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## INVOLUNTARY MOVEMENTS IN ADULTS WITH INTELLECTUAL DISABILITY<sup>1</sup>

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### SUMMARY

*Involuntary movements in adults with intellectual disability are not sufficiently researched manifestation. There are numerous causes of the emergence of involuntary movement in this population. This paper deals with some of them, such as the life in an institution and the consumption of certain medications. Aim of the research is to determine percentile representation of involuntary movement manifestation by detecting body parts that are usually covered by these movements, as well the relation between consumption of neuroleptics and institutionalization with the expression of involuntary movements in persons with intellectual disability. Research sample consisted of 66 adults with intellectual disability of both genders, ages 21 to 55 years. For identifying and examining involuntary movements Abnormal Involuntary Movement Scale (AIMS) is used (Abnormal Involuntary Movement Scale; Guy, 1976). Research results have confirmed the existence of involuntary movements with 59,1% of respondents. This percentage of the involuntary movements is detected in the facial area. X<sup>2</sup> test shows that between the groups of patients in which involuntary movements were registered there were no statistically significant differences relating the circumstances of the institutionalized or home conditions. The connection between consumption of neuroleptics and the occurrence of involuntary movements in persons with intellectual disability in this research is confirmed.*

Key words: involuntary movements, adults with intellectual disability, medication, institutionalization

### INTRODUCTION

Dyskinesia (involuntary muscle movements) represents insufficient muscle tone maturity. Synkinetic movements may significantly affect the quality of execution of voluntary motor activity. Axial synkinesisi indicate maturity level and differentiation of axial muscle mass tone. Postural and emotional functions are in syncretic relation which causes somatization of growing emotional tension. They are more pronounced on the dominant tonic tension side, concerning the side where extensibility and swaying are less pronounced (Brinar, 2009). Impulse, placed in the region of the lips, diffuses on to muscles without causing movement of those structures that are mature in tone. As the muscle

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tone maturation in the cranio-caudal and medio-lateral direction occurs, unestablished neuromuscular relations in the small joints of the wrist and metacarpus result in the appearance of movements that are beyond voluntary control (Radojičić, 2011).

Movement disorders are comprised of wide range of difficulties which are described as voluntary and/or involuntary movement disorder (dyskinesia) (Marjanović, Lević, 1997). These disorders may be characterized as lack of spontaneous motor skills and therefore called hypokinetic syndromes. Hyperkinetic syndromes represent a set of specific characteristics of behavior in which there are „movements in surplus“ (dyskinesia). Involuntary movements in the broadest sense can be divided into: hyperkinesia characterized by excess movement and hypokinesia characterized by poverty spontaneous or voluntary motor skills (Pekmezovic et al., 2013). Involuntary hyperkinesias include various types of movements such as tremor, chorea, ballism, dystonia, myoclonus, and tics. Hypokinesia includes manifestations which are mainly based on Parkinson's disease (Brinar, 2009; Radojičić, 2011).

The most complex state, regarding previous elaborations, is the one that involves involuntary movements as part of a more complex disease (Kaufman, 2007). Tremor would be such case. Involuntary movements in this case can occur in the arms, legs, and often tremor of the head, chin and voice are manifested. In the elderly, head tremor is often occurred, or hand tremor, when, for example, holding a cup of coffee. That is so called essential tremor, which is not associated with Parkinson's disease, and most often, erroneously, attributed to it (Brinar, 2009).

Chorea is manifested as meaningless limb movement and as various signs of irritability which includes motor actions and clumsiness. Hands and face are first to be affected by choreic movements in adults, while later on they spread on entire musculature. Meaningless movements are fast, involuntary, uncoordinated. Most often they are expressed in facial muscles, tongue, trunk and remote parts of limbs, sometimes only on the one side. „Spoon shape“ palm is characteristic for chorea, and later on irregular breathing, talk and gait may develop. In the rigid forms of akinesia clinical features corresponds Parkinsonism. It's more common in children, and in adults sooner or later causes intellectual deterioration (Kaufman, 2007).

Ballism is characterized by strong involuntary movements of large amplitude, which most of them resembles to discus throw movement, and primarily muscles of the arms and legs are affected. Pearson involuntarily strikes wall, edges of the bed or any other objects in his/hers vicinity. Sometimes whole body is moving, often hurting itself, fracture of arm or leg can occur. If these movements are manifested only on one side of the body, we are talking about hemiballismus. Most common cause of rapidly developed hemiballismus is a cerebrovascular illness, such as stroke for example (Saloviita, 2000).

Dystonia also falls under involuntary movements: abnormal postures with casual arm, leg or trunk twitching, as well as characteristic one side head tilt (torticollis). Convulsively tightening eyelids (blepharospasm), or hand spasm hand, when writing (graphospasm), are also forms of manifestation of dystonia. It can affect parts of the body, its greater part or the whole body (Radojičić, 2011).

Sudden, brief (such as electric shock) involuntary jerk of an arm or a leg is called myoclonus. It can develop at any age, sometimes as early as childhood. Problems are deteriorating by aging, in terms of frequent occurrence and longer duration. Involuntary

movements of myoclonus may occur unilaterally, but more often affect both sides of the body. Difficulties are deteriorating in the stationary phase, such as sitting, lying down or nap snoozing (Marjanović, Lević, 1997).

The occurrence of tics, is usually related to childhood. However, very often they occur in adulthood. A number of indicators suggest that there is an organic, even a genetic disposition for the occurrence of this condition. Tics change over time, and they may also manifest as vocal sound, or even complex sentences. In adults they are sometimes accompanied by the need for expressing profanities. A person does not need to be aware of them (Begić, 2011).

The manifestation of the difficulties presented in the form of involuntary movements can dramatically change the quality of life of people and lead to significant hardship. Depending on the localization of involuntary movements it is possible that occur functional disturbances in speech may occur, consummation of solid and liquid food, and the closing of the eyelid, or eyelids, which may significantly impair aesthetic, endangers communication, makes the person unhappy, depressed and worried about the outcome of their condition, while self-esteem is being perturbed (Kaufman, 2007). Because of these appearances, those who find themselves in the public may be compromised by the social environment. All this indicates that the involuntary movements are not only medical, but also socio-psychological problem, which both undermines the quality of life of persons in which they are exhibited, regardless of age, gender, occupation, social background and education (Lyketos, Rabins, Lipsey, 2008).

Several studies dealing with the prevalence of involuntary movements in younger and older adult age, came to the following results: involuntary movement was noted in 5% of the cases with typical respondent average age of 29, while in older respondents that percent was significantly higher amounting to 26% (Lyketos, Rabins, Lipsey, 2008; Kaufman, 2007). Thus, in adulthood in subjects of the typical population, involuntary movements become more frequent.

Persons with intellectual disability (ID), according to some authors, are particularly vulnerable in expressing this condition (Brasic et al., 2004). However, there is not much data that would characterize appearance of involuntary movement at mature age, although few studies (Dosen & Day, 2008; Griffiths, Halder, Chaudhry, 2012) emphasized the need to explore these problems.

The occurrence of involuntary movements in patients with ID some authors attribute to undifferentiated postural-motor function of the area of feelings (Dosen & Day, 2008). The possibility remains that in certain number of adults with ID some elements of immaturity of these structures persist throughout life.

The frequency of involuntary movements in adults with ID is greater than that in adult of a typical population. In about 30% of persons with ID the age to 45 registered the presence of involuntary movements. Perceived involuntary movements were mainly focused on the head area (Buono et al., 2012). With aging, in some studies the percentage increases, ranging from 50% to 60% (Janicki & Dalton, 1999). Bearing in mind that a lot of people with ID are placed in specialized institutions, the study authors state that the percentage includes people who are institutionalized and those living in their own homes. The research states that there was no statistically significant difference in expressing involuntary movements of different etiology in patients with

ID who are institutionalized in relation to people with ID who live in their own homes (Janicki & Dalton, 1999).

The differences in the quantity of the manifestation of behavioral problems that occur in adults with ID, according to some studies are even in 30% of cases higher than in those of a typical population. For this reason, the medication therapy in these individuals is often included (Deb, Thomas, Bright, 2001). Drug therapy, among other things, is used as an attempt to mitigate the above problems – both in persons with ID who are institutionalized and with the person of this population who live in their own homes (Soenen, Van Berckelaer-Onnes, Scholte, 2009).

Antipsychotic drugs (also known as neuroleptics) are mostly used in serious psychiatric conditions therapy (behavior reduction) or neurobiological disorders (Ahmed et al., 2000). Besides, newer antipsychotics, achieve improving effect in difficulties with disorders which include attention deficit, hyperactivity and aggressiveness (Djuric-Zdravkovic et al., 2011). These difficulties often follow ID (Đurić-Zdravković, Japundža-Milisavljević, 2009).

Inclusion of antipsychotics for adults with ID are followed by strong controversy. They arise from the lack of research which would support their use in the treatment of behavioral problems, aggressiveness, anxiety, impulsivity, hyperactivity, and so on. One research suggests that 72% of 178 intellectually disabled persons was induced to neuroleptic therapy in an institution. 33% of intellectually disabled has been given aforementioned therapy because of their behavioral problems (Griffiths, Halder, Chaudhry, 2012).

Numerous neuroleptics have various side effects (Ahmed et al., 2000). For this reason their effects should be monitored during whole course of treatment.

One of the most often, potentially most severe side effect is tardive dyskinesia (TD) which is characterized by involuntary movements. It appears after several months after use of these medications (Brasic et al., 2004). These movements usually affect the mouth, lips and tongue, jaw, facial grimace, arms, legs, fingers and toes movement, and even rocking movement of certain body parts. Altogether, these movements sometimes resemble dance and have no rhythm. In rare cases, these difficulties may affect the operation of the respiratory muscles, which can cause breathing difficulties. Sometimes even the movement becomes more difficult. While specific causes for tardive dyskinesia are still unknown, antipsychotics are considered to be the main reason for this disorder. Most persons who develop tardive dyskinesia have mild symptoms, while about 10% develop moderate and severe forms (Kaufman, 2007).

Risk factors that promote development of tardive dyskinesia are: ID, older adult age and use of antipsychotics in the extended period of time (Ruedrich et al., 2005).

Taking into account the aforementioned, it is evident that there are many uncertainties related to manifestations of involuntary movements in adults with ID. In this context, the aim of the research was to determine the percentage of the manifestation of involuntary movements, detecting body parts that are usually covered by involuntary movements, as well as determining the impact of the consumption of medication (neuroleptics) and institutionalization on the expression of involuntary movements in persons with ID. By analyzing possible causes for the appearance of involuntary movements it could be indirectly pointed to the possibility for overcoming problems caused by the presence of these movements in adults with ID.

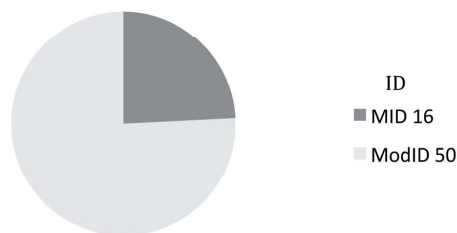
## METHOD

### Sample

The research was conducted on a sample of a 66 subjects of both gender.

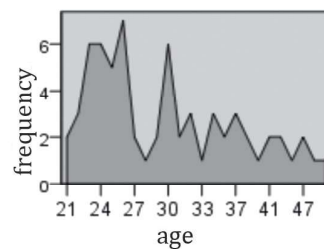
Following criteria was used for selecting subjects: IQ specific for moderate and mild ID (36 to 69), age of minimum 21, given that this is the age limit for exclusion of intellectually disabled persons from primary educational system and that at this age they are being transferred to an institution for adults.

Sample is consisting of 16 (24,2%) respondents who fall into a category of mild ID, 50 of them (75, 8%) have moderate ID. The difference in the number of respondents by intellectual disabled category is statistically significant ( $\chi^2=17,515$ ,  $df=1$ ,  $p=0,000$ ). This imbalance in the number of respondents with mild and moderate ID is typical of all institutions and associations in which the survey was conducted. Adults with moderate ID are generally more involved in the work of specialized organizations, or institutionalized in purposive institutes, while adults with mild ID manage to find a job, staying within their families.



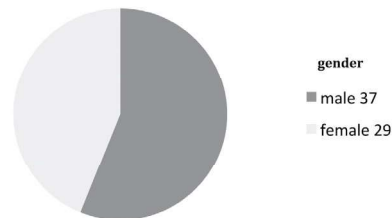
*Chart 1 Distribution of respondents by category of ID*

The age of the sample of this research ranged from 21 to 55 years ( $AS=30,71$ ,  $SD=7,93$ ). In papers with similar research objectives where the sample consisted of subjects typical population much greater range of ages is generally present ( $AS=72,5$ ) (Jeste et al., 2000) & ( $AS=56,7$ ) (Kane, 2004). Specifics of organic difficulties that are typical for people with ID in some cases reduce their life expectancy (Dosen & Day, 2008).



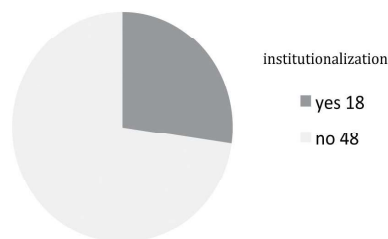
*Chart 2 Distribution of respondents in relation to the age*

The sample was attended by slightly more male respondents, 37 of them (56,1%), compared to those female who were 29 (43,9%).



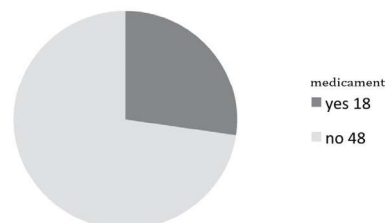
*Chart 3 Distribution of respondents based on gender*

The research sample included 18 (27,3%) of those who were placed in institutions for people with ID and 48 (72,7%) of the respondents who have lived in their homes.



*Chart 4 Distribution of respondents by place of living (home or institution)*

Also, 18 (27,3%) of persons with ID had included medication therapy, while 48 (72,7%) patients had no therapy.



*Chart 5 Distribution of respondents in relation to the medicament consummation*

### ***Instruments and procedure***

If the intention is to examine or to notice the presence of involuntary movements in person with ID, it is suggested their closer examination with the Abnormal Involuntary Movement Scale (AIMS) (*Abnormal Involuntary Movement Scale; Guy, 1976*).

This scale can be reapplied at intervals of three to six months for the purpose of monitoring the involuntary movements of respondents.

The scale consists of 12 items that assess the involuntary movements of different body parts, which are divided into several subscales (facial and oral movements, limb movements, trunk movements, the global assessment of the body and dental status). Five-point scale is graduated values from 0 to 4. The scale is being assessed by the following: 0 – no involuntary movements, 1 – minimal involuntary movements, 2 – presence of



light involuntary movements, 3 – presence of moderate involuntary movements and 4 – severe involuntary movements. Testing should be done individually, when the subject is sitting in a chair that does not have armrests. Respondent should be placed in a position where his feet are placed flat on the ground, legs slightly spread, with his hands on his knees. Respondent must not have any content in the mouth. Two of the twelve items are treating dental care and presence of dentures recording possible dental problems or pain that sometimes can cause involuntary movements. The remaining ten items of the scale are related to body movements. Score of two or more on this scale is evidence that confirms the presence of involuntary movements. It is sufficient that the respondent has a rating of two on the item which marks light involuntary movements, or rating of one on the item which includes moderate involuntary movements, involuntary movements may be diagnosed.

The research was conducted in specialized homes and institutes for intellectually disabled adults, as well as local associations (association for helping the intellectually disabled) in grader area of Belgrade and Novi Sad. Data collection was carried out continuously, without time break, with each respondent individually.

#### ***Data processing***

During statistical processing following statistical methods were applied: arithmetic mean, standard deviation, range of scores, frequencies and percentages, cross-tabulations and  $\chi^2$ -test with Yates's correction for determining the significance of the relationship of the observed non-parametric variables.

### **RESULTS WITH DISCUSSION**

By looking at Table 1, which shows the numeric and percentage representation of involuntary movements manifestation in a sample of adults with ID, it can be seen that even in 59, 1% of respondents is registered involuntary movements in the area of the face. At the same time, involuntary movements of the facial and oral parts of the body are the most common type of involuntary movements that are recorded in the sample of this research. The movements of this body part implies observation of facial expression muscles (movement of the forehead, eyebrows, periorbital area, cheeks – including frowning, squinting, laughing, making grimace), lips and perioral area (shirring, puckering, kissing, smooching), jaw (biting, squeezing, chewing, mouth opening, lateral movements) and tongue (assessing only the movement increase in and out of the mouth, like rapid tongue movement both in and out of the mouth).

Involuntary movements of the extremities were registered in 28,8% of adults with ID. This assessment included an observation of the upper extremities (arms, wrists, hands, fingers) where attention is paid to registering choreic movements (fast, aimless, irregular, spontaneous) and athetoid movements without tremor. Assessment of involuntary limb movements included also lower extremities (legs, knees, ankles, toes) the registration of the lateral (outside) knee movement, stamping feet, standing on the heel, drawing the foot, and inversion (outside) and eversion (inward) feet.

Involuntary trunk movements in a sample of intellectually disabled adults were present in 9 subjects (or 13,9%). In assessing this segment potential involuntary movements of neck, shoulders and hips (e.g., rocking, twisting, squirming, turning the pelvis) were observed.

Global, overall assessment of involuntary movements in adults with ID included the severity of total involuntary movements, disability due to the appearance of involuntary movements, as well as the respondents' awareness of the existence of involuntary movements. A total of 19,7% of the sample was aware that they have severe involuntary movements that often interfere with the performance of everyday activities.

The guidelines for the application of this instrument (Guy, 1976) stated that it is necessary to assess the dental status of the adult respondent with regard that ongoing problems in this area can affect the appearance of involuntary movements. It was found that in the research sample nearly half of respondents (50%) have teeth or denture problems, or that involuntary movements of this body part are provoked by the absence of large number of teeth.

*Table 1 The representation of the manifestation of involuntary movements in adults with ID relative to specified body portion*

		<b>FOM</b>	<b>EM</b>	<b>TM</b>	<b>GA</b>	<b>DS</b>
There are no involuntary movements	n	27	47	57	53	33
	%	40,9	71,2	86,4	80,3	50,0
There are involuntary movements	n	39	19	9	13	33
	%	59,1	28,8	13,9	19,7	50,0

Legend: FOM – facial and oral movements, EM – extremity movement, TM – trunk movement, GA – general, global body assessment, DS – dental status

The data obtained in terms of the percentage of the involuntary movements in adults with ID, as well as marking that movements in a particular part of the body are compatible with the data obtained by the authors in previous studies with similar objectives (Buono et al., 2012; Deb, Thomas, Bright, 2001; Janicki & Dalton, 1999). This research confirmed the more frequent occurrence of involuntary movements in adults with ID, compared to persons of typical population with same age range (Lyketos, Rabins, Lipsey, 2008; Kaufman, 2007).

Table 2 shows the connection between the usage of medications (neuroleptics) and the institutionalization with manifestation of involuntary movements in persons with ID.

*Table 2 Correlation between consumption of medications (neuroleptics) and the institutionalization with the manifestation of involuntary movements in patients with ID*

<b>AIMS</b>			
	$\chi^2$ -test with Yates correction	df	Sig.
Life in institution	1,222	1	2,269
Neuroleptic consumption	4,889	1	<b>0,027</b>

$\chi^2$  test shows that between a group of respondents in which the appearance of involuntary movements is registered there is no statistically significant difference in relation to the time of their life in institutionalized conditions ( $\chi^2 = 1,222$ ,  $df = 1$ ,  $p > 0,05$ ).

This indicates that involuntary movements in adults with ID exist independently from life conditions that are characteristic for the institutionalized or house conditions. They are equally manifested in adults with ID who live in their homes and in persons of this population who are living in institutions. Data obtained in this research are in accordance with the results of the single research available to authors of this study, who examined the correlation of the same variables in adults with ID (Janicki & Dalton, 1999).

The connection between consumption of neuroleptics and the emergence of involuntary movements in patients with ID in this research was confirmed ( $\chi^2=4,889$ ,  $df=1$ ,  $p=0,027$ ). Therefore, it was determined, that consumption of neuroleptics effect the appearance of involuntary movements manifestation in adults with ID. Some of previous research confirmed a statistically significant relationship between specified variables in the population of adults with ID (Ahmed et al., 2000; Griffiths, Halder, Chaudhry, 2012) stating that it is necessary to explore in more detail the actual need for the introduction of neuroleptics in the treatment of these persons. Some papers state the conclusion that the introduction of neuroleptics in the treatment of people with ID is often accompanied by a lack of evidence that confirms that consuming them is necessary and that side effects caused by these medicaments prevent the person to function daily (Kane, 2004).

There are two main types of these medicaments: traditional antipsychotics and newer atypical antipsychotics. The literature states that atypical antipsychotics are slightly more effective in reducing symptoms of agitation, depression, lack of motivation and energy. The primary difference between these two groups are the side effects and symptoms on which they act (Griffiths, Halder, Chaudhry, 2012). In participants of this research have been used medicaments belonging to both groups. Considering that there are evidences of a better performance of the new antipsychotics, the suggestion could relate the consummation of the representatives of this group of drugs, if there is the need for that.

## CONCLUSION

Summarizing the results of this research it can be concluded that the involuntary movements are registered in 59,1% of subjects in facial and oral region of the body. Involuntary movements of the extremities were recorded in 28,8% of adults with ID, while involuntary trunk movements are recorded in 13, 9% of cases. It was confirmed that 19,7% of respondents are aware that there have severe involuntary movements that often interfere in performing everyday activities. Half of the respondents (50%) have problems with their teeth or dentures, or the occurrence of involuntary movements in this part of the body is provoked by the absence of large number of teeth.  $X^2$  test shows that among a group of respondents in which involuntary movements were registered have no statistically significant difference in relation to the circumstances of life in the institution or home. The connection between consumption of neuroleptics and the occurrence of involuntary movements in patients with ID in this research was confirmed.

It would be necessary for adults with ID whose motor skills are immature or not mature enough with an accompanying dyskinesia in their motor activities to organize activities that might contribute to the reduction of the problems caused by involuntary movements (Dosen & Day, 2008).

The emergence of new therapeutic approaches allows control of a certain number of involuntary movements, and their adequate application dictates the timely and adequate detection. It is believed that involuntary movements should be suppressed only when they become pronounced and when they interfere with motor functions and functioning of the person itself (Kaufman, 2007).

Some studies indicate possible improvement of the condition of involuntary movements in adults with ID, while adhering to intensive program of stimulating exercises (Deb, Thomas, Bright, 2001). It is possible to do re-educational exercises where the person is being provided certain aid to perform the required movement in space or a motor activity which he himself cannot perform alone due to the immaturity of neuromuscular structures, or because involuntary movements interference (Serdà I Ferrer, Ortiz-Collado, Avila-Castells, 2013). With this in regard it is possible to apply relaxation exercises, exercises to control impulsivity, exercises to equalize muscle tone and independence of movement, with special emphasis on exercises for differentiation of facial muscle movements because large percentage of involuntary movement manifested in that part of the body in adults with ID. With re-educational exercises it is possible to reduce the excitability of nerve-muscle structures of the central nervous system, to master certain movements with control the emergence of involuntary movements, as long as automatic repetition does not appear. When automatic repetition is strengthened, new model exercises is given to dissolve the old one the previous one, and a new one adopted. In this way, stereotype schematics are broken (Bojanin, 1985).

For improving the state caused by involuntary movements some authors suggest that it is useful to apply therapy with animals (Broadbent, Heimlich, Schiro-Geist, 2003; Krupa, & Zimolag, 2009).

In the treatment of involuntary movements sometimes rhythmic motion games and musical instruments are use, such as drums, cymbals, rattles, horns, etc. It is started with the simplest rhythm, and later on more complex variations are required. Relaxation exercises with classical music are used in research. During one experiment which has been conducted by six months it was found that there was a significant reduction in the number of involuntary movements by including music and rhythmic activity in the daily lives of institutionalized adults with ID (Gentile & Jackson, 2008). With rhythmic swaying of the whole body it is necessary to relax the muscle that is being treated, with no restraining of the existing involuntary movements (O'Hara, 2010).

Difficulties resulting from the emergence of involuntary movements can be alleviated with lifestyle modification, such as, for example, wearing weights on hands to reduce tremor amplitude proportional to the applied weight. The most common activities that help persons with involuntary movements are walking, stretching, cycling or simply raising and lowering the feet (Kaufman, 2007).

When it comes to pharmacological approach, the involuntary movements can be treated with medicaments which mainly only relieves symptoms, including beta-blockers such as propranolol, and calcium channel blockers (Ahmed et al., 2000).

Suggestions for future studies of involuntary movement manifestation could be related to the determination of dominance types of involuntary movements that predominate in adults with ID (tremor, chorea, ballism, dystonia, myoclonus, and tics), because with the more detailed study of these issues it could be possible to influence their maximum reduction, which would lead to raising the quality of life in this population.

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