixed	680 (88.5%)
Radiological findings	X-Ray chest	Normal	741 (96.5%)
		Abnormal	27 (3.5%)
	Ultrasonography	WNL	574 (74.7%)
		Others	194 (25.3%)
	Electrocardiography	Normal	746 (97.1%)
		Abnormal	22 (2.9%)
	Treadmill stress test	Not conducted	264 (34.4%)
		Negative	459 (59.8%)
		Positive	45 (5.9%)
	Echocardiography	Not conducted	511 (66.5%)
		EF60	234 (30.5%)
		EF50	2 (0.3%)
		EF45	4 (0.5%)
		EF40	17 (2.2%)

Table-2: Comparison of demographics with mean psychological wellbeing scores and their components					
		Overall		**Autonomy**	
		Score (mean ± SD)	***P****	**Score (mean ± SD)**	***P****
Gender	Male	65.75 ± 21.2	0.8	9.93 ± 4.08	0.90
	Female	66.01 ± 21.73		9.96 ± 4.08	
Age group (years)	20-29	69.52 ± 24.19	0.65	10.61 ± 4.5	0.52
	30-39	64.34 ± 19.93		9.85 ± 3.91	
	40-49	66.46 ± 21.43		10.05 ± 4.12	
	50-59	65.82 ± 21.67		10 ± 4.21	
	≥60	65.03 ± 21.32		9.45 ± 3.78	
Social history	Nil	65.86 ± 21.34	0.99	9.94 ± 4.09	0.99
	Smoking	66.03 ± 20.97		9.84 ± 4.03	
	Alcohol	65.26 ± 21.2		9.9 ± 3.97	
	Both	65.92 ± 21.71		9.98 ± 4.13	
Type of family	Nuclear	65.87 ± 21.3	0.97	9.9 ± 4.09	0.87
	Joint	65.82 ± 21.41		9.96 ± 4.08	
Socioeconomic status	Class I	68.83 ± 23.53	0.64	10.48 ± 4.39	0.67
	Class II	65.73 ± 21.28		9.92 ± 4.06	
	Class III	65.18 ± 21.06		9.81 ± 4.07	
Diet	Vegetarian	65.59 ± 19.84	0.91	9.88 ± 3.6	0.87
	Mixed	65.86 ± 21.57		9.95 ± 4.14	
	Total	65.83 ± 21.36		9.94 ± 4.08	

**Paired t-test*

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Table-3: Distribution of environmental mastery and personal growth based on demographics						
	Environmental mastery			Personal growth		
	Demographics	Psychological well-being	*P**	Psychological well-being	*P**
Gender	Male	10.52 ± 5.34	0.95	10.47 ± 5.1	0.71
	Female	10.5 ± 5.35		10.62 ± 5.37	
Age group (years)	20-29	11.65 ± 5.45	0.56	11.11 ± 5.61	0.74
	30-39	10.14 ± 5.21		10.21 ± 4.89	
	40-49	10.63 ± 5.47		10.75 ± 5.16	
	50-59	10.42 ± 5.24		10.51 ± 5.24	
	≥60	10.48 ± 5.39		10.24 ± 5.4	
Social history	Nil	10.51 ± 5.32	0.98	10.53 ± 5.18	0.99
	Smoking	10.65 ± 5.36		10.52 ± 5.08	
	Alcohol	10.35 ± 5.44		10.42 ± 5.23	
	Both	10.53 ± 5.36		10.53 ± 5.26	
Type of family	Nuclear	10.55 ± 5.34	0.89	10.48 ± 5.13	0.89
	Joint	10.5 ± 5.34		10.54 ± 5.22	
Socioeconomic status	Class I	10.15 ± 5.75	0.73	11.8 ± 5.78	0.27
	Class II	10.58 ± 5.31		10.46 ± 5.15	
	Class III	10.16±5.36		10.39 ± 5.19	
Diet	Vegetarian	10.26 ± 5.18	0.63	10.68 ± 5.03	0.75
	Mixed	10.55 ± 5.36		10.5 ± 5.21	
	Total	10.51 ± 5.34		10.52 ± 5.19	
**Paired t-test*						

Table-4: Association of electrocardiography and treadmill stress test based on demographics									
Demographics		Electrocardiography					Treadmill stress test		
		Normal		Abnormal		*P**	Positive	Negative	*P**
		N	%	N	%				
Gender	Male	500	97.09	15	2.91	0.90	154	332	0.01
	Female	246	97.23	7	2.77		110	127	
Age groups (years)	20-29	46	100.0	0	0.00	0.001	24	22	0.001
	30-39	142	97.93	3	2.07		39	97	
	40-49	231	98.30	4	1.70		58	172	
	50-59	219	98.21	4	1.79		82	132	
	≥60	108	90.76	11	9.24		61	36	
Social history	Nil	377	98.18	7	1.82	0.30	140	224	0.60
	Smoking	74	96.10	3	3.90		22	49	
	Alcohol	73	94.81	4	5.19		27	43	
	Both	222	96.52	8	3.48		75	143	
Type of family	Nuclear	222	96.52	8	3.48	0.50	78	137	0.87
	Joint	524	97.40	14	2.60		186	322	
Socio-economic status	Class I	39	97.50	1	2.50	0.13	14	24	0.86
	Class II	635	97.54	16	2.46		226	385	
	Class III	72	93.51	5	6.49		24	50	
Diet	Veg	87	98.86	1	1.14	0.30	32	47	0.13
	Mixed	659	96.91	21	3.09		232	412	
**Chi-square*									

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Discussion

In this cross-sectional study on executive health checkup data, physiological determinants of health and disease have been evaluated, as well as their application for encouraging people to utilize preventive health services. Executive health checkup program has become increasingly clear, however, that the mere establishment of a diagnosis may be of little real benefit to a patient. Reviews of executive health programs have been generally favorable, but this has been based on listing many new diagnoses. Findings of the current study are concordance in general with the established literature [15].

In the current study, no significant difference was found between demographic variables and mean psychological wellbeing scores. However, abnormal ECG findings and positive TMT were found in 2.9% and 5.9% executives, respectively. In contrast to current study findings, previous studies have reported emotional illness as common finding [15-16]. Almost, 40% of executives have poor health habits including diet, smoking, and alcohol consumption. Nonetheless, the discovery of cardiovascular findings and other diseases, combined with the changing of poor health habits in some, allows to feel that the overall results would be beneficial [15].

Carryer et al also reported the same after evaluating findings of 2,812 examinations on 569 executives over 24 years at the Mayo Clinic [17]. In a Kaiser-Permanente health plan, two large cohorts of middle-aged executives were followed-up for seven to eleven years. Executives having regular health checkups had less "potentially postponable" causes of death, such as hypertension, cancer, and stroke when compared to controls [15, 18].

In the present study, no significant difference was found between demographic variables and environmental mastery and personal growth, whereas a significant association was found between age and findings of ECT and TMT, between gender and findings of TMT as well. Supportively, all earlier studies have reported that aging is particularly susceptible to cardiovascular disease (CVD) and this risk is compounded by additional factors, such as smoking, alcohol abuse, and obesity [19].

However, there is evidence that good habits promote health and allow patients to feel better. Though Burnam et al reported that only 10% to 30% of those with self-destructive habits, such as smoking, alcoholism, and overeating can change, at least an initiative can be made via the regular examination. Many organizations have been satisfied with health executive program that will lead to less future morbidity and mortality [15, 20].

However, this study has its own limitations. Firstly, we did not compare executives with controls. Secondly, we did not include laboratory screening tests. Future studies on executive health checkup data by considering these points also would be encouraged.

Conclusion

Age and gender associated abnormal ECG and TMT findings are common physiological determinants found in this study. Executive checkups are integral to health promotion, especially in the current scenario of silent killer diseases; preventive health services reduce eventual demand for medical care, thus, enhancing the economic efficiency.

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References

1. Constitution of the World Health Organization. In: World Health Organization: Basic documents. 45th ed. Geneva: *World Health Organization;* 2005. Retrieved from: *Microsoft Word - A58_DIV2-en.doc (who.int)*
2. Boyd KM. Disease, illness, sickness, health, healing and wholeness: exploring some elusive concepts. *Med Humanit.* 2000; 26(1):9-17.
3. Ford ES, Zhao G, Tsai J, Li C. Low-risk lifestyle behaviors and all-cause mortality: findings from the National Health and Nutrition Examination Survey III Mortality Study. *Am J Public Health.* 2011; 101:1922-1929.
4. Reeves MJ, Rafferty AP. Healthy lifestyle characteristics among adults in the United States, 2000. *Arch Intern Med.* 2005; 165:854-857.

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5. Danaei G, Ding EL, Mozaffarian D, Taylor B, Rehm J, Murray CJ et al. The preventable causes of death in the United States: comparative risk assessment of dietary, lifestyle, and metabolic risk factors. *PLoS Med.* 2009; 6(4):e1000058.
6. Mokdad AH, Marks JS, Stroup DF, Gerberding JL. Actual Causes of Death in the United States, 2000. *JAMA*. 2004; 291(10):1238-1245.
7. Prochazka AV, Lundahl K, Pearson W, Oboler SK, Anderson RJ. Support of evidence-based guidelines for the annual physical examination: a survey of primary care providers. *Arch Intern Med.*2005; 165(12):1347-1352.
8. Björck L, Rosengren A, Bennett K, Lappas G, Capewell S. Modelling the decreasing coronary heart disease mortality in Sweden between 1986 and 2002. *Eur Heart J.* 2009; 30(9):1046-1056.
9. Ford ES, Ajani UA, Croft JB, Critchley JA, Labarthe DR, Kottke TE et al. Explaining the decreasein U.S. deaths from coronary disease, 1980-2000. *N Engl J Med.* 2007; 356(23):2388-2398.
10. Nakanishi N, Tatara K, Tatatorige T, Murakami S, Shinsho F. Effects of preventive health services on survival of the elderly living in a community in Osaka, Japan. *J Epidemiol Community Health.* 1997; 51:199-204.
11. Nakanishi N, Tatara K, Fujiwara H. Do preventive health services reduce eventual demand for medical care?. *Soc Sci Med.* 1996; 43(6):999-1005.
12. de Hollander AEM, Hoeymans N, Melse JM, van Oers JAM, Polder JJ, eds. Care for health. The 2006 Dutch Public Health Status and Forecasts Report. Bilthoven, The Netherlands: RIVM Report, *National Institute for Public Health and the Environment;* 2007.
13. Ramesh R, Yuri Gagarin P, Senthil Murugan R, Rizwan SA, Virgin Joena M, Aravind A. A study on the utility of preventive health check-up in early detection of disease states. *Int J Res Med Sci.* 2016; 4(9):4022-4025.
14. Ottenbacher ME, Kuo YF, Ostir GV. Test-retest reliability of a psychological well-being scale in hospitalized older adults. *Aging Clin Exp Res.* 2007; 19(5):424-429.
15. Babb RR. An evaluation of the executive health examination. *West J Med.* 1980; 133(3):260-263.
16. Prickman LE, Koelscke GA, Berkman JM et al. Does the executive health program meet its objective? *JAMA.*1958; 167:1451-1455.
17. Carryer HM, Randall RV, Mankin RT, et al. Executive health examination. *Mayo Clin Proc.* 1971; 46:742-746.
18. Dales LG, Friedman GD, Collen MF: Evaluating periodic multiphasic health checkups: A controlled trial. *J Chronic Dis.*1979; 32:385-404.
19. Rodgers JL, Jones J, Bolleddu SI, Vanthenapalli S, Rodgers LE, Shah K, Karia K, Panguluri SK. Cardiovascular Risks Associated with Gender and Aging. *J Cardiovasc Dev Dis.* 2019; 6(2):19.
20. Burnam JF. Outlook for treating patients with self-destructive habits. *Ann Intern Med.*1974; 81:387-392.

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