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Sleep quality among psoriasis patients: excluding the immunosuppressive therapy effect

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Abstract

Background Psoriasis is associated with several comorbidities and different psychological disorders including anxiety and depression. Psoriasis may also affect sleep quality and consequently the quality of life. The use of immunosuppressants used in the treatment of psoriasis were also reported to increase insomnia, so the purpose of the study is to assess the quality of sleep and degree of insomnia in patients with psoriasis not on any systemic or immunosuppressive therapy compared to controls and to examine the relation between sleep quality, insomnia with depressive, and anxiety symptoms. One hundred psoriasis cases, not receiving immunosuppressive therapy, and 80 apparently healthy subjects were recruited as controls. We assessed quality of sleep, insomnia and screened for anxiety and depressive symptoms among psoriasis patients and healthy controls; any patient on immunosuppressant therapy was excluded.

Results Quality of sleep using Pittsburgh Sleep Quality Index, insomnia using Insomnia Severity Index, depression using Beck Depression Inventory, and anxiety using Taylor Anxiety Manifest Scale were statistically significant higher among psoriasis patients than healthy controls all with p value $p < 0.001$. Depressive symptoms were significantly positively correlated with Pittsburgh Sleep Quality Index (PSQI) global score ($p = 0.045$) and subjective sleep quality subscale ($p = 0.005$). Also, BDI scores was significantly positively correlated with insomnia scores as measured by ISI ($p = 0.026$).

Anxiety symptoms were significantly positively correlated with global score of PSQI ($p = 0.004$) and its subscale (subjective sleep quality, sleep latency, sleep disturbance, use of medications and daytime dysfunction) and insomnia ($p = 0.001$).

Conclusions Abnormal sleep quality and insomnia were detected in patients with psoriasis not using any immunosuppressive or systemic therapy, and this could be due to the psoriasis disease itself or due to the associated anxiety and depression associated with psoriasis. Screening for psychiatric symptoms specially that of depression, anxiety, and sleep among patients with psoriasis is of utmost importance for better quality of life. Thus, collaboration between dermatologists and psychiatrists may show better life quality for these cases and better treatment outcomes.

Keywords Psoriasis, Sleep quality, Insomnia, Anxiety, Depression

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Background

Psoriasis is a chronic recurrent inflammatory skin disorder with genetic background, environmental factors, and immune system disturbances [1]. However, it is now well known that it is a systemic disease with inflammation that affects several organs in the patient. One of the

most important comorbidities are obesity, cardiovascular disease and arthritis. This inflammation was also accused to be the cause of several psychiatric disorders with all of their negative effects on the quality of life of patients. Sleep is an essential physiological status for all human beings and any disturbance may have terrible impact. Several studies have also shown the association of abnormal sleep quality in patients with psoriasis. The cause of this association could be the skin disease itself due to the inability of psoriatic skin to decrease the core body temperature which is required for sleep initiation [2]. Moreover, the associated depression may result in sleep deprivation or fragmentation which may affect the immunological status especially nocturnal cytokine release. Kallikrein-5, Kallikrein 7, IL-1B, Il-6, and IL-12 were potentiated with lack of sleep. Elaborating the effect of sleep deprivation all with depressive and anxiety symptoms on psoriasis may help improving the quality of life of these patients and may aid in finding different therapeutic interventions [1]. There is a bidirectional impact between psoriasis and sleep deprivation. Both were found to be associated with inflammatory cytokines as IL-6 and thus psoriasis may worsen the sleep quality and the poor sleep quality may worsen the psoriasis [3].

The exact cause of sleep disturbance in psoriasis is likely to be multifactorial. So, the aim of the current work was to assess the quality of sleep and degree of insomnia in patients with psoriasis not on any systemic or immunosuppressive therapy compared to controls. The second aim was to examine the relation between sleep quality, anxiety and depression symptoms. Paving the way to reach the different factors that may be the cause of this disturbed sleep and so helping in its cure.

Methods

One hundred psoriasis cases including both Males and Females, age range from 18 to 60 were recruited from Kasr Al Ainy Psoriasis Unit (KAPU) dermatology department between May 2019 and December 2019. Moreover, 80 apparently healthy subjects were recruited as control group. Included cases were only on topical therapies as emollients and combined topical vitamin D analogues and steroids.

Any participants on any immunosuppressive treatment were excluded as well as subjects with any renal disease, infectious disease, malignant disease, hyperthyroidism, hypothyroidism, and pregnant ladies.

All cases were subjected to the following:

Psoriasis grading

All cases were evaluated using psoriasis area and severity index (PASI) which is a scale for the degree of psoriasis where the erythema, induration and scaling of the lesions are given different grades from 0 to 4 according to their severity in different body parts (head, trunk, upper, and lower limbs) and then the surface area in each body part is assessed. The PASI scale ranges from 0 to 72 [4] and body surface area (BSA) which is another severity score measuring the total surface area affected by psoriasis in the skin of the patient using the patient's hand unit as a measure for 1% of the surface area of each person [5]. PASI less than 10 and body surface area less than 10 were considered as mild [6].

The effect of psoriasis on daily activities, work or school, relationships, leisure, and treatment were assessed using the psoriasis disability index questionnaire (PDI) [7].

Quality of sleep was assessed

Using the Arabic version of Pittsburgh Sleep Quality Index (PSQI) [8] which is a self-administrated questionnaire, measures the pattern and quality of sleep in adults by assessing seven components; subjective sleep quality, latency of sleep, duration of sleeping, habitual sleep efficiency, disturbances of sleep, whether or not sleep medications are used, and dysfunction of the following day over the last month. Each component is scored from 0 to 3, resulting in a global PSQI score between 0 and 21, with higher scores indicating lower quality of sleep. The PSQI was useful in identifying good and poor sleepers [9].

Insomnia was assessed using Arabic version of Insomnia severity index (ISI). It measures perceived insomnia severity. It consists of seven items rated on a 5-point Likert scale (0 = not at all and 4 = extremely), with a total score ranging from 0 to 28 [10]. ISI score of 0–7 was defined as absence of clinically significant insomnia, ISI score of 8–14 was defined as subthreshold insomnia, ISI score of 15–21 was defined as moderate clinical insomnia and ISI score of 22–28 was defined as severe clinical insomnia.

Depression was assessed using the Arabic version of Beck Depression Inventory (BDI) [11], it is a self-reported scale which is suitable for people 13 years or older. It has 21 statements (each has a 4-grade scale) and the individuals should choose the grade that best describes their statuses. The final score range from 0 to 63. The scoring range is as follows:

1–10_____These ups and downs are considered normal
11–16_____ Mild mood disturbance
17–20_____Borderline clinical depression
21–30_____Moderate depression
31–40_____Severe depression
Over 40_____Extreme depression

Anxiety was assessed using the Arabic validated version of Taylor Manifest Anxiety Scale [12]. The scale measures trait anxiety levels, it consists of 50 questions. Anxiety level was assessed as follows: normal (score of 0–16), mild (17–20), moderate (21–26), severe (27–29), and very severe (30–50).

Sample size

Based on a previous study by Melikoglu [13], the mean global PSQI in the patient's group was 7.01 ± 4.19 and in the control group was 4.18 ± 2.76 to detect the true difference between groups with a power of 90% and a level of significance of 5%, and effect size of 0.7 a minimum sample size of 88 participants will be needed (i.e., 44 for each group will be needed, to compensate for possible 25% will be added, therefore a total sample size of 110 participants will be needed (i.e., 55 participants for each group). The sample size was calculated by G*Power (version 3.1.9.2; Germany).

Data were coded and entered using the statistical package for the Social Sciences (SPSS) version 26 (IBM Corp., Armonk, NY, USA). Data was summarized using mean, standard deviation, median, minimum and maximum in quantitative data, and using frequency (count) and relative frequency (percentage) for categorical data. Comparisons between quantitative variables were done using the non-parametric Mann-Whitney test. For comparing categorical data, chi-square ($\chi 2$) test was performed. Exact test was used instead when the expected frequency is less than 5. Correlations between quantitative variables were done using Spearman correlation coefficient. *P* values less than 0.05 were considered as statistically significant.

Results

Demographic and clinical data

Patients

One hundred patients and 80 healthy controls completed this study. Demographic data of all recruits as well as statistical differences between patients and controls are presented in Table 1. Table 1 showed also the mean PASI score among patients group was 4.97 ± 5.24 and BSA % was 9.98 ± 12.32.

Quality of sleep and insomnia among cases and control groups

Results of ISI for patients and controls are demonstrated in Table 2. The mean scores were 9.50 ± 6 and 3.48 ± 4.85 for patients and controls respectively and this was statistically significant ($p < 0.001$). This results showed that patients group suffered from insomnia more than controls.

Also, Table 3 showed PSQI scores which assessed sleep quality, there was a highly statistical significant difference between both groups as regards the global score and its subscales measuring (subjective sleep quality, habitual sleep efficiency, sleep disturbance, use of sleep medications, and day time dysfunction). These results showed that patients group suffered from poor quality sleep more than controls.

Table 1 Demographic data of cases and controls and clinical data of cases

					Cases		Controls		*P*value	
					Count	%	Count	%		
Sex		**Males**			51	51.0%	16	20.0%	<0.001	
		Females			49	49.0%	64	80.0%		
Marital status		**Single**			34	34.0%	8	10.0%	< 0.001	
		Married			66	66.0%	72	90.0%		
Work		**Working**			37	37.0%	30	37.5%	0.956	
		Not working			63	63.0%	50	62.5%		
	Cases					**Controls**				***P*value**
	Mean	**SD**	**Median**	**Min.**	**Max.**	**Mean**	**SD**	**Median**	**Min.**	**Max.**	
Age	36.45	13.99	35.00	14.00	73.00	39.79	10.40	39.50	22.00	60.00	0.060
PASI	4.97	5.24	3.65	0.20	40.00	.	.	.	.	.	-----
BSA (%)	9.98	12.32	5.00	1.00	70.00	.	.	.	.	.	-----
Psoriasis duration in months	77.45	81.67	54.00	1.00	504.00						
BMI	27.49	7.01	26.20	16.60	48.80	.	.	.	.	.	-----
PDI	13.50	11.06	10.00	0.00	51.00	.	.	.	.	.	-----

PASI psoriasis area and severity index, *BSA* body surface area, *BMI* body mass index, *PDI* Psoriasis Disability Index

Table 2 Insomnia and quality of sleep among cases and control

	Cases					Controls					*P* value
	Mean	SD	Median	Min	Max	Mean	SD	Median	Min	Max	
ISI	9.50	6.00	8.00	0.00	27.00	3.48	4.85	1.00	0.00	19.00	< 0.001
Global PSQI score	8.16	4.06	8.00	0.00	19.00	3.25	2.68	2.00	0.00	11.00	< 0.001
Subjective sleep quality	1.14	1.15	1.00	0.00	3.00	0.35	0.62	0.00	0.00	2.00	< 0.001
Sleep latency	1.27	1.15	1.00	0.00	3.00	0.98	0.86	1.00	0.00	3.00	0.135
Sleep duration	0.93	1.03	1.00	0.00	3.00	0.88	0.64	1.00	0.00	3.00	0.589
Habitual sleep efficiency	1.01	1.19	0.50	0.00	3.00	0.15	0.36	0.00	0.00	1.00	< 0.001
Sleep disturbance	1.41	0.71	1.00	0.00	3.00	0.75	0.67	1.00	0.00	2.00	< 0.001
Use of sleeping medication	1.38	0.91	1.00	0.00	3.00	0.00	0.00	0.00	0.00	0.00	< 0.001
Daytime dysfunction	1.01	1.03	1.00	0.00	4.00	0.18	0.44	0.00	0.00	2.00	< 0.001

Table 3 Depression and anxiety scores among cases and control

			Cases		**Controls**		*P* value
			Mean	S.D	Mean	S.D	
BDI			20.93	10.75	3.48	3.42	< 0.001
Taylor Manifest Anxiety Scale			24.65	8.71	6.40	5.78	< 0.001
		Cases		**Controls**		***P*value**	
		Count	**%**	**Count**	**%**		
Beck Depression Inventory	**Normal**	20	20.0%	72	90.0%	< 0.001	
	Mild	15	15.0%	8	10.0%		
	Borderline	19	19.0%	0	0.0%		
	Moderate	28	28.0%	0	0.0%		
	Severe depression	13	13.0%	0	0.0%		
	Extreme	5	5.0%	0	0.0%		
		Cases		**Controls**		***P*value**	
		Count	**%**	**Count**	**%**		
Taylor Manifest Anxiety Scale	**No anxiety**	18	18.0%	72	90.0%	< 0.001	
	Mild anxiety	21	21.0%	8	10.0%		
	Moderate anxiety	20	20.0%	0	0.0%		
	Severe anxiety	11	11.0%	0	0.0%		
	Extreme anxiety	30	30.0%	0	0.0%		

Depression assessment for cases and control groups

Results of Beck Depression Inventory (BDI) for patients and controls are demonstrated in Table 3. The mean scores BDI test were 20.93 ± 10.75 and 3.48 ± 3.42 for patients and controls respectively and it was statistically significant higher among patients group ($p < 0.001$), indicating that patients group suffer more from depressive symptoms.

Anxiety assessment for cases and control groups

Results of Taylor Manifest Anxiety Scale for patients and controls are demonstrated in Table 3. The mean results of the scale were 26.65 ± 8.71 and 6.40 ± 5.78 for patients and controls respectively and this was statistically significant ($p < 0.001$), indicating more anxiety symptoms among patients group.

As regards percentage only 10% of controls had mild depressive and anxiety symptoms in comparison to 80% of cases that showed different severities of depression and 82% showed different severities of anxiety.

Correlations

As shown in Table 4, there were statistically significant positive correlation between ISI and PDI, also there were statistically significant positive correlation between sleep latency, sleep disturbance and use of sleep medication and BMI, on the other hand there was statistically

Table 4 Correlating patient's clinical data with ISI, global PSQI and its subscales, BDI, and Taylor Manifest Anxiety Scale

	Age	Psoriasis duration in months	Education (years)	PASI	BSA (%)	BMI	PDI
ISI							
Correlation Coefficient	-0.043	-0.043	-0.160	0.163	0.029	0.121	0.245
***P*value**	0.670	0.670	0.113	0.106	0.778	0.231	0.014
N	100	100	100	100	100	100	100
PSQI-global							
Correlation Coefficient	-0.095	-0.095	-0.054	-0.092	-0.193	0.091	0.054
***P*value**	0.349	0.349	0.591	0.365	0.055	0.370	0.595
N	100	100	100	100	100	100	100
Subjective sleep quality							
Correlation Coefficient	-0.064	-0.064	-0.092	0.037	-0.064	0.082	0.101
***P*value**	0.524	0.524	0.362	0.717	0.524	0.420	0.318
N	100	100	100	100	100	100	100
Sleep latency							
Correlation Coefficient	-0.118	-0.118	0.031	0.028	-0.038	0.217	0.085
***P*value**	0.242	0.242	0.762	0.782	0.709	0.030	0.401
N	100	100	100	100	100	100	100
Sleep duration							
Correlation Coefficient	0.080	0.080	-0.012	-0.043	-0.144	-0.115	0.047
***P*value**	0.427	0.427	0.904	0.668	0.154	0.253	0.639
N	100	100	100	100	100	100	100
Habitual sleep efficiency							
Correlation Coefficient	0.000	0.000	0.029	-0.120	-0.210	-0.051	-0.064
***P*value**	0.999	0.999	0.776	0.236	0.036	0.616	0.530
N	100	100	100	100	100	100	100
Sleep disturbance							
Correlation Coefficient	-0.117	-0.117	0.032	-0.056	-0.155	0.214	-0.014
***P*value**	0.247	0.247	0.755	0.582	0.123	0.033	0.890
N	100	100	100	100	100	100	100
Use of sleeping medication							
Correlation Coefficient	-0.155	-0.155	-0.098	-0.035	-0.077	0.238	0.052
***P*value**	0.123	0.123	0.333	0.732	0.449	0.017	0.611
N	100	100	100	100	100	100	100
Daytime dysfunction							
Correlation Coefficient	0.055	0.055	-0.147-	-0.136-	-0.053-	-0.106-	-0.021-
***P*value**	0.584	0.584	0.144	0.176	0.603	0.295	0.835
N	100	100	100	100	100	100	100
BDI							
Correlation Coefficient	-0.046-	-0.046-	-0.021-	-0.146-	-0.145-	0.087	0.203
***P*value**	0.651	0.651	0.838	0.146	0.149	0.392	0.043
N	99	99	100	100	100	100	100
Taylor Manifest Anxiety Scale							
Correlation Coefficient	-0.017	-0.017	-0.017	0.043	0.011	0.097	0.278
***P*value**	0.869	0.869	0.870	0.674	0.915	0.339	0.005
N	99	99	100	100	100	100	100

Table 5 Correlation between BDI and Taylor Manifest Anxiety scale with PSQI global and all its subscales and Insomnia Severity Index (ISI)

	Correlation coefficient	*P* value	*N*
BDI			
PSQI-global	0.201	0.045	100
Subjective sleep quality	0.277	0.005	100
Sleep latency	0.151	0.135	100
Sleep duration	-0.012	0.906	100
Habitual sleep efficiency	-0.102	0.313	100
Sleep disturbance	0.151	0.134	100
Use of sleeping medication	0.181	0.071	100
Daytime dysfunction	0.185	0.066	100
ISI	0.223	0.026	100
Taylor Manifest Anxiety Scale			
PSQI-global score	0.286	0.004	100
Subjective sleep quality	0.262	0.008	100
Sleep latency	0.259	0.009	100
Sleep duration	0.096	0.340	100
Habitual sleep efficiency	-0.041	0.683	100
Sleep disturbance	0.237	0.017	100
Use of sleeping medication	0.225	0.024	100
Daytime dysfunction	0.207	0.039	100
ISI	0.314	0.001	100

negative correlation between habitual sleep efficiency and BSA. Depressive and anxiety symptoms measured by BDI and Taylor Manifest Anxiety Scale were significantly positively correlated with PDI.

In Table 5, depressive symptoms measured by BDI were significantly positively correlated with Pittsburgh Sleep Quality Index (PSQI) global score and subjective sleep quality subscale. Also, BDI scores was significantly positively correlated with insomnia scores as measured by ISI.

Anxiety symptoms as measured by Taylor Manifest Anxiety Scale were significantly positively correlated with global score of PSQI and its subscale (subjective sleep quality, sleep latency, sleep disturbance, use of medications, and daytime dysfunction)

Discussion

In this current study, we excluded psoriasis patients on any immunosuppressant therapy or systemic therapy to exclude their effect on sleep quality. We found a significant disturbance in sleep quality as measured by PSQI and insomnia severity as measured by ISI in these psoriasis patients when compared to controls. Moreover, sleep quality and insomnia severity among them were positively correlated with depressive and anxiety symptoms.

Different studies have investigated the sleep affection in patients with psoriasis. Samaci et al. 2019 recruited sixty psoriasis cases with mean PASI scores of 10.1 ± 9.7 which was slightly higher than ours (4.97 ± 5.24) and showed statistically significant changes in daytime sleepiness, sleep quality and insomnia severity index when compared to controls. Similar to our findings the latter authors did not find any correlation between the severity or duration of psoriasis and the degree of sleep affection. However, it has been previously reported that psoriasis itself may negatively affect sleep due to its negative effect on the person's circadian rhythm regulating body temperature. For sleep to start, there must be a slight lowering in one's body temperature which does not occur in psoriasis due to an impairment in heat transmission [14]. Surprisingly, according to the current work and that of Samaci et al. 2019, it seems that nor severity nor extent of psoriasis are related to the disease effect on body temperature regulation. On the other hand, while Karjewska-Wlodarczyk et al. [15] showed that 57.7% of psoriasis patients had sleep disorders when compared to 14.6% only among healthy controls, unlike our findings and that of Samaci et al. 2019, this sleep affection was related to the severity of psoriasis, but the study included patients with psoriatic arthritis as well.

Moreover, Sahin et al. [16] recent work showed statistically significant sleep affection in psoriasis cases when compared to controls and this affection was related to the degree of itching that they suffered from as well as the degree of anxiety and depression.

Chronic deterioration of sleep quality decreases the quality of life and may cause cardiovascular and metabolic disorders. Short duration of sleep affection also raises the inflammation in the form of elevation in TNF-alpha, C-reactive protein, and IL-17. Treatment of this decreased sleep quality should be treated by psychotherapy and treating the underlying cause [15]. The skin barrier may get disturbed from depriving a person just one night sleep and may increase IL-1 beta and TNF-alpha. Subclinical shifting in the basal normal cytokine levels may lead to future metabolic syndrome as the decreased sleep stimulates the autonomic nervous system. Itchy, painful psoriatic lesions as well as psoriatic arthritis together with the degree of affection of the emotional well-being and not the percentage of body surface area affected by psoriasis are all causes of disturbed sleep [17]. It is essential that this disturbed sleep quality among psoriasis patients be treated together with treating the underlying cause [15].

As the use of an immunosuppressant therapy in lung transplant patients contributed to their insomnia [18], we excluded patients on such medications in the current

study to avoid any confounding factor that may alter the relationship between psoriasis and insomnia.

Interestingly while the relation between psoriasis and physical disability has previously been demonstrated [19], poor sleep quality was associated with higher risk of physical impairment and disability in older adults [20]. As we detected positive correlations between psoriasis disability index and insomnia, anxiety, and depression, this relation association needs further research and insights into the management of the skin as well as its impact on the psychological and physical functions of patients.

Conclusions

In the current study, there was affection of sleep quality and insomnia in patients with psoriasis not on any immunosuppressive or systemic therapy, and this could be due to the psoriasis disease itself or due to the inflammatory effect of associated depression and anxiety. Detection of sleep problems and screening of any depressive and anxiety symptoms is recommended to be in the follow up routine with the patients. Psychoeducation about sleep hygiene should be aimed for to improve psoriasis patient's quality of life.

Limitations and further recommendations

Larger sample is needed with different types of psoriasis patients to be included to compare between different subtypes and different levels of severity to assess the quality of sleep among them and to study different factors affecting it. Also, the need for further researches to study the effect of sleep on psoriasis patients not suffering from depression and anxiety as well as not on any immunosuppressive or systemic therapy.

Abbreviations

PASI	Psoriasis Area and Severity Index
BSA	Body Surface Area
PDI	Psoriasis Disability Index
PSQI	Pittsburgh Sleep Quality Index
BDI	Beck Depression Inventory
ISI	Insomnia Severity Index
BMI	Body mass index

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Authors' contributions

Ola Osama Khalaf: methodology (choosing tools), correcting psychometric tools used in the study, data collection, and sharing in manuscript writing and corresponding author. Mohamed M. El-Komy: research idea, supervision on the research process, and revising the manuscript. Dina B. Kattaria: collecting controls and revising manuscript. Marwa S. El-Mesidy: research idea, methodology, collecting cases, and sharing in manuscript writing. The author(s) read and approved the final manuscript.

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Availability of data and materials

Upon request

Declarations

Ethics approval and consent to participate

This study was performed in line with the principles of the Declaration of Helsinki. Approval was granted by the Dermatology Ethics Committee (Date: April 2019 /No. 37/2019). All subjects signed written informed consents to participate in the study.

Consent for publication

Agree

Competing interests

All authors declare that they have no competing interests.

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