

The paradoxical clinical course of persons with gambling disorder and comorbid attention-deficit/hyperactivity disorder (ADHD)

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Declarations

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Abstract

The co-occurrence of gambling disorder (GD) and attention-deficit/hyperactivity disorder (ADHD) has been widely reported. In this study, we aimed to investigate the social background, clinical characteristics, and clinical course of initial-visit GD patients with and without ADHD in a Japanese psychiatric hospital. We recruited 40 initial-visit GD patients and collected comprehensive information by self-report questionnaires, direct interviews, and medical records. 27.5% of the GD patients had comorbid ADHD. Compared to the GD patients without ADHD, those with ADHD had significantly higher comorbidity rates of autism spectrum disorder (ASD), lower rates of marriage, slightly less years of education and marginally lower employment rates. On the other hand, the GD patients with ADHD showed higher treatment retention rates and participation rates in the mutual support group. Despite presenting with disadvantageous characteristics, GD patients with ADHD exhibited a more favourable clinical course. Therefore, clinicians should be mindful of the possibility of ADHD comorbidity and the potential for better clinical outcomes among GD patients with ADHD.

Keywords

gambling disorder, comorbidity, attention-deficit/hyperactivity disorder (ADHD), clinical course, prognosis

Introduction

Accurate diagnosis and treatment of psychiatric comorbidities are imperative for addiction clinicians (Griswold, Aronoff, Kernan, & Kahn, 2008; Mueser & Kavanagh, 2004; Webster, 2017) because addiction is frequently comorbid with other psychiatric disorders. For instance, more than half of gambling disorder (GD) patients exhibit comorbid alcohol use disorder, substance use disorder, mood disorder, and other conditions (Lorains, Cowlishaw, & Thomas, 2011). Moreover, problem gamblers have a significantly higher prevalence of psychiatric comorbidities, exceeding twice that of non-problem gamblers (Sundqvist & Rosendahl, 2019), irrespective of sex.

In recent years, the concept of neurodevelopmental disorders has gained significant prominence in the fields of paediatrics and psychiatry. Attention-deficit/hyperactivity disorder (ADHD) is a well-established disorder in this category, with symptoms of ADHD often persisting into adulthood, although some patients also experience remission (Biederman et al., 2010). Furthermore, those enduring symptoms that adversely affects an individual's quality of life due to its persistent symptoms and characteristics into adulthood (Agarwal, Goldenberg, Perry, & Ishak, 2012; Brod, Schmitt, Goodwin, Hodgkins, & Niebler, 2012; Quintero, Morales, Vera, Zuluaga, & Fernández, 2019). According to in the literature on substance addiction, 5.4 ~ 31.3% of individuals with substance use disorder (SUD) exhibited comorbid ADHD (van de Glind et al., 2014), which substantially exceeds the prevalence of ADHD (2.5%) among general adults (Simon, Czobor, Bálint, Mészáros, & Bitter, 2009). Similarly, 5.8 ~ 25.2% of GD patients were comorbid with ADHD (Chamberlain, Derbyshire, Leppink, & Grant, 2015; Fatseas et al., 2016; Karaca, Saleh, Canan, & Potenza, 2017; Retz, Ringling, Retz-Junginger, Vogelgesang, & Rösler, 2016). Conversely, individuals with ADHD symptoms showed a four-fold higher rate of comorbid SUD (Fayyad et al., 2007) and GD (Jacob, Haro, & Koyanagi, 2018) compared to those without ADHD symptoms. Thus, a close relationship can be observed between GD and ADHD, as is the case with SUD and ADHD.

However, GD patients show different clinical characteristics according to depending on the presence or absence of ADHD. For instance, GD patients with ADHD show higher rates of psychiatric comorbidities (Aymamí et al., 2015; Cairncross, Milosevic, Struble, Ellis, & Ledgerwood, 2019) and impulsivity (Cairncross et al., 2019; Chamberlain et al., 2015; Grall-Bronnec et al., 2011) compared to those without ADHD. Nevertheless, few studies have investigated the social backgrounds, such as marital status, income, and debt, and none have explored both social backgrounds and clinical courses

simultaneously between GD patients with and without ADHD.

In the present study, we aimed to investigate the clinical characteristics and social backgrounds of GD patients with and without ADHD and ~~examined to examine~~ their clinical course after consultations.

Materials and methods

Participants and procedures

The information obtained in this survey was utilized exclusively for medical reporting as retrospective data for the group, with careful consideration of personal information to ensure confidentiality. This study was approved by the Ethics Committee of Research of the Koryo Hospital and ~~was~~ carried out in accordance with the Code of Ethics of the World Medical Association. After providing a complete description of the study, written informed consent was obtained from all participants.

For two years (from January 1, 2016, to December 31, 2017), we ~~enrolled 40 recruited initial-visit~~ treatment-seeking GD ~~outpatients during their initial visits~~ at a psychiatric hospital (Koryo Hospital). ~~Given that Koryo Hospital is the only hospital that examines GD patients in Yamaguchi prefecture, GD patients either self-referred or were referred from other medical facilities within the region. Throughout this duration, a total of 40 patients were enrolled and underwent assessment upon their initial presentation.~~ Criteria from the Diagnosis and Statistical Manual of Mental Disorders 5th edition (DSM-5) (American Psychiatric Association, 2013) were used to diagnose GD and ADHD in the patients. ~~All patients were confirmed as meeting four or more criteria of GD among the DSM-5 criteria of GD and as having no history of manic episodes.~~ For ADHD, the patients were screened using the Adult ADHD Self-Report Scale (ASRS-v1.1) (Daigre Blanco et al., 2009; Kessler et al., 2005). Subsequently, the life history before and during school years was obtained from the patients' parent(s), as a definitive DSM-5 diagnosis of ADHD requires information about ADHD symptoms before age 12. If this information was not available from family members, it was corroborated by self-reports from the patients. ~~Subsequently, using DSM-5 criteria, comorbid ADHD was diagnosed by a trained psychiatrist.~~ We made a definitive diagnosis of GD, ADHD, and other coexisting psychiatric disorders on the initial visitation day. Given the high comorbidity between GD and alcohol use disorder (AUD), and between ADHD and autism spectrum disorder (ASD), we divided the psychiatric comorbidities other than ADHD into 3 categories: AUD, ASD, and other psychiatric disorders.

Apart from these definitive diagnoses of GD and ADHD, we obtained information regarding the demographic and social backgrounds, including years of education, employment, income, and so forth from interviews with patients and/or family members, as well as medical records on the day of initial visit. In the case of school dropouts, the years of education included those up to the previous fiscal year. We also collected comprehensive GD-related clinical information such as age at gambling, any criminal history related to money to be used for gambling, the total amount of ~~gambling-related debt from~~ ~~gambling~~ up to their initial visit, and the presence/absence of gambling problems among other family members. Regarding age at first gambling, we excluded four GD patients, one with ADHD and three without ADHD, from the analysis, as their age at their first gambling occasion could not be determined. Regarding debt, we excluded two GD patients, one with and one without ADHD, from the analysis as the total amount of debt could not be determined.

While methylphenidate is typically regarded as the first-line medication for treating ADHD, Koryo Hospital prohibits its usage due to the potential risk of dependence. Consequently, we administered atomoxetine as a treatment for comorbid ADHD symptoms in GD patients, titrating the dosage in accordance with the dynamism of ADHD symptoms as usual. We ~~also~~ investigated the utilization and maintenance dosage of atomoxetine among GD patients with ADHD in this study. ~~In addition~~ Furthermore, to examine their treatment retention following their initial visit, we investigated subsequent continuation outpatient visits. ~~and In addition, we investigated their participation status in~~ the mutual support group ‘Gamblers Anonymous (GA)’ three months after their initial visit according to their medical records. ~~GA is recognized as a common general support resource for GD patients.~~

Statistical analysis

Statistical analyses were performed using SPSS (SPSS 25.0 for Windows, SPSS Inc, Chicago, IL, USA). We employed the Fisher’s exact test to compare the percentages of males, ~~presence existence~~ of a family history of gambling problems, employment, marriage, income independence, comorbidity (ASD, AUD, and other psychiatric conditions), criminal behaviour, continuation of outpatient therapy, and participation in a mutual support group. After evaluating the normality of the population distribution by ~~the~~ Shapiro-Wilk normality test, we ~~performed used~~ the Mann-Whitney U test to compare ~~the~~ non-normally distributed variables (age, years of education, age ~~of at~~ first gambling experience, and amount of debt).

Results

Demographics, social backgrounds and clinical course

Of the 40 GD patients, 11 (27.5%) had comorbidity with ADHD. Two, five, and four of these patients were categorized as predominantly inattentive subtype, predominantly hyperactive-impulsive subtype, and combined subtype, respectively. Atomoxetine was prescribed for 9 of the 11 GD patients with ADHD (81.8%), with an average maintenance dose of 72.2 ± 17.0 mg (mean $\pm$ standard error).

We summarized the social backgrounds and clinical information of the GD patients with and without ADHD in Table 1. GD patients with ADHD showed a significantly higher comorbidity rate of ASD, and a lower marriage rate compared to those without ADHD. While no GD patients without ADHD were divorced, two GD patients with ADHD were divorced. GD patients with ADHD showed a tendency to have shorter durations of education and lower rates of employment compared to those without ADHD. None of the GD patients with ADHD had entered university or college, in contrast to the GD patients without ADHD, of whom 10 of 29 had entered university or college. Regarding age, sex, age at first gambling occasion, presence of a family history of gambling problems, rate of income independence, comorbidity rate of AUD, and other psychiatric disorders, the rate of committing crimes, crime commitment, and the amount of debt, there were no between-group differences.

Clinical Course

Finally, we evaluated the prognosis of GD patients with and without ADHD. GD patients with ADHD showed a significantly higher treatment retention rate compared to those without ADHD. Furthermore, GD patients with ADHD showed a significantly higher participation rate in GA compared to those without ADHD (Table 2).

Discussion

In this study, the comorbidity rate of ADHD among GD patients at a Japanese psychiatric hospital was 27.5%. Most of the GD patients with ADHD (81.8%) were prescribed atomoxetine. Furthermore, GD patients with comorbid ADHD exhibited a significantly higher rate of comorbid ASD, a substantially lower rate of marriage, slightly fewer years of education, and a marginally lower rate of

151 employment compared to those without ADHD. Regarding the clinical course, GD patients with ADHD
152 showed significantly higher treatment retention and GA participation rate.

153 The prevalence of comorbid ADHD in GD patients in this study (27.5%) was slightly higher but still
154 comparable to the rates reported in previous studies in Germany (25.2%) (Retz et al., 2016), UK /USA
155 (21.4%) (Chamberlain et al., 2015), France (9.2%) (Fatseas et al., 2016) and Singapore (20.0%) (Mak,
156 Tan, & Guo, 2018). Previous research on the comorbidity rate of ADHD in substance use disorder
157 patients ~~has shown~~ showed a range of 5.4% to 31.3% (van de Glind et al., 2014). Taken together, the
158 comorbidity rate of ADHD in GD patients appears to fall within the range of that in substance use
159 disorders, and it exceeds the prevalence in the general adult population (2.5%) (Simon et al., 2009). The
160 high comorbidity rate of ADHD among GD patients could be ascribed to two factors. The first factor is
161 impulsivity, a hallmark symptom of ADHD, (Urcelay & Dalley, 2012; Winstanley, Eagle, & Robbins,
162 2006) that has been linked to an increased risk of developing GD (Blaszczynski & Nower, 2002). This
163 association could elevate the ADHD comorbidity rate among GD patients. In addition, impulsivity
164 observed among GD patients (Chowdhury, Livesey, Blaszczynski, & Harris, 2017; Leeman & Potenza,
165 2012) could be partly explained by comorbid ADHD. The second factor is adverse childhood
166 experiences. Children with ADHD have been shown to be at an increased risk for experiencing
167 subsequent adverse childhood experiences (Lugo-Candelas et al., 2021), and adverse childhood
168 experiences are associated with an increase in gambling problems (Afifi, Brownridge, MacMillan, &
169 Sareen, 2010; Poole, Kim, Dobson, & Hodgins, 2017). Thus, adverse childhood experiences could
170 mediate the coexistence of GD and ADHD.

171 The higher comorbidity rate of ASD observed among GD patients with ADHD could be due to the
172 high comorbidity rate between ADHD and ASD (Antshel, Zhang-James, Wagner, Ledesma, & Faraone,
173 2016). As for the lower marriage rate among GD patients with ADHD, considering their comparable age
174 at their initial hospital visit, GD patients with ADHD could often be unmarried or divorced compared to
175 those without ADHD. Additionally, the high comorbidity rate of ASD among GD patients with ADHD
176 might also have influenced their marital status.

177 GD patients with ADHD showed a trend of having shorter ~~lengths of education histories~~ compared to
178 those without ADHD. ADHD students were reported to have experienced more school dropouts
179 (Barkley, Fischer, Smallish, & Fletcher, 2006; Breslau, Miller, Joanie Chung, & Schweitzer, 2011;
180 Currie & Stabile, 2006) and/or repeated academic years (Biederman et al., 1996; Breslau et al., 2011).

181 Although we did not inquire about the number of repeated years in this study, we obtained information
182 about their school dropouts and recorded it in their medical records. Slightly less years of education
183 among GD patients with ADHD could be due to the high rate of school dropouts and the 0% enrolment
184 rate in university or college. Although limited information on adjustment to attending school prevents a
185 clear explanation, we assume that GD patients with ADHD might have faced academic challenges
186 during their school days.

187 GD patients with ADHD showed a tendency to have less employment in comparison to those without
188 ADHD. The slightly lower employment rates among GD patients with ADHD could be attributed, at
189 least in part, to their marginally shorter spans of education. On the other hand, there were no between-
190 group differences in their rates of income independence and amounts of debt. Given the high impulsivity
191 among ADHD patients (Urcelay & Dalley, 2012; Winstanley et al., 2006) and the correlation between
192 impulsivity and symptom severity among GD patients (Alessi & Petry, 2003; Steel & Blaszczyński,
193 1998), the comparable amount of debt between GD patients with and without ADHD is somewhat
194 unexpected. One possible explanation for this might be their insufficient availability of funds due to
195 their low employment rate. Financial problems are one of the main motivations for GD patients to seek
196 treatment (Suurvali, Hodgins, & Cunningham, 2010). However, our data suggest that GD patients with
197 ADHD seek treatment for reasons other than financial problems.

198 Notwithstanding the above-mentioned disadvantageous characteristics, GD patients with ADHD
199 showed a good prognosis, as such patients had a significantly higher treatment retention rate compared
200 to those without ADHD. There might be some reasons for this phenomenon to be attributable to
201 comorbid ADHD. Firstly, clarification of the underlying cause of their difficulties might provide relief
202 to GD patients with ADHD. They often face challenges in their daily lives and rarely recognise the
203 cause of their struggles by themselves. However, following a diagnosis of comorbid ADHD, they
204 usually express a decreased sense of guilt and a feeling of relief, which may extend to their families,
205 leading to conciliation of their families' attitudes and behaviour towards them. These factors might help
206 ameliorate their troubles and ultimately motivate patients to continue their treatment. Secondly, the
207 availability of prescribed medications for ADHD might encourage patients to adhere to their
208 consultations. Additionally, the pharmacological effect of atomoxetine itself might have contributed to
209 the high treatment retention rate of GD patients with ADHD. Conversely, the absence of approved
210 medications for GD could negatively affect the motivation of GD patients without ADHD to continue

211 their consultations.

212 Thirdly, self-esteem restoration could explain the high treatment retention rate in GD patients with
213 ADHD. The relief that their difficulties could be treated, amelioration of symptoms by medication, and
214 improvement of GD-related symptoms might help GD patients with ADHD regain self-esteem. Low
215 self-esteem is associated not only with gambling problems (Volberg, Reitzes, & Boles, 1997) and
216 substance use (Ahlgren & Norem-Hebeisen, 1979; Charalampous, Ford, & Skinner, 1976) but also with
217 the clinical course of the addiction population (Choi & Kim, 2021; González-Ortega, Echeburúa, Corral,
218 Polo-López, & Alberich, 2013; Kelly, Lynch, Donovan, & Clark, 2001; Richter, Brown, & Mott, 1991).
219 Although we did not ~~administer~~ provide a self-esteem questionnaire in this study, comorbid ADHD
220 might exacerbate low self-esteem in the addiction population, including GD patients. Therefore,
221 restoring self-esteem might be essential in the treatment of ~~addiction~~ addicted patients, particularly those
222 with comorbid ADHD.

223 In addition, GD patients with ADHD showed a higher participation rate in GA after their initial
224 consultation compared to those without ADHD. This might be ascribed to novelty-seeking in GD
225 patients with ADHD. Novelty-seeking is a trait that exacerbates the severity of GD (Martinotti et al.,
226 2006) and is observed in both GD (Forbush et al., 2008; Janiri, Martinotti, Dario, Schifano, & Bria,
227 2007; Martinotti et al., 2006) and ADHD (Pinzone et al., 2019). Thus, novelty-seeking could
228 accumulatively aggravate the symptoms in GD with ADHD. However, novelty-seeking of ADHD could
229 also work in a bidirectional manner (Hartmann, 2002). Concerning the participation rate of GA, novelty-
230 seeking seemed to contribute to the high participation rate among GD patients with ADHD, as GA itself
231 could be perceived as being novel to GD patients with ADHD. Therefore, taken together, we
232 recommend leveraging seemingly detrimental characteristics of ADHD to treat GD patients with ADHD.

234 Limitations

235 There are several limitations to this study. First, because we collected data from a single hospital, the
236 results could be influenced by the local medical setting (i.e., a rurally located addiction-specialised
237 hospital). To rule out such an effect, multi-centre studies are needed. Second, all male participants and
238 the limited sample size, especially the number of GD patients with ADHD, might impede the
239 generalizability of the results. Future studies should include female patients and a larger number of
240 participants. ~~Third, while this is the first study to investigate the effect of atomoxetine on GD patients~~

with ADHD, there have as yet been no clinical trials of atomoxetine administered to ADHD patients comorbid with substance use disorders and behavioural addictions due to the exclusion criteria of such clinical trials. Therefore, clinical trials of GD patients with ADHD are needed to verify the effects of atomoxetine. Third, we did not incorporate structured instruments such as structured clinical interviews for pathological gambling (Grant et al., 2004) or the Conners' Adult ADHD Diagnostic Interview for DSM-IV (Epstein et al., 2001) to diagnose GD or ADHD, respectively. Although practical reasons prevented us from including such structured instruments in this study, adopting those instruments would enhance the overall rigour and validity of the research. Despite these limitations, however, this is still the first study to investigate the clinical course together with social backgrounds and clinical characteristics of GD patients with ADHD. Furthermore, we could utilize the DSM-5 criteria to describe comorbid ~~robustly~~ diagnose ADHD by obtaining information concerning ADHD symptoms prior to the age of 12 from the parent(s) of 9 of 11 patients because of the relatively young age of the participants. Finally, because one psychiatrist was the attending psychiatrist for all the patients in this study, there is consistency in the quality and strategy of the treatment.

Conclusions

Among the persons with GD who visited a Japanese psychiatric hospital, 27.5% also showed ADHD symptoms. Although GD patients with ADHD had some disadvantageous clinical characteristics, they exhibited a higher treatment retention rate and a greater participation rate in GA compared to those without ADHD. In clinical settings, comorbid ADHD should be considered among GD patients, and clinicians should bear in mind the positive clinical outcomes of GD patients with ADHD.

Data Availability The data from this study are available ~~on~~ upon request.

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Table 1

Social backgrounds and clinical information among gambling disorder patients existing with/without ADHD

	With ADHD n=11	Without ADHD n=29	P value
Age, Median [25%-75%]	36.0 [28.0-43.0]	35.0 [27.0-43.0]	0.739 ^x
Sex, n (%)			0.521 ^y
Male	11 (100)	27 (93.1)	
Female	0 (0)	2 (6.9)	
Years of education, Median [25%-75%]	12.0 [12.0-12.0]	12.0 [12.0-14.0]	0.072 ^x
Age at first gambling, Median [25%-75%]	19.0 [17.0-20.5] (n = 10)	18.0 [17.0-19.3] (n = 26)	0.401 ^x
Family history of gambling problems, n (%)			0.26 ^y
With family history	0 (0)	4 (13.8)	
Without family history	11 (100)	25 (86.2)	
Rate of employment, n (%)			0.065 ^y
Employed	4 (36.4)	20 (69.0)	
Not employed	7 (63.6)	9 (31.0)	
Rate of marriage, n (%)			0.001 ^{*y}
Married	2 (18.2)	22 (75.9)	
Not married	9 (81.8)	7 (24.1)	
Rate of income independence, n (%)			0.250 ^y
Independent	7 (63.6)	25 (86.2)	
Dependent	4 (36.4)	4 (13.8)	
Rate of comorbidity of autism spectrum disorder (ASD), including ASD tendency, n (%)			0.015 ^{*y}
With comorbidity	4 (36.4)	1 (3.4)	
Without comorbidity	7 (63.6)	28 (96.6)	
Comorbidity rate of alcohol use disorder, n (%)			0.521 ^y
With comorbidity	0 (0)	2 (6.9)	
Without comorbidity	11 (100)	27 (93.1)	
Comorbidity rate of other psychiatric disorders, n (%)			0.479 ^y
With comorbidity	1 (9.1)	1 (3.4)	
Without comorbidity	10 (90.9)	28 (96.6)	
Rate of committing crimes, n(%)			0.126 ^y
Have criminal record	4 (36.4)	4 (13.8)	
No criminal record	7 (63.6)	25 (86.2)	
Amount of debt (Unit; JPY) Median [25%-75%]	1,100,000 [0-6,050,000] (n = 10)	3,000,000 [1,325,000-7,900,000] (n = 28)	0.123 ^x

^x: Mann-Whitney U test. ^y : Fisher's exact test. * : p < 0.05

Table 2

Clinical course of gambling disorder patients with/without ADHD

	With ADHD		Without ADHD		<i>P</i> value
	N	n (%)	N	n (%)	
Treatment retention rate	11		29		0.003*
Continued		10 (90.9)		11 (37.9)	
Interrupted		1 (9.1)		18 (62.1)	
Participation rate in GA	11		28		0.037*
Participation		8 (72.7)		10 (35.7)	
Non-participation		3 (27.3)		18 (64.3)	

Abbreviation. GA: gamblers anonymous

* : $p < 0.05$