CREATIVE PSYCHOPHARMACOTHERAPY IN CHILD AND ADOLESCENT PSYCHIATRY AND EXPERIENCES FROM BOSNIA AND HERZEGOVINA

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SUMMARY

Introduction: Paediatric psychopharmacology involves the application of psychotropic agents to the treatment of children and adolescents with mental disorders and gathered knowledge from child and adolescent psychiatry (CAP), neurology, paediatrics and pharmacology. Defining elements of this discipline are: the metabolism of drugs is different in children than in adults (pharmacokinetics), the developing brain reacts specifically to the drug (pharmacodynamics), and psychopathology itself is not differentiated yet. To make an overview of specifics in psychopharmacological use in CAP and emphasize some experiences from Bosnia and Herzegovina in that field.

Methods: Through insight in current literature, we presented comprehensive findings and compare it with situation in Bosnia and Herzegovina.

Results: The most common conditions in which psycho pharmaceuticals are used in CAP were attention deficit hyperactivity disorders (ADHD), depressive and bipolar disorder, obsessive compulsive disorder and the treatment of early psychosis. Psycho pharmaceuticals were also used to treat agitated conditions in various causes. We made an overview of psycho pharmaceuticals use in Bosnia and Herzegovina CAP and emphasized the fact that psycho stimulants are not approved for the use yet, although they are mostly prescribed medicament in CAP over the world. That limits us in the effectiveness of the treatment in ADHD and put us in the situations to use other medicaments instead (anxiolytics, antipsychotics, mood stabilizers) which are not approved for that condition.

Conclusion: The use of psycho pharmacotherapy in CAP is justified in cases where it is necessary to reduce the suffering of children and to improve their functionality at the time when cognitive, social and emotional advancement is most pronounced. Further research and clinical monitoring of efficacy and safety in the use of psycho pharmaceuticals in youngsters are necessary.

Key words: psycho pharmacotherapy - child and adolescent psychiatry - Bosnia and Herzegovina

INTRODUCTION

Children and adolescents constitute about one-third of the world’s population. They are a particularly vulnerable group for the onset of mental disorders. Approximately one-half of all mental disorders emerge before 14 years of age and 75% by 25 years. Furthermore, globally, one-quarter of disability-adjusted life years (DALYs) for mental and substance use disorder occurs in youth (Skokauskas et al. 2019).

To make and overview of specifics in psychopharmacological use in CAP and emphasize some experiences from Bosnia and Herzegovina in that field.

CHILD AND ADOLESCENTS’ PSYCHOPHARMACOLOGY

Medications to treat mental conditions have become increasingly used in child and adolescent psychiatry around the world. Pediatric psychopharmacology involves the application of psychotropic agents to the treatment of children and adolescents with mental disorders and gathered knowledge from child and adolescent psychiatry, neurology, pediatrics and pharmacology. The defining elements of this discipline are the developing organism, the metabolism of drugs is different than in an adult person (pharmacokinetics), the developing brain reacts specifically to the drug (pharmacodynamics), and psychopathology itself is not well differentiated yet. Although children are smaller in body size than adults, they have a greater proportion of liver and kidney parenchyma after adjustment for body weight, so they have faster metabolism and elimination of drugs. The phase I oxidative processes are mediated by cytochrome 450 (CYP450) microsomal enzymes, which are concentrated primarily in the liver. The CYP450 system is immature at birth, but its metabolizing capacity increases rapidly, so that by one month of age it is already about 20% of the mature level, which is achieved by three years of age. Because children have
proportionally more liver parenchyma than adults, they have greater weight-adjusted metabolic capacity (Lorberge et al. 2019, Zohar et al. 2018, Kocijan Hercigonja 2002).

Diagnostically statistical manual 5th revision (DSM 5) and International classification of diseases 11th (ICD-11) provide further evidence that categorical diagnosis, while robust and important, also has distinct limits. As the field tries to more fully describe the dimensions of developmental psychopathology, the development of new models and tools for phenotyping will be necessary. Further studies will be necessary to validate these tools and translate them for use as a part of standard clinical practice. Studies using evolving brain imaging technology (e.g., fMRI, MEG, fNIR, and EEG) will provide insights into the systems biology of the brain in health and disease and will create new opportunities for defining functional elements in the brain and their role in developmental psychopathology. Further studies of the genetics (including studies on coding and non-coding regions and on epigenetics and gene expression) of psychopathology will be necessary to elucidate the etiologic understanding of disorders and phenotypes. Of note is growing evidence for the impact of stress and inflammatory processes on the developing brain and emergence of developmental psychopathology, both directly and through an impact on glial and other brain functions (Skokauskas et al. 2019).

A developmental perspective should be a key underpinning of prevention research, providing insights into the pathways, continuities, and changes in normal and pathological processes over the life span (Costello 2016). It will move research away from the notion of a single causal agent and will attempt to examine different and sometimes interacting causal factors as well as identify optimal points for intervention. Given this complexity, it is expected that child and adolescent psychiatry and multiple other disciplines will work together to succeed in comprehensive preventive research trials.

Advocacy around the prevention of psychological trauma is a particularly important focus given that early childhood exposure is likely to affect formative developmental processes in a manner that impairs the foundation of future growth and that may have inter-generational consequences (Hasanović 2021).

The development of the brain in adolescents moves from caudal to the rostral parts of the brain. During late adolescence and early adulthood, neurobiological systems responsible for self-regulation and control undergo a complex maturation. This maturation involves a decrease in prefrontal gray matter related to synaptic pruning, an increase in myelination within the prefrontal cortex, and a proliferation of white matter tracts between cortical and subcortical areas, especially including the prefrontal regions, amygdala, nucleus accumbens, and hippocampus. This normal maturation of neurobiological systems may underlie the decrease in antipsychotic treatment prevalence during late adolescence among youth who do not have enduring cognitive impairments and long-term severe behavioral disorders (Steinberg 2008).

Cerebellum and amygdala are involved in maturation process during adolescence before prefrontal cortex, what increased impulsivity and decrease thoughtfulness in certain age (before the age of 20). It could influence increased risk for suicidal behavior in adolescents treated with antidepressants.

Researches in child and adolescent psychopharmacology are in greater delicacy for clinical application because low regulations are stricter then in adult psychopharmacology, sample size are small, age groups are heterogenous, children are more often placebo reactors, and they have restricted verbal description of their inner state.

A comprehensive diagnostic evaluation and psychosocial formulation is the necessary first step (Figure 1). Patients with psychotic disorders often require pharmacological treatment as a first step to control symptoms and restore functioning. Patients with non-psychotic disorders may often be successfully treated with non-pharmacological interventions first. In child and

![Figure 1. General approach to psychopharmacotherapy in children and adolescents](image-url)
adolescent psycho pharmaceutical treatment we should start with lower doses. Dosage for older than 17 is same as for an adult (Lorberg et al. 2019, Zohar et al. 2018, Kocijan Hercigonja 2002).

Approaching to a child with mental health problems we should always consider detailed medical anamnesis and psychological evaluation, as well as laboratory diagnostics, neuro radiological and neuro physiological examination (Figure 2).

**Diagnostics in child and adolescent psychiatry**

Whole blood tests, C-reactive protein, sedimentation, creatinine, urea, transaminases, bilirubin, ceruloplasmin, CPK (creatine phosphor kinases), urine tests, level of thyroid gland hormones, prolactin, EEG, Mg, Ca, Fe, phosphates, B12 level, folate acid, tests for psychoactive substances use. Additional tests: HIV, hepatitis B and C, pregnancy tests, syphilis. Neuro-radiological and neuro-physiological diagnostics (Figure 2).

**PSYCHOTROPIC MEDICATION IN CHILD AND ADOLESCENT PSYCHIATRY**

**Indication for antipsychotic use in child and adolescent psychiatry:**
- Psychosis (manic, bipolar, SCH),
- Tick (Sy de la Tourett)
- Psychomotor agitation (ASD, ID)
- Difficult behavioural problems

Side effects antipsychotic use in child and adolescent psychiatry:
- Iatrogenic Extra Pyramidal Sy
- Sedation, hypotension
- Metabolic sy
- Weight gain
- Hyperprolactinaemia
- Granulocitopaenia
- Epileptic seizures.

**Indications for anxiolytic use in child and adolescent psychiatry:**
- Acute agitation in adolescence,
- Panic attacks,
- Epileptic seizure
- Mio-relaxation.

**Indications:**
- Major depression
- Obsessive compulsive disorder
- Social anxiety
- Generalised anxiety
- Panic disorder
- Posttraumatic stress disorder
- Eating disorder
- Elective mutism
- Enuresis

**Attention Deficit Hyperactivity Disorder (third line)**

**Side effects:**
- Increased suicidal ideation and suicidal risk
- Gastro intestinal symptoms
- Sexual dysfunctions
- Prolonged QT interval
- Sedation
- Weight gain

**Indications for use of medicines for hyperactivity and attention deficit:**

**Attention deficit Hyperactivity Disorder**

**Side effects:**
- Decrease of appetite and weight loss
- Insomnia
- Irritability and aggression
- Worsening of tick disorder and psychosis
- Headache
- Palpitations

**Those medicines are not registered in Bosnia and Herzegovina**

**Indications:**
- manic, BAP,
- aggression in behavior,
- Encopresis,
- Intellectual deficit with affective and behavioral.

**Side effects:**
- Liver problems,
- agranulocytosis,
- aplastic anemia,
- Polycystic ovaria problems.
Table 1. Antipsychotic use in child and adolescent psychiatry. First generation antipsychotics (conventional)

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Maximal daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low potent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chlorpromazine</td>
<td>6 month</td>
<td>2.5 mg/kg/day divided in two or tree dosage, &lt;5 year – not more than 40 mg/day</td>
<td>40-50 mg</td>
</tr>
<tr>
<td>Levomepromazine</td>
<td>12 years</td>
<td>12.5-50 mg/day, 75-150 mg/day</td>
<td>300 mg</td>
</tr>
<tr>
<td>Promazine</td>
<td>12 years</td>
<td>12.5-100 mg/day, 1 mg/kg</td>
<td></td>
</tr>
<tr>
<td>Tioridazine</td>
<td>2 years</td>
<td></td>
<td>30 mg/day</td>
</tr>
<tr>
<td>Sulpiride</td>
<td>14 years</td>
<td>50-100 mg, tbl; 25 mg/5 mg, syrup (3 mg/kg)</td>
<td>100 mg/day</td>
</tr>
</tbody>
</table>

Table 2. First generation antipsychotics (conventional) in CAP

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Maximal daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>High potency</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Haloperidol</td>
<td>3 years</td>
<td>3-12 y. 0.25-0.5 mg in 2-3 dose PO 6-12 g. 1-3 mg/dozina 4-8 h IM</td>
<td>5 mg</td>
</tr>
<tr>
<td>Pimozide</td>
<td>12 years</td>
<td>0.05-0.2 mg/kg evening (1-2 mg/day)</td>
<td>10 mg/day</td>
</tr>
<tr>
<td>Fluphenazine</td>
<td>16 years</td>
<td>0.5-1.5 mg/day</td>
<td>10 mg/day</td>
</tr>
</tbody>
</table>

Table 3. Second and third generation antipsychotics (atypical) in CAP

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Maximal daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clozapine</td>
<td>16 years</td>
<td>12.5-100 mg</td>
<td>450 mg divided in 2-3 dose/day</td>
</tr>
<tr>
<td>Olanzapin</td>
<td>10 (13) years</td>
<td>2.5-5 mg initial dose 10 mg/day</td>
<td>20 mg/day</td>
</tr>
<tr>
<td>Aripiprazol</td>
<td>6 (10) years</td>
<td>2.5-5 mg initial, 20 mg recommended</td>
<td>30 mg/day</td>
</tr>
<tr>
<td>Amisulprid</td>
<td>(16) 18 years</td>
<td>50 mg-initial, Recommended 400-800 mg/day</td>
<td>1200 mg/day (adults)</td>
</tr>
<tr>
<td>Asenapin</td>
<td>10 years</td>
<td>2.5-5 mg 2x/day SL</td>
<td>10 mg/day</td>
</tr>
<tr>
<td>Risperidone</td>
<td>5 (10) years</td>
<td>&lt;50 kg 0.25-0.5 mg/day &gt;50 kg 0.5-2 mg</td>
<td>2 mg/day, 8 mg/dayadol</td>
</tr>
<tr>
<td>Quetiapine</td>
<td>10 (13) years</td>
<td>25 mg once a day, 400 mg/12 h</td>
<td>600 mg/day</td>
</tr>
<tr>
<td>Ziprasidone</td>
<td>10 years</td>
<td>Initial 20 mg, 80-160 mg/day</td>
<td>160 mg/day</td>
</tr>
</tbody>
</table>

Table 4. The use of anxiolytics in child and adolescent psychiatry

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Maximal daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diazepam</td>
<td>6 months</td>
<td>0.1-0.3 mg/kg</td>
<td>10-15 mg for children</td>
</tr>
<tr>
<td>Lorazepam</td>
<td>12 y Epi status</td>
<td>0.25-6 mg 2-4x day PO or IM</td>
<td>20-30 mg for adolescents</td>
</tr>
<tr>
<td>Clonazepam</td>
<td>Initial dose</td>
<td>0.125 mg for children</td>
<td>0.2 mg/kg for children</td>
</tr>
<tr>
<td></td>
<td>For adolescents 0.5-0.75 mg (minimal age is not determined)</td>
<td>4 mg for adolescents</td>
<td></td>
</tr>
</tbody>
</table>

Table 5. The use of antidepressant in child and adolescent psychiatry

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Maximal daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluoxetine</td>
<td>8 years</td>
<td>10 mg younger than 12, 20 mg older than 12</td>
<td>60 mg</td>
</tr>
<tr>
<td>Fluoxamin</td>
<td>8 years</td>
<td>25 mg</td>
<td>250 mg/day</td>
</tr>
<tr>
<td>Sertralin</td>
<td>6 years</td>
<td>12.5-50 mg</td>
<td>200 mg/day</td>
</tr>
<tr>
<td>Escitalopram</td>
<td>12 years</td>
<td>5 mg younger than 12, 10 mg adolescents.</td>
<td>20 mg/day</td>
</tr>
<tr>
<td>Citalopram</td>
<td>* 10 mg/day increase every 2 weeks 5-10 mg</td>
<td>40 mg/day</td>
<td></td>
</tr>
<tr>
<td>Paroxetine</td>
<td>18 years</td>
<td>10 mg/day</td>
<td>60 mg/day</td>
</tr>
<tr>
<td>Venlafaxin</td>
<td>8 (17) years</td>
<td>18.75 mg-300 mg</td>
<td>300 mg/day</td>
</tr>
<tr>
<td>Mirtazapin</td>
<td>* 7.5-15 mg</td>
<td></td>
<td>45 mg/day</td>
</tr>
<tr>
<td>Bupropion</td>
<td>* 100-150 mg/day in 2 dose</td>
<td></td>
<td>450 mg/day</td>
</tr>
<tr>
<td>Duloxetine</td>
<td>* 30-60 mg/day</td>
<td></td>
<td>60 mg/day</td>
</tr>
</tbody>
</table>

SSRI, +NA, +DA  *- risk for higher suicidal ideation in younger than 25
Table 6. Tricyclic antidepressants

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Maximal daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clomipramin</td>
<td>10 years</td>
<td>25 mg initial, 75-250 mg/day in 2 dose</td>
<td>250 mg/day</td>
</tr>
<tr>
<td>Desipramin</td>
<td>12 years</td>
<td>25 mg, 75-150 mg/day in 2-3 dose</td>
<td>300 mg/day</td>
</tr>
<tr>
<td>Imipramin</td>
<td>6 years</td>
<td>6-12 years 25-50 mg/day, 12-18 years 25-75 mg/day</td>
<td>2.5 mg/kg/day</td>
</tr>
<tr>
<td>Doxepin</td>
<td>12 years</td>
<td>25 mg/day, 75-300 mg/day in 2-3 dose</td>
<td>300 mg/day</td>
</tr>
<tr>
<td>Amitriptilin</td>
<td>12 years</td>
<td>25-50 mg/day</td>
<td>75-150 mg/day</td>
</tr>
</tbody>
</table>

Table 7. Medication treatment in ADHD

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Maximal dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metilphenidat and dexametilphenidat</td>
<td>6 years</td>
<td>0.3-2.0 mg/kg/day Initial 2.5-5 mg</td>
<td>72 mg/day</td>
</tr>
<tr>
<td>Amphetamin and dextroamphetamine</td>
<td>3 years</td>
<td>0.1-1.5 mg/kg/day 5-10 mg/day in 2 dose</td>
<td>30 mg/day</td>
</tr>
<tr>
<td>Atomoxetin</td>
<td>6 years</td>
<td>0.5-1.2 mg/kg/day 40 mg</td>
<td>80 mg/day in the morning</td>
</tr>
<tr>
<td>Clonidin</td>
<td>6 years</td>
<td>0.05 mg/day less than 40.5 kg 0.1 mg/day more than 40.5 kg</td>
<td>0.2 mg/day 3x 0.4 mg/day</td>
</tr>
<tr>
<td>Guanfancin</td>
<td>6 god</td>
<td>0.5 mg/day less than 40.5 kg 0.5 mg/day more than 40.5 kg</td>
<td>2 mg/day 4 mg/day</td>
</tr>
</tbody>
</table>

Table 8. Mood stabilizers in child and adolescent psychiatry

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Age</th>
<th>Dosage</th>
<th>Plasma level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lithijum carbonate</td>
<td>7 years</td>
<td>10 mg/kg/day initial 300-1800 mg/day</td>
<td>0.6-1.2 mmol/l</td>
</tr>
<tr>
<td>Valproat acid</td>
<td>2 years</td>
<td>7.5 mg/kg in 2x younger 12 y (60-120 mg) 300mg/day older than 12 y</td>
<td>50-100 μg/l</td>
</tr>
<tr>
<td>Carbamazepin</td>
<td>4 years</td>
<td>0.5-10 mg/kg (4-10 years) 2x10 0mg, max. 1200 mg/day</td>
<td>4-12 mg/l</td>
</tr>
<tr>
<td>Lamotrigin</td>
<td>2 (12) years</td>
<td>0.15-0.6 mg/kg/d initial 200 mg 1.2-5 mg/kg/d maintaining 400 mg</td>
<td></td>
</tr>
<tr>
<td>Gabapentin</td>
<td>3 years</td>
<td>10-15 mg/kg/day for &lt;12 24-50 mg/kg/day Adolescents 300-2400 mg</td>
<td></td>
</tr>
<tr>
<td>Pregabalin</td>
<td></td>
<td>25-400 mg/day</td>
<td></td>
</tr>
</tbody>
</table>

Table 9. Medicaments for sedation / tranquilizers

<table>
<thead>
<tr>
<th>Medicament</th>
<th>Dosage (mg/kg)</th>
<th>Way of use</th>
<th>Max effect</th>
<th>Duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midazolam</td>
<td>0.1-0.2</td>
<td>i.v., i.m.</td>
<td>10-35 min</td>
<td>45 min</td>
</tr>
<tr>
<td></td>
<td>0.3-0.5</td>
<td>p.o.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diazepam</td>
<td>0.1-0.2</td>
<td>p.o., i.v., i.m.</td>
<td>60-90 min</td>
<td>45 min-18 h</td>
</tr>
<tr>
<td>Chloral-hydrate</td>
<td>20-100</td>
<td>p.o.</td>
<td>60-90 min</td>
<td>4-6 h</td>
</tr>
<tr>
<td>Phenobarbital</td>
<td>5-10</td>
<td>p.o., i.m.</td>
<td>60-90 min</td>
<td>4-6 h</td>
</tr>
</tbody>
</table>

The use of supplements in child and adolescent psychiatry

**Vitamin D**

Plays a dual role as hormone and fat-soluble vitamin, regulating the expression of more than 900 genes. It is important in calcium and phosphorus homeostasis, bone health and various cellular and neuromuscular functions. The vitamin D receptor and vitamin D metabolizing enzymes are expressed in the brain (Eyles et al. 2013). Due to its pleiotropic function vitamin D is also involved in signaling cascades and neurobiological pathways, which may affect mental health. The active metabolite 1.25(OH)2D3 is thought to modulate the differentiation and maturation of dopaminergic neurons and to affect brain serotonin concentrations. Low
vitamin D status is associated with a range of adverse neuropsychiatric outcome. In particular, population based epidemiological and clinical studies showed an association of low 25(OH)-vitamin D serum levels (25(OH)D) with depressed mood, attention Deficit Hyperactivity Disorder (ADHD) or Autism Spectrum Disorders (ASD). The Institute of Medicine (IoM) defines 25(OH)D levels >50 nmol/l (equals 20 ng/ml) as sufficient, whereas levels of 30–50 nmol/l or < 30 nmol/l are classified as at risk for inadequacy or as at risk for deficiency. Recommended dosage depends on age and clinical conditions, wary from 300 IJ - 500 IJ in neonatal age up to 4000 IJ for deficiencies. In treatment of depression in adolescence it is recommended to use 2600 IJ vit D3 for 28 days (Föcker et al. 2018).

**Melatonin**

Melatonin is used in treatment of insomnia, its activity is targeting MT1, MT2 and MT3 receptors in brain. In child and adolescent psychiatry is often use for change of circadian sleep rhythm which is often in patients with autism spectrum disorder. Dosage is 1-12mg, concerning age and weight. It should be avoided to be taken together with benzodiazepine hypnotics (zolpidem, zolpidlon, zalepton) (Jakovljević 2016).

**Herbal supplements**

Melissa officinalis, Humulus lupus, Lavandula officinalis) base the sedative effect on increasing level of inhibitory neurotransmitter GABA. Those substances are often use for anxiety and acute stress reactions in children and sometimes in adolescents, their effect is often as „transitional object“ which's duty is to remind on psychotherapeutical safety of the psychiatrist who recommended it, to comfort and reduce fearful expectations which increase during the separation of parents /caretakers before the sleeping time.

**SOME SPECIFICITIES AND CREATIVITY OF TREATMENT IN CHILD AND ADOLESCENT PSYCHIATRY**

Parents / caregivers are always included in the treatment of the child and adolescent with mental health problems, their relationship is sometimes crucial for the development of pathology and could help in the process of the treatment and recovery. Psychotherapeutical approach to parents/caregivers, without accusation, but with understanding and explanations are necessary. Each parent expect healthy child, their positive narcissist expectations are invested in their child and if something is going unexpected and wrong way, they could feel it as their own failure, or project it in others, looking for a cause accusing themselves or others. Getting parent’s /caregivers awareness that treatment of the child with mental health problems could be long term and demand their cooperation at home, school and other children’s life circumstances is very important for remission and recovery of the child. Comprehensive and sincere parent/patient – doctor relationship is important for reliable psychopharmacological treatment of children, parents are usually very concerned about side effects of medical treatment and delay its application. We should always discuss benefits and potential worries of medical treatment, as well as consider possibilities for reducing suffer and make no harm to child (Olfson et al. 2018, Angold et al. 2000, Delate et al. 2004).

Adolescents should be recognized as representing a special population. On the one hand, the community must respect their developmental rights and movement toward full autonomy; on the other, there must be recognized that their capacities may be limited in some functional areas. Adolescents therefore need a different approach in fostering healthy development and resilience. They should be protected from violence and exploitation, but approaches must take into account their emerging competencies and capacities developing during this period of life.

Adolescence is characterized by marked growth in body size and redistribution of body compartments, differences between sexes become more pronounced. In males, the percentage of total body water increases and that of body fat decreases, while the opposite occurs in females. These changes can produce gender differences in pharmacokinetics (Goodwin et al. 2001).

Early childhood interventions (including those addressing mental health and socio-emotional development) should be integrated into the systems for general healthcare with adequate funding; they can and should be provided as a core element of the larger investment in the health, economic prosperity, and safety of each nation and community (McVoy & Findling 2015).

**THE USE OF ANTIPSYCHOTIC MEDICATION IN CHILD AND ADOLESCENT PSYCHIATRY IN BOSNIA AND HERZEGOVINA**

The child and adolescent psychiatry in Bosnia and Herzegovina (BH) is a branch of psychiatry which is in expansion. Currently, there are 15 child and adolescent psychiatrist in Bosnia and Herzegovina, for the population of 786,461 (22.7% of the whole BH population) under 19 years old. We will give a brief overview of our multi-centric study that we did by retrospective monitoring of the prescribed psychopharmaceuticals on the outpatient and inpatient basis during one calendar year.
SAMPLE AND METHODS

In our research we did retrospective multi-centric study where we wanted to get insight in prescription of antipsychotic in child and adolescent psychiatry practice for inpatient (Sarajevo and Banja Luka) and outpatient (Tuzla and Mostar) settings in four BH Clinical Centers, for a one year period (from November 1st, 2017 to October 31st, 2018). At outpatient units in Tuzla and Mostar there were 1352 psychiatric checkups of youngsters during the observing period (Tuzla 875 and Mostar 477).

RESULTS

Antipsychotics were prescribed in 343 times (25.3%), mostly the second generation of antipsychotics: risperidon (39.6-60.5%), olanzapin (about 22%), aripiprazol (about 9.3-12.3%), quetiapine (10.4%). There were still some prescriptions of first generation antipsychotics: promazine (3.1-12.5%) and haloperidol (3.12-8.3%). Adjuvant therapy combined with antipsychotics were: diazepam (20-40%), sertraline (6.2-14.5%), lamotrigine (about 15%), Valproic acid (10-12.5%), promazine (6.2-21%), fluoxetine (6.2%), hypnotics (6.2-20%).

Antipsychotics were prescribed mostly for acute and other psychotic disorders (18-30%), for intellectual disabilities (about 30%) and autistic spectrum disorders with some specific disturbances (about 15%), and rarely for obsessive compulsive disorder (about 4%), conduct and affective disorders (less than 10%).

At Banja Luka and Sarajevo inpatient units there were hospitalised 278 patients (130 Banja Luka and 148 Sarajevo) in one year period. Antipsychotics were used in treatment of 104 patients (37.3%) – 48 (36.9%) patients in Banja Luka and 56 (37.8%) patients in Sarajevo.

The use of antipsychotics and dosage varies for inpatient treated adolescents: risperidon (1-3 mg), olanzapin (2.5-10 mg), aripiprazol (2.5-15 mg), haloperidol (0.5-4 mg), promazine tbl (12.5-100 mg), flufenazin (0.5-2 mg) and clozapin (12.5-50 mg).

For inpatient minors antipsychotics were used in further conditions: psychotic disorders, conduct disorders, intellectual disabilities with co-morbid psychotic symptoms, psychotic depression, obsessive compulsive disorder, autistic spectrum disorder with psychiatric co-morbidities and anorexia nervosa.

Departments for child and adolescent psychiatry in Tuzla and Mostar do not have specific wards for inpatient treatment, so in the situation when hospitalization is necessary, and parents gave permission for that (previously offered to transport child/adolescent in some of centers where inpatient treatment is available: Sarajevo or Banja Luka), we have to hospitalize youngsters in adult psychiatric departments, what is additionally stressful for them as well as their families. Inpatient treatment of adolescents in adult inpatient units: In Mostar there were 11 and in Tuzla 10 adolescents who were hospitalized in adult psychiatric wards in one year period, their mean age was 17.1 years and about 80% of them were treated with antipsychotics, mostly olanzapine and quetiapine.

PSYCHOTROPIC MEDICATION IN YOUTH- WAYS AND PERSPECTIVES

The use of antipsychotic medication in children and adolescents has increased immensely for a wide range of psychiatric disorders which occur in the age of <18 years. The use of psychotropic medication for children and adolescents should be provided in a holistic way and involve a commitment to the evidence based biopsychosocial perspective, trauma-informed care principles, and system-of-care values and principles. Care that is individualized, family-driven, and youth-guided, with recognition that collaborating with children and families is both an ethical and a pragmatic imperative (Anonymous 2017).

Our research shows certain strengths as well and weakness of Bosnia-Herzegovina child and adolescent psychiatry:

- Departments for child and adolescent psychiatry in Tuzla and Mostar do not have specific wards for inpatient treatment. In the case that hospitalization is necessary, children and adolescents are referred to inpatient psychiatry units in Sarajevo or Banja Luka, what could keep child far from his/her family more than 100 kilometers away.
- If parents refuse to put their child away, and gave their written permission, we have to hospitalize youngsters in adult psychiatric departments.
- Sarajevo and Banja Luka inpatient child and adolescent units do not have indoor /acute wards. Children and adolescents in acute psychiatric state (suicidal, acute psychotic, aggressive...) are often treated in adult closed wards. It is additionally stressful for them and increase a risk for harmful situations.
- In Bosnia and Herzegovina there is a legislative restrictions, it means that there is no permission for prescription of psycho-stimulants for any disturbance, what force us to prescribe other medication for children with ADHD.
- Human resources of experienced child and adolescent psychiatrists are our highest strength. Most of them have additional education in group analysis, cognitive behavioral techniques, EMDR. They put a lot of effort, creativity and love in their work with children, adolescents and their families. Psychotherapy is important part of our activities work, and allied professionals are also included in team work.
Legislative restriction for prescription of psychostimulants in Bosnia and Herzegovina put child and adolescent psychiatrist in the situation to treat minors with ADHD inadequately and to prescribe some other psychotropic medicaments off label (Anonymous 2017)

The prescription of antipsychotics in children and adolescents treated in child and adolescent psychiatric units in Bosnia and Herzegovina were present in about 25% outpatient and about 40% inpatient treated.

It was mostly used for psychotic disturbances, intellectual disabilities with psychotic symptoms and autistic spectrum disorder with behavioral problems.

Mostly prescribed were second generation antipsychotics risperidone and olanzapine, first generation antipsychotics were also used occasionally.

CONCLUSION

The use of antipsychotic medication in children and adolescents has increased immensely for a wide range of psychiatric disorders which occur in the age of <18 years. The prescription of antipsychotics in children and adolescents treated in child and adolescent psychiatric units in Bosnia and Herzegovina were present in about 10% outpatient and about 40% inpatient treated.

It was mostly used for psychotic disturbances, intellectual disabilities with psychotic symptoms and autistic spectrum disorder with behavioural problems.

Mostly prescribed were second generation antipsychotics risperidone and olanzapine, occasionally first generation antipsychotics were also used occasionally.

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Marija Burgić Radmanović: collecting data and analyses of data, participated in revising the manuscript and gave final approval of the version to be submitted. collecting data and literature searches, analyses and interpretation of literature.

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