Obesity and hypertension in adolescents and adults with intellectual disability

Obesidade e hipertensão em adolescentes e adultos com deficiência intelectual

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Abstract

Objective: The aim of this study is to determine the rate of obesity and hypertension in individuals with intellectual disability.
Methods: This study was carried out with the adolescents and adults with intellectual disability in three centres, in Izmir, Turkey. The BMI of the adults were classified according to the Turkey Obesity Prevention and Control Program. The BMIs of the adolescents were evaluated according to the BMI percentile curves for Turkish children. For the evaluation of blood pressure levels of adults, the classification system determined by the Turkish Society of Cardiology was used. Blood pressure diagnosis in adolescents is different from that in adults. In terms of age and gender, systolic and diastolic blood pressures lower than the 90th percentile are considered as normal.
Results: The mean measurements for adults were as follows: height 166 ± 0.1 cm, weight 71.7 ± 1.86 kg, systolic blood pressure 120.8 ± 1.53 mmHg, diastolic blood pressure 74.8 ± 1.35 mmHg, and BMI 25.96 ± 5.98. The mean measurements for adolescents were as follows: BMI 23.02 ± 6.3 systolic blood pressure 117 ± 14.3 mmHg and diastolic pressure 70 ± 13.8 mmHg. 37.3% of adults were of normal weight and 28% were overweight. Analysis of BMI of the adolescents demonstrated that 46.1% were between the 5th and 85th percentiles, 26.3% appeared above the 95th percentile and 18.4% were below the 5th percentile. Of the subjects, 59.8% had an optimal systolic pressure and 77.5% had an optimal diastolic pressure of adults.
Conclusion: The results of this study demonstrate that the rate of obesity and hypertension is high in adolescents and adults with intellectual disabilities and therefore, these individuals are at a serious risk of developing cardiovascular disease.

Resumo

Objetivo: O objetivo deste estudo foi identificar as taxas de obesidade e hipertensão arterial em indivíduos com deficiência intelectual.
Métodos: Este estudo foi realizado com adolescentes e adultos com deficiência intelectual em três centros em Izmir, Turquia. O IMC dos adultos foi determinado de acordo com o Programa de Prevenção e Controle da obesidade da Turquia. O IMC dos adolescentes foi avaliado de acordo com as curvas de percentis de IMC para crianças turcas. Para a avaliação dos níveis de pressão arterial de adultos, foi utilizado o sistema de classificação determinado pela Sociedade Turca de Cardiologia. O diagnóstico da pressão sanguínea em adolescentes é diferente dos adultos. Em termos de idade e sexo, pressões arteriais sistólica e diastólica menores que o percentil 90 são considerados normais.
Resultados: Os valores médios dos adultos foram: altura de 166 ± 0,1 cm, peso de 71,7 ± 1,86 kg, pressão arterial sistólica de 120,8 ± 1,53 mmHg, pressão arterial diastólica de 74,8 ± 1,35 mmHg e IMC de 25,96 ± 5,98. Os valores médios dos adolescentes foram: IMC de 23,02 ± 6,3, pressão arterial sistólica de 117 ± 14,3 mmHg e diastólica de 70 ± 13,8 mmHg. Dentre os adultos, 37,3% estavam com peso normal e 28% estavam acima do peso. A análise do IMC dos adolescentes demonstrou que 46,1% estavam entre o 5ª e 85º percentis, 26,3% encontravam-se acima do percentil 95 e 18,4% estavam abaixo do 5º percentil. Dentre os adultos, 59,8% tinham pressão sistólica ótima e 77,5% tinham pressão diastólica ótima.
Conclusão: Os resultados deste estudo demonstram que as taxas de obesidade e hipertensão é elevada em adolescentes e adultos com deficiência intelectual e, portanto, estes indivíduos encontram-se em sério risco de desenvolver doença cardiovascular

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Introduction

Intellectual disability is a neuro-developmental condition lasting a person's entire life. Studies by the World Health Organisation have determined that individuals with intellectual disabilities have multiple health problems, which have not been adequately addressed by health care services.[1]

Individuals with mental disabilities are known to have higher morbidity and mortality rates. Increased prevalence of diabetes and vascular diseases correlates with the higher morbidity rates. Whilst obesity is an important risk factor for the development of diabetes, abdominal obesity and hypertension (HT) are important risk factors for the metabolic syndrome.[2] Prevention and management of hypertension and obesity in people with intellectual disabilities is essential but more challenging due to difficulty in communication, challenging behaviours, poly-pharmacy, presence of other co-morbid physical and mental health problems (including epilepsy, autism and, motor disabilities). Inadequate health service provision along with a negative attitude towards people with intellectual disabilities further compounds the problem.[1,3]

Obesity

The World Health Organization defines obesity as "abnormal or excessive fat accumulation in the body that presents a risk to health." In recent years, the prevalence of obesity is increasing not only in adults but also in children and adolescents all over the world. Obesity is a major health issue due to its constantly increasing prevalence and its association with morbidity and mortality. Various biological and socio-cultural factors contribute to obesity. These include gender, marital status dietary habits, smoking, inadequate physical activity and alcohol intake. Obesity results in chronic diseases or premature deaths, with a subsequent increase in health care costs. Cardio-vascular diseases, diabetes, hypertension, certain types of cancer and musculoskeletal diseases have all been associated with obesity.[4]

Obesity is the stronger risk factor for premature deaths in disabled individuals.[5] A study of 461 American adolescents found rates of obesity to be up to three times higher in children with Down syndrome when compared to the general population.[6] Another study focussing on adults with Down Syndrome[7] found that 36.8% of the study population were overweight and 36.8% were obese.

Despite the benefits of physical activities, disabled children refrain from participating in these activities, which can account for lower fitness levels and higher obesity rates among them.[8] In Taiwan, 27.4% of 833 disabled adults over the age of 30 were diagnosed with hypertension.[9] In this study, the risk of hypertension increased when associated with a higher BMI, obesity and a larger waist circumference.[9]

A cross-sectional study investigating co-morbidities in intellectually disabled adults demonstrated that 53% of the participants had hypertension, 14% had diabetes and 45% had another metabolic syndrome (45%). Other risk factors for cardiovascular diseases are female gender, increased age, living alone, and preparing one's own meal.[10]

In a study conducted in individuals with intellectual disabilities in Turkey, 44% of the subjects were overweight and obese.[11] There are no other studies investigating the rate of obesity in individuals with intellectual disabilities in Turkey. However, in Turkey, there are many studies conducted on the prevalence of obesity among children, adolescents and adults without disabilities. In one study, the prevalence of being overweight was 10.4% and 12.2% and the prevalence of obesity was 7.9% and 11.3% in rural and urban areas, respectively.[12] Whilst in another study of children and adolescents, 10.6% were overweight and 1.6% were obese.[13] According to the Health Behaviour in School-Aged Children Study (HBSC), 5% of the 15-year-old girls and 14% of the 15-year-old boys were overweight or obese. In a large-scale survey conducted by the Turkish Association for the Study of Obesity, 39.6% of adults were overweight and 29.5% were obese; with a greater number of obese females than that of males.[14]

Hypertension

According to the WHO, "Hypertension is a systolic blood pressure equal to or above 140 mm Hg and/or diastolic blood pressure equal to or above 90 mm Hg".[15] In a study by the Turkish Society of Hypertension and Renal Diseases,[16] the prevalence of HT was 31.8% across the country. It is important to note that an age-standardized analysis showed the prevalence of HT as 11.8% even among those under the age of 30.[15,16]

Hypertension is an important health problem because of the damage it causes to the target organs. Hypertension is an important public health issue as it has a high prevalence in society, and leads to serious complications such as heart failure, kidney failure and stroke. Hypertension is the main risk factor for many health problems which particularly arise during adulthood, and its prevalence in individuals with intellectual disabilities under the age of 50 was 17.4%, and the risk increased with age.[17] In Taiwan, 27.4% of 833 disabled adults over the age of 30 were diagnosed with hypertension.[18] In 30 year-old mentally disabled individuals, the average diastolic blood pressure value was 76.51 ± 12.65 (range = 40-155), the average systolic blood pressure value was 127.39 ± 20.32 (range = 77-221), and the rate of hypertension was 27.4%.[18] The rate of hypertension in adults with intellectual disabilities in Spain was low.[19] The prevalence of HT in childhood is low (1-2%), but increases in parallel with the increase in obesity in healthy children.[20] The prevalence of HT was 1-2% in female adolescents and increased approximately 2-3 times in those individuals who were overweight.[21] Authors[22] reported that the prevalence of prehypertension (13.9%) and hypertension (19.4%) in adolescent girls was high and increased as the BMI increased. The studies conducted on blood pressure of adolescents with intellectual disabilities are not many. Authors[6] found that the risks for hypertension, diabetes and high cholesterol were higher in adolescents with intellectual disabilities than in the general population.

In Turkey, there are a limited number of studies conducted to determine the rate of obesity and HT in adolescents and adults with intellectual disabilities.[11] The main targets in tackling cardiovascular diseases are the elimination of three major risk factors: smoking, obesity, and hypertension. Main strategies in fulfilling these targets are the identification of high-risk individuals in the population, prevention of cardiovascular events, and the protection of low-risk individuals who are likely be potential patients in the future.[15,16] Since obesity and hypertension are modifiable risk factors, early diagnosis and intervention become essential.

The aim of this study is to determine the rate of obesity and hypertension, and the association between blood pressure and antropometric measurements in adolescents and adults with intellectual disability.

Methods

Data Collection / Assessment Tools

Height-Weight Measurement and Calculation of BMI

Obesity and hypertension rates were determined by measuring the height, weight, waist and hip circumference and blood pressure of the individuals with intellectual disability in three centres in İzmir. Adolescents and adults studying in three schools (Karşıyaka Vocational Training School, İzmir Vocational Training Centre, Atatürk Organised Industry Zone Educational Practice School and Vocational Training Centre) comprised the population of this study. Authors decided to include all the students in the study and thus no sample was calculated. The data were collected from state-run schools where, in addition to academic education, vocational training is provided. In this study, adolescents were defined as individuals between the ages of 14 and18, and adults between the ages of 19 and 49. The participants of the study were adolescents and adults who were diagnosed with intel-

lectual disability in hospitals and referred to these special educational institutions by the counselling and research centre. According to the American Association on Intellectual and Developmental Disabilities (2010).

The heights of the individuals were measured without shoes on, in an upright position whilst they looked straight ahead and during inspiration. Weight measurements were taken with a 100-g precision scale and the individuals were asked to wear a lightweight sports outfit. The BMI was calculated using the following formula: weight / height^2 (kg / m^2).[4,23] In line with the WHO's BMI criteria, the BMI of the adults were classified as underweight (<18.5), normal weight (18.5-24.9), overweight (25-29.9), 1st degree obese (30-34.9), 2nd degree obese (35-39.9), and 3rd degree obese (≥ 40).[4] The BMIs of the adolescents were evaluated according to the BMI percentile curves for Turkish children developed[23] by Neyzi et al., and those under the 5th percentile were accepted as underweight, between the 5th and 85th percentiles as normal weight, between the 85th and 95th percentiles as overweight, and at the 95th percentile and above as obese.

Waist-hip circumference measurement

Waist circumferences were measured at the end of a normal expiration. For waist circumference, the narrowest diameter between arch kostarum and processus spina iliaca anterior posterior (superior) was measured by using a tape measure parallel to the ground from the abdomen or by using steel tape after the individual breathes out. Hip circumference was accepted as the widest diameter passing through the gluteus maximus at the back and symphysis pubis antriorly. Over 1.0 for waist/hip ratio for men and over 0.8 for women was evaluated as the indicator of risk for adults.[4] The waist/hip ratio for adolescent subjects was not calculated because we could not find the risk rating criteria regarding waist circumference and waist/hip ratio for adolescents.

Blood Pressure

Blood pressure was measured with an Omron M3® Brand blood pressure measuring device placed on the left arm restin at heart level. External variables likely to affect the blood pressure measurement were checked. The measurements were taken in a quiet nursing room at school. The individual seated with his/her feet flat on the floor rested at least 5-10 minutes. It was ensured that his/her bladder was empty. The average of the three blood pressures taken at five-minute intervals was accepted as the individual's blood pressure. All the measurements were taken by the same researcher. For the evaluation of blood pressure levels of adults, the classification system determined by the WHO was used.[15] A systolic blood pressure equal to or greater than 140 mmHg and / or diastolic blood pressure equal to or greater than 90 mmHg is considered as a hypertensive measure. Blood pressure diagnosis in adolescents is different from that in adults. In terms of age and gender, systolic and diastolic blood pressures lower than the 90th percentile are considered as normal. While systolic blood pressure and / or diastolic blood pressure between the 90th and 95th percentiles are considered as high-normal blood pressure, systolic blood pressure and / or diastolic blood pressure greater than the 95th percentile are considered as hypertension.[20]

All of the measurements were performed by the researchers themselves. In order to eliminate any error in measurement differences that may arise, each measurement was performed by a single researcher. For example, one researcher measured all of the heights, whereas another researcher measured all of the hip circumferences. Before the measurements were taken, individuals with intellectual disabilities were provided with information regarding the process and then their informed consent was obtained. In order to resolve any anxiety, measurements were first performed on the trainers, and then on the individuals with intellectual disabilities. Measurements were conducted in a suitable room, and necessary precautions were taken to protect privacy. In order to avoid white coat hypertension, the researchers did not wear white coats or uniforms during the measurements.

In this study, descriptive statistics, numbers and percentages, chi-square and correlation analysis were used. In order to carry out the study, Izmir Katip Çelebi University Ethics Committee's permission and written informed consents of adolescents and adults and their families were obtained. The development of this study met Turkish standards of ethics in research involving human subjects.

This research is presented at the Fourth International IASSID Europe Regional Congress and it published as an abstract Journal of Applied Research in Intellectual Disabilities.

The study was registered at the Izmir Ethics Committee Katip Celebi University, Health Science Faculty decision no. 98 on 12.10.2012.

Results

Of the adolescents and adults participating in the study, 234 (67.4%) were male and 113 (32.6%) were female. The mean age was 24.01 (SD: 7.6, Min: 14-Max: 49). All subjects either had mild or moderate intellectual disabilities. The mean measurements for adults were: height 166 ± 0.1 cm (128 cm-200 cm), weight 71.7 ± 1.86 kg (38 kg-144 kg), waist circumference 89.1 ± 1.5 cm (60 cm-135 cm), hip circumference 100 ± 1.26 cm (50 cm-141 cm), systolic blood pressure 120.8 ± 1.53 mmHg (80 mmHg-175 mmHg), diastolic blood pressure 74.8 ± 1.35 mmHg (10 cmHg-148 mmHg), and BMI 25.96 ± 5.98 (14.36-45.31). The mean measurements for adolescents were : height 166.3 ± 11.4 cm (140-196 cm), weight 65.4 ± 18.1 kg (35 kg-115 kg), waist circumference 81 ± 16.9 cm (61 cm-173 cm), hip circumference 94.5 ± 14.2 cm (64 cm-144 cm), BMI 23.02 ± 6.3 (15.2-45.9) systolic blood pressure 117 ± 14.3 mmHg (90 mmHg-160 mmHg) and diastolic pressure 70 ± 13.8 mmHg (34 mmHg-130 mmHg).

As shown in table 1, 37.3% of the adults were of normal weight and 28% were overweight. The analysis of BMI of the adolescents demonstrated that 26.3% appeared above the 95th percentile (Table 1). According to the waist / hip ratio analysis, 54.5% of the females and 48.6% of males were in the at-risk group (Table 2).

Table 1. Body Mass Index of adults and adolescents

Degree	n(%)
Adults*	
Underweight (<18.5)	29(10.7)
Normal (18.5-24.9)	101(37.3)
Overweight (25-29.9)	76(28.0)
1st degree obesity (30-34.9)	43(15.9)
2nd degree obesity (35-39.9)	16(5.9)
3rd degree obesity (≥40	6(2.2)
Total	271(100)
Adolescents**	
Under the 5 percentile	14(18.4)
5-85 percentile	35(46.1)
85-95 percentile	7(9.2)
Above the 95 percentile	20(26.3)
Total	76(100)

*Classified according to WHO criteria (2000);[4] **Classified according to "Weight, height, head circumference and body mass index references for Turkish children" (2008)[23]

Table 2. Waist measurements and Waist/Hip ratio of adults*

Female	WAIST n(%)	Male	n(%)
Normal (<80 cm)	30(34.1)	Normal (<94 cm)	108(59.0)
Risk (80-87 cm)	20(22.7)	Risk (94-101 cm)	26(14.2)
High risk (≥ 88 cm)	38 (43.2)	High Risk (≥102 cm)	49(26.8)
Total	88 (100)	Total	183(100)
Female	**WAIST/HIP RATIO n(%)**	**Male**	**n(%)**
Normal (≤0.8)	40(45.5)	Normal (≤0.9)	94(51.4)
Risk (≥0.8)	48(54.5)	Risk (>0.9)	89(48.6)
Total	88(100)	Total	183(100)

*Classified according to WHO criteria (2000)[4]

The obesity rate was higher in the females (27.3%) than in the males (22.4%), and the rate of the overweight was higher in males (29%) than in females (26.1%); however, the differences were not statistically significant (p> 0.05) (Table 3). The rate of the adolescents with a BMI above the 95th percentile was 36% for females and 21.6% for males; however, the difference was not statistically significant (χ^2 = 4.84, p> 0.05).

Table 3. Adults and adolescents body mass ındex toward gender

Degree	Female n(%)	Male n(%)
Adults (n=271)		
Underweight <18.5	7(8.0)	22(12.0)
Normal 18.5-24.9	34(38.6)	67(36.6)
Overweight 25-29.9	23(26.1)	53(29.0)
Obesity	24(27.3)	41(22.4)
Total	88(100)	183(100)
Pearson chi-square	χ^2= 1.740	p>0.05
Adolescents (n=76)		
Under the 5th percentile	5(20.0)	9(17.6)
Between the 5th and 85th percentile	11(44.0)	24(47.1)
Between the 85th and 95th percentile	0(0)	7(13.7)
Above the 95 percentile	9(36.0)	11(21.6)
Total	25(100)	51(100)
Pearson chi-square	χ^2= 4.84	p>0.05

According to table 4, 59.8% of subjects had an optimal systolic pressure and 77.5% of them had an optimal diastolic pressure. Stage 3 hypertension was not observed in systolic blood pressure measurements, but was observed in 2.2% of the diastolic blood pressure measurements. The systolic blood pressure values were higher in stage 1 and 2 hypertension (21.1%), while diastolic blood pressure values were higher in prehypertension (23.7%).

Table 4. Blood pressure of adults and adolescents

Degree*	Systolic n(%)	Diastolic n(%)
Adults		
Optimal		
(Systolic: <120 mmHg)	162(59.8)	210(77.5)
(Diastolic: <80 mmHg)		
Normal		
(Systolic: <130 mmHg)	35(12.9)	9(3.3)
(Diastolic: <85 mmHg)		
Over-Normal		
(Systolic: 130-139 mmHg)	38(14.0)	21(7.7)
(Diastolic: 85-89 mmHg)		
Stage 1 Hypertension		
(Systolic: 140-159 mmHg)	29(10.7)	20(7.4)
(Diastolic: 90-99 mmHg)		
Stage 2 Hypertension		
(Systolic: 160-179 mmHg)	7(2.6)	5(1.8)
(Diastolic: 100-109 mmHg)		
Stage 3 Hypertension		
(≥180- ≥110)	0(0)	6(2.2)
Adolescents		
Normal	47(61.8)	48(63.2)
Prehypertension	13(17.1)	18(23.7)
Stage 1 hypertension	11(14.5)	5(6.6)
Stage 2 hypertension	5(6.6)	5(6.6)

*Classified according to WHO, (2013);[15](When evaluated in terms of age and gender, systolic and diastolic blood pressures below the 90th percentile were considered as normal, between the 90th and 95th percentiles as prehypertension, and over the 95th percentile as hypertension)

According to the systolic blood pressure classification, adult males participating in the study had worse hypertension (χ^2: 20.86, p = 0.000). While diastolic blood pressure values were higher in stage 1-2 hypertension in adolescent females, they were higher both in prehypertension and stage 1-2 hypertension in adolescent males. However, blood pressure values did not differ both in adolescents and adults by gender (p> 0.05) (Table 5).

In adults, a significant association was determined between the systolic blood pressure values and diastolic blood pressure values (R = 0.54), BMI (R = 0.27), waist circumference (R = 0.32) and, waist/hip ratio (R = 0.39) (p = 0.000). The association between diastolic blood pressure values and BMI (R = 0.18), waist circumference (R = 0.18), waist/hip ratio (R = 0.19) was also significant (p <0.05). There was a significant relationship between BMI and waist circumference (R = 0.83) and waist /hip ratio (R = 0.41) (p = 0.000).

Table 5. Blood pressure of adults and adolescents toward gender*

Degree	Female n(%)	Male n(%)
Adults		
Systolic pressure**		
Optimal	69(78.4)	93(50.8)
Normal	8(9.1)	27(14.8)
Over-normal	8(9.1)	30(16.4)
Hypertension	3(3.4)	33(18.0)
Diastolic pressure***		
Optimal	74(84.1)	136(74.3)
Normal	2(2.3)	7(3.8)
Over-normal	5(5.7)	16(8.7)
Hypertension	7(8.0)	24(13.1)
Systolic pressure		
Adolescents		
Normal	17(68.0)	30(58.8)
Prehypertension	4(16.0)	9(17.6)
Stage 1-2	4(16.0)	12(21.1)
Diastolic pressure		
Normal	14(15.8)	34(32.2)
Prehypertension	6(24.0)	12(23.5)
Stage 1-2	5(20.0)	5(9.8)

*Column percentage; **Pearson Chi Square: 20.869, p=0.000; *** Pearson Chi Square: 3.266, p>0.05

In adolescents, an association was determined between BMI and systolic blood pressure (R: 0.23, p<0.05), BMI and diastolic blood pressure (R: 0.28 (p<0.05), BMI and waist circumference (R: 0.64, p=0.000), BMI and hip circumference (R: 0.90 p=0.000), systolic blood pressure and diastolic blood pressure (R: 0.40, p=0.000), systolic blood pressure and waist circumference (R: 0.26, p<0.05), systolic blood pressure and hip circumference (R: 0.26, p<0.05), diastolic blood pressure and waist circumference (R: 0.30, p<0.05), diastolic blood pressure and hip circumference (R: 0.28, p<0.05), and waist circumference and hip circumference (R: 0.60, p=0.000).

Discussion

In this study conducted to determine the rate of obesity and HT in individuals with intellectual disabilities, we evaluated the measurements of

347 people. We found that 52% of the adult participants and 35.5% of the adolescent participants were either overweight or obese. Additionally, 65.9% of the female adult participants and 41% of the male adult participants were in the at-risk or high-risk groups according to their waist circumference measurements. According to their waist/hip ratio, 54.5% of the adult female participants and 48.6% of the adult male participants were in the at-risk group. Obesity is reported to be high in the general population in Turkey Obesity Prevention and Control Program 2010.[24] Obesity is high in the general population; however, many studies have determined that the prevalence of obesity in individuals with intellectual disabilities is higher than those in the general population.[6,8] Authors[25] reported that the obesity risk in adults with intellectual disabilities increased 1.8 times more than it did in general population. Obesity is a condition that must be prevented or corrected, due to the serious complications it can lead to; however, it is difficult to prevent or correct obesity in individuals with intellectual disabilities. Research highlights that serious nutritional problems suffered during childhood increase risk of obesity (malnutrition, inadequate fruit and vegetable consumption, excessive food consumption, consumption of high calorie foods in order to award or draw attention to another direction) and a sedentary lifestyle with increasing age (motor disability, lack of leisure-time activities).[8] Efforts to prevent and correct obesity will only be successful if they are applied to the entire population. To prevent and correct obesity in individuals with intellectual disabilities, extensive studies aiming to look into the regulation of their living conditions should be performed.

We found that the obesity rate was higher in adult females compared to adult males whereas the number of those classified as overweight was higher in adult males than in adult females. When BMI distribution in adolescents was analysed in terms of gender, we found that the number of females above the 95th percentile was higher than that of males, which correlates to a study by Hsieh et. al.[26] in which the obesity risk was higher in adult females. In another study, the BMI of women had greater variance than that of men.[7] In a study, obesity rate was two or three times higher in children with Down syndrome when compared to the general population. However, no differences were noted between genders when BMI were analysed. Stewart et al.[27] compared adolescents having intellectual disabilities with the general population and found a higher prevalence of obesity in those with intellectual disabilities, but they did not find any significant differences between males and females with intellectual disabilities in terms of obesity.

According to their systolic blood pressure values, 13.3% of the adults were hypertensive, and according to their diastolic blood pressure values, 11.4% of the adults were hypertensive. When analysing systolic blood pressure values, the adult males that participated in the study were more hypertensive than were the adult females. While the HT prevalence in young people with mental disabilities was 17.4% in a study conducted in the Netherlands[6] and 11.7% in a study conducted in Taiwan,[9] the prevalence increased up to 53% in elderly Dutch individuals with mental retardation according to the another study.[6] In Taiwan, 27.4% of 833 disabled adults (30 years of age or over) had been diagnosed with hypertension.[9] It is noteworthy that the diastolic blood pressure was more elevated than that of the systolic blood pressure, which is important in terms of the size of the risk. The presence of high diastolic blood pressure is of more importance in young people. With age, diastolic blood pressure decreases, while systolic blood pressure increases (generally, before the age of 50, diastolic blood pressure is higher and, after the age of 50, systolic blood pressure is higher).

According to our results, the vast majority of adolescents had normal blood pressure. Of the adolescents, 21.1% had stage 1-2 systolic blood pressure values, and 13.2% had stage 1-2 diastolic blood pressure values. However, their pre-hypertension rates were also high. There are a limited number of studies conducted regarding the blood pressure of adolescents with intellectual disabilities. Authors[6] determined that risks for hypertension, diabetes and high cholesterol were higher in adolescents with intellectual disabilities when compared to the

general population. In general-population studies, Oberzanek et al.[21] found the prevalence of HT in adolescent girls as 1-2%, whereas Raffaf, Gargari, & Safaiyan[22] found higher prehypertension (13.9%) and HT (19.4%) prevalence in adolescent girls.

According to our findings, there was a significant correlation between the adults' systolic blood pressure and diastolic blood pressure values and their BMI, waist circumference and waist/hip ratio. Similarly, there was an association between BMI and systolic blood pressure and diastolic blood pressure, waist circumference and hip circumference values in adolescents. In Taiwan, 27.4% of 833 disabled adults (30 years of age or over) had been diagnosed with hypertension.[18] Raised BMI (2.5 times more) or obesity (6.7 times more), and waist circumference (1.6 times more) were determined to be risk factors for hypertension.[18]

This study has several limitations. First of all, only state-owned institutions and one foundation center were included in the study. So these findings do reflect individuals' results only who received services, do not reflect individuals who did not receive any services. Additionally, considering that individuals who did not exhibit a compatible behaviour were excluded from the study to ensure correct measurements.

Conclusion

Hypertension and obesity are two important risk factors for cardiovascular diseases in Turkey and throughout the world. The results of this study demonstrate that the rate of obesity and hypertension is high in adolescents and adults with intellectual disabilities and therefore, these individuals are at a serious risk of developing cardiovascular diseases. Thus, future studies aiming to explore methods to prevent obesity and hypertension should give priority to individuals with intellectual disabilities. Nurses can provide training regarding a healthy diet and activity for individuals with intellectual disabilities and can regularly monitor their heights, weights and blood pressures from childhood.

Collaborations

Sarı HY, Yılmaz M, Serin E, Kısa SS, Yesiltepe Ö, Tokem Y and Rowley H contributed to the design of the study, analyzed and interpreted data. They were also responsible to draft the paper, critical review and final approval of proofs.

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