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Sleep evaluation scales and questionnaires: a review

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Introduction. Whenever a new scale is created or translated from another language, it must be validated, establishing its reliability for the new population where it will be used. Sleep quality concept is a construct that can be evaluated using self-report scales. Resulting elements vary depending on the individuals surveyed. This type of evaluation is mainly subjective and includes quantitative aspects such as sleep duration, number of awakenings, latency time, and qualitative aspects such as rest sensation, mood and oneiric content (Valencia, 2000). In the present study we made a critical review of the sleep scales designed for child, adolescent and adult populations that have been validated and the difficulties they might present.

Methodology. Between September 2005 and May 2006 a bibliographical search was made within pubmed, ovid, and the data base of the periodical and book library of the Ramón de la Fuente Muñiz National Institute of Psychiatry, using and combining the following key words: sleep, sleep questionnaire, sleep scale, sleep inventory, adolescent, adolescent sleep scale. The most relevant papers to our study were selected. The search was limited to Spanish and English articles, although there was no year or geographical origin limit. Articles that did not include clinimetrical data where excluded.

Conclusions. Based on our bibliographical search and our discussion, we suggested the design and validation of a Spanish scale to evaluate adolescent population which avoids a time interval between awakening and the answering of the instrument in order to decrease recall bias.

Key words:
Sleep. Sleep quality. Dreams. Disorders.

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Escalas y cuestionarios para evaluar el sueño: una revisión

Introducción. Cuando se elabora una escala o se traduce de otro idioma se debe validar y establecer la confiabilidad del instrumento para poblaciones donde se desea utilizar. El concepto de calidad del sueño es un constructo que puede ser evaluado mediante escalas de autoinforme. Los elementos resultantes varían según los individuos encuestados. Este tipo de evaluación es fundamentalmente subjetiva e incluye aspectos cuantitativos como la duración del sueño, el número de despertares, el tiempo de latencia y aspectos cualitativos como la sensación de descanso, el estado de ánimo o el contenido onírico. En el presente trabajo se hace una revisión crítica de las escalas de sueño diseñadas para población infantil, adolescentes y adultos que han sido validadas y las dificultades que pueden presentar.

Metodología. Entre septiembre de 2005 y mayo de 2006 se realizó una búsqueda en pubmed, ovid y base de datos de la bibliohemeroteca del Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz utilizando y combinando las palabras clave: *sleep, sleep questionnaire, sleep scale, sleep inventory, adolescent, adolescent sleep scale*. De los artículos obtenidos se seleccionaron los más relevantes para el tema de interés. No se limitó la búsqueda por fecha de publicación; sólo se incluyeron artículos en inglés y en español; se incluyeron artículos que proporcionaban datos clinimétricos; sin embargo, esta circunstancia ha sido señalada en la presente revisión. Tampoco se excluyeron publicaciones por su origen geográfico.

Conclusiones. Con base en la revisión y en la discusión sugerimos el diseño y validación de una escala en español para evaluar población adolescente y que además evite el intervalo de tiempo entre el despertar y el momento en que se contesta el instrumento con la finalidad de disminuir el sesgo de recuerdo.

Palabras clave:
Dormir. Calidad del sueño. Ensoñaciones. Trastornos.

INTRODUCTION

The scales used to evaluate the characteristics of cognitive and behavioral functioning of persons make it possible to obtain data that orient towards the diagnoses, especially in the area of mental health and neurology. Many scales have been developed in different health care field settings. These go from measuring the altered states of behavior to personality disorders, including instruments that measure quality of life in cancer patients[1], as well as the scales that measure emotional states[2].

When the scale is elaborated or translated from another language, it should be validated and the reliability of the instrument should be established for populations where it is going to be used. Different statistical techniques can be used to determine instrument reliability. One of these uses point dispersion and is calculated with the variance between the points expected in those obtained. The greater the level of reliability, the lower the measurement error[3]. A valid instrument is that which really measures the quality or characteristics for which it has been designed. There are different types of validation tests, that is, predictive content and construct. The concept of sleep quality is a construct that may be evaluated using self-report scales. The resulting elements vary according to the individuals surveyed. This type of evaluation is basically subjective and includes quantitative aspects such as sleep duration, number of awakenings, latency time, and qualitative aspects such as sensation of rest, mood state or oneiric content[4].

The study of sleep should not only refer to the fact of sleeping well at night but also should include the examination of daytime functioning[5]. The subjective report of the patient is of great importance in sleep alterations, for example, the definition of insomnia includes subjective malaise associated with the onset or maintenance of sleep, however the opinions vary according to the individuals[6].

Sleep duration makes up one third of our life. It has been established that there is a 35 % prevalence of sleep alterations at some time in life in the general population[4]. A total of 13 % of adolescent have sleeping difficulties during the night, 10 % report difficulties to get to asleep[7] and there is greater association with psychiatric disorders such as anxiety, depression, attention deficit and behavioral disorders in those who have problems during sleep as well as being prone to accidents and day time hypersomnia[8]. Suicidal depressive persons have higher rates of alterations in quality, latency and sleep duration in comparison with those who are not suicidal[9]. Given the impact that sleep has on mental health and that it is difficult to make adequately define and quantify it, instruments are needed for its evaluation and measurement that can decrease the bias due to subjectivity. Some existing scales require the person to answer retrospectively according to what he/she recalls of his/her quality of sleep during the last month[10].

All of the knowledge on sleep has been applied to the development of scales designed to evaluate sleep characteristics and disorders in the child, adolescent and adult population. In this work, we present a review of the sleep scales found in the literature.

METHODOLOGY

Between September 2005 in May 2006, a search was performed in pubmed, ovid, and databases of the book-journal library of the National Institute of Psychiatry Ramón de la Fuente Muñiz, using and combining the key words: sleep, sleep questionnaire, sleep scale, sleep inventory, adolescent sleep questionnaire, adolescent sleep scale. From the articles obtained, the most relevant for the subject of interest were selected. The search was not limited by publication date or language, although only articles in English and Spanish were included as well as those that did not provide clinimetric data. However, this circumstance has been indicated in the present review. Publications were not excluded by their geographic origin.

Thirty-eight scales which were organized into three groups according to age, that is children, adolescents and adults, were found. Some of these scales can be applied to more than one group. The main characteristics of the different instruments are shown in tables 1, 2 and 3.

SCALES THAT EVALUATE SLEEP AND OTHER PARAMETERS

Scale for the Infant Population (table 1)

The short questionnaire on sleep in infants, Brief Infant Sleep Questionnaire (BISQ), is an instrument designed for the pediatric population[11]. Sadeh found a significant correlation between actigraphy and the data obtained with the BISQ in a population of infants from 5 to 29 months of age in the number of nighttime wakings and duration of nighttime sleep. Thus, it can be used as a screening tool for infant sleep.

The BISQ was developed on the basis of the significant variables found in a review of the scientific literature on infant sleep. These were: duration of nighttime sleep (from 9 p.m. to 7 a.m.), duration of daytime sleep (from 7 a.m. to 7 p.m.), number of nighttime wakings, (from 10 p.m. to 6 a.m.), hours of sleep, duration of sleep latency, method of going to sleep, place where the infant sleeps, preferred body position, the infant's age, gender, place occupied among the siblings, and person who answers the questionnaire. Five to 10 minutes are required to administer the questionnaire.

The Sleep Disturbance Scale for Children (SDSC) is made up of 27 Likert type items and is designed to detect sleep

Table 1 Scales that evaluate sleep in child population

Instrument	Origin site	References	Aspects evaluated	Period evaluated
Brief Infant Sleep Questionary (BISQ)	Tel Aviv (Israel)	Sadeh. Pediatrics, 2004	Hour of sleeping, duration of sleep (night-day), nighttime wakings	Sleep in last week
Sleep Disturbance Scale for Children (SDSC)*	Roma (Italia)	Bruni O. J Sleep Res, 1996	Sleep disorder (26 items)	Retrospective up to 6 months
Pediatric Sleep Questionnaire (PSQ)	Michigan (USA.)	Chervin RD. Sleep Med, 2000	Snoring, daytime sleepiness and inattentive-hyperactive behavior (22 items)	Night prior to polysomnography

* Includes adolescent population.

Table 2 Scales that evaluate sleep in adolescent population

Instrument	Origin site	References	Aspects evaluated	Period evaluated
Sleep Impairment Index (SII)	USA	Smith S. J Sleep Res, 2001. Morin, 1993	Sleep perception in relationship with daytime occupation	Daily for 2 weeks
Sleep-Wake Activity Inventory (SWAI)	Unknown	Smith S. J Sleep Res, 2001. Rosenthal, 1993	Sleepiness (59 items)	Daily for 2 weeks
Sleep Disorders Questionnaire (SDQ	Unknown	Smith S. J Sleep Res, 2001. Douglass, 1994	Physiological sleep and disorders (176 items)	Daily for 2 weeks
Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS)*	Unknown	Smith S. J Sleep Res, 2001. Morin,1993	Perception and beliefs on the sleep alterations (insomnia) (30 items)	Daily for 2 weeks
School Sleep Habits Survey (modified)	Rhode Island (USA)	Giannotti. J Sleep Res, 2002	Sleep habits, daytime sleepiness, school attendance, chronotypes, emotional aspects and substance consumption	Last 2 weeks
Sleep survey for adolescents	Island	Thorleifdottir B. J Psychosomatic Research, 2002	Sleep, sleep habits and sleep problems	Daily (in the morning) for 1 week)
Post-Sleep Inventory*	Unknown	Webb WB. Percept Mot Skills, 1976	Pre, during and post-sleep aspects (mental activity, sleep factors, good and bad sleep) (29 items)	Evaluation of a single night
Sleep Questionnaire*	Unknown	Johns MW. Br J Prev Soc Med, 1971	Latency, time of getting up, total sleep time, sleep quality (27-31 items)	Previous night
Post-Sleep Questionnaire (PSQ)/Sleep Effects Index (SEI)*	Unknown	Zammit GK. J Clin Psychol, 1988	Latency, total time, maintenance, dysphoria, sleepiness, motor involvement, social (28 items)	

* Includes adult population.

Table 3 Scales that evaluate sleep in adult population

Instrument	Origin site	References	Aspects evaluated	Period evaluated
Oviedo Sleep Questionnaire (OSQ)	Oviedo (Spain)	Bobes, 1988. Bobes, 2000	Sleep times and sleep perception (15 items)	Last month
Sleep Timing Questionnaire (STQ)	Pittsburgh (USA)	Monk J. Sleep Res, 2001	Sleep times (going to bed, waking up, and ideal sleep times	Daily for two weeks
Sleep Disorders Questionaire (SDQ)	Unknown	Douglas A. Sleep Res, 1986	Sleep disorders (165 items)	
Sleep Disorders Questionaire (SDQ)	Unknown	Sweere Y. J Psychosomatic Research, 1998	Physiological sleep, depression, insomnia, narcolepsy and apnea (34 items)	Daily for two weeks
Wisconsin Sleep Questionnaire. Validación en Francia	Wisconsin	Teculescu D. J Clin Epidemiol, 2003. Young, 1993	32-10 (sleep disorders due to breathing), 5 (sleep disorder), 5 (personal), 12 (habits and work)	Retrospective (week) and follow-up at 3 months
Sleep Disorders Inventary (SDI)	USA	Tractenberg RE. J Sleep Res, 2003	Alterations in sleep (8 items)	Retrospective 2 weeks
Pittsburgh Sleep Quality Index (PSQI)*	USA	Buysse DJ. Psychiatry Res, 1989	Sleep disorders (19 personal items + 5 items answered by partner or caregiver)	Interval of 1 to 12 months
Leeds Sleep Evaluation Questionnaire (LSEQ)	Leeds (England)	Zisapel N. J Sleep Res, 2003	Sleep quality	During 7 weeks (evaluates 1 night of sleep
Sleep Disturbance Questionnaire (SDQ)		Espie CA. J Behav Ther Exper Psychiatry, 1989	Insomnia (12 items)	
VSH Sleep Scale	Unknown	Snyder-Halpern R, Verran JA. Res Nurs Health, 1987	8 characteristics of sleep, fragmentation, duratino, latency, deepness	
Basic Nordic Sleep Questionnaire (BNSQ)	Unknown	Partinen M. J Sleep Res, 1995	Quantitative and qualitative aspects of sleep (26 items)	
Sleep Evaluation Questionnaire	Unknown	Parrot AC. Psychol Med, 1978	Tme of going to bed, quality of sleep, time of waking up, behavior on getting up (10 items)	Evaluation of a single night
Karolinska Sleep Diary (KSD)	Sweden	Akerstedt T. Percept Mot Skills, 1994	Sleep quality, latency, ease of waking up, continuity (12 items)	Evaluation of a single night
Lindberg	Sweden	Lindberg E. J Sleep Res, 2000	Sleep alteration and symptoms (71 items)	Dialy
Athens Insomnia Scale (AIS)	Athens (Greece)	Soldatos CR. J Psychosom Res, 2000	It quantifies difficulty in sleep (onset, wakings, duration, quality) according to ICD-10 criteria (8 items)	Retrospective (last month)
Sleep Problems Scale	Boston (USA)	Jenkins CD. J Clin Epidemiol, 1988	Sleep disorders (3 and 4 items)	Self-evaluation (registries of 1 month-6 months?)
Disfunctional Beliefs and Attitudes about Sleep Scale-10 (DBAS-10)*	Glasgow (Scotland)	Espie CA. J Psychosomatic Research, 2000	Long and short term beliefs on insomnia and its control (10 items)	Daily for two weeks
Epworth Sleepiness Scale (ESS)*	Melbourne (Australia)	Johns MW. Sleep, 1991. Gibson ES. BMC Public Health, 2006	Sleepiness (9 items)	Immediate
Visual Analog Scale in quality of sleep (VAS-QOS)	Tel Aviv (Israel)	J Sleep Res, 2003	Sleep perception (insomnia)	During 7 weeks
Calgari Sleep Apnea Quality of Life Index (SAQLI)	Calgary (Canada)	Am J Respir Crit Care Med, 1998	Sleep apnea (daily, social, emotional function, symptoms and therapy) (35 items)	Immediate (4 weeks after treatment)
Sleep-EVAL system	Unknown	Ohayon M. J Sleep Res, 2002	Insomnia	Immediate (by telephone)
St. Mary´s Hospital Sleep Questionnaire	Unknown	Ellis BW. Sleep, 1981	Sleep quality, latency, continuity, satisfaction (14 items)	Evaluation of a single night

Table 3 Scales that evaluate sleep in adult population (continuation)

Instrument	Origin site	References	Aspects evaluated	Period evaluated
St. Mary's Hospital Sleep Questionnaire	Unknown	Leigh TJ. Sleep, 1988	Sleep quality, latency, continuity, satisfaction (14 items)	Evaluation of a single night
Sleep Questionnaire	Unknown	Domino G. Percept Mot Skills, 1984	Difficulty to wake up, Quality (latency), duration, irregularities, negative affect, recall (55 items)	
Stanford Sleepiness Scale (SSS)*	Stanford (USA)	Hoddes E. Psychophysiology, 1973	Evaluation of sleepiness on 7 levels	Every 15 minutes or at any time
Subjective assessment scale of sleep and dreams	Mexico	Gruen, Martínez, Cruz-Ulloa, Aranday, Calvo. Salud Mental, 1997	Emotional aspects of sleep and dreams	The night before

* Includes adolescent population.

disorders in children and adolescents[12]. The factorial analysis provided the following dimensions of the scale (total variance of 44.2%):

- Disorders concerning the initiation and maintenance of sleep (this accounts for 16.5% of the variance) that includes sleep duration, sleep latency, going to bed unwillingly, problems getting to sleep, anxiety on getting to sleep, nighttime wakings, and difficulty to stay asleep after wakings.
- Breathing disorders during sleep (this accounts for 6.2% of the variance) and it includes breathing problems, sleep apnea and snoring.
- Disorders due to activation and nightmares (this accounts for 5.5% of the variance) and includes wakings, nighttime terrors and nightmares.
- Disorders in sleep-wake transition (this accounts for 5.5% of the variance) and includes shaking during sleep, rhythmic movement disorder, hypnagogic hallucinations, nighttime hyperkinesis, sleep talking and bruxism.

  Disorders due to excessive sleepiness (it accounts for 5.1% of the variance) and includes difficulty for waking, tiredness on waking, sleep paralysis, daytime sleepiness, sleep attacks and enuresis. The enuresis item in the factorial analysis was the only one with a weight less than 0.40 and low inter-item correlation. Therefore, it was eliminated.
- Sleep hyperhidrosis (it accounts for 4.8% of the variance) refers to excessive sweating during sleep[12].

Internal consistence was greater in the controls (0.79) and was satisfactorily maintained in the subjects with sleep disorders (0.71), reliability was satisfactory for the total ($r = 0.71$) and for each item individually.

Another sleep evaluation scale in children and adolescents is the Pediatric Sleep Questionnaire (PSQ). This evaluates 22 items and its accuracy, reliability and sensitivity measurements are greater than 0.80. This instrument is characterized by the fact that it compares sleep disorders and daytime sleepiness with lack of attention and hyperactivity symptoms and also correlates them with the findings on the polysomnography[13].

Scales for the adolescent population (table 2)

Nine scales or questionnaires to evaluate sleep in adolescents were found in the bibliography reviewed. Although most have been developed recently, three that have existed for more than 20 years were found.

The Sleep Impairment Index (SII) scale is a self-report one that evaluates sleep perception in relationship with daytime occupation. It includes five items on severity of the disorder at the onset of sleep, sleep maintenance and waking problems in the morning as well as interference of daytime functioning and dissatisfaction grade with the current sleep pattern[14,15].

The Sleep-Wake Activity Inventory (SWAI) is a self-report one with 59 items designed specifically to identify excessive daytime sleepiness, but includes five additional factors: nighttime sleep, energy level, discomfort, desire to socialize and ability to relax. Some of these items are relevant to evaluate other aspects that may be related with insomnia, especially those regarding energy level and desire to socialize[15,16].

The Sleep Disorders Questionnaire (SDQ) is a questionnaire having 176 items designed to evaluate the presence of common sleep disorders. It includes four main factors: sleep apnea, narcolepsy, psychiatric sleep problems and periodic limb movement disorder. The authors state that the questionnaire is designed more to give any diagnosis than for a description of the disorders[15,17].

Morin published the Dysfunctional Beliefs and Attitudes about Sleep Scale (DBAS) to identify specific, irrational and affect-loaded thoughts that hinder sleep onset. This includes 30 items organized into 5 subscales: erroneous concepts on the causes of insomnia, erroneous attributions or «amplifications» of the consequences of insomnia, unrealistic expectations on sleep, perception of lack of control and defective beliefs on the practices the promote sleep. Each item is evaluated with a 20 cm visual analogue scale whose limits are poles that go from «strongly agree» to «strongly disagree»[18]. After, the psychometric properties of this scale were calculated, obtaining an 0.72 internal consistency of alpha for the totality of the scale. However, only 2 subscales reached a satisfactory internal consistency: number 2 on «erroneous attributions and amplifications on the consequences of insomnia» (alpha: 0.77) and number 4 «perception of lack of control and prediction and sleep» (alpha: 0.41). The remaining subscales showed an even lower consistency and, based on these results, an exploratory analysis was applied on the main components (PCA) to consider other possible factors or dimensions. However, this study did not show a satisfactory convergence so that some amendments in the survey were necessary[5]. The DBAS items that showed significant changes in the population studied were included in a new version of the scale[19]. The DBAS (DBAS-10) contained 10 items grouped into three factors and that showed an internal consistency of 0.69. Factor 1 includes five items from the original scale that were re-labeled as «beliefs on the immediate negative consequences of insomnia», factor 2 was called «beliefs on the long-term negative consequences of insomnia» that includes three of the original «beliefs and the need to control insomnia» that includes two original items. The DBAS-10 highly correlated with the original DBAS ($r = 0.826$).

DBAS-10 had sensitivity to monitor the cognitive-behavioral treatment results of the sleep disorder. Both the DBAS and DBAS-10 can be equally applied in the adult and adolescent population.

Other instruments that evaluate sleep in adolescents are the School Sleep Habits Survey[20], sleep survey for adolescents in Iceland[21], post-sleep inventory[22], Sleep Questionnaire[23] and Post-Sleep Questionnaire/Sleep Effects Index (PSQ/SEI)[24].

Giannotti et al.[20] from the Sleep Study Center of the University La Sapienza in Rome slightly modified and validated in Italy the original School Sleep Habits Survey of Carskadon et al.[25,26] The final instrument evaluated sleep, sleepiness, substance use, anxiety, depressive mood, use of sleeping pills, school attendance and circadian preferences (morninguess-eveninguess) of the adolescents during the last two weeks of its application and this is made up of several subscales that measure these aspects.

Scales for the adult population (table 3)

Scales that have been designed for the adult population include different types of questionnaires that consider varied aspects of the sleep conditions. These instruments are grouped in this review by the convenience and clarity of the description according to whether they evaluate: sleep times on physiological sleep, sleep disorders in general, insomnia, sleep quality, sleep apnea and sleepiness. Included among the tests related with sleep time in physiological sleep are the Sleep Quality Questionnaire of Oviedo (SQQ), Sleep Timing Questionnaire (STQ), VSH Sleep Scale of Snyder-Halpem, elaborated around the year 1987, Basic Nordic Sleep Questionnaire of Partinen of 1995, Sleep Evaluation Questionnaire[27] and Karolinska Sleep Diary (KSD)[28].

The Sleep Quality Questionnaire (SQQ) of Oviedo[29] is a questionnaire that provides diagnostic help for insomnia and hypersomia type disorders according to the DSM-IV and ICD-10 criteria. It is made up of 3 subscales: subjective satisfaction of sleep (1 item), insomnia (9 items) and hypersomia (3 items). It also contains 2 items that provide information on the use of sleeping aids or the presence of adverse phenomena during sleep (parasomnias, snorings). The insomnia subscale also examines several dimensions (sleep latency, duration, efficiency, daytime dysfunction) and provides information on their severity. All the items are answered using a Likert type scale. It is a short, simple and easy-to-apply questionnaire. It can orient the clinician and different dimensions of insomnia and its severity.

Bobes et al.[30] validated this scale in patients with depression, which made it necessary to conduct more studies with another type of population. In regards to the reliability obtained in the validation, Cronbach's alpha coefficient was 0.76. The instrument had adequate concurrent validity when compared with the Hamilton scale (Pearson's r of 0.78). Other questionnaires used to evaluate sleep times and physiological sleep are characterized by having a moderate number of items (8 for VSH and 26 the Nordic Sleep Questionnaire), by evaluating quantitative aspects and at times qualitative ones of physiological sleep. The STQ makes a daily analyses for two weeks and is only quantitative[31].

There are many tests that evaluate sleep disorders in general, among them the Sleep Disorders Questionnaire (SDQ),

Wisconsin Sleep Questionnaire (WSQ), developed by Lindberg et al.[32], Sleep Disorders Inventory (SDI), Pittsburgh Sleep Quality Index (PSQI), the Athens Insomnia Scale (AIS) instrument[33] and the Sleep Problems Scale[34].

The Sleep Disorders Questionnaire (SDQ) was designed by Douglas et al.[35] and then modified and validated in Holland[36]. These questionnaires aim to evaluate common sleep disorders. The original one had 165 items and the Dutch version reduced this to 34 items. These questionnaires evaluate in physiological sleep, depression, insomnia, narcolepsy and sleep apnea.

The Wisconsin Sleep Questionnaire (WSQ) is a short instrument designed to investigate sleep problems such as snoring, apnea and others such as difficulties of getting to sleep, getting out of bed at night or too early, sensation of not having rested, waking difficulty, nightmares, daytime sleepiness, restlessness and going to sleep, nasal obstruction or drip and falling asleep while watching television or reading. It showed a significant internal consistency (Cron-bach's alpha: 0.67-0.81) and maintained its validity in the measurements made at an interval of 3 months (Cohen's kappa > 0.60)[37,38].

The Sleep Disorders Inventory (SDI) was designed to evaluate sleep in populations with neuropsychiatric problems, mainly with Alzheimer's disease. It is made up of a list of evaluation of eigth symptoms (difficulty to sleep, getting out of bed during the night, inappropriate behaviors during the night, wakings during nighttime sleep, confusing night with day, waking up too early in the morning, sleeping excessively during the day and other behaviors) and a second section to determine frequency and severity of these symptoms, besides anxiety of the caretakers[39].

The Pittsburgh Sleep Quality Index of (PSQI) is a self-administered questionnaire. It is made up of 19 items in addition to five questions for the bed companion. The latter are used as clinical information, but do not contribute to the total score of the index. The 19 items analyze different factors determining sleep quality, grouped into seven components: quality, latency, duration, efficiency and sleep alterations, use of sleeping pills and daytime dysfunction[40,41]. Each component is scored from 0 to 3. The total score of PSQI is obtained from the sum of the sevent components and ranges from 0 to 21 points (the higher the score, the worse the sleep quality). Buysee proposed a cutoff of 5 (score ≥ 5 defining bad sleepers). This is a short questionnaire, simple and well-accepted by the patients. In the general population, it can be used as a screening element to detect «good» and «bad» sleepers. In the psychiatric population, it can identify patients who have sleep disorders concomitant with their mental condition. It can orient the clinician on the most deteriorated sleep components. It makes it possible to monitor the natural history of the sleep disorder of the patients, the influence of the sleep disorder on the course of the psychiatric conditions and the response to the specific treatments, among others. As a self-administered instrument, it may be difficult to apply in patients having low educational level. The internal consistency of Cronbach's alpha was elevated for the 19 items and for the seven components: the scores of the items, components and global value remained stable over time (test-retest)[40]. In the Royuela and Macías work[42] high internal consistency was found (Cronbach's alpha of 0.81). In the Buysse work, the predictive validity data provided the following results: using a cutoff of 5 (five bad sleeper), sensitivity was 89.6% and specificity 86.5%[40].

However, the Leeds Sleep Evaluation Questionnaire (LSEQ) is a standardized instrument to measure difficulties to sleep in the context of clinical investigation. It is a retrospective instrument in which the patients are asked to compare current aspects of sleep with those prior to the study they are enrolled in. It is made up of ten 10 cm line visual analogue scales to evaluate four domains (getting to sleep, sleep quality, waking and behavior after waking). The LSEQ is applied repetitively and the difference between current measurements and previous ones is used to evaluate efficacy of the study drug[43].

A factorial analysis was made of the Sleep Disturbance Questionnaire (SDQ). This provided three components or main factors that accounted for 68% of the total variance. Factor 1 is associated with «mental anxiety» and includes seven items. However, its validity and internal consistency have still not been calculated[44].

The Sleep Disturbance Questionnaire (SDQ) includes 12 items. Each one of them responds to a 5 point Likert type scale: «it is never true», «it is rarely true», «it is sometimes true», «it is frequently true», «it is always true»[44]. Espie et al. in 2000 obtained an internal consistency of 0.67 that indicates satisfactory reliability. A principal component analysis (PCA) provided four factors that accounted for 61% of the total variance: factor 1: «attributions regarding agitation/insomnia»; factor 2: «attributions regarding mental overactivation»; factor 3: «attributions regarding the consequences of insomnia»; factor 4: «attributions regarding the lack of preparation to go to sleep». A small but significant correlation was found between the total score is of the DBAS-10 and SDQ (r = 0.28). As there was a minor correlation between the factors of these scales, it can be supposed that they are independent from each other. Some differences in the measurements of both scales should be taken into account: while the DBAS-10 identifies the leaks regarding insomnia and specifically the effects of its, the SDQ seeks to identify causal attributions regarding the source of the sleep problems perceived. This would explain the independence mentioned above between the two scales[19].

There are some scales that are useful to identify cognitive elements associated to sleep: the Pre-Sleep Arousal Scale

which was published by Nicassio et al. and demonstrated a satisfactory internal consistency for both its somatic and cognitive subscales (r = 0.81 and r = 0.76, respectively) and its validity was statistically significant[45].

The Epworth Sleepiness Scale[46] is a short self-administered questionnaire that provides information on daily conditions of sleepiness in the adult population. However, no statistical analysis of validation has been performed on this 8 item questionnaire. The same has occurred with a combination of instruments that are not mentioned in this review, but, however, appear in the included tables.

Other scales

In this literature review we found other questionnaires and scales that mention sleep items althougth they are not aimed to mainly evaluate sleep. Among these, the Seasonal Pattern Assessment Questionnaire (SPAQ) is included. Among other things, this evaluates the effects of the seasonal changes on sleep[47,48].

DISCUSSION AND CONCLUSIONS

Most of the sleep scales reviewed aim to evaluate the alterations and diseases present in both the general as well as specific populations (elderly, children, adolescents, dementia patients and those with other diseases). In these scales, there are often questions on the characteristics of sleep that have occurred in periods distant from the time when the questionnaire is applied. Thus the answers may be erroneous due to false recall or forgetfulness, altering the results that support the criteria and knowledge on the different aspects of sleep.

It is common to find scales with many items, some of them even exceed 150[49,50]. This makes them impractical to obtain the collaboration of the study subjects. Some having a number that does not exceed 30 questions that are sometimes obtained from longer ones and are more useful for both clinical and research application are found[19,24,39].

It is interesting to note that very few sleep scales study only the habits, physiological characteristics and the relationships between them and the environmental, social, cultural, seasonal and chronobiological rhythm conditions.

It should also be noted that there were no instruments developed or validated in the Latin American population in the scales found in the review of the literature. The only instrument that we know of that was elaborated in Latin America, but that was not subjected to validation or reliability, was that designed by Gruen et al.[49] in the year 1997. This instrument, which uses an 8-item visual analogue scale, evaluate the emotions of the dreams in patients with temporal lobel epilepsy of the temporal lobe in relationship to healthy persons. It finds that patients with epilepsy have unpleasant dreams more frequently and that they have higher intensity and fewer emotions in their dreams in comparison to the control group. However, we do not know if this scale has been used again.

Adolescents are in a development stage that involves biological changes and changes in the social roles which have great impact. This has a repercussion on their sleep habits and patterns, since they are in a transition stage between the child sleep pattern and that of the adults. The study of sleep in this juvenile population is of great interest because it can contribute to knowledge on the external and internal influences in the establishment of sleep patterns. Thus, scales that study this population specifically need to be developed. Most of the studies reviewed have not exclusively focused on adolescents. Those that mention them are generally combined with adults or children populations[15,22,23].

Another one of the important aspects observed in this review refers to the absence of information regarding the validation of these scales used.

It is not rare to find studies that correlate the information obtained in the questionnaires on sleep and the measurement by polysomnography or actigraphy in these articles[13].

Considering the above, designing and validating a scale in Spanish to evaluate the adolescent population and to avoid the time interval between waking and the time and when the instrument is answered is necessary in order to decrease the recall bias.

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