Psychotropic Drug Use in Preschool and Toddler Age Groups: An Evaluation of Hospital Admissions

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ABSTRACT
Objective: This study is aimed to evaluate the frequency of psychotropic drug use in children under age 6, and determine the predictive variables of psychotropic drug use.
Methods: For six months, data of children aged up to 6 admitted to Ankara Child Health and Diseases Hematology Oncology Training and Research Hospital, Child Psychiatry Department was evaluated. Statistical analyses were performed using SPSS version 17 for Windows. A value of p<0.05 was accepted as significant.
Results: Total of 953 children under age 6 were recruited. Mean age was 3.5 years and 67.7% were male. 83.4% of all had at least one psychiatric disorder. The most common diagnosis was communication disorders (33.5%). Comorbid psychiatric disorder was found in 5.9% of all and the most comorbid diagnosis was an oppositional defiant disorder (3.3%). Psychotropic drug use was found in 7.3%. The most commonly used drug was risperidone (4%). Predictors of treatment were found as aged in 4-5 (p=0.002); male gender (p=0.049); anxiety (p<0.001); attention-deficit/ hyperactivity disorder (ADHD) (p<0.001), and pervasive developmental disorder (p<0.001).
Conclusions: Our results could be useful for preferences of clinicians in treatment of children under age 6, and predictions of scientists working on these age groups in pharmaceutical industry. Multi-centered, large clinic-based studies are needed to constitute a systematic approach for psychopharmacological treatment in these age groups.
Keywords: Psychotropic drug use, preschool, toddler

INTRODUCTION
Early childhood psychiatric disorders that cause impairment, reduce quality of life, and increase family burden could continue throughout adulthood in the absence of appropriate interventions (1). Timely identification and treatment of psychiatric conditions during early childhood would also improve social, academic, interpersonal and family functioning (2). It is more difficult to detect psychiatric disorders in childhood compared to adulthood. This difficulty is particularly prominent in early childhood (3). Distinguishing between normal developmental features and symptoms of psychopathologies could be difficult in infants, toddlers and preschoolers (4). Besides, very young children are less likely to be able to report on their own experiences and feelings. Diagnostic classifications of psychopathologies used for psychiatric evaluation are also mostly relied on symptoms seen in adulthood. For these reasons, properly diagnosing psychiatric conditions in these age groups becomes rather challenging (5,6). In recent years, the use of psychotropic medication for the treatment of mental health problems in young children has increased, and drug choices
have changed mostly (7). In other words, defining the prevalence, clinical presentations and treatment options of psychiatric diagnoses in young children are crucially important in terms of helping clinicians understand general trends in these age groups.

There is a very large amount of studies examining the prevalence of psychiatric disorders and treatment preferences in children and adolescents admitted to child psychiatry departments in the literature (8-19). However, there are only a few studies conducted on the use of psychotropic medications in toddlers and preschoolers (2,19,20). The prevalence of and indications for psychotropic medication were determined among preschool children in Medicaid Program from 36 states in USA (21). The cohort study showed that the rate of children received at least one psychotropic drug was 1.19%, and medications for attention-deficit disorder/attention-deficit/hyperactivity disorder treatment were most common, followed by depression or anxiety and psychotic illness or bipolar. The most commonly prescribed medications were found as antidepressants (sertraline), tranquilizers/antipsychotics (risperidone), amphetamine-type stimulants (amphetamine salt combination) and nonamphetamine stimulants (caffeine citrate), respectively (21). Psychotropic medications are used in preschoolers despite limited evidence supporting safety or efficacy. So, the difficulties experienced the in usage of psychotropic agents in young children lead clinicians to study on these age groups (3,20,22-24).

In this study, we aimed to examine demographic features, psychiatric diagnoses, use of psychotropic medications, and predictors of medication use in children under age 6 who presented to the Ankara Pediatric Hematology Oncology Training and Research Hospital, Child Psychiatry Department.

**METHODS**

**Sample**

The medical record of 12,320 children under age 18 admitted to Ankara Pediatric Hematology Oncology Training and Research Hospital, Child Psychiatry Department between June 2013 and December 2013 were reviewed retrospectively. Electronic records of 953 children under age 6 were reached. The proportion of children under age 6 among 12,320 admissions was 7.7% (n=953). Of these whose demographics and clinical data were complete were included in this study. Psychiatric disorders were diagnosed with clinical interview according to DSM-IV-TR criteria by a child psychiatrist.

**Statistical Analysis**

All statistical analyses were performed by using SPSS version 17 for Windows (Statistical Package for Social Sciences, Version 17.0, Chicago: SPSS Inc., 2008) statistical software package. Categorical variables were analyzed with chi-square (χ²) test and Fisher’s exact test. Interval variables were analyzed with t-test. The predictors of psychotropic medication use were analyzed with binary logistic regression analysis. In all evaluations, p<0.05 value was considered statistically significant.

**RESULTS**

Mean age of children under age 6 was 3.5±1.2 (min-max=1-5 years), 67.7% of them (n=645) were male. The children were divided into two groups: toddlers (ages from 1 to 3) and preschoolers (ages from 4 to 5). 53.6% of children (n=511) were preschoolers and in this group there was significantly more males than females (χ²(1)=5.674, p=0.017) (Table 1).

In this study, we aimed to examine demographic features, psychiatric diagnoses, use of psychotropic medications, and predictors of medication use in children under age 6 who presented to the Ankara Pediatric Hematology Oncology Training and Research Hospital, Child Psychiatry Department.
The most frequently recommended psychotropic agent was risperidone (4\%, n=38), followed by fluoxetine (1.8\%, n=17) and hydroxyzine (1.2\%, n=11). Children having either anxiety disorders, ADHD, PDD or MR were treated with medication. 26.7\% of children diagnosed with ADHD (n=27) were treated with risperidone and 3\% of them (n=3) were treated with methylphenidate (MPH). On the other hand, in children with anxiety disorders, 15.2\% of them (n=16) were treated with fluoxetine, followed by 10.5\% of them (n=11) with hydroxyzine and 91 of them (n=1) with sertraline. Risperidone was used in 15.4\% of the children diagnosed with pervasive developmental disorders (PDD) (n=4), and 3.7\% of the children diagnosed with mental retardation (n=7) (Table 2).

Mean age of children who used any psychotropic medication was significantly higher compared to children who did not use (t(98.9)=6.940, p<0.001). Also there was significantly higher proportion of medication use in

### Table 1: Sociodemographic and clinical features of children aged under 6 years old in terms of medication use or not

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total n=953</th>
<th>Medication none n=883</th>
<th>Medication yes n=70</th>
<th>Statistics t or χ²</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)a</td>
<td>3.5 (1.2)</td>
<td>3.5 (1.2)</td>
<td>4.2 (0.7)</td>
<td>6.940</td>
<td>0.000</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>645 (67.7)</td>
<td>595 (67.4)</td>
<td>50 (71.4)</td>
<td>0.485</td>
<td>0.486</td>
</tr>
<tr>
<td>Females</td>
<td>308 (32.3)</td>
<td>288 (32.6)</td>
<td>20 (28.6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age groups, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ages 1-3 (toddler)</td>
<td>442 (46.4)</td>
<td>429 (48.6)</td>
<td>13 (18.6)</td>
<td>23.492</td>
<td>0.000</td>
</tr>
<tr>
<td>Ages 4-5 (preschooler)</td>
<td>511 (53.6)</td>
<td>454 (51.4)</td>
<td>57 (81.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Psychiatric diagnosis, n (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal</td>
<td>158 (16.6)</td>
<td>158 (17.9)</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Communication dis.</td>
<td>319 (33.5)</td>
<td>319 (36.1)</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>MR (IQ≥69)</td>
<td>187 (19.6)</td>
<td>179 (20.3)</td>
<td>8 (11.4)</td>
<td>3.216</td>
<td>0.073</td>
</tr>
<tr>
<td>Anxiety disorders</td>
<td>105 (11.0)</td>
<td>77 (8.7)</td>
<td>28 (40.0)</td>
<td>64.728</td>
<td>0.000</td>
</tr>
<tr>
<td>ADHD</td>
<td>101 (10.6)</td>
<td>71 (8.0)</td>
<td>30 (42.9)</td>
<td>82.977</td>
<td>0.000</td>
</tr>
<tr>
<td>PDD</td>
<td>26 (2.7)</td>
<td>22 (2.5)</td>
<td>4 (5.7)</td>
<td>2.538*</td>
<td>0.117</td>
</tr>
<tr>
<td>BIF (IQ=70-79)</td>
<td>22 (2.3)</td>
<td>22 (2.4)</td>
<td>0</td>
<td>NA</td>
<td></td>
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<tr>
<td>Depressive disorder</td>
<td>13 (1.4)</td>
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<tr>
<td>Enuresis</td>
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<td>8 (0.9)</td>
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<td>NA</td>
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<tr>
<td>Adjustment disorder</td>
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<td>8 (0.9)</td>
<td>0</td>
<td>NA</td>
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<tr>
<td>Sleep disorders</td>
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<td>4 (0.4)</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Tic disorders</td>
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<td>2 (0.2)</td>
<td>0</td>
<td>NA</td>
<td></td>
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<tr>
<td>Comorbidity</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>897 (94.1)</td>
<td>846 (95.8)</td>
<td>51 (72.9)</td>
<td>61.778*</td>
<td>0.000</td>
</tr>
<tr>
<td>Yes</td>
<td>56 (5.9)</td>
<td>37 (4.2)</td>
<td>19 (27.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ODD</td>
<td>31 (3.3)</td>
<td>26 (2.9)</td>
<td>5 (7.1)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>MR (IQ≥69)</td>
<td>7 (0.7)</td>
<td>6 (0.6)</td>
<td>1 (1.4)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Elimination disorders</td>
<td>7 (0.7)</td>
<td>0</td>
<td>7 (10.0)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>ADHD</td>
<td>4 (0.4)</td>
<td>2 (0.2)</td>
<td>2 (2.8)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Conduct disorder-NOS</td>
<td>4 (0.4)</td>
<td>0</td>
<td>4 (5.7)</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Tic disorders</td>
<td>3 (0.3)</td>
<td>3 (0.3)</td>
<td>0</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

* Mean (standard deviation); ** Toddler; ** Preschooler; dis.: Disorder; NA: Not-applicable; BIF: Borderline intellectual functioning; MR: Mental retardation; NOS: Not otherwise specified; ADHD: Attention deficit hyperactivity disorder; PDD: Pervasive developmental disorder; ODD: Oppositional defiant disorder
preschooler group compared to children in toddler group (81.4% vs. 18.6%, respectively, $\chi^2$ (1)=23.492, p<0.001). Children who had psychiatric comorbidity were found to have a significantly higher proportion of medication usage than that of children with no comorbidity (27.1% vs. 4.2%, respectively, $\chi^2$ (1)=61.778, p<0.001) (Table 1).

Since medication usage was significantly related to the variables of age, psychiatric disorder, and comorbidity, a binary logistic regression analysis was carried out and findings revealed that the predictors of psychotropic agent use were the following; aged 4-5 years ($p=0.002 \beta=-1.082 95\%CI (0.173-0.665)$), male sex ($p=0.049 \beta=-0.625 95\%CI (0.288-0.997)$), anxiety disorders [$p<0.001 \beta=-3.622 95\%CI (0.011-0.0.063)$], ADHD [$p<0.001 \beta=-3.206 95\%CI (0.016-0.102)$] and PDD [$p<0.001 \beta=-2.682 95\%CI (0.017-0.271)$] (see Table 3).

**DISCUSSION**

The admission rates of children aged 0-5 years to child psychiatry departments in Turkey were found to range between 21.4% and 32.9% (8,10-12). Harpaz-Rotem and Rosenheck (2004) reported a similar rate in their study conducted in USA (14). In our cross-sectional study, the admission rate was relatively lower than previous studies, suggesting that Turkish parents consider that emotional and behavioral problems in these age groups are due to being younger rather than psychopathology of children. Potential other reasons are that socio-cultural features and/or economical levels of our sample could affect the rate of admissions in these age groups.

Zito et al. (2007) reported the percentage of children aged 1–3 years as 68% in their own study (22). Another study conducted by Fontanella et al. (2014) reported the proportions ranging from 50.2% to 52.1% for children aged 2-3 years (25). Similarly, the rate of 1-3 years old children in our study was found at 46.4%.

Similar to the cohort study of Garfield et al. (2015) (21), male gender was prominent in our sample (67.7%). Other studies conducted in Turkey have varying rates compared to our study in terms of gender. A retrospective study carried out in Ordu province revealed that 55.6% of the sample was male (8). Aras et al. (2007) showed that the rate of male gender in the sample of children aged 1–6 years who presented to the Dokuz Eylul University, Child and Adolescent Psychiatry Department was 72.5% (12). In another study, Akin (2013) pointed out that the...
proportion of male gender among children aged 0–6
years admitted to the Batman State Hospital was 48.3% (9). Our findings were similar with these results for
toddlers and preschoolers. In boys under aged 6 years,
psychiatric disorders could be possible to be more
common and symptomatic, or impair functionality much
more compared to girls aged same years.

In our study, 83.4% of all children had at least one
psychiatric diagnosis. Similarly, in a preschool aged group
(0-6 aged), the rates of having any psychiatric diagnosis
reported as 50.3% and 44.8% in previous studies (8,10).
Another study carried out between 2002 and 2008 in the
USA showed that the rate of psychiatric diagnosis
increased from 9.9% to 14% in a preschool sample (22).
In our study, 13.9% of all children had more than one
psychiatric disorder. Fontanella et al. (2014) reported that
this rate ranged from 0.9% to 1.7% (25). Our study was
conducted in a multi-specialty children hospital that
complicated patients are referred to by physicians in all
around of Turkey. Therefore, participants of the study are
more likely to be impaired. Our rate of having any
psychiatric disorder that was higher than other studies
could be explained by cross-sectional design of our study.

We found that communication disorders, mental
retardation and anxiety disorders were common in
children under age 6. These results are consistent with the
other studies carried out on this field (8-10,14,19,25). In
our sample, the rate of psychotropic medication use was
7.3%. Another study whose sample size of 274,518 reported this rate as 2.3% in the USA (22). An
epidemiological study in Italy showed the rate of
psychotropic medication use in children and adolescents
as 1.7% (26). Similarly, a cohort study conducted in the
USA between 2002 and 2008 in preschoolers revealed
that the rate of psychotropic medication use increased
from 1.7% to 1.9% (21, 25). A study that consisted of
children aged 2-5 years in Thailand between 1994 and
2009 showed that the rate of psychotropic drug use was
1.07% (27). Another study in Turkey pointed out that
20.8% of children aged 0-5 years admitted to the child
psychiatry department had used any psychotropic
medication (19). A study that consisted of 1467 children
under age 6 carried out in Dokuz Eylul University, Child
Psychiatry Department revealed that 6.3% of them were
treated with a psychotropic agent (28). Our findings are
consistent with the other studies conducted in Turkey in
terms of the proportion of medication use but higher
than in the other countries because of our sample's
characteristics. Due to the socio-cultural features and/or
economical levels of our sample, clinicians and parents
seem to prefer psychopharmacological treatments
instead of behavioural therapies. Further studies
consisting of community samples will enlighten to these
findings are needed.

Mean age of children whom we recommended
psychotropic medication use was 4.2±0.7 years (2-5
aged). This result was significantly higher than children
who did not use any medication. Consistently with our
findings, Garfield et al. (2015) reported that psychotropic
medication use increased with age among preschool
children (21).

In our study, mostly prescribed medication agents
were risperidone, fluoxetine, hydroxyzine and
methylphenidate (MPH), respectively. There is a very
large amount of studies pointing out that these
medication agents were commonly used in children under
age 6 (19,24,27). Risperidone is one of the approved
agents for use of children under age 6 by FDA. It is easy to
use in children who cannot swallow any pills due to its
liquid form and a great number of studies showed
risperidone as effective and safe in children with
disruptive behavior disorders, autism-related behavioral
problems, bipolar disorder and acute stress disorder (29-
32). Consequently, it is not surprising that the most
prescribed agent in our sample was risperidone.
Fluoxetine and hydroxyzine were the most preferable
agents to treat children under age 6 with anxiety in our
hospital. There are some case series studies pointing out
that selective serotonin reuptake inhibitors (SSRI) like
fluoxetine, sertraline and escitalopram are effective and
tolerable in preschoolers (33,34). In our study, fluoxetine
was mostly prescribed SSRI due to its liquid form.
Hydroxyzine is one of the antihistaminic agents having
mild sedation effect and lesser side effects compared the
others and it can be used as anxiolytic. It could also be
used in sleep disorders (28). For these reasons, this agent
could often be preferable in children under age 6. Although clinically-significant improvements in PDD symptoms were found in very young children receiving Omega-3-6-9 daily (35), there was no usage of Omega-3-6-9 in children with PDD in our sample.

In contrast to our findings, some studies revealed that amphetamines are mostly used agents in preschoolers in the USA (22,25). Amphetamines which were approved for young children by FDA in the USA are not available in our country. Therefore, we could not use these agents in young children. In addition, there is a large number of convincing reports that methylphenidate is safe and tolerable in preschoolers (36-38). However, all ADHD drugs prescribed for young children are off-label in Turkey.

The predictors of medication use were an age in 4–5 years, male sex, anxiety, attention deficit hyperactivity disorder, and pervasive developmental disorder. Being preshoodler and male were related to increased medication use (21,22,26,27). Fontanella et al. (2014) revealed that being 4 to 5 aged and male in preschoolers between 2002 and 2008, and having ADHD, bipolar disorders, and disruptive behavior disorders were related with medication use (25). Another study conducted in Turkish preschoolers between 1997 and 2002 showed that 73.9% of all children were 4 to 6 aged and 66.3% of them were male. These findings are consistent with our results.

Limitations of our study are the following; its design was cross-sectional and retrospective. Our study focused on only medication use of children under age 6 not complaints of them admitted to the child psychiatry department. Besides, the evaluation of psychotropic drug use based on electronic data is likely to be inefficient. Finally, our findings cannot be generalized to all children under age 6 in the community.

In conclusion; this cross-sectional study examining predictors of receiving psychopharmacologic interventions in children under age 6 has shown that medication use is recommended in case of an age in 4–5 years, male gender, anxiety, ADHD and pervasive developmental disorders. Our results could be useful for preferences of clinicians in the treatment of children under age 6, and the predictions of neuroscientists working on these age groups in pharmaceutical industry. Future multi-centered, large clinic-based studies should focus on trends of treatment in early childhood psychiatric disorders, and constitute a systematic approach for psychopharmacological treatment in these age groups.

**Ethics Committee Approval:** The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation.

**Conflict of Interest:** None declared.

**Financial Disclosure:** None declared.

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