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RELATIONSHIP OF DISTURBED SLEEP CYCLE AND DIFFERENT METABOLIC DISEASE IN PAKISTAN

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Abstract:

Introduction: *Metabolic syndrome (MetS) is an aggregation of cardiometabolic problems, characterized by a rise in arterial pressure (AP), fasting venous blood glucose (FVBG), plasma triglycerides (PT), abdominal circumference (AC) and reduction in the levels of high density lipoprotein-cholesterol (cholesterol) (HDL-C).* ***Aims and objectives:*** *The basic aim of the study is to find the relationship of sleep cycle and different common metabolic diseases among local population of Pakistan.* ***Methodology of the study:*** *This cross sectional study was conducted at RMC during Dec 2018 to May 2019. The data was collected from both genders, age range from 18 years to 50 years. The evaluation of the socio-demographic data and data on sleep quality, undertaken through a structured questionnaire, took place at times distinct from those of collection of clinical data.* ***Results:*** *Our results shows that the mean age of the sample was 21.5 years (SD±4.5 years). The value of AC was elevated in 5.4% of the students, while only 3.0% of the participants were classified as hypertensive. The prevalence of MetS in the study population was below 2%. We did not identify statistically significant proportional differences between the groups in relation to the prevalence of MetS (p=1.000). However, all the participants with MetS were classified as poor sleepers.* ***Conclusion:*** *It is concluded that sleep quality has direct relationship with metabolic syndromes. Several common sleep problems including insufficient sleep schedules, insomnia, sleep apnea, narcolepsy, and shift work disorder are known to cause sleep deficiencies that likely contribute to metabolic diseases.*

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INTRODUCTION:

Metabolic syndrome (MetS) is an aggregation of cardiometabolic problems, characterized by a rise in arterial pressure (AP), fasting venous blood glucose (FVBG), plasma triglycerides (PT), abdominal circumference (AC) and reduction in the levels of high density lipoprotein-cholesterol (cholesterol) (HDL-C) [1]. This may or may not be accompanied by the use of antidiabetic, antilipemic and anti-hypertensive medications. Today, approximately 40% of North Americans, 30% of Europeans and 20-30% of Asians are affected by MetS, while in Africa and the Middle East, there are publications indicating prevalences of 25% and 20.4% for this metabolic disorder, respectively. In Brazil, general epidemiological data on the prevalence of MetS do not yet exist, although a recent review estimated the prevalence of MetS in Brazil at between 14.9% and 65.3% [2].

MetS is responsible for approximately 7% of deaths worldwide, regardless of cause, as it significantly increases the chances of cardiovascular diseases (CVD), and cerebrovascular diseases, type II diabetes, non-alcoholic hepatic steatosis, cancer and Parkinson's disease [3]. Today, one in five young adults (20-30 years old) will develop MetS, depending on their lifestyles. As a result, 10% of the world population in this age range will be vulnerable to developing the cardiometabolic complications associated with MetS [4].

The prevalence of chronic metabolic disorders such as obesity and Type 2 diabetes (T2D) has increased rapidly over the past 30 years reaching world-wide epidemic proportions. As such, diseases of metabolic dysregulation are now a major public health burden [5]. In parallel with the increased prevalence of obesity and metabolic disorders, nightly sleep duration in the United States has decreased with reports of over 50% of Americans sleeping ≤7 hours/night. Furthermore, U shaped associations between body mass index and sleep duration have been reported. These findings have brought to light the hypothesis that sleep deficiencies may have causal mechanisms contributing, at least in part, to the rapidly increasing prevalence of metabolic disorders [6].

Aims and objectives

The basic aim of the study is to find the relationship of sleep cycle and different common metabolic diseases among local population of Pakistan.

METHODOLOGY OF THE STUDY:

This cross sectional study was conducted at RMC during Dec 2018 to May 2019. The data was collected from both genders, age range from 18 years to 50 years. The evaluation of the socio-demographic data and data on sleep quality, undertaken through a structured questionnaire, took place at times distinct from those of collection of clinical data. In this stage, systolic arterial pressure (SAP), diastolic arterial pressure (DAP) and AC were measured; biochemical data were collected.

Sleep quality was analyzed based on a version of the Pittsburgh Sleep Quality Index (PSQI) validated, translated and adapted to Brazilian standards. The above-mentioned version evidenced a high degree of internal consistency (Cronbach alpha = 0.82) and was demonstrated to be equivalent to its respective original. The university students with scores of over five points were classified as poor sleepers.

In order to estimate the scale of the association, the prevalence of the PSQI and MetS was used as a measure of frequency. As a measure of association, the researchers used the Prevalence Ratio (PR) and its respective confidence intervals at 95%, estimated as a function of the relative risk (RR) of the robust Poisson regression. In all the analyses, a level of significance of p£0.05 was adopted. The associations were adjusted according to age and sex. The indication for use of the robust Poisson regression, in this study, was a result of the high prevalence qualities found in the study population (95.3%).

Statistical analysis

Two-way ANOVA was performed to study the contributions. A chi-square test was used to examine the difference in the distribution of the fracture modes (SPSS 19.0 for Windows, SPSS Inc., USA).

RESULTS:

Our results shows that the mean age of the sample was 21.5 years (SD±4.5 years). The value of AC was elevated in 5.4% of the students, while only 3.0% of the participants were classified as hypertensive. The participation of students using antihypertensive, oral antidiabetic or antilipemic drugs was not detected. The prevalence of poor quality sleep was 95.3%, which made the event studied a common outcome. The prevalence of MetS in the study population was below 2%. We did not identify statistically significant proportional differences between the groups in relation to the prevalence of MetS (p=1.000). However, all the participants with MetS were classified as poor sleepers.

Table 01: Components of metabolic syndrome in relation to sleep quality

Components of Metabolic Syndrome	Good sleepers	Poor sleepers	p-value*
Abdominal Circumference (n=700)			
Normal	30 (91.0)	631 (94.6)	0.421
Raised	3 (9.0)	36 (5.4)	
Triglycerides (n=690)			
Normal	26 (78.7)	505 (76.8)	1.000
Raised	7 (21.3)	152 (23.2)	
HDL-C† (n=690)			
Normal	30 (91.0)	575 (87.5)	0.787
Low	3 (9.0)	82 (12.5)	
Fasting Venous Glycemia (n=691)			
Normal	29 (88)	577 (87.7)	1.000
Raised	4 (12)	81 (12.3)	
Arterial Pressure (n=700)			
Normal	31 (94.0)	611 (91.6)	1.000
Raised	2 (6.0)	56 (8.4)	
Metabolic Syndrome			
No	33 (100.0)	645 (98.3)	1.000
Yes	-	12 (1.7)	

DISCUSSION:

The prevalence of MetS identified was low, while that of poor sleep quality was a common event in the population. It is worth emphasizing that the worldwide prevalence of MetS varies from <10% to up to 84%, depending on the region, the environment (urban or rural), the composition of the population studied (sex, age, race and ethnic group) and on the definition adopted for MetS [7]. In relation to sleep quality, this may diverge as a result of the natural difference there is between biological age and chronological age. Restorative sleep (slow waves) reduces as biological age advances, this process being more harmful when it occurs among younger people [8].

Altering the timing of sleep and wakefulness such that sleep occurs during the daytime and wakefulness occurs at night results in circadian misalignment. One common cause of circadian misalignment is shift work in which shifts occur during the biological night, a time normally reserved for sleeping. Other common causes include insufficient sleep, social jet-lag, and night time light exposure. Circadian misalignment has been shown to alter neuroendocrine physiology with the potential for negative health consequences such as obesity and diabetes. Findings from several studies suggest that circadian misalignment may contribute to impaired glucose tolerance and reduced insulin sensitivity [9]. In studies where meals occur during the biological night, findings show increased glucose or insulin levels.

Research findings have shown that short-term circadian misalignment in humans to elevate postprandial blood glucose levels. These findings likely resulted from reduced pancreatic β-cell compensation or reduced insulin sensitivity. Long-term blood glucose dysregulation from chronic circadian misalignment may be due to differences in the circadian timing of central and peripheral circadian clocks, which has been demonstrated in animals, but has yet to be tested in humans [10]. Findings from a genome wide association study indicate a possible link between circadian rhythm regulation, glucose homeostasis and melatonin signaling in the pancreas, supporting the idea that uncoupling of peripheral circadian clocks may contribute to metabolic dysregulation in humans. Furthermore, altered cortisol secretion relative to the feeding-fasting, wakefulness-sleep cycle during circadian misalignment may contribute to insulin resistance [11].

CONCLUSION:

It is concluded that sleep quality has direct relationship with metabolic syndromes. Several common sleep problems including insufficient sleep schedules, insomnia, sleep apnea, narcolepsy, shift work and shift

work disorder are known to cause sleep deficiencies that likely contribute to metabolic diseases.

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