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Assessment Of Resting Heart Rate And Its Association With Lifestyle Risk Factors Among Young Adults In A Tertiary Care Hospital: A Cross-Sectional Study

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Abstract

Resting heart rate (RHR) is a commonly used clinical marker of cardiovascular function and autonomic nervous system balance. It's a measure of the balance of sympathetic and parasympathetic activity and is believed to be a simple measure of overall cardiovascular health (1). The elevated resting heart rate has been increasingly recognised as an independent predictor of cardiovascular morbidity and mortality in healthy and diseased subjects (2).

Lifestyle risk factors like physical inactivity, unhealthy dietary habits, tobacco use, alcohol consumption, poor sleep quality, and psychological stress have been suggested to be associated with autonomic regulation and increased resting heart rate (3). Young adults are increasingly experiencing these behavioural risk factors, driven by academic pressure, reliance on digital technology and sedentary lifestyle (4). Prolonged exposure to these elements might lead to early autonomic imbalance and increased cardiovascular risk even in apparently healthy subjects (5).

Introduction

Resting heart rate (RHR) is a commonly used clinical marker of cardiovascular function and autonomic nervous system balance. It's a measure of the balance of sympathetic and parasympathetic activity and is believed to be a simple measure of overall cardiovascular health (1). The elevated resting heart rate has been increasingly recognised as an independent predictor of cardiovascular morbidity and mortality in healthy and diseased subjects (2).

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suggested to be associated with autonomic regulation and increased resting heart rate (3). Young adults are increasingly experiencing these behavioural risk factors, driven by academic pressure, reliance on digital technology and sedentary lifestyle (4). Prolonged exposure to these elements might lead to early autonomic imbalance and increased cardiovascular risk even in apparently healthy subjects (5).

Young adults are a key population for early screening as lifestyle behaviours started at this time are often carried into later life (6). There is growing global evidence of increasing sedentary behaviour and decreasing levels of physical activity in youth which significantly contributes to the future burden of non-communicable diseases (7). Early identification of physiological markers such as increased resting heart rate can facilitate prevention of long-term cardiovascular sequelae through timely intervention (8).

Resting heart rate is a clinically useful measure, but it is not routinely emphasised in preventive health screening, especially in asymptomatic young people. The study of a diverse population in a tertiary care hospital setting and its association with lifestyle risk factors gives us an insight into the modifiable determinants of cardiovascular health (9).

METHODOLOGY:

STUDY DESIGN

A cross-sectional study was conducted among young adults attending a tertiary care hospital in Peshawar. The main objective of the study was to assess resting heart rate and its association with lifestyle risk factors including physical activity, dietary habits, sleep pattern, tobacco use, and alcohol consumption. The study included participants aged 18–30 years who visited the outpatient departments or accompanied patients during the study period.

STUDY SETTING

The study was carried out in a tertiary care teaching hospital in Peshawar, Pakistan. The hospital provides healthcare services to both urban and rural populations, making it suitable for assessing diverse lifestyle patterns and cardiovascular risk factors among young adults.

STUDY DURATION

The study was conducted over a period of three months.

STUDY POPULATION

Young adults aged 18–30 years attending the hospital during the study period were included in the study. Participants who gave consent and were willing to participate were enrolled.

INCLUSION CRITERIA

Young adults aged 18–30 years
Participants who provided written informed consent
Individuals attending outpatient departments or accompanying patients

EXCLUSION CRITERIA

Known cardiovascular disease patients
Individuals on drugs affecting heart rate (beta blockers, etc.)
History of endocrine disorders such as thyroid disease
Unwilling participants

SAMPLE SIZE AND SAMPLING TECHNIQUE

Sample size was calculated using OpenEpi software based on estimated prevalence from previous studies. A convenient sampling technique was used to select participants until the required sample size was achieved.

DATA COLLECTION PROCEDURE

Data was collected using a pre-structured questionnaire. The questionnaire included demographic details and lifestyle-related variables such as physical activity level, smoking status, alcohol intake, sleep duration, and dietary habits.

Resting heart rate was measured in a quiet environment after the participant had rested for at least 10 minutes in a seated position. Measurements were taken using a digital pulse oximeter and confirmed by manual radial pulse method. Two readings were taken and the average was recorded to ensure accuracy.

OPERATIONAL DEFINITIONS

Elevated resting heart rate was defined as >80 beats per minute

Physical inactivity was defined as not meeting WHO recommended physical activity guidelines

Poor sleep was defined as sleep duration less than 6 hours per night

STATISTICAL ANALYSIS

Data was entered and analyzed using statistical software. Descriptive statistics were calculated in the form of mean, standard deviation, frequency, and percentages. Association between resting heart rate and lifestyle factors was analyzed using chi-square test and independent t-test. A p-value of less than 0.05 was considered statistically significant.

ETHICAL CONSIDERATION

Ethical approval was obtained from the Institutional Ethics Committee of the tertiary care hospital in Peshawar. Written informed consent was taken from all participants before data collection. Confidentiality and anonymity of participants were strictly maintained throughout the study.

RESULTS:

Table 1:

Variable	Category	Frequency (n)	Percentage (%)
Age	18–20 years	64	32%
	21–25 years	96	48%
	26–30 years	40	20%
Gender	Male	108	54%
	Female	92	46%
Occupation	Student	124	62%
	Employed	50	25%
	Unemployed	26	13%

TABLE 2:

Lifestyle Factor	Category	Frequency (n)	Percentage (%)
Physical Activity	Active	78	39%
	Inactive	122	61%
Lifestyle Pattern	Sedentary	116	58%

Lifestyle Factor	Category	Frequency (n)	Percentage (%)
	Non-sedentary	84	42%
Diet Pattern	Healthy diet	72	36%
	Unhealthy (fast food frequent)	128	64%
Sleep Quality	≥6 hours	102	51%
	<6 hours	98	49%
Tobacco Use	Yes	44	22%
	No	156	78%
Alcohol Use	Yes	16	8%
	No	184	92%

TABLE 3:

Variable	Category	Mean RHR (bpm)	p-value
Physical Activity	Active	76.2 ± 9.4	
	Inactive	85.8 ± 10.7	0.01*
Sleep Quality	≥6 hours	78.1 ± 9.2	
	<6 hours	86.5 ± 11.3	0.03*
Tobacco Use	Yes	84.9 ± 10.8	
	No	81.7 ± 11.4	0.07
Gender	Male	82.9 ± 11.1	
	Female	81.8 ± 12.0	0.21

DISCUSSION:

The present study was carried out to determine the resting heart rate and its association with lifestyle risk factors in young adults at a tertiary care hospital of Peshawar. The results demonstrated that a high percentage of the participants had elevated resting heart rates. Over half of these were beyond the normal physiological range. The three variables were significantly correlated with each other: physical inactivity, poor sleep quality and higher resting heart rate Tobacco use was also positively, but to a lesser extent.

Resting heart rate (RHR) is increasingly recognised as an independent predictor of cardiovascular morbidity and mortality [11][12]. The resting heart rate has been shown repeatedly in previous studies to be a marker of autonomic imbalance with increased sympathetic and decreased parasympathetic activity and associated with an increased risk of adverse cardiovascular outcomes [11,12]. High resting heart rate has been associated with increased risk of hypertension, ischaemic heart disease and all-cause mortality, even within the normal clinical range [13,14] .

We found a significant association between physical inactivity and increased resting HR. This finding is consistent with large epidemiological studies demonstrating that low levels of physical activity are associated with impaired autonomic regulation and increased cardiovascular risk [15,16]. Regular physical activity protects against cardiovascular disease by increasing parasympathetic tone, improving cardiac efficiency and decreasing resting heart rate [17, 18]. In young adult populations, where sedentary behaviour is becoming more common due to academic pressure and changes in digital lifestyle [19], similar findings have been noted.

Resting heart rate was also significantly associated with sleep duration and sleep quality in this study. Lower sleep duration was associated with higher resting heart rate indicating sympathetic over-activity. Previous studies have demonstrated that sleep deprivation is linked to increased sympathetic nervous system activation,

reduced heart rate variability, and higher cardiovascular risk profiles [20,21]. In addition, chronic sleep deficiency has been associated with increased inflammation and metabolic dysregulation, contributing to cardiovascular burden [22].

Mean resting heart rate was higher among smokers compared with non-smokers, but this was not statistically significant in its association with tobacco use. But there is a large literature showing that nicotine stimulates catecholamine release and raises HR and BP [23, 24]. The low prevalence of smoking in the current sample may explain the weaker statistical association.

The high prevalence of sedentary lifestyle among participants is a manifestation of a global increasing trend of reduced physical activity among young adults. Insufficient physical activity has been reported in international studies [25,26], which is a major modifiable risk factor for non-communicable diseases worldwide. This becomes particularly concerning in young populations as early lifestyle patterns tend to track into adulthood and increase long term cardiovascular risk [27].

Resting heart rate is a simple, inexpensive marker that can be easily incorporated in routine screening from a clinical point of view. It has prognostic value but is underused in preventive health assessments, especially for asymptomatic young people [28]. The current findings reinforce the relevance of lifestyle assessment and resting HR monitoring within early cardiovascular risk stratification strategies.

The study's strengths include its focus on a young adult population in a tertiary care setting and the consideration of multiple lifestyle determinants. Limitations include the cross-sectional design of the study and the lack of causal inference, and the self-reported nature of lifestyle data and potential recall bias.

Overall, the findings indicate that modifiable lifestyle behaviours, specifically physical inactivity and poor sleep, are significantly associated with elevated resting heart rate in young adults. Early recognition and intervention on these factors may help to minimise long-term cardiovascular risk.

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