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Subjective daytime functioning assessment in people with insomnia

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"The detection, assessment and treatment of sleep/wake disorders are rapidly becoming standardized parts of a psychiatric evaluation"
Stephen M. Stahl

Summary

Aim. The aim of this study was to assess the prevalence and severity of subjective daytime functioning impairment among people with insomnia complaints. Another goal was to establish its relationships with age, gender, type and duration of subjective insomnia.

Method. Study group consisted of NATPOL study participants – 2,413 people (1,245 women and 1,168 men) aged 18–79. We extracted group with declared insomnia complaints, consisting of 1,221 people (736 women and 485 men) aged 18–79. Data on insomnia symptoms characteristics, their duration and subjective functioning impairment were further analyzed.

Results. Functioning impairment was declared by 825 people (67.7% of those who declared subjective insomnia) and it was more common in women. It was most common among people with insomnia complaints lasting over two weeks – 72.4%. In people with symptoms lasting less than two weeks or for a few days it was 70.7% and 64.9% respectively. People with insomnia symptoms lasting over two weeks accounted for 20% of group with severe functioning impairment. For shorter duration of symptoms it was 8.6% and 6.9% respectively. Among people with mild functioning impairment, persons with symptoms lasting for a few days and less than two weeks were predominant – 32.5% and 35.3% respectively. In people aged 18–24 years mild functioning impairment was predominant (66.66%).

Conclusions. Subjective daytime functioning impairment is common in people declaring insomnia symptoms. It is more common in women and its prevalence and intensity are greater in people with longer duration of sleep problems. Its prevalence is not correlated with age and it is the mildest in people aged 18–24.

Key words: functioning, insomnia, epidemiology

Introduction

Hyposomnias, especially insomnia are often diagnosed based on quantitative criteria. However, according to well-known and commonly used sleep disorders classifications [1–6], subjective assessment of sleep quality as well as its potential individual consequences are absolutely essential elements of diagnostic process. This assessment concerns well-being, physical and mental fitness, activity, ability to fulfill one's duties and goals, i.e., daytime functioning. The term "functioning impairment" is used in this paper to describe various symptoms and complaints in people declaring sleep problems.

According to Stehpen M. Stahl's message, investigating patient's complaints – especially by psychologist, psychiatrist, but also by doctor of other specialization – should include sleep and wake disorders assessment as they are an important element of general health. Sleep disorders are important and common symptom of all mental illnesses and disorders and can be regarded as an independent factor of functioning deterioration both in psychiatric patients and in healthy people [7].

As contrasted to clinical studies, in epidemiological ones the problem of daytime functioning in patients with sleep disorders is still underrepresented, even though it is included in diagnostic criteria of mental disorders [3, 4]. It may be explained by different goals of epidemiologists and clinicians dealing with the diagnosis and therapy of these disorders [8–11]. Our paper is an attempt to fill this gap.

The aim of this study was to assess the prevalence and a degree of subjective daytime functioning impairment in people declaring insomnia symptoms. We also made an attempt to identify potential relationships of functioning impairment with age, gender as well as with the type and duration of declared sleep problems.

Material and method

The present study was as a part of NATPOL study which was a part of National Program of Prophylaxis and Treatment of Cardiovascular Diseases POLCARD. It was a cross-sectional, observational study designed to assess the prevalence and control of arterial hypertension, dyslipidemias, metabolic syndrome, obesity, diabetes, sedentary lifestyle, smoking and other cardiovascular diseases risk factors. Authors of this study also wanted to compare the changes in prevalence of above-mentioned health problems with data acquired in the first edition of NATPOL study, conducted in 2002 [12].

According to the rules of adequate choice of study group, potential respondents were chosen in a procedure of stratified sampling with regards to place of residence, age and gender. Study group was divided in territorial clusters with the average of 11 people in each cluster. The choice of respondents was a two-step process.

First step involved the sampling of communities and second step – sampling of clusters within each community and individual respondents in each cluster. This step

was made in cooperation with the Ministry of Internal Affairs and Administration and was based on Personal Identification Number (PESEL). The detailed description of this process can be found in a separate publication in "Kardiologia Polska" [12] and our previous paper on prevalence of subjective insomnia [13]. The study procedure consisted of filling the questionnaire, measurement of arterial tension and anthropometric parameters as well as collecting blood and urine samples. All procedures were done by trained nurses. Study procedure is described in detail in a separate paper [12]. Characteristics of study population is presented in Table 1, it can also be found in the previous paper [13].

Table 1. **Characteristics of the study population**

	Women		Men		Total	
	n	%	n	%	n	%
Age						
18–39	497	39.9	477	40.8	974	40.4
40–59	405	32.5	444	38.0	849	35.2
60–79	343	27.6	247	21.1	590	24.5
Education						
Incomplete primary – incomplete secondary	405	32.5	551	47.2	956	39.6
Secondary – higher	840	65.5	617	52.8	1,457	60.4
Place of residence						
Village	496	39.8	617	52.8	1,113	46.1
City <50 thousand	213	17.1	146	12.5	359	14.9
City 50–200 thousand	209	16.8	201	17.2	410	17.0
City >200 thousand	327	26.3	204	17.5	531	22.0
Total	1,245	100.0	1,168	100.0	2,413	100.0

Creating study group for our study from NATPOL participants was also a two-step process. First step was to identify people with sleep problems in the group of 2,413 NATPOL participants (1,245 women and 1,168 men) aged 18–79. The present study on the analysis of daytime functioning impairment involved a group of 1,221 people declaring sleep problems. This group included 736 women and 485 men aged 18–79. The age structure of this group is presented in Table 2.

In order to meet our goals we analyzed answers to a question asked to the respondents: "In what degree sleep problems did or still do impair your daytime functioning?". Respondents chose one of these four answers: "they impair my functioning in a substantial degree", "they impair my functioning in a moderate degree", "they impair my functioning in a mild degree", "they do not have an impact on my functioning".

Statistical methods

Statistical analysis was made with SPSS 19 software. The results were presented in cross tables with information about number of participants (with accuracy to 100) in each category as well as their percentage representation. The 95% confidence intervals were calculated for all data. All the calculations were made with the consideration of two-step (stratified and group) sampling. In order to measure the differences in prevalence between selected categories we used the χ^2 test. Statistical significance level was $p < 0.005$.

Results

Among 1,221 respondents declaring sleep problems of different type and intensity, 825 people (521 women and 304 men) complaint on functioning impairment, which is 67.7 % of respondents. According to different social roles consistent with age, we divided this group in three age categories: 18–24 years old (72 people), 25–64 years old (614 people) and 65 and more (139 people). The analysis of functioning impairment prevalence showed that functioning impairment in these groups ranged from 68.68% in 25–64 years old group to 62.06% in 18–24 years old group (Table 2).

Table 2. **Characteristics of functioning impairment according to age**

Age groups	Number of people	Functioning impairment						Functioning impairment total	
		Severe		Moderate		Mild			
		n	%	n	%	n	%	n	%
18–24	116	7	9.7	17	23.6	48	66.66	72	62.06
25–64	894	94	15.31	239	38.92	281	36.69	614	68.68
65+	211	29	20.86	51	36.69	59	42.45	139	65.88
Total	1,221	130	15.76	307	37.21	388	47.03	825	67.7

In Table 2 also indicates different degrees of declared functioning impairment in the established age groups. In the youngest group mild degree was predominant, in 25–64 years old group moderate functioning impairment was the most common one and in people aged 65 and more, severe degree of functioning impairment was the most common one.

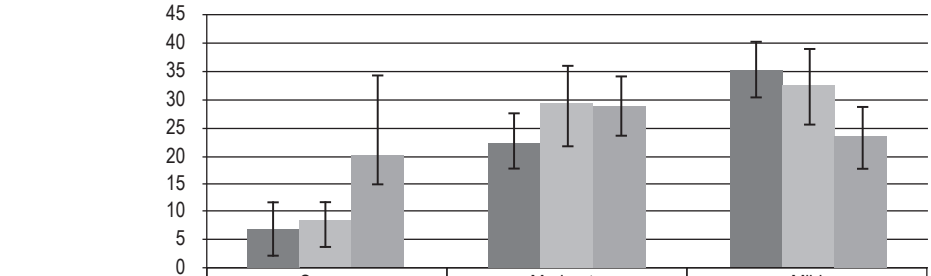
Based on our data, we can state there is a statistically significant relationship between gender and functioning impairment. Functioning impairment was reported by 70.8% of women with sleep problems, whereas in men it was 62.7%. In women moderate and severe impairment was dominant, in men it was the mild one. Data illustrating relationship between gender and functioning impairment are presented in Table 3.

Table 3. **Relationship between functioning impairment and gender**

Functioning impairment		Gender				Total
		Women		Men		
		n	%	n	%	n
Degree	severe	96	18.4	34	11.2	130
	moderate	198	38.0	109	35.8	307
	mild	227	43.6	161	53.0	388
Total		521	100.0	304	100.0	825
No functioning impairment		215	29.2	181	37.3	396
Total sample size		736	70.8	485	62.7	1,221

Considering the relationship between the duration of sleep problems and the daytime functioning impairment, it was shown that the highest percentage of people reporting functioning impairment – 72.4% (calculated for all degrees of impairment) was observed among those with the longest duration of sleep problems (more than 2 weeks). We also noted, that 20% of people with severe functioning impairment declared having sleep problems for more than two weeks. Mild functioning impairment was most common in the highest percentage of people with sleep problems of the shortest duration ("no more than two weeks", "few days"). The relationship between duration of insomnia symptoms and a degree of functioning impairment is presented at Figure 1.

Relationship between the type of insomnia complaints and prevalence and degree of functioning impairment was also studied. Functioning impairment was most common in people with difficulties in maintaining sleep and initiating sleep. For both



	Severe	Moderate	Mild
For a few days	6.9	22.5	35.3
Shorter than 2 weeks	8.6	29.4	32.5
Longer than 2 weeks	20	29	23.4

Figure 1. **Declared degree of functional impairment in people with insomnia in relation to its duration. Values presented as percentage**

these insomnia complaints the relationship was statistically significant. There was no such relationship for early morning awakenings. The relationship between the type of insomnia complaints and functioning impairment is presented in Table 4.

Table 4. **Relationship between the type of insomnia complaints and functioning impairment**

Type of insomnia complaint	Functioning impairment			"They do not have an impact on my functioning"
	Severe	Moderate	mild	
Difficulties in falling asleep	12.9% (10.4–15.9)	24.8% (21.5–28.4)	33.3% (29.5–37.3)	29.0% (25.3–33)
Difficulties in maintaining sleep	11.3% (8.6–14.6)	29.1% (25–33.6)	31.8% (27.5–36.4)	27.8% (23.6–32.5)
Early morning awakening	10.3% (7.2–14.4)	22.9% (17.9–28.9)	33.5% (28–39.5)	33.3% (27.9–39.2)

95% Confidence Intervals are shown in brackets. * $p < 0.001$; ** $p < 0.005$; *** $p < 0.685$

Discussion

In our study the term "functioning impairment" was used to describe complaints such as: poor well-being, tiredness, worse functioning at school/work, daytime sleepiness, non-restorative sleep, irritability, low mood, low physical effectiveness, various somatic symptoms. Method of functioning impairment assessment is not as accurate as with dedicated clinical tools but it seems sufficient for epidemiological study. Similar method with questionnaire designed for the study was used in EQUINOX study assessing the influence of insomnia on daytime functioning in primary care patients [14]. Our results come from NATPOL study which was designed to assess the prevalence of cardiovascular risk factors. Data on sleep was only a small element of this study and was restricted to respondents' subjective reports. Because of the sample size and the process of study group recruitment these results are representative for the whole population of Poland which is the greatest value of this study.

Subjective assessment of sleep quality is very important for assessment of the influence of sleep worsening on daytime functioning [15] and in some cases it may be even more important than objective data, e.g., total sleep time [16]. Assessment of sleep length would be a valuable supplement of presented data, unfortunately due to limited number of questions in the study questionnaire authors decided not to include this parameter. Based on our data we are also not able to determine to what extent subjective sleep complaints influenced the length of sleep. It is a limitation in creating a full picture of relationship between sleep complaints and their character

and functioning impairment. This limitation is an effect of specific character and goals of NATPOL study, in which the sleep complaints assessment was one of a secondary elements.

Considering such high prevalence of insomnia complaints and functioning impairment, the influence of potential comorbid mental disorders, especially depression has to be acknowledged. NATPOL study procedure included depressive symptoms assessment with the Beck Depression Inventory [12], however, considerable percentage of participants did not fill it (it was not a part of the main questionnaire), which did not excluded them from participation in the study. The exact data on depression prevalence in the study population are not available, however, based on the high prevalence of insomnia symptoms and functioning impairment we may assume it was relatively high.

One of our goals was to illustrate the size of the problem of functioning impairment associated with subjective insomnia. In order to clearly see this size we have to note that 50.5% of Polish population have insomnia symptoms [13] and 67.7% of this group declares functioning impairment. Based on this results we may calculate that 34.18% of Polish population have functioning impairment associated with insomnia-type sleep problems.

It is worth to notice that even though the prevalence of functioning impairment in people with sleep problems is quite high, most people declare mild or moderate degree of functioning impairment. Severe degree was noted only in 15.76% of respondents (Table 2). In other studies [14, 17] prevalence of functioning impairment is between 20 and 33%, however, it has to be underlined that these results are representative for primary care patients and not for the general population.

Differences in social roles consistent with age were the foundation of extracting three age groups of respondents. They included people who still study, people who work and people who do not work or study. Results presented in Table 2 can only to a small extent support the validity of the accepted hypothesis, which underlies the division, according to which the most severe consequences of sleep problems should occur in the group of people who work, and to a lesser extent in the remaining age groups. It seems that young people have "good" tolerance of sleep problems consequences because most of them (66.66%) rated their functioning impairment as mild and only 9.7% as severe. In older age groups we can see less differences in the prevalence of various degrees of functioning impairment.

We would also like to point out that functioning impairment is more common in women than in men. These results are consistent with higher prevalence of insomnia in women, even though some studies do not confirm an association between gender and sleep-related functioning impairment [14].

Another important factor in studies on functioning impairment related to medical condition is a duration of this condition. Our results show that the most severe daytime

functioning impairment were accompanied by the longest-lasting sleep problems. It is worth to notice that in respondents with longer duration of subjective insomnia severe functioning impairment was declared by almost three times more people (20%) than in groups with shorter duration of this problem: the shortest – 6.9%, and medium one – 8.6%. However, even more important result concerns high general prevalence of functioning impairment of various degrees in groups with shorter duration of symptoms – 70.7% in people with insomnia complaints lasting no more than 2 weeks and 64.9% in people with sleep problems lasting for a few days.

The negative impact of sleep problems duration can be also noticed in groups with less severe functioning impairment. Similarly, it is less pronounced in people with moderate functioning impairment and in those who report a mild negative impact of sleep problems on their functioning. As could be expected, in this group people with the shortest duration of insomnia symptoms are predominant.

In summary, our results confirm the hypothesis on the relationship between duration of sleep complaints and their consequences defined as functioning impairment. The longer the insomnia symptoms persist, the more negative impact on functioning they cause. Our results correspond with results of other studies confirming negative impact of currently experienced insomnia on functioning. This negative impact was described as increased difficulties in routine daily activities, increased life dissatisfaction and increased frequency of doctor's appointments and sleep agents use [18]. Studies analyzing the impact of single nights of insomnia also clearly demonstrate its negative impact on functioning which can be increased by one's beliefs about negative consequences of insomnia [19].

Our results on relationship between the type of insomnia complaints and functioning impairment are consistent with previous results of other studies which demonstrated that functioning impairment is most strongly related to problems with maintaining sleep [20], as well as with difficulties in falling asleep [14, 15]. In EQUINOX study [14] the correlation between early morning awakenings and functioning impairment was found, although our results do not confirm them.

Our results, even if they may be found disputable, point to the problem of assessment and classification of patients' complaints, often faced by psychologists and psychiatrist. Practical consequences of this problem is to choose the most accurate psychological and pharmacological treatment. It has to be underlined that the main goal of the study we participated in was the assessment of cardiovascular risk factors and the methodology was designed specifically to achieve this goal. This is important in context of comparing the results of only Polish study which was published in 1999 [8]. In this study, complaints on non-restorative sleep were declared by 27% of respondents, however, there was no assessment of relationship between non-restorative sleep and daytime functioning impairment. In an Australian study, insomnia with functioning impairment was declared by 5.6% of respondents [18]. In an Italian study, insomnia

symptoms were declared by 27.6% of respondents, 10.1% of respondents were not satisfied with their sleep quality and clinical insomnia was diagnosed in 7% of study population [21]. Assessment of poor sleep quality consequences revealed its association with more frequent naps and increased daytime sleepiness. Moreover, in a group of people aged 45–64 there was threefold increase of frequency of traffic accidents [21]. American study published by the National Sleep Foundation revealed sleep complaints in 21% of respondents, however, functioning impairment was noticed only in 9% of study population [22].

Conclusions of our study seem to be important in discussion on the influence of sleep problems on general health. They also confirm a substantial role of subjective assessment of sleep quality and functioning impairment in diagnostic criteria of insomnia.

Conclusions

1. Subjective functioning impairment is common in people with subjective insomnia.
2. In the study group of people reporting insomnia symptoms functioning impairment is more common in women.
3. Functioning impairment is more common and more severe in people with longer duration of insomnia symptoms.
4. In the study group the prevalence of functioning impairment complaints is not correlated with age.
5. People in the youngest age group have the mildest degree of functioning impairment.
6. Differential diagnosis of daytime functioning should include sleep characteristics subjective assessment of its quality.

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