

THE PREVALENCE OF SEASONAL AFFECTIVE DISORDER AMONG THE BLIND AND PATIENTS WITH SERIOUS VISUAL IMPAIRMENT

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SUMMARY

Background: Seasonal affective disorder (SAD) is an interesting disorder in which depression should occur at a particular time of a year, each year and it should disappear at a specific time of the year. While the prevalence of SAD among generally healthy individuals is well known, the information about the prevalence of this disorder among the blind and visually impaired patients is very limited. The aim of the study was to investigate the prevalence of SAD among the blind and people with serious visual impairment in Polish population.

Subjects and methods: 250 blind or seriously visually impaired individuals and 258 healthy controls were assessed with the usage of Seasonal Pattern Assessment Questionnaire (SPAQ). In research group survey was conducted with the Computer Assisted Telephone Interview (CATI) technique. In control group the questionnaire was distributed via Internet. The results were analysed with the usage of statistical package - Statistica 13.1.

Results: The results revealed that among people suffering from SAD there is statistically significant difference in SPAQ scores between completely blind and seriously visually impaired people.

The study shows that in the control group age is negatively correlated with score in SPAQ score, while in the study group age is positively correlated with SPAQ score. The data show that there is a difference in occurrence of SAD between men and women.

Conclusion: The study has shown a significant difference in occurrence of SAD between study and control groups. What is more the analysis has indicated major difference in the occurrence of SAD between men and women from the study group. Taking into consideration the fact that this is the second analysis of this type in Europe further investigations are needed.

Key words: seasonal affective disorder - visual impairment - blindness

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INTRODUCTION

Seasonal affective disorder (SAD) is a recurring major depression with a seasonal pattern. According to the *Diagnostic and Statistical Manual of Mental Disorders DSM-5*, depression should occur at a particular time of a year, each year and it should disappear at a specific time of the year (Lam et al. 2001). Moreover the patient should demonstrate minimum 2 episodes of depression in the previous 2 years and the number of seasonal episodes should be larger than non-seasonal episodes (Lam et al. 2001).

It is possible to distinguish 2 different types of SAD - winter-type and summer-type SAD.

The symptoms of winter seasonal pattern disorder usually occur during autumn and winter months and improve with the arrival of spring or early summer. The most common symptoms of winter-type SAD include lack of energy, low mood, slowing down, anxiety and reduced motivation to act (Zauderer & Ganzer 2015, Roecklein & Rohan 2005). These patients feel tired despite sleeping more than healthy people, they have problems with concentration. Their appetite may be increased leading to weight gain (Rosenthal et al. 1987). Apathy, sadness and lack of motivation in patients with SAD contribute to the impairment of functioning at work and in social relations (Roecklein & Rohan 2005).

People with summer seasonal pattern disorder experience SAD during summer. Moreover the symptoms are reversible. They have poor appetite leading to weight loss, insomnia, agitation, restlessness, anxiety, and even episodes of violent behaviour (Melrose 2015, Dan & Oren 2014). Another important thing is the severity of SAD. Some people present milder symptoms and this form is known as subsyndromal (sSAD) (Lam et al. 2001).

The pathogenesis of SAD is not fully understood, however, it is known that the presence of SAD is influenced by many factors, both biological and physical. Formerly the scientists thought that one of the most important factors was geographic latitude (Magnússon & Stefánsson 1993), however nowadays numerous studies suggest that impact of latitude on the prevalence of SAD is minimal (Magnússon et al. 2000). What is more, many studies indicate that genetic factor can play a role in the development of SAD (Ho et al. 2018).

The prevalence of SAD among generally healthy individuals is well known and it ranges from 1.5% to 9% (Thaler et al. 2011). SAD occurs 4 times more frequently in women than in men (Magnússon & Partonen 2005). It is more common among young people rather than older ones (Magnússon & Partonen 2005). However the prevalence of SAD among the blind and visually impaired patients is not investigated, with this study being the first in Poland and the second in Europe about this subject.

The aim of the study was to investigate the prevalence of seasonal affective disorder among the blind and people with serious visual impairment in Polish population and to find out if there are any differences in prevalence of SAD between healthy and blind or visually impaired people.

SUBJECTS AND METHODS

We have assessed 258 healthy individuals and 250 blind or seriously visually impaired patients, who were aged 18 or above, with the usage of Seasonal Pattern Assessment Questionnaire (SPAQ) and with authors' questionnaire, which task was to assess what kind of visual deficit subjects from the study group have. It consisted of detailed questions concerning sense of light, field of view and disability class; full version of the questionnaire is presented as a Table 1. In order to obtain the data of the study group CATI (Computer Assisted Telephone Interview) technique was introduced, with the help of School and Educational Centre for Blind Children in Laski. All together, 4 pollsters conducted over 65 hours of telephone interviews and did 750 phone calls.

After successfully collecting 250 records, study group was divided into 2 main subgroups: the blind and persons with serious visual impairment. Data from both subgroups were compared with each other as well as with control group, and the results from other studies.

Statistical analysis of gathered data was performed using legal statistical package Statistica 13.1. There were used only nonparametric tests, because Shapiro-Wilk test revealed that distribution of SPAQ score is nonparametric.

RESULTS

Study group consisted of 117 women and 133 men. Mean age in this group was 41 (± 13.8) years. 129 was seriously visually impaired (with disability class), but with sense of light, and 121 were completely blind and without any sense of light. Median of obtained scores in SPAQ was 5 points (IQR=6). Control group consisted of 176 women and 82 men. Mean age in this group was 37 (± 14.0) years. No one had visual impairment. Median of obtained scores in SPAQ was 9 points (IQR=8). Full demographic data are shown in the Table 2.

Table 1. Author's questionnaire

Question	Possible answers
Are you completely blind or seriously visually impaired?	Completely blind Seriously visually impaired
What is your vision deficit in dioptres in your right eye? (question only for seriously visually impaired people)	Numerical value I don't know
What is your vision deficit in dioptres in your left eye? (question only for seriously visually impaired people)	Numerical value I don't know
Do you have a narrow field of view	Yes No
To what extent do you have a narrow field of view? (question only for people with narrow field of view)	Ca. 20 degrees Ca. 30 degrees I don't know
Is your blindness or visual impairment acquired?	Yes No
Has your blindness or visual impairment occurred after fifth year of age? (question for people with acquired blindness of visual impairment)	Yes No
Can you see strong light?	Yes No
Can you determine the direction of strong light? (question for people with perception of strong light)	Yes No
Have you ever taken antidepressants prescribed by a doctor?	Yes No

Table 2. Demographic data

Parameter	Men	Women
Quantity (N)	133	117
Mean age (years)	40.11 \pm 13.82	43.05 \pm 13.78
Median of SPAQ score (points)	4 (IQR=7)	6 (IQR=6)
Completely blind (%)	53	50
Serious visual impairment (%)	47	50

First of all the data showed that 36 people out of 250 from the study group, which is 15%, reached score 11 or more in SPAQ questionnaire, what meets the criteria of SAD. While as many as 33 persons, which is 14%, obtained between 8 and 10 points in SPAQ what meets the criteria for sSAD.

Interesting thing is that in general polish population the occurrence of SAD is of about 4% and in case of sSAD it is established to 10 %.

In addition Mann-Whitney U test revealed, that among individuals with 8 or more points in SPAQ, the blind have higher scores than people with serious visual impairment, but with sense of light and the difference is statistically significant ($p < 0.01643$), as shown on a Figure 1.

What is more Mann-Whitney U test proved, that in both study ($p < 0.0016$) and control groups ($p < 0.00001$)

the fraction of people with seasonal affective disorders is greater among women, what is presented on Figure 2.

Furthermore the study have found that blind woman with a score of 8 or more points in SPAQ have higher scores in SPAQ than women with serious visual impairment ($p < 0.008$). Among men this difference was not statistically significant.

In addition to this, Spearman rank correlation coefficient revealed that in control group age is negatively correlated ($p < 0.001$; $R = -0.2116$) with SPAQ score, which means that younger patients received higher scores.

On the other hand Spearman rank correlation coefficient revealed that in the study group age is positively correlated ($p < 0.018$; $R = 0.1491$) with SPAQ score. The correlations are shown on the Figure 3 and Figure 4 respectively.

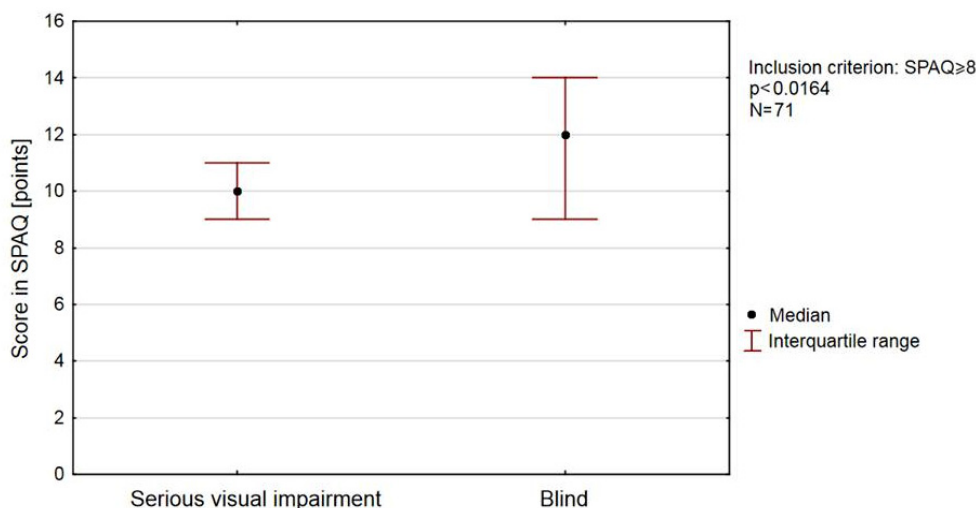


Figure 1. Difference in SPAQ scores between two subgroups of the study group

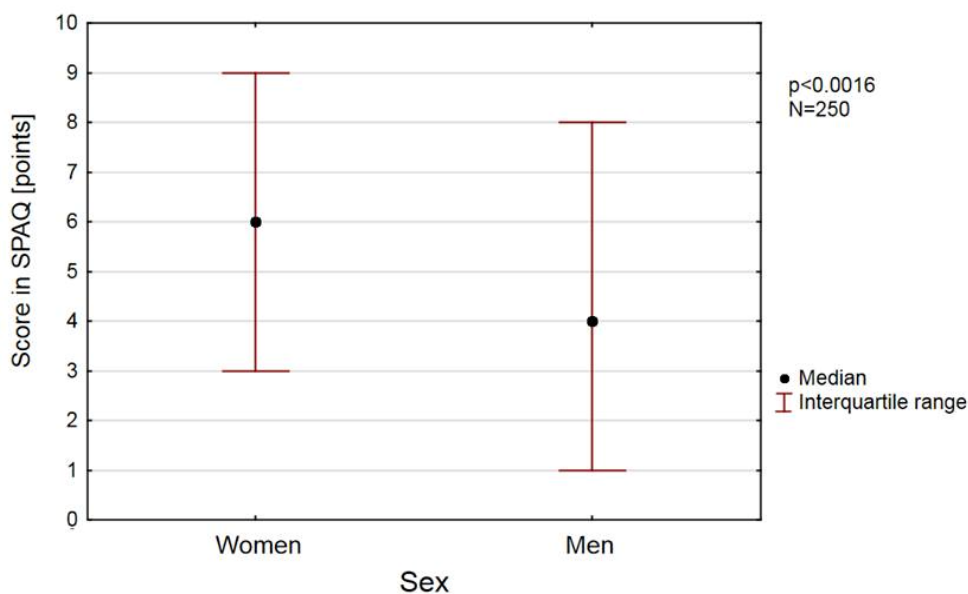


Figure 2. Difference in SPAQ scores between women and man of the study group

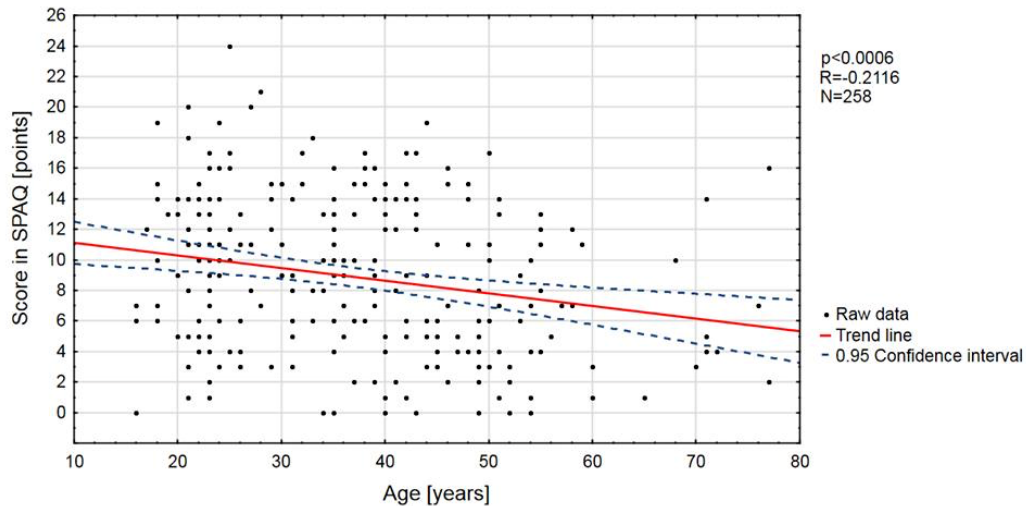


Figure 3. Correlation between age and SPAQ score in the control group

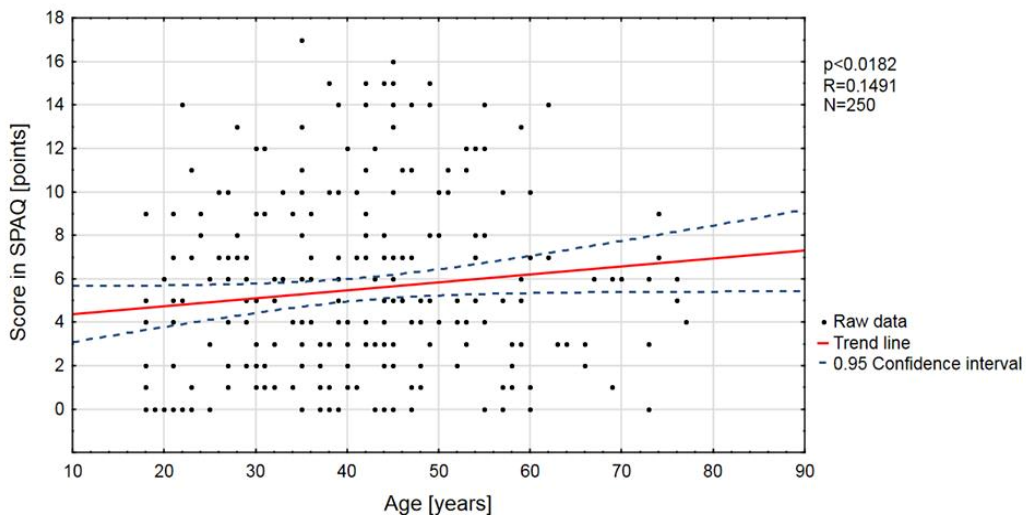


Figure 4. Correlation between age and SPAQ score in the study group

DISCUSSION

Although seasonal affective disorder is a common depressive disorder, the data about its prevalence among the blind or persons with serious visual impairment are very limited (Melrose 2015). To our knowledge this is the first study on this subject in Poland and only the second in Europe (the first one conducted in Denmark). The data obtained in this study indicate that the prevalence of seasonal affective disorder is significantly higher among the study group than in the control. Moreover there is a statistically significant difference in the prevalence of SAD between the blind and persons with serious visual impairment. Since photoperiodic information can be transferred via a pathway extending from the retina to the retino-hypothalamic tract, the suprachiasmatic nuclei, the superior cervical ganglia, and the melatonin-producing pineal gland, the dysfunction of retina may result in deregulation of secretion of melatonin what matches the results of other studies (Oren 1991). Contrastingly in the other European study

on this subject the results suggested that there is no difference in the prevalence of SAD among the blind and seriously visually impaired persons (Madsen et al. 2016). However we think it possible that melatonin secretion is deregulated to the greater extend among the blind because reduced amount of bright light reaches their retino-hypothalamic tract and thus their pineal gland. Nevertheless it is only a hypothesis and this difference in the prevalence still needs to be investigated.

The difference in prevalence of SAD among the study and control groups may also be caused by deregulation of circadian rhythm and thus melatonin secretion (Winkler 2006). We believe that the circadian rhythm is deregulated to the greater extend among the study group causing abnormal secretion of melatonin and in turn resulting in greater frequency of SAD among this group. Imbalanced production of melatonin most probably increases number of serotonin reuptake receptors, which results in decrease of serotonin level and causes symptoms of depression (Święcicki 2007). The reason why some people may experience SAD in the summer

may be connected with too much sunlight, which also leads to the modulation of melatonin production, however this subject exceeds the topic of this study (Lingjaerde & Reichborn-Kjennerud 1993, Wehr et al. 1987).

Many studies indicate that noradrenaline can also play the role in the pathogenesis of SAD, with its level inversely correlated with the level of depression in untreated SAD (Checkly et al. 1993). There are also reports that dopamine is being involved in the occurrence of SAD (Lam & Levitan 2000). The data on the genetics of seasonal affective disorders show a familial contribution to the development of SAD and that genetic variant related to serotonergic transmission, the 5-HTTLPR gene promoter polymorphisms, is associated with SAD (Sher et al. 1999). It is very probable that in some cases subjects from the study group also have this genetic variant what further contributes to the higher prevalence of SAD, however this hypothesis exceeds the topic of this study.

The data show that in the study group the prevalence of subsyndromal SAD was also significantly higher than in the control group what matches the results of other studies (Magnússon & Stefánsson 1993). The analysis also shows that women in both study and control groups are more prone to developing SAD. This is most probably connected to the genetic predisposition as well as hormonal fluctuations, which may act as a trigger to depression (Albert 2015). Furthermore blind women are more susceptible to developing SAD than seriously visually impaired women, what supports our hypothesis that deregulation of melatonin secretion is greater among the blind. Interestingly the data show that there is no difference between blind and visually impaired men. This suggests that genetic predisposition and hormonal fluctuations have greater impact on the prevalence of SAD than the difference in the amount of light, which falls on the retina between the blind and visually impaired persons.

The study also shows that age is negatively correlated with SPAQ score, which means that younger people received higher scores in the questionnaire, and it matches the results of other studies (Roeklein & Rohan 2005). On the other hand, in the study group age is positively correlated with SPAQ score, which means that the older the patient the higher the score he obtained. This correlation may be connected to the fact that the blind and seriously visually impaired live with decreased quality of life, thus along with time it is more probable to develop SAD, however this topic needs to be further investigated (Renaud & Bédard 2013).

This study has its limitations, which are connected to the fact that data for the study group were gathered via CATI technique and not by a face-to-face interview with the subjects. This technique was imposed because the Polish Association of the Blind (PZN) refused to cooperate with us thus making it impossible to assess the blind and visually impaired people in person. Their decision was motivated by the lack of time and place to conduct the study, as PZN hasn't got its own quarters

and their meetings are very scarce. In the end we have teamed with The Educational Centre in Laski, with whom we've been gathering the data for 2 years. Moreover the data for the control group were gathered via Internet survey what on the one hand allows reaching greater amount of persons but on the other creates a problem of bias based on a self-report. The validity of SPAQ is also a subject of discussion since it is acceptable as a scanning tool and not as a diagnostic, however it was the only possible option to use while gathering data via Internet and telephone interviews (Magnusson 1996).

CONCLUSION

The aim of this research was to investigate the prevalence of seasonal affective disorder among the blind and people with serious visual impairment in polish population. The study also tried to find reasons for any differences in prevalence of SAD between healthy and blind or visually impaired people. The study has shown a significant difference in occurrence of SAD between study and control groups. Moreover the blind achieved higher average score in SPAQ than visually impaired persons. It may support the thesis that retinal dysfunction can play a role in the pathogenesis of some cases of SAD. What is more the study showed major difference in the occurrence of SAD between sexes. Women achieved higher score in SPAQ than men which means women are more susceptible to develop SAD. Moreover blind women suffer from SAD more often than women with serious visual impairment. Since this is only the second study about this subject in Europe this topic is fairly unknown to the public thus this problem might be belittled. That is why it is crucial to raise awareness about the fact of high prevalence of SAD among the blind and people with serious visual impairment. Only then it will be possible to have effective treatment and in consequence to improve the quality of life of the blind and seriously visually impaired persons suffering from SAD.

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Contribution of individual authors:

Bartłomiej Kurczab: design and conception of the study, data analysis, and literature searches.

Aleksandra Ćwiek: design and conception of the study, collection and analysis of data.

Anna Witkowska: design of the study, data collection.

Krzysztof Kramarczyk: data collection, literature searches.

Karolina Drzyzga: design and conception of the study, literature searches.

Krzysztof Kucia: design and conception of the study.

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