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Impulsive compulsive behaviors in Japanese Parkinson's disease patients and utility of the Japanese version of the Questionnaire for Impulsive–Compulsive Disorders in Parkinson's disease

Kenichiro Tanaka *, Kenji Wada-Isoe, Satoko Nakashita, Mikie Yamamoto, Kenji Nakashima

Division of Neurology, Department of Brain and Neurosciences, Faculty of Medicine, Tottori University, Japan

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ABSTRACT

Background: In order to evaluate impulsive compulsive behaviors (ICBs), such as pathological gambling, compulsive sexual behavior, compulsive buying, compulsive eating, punding, and dopamine dysregulation syndrome (DDS) in Japanese Parkinson's disease (PD) patients, we constructed a Japanese version of the Questionnaire for Impulsive–Compulsive Disorders in Parkinson's disease (J-QUIP) and evaluated the utility of the J-QUIP in Japanese PD patients.
Methods: J-QUIP was administered to 121 PD patients. Diagnoses of ICBs were made via interview of patients or their caregivers. Subsequently, in order to evaluate risk factors related to these conditions, we evaluated demographic and clinical characteristics, clinical features, and medications utilized.
Results: We were able to administer the J-QUIP to 118 of 121 PD patients (97.5%). Sensitivity and specificity of J-QUIP were similar to that reported for the original version of QUIP. In our study, the actual prevalence of each disorder diagnosed via interview was as follows: pathological gambling (6.5%), compulsive sexual behavior (3.2%), compulsive buying (3.2%), compulsive eating (3.2%), punding (6.5%), and DDS (2.2%). Significantly risk factors for these conditions were younger age ($p = 0.047$), earlier age of disease onset ($p = 0.015$), longer PD duration ($p = 0.001$), total levodopa equivalent dose ($p = 0.006$), and dosage of levodopa ($p = 0.019$).
Conclusions: We evaluated the prevalence of ICBs in Japanese PD patients along with factors associated with these behaviors via J-QUIP.

1. Introduction

Besides classical motor symptoms, patients with Parkinson's disease (PD) also experience non-motor symptoms. These non-motor symptoms affect quality-of-life, institutionalization, and healthcare costs. Certain behaviors associated with PD are produced by chronic treatment with dopaminergic medications. These behaviors are linked by their incentive- or reward-based and repetitive natures [1], and are termed impulsive compulsive behaviors (ICBs). These behaviors include pathological gambling, compulsive sexual behavior, compulsive buying, compulsive eating, punding, and dopamine dysregulation syndrome (DDS). DDS means compulsive medication use. Especially, pathological gambling, compulsive sexual behavior, compulsive buying, and compulsive eating are often called impulsive–compulsive disorders (ICDs) [2]. Although ICBs represent one of the non-motor symptoms of PD, they are not very well identified by patients or family caregivers and are frequently overlooked in the clinical setting. In addition, whereas the prevalence and the risk factors of these behaviors were estimated in recent reports, it has not fully considered. Recently, Weintraub et al. have reported the utility of the Questionnaire for Impulsive–Compulsive Disorders in Parkinson's disease (QUIP), a self-administered questionnaire for impulsive–compulsive disorders [2]. QUIP can also screen punding and DDS. Of note, QUIP was used in Malaysia [3]. In this study, we developed a Japanese version of QUIP (J-QUIP) and evaluated the usefulness of J-QUIP in Japanese PD patients. Furthermore, we estimated the prevalence and the risk factors of ICBs in Japanese PD patients.

2. Material and methods

2.1. Development of J-QUIP

We developed a Japanese version of QUIP, employing procedures accepted internationally [4]. After obtaining permission from the authors of the original version of QUIP to produce the J-QUIP, we translated the original version of QUIP into the Japanese language. Next, the Japanese-translated QUIP was re-translated into English

* Corresponding author at: Division of Neurology, Department of Brain and Neurosciences, Faculty of Medicine, Tottori University, 36-1 Nishi-cho, Yonago 683-8504, Japan. Tel.: +81 859 38 6757; fax: +81 859 38 6759.
E-mail address: ken0815@med.tottori-u.ac.jp (K. Tanaka).

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by a person unassociated with the first translation. Finally, we asked the original authors whether this back-translated version preserved the same meanings as the original, and this ultimately resulted in the J-QUIP. Although the original version of QUIP included both a full version questionnaire and a short version questionnaire, we employed only the short version questionnaire since no differences exist in the test sensitivity between these two versions [2].

2.2. Subjects

The subjects for this study comprised 121 consecutive patients diagnosed with idiopathic PD in the Department of Neurology at Tottori University Hospital between April 2011 and December 2011. The clinical diagnosis of PD was based on the UK PD Society Brain Bank criteria [5]. Demographic and clinical characteristics are as follows: Age (70.5 ± 9.7 years), Sex (male: female = 56: 65), PD duration (9.9 ± 7.3 years), and Hoehn–Yahr scale (2.6 ± 0.9). We evaluated demographic and clinical characteristics of each group, such as sex, age, age of disease onset, PD duration, degree of severity of motor symptoms, non-motor symptoms (depression, apathy, sleep disturbance, excessive daytime sleepiness, REM sleep behavior disorder, restless leg syndrome, fatigue, orthostatic hypotension, constipation, visual hallucination, and olfactory dysfunction), medications (total levodopa equivalent dose (LEDs) [6], dopamine agonist-only LEDs, levodopa, pramipexole, ropinirole, selegiline, and amantadine), heart-mediastinum (H/M) ratio of ^{123}I-meta-iodobezylguanidine (MIBG) myocardial scintigraphy [7], and amount of activity in actigraphy [8]. We assessed motor symptoms by using the Hoehn–Yahr scale, and certain non-motor symptoms via questionnaires. The employed questionnaires included the Geriatric Depression Scale-15 (GDS-15) [9], the Apathy Scale (AS) [10], the Pittsburgh Sleep Quality Index (PSQI) [11], the Japanese version of the Epworth Sleepiness Scale (JESS) [12], the REM Sleep Behavior Disorder Screening Questionnaire (RBDSQ) [13], and the Parkinson Fatigue Scale (PFS) [14]. GDS-15 has been validated for the diagnosis of depression, with the cut-off point being 5/6. AS has also been validated for apathy, with the cutoff point being 15/16. The cutoff value for the PSQI for poor sleep was 5/6 points, for the JESS to assess excessive daytime sleepiness was 9/10 points, and for the RBDSQ to detect REM sleep behavior disorder was 5/6 points. In addition, PFS was used to evaluate fatigue, and the cutoff point was 3.3. Regarding restless leg syndrome, fatigue, orthostatic hypotension, constipation, visual hallucination, and olfactory dysfunction, we assessed it positive or negative.

2.3. Diagnosis of ICBs

After administration of J-QUIP, we interviewed the patients directly or by telephone to confirm whether the patient experienced abnormal behaviors related to ICBs. In case we were unable to gather sufficient information from the patient, we also interviewed their caregiver. We diagnosed pathological gambling, compulsive sexual behavior, compulsive buying, compulsive eating, punding and DDS according to various diagnostic criteria as listed in the review by Voon and Fox [1].

2.4. Data analysis

Data analysis was conducted with SPSS for Windows version 18 (Chicago, IL). The results are presented as mean ± standard deviation. Intergroup differences were analyzed using a Mann–Whitney *U* test. Categorical variances were examined using a χ^2 test. We used a level of 95% ($P < 0.05$) as the criterion for statistical significance.

This study was planned and conducted in accordance with the Declaration of Helsinki. The Ethics Committee of the Tottori University Faculty of Medicine approved the study prior to its implementation.

3. Results

3.1. Validation of J-QUIP and prevalence of ICBs

We were able to administer the J-QUIP to 118 of 121 PD patients (97.5%), almost all within 5 min. Three patients rejected the survey due to their severe cognitive impairment. Of the 118 PD patients, 93 patients were able to confirm whether they experienced symptoms of ICBs via interviewing directly or by telephone. 25 patients were not able to confirm because we couldn't contact them. So, we decided to turn these 93 patients into this study (Fig. 1).

The prevalence of QUIP positivity in our patients was as follows: pathological gambling (14.0%), compulsive sexual behavior (14.0%), compulsive buying (10.8%), compulsive eating (10.8%), punding (16.1%), and DDS (18.3%) (Fig. 1).

The actual prevalence of ICBs which is determined by interview for patients was indicated in below: pathological gambling (6.5%), compulsive sexual behavior (3.2%), compulsive buying (3.2%), compulsive eating (3.2%), punding (6.5%), and DDS (2.2%) (Fig. 1 and Table 1). Regarding DDS, DDS was highest QUIP positive, but only 2 of 17 PD patients actually experienced compulsive medication use. Overall, 21.5% of PD patients had a history of at least one ICB and 12.9% of PD patients had a history of at least one ICD. In addition, we detected 2 patients (2.2%) who concealed their ICBs (one is pathological gambling, the other is punding) from their caregiver's interview.

Based on these results, we validated the utility of J-QUIP. We calculated sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) for each behavior via diagnostic concordance rate between actual diagnosis and result of J-QUIP. These are shown in Table 2.

3.2. Risk factors for ICBs

We evaluated risk factors for actual ICBs diagnosed via interview.

Regarding demographic features, younger age ($p = 0.047$), earlier age of disease onset ($p = 0.015$), and longer PD duration ($p = 0.001$) were all related to ICBs. Gender was unrelated to these conditions (Table 3).

Regarding motor symptoms, Hoehn–Yahr scale scores were not related to ICBs. Regarding non-motor symptoms, none of the symptoms studied, including depression, apathy, sleep disturbances, excessive daytime sleepiness, REM sleep behavior disorder, restless leg syndrome, fatigue, orthostatic hypotension, constipation, visual hallucination, or olfactory dysfunction, were related to ICBs (Table 3).

Regarding dopamine replacement therapy as medications, LEDs ($p = 0.006$) and dosage of levodopa ($p = 0.019$) were related to the prevalence of ICBs. Mean dose of dopamine agonist-only LEDs in the PD patients with ICBs was higher than that in the PD patients without ICBs, but the difference did not reach statistical significance. Other medications, such as dosage of pramipexole, dosage of ropinirole, dosage of selegiline, or dosage of amantadine, were not related. The use of dopamine agonists (any one of pramipexole, ropinirole, cabergoline, bromocriptine, or pergolide) was not also statistically related to the presence of ICBs (Table 3).

4. Discussion

In this study, we created a Japanese version of QUIP, which represents a screening questionnaire for ICBs. We also evaluated the usefulness of this test since the sensitivity and specificity of J-QUIP share similar detection rates as the original version of QUIP (Table 2). Previously, the Japanese versions of BIS-11 (Barratt Impulsive Scale-11) [15], SOGS (South Oaks Pathological gambling Screen) [16], and MOCI (Maudsley Obsessional–Compulsive Inventory) [17] have been used for the screening of impulsivity in Japan. In addition, the MIDI (Minnesota Impulsive Disorders Interview) has been used in foreign countries although it has

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