Nonmedical use of d-Amphetamines and Methylphenidate in Medical Students

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Objective: The purpose of this study was to determine the prevalence of medical and nonmedical use of prescription attention deficit hyperactive disorder (ADHD) stimulant medication among medical students.

Materials and Methods: An IRB approved 19-question web survey was sent out to all students from a Puerto Rico (PR) medical school to assess use of ADHD medication. Out of the 250 stu-dents consulted there was a response of 152 surveys. Data was cross-referenced and compared with data from other studies.

Results/Discussion: From the results gathered, the study's sample had a higher prevalence of use than the 15% reported in previous studies, reaching 47.4%. Among students who had used these drugs, 89.4% indicated using it without a prescription. 86.8% of all respondents used some form of stimulant or substance in order to cope with the academic workload of medical school, includ-ing coffee, energy drinks, cigarettes, and alcohol. The majority of students (60.5%) considered study techniques workshops and exercise programs to succeed academically.

Conclusion: This study suggests a higher prevalence of ADHD medication use amongst the PR medical student sample compared to findings reported of US medical students, as well as a high prevalence related to nonmedical use as a means for medical students to cope with their training. The nonmedical use of stimulants in the medical school setting remains of utmost public health and clinical concern. The results of this study could help develop proper workshops and non-pharmacological techniques to help medical students cope with their workload. [*P R Health Sci J 2019;38:185-188*]

Key words: Stimulants, Methylphenidate, d-amphetamine, Medical students

The increased use of psychopharmacological drugs to treat individuals with attention and behavior disorders such as attention deficit/hyperactivity disorder (ADHD) has amplified aware-ness of the nonmedical use in academic settings, like medical school, where their use is often seen as a means to enhance academic performance (1). Drugs like methylphenidate (Ritalin), dextro-amphetamine and dextroamphetamine-amphetamine (Adderall) are the most commonly pre-scribed drugs for ADHD in the United States (US) (2). These drugs elicit their effect by stimu-lating the central nervous system to improve cognitive function and to achieve a more enhanced attention level (2).

Medical students endure a range of anxieties throughout their education such as adapting to changing circumstances, managing lifestyle demands, increasing competitiveness, and possibly losing social support (3). The persistent desire to succeed academically places medical students at risk of engaging in hazardous practices in order to cope (2, 4). To achieve such demands, many students resort to abuse of stimulants- particularly amphetamines (5-11). An important factor for the use of stimulants is the belief that these drugs will improve academic performance (7, 8, 12). In one study, among a sample of 144 medical students, the prevalence of stimulant use was 15.0% and 83% of them used them to enhance cognitive performance (6).

Another factor that contributes to the increased nonmedical use of amphetamines among students is accessibility. Students obtain these medications by legal prescription through a diagnosis of ADHD and through diversion, where they are obtained from classmates or by buying them illegally (13). Misuse contributes to increased risk of developing dependence and is of par-ticular concern due to side effects such as psychosis, seizures, cardiovascular events and sudden death (5,15).

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Moreover, healthy individuals consuming prescription drugs with the purpose of performance enhancement are usually unaware of these side effects (5, 16- 18). Despite growing literature on this topic in the US, data among PR medical students remains scarce. The purpose of this study was to determine the prevalence of medical and nonmedical use of prescription ADHD stimulant medication among a population of medical students in Puerto Rico.

Methodology

The study questionnaire was approved by the San Juan Bautista School of Medicine (SJB) Insti-tutional Review Board #14-2016. Data was collected through a 19-question web-based survey via Google sent to SJB medical student's school email. The survey included an informed consent form with a description of intents and purpose where subjects were guaranteed complete confi-dentiality. Responses were not tied to student's individual identifiers and data collected was analyzed as is. The survey was validated with questions as described in the published AMEE Guide (19). No incentives were offered for survey completion. The study population consisted of first through fourth year students enrolled in the SJB Medical Doctor program ages 21-75 years old. The variables quantified via the online survey were the use of methylphenidate (Ritalin), dextroamphetamine and dextroamphetamine-amphetamine (Adderall), whether these drugs were prescribed for the participant, intended purpose of use, frequency of use, side effect awareness, whether the participant feels these drugs work for their intended purpose, alternate recommenda-tions that the participant was willing to consider, age of onset of use, reason for not using among those participants who denied use of these drugs, perceived stress level and workload, use of other substances and demographics.

The data from the survey was statistically analyzed in order to discuss the results. Along with these results, the data was further organized between users and nonusers in terms of their gender, age group, year enrolled, workload and stress level. Statistical analysis was performed with the open source software R version 3.5.2, function used was CrossTable from the package gmodels, Yates correction was used when degree of freedom was one (Warnes, Lumley and Johnson 2018). Individual percentages were used to ascertain overall prevalence of prescribed and non-prescribed use of stimulants. Results were compared to percentages reported in other studies.

Results

From a total of 250 surveys that were emailed, we obtained a response rate of 60.8% (n=152). Table 1 shows the demographics of the sample according to users (%) and non-users (%) of stimulants. There was a significant difference by age group when comparing users to non-users. Table 2 shows the responses of the users regarding the source of the stimulant drugs. 24.3% answered having their own prescription and 15.8% received the stimulant drugs from a friend; 1.3% stated a family member provided them; 3.3% purchased from a friend, 2.0% from an acquaintance.

Table 1. Prevalence of use according to gender, age group, year enrolled, stress and workload among SJB med-ical students. Statistical analysis and expected number (in bold and italics), the sum of the proportion may not sum to 100 because of rounding error.

	User No. (%)	Nonuser No. (%)	Total
Sample Population	72 (47.4)	80 (52.6)	152
Gender			
Male	30 (47.6) 29.4	33 (52.4) 33.6	63
Female	40 (46.0) 40.6	47 (54.0) 46.7	87
		□2 = 0.001, p = 0.97	
Age Group			
Less than 23 years	6 (30.0) 9.4	14 (70.0) 10.6	20
23-26 years	43 (44.8) 45.1	53 (55.2) 50.9	96
27-30 years	18 (75.0) 11.3	6 (25.0) 12.7	24
More than 30 years	4 (36.4) 5.2	7 (63.6) 5.8	11
		□2 = 10.6, p = 0.014	
Year currently enrolled			
1st year	11 (28.2) 18.0	28 (71.8) 21.0	39
2nd year	21 (53.8) 18.0	18 (46.2) 21.0	39
3rd year	21 (56.8) 17.1	16 (43.2) 19.9	37
4th year	15 (46.9) 14.8	17 (53.1) 17.2	32
		□2 = 7.66, p = 0.05	
Workload			
Low	1 (50.0)	1 (50.0)	2
Moderate	18 (46.2) 19.7	21 (53.8) 21.3	39
High	53 (48.6) 52.3	56 (51.4) 56.7	109
	The low and moderate group were amalgamated	□2 = 0.004, p = 0.95	
Stress level			
Low	2 (40.0) 2.4	3 (60.0) 2.6	5
Moderate	32 (44.4) 34.1	40 (55.6) 37.9	72
High	38 (50.7) 35.5	37 (49.3) 39.5	75
		□2 = 0.68, p = 0.71	

Table 2. Source of d-Amphetamines and/or Methylphenidates

Source	*n* out of 152 (%)
Own prescription	37 (24.3)
A friend gives them to me	24 (15.8)
Family member provides them	2 (1.3)
Purchased them from a friend	5 (3.3)
Purchased them from an acquaintance	3 (2.0)

Table 3 presents the responses of the users for their reasons to use stimulant drugs, 60.3% used it to study for medical school examinations or to deal with the workload; another 9.9% for medical reasons; 6.6% used before attending class; 4.6% used due to fear of failure. A clear majority of 87.5% were aware of the side effects with only 12.5% unaware. 29.6% consider the stimulants to be rewarding while 17.8% stated using the drugs are not rewarding. 69.7% con-sidered stimulant drugs to be addictive while 27.6% considered stimulant drugs not to be addictive.

Table 3. Reasons for use of d-Amphetamines and/or Methylphenidates

Reasons	*n* out of 152 (%)
To deal with stress/workload	15 (9.9)
To enhance cognitive abilities	35 (23.0)
To increase productivity	53 (34.9)
For weight loss	0 (0.0)
Fear of failure	7 (4.6)
To study for USMLE	31 (20.4)
To study for NBME CAS exams	38 (25.0)
Before attending class	10 (6.6)
I have never used them	80 (52.6)
It was prescribed to me for medical reasons	15 (9.9)
Prefer not to respond	1 (0.7)

A majority of users (60.5%) preferred study techniques and exercise programs compared to 48.7% who would try relaxation techniques, while 36.8% would try stress management workshops. Also, 26.3% would consider participating in support groups and 17.8% would not consid-er any of the previously mentioned alternatives. For those who had never used stimulant drugs, they reported many contributing factors. 34.2% generally do not use any drugs, 32.9% had a lack of interest, 27.0% feared the known side effects, 21.7% feared damage to physical health and 21.1% feared damage to mental health.

Discussion

This pilot study is a tool to understand what drives students to non-medical use of stimu-lants. Compared to previous studies, our sample had a higher prevalence of use for non-medical reasons. Taking gender in consideration, the majority of users identified as males, which is con-sistent with previous data findings (12). Previous studies have not shown if a correlation exists between increasing age and stimulant use. However, our analysis found a significant difference by age group. Of the various age groups, within the 27-30 age range, 75% were users while the majority of users were aged 23-26 years old. In addition, it would be reasonable to assume that students in first year, who are learning to adapt to these new stresses would show a higher preva-lence. However, when stratifying the users by school year, those in second and third year were the majority of users.

Furthermore, the results demonstrated that workload did not have significant influence on use. An important factor that relates to workload is perceived stress level and these results were consistent with a previous study (1). As the amount of self-reported stress level increased from low to high, an increase is seen in the prevalence of use. Previous studies have shown that the prevalence is influenced by the student's aspiration of achieving higher academic perfor-mance. This is likely related to how a student identifies and chooses to manage their stressors.

Other studies have found that the majority students that are users obtain it without a pre-scription (4,16). In our sample, a marginal majority described their source to be from their own prescription. Other than the use of stimulant drugs to cope, non-medical users were more likely to also report the use of caffeine, alcohol and/or illicit drugs. Ultimately, when presented with alter-natives to stimulant drugs that they would consider, the majority selected study techniques and exercise programs.

This study is limited by potential recall bias among the students who answered the sur-vey. The response rate was below what was obtained in a similar prior study (1). Factors that could contribute to lack of participation were: lack of incentives to participate, method of deliv-ery of survey link, fear of academic reprisal and length of survey. The demographics data collect-ed is representative of an expected typical medical student class. It is reasonable to infer that non-respondents would be comparable in composition. Future studies could recruit a bigger sam-ple size with participation from students enrolled in all medical schools in PR to minimize possi-ble selection bias. A future study could also describe in more detail the use of stimulants in this population. The results could help medical schools develop proper workshops and non-pharmacological techniques to help medical students cope with their workload.

Resumen

Objetivos: Este estudio fue realizado con el propósito de evaluar el uso médico y no-médico de estimulantes típicamente prescritos para el trastorno de déficit de atención e hiperactividad (ADHD) entre estudiantes de medicina. Metodología: Una encuesta aprobada por el IRB de 19 preguntas fue enviada a los estudiantes de medicina de una escuela de medicina de Puerto Rico (PR) por correo electrónico. Un total de 152 de los 250 estudiantes contactados respondieron. La data obtenida fue tabulada y comparada con otros estudios similares realizados fuera de PR. Resultados: Se observó una prevalencia de 47.4% de uso de metanfetaminas entre los estudiantes. Esto representa una diferencia considerable al 15% reportado en estudios similares. Un 89.4% indicó haberlos obtenido sin prescripción. 86.8% mencionó haber utilizado algún tipo de sustan-cia para lidiar con su carga académica, como café, bebidas energizantes, tabaco, o alcohol. 60.5% de los encuestados consideraron otros métodos de acoplamiento tales como talleres de hábitos de estudio e implementación de programas de ejercicio. Conclusiones: Este estudio sugiere una prevalencia mayor de uso de anfetaminas (methylphenida-te y d-amphetamine) por el grupo de estudiantes de medicina encuestados en PR a la reportada por estudios similares en los Estados Unidos. La mayoría de los encuestados utilizaba estas sin receta para acoplarse a su carga académica actual. El uso no médico de estimulantes sigue siendo una preocupación clínica y de salud pública. Los resultados de este estudio resaltan la necesidad de desarrollar estrategias no farmacológicas apropiadas para lidiar con la carga académica.

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