Section 4. Medical science

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PECULIARITIES OF SLEEP AS POSSIBLE RISK FACTOR OF OVERWEIGHT IN YOUNG PEOPLE

Abstract: The article features the importance of regimen of sleep and its impact on human organism. The relationship between sleep peculiarities and weight changes were pointed out. The mechanisms providing weight gaining are explained. The original research data on weight changes related to peculiarities of sleep are provided. Importance of sleep and working regimen and further prospects of such studies are shown.

Keywords: sleep and working regimen, overweight, obesity, young people, medical students.

Background. During last years the problem of obesity in people of all ages all around the world not only doesn't diminish, but continues to increase, leading to of worsening of health of world population. According to statistics, about 30% of adult people aged 20 years and more have obesity [4, 166]. Potential risk factors that may cause overweight and obesity include various biological and genetic causes, cultural, social and environ-

mental factors [4, 172–173]. Among such risk factors, especially for children and adolescents, many scientific researches consider sleep disorders [1, 137–138]. Studies showed that the probability of overweight and obesity increases twice in children and adolescents with shorter sleep duration [1, 145]. Results of many researches and cross-sectional studies show that around 30–35% of adults suffer from disorders of sleep,

and at least 10% of the population suffers from a sleep disorder that is clinically significant [3, 63]. Furthermore, many of sleep disorders are greatly underdiagnosed by both patients and their doctors [3, 67]. In last decades studies about biological clock of human organism and its influence on processes of substances exchange increase their popularity and importance, focusing especially on carbohydrates and lipid exchange and trying to reveal the connection between sleep disorders and excessive weight problems [6, 132–133; 8, 26–28; 2, 12472]. As the basis of weight increase lies in energy imbalance, i.e. significant difference between intake and expenditure of energy, that is controlled by circadian rhythms of the body, changes of those rhythms provide appearance of weight variations [1, 146]. Setting of biological rhythms is provided by hormones and biological active substances that have daily dynamics based on duration and phases of sleep. Sleep disorder causes disturbance of production of biologically active substances in hypothalamus and epiphysis that leads to changes of exchange processes in young organism [2, 12472; 7, 17; 8, 27]. As young people, and especially students, have excessive psychic and emotional loads together with improper regimen of work and rest in many cases, the interest to this topic arises. There is also a lack of data regarding sleep habits among students in Ukraine, even though quality and quantity of sleep greatly influences concentration ability and memorization that are necessary for academic achievements of students, thus proving the importance of such studies.

The aim of current research was to study the connection between sleep disorders and increase of body weight in students. The tasks set for that aim included determination of category of student with sleep disorders, estimation of peculiarities of their diet, evaluation of dynamics of student physical development during last 3 years, and determination of interrelation of sleep disorders and possible body mass change.

Materials and methods of research. In current study participated 150 students of Kharkiv National Medical University aged 18–22, including 70% of young woman and 30% of young men, all participants gave written consent to take part in research. The survey was made using a questionnaire that included questions about quality and duration of sleep, availability of insomnia or other sleep disorders, esteem of peculiarities of diet. Big attention was paid to time of falling asleep as one of factors influencing production of hormones.

Research results and their discussion. Analysis of results allowed us to divide all examined students into groups according to established manner of lifestyle and habits. 1st group included 25% of young people with well-determined sleep regimen, i.e. falling asleep before 22.00, sleep duration of 7–8 hours, without night awakening episodes and insomnia. Together with sleep regimen, people of 1st group showed strict dieting habits with last intake of food not later than 3 hours before sleep time. As a result, no significant body weight variations were detected in them during last 3 years. Wholly satisfactory level of physical development in persons of 1st group with stability of body weight can be explained by simultaneous established diet habits and sleep regimen, that leads to maintenance of levels of hormones influencing exchange processes.

The 2nd group consisted of 38% of people with significant changes of sleep and dieting characterized by insomnia, night awakening episodes, late falling asleep time (after 1 AM), food intake at night and directly before sleep. The increase of body weight was determined in that group together with worsening of general health state and decreased working ability. Body weight changes may be related to disruption of biological rhythms as during some particular phases of sleep hormones leptin and ghrelin are produced that have antagonistic effect on centers of hunger and satiety in hypothalamus [6, 132–133; 2, 12472]. In people with sleep disorders the increase of ghrelin level and decreased leptin production is determined

that causes overeating and body weight increase [7, 17]. Moreover, thyroid stimulating hormone (TSH) also obeys circadian rhythms with peak production in the evening between 23.00 and 04.00. Therefore, late falling asleep time causes decreased TSH secretion leading to disorder of basal metabolism, decrease of lipolysis and activation of lipogenesis [5, 13–15; 7, 17]. Sleep disorders and further decrease of hormones secretion together with improper dieting becomes the base of significant body weight increase during examined 3 years.

The other 37% of examined people who have balanced diet, however, disturbed sleeping regimen, constituted 3rd group. Excessive load and time deficiency due to studying process make persons of that group to sleep for 4–5 hours per day and change their falling asleep time to later hour, thus causing feeling of fatigue and sleepiness during the day. Furthermore, even though there is strict control of feeding habits in people of 3rd group, the increase of weight still occurs. That fact proves the theory of direct connection existing between sleep disorders and continuing body mass increase in students. Massive researches of last decade showed that decrease of sleep duration by 1 hour causes increase of body mass index on 0.35 kg/m²

[8, 30–31]. Therefore, the maintenance of stable normal body weight is possible only in case of combination of healthy diet with adequate regimen of sleep. Moreover, the situation with sleep duration may be even worse as self-reports on sleep usually exceed real sleeping time on 0.3–1.3 hours in average [1, 146].

Conclusions. The significance of sleep and circadian rhythms for human health is hard to overestimate. Many current researches and scientific societies aim at studying of those features, and one of problems that make them so important is that sleep deficiency and sleep disorders work as a stress factor for human organism that increases risk of overweight and obesity development, starting from childhood and adolescence up to old age. Disturbances of different phases of sleep lead to changes of carbohydrates and lipid metabolism and hormonal imbalance of the body. Current study proves the importance of maintenance of balanced diet and rest and the necessity to continue the research of influences of biological rhythms as the cause and the target of body metabolism changes. Further prospects of researches in that area should also be aimed at development of means of correction of sleep and working regimen of young people including students for prevention of possible negative outcomes.

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